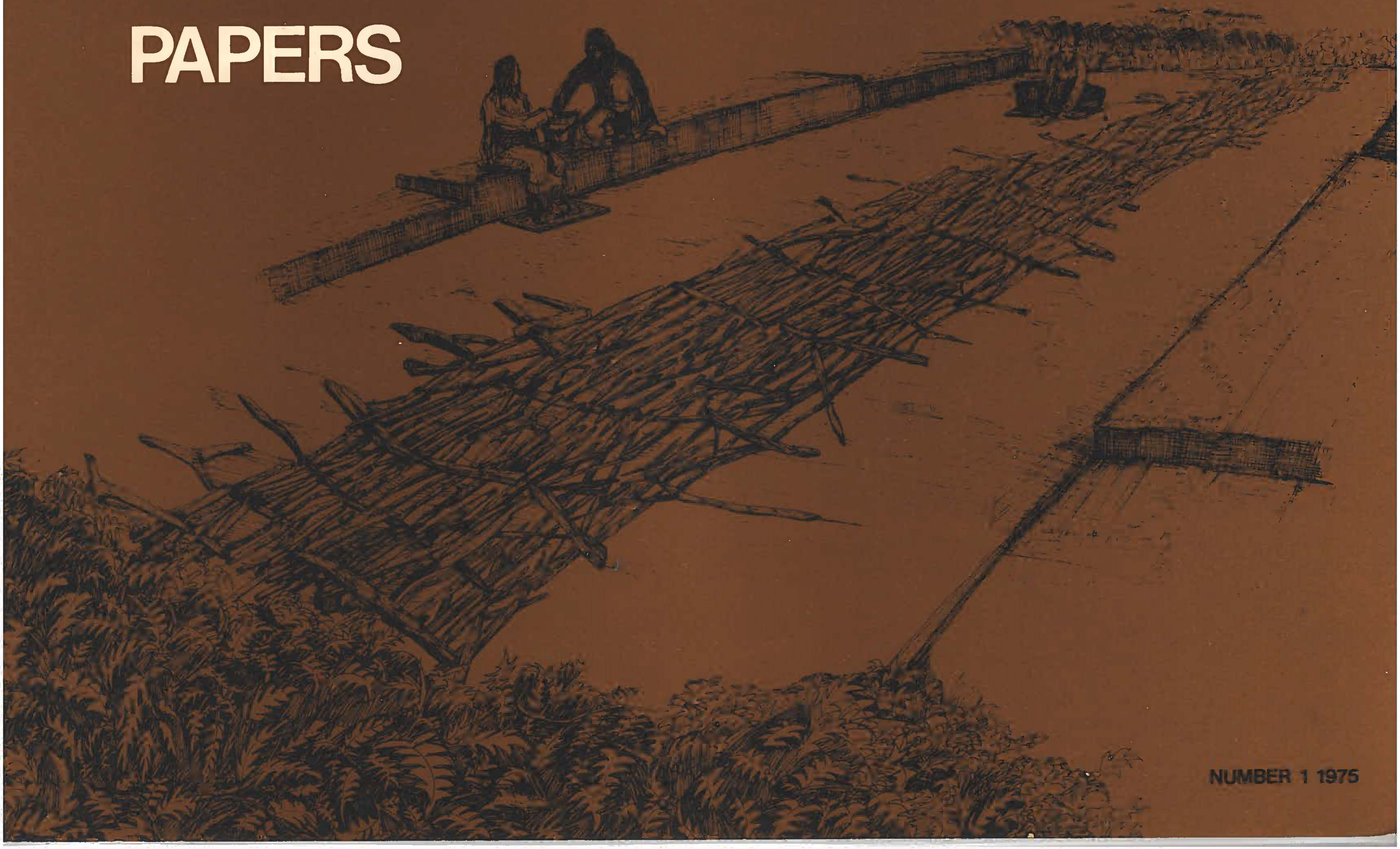
SOMERSET LEVELS PAPERS



NUMBER 1 1975

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SOMERSET LEVELS PROJECT

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ARCHAEOLOGY IN THE SOMERSET LEVELS

by J. M. COLES

The Somerset Levels consist of an area of low-lying land between the Quantock Hills and the Mendips. The area is not uniformly low, as there are numerous islands and ridges that divide the Levels into a series of smaller regions. Archaeology in the Levels has been concentrated upon the major northern region, between the line of the Polden Hills and the Wedmore ridge, the latter close to the main Mendip chain. The reasons for this concentration of archaeological effort in the northern region are several. Since the later nineteenth century the existence of the famous 'lake village' of Glastonbury has attracted interest to this area, and this has been maintained by the subsequent work at the 'lake village' of Meare. No such settlements are known from other parts of the Levels. In addition, the northern region is undergoing extensive exploitation by commercial peat companies, whose activities allied to those of the river authorities, have succeeded in cutting what are in effect enormously long trenches across the entire area, both north–south and east–west. The archaeological possibilities for these sections are self-apparent. In other parts of the Levels such peat activities are minimal or non-existent at the present. Finally, through this activity in the northern region, many prehistoric wood structures, particularly trackways, have been recorded by antiquarians and archaeologists since the mid-nineteenth century, and interest in these has gradually increased up to the present day. Little record exists for the presence of such structures in other parts of the Levels, although it must be a strong possibility that some remains still exist elsewhere, masked however by peat.

The area of archaeological interest, therefore, is in the northern part of the Levels, between the Lias and limestone Polden Hills and the Wedmore ridge (map, fig. 1). Between these major outcrops are not only the peats of the Levels, but also various islands of rock (Westhay, Meare, Godney) and sand (Burtle, and other smaller areas). These islands would have served as dry refuges in an otherwise marshy environment, or as favourable areas for cultivation, particularly the Burtle sands, and the structural remains in the peat indicate a demand on the part of prehistoric man to exploit both these islands and the marshlands surrounding them.

The map shows the precise area under archaeological investigation, measuring 14 × 5 km. The Levels here consist of stratified peats resting upon a more or less uniformly-level marine clay. The precise geological sequence in the area, the recognition of lower peats beneath the clay, and the features of the basal rock, are outside the immediate archaeological province, but mention of these is made in F. A. Hibbert's description of the geology and palaeobotany elsewhere in these *Papers*.

The sequence of peat deposits begins about 3500 bc, with the transition from marine transgression waters to freshwater conditions, which allowed the colonisation of the area by plants, particularly the common reed *Phragmites*. Thereafter a generalised series of vegetational zones in the Levels began to develop, from a reed swamp, through a fen-woodland, to *Sphagnum*-based raised bog, which ended in about 400 A.D. with the decline of precipitation. Throughout this period of 4000 years, man was present in the area, exploiting both dry uplands and wet marshlands, and traces of his activities occur at differing levels in the peats. Many remain to be discovered by commercial peat-cutting, and by archaeology, but already there is a wealth of data about the prehistoric occupation, and a steady stream of information is emerging from continued activities.

These activities are almost entirely carried out by peat companies, although the former Somerset River Authority in its major drainage operations was responsible for a number of important discoveries. The extraction of peat, however, is by far the most important agency for discoveries today. Peat over a large area of the Levels has been removed, and current extraction rates are higher than ever. The methods of cutting can vary, but most of the work today is done by machines that cut, lift and stack the blocks (mumps) of peat in a rapid single operation; hand-cutting, which yielded in the past many archaeological finds, has more or less disappeared except at field edges where the machines cannot operate. The process employed begins with clearance of trees, and draining of the land by ditch and pump; thereafter machine-cutting takes place, the cuts parallel to one another and generally from 5 to 15 m apart. Each cut is 80 cm wide, and nearly 1 m deep. The two faces or sections of each cut are called heads, generally numbered consecutively across a field; several examples of field cuts are shown in these papers (fig. 14) and one of these shows the numbered heads (fig. 22). The intact zone of peat between each cut allows the machines and lifting trucks to operate.

The mumps are dried, turned by hand for more drying, then lifted and transported by wagon or miniature train to the factory where they are broken up, sifted, dried and mixed for bagging. Thereafter the bags are available for sale as garden fertilisers. When the mumps have been removed from the field, more cutting can take place with the removal of a further 80 cm of peat from the existing heads, on both sides of each unit. The heads therefore move outwards from their original cut. As the heads are cut back, the top soil and vegetated peat surfaces are scraped, and this material is dropped into the original cut so that the field gradually is partly refilled. In due time this consolidates, so the machines can operate upon a built-up layer and eventually make the final cut that link the heads; the field has then been completely cut over once, and the topmost 1 m of peat has gone. The fill can then be scraped off and a lower cut begun. In this way a field may have one, two or more cuts, over a period of many years, and its surface will be lowered by anything up to 3 m or more. As the peat in part of the Levels was once 8 m thick, and now stands at less than 2 m thick, the extent of peat-cutting can be appreciated. Not all of this, however, is due entirely to peat extraction, as consistent drainage over the years has caused some areas to shrink. Nonetheless, the landscape is at present being lowered over considerable areas, and although much peat remains undisturbed, quantities have already been removed.

Through these operations, many archaeological remains have been discovered both by hand-cutters and by machines. The tradition of joint archaeological interest and assistance by peat companies is very strong, and we venture to suggest that the degree of co-operation granted to archaeology by peat concerns is as high as that of any commercial interest of any kind in Britain. Peat-cutting operations are postponed, machinery and equipment are loaned, and enthusiastic interest is shown, by all of the active peat companies in the Levels, and without this the archaeological work could hardly continue.

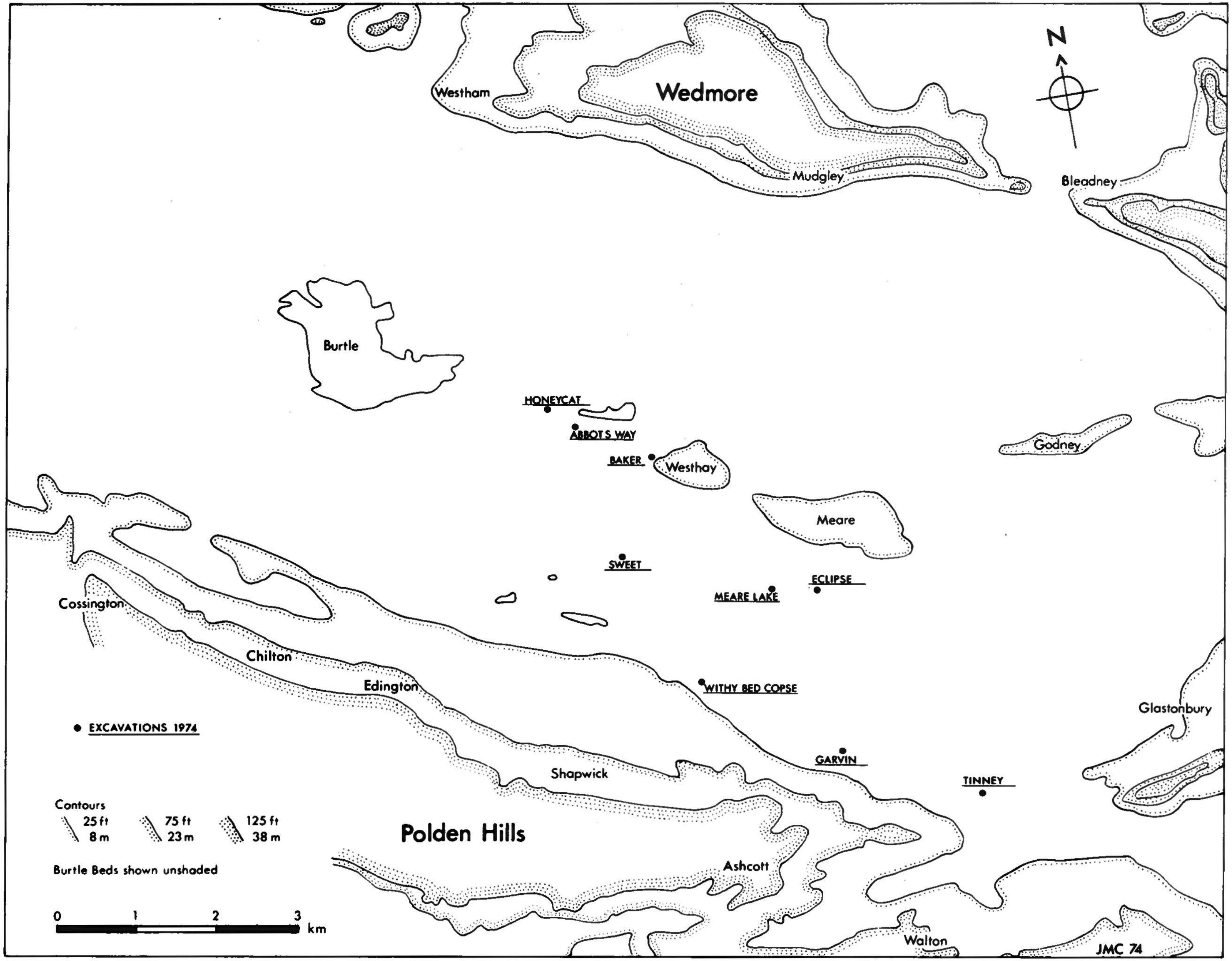

Fig. 1 Excavations in the Somerset Levels, 1974.

This is not the place for a detailed statement about the history of archaeological work in the Levels, but mention should be made of the pioneer work done by Sir Harry Godwin and Mr Stephen Dewar who recorded material found at the beginning of the expansion of peat operations, and who assessed much of the previous data (Godwin 1960; Dewar and Godwin 1963). In 1964, archaeological investigation in the Levels devolved upon the Department of Archaeology, University of Cambridge, and J. M. Coles carried out both fieldwork and excavation. He was joined in 1967 by F. A. Hibbert who undertook all of the palaeobotanical work, and since then an annual series of excavations has taken place on a variety of sites through the Levels. A second archaeologist, B. J. Orme of Exeter University, joined the team in 1971. Mr C. F. Clements of Taunton gave valued assistance in fieldwork and excavations, particularly in 1968–70. In 1973, the Somerset Levels Project was formed with Department of the Environment assistance, and since then a larger number of archaeological operations have become possible. From mid-1973 full-time Field Archaeologists were appointed to observe peat-cutting operations, and excavations have been arranged on the basis of the discoveries made during this fieldwork, and through contacts established over a decade of interest in the Levels. A permanent office in the Levels was kindly provided by the Eclipse Peat Works.

Through the presence of Field Archaeologists, hitherto unknown prehistoric structures have been found at Withy Bed Copse, Garvin's, Tinney's Ground, Difford's (Eclipse), and Meare Lake. Many small finds, of flint, stone and wood have also been reported to archaeologists by peat-cutters. New exposures of previously-known sites have also been recorded recently, including the Abbot's Way. Some of the results of the current activity, and previous work as well, appear in these papers. The map (fig. 1) shows all of the sites examined in 1974, but not all of these are reported in this volume. The Project has also been able to commission specialist work on tree-rings, beetle remains, and wood identifications, all of which have already made significant contributions to the archaeological investigations; reports on some of these also occur here.

The excavations undertaken in the Levels over the past several years have gradually developed more efficient methods of recovery of the evidence and various procedures are now standardised; details of some of these appear in the excavation reports, but techniques are always adaptable and no doubt will change over the next years. The essential point about the prehistoric remains is that most are of wood which tends to be wet and rather soft. Metal tools are generally not employed, and plastic or wooden spatulae, or bare hands, are the main items used in the removal of peat from around the timbers. A second essential is that excavators are confined to planks or toeboards, so that the contemporary peat surfaces are not trampled. On almost all occasions, after excavation and recording, all of the timbers are removed; samples of each are generally taken for identification, some are conserved complete for carbowax or other preservative treatment, and some are sampled for tree-ring or other studies. The excavations are directed in close conjunction with palaeobotanical work, and it is true to say that neither the archaeological remains nor the associated peat is totally explicable in isolation.

Without the assistance of the peat companies, much of this work would not succeed in retrieving the abundant evidence for man's presence in the Levels over a period of 4000 years. In particular, the interest and assistance of the Eclipse Peat Works (Fison's Agrochemicals) and the E. J. Godwin (Peat Industries) Ltd, have been constant sources of encouragement to archaeology. Other companies and individuals have also been helpful, including Mr S. Durston, Mr D. Baker, Mr M. Bell and Mr H. Willcox. There are many others who have materially assisted the work, particularly Mr Sam Foster of the Eclipse Peat Works and the other foremen.

Financial support for the archaeological work in the Levels has been provided since 1964 by the Crowther-Beynon Fund of the University Museum of Archaeology and Ethnology, since 1970 by the Maltwood Fund, in 1974 by Exeter University and from time to time by the Society of Antiquaries of London. The Leverhulme Trust has provided a grant for fieldwork to J. M. Coles for 1974–5. Major financial assistance for 1973 and 1974 has come from the Department of the Environment, and the particular interest of Dr G. J. Wainwright has been an encouragement. Radiocarbon dating from the Carbon-14/Tritium Measurements Laboratory at Harwell was made available in 1974 by the Department of the Environment, which now complement the dating facilities of the Radiocarbon Dating Laboratory at Cambridge. Since 1964, conservation of wood has been carried out at Cambridge, and in 1974 additional provision for conservation was made at the County Museum, Taunton.

The project has been fortunate in the Field Archaeologists who have attempted to observe and report on all of the peat sections (heads) in the Levels. The actual total length of sections to be inspected and recorded is beyond precise measurement, but some indication of the task may be gained by considering one field alone (fig. 22). This field has 41 heads representing over 12 km of sections to be inspected, and mumps examined, after cutting. The field measures only 350 × 300 m and is only one of hundreds of fields in the area, each with its phase of activity when observation is needed. The Field Archaeologists for the Levels since mid-1973 have been V. Morse, R. Palmer, S. M. Buchanan, J. Plouviez, S. Brock and A. P. Fowler.

The excavations in the Levels have been directed by J. M. Coles and B. J. Orme since 1973, but individual sites have benefited by supervisors who were responsible for day-to-day operations: the supervisors in 1974 were S. M. Buchanan, E. Higginbotham, R. A. Jones, T. Padley, R. Palmer and N. Ralph. Assistance in pollen analyses was provided by S. Beckett. The drawings of the wood in figs. 12, 26 and 27 are the work of M. Galley. Cover by M. Galley and J. M. Coles.

This issue of the *Somerset Levels Papers* contains excavation reports on four areas, three of which represent discoveries made in late 1973; all four sites were examined in 1974, although the major programme on the Honeygore complex was completed in 1970. New radiocarbon dates were obtained in 1974 for this complex, and for the other sites. In addition to the archaeological reports, pollen analytical studies have been completed for each site, and tree-ring analyses also appear where appropriate in the site report. A more extensive tree-ring study on the oldest known structure in the Levels, the Sweet Track (Coles, Hibbert and Orme 1973) will be published in the next volume. Assessments of the beetle remains, immaculately preserved in the peat, will also appear in volume 2 now in preparation. A check list of the seventy radiocarbon dates so far available for the archaeology of the Levels has been provided here in summary form, and there is a short bibliography relating to recent work in the area. Dates quoted in these *Papers* are expressed in radiocarbon years, shown conventionally as bc (before Christ), and calibrated dates will be shown as BC.

The value of the Somerset Levels in terms of their archaeological content is principally that of preservation, because there are few other areas in Britain that have contained, and none has yielded, wooden materials of such quantity and quality. In addition, the Levels provide the opportunity, again rarely gained, of relating man's activities to an intimately detailed picture of the environment. Overall assessments of these features of the Levels, for example, changes in wood technology and woodland management over three millennia, the development of communication networks through time, the nature of prehistoric occupations in the varied environmental circumstances offered by the Levels, all can be made the more accurately as more investigations are completed. Interim reports on these subjects are in preparation for future publication.

VEGETATIONAL HISTORY OF THE SOMERSET LEVELS

by F. A. HIBBERT and R. A. JONES

Peat stratigraphy (F. A. H.)

The presence of peat, which comprises the partially decayed remains of plants, in the Somerset Levels is due to persistent waterlogging of a low-lying, flat plateau. Under such persistently wet conditions the normal agencies leading to the decay of dead organic material do not operate. Conditions are said to be anaerobic and such lack of air prevents the activity of the many bacteria and fungi which destroy the dead plants under normal aerobic conditions. So the death of plant material under such waterlogged conditions leads to a build up, in a chronological sequence, of peat deposits. It is this deposition and its normal orderly manner which contains much information about past environments. The macroscopic plant remains tell us of plants growing in, or very close to, the area of deposition itself, and the microscopic fossils, pollen and spores tell us both of the local and regional vegetation, for pollen in some cases may be transported over many miles before deposition in peat. By an analysis of the structure of the peat, and of the pollen it contains, a picture of the change in vegetation with time may be built up and when taken together with archaeological evidence such changes in vegetation that occur may be attributed to the activities of prehistoric peoples.

The relative land/sea levels have been the greatest influence in the development of both the historical and the present day environment within the Levels. Beneath the peat there are deep deposits of grey clay containing the remains of marine organisms and therefore representing a time when the sea level stood higher than at the present time and so flooded the Levels leaving this blue-grey marine clay deposit. The environment would then have been one of an estuary-like situation with large expanses of bare mud frequently exposed. In time the sea level fell and left the area above normal sea levels. The drainage remained poor, possibly due to the rather flat nature of the land left as the sea receded and to a sea-level which was still high enough to prevent much down cutting of the principal drainage rivers as they crossed the Levels. It was at this time that organic deposition began once again. Recent work (Coles, Hibbert and Orme 1973) has shown that in an area around Shapwick Heath there are peat deposits beneath the clay. The extent of this lower peat bed is not yet known but it is now found over an area extending roughly two miles east of its original known locality by the Sweet Factory site. This means that at some time prior to the flooding of the Levels by the rising sea level there had been some areas of marshy ground. The peats have a flora characteristic of pollen zone VIIa and indicate that the environment of the Levels was one of open-freshwater with a fringing reed-swamp vegetation.

This stratigraphy is similar to that found in the Fenland of East Anglia (Godwin 1940) and indicates that the grey marine clay deposits which extend to a great depth beneath the present day surface in some areas (Godwin 1960) do not do so in the area around Shapwick and may not do so in other areas yet to be studied. The earliest biogenic deposits found on top of the marine clay are of plant remains characteristic of open reed swamp. Such a situation is not commonly found in the

British Isles today; it would have had interconnecting deep water channels with isolated areas of shallower water which at first supported reeds alone and later as the evolution proceeded would have been the nuclei of woodland development.

As time passes there was a progressive build-up of organic debris which shallowed the water level and so allowed plants more tolerant of such shallower water to invade the flora and become dominant. Indications of this are evidenced by the presence of rhizomes of saw-toothed sedge (*Cladium*) which is intolerant of water deeper than 0·5 m and especially intolerant of widely fluctuating water levels. It is a plant which likes nutrient rich water such as drains from the Limestone uplands surrounding the Levels. Accompanying *Cladium* there are the first remains of wood to be found in the peat, trees of birch and alder growing either on rafted vegetation or on areas which had become shallow and stable enough to allow trees to establish themselves. The environment would now be one of shallow water and isolated islands of more stable vegetation but still, as shown by *Cladium*, under the general influence of base-rich drainage water from the surrounding high land.

This progressive shallowing of the water continued until the area became one dominated by trees with the possibility of seasonal flooding. This is shown in the peat by a layer of wood peat. It is at this time that the influence of ground water is critical in maintaining a stable fen-woodland. If the area was to have become drier then peat formation would have ceased. It is at this time of early fen wood development that the majority of the Neolithic roads and tracks were laid down. These would establish and maintain lines of communication across a difficult and often very wet terrain.

The pollen record substantiates the macroscopic evidence of the peat itself. The earliest colonisers are plants of open, quite deep water, followed by sedge pollen and then progressing to show very high values of birch pollen, the tree which dominated the fen-woodland. In addition we know of the vegetation of the higher, dry ground; the pollen types indicate that here there was a dominance of mixed-oak forest with very little pollen from open-ground habitats.

If the ratio of precipitation to evaporation favours precipitation then there can be a build up of bog peat which, instead of relying on ground water for its maintenance as did the earlier fen and fen-wood stages, relies on rain fall remaining high enough to exceed the loss of water by drainage away and evaporation. Rain water is extremely impoverished in the way of plant nutrients and so the plant community which it supports is very different to those previously mentioned and is dominated by the bog moss (*Sphagnum*), ling (*Calluna*) and cotton grass (*Eriophorum*). Peat containing the remains of these plants succeeds the fen wood peat over the whole area of the Levels. This tells us that rainfall was sufficiently high (over 1·0 m per year) to allow raised bogs to develop. This rainfall figure is higher than that in the area at the present time. So the environment of the fen wood gradually changed to one of a bare open bog similar to the vast raised bogs of Wales and the central plain of Ireland. The surface topography of these varies with the relative intensity of the rainfall. At the wetter times they are characterised by deep pools with hummocks of drier ground between them. Conversely at drier times they are dominated by heather and ling and would only have isolated pools. This relativity is reflected in the character of the peat and by the colour of the peat itself. At the wettest time there is little or no oxidation of the peat and the plants are preserved more or less intact, the peat is elastic and has a yellow or light brown colour. At the other extreme of dry conditions the peat has little or no form, is homogenous and black in colour. In the early stages following the fen wood there are indications of a pool and hollow complex having existed but it is not until the later Bronze Age that there is evidence for widespread extremely wet conditions over vast areas of the Levels.

Nevertheless, passage across the Levels from middle Neolithic through to early middle Bronze Age times would have been possible for man, picking his way carefully across using the dry hummocks. The building of such massive trackways as the Abbot's way (Coles and Hibbert 1968) which is contained within peat deposits of this raised bog complex would seem to indicate a more deliberate need to maintain communication than for humans alone.

The pollen diagrams show, about the time of local fen-woodland dominance on the Levels themselves, the first indications of forest clearance. The pollen frequency of elm (*Ulmus*) falls as does the value of lime (*Tilia*) pollen. These are accompanied by a rise in the values of pollen associated with newly disturbed ground, mugwort (*Artemisia*), *Matricaria*, sorrel (*Rumex*) also those of grassland plantain (*Plantago*) and grass itself. These are interpreted as being caused by the earliest farming economy in the area creating clearings in the closed forest cover. If the pollen diagrams are arranged in relation to their proximity to dry land they show varying response to this early clearance (Coles, Hibbert and Orme 1973). Those showing the greatest oscillation in the values for dry land trees and weeds are assumed to be closest to the actual clearance sites. The response indicated by fluctuation in pollen values is always most sensitive and of greatest magnitude when close to the actual site of disturbance.

The pollen diagrams show this effect to be short lived; there follows a regeneration of some of the components of the mixed-oak forest and a decline in the values of pollen from "weeds". At the time of change from fen-wood to raised bog peat the locally dominant pollen producer is *Calluna* and it is pollen of this plant, together with the spores of *Sphagnum*, which dominate the locally produced pollen assemblage.

This raised bog peat shows evidence of pool and hummock topography throughout most of the deposit. However, towards the top of the sequence there are changes towards a black, highly humified peat. This is an indication of more oxidation of the fossil remains which tells of relatively dry conditions.

The black, highly-humified, raised bog peat then changes into a peat with remains of saw-toothed sedge (*Cladium*). This is of great significance for it marks the return of ground water influence over the Levels, as only under such base-rich conditions may the sedge survive. The reasons why the area should be once again subject to flooding may be diverse. The popularly held belief is that a rise in sea level caused a damming up of drainage from the area leading to flooding once again. The early discoveries of Bronze Age trackways (Godwin 1960, Dewar and Godwin 1963) which were associated with this change in the peat stratigraphy were said to have been constructed in response to the need to maintain communication in the face of renewed flooding.

Pollen evidence shows the extension of aquatic and mire plants at this time so supporting the evidence gained from the peat stratigraphy that the area once again became a shallow water fen. There is evidence of wood remains in the peat and it would seem as if the flooding receded after a short period allowing extensive woodland development. The pollen of birch shows a small temporary rise at this time. The pollen of dry land plants indicates further, more extensive clearance of forest. The recovery in the values of elm following the Neolithic clearances is shown to fall to a more or less stable level accompanied by large increases in weed pollen which reach values much higher than those in early clearances. This indicates that the clearances were more extensive and forest was not allowed to regenerate. Pollen grains of Cereals found only as isolated records in Neolithic times become more common and form a continuous record.

Growth of peat in the Somerset Levels seems to have ceased at around 400 A.D. There are records of Roman hoards having been hidden in holes cut down into the surface of the bog. Peat stratigraphy of these last centuries show one further flooding by calcareous water, marked by the remains of *Cladium* and a final return to *Sphagnum* peat. These raised bog peats are lighter in colour and are indicative of wetter conditions caused by high rainfall in the area. Oscillation of renewed bog growth and bog degeneration are well documented around this time and correlations have been made between such recurrence surfaces over much of north-west Europe and Scandinavia and are taken to indicate a general deterioration in climate at this time.

This general account of the recent history of the vegetation in the area of the Somerset Levels is a guide to the overall changes which have taken place. It shows how a study of the macrofossil evidence from the peat itself and the fossils contained within it may be complemented by a study of the microfossils.

By such a combined study a great deal may be learned about both the local and the regional vegetation. The relationship of vegetation with climate tells us of the environment within which prehistoric people were living and how this changes with time. Furthermore, as has been shown, changes in this pattern of vegetation may be detected and the causes of such changes attributed to the activities of prehistoric people.

The use of radiocarbon dating for major shifts in vegetation assists in the determination of the time-scale of change, in particular the re-growth of forest trees following clearance activity. A study is being undertaken at the present time to establish absolute pollen influx figures. This entails a calculation of the actual numbers of pollen grains in a known weight of sediment and close radiocarbon dating of the profile to establish a more detailed time scale. This work will enable a much more accurate assessment of vegetational change and the effects of prehistoric man than has been previously possible. It is expected that such a study will not change the overall picture of the vegetational history but allow a more detailed local study such as is required alongside archaeological excavations.

Tree-ring analysis (R. A. J.)

Study of the growth rings of timbers used in the construction of the trackways in the Levels can provide valuable information on relative and absolute dating by correlation of the growth patterns, and the association of radiocarbon determinations of annual rings of known relative age: several floating chronologies of between 100 and 300 years now exist which, it is hoped, will be extended and verified by further material and at the same time provide an accurate dating method for other trackways. In addition, tree-ring data may give some insight into the contemporary climate, woodland management, seasons of felling and constructional details such as size and source of trees, volume of timber and processing methods.

Dendrochronological dating is based on the principle that trees of the same species growing in the same area will show broadly the same pattern of wide and narrow rings, influenced mainly by fluctuations in the climate. Oak is by far the most useful species in Europe because of its ring-porous structure, fairly uniform sapwood (*c.* 25 years), and general availability; however, the ring patterns of ash, alder and birch, though of little value for building up a standard chronology for dating, have provided information on reuse of timber, season of felling and possibly coppicing.

For analyses, transverse sections are removed from the timbers; these are then deep-frozen and cut to clarify the ring boundaries. Ring widths are measured to 0·1 mm and the resulting plots may be compared visually and by computer; two programs are used, one from Hamburg which compares the relative fluctuations in the curve, and another from Belfast in which correlation is based on absolute values. Each provides an objective measure of the level of similarity between two or more tree-ring sequences. Individual curves may then be meaned, resulting in a standard sequence for the period and area.

It is hoped that the varied information available from tree-ring analysis will contribute to our knowledge of timber technology and trackway construction in prehistoric times, as well as supplementing the conclusions from studies of beetles and pollen analysis. The potential for dating should be refined as more trackways, particularly those with oak timber, are exposed and investigated.

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THE HONEYGORE COMPLEX

by J. M. COLES and F. A. HIBBERT

In his publication on the Somerset trackways in 1960, Godwin described the discovery of two slender brushwood tracks on the Westhay Level to the west of the Westhay island (Godwin 1960, 18, 21). The precise locations of the discoveries are now lost, but they lay near the eastern edges of fields marked GVI and MI on the map (fig. 2). As these tracks seemed to run in an east-west direction, between Westhay and Catcott Burtle, they appeared to join both these major dry-land areas and also a small sand island called Honeygar or Honeygore (fig. 1). The heavier track was called Honeygore and the lighter track was called Honeycat. The peat stratigraphy of both tracks was described by Godwin, and the position of both tracks was established within the fen-wood stage of the vegetational succession. Radiocarbon samples were obtained from the timbers of both tracks during small excavations carried out by Godwin and Dewar. The Honeygore track was dated to 2800 ± 130 bc, and the Honeycat dates were 2376 ± 130 bc, 2265 ± 130 bc and possibly 2155 ± 130 bc.

In 1967, during excavations on the Abbot's Way in fields near the E. J. Godwin peat works, GI and GII on the map (fig. 2), a brushwood track was discovered which appeared to represent an eastern section of the Honeygore track (Coles and Hibbert 1968, 240). As peat extraction by rotovation was particularly intensive in GI, an excavation was carried out in 1969 to recover a length of this track before its destruction; the peat company kindly held up their operations in part of this field to allow the work to be conducted. At the same time, fieldwork in areas to the west, beyond Godwin's excavations, revealed new exposures of tracks, presumed to be Honeygore and Honeycat, in field GV. Later in 1969 a new exposure of track was noted by C. F. Clements to the north of GV, in GVII (fig. 3). It seemed that the crucial area, where all of these tracks could be seen, was a rotovated field GVI between these western exposures and Godwin's original areas of discovery. In 1970, excavations took place in GVI, as well as in GV and GVII, through the courtesy of the E. J. Godwin peat works. The peat company postponed their own operations, and loaned machinery and men to assist in the removal of a heavy overburden of peat in one of these areas, and without their assistance the archaeological work could not have been completed.

All of the tracks described here are brushwood tracks, with bundles of chopped or broken stems, branches or twigs laid down along the line of the track, to form a rather narrow footpath (pl. 1–5). Pegs were driven in along the sides of the bundles to hold them in place, and sometimes pegs were placed within the heaped timbers. There is no evidence that each bundle represents anything more than an armload of timber of from 10 to 30 pieces, and no trace of any ties has been recovered. The timber was placed directly upon the uneven surface of the peat. The pressure of traffic would inevitably both spread the timber, hence the need for side pegs, and depress it into the yielding underlying peat, hence the need for subsequent repair of the track by additional bundles. The passage of traffic would also have the effect of aligning the timber, as upper pieces slipped down between longitudinals. In places, separate bundles of timber have been identified beneath the upper track bundles, and these may represent foundation deposits in particularly wet depressions, or sunken sectors of the track subsequently repaired by an extra bundle; it is not possible to decide which of these explanations better suits the archaeological evidence, but in the absence of any suggestion that these tracks were in use over a long period, the single phase of activity is preferred.

The timbers used in the construction of these tracks are generally of slender diameter, and all are either birch or hazel. Samples for identification were taken from all of the excavated areas, and yielded consistent results. The bundled wood laid longitudinally ranged in diameters from 20 to 50 mm, with exceptional pieces over 60 mm, and on average the selection seems to have been of wood about 30–40 mm thick. Where bundles could be identified, the lengths were about 1 m, but the individual pieces in a bundle were more varied, sometimes only 40 cm long, but quite often nearly 1 m in length. However, in some cases the bundles or groups of timber dropped onto the line of the track were longer even than this, and a number of timbers approach 2 m in length. These seem to have been deliberately put down either as an assembly of long pieces, as a separate bundle, or as a few timbers to bridge the junction between bundles of smaller pieces.

An important feature of some of these tracks is the use of natural tree stumps in the body of the tracks. In some cases the trees were apparently growing on the proposed line of the track, and the tree must have been felled, its trunk and branches cut up and used in the track bundles, the stump, cut low, left as a substantial and rigid part of the track, surrounded by bundled wood. In other cases, felled tree stumps were chopped out of the ground and carted to the line of the track where they were deposited as a substitute for part of a bundle, or in place of a peg along the side.

The pegs, driven in along the sides of the tracks, were also of hazel and birch, with birch seemingly favoured although the sample is not conclusive. These pegs range in length from 45 to 70 cm, and may be very slender twig-like pieces or very substantial stems or branches. The lower ends were roughly pointed, often by a single blow from an axe followed by snapping off, sometimes by a simple fracturing of the wood, but in no observable case was there the careful faceting and sharpening of pegs seen in the earlier Sweet track. The upper ends of the pegs, presumably left blunted in their production, sometimes show signs of hammering by a blunt instrument, such as a mallet or rock; a mallet of yew was recently found in peats and is broadly contemporary with these tracks (Coles and Hibbert 1971). Because of the massing of fenwood stumps and trees in the underlying peats, some difficulty must have been experienced in driving some of the pegs where their points encountered a substantial root or stump.

The excavation techniques used in recovering these tracks followed the general lines adopted in other areas of the Levels, and it was in some ways the experience gained on the Honeygore complex in 1969 and 1970 that helped evolve the procedures employed today. The wood of these trackways was relatively soft, but the preservation of bark created a hard outer surface so that recognition of structural pieces was not difficult; the bark, however, made actual excavation with the fingers rather dangerous, with occasional splinters of bark running under the nails during the cleaning of the wood. All work was conducted from planks laid over the sites and held on boxes or on the sides of the trenches, but on occasion the excavators worked from toeboards laid on the contemporary peat surface beside the tracks.

One of the major problems encountered in this area was the recognition of individual tracks as they progressed through the fields, yet were excavated only in small areas. Prehistoric tracks tend to run only in straight lines when plotted on small-scale maps (fig. 2), but on the ground itself it is generally apparent that trackway building depended upon very local circumstances, the avoidance of a tree or dense bush, or a pool of open water, the adoption of a slight variation to take advantage of a higher or drier patch of vegetation. It has been shown time and again that projections of the line of a prehistoric track based on a small exposure are highly uncertain, and that closely concentrated searching is required unless a particularly appropriate peat-cutting or drainage ditch lies in position. The Honeygore complex presented certain problems as can be seen by the field plan (fig. 3).

The second problem encountered here concerned the actual constructional details of the trackways. Their general characteristics have been described, but in practice the variation in expression was considerable. Although each trackway in the Levels exhibits its own set of features, which may be in the types of wood used, their manner of preparation, or their position or function, each trackway also shows some variation within itself. Where the particular structure is basically simple, as in the Honeygore complex of tracks, such variations may not be readily identifiable, or their importance may not be appreciated. In such cases, the provision of age determinations through radio-carbon dating, or through peat stratigraphy and pollen analysis, is an important asset in the elucidation of the complex.

Taken together, the archaeological solution to these problems represents no more than a working theory. Uniform radiocarbon dating of samples of wood from

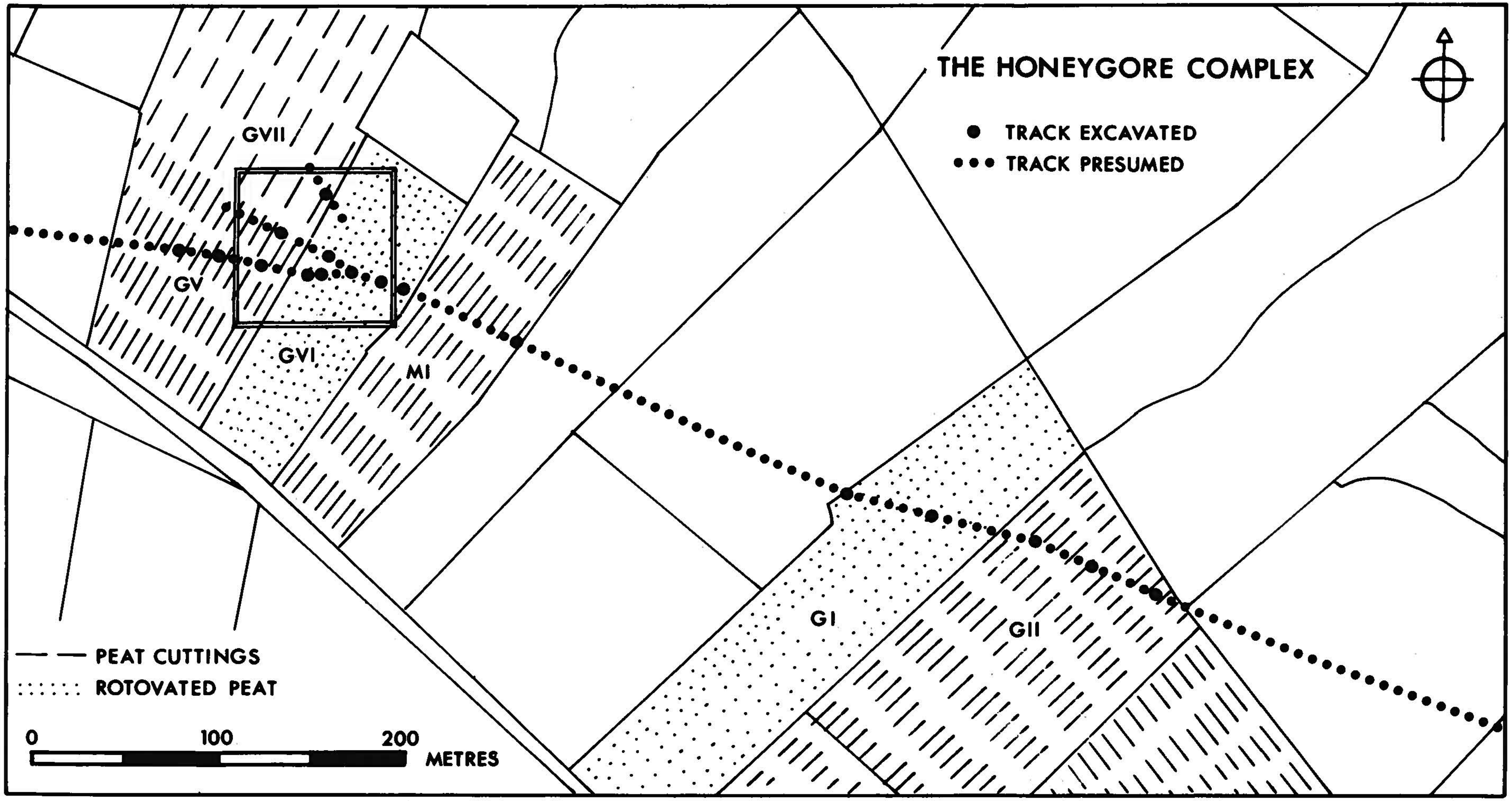


Fig. 2 Map of the Honeygore tracks on part of the Westhay Level.

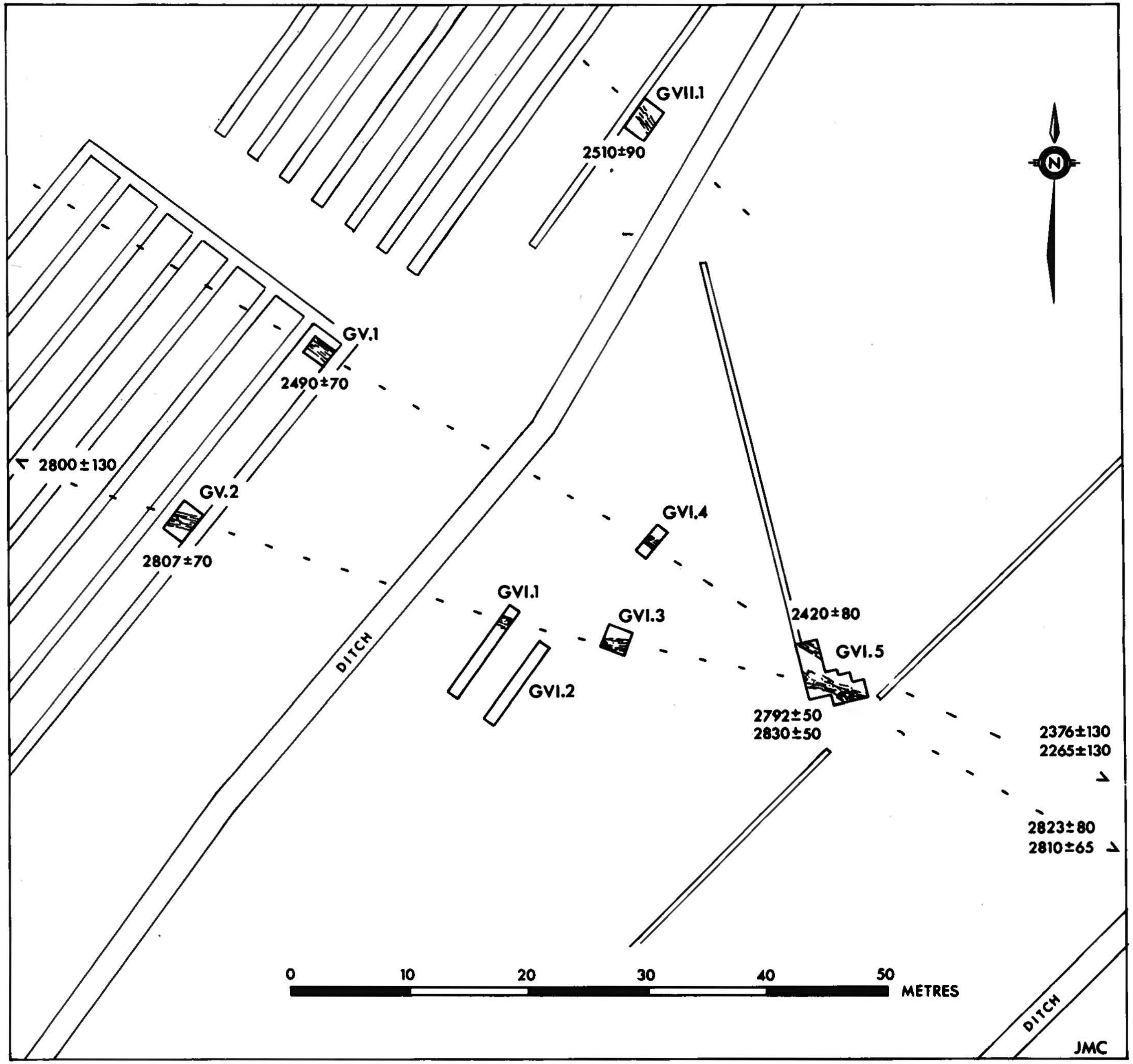


Fig. 3 Field plan of the Honeygore complex.

five different exposures of trackways, which have been joined on the basis of intervening excavations, borings, and field search, and which form a relatively uniform line on a small-scale map (fig. 2), suggest that a major trackway in this area is the Honeygore as discovered by Godwin. The dates, 7 in number, appear in the check list; of these, only one (Gak—1939) appears well outside the group, and the several reasons for its withdrawal are provided in the list. The others are remarkably homogeneous and a radiocarbon age of 2890–2730 bc seems assured; the wood used in dating was exclusively young timber of 10 or 20 years maximum age when felled.

The Honeygore track

The Honeygore track is the most substantial of any of the tracks in this group. Its timbers may be as much as 70 mm in diameter (fig. 5), and in length over 2 m (fig. 6). Careful bundles of timber sometimes formed a dense track (fig. 5, pl. 1), but on occasion the timbers were more sparse (fig. 4, pl. 2). In all exposures made, very small brushwood, or brash, was observed between the timbers, sometimes beneath them, rarely beside them; such brash is likely to represent packing although the general peat-type contains much natural brushwood that can be seen over wide areas. In the Honeygore case, however, there seems good reason to suggest deliberate collection of twigs, leaves and miscellaneous fibrous material to consolidate the track timbers. The use of stumps, both *in situ* and brought in, is also attested in this track (fig. 5). Lower bundles of birchwood were observed on occasion (fig. 5) but in general this track seems to have consisted of a single deposit of bundled wood supported by stumps, brash and held in position by pegs along either side. In some cases these seem to have been driven in at random, occasionally in the centre of the track (fig. 6) but other exposures show a more regular and substantial pattern (fig. 5). The pegs tend to delimit the effective width of the track which can have been little more than 70 or 80 cm. By its nature the Honeygore was nothing more than a footpath, unsuitable for vehicles whether wheeled or sledged. The effectiveness of the track in supporting cattle is very dubious.

The Honeygore track in GVI.5 (pl. 1) compares well with most of the other exposures of this track except that it seems to consist here of two distinct units of timber. The lower unit, shown shaded on the plan (fig. 6), has a slightly different alignment to the upper unit and indeed was considered during the excavations in 1970 to represent a different track altogether. The lower unit had a maximum of 12 mm of peat separating it from the upper unit, and most of the upper timbers rested directly upon the lower. The methods of track manufacture, the timbers used, and particularly the peg positions, make it more likely that one single major track is represented here, the Honeygore; the slender track in the northern part of the excavated area may be the Honeycat, described below. This part of the Honeygore track then represents a very substantial piece of construction, involving the deposition of several long bundles of timber in an area perhaps where difficult conditions necessitated a quantity of material to serve as a substructure; the packing of timber by brushwood, abundantly represented here, would account for the peat between the lower and upper units which touched in places, and which were never more than 12 mm apart. To the east of GVI.5 an intensive search has gone on to locate any possible extensions to the upper and lower units. Only one

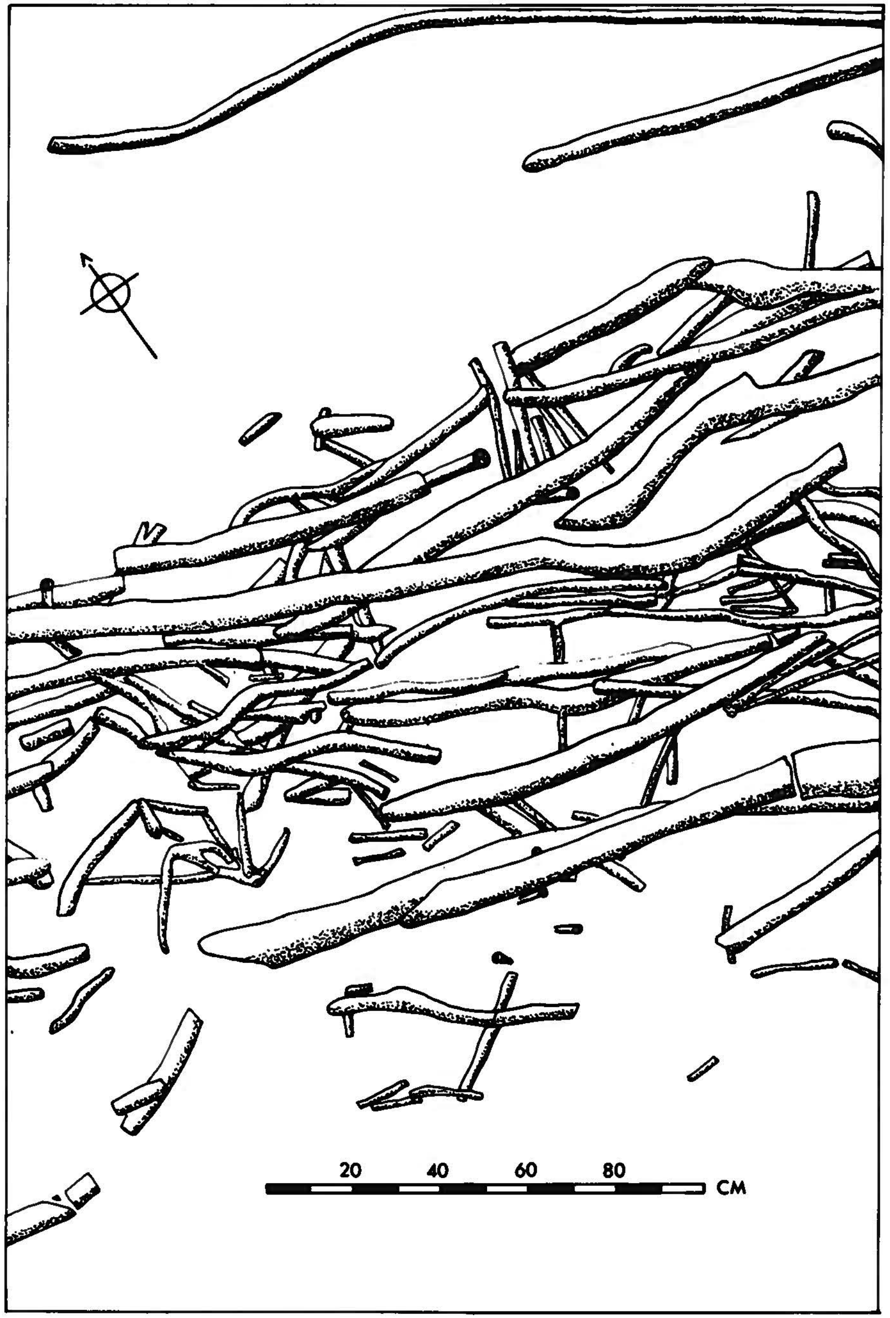


Fig. 4 The Honeygore track in GV.2.

has been found, and this relates directly to the Honeygore both to west and east (fig. 2). It lies more or less midway between the upper and lower projected units, and no other firm indications of other tracks have been recovered other than the Honeycat. The solution then proposed here for GVI.5 has the virtue of simplicity, one track which aligns well with an identical track to west and east, but other possibilities exist which would involve dismissal of the otherwise perfectly reasonable radiocarbon date for the Honeycat track in GV.1 (fig. 8), a track considered during the excavations to potentially represent the lower unit in GVI.5; if it does, it must be older than the Honeygore, yet its date is younger by too much. The constant urge to join seemingly-aligned exposures of track sometimes causes difficulties in the final analysis.

The work that has been conducted in this area of the Westhay Level is in some respects typical of much of the archaeological investigations in the Somerset Levels. Reliance upon local peat operators for initial discoveries continues, and assistance from the peat companies concerned is always sought and always provided. The excavations involve careful removal of overburden, by hand or machine, and rapid recording of the structures upon their exposure, with accompanying peat and pollen studies carried out beside the archaeological work, each gaining from a constant cross-reference and questioning approach. In the case of the tracks reported here, the complications surrounding the relationships between individual exposures have to a great extent been reduced or eliminated by reliance upon accurate field plans, the establishment of reliable peat stratigraphical units allied to absolute levels of the tracks, archaeological comparisons in constructional (typological) details and timbers used, and multiple radiocarbon determinations. All of these have combined to produce the explanations here, but the latter should not necessarily be accepted as the only possible solution to the problems posed by the Honeygore complex.

The Honeygore track has now been traced over a distance of 600 m. Its original length was either 3000 or 1700 m, because it ran from the sand island of Catcott Burtle eastwards through a fen-woodland either to the rock island of Westhay or to the small sand island of Honeygar. At the moment its easternmost position lies

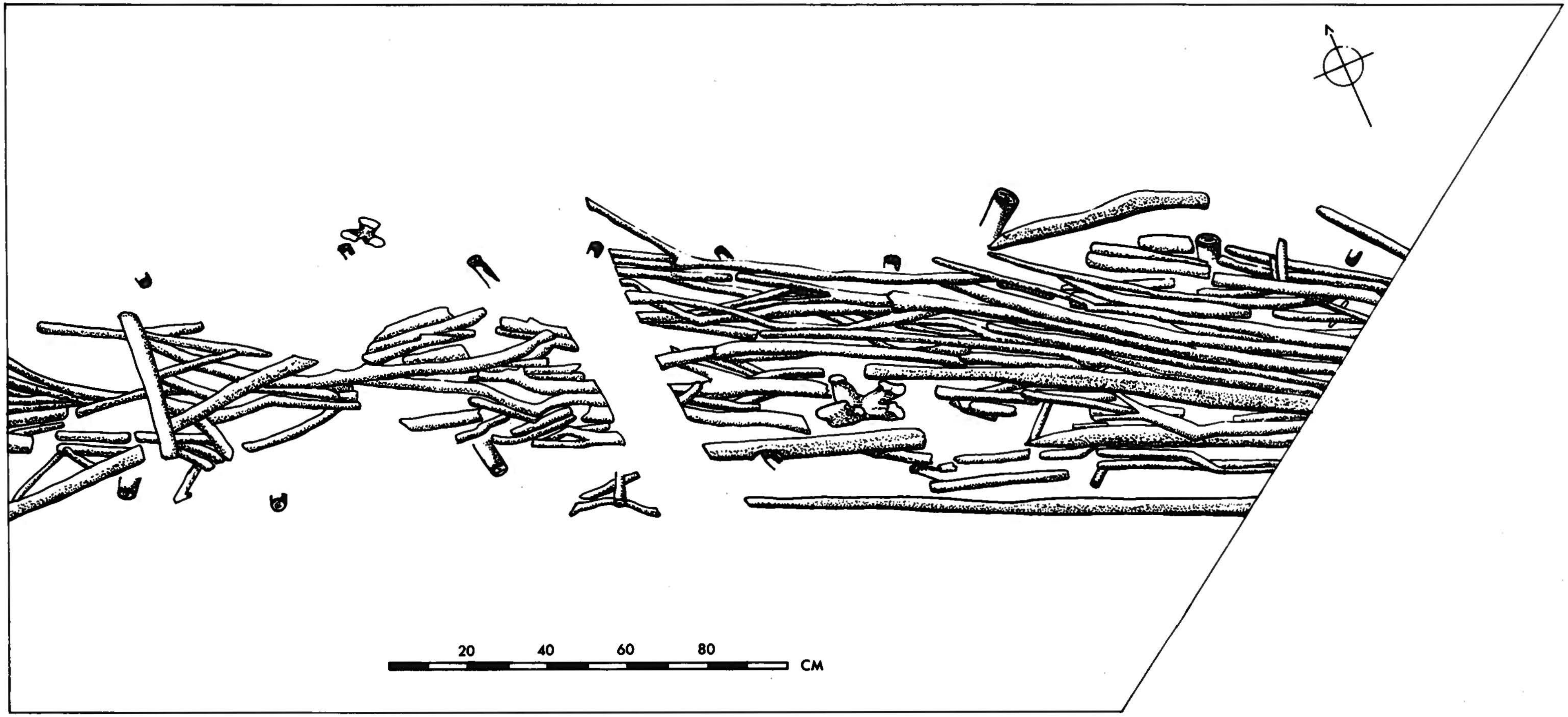


Fig. 5 The Honeygore track in GI.

immediately to the south of the latter island, where it is deep in peat and untraced. It may have veered towards this island if its prime purpose was to allow access to the dry land there and on to Westhay, because by so doing its builders would have saved about 500 m of bundles, and perhaps 1000 pegs. The evidence from pollen analyses in the immediate area suggests that the Honeygore track was closely associated with the sand island. In any case, its construction represents a considerable desire on the part of Neolithic man to open up the fen woodland in this area, and to create communication between the two largest islands in this part of the Levels.

The evidence for the maintenance of this communication over a long period of time can be approached in two ways. There are no certain areas on the Honeygore where repairs or refurbishments can be detected, except perhaps GVI.5 noted above, and there are no traces of the human debris, broken stone or wooden tools, pottery fragments and the like, such as have been recovered from the Sweet track. The growth-rate of peat, which eventually overwhelmed and buried the Honeygore, is uncertain, but it is likely that after only a few years the track would have needed building-up above the level of the general watery fen woodland due to depression of the track by use and elevation of the surface of the peat. In addition, the fact that fen woodland trees soon overwhelmed the track, spreading their roots over the track timbers (pl. 3), suggests a period of use limited to less than 20 years. In the excavations in GI, nine stumps and root systems were directly upon the track timbers. Therefore it would seem that the track had a restricted life.

On the other hand, the actual communication route between Burtle and Westhay seems to have been a preferred one, because not only is there the Honeygore track, *c.* 2800 bc, but also the Honeycat, described below, *c.* 2400 bc, the Abbot's Way, *c.* 2000 bc, and several other incompletely-known tracks in the immediate area. The two islands as noted above are the largest in the northern Levels so such a continued interest in their respective qualities would seem logical.

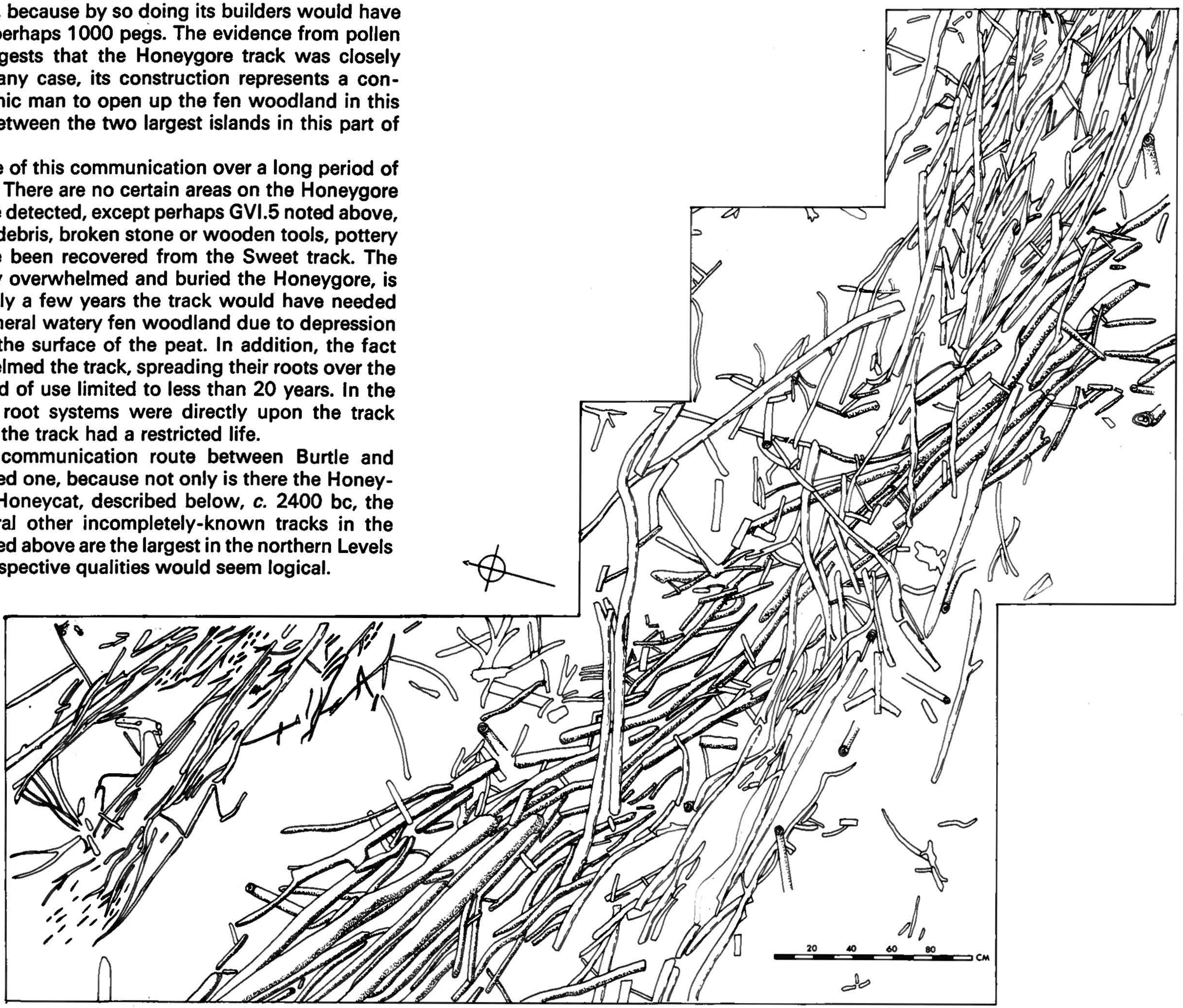


Fig. 6 The Honeygore complex in GVI.5.

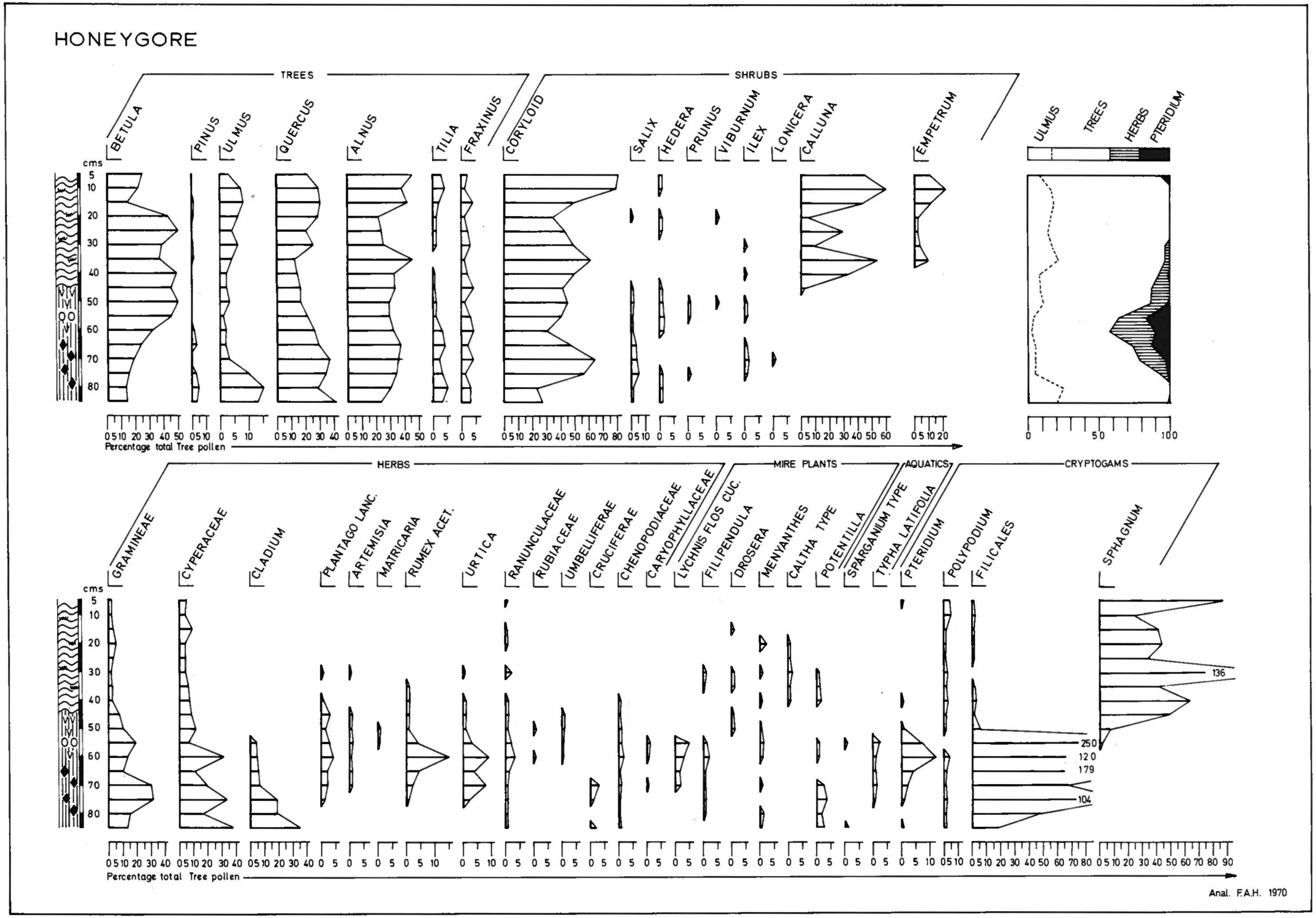


Fig. 7 Pollen diagram of the Honeygore track.

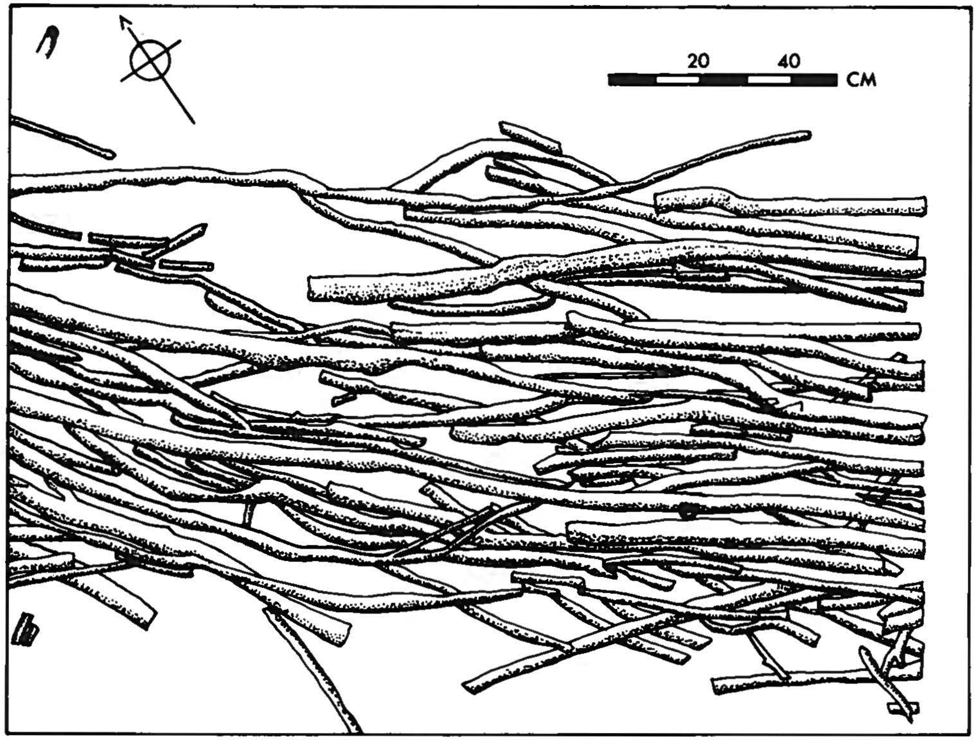


Fig. 8 The Honeycat track in GV.1.

Peat stratigraphy (fig. 7)

The Honeygore track is associated with fen-wood peat and the detailed stratigraphy of the monolith from which the pollen samples were taken is as follows:

0–45 cm	Dark brown, humified *Sphagnum, Eriophorum, Calluna,* peat.
45–60 cm	Fen-wood peat with abundant *Betula*, rhizomes of *Phragmites* and *Cladium.* Track at 55 cm.
60–85 cm	Yellow-brown *Phragmites* peat with *Cladium* rhizomes.

There was a layer of compacted moss peat directly on top of the trackway. The remains were principally those of *Camptothecium nitens,* a moss which would occur naturally in such fen wood situations. However, the abundance of this and other associated mosses of fen wood distribution, immediately on top of the brushwood, may be an indication of a surface deliberately laid on top of the track.

The analysis of wood from the trackway shows that it was constructed principally of birch wood. The pegs were mostly hazel, with a few of birch. Birch would be growing all around on the Levels and would be easily obtained; the hazel would have been brought from the drier slopes surrounding the Levels. In the exposure examined in GVI.5 there was a birch stump incorporated in the construction of the trackway.

The pollen diagram constructed from the monolith shows a trend from open water deposition, through shallow water fen and fen woodland, finally to raised bog conditions. The grouping of pollen taxa on the diagram is on the order of their present day distributions.

In the early stages there is representation of the pollen of *Typha latifolia* (bullrush) and *Sparganium,* indicating areas of open water. The high values for grass and sedge pollen, together with pollen of *Cladium,* indicate the beginnings of shallow water fen conditions. From these areas these plants spread to form the fen, as indicated on the pollen diagram by the disappearance of pollen from aquatics and the presence of pollen from Mire plants.

At 75 cm the values of *Ulmus* (elm) pollen fall. This is coincident with the marked expansion in *Betula* (birch) pollen and the presence of birch wood in the peat. In order to remove the influence of plants which are thought to have been growing actually on the bog surface a composite pollen diagram has been constructed solely of pollen from exclusively dry-land habitats. These are *Pinus* (pine), *Ulmus* (elm), *Tilia* (lime), *Fraxinus* (ash), *Plantago* (plantain), *Artemisia* (mugwort), *Matricaria* (mayweed), *Rumex* (dock), and *Urtica* (nettle); spores of *Pteridium* (bracken) are also included. This shows the magnitude of the fall in elm pollen and the expansion of plants associated with open-ground habitats. From this it can be seen that there is a short-lived phase with low elm pollen values and high herbaceous pollen values. This is taken to indicate the opening of forest cover. This phase seems to be of a temporary nature; the values of herbaceous pollen then fall away and the values of elm pollen rise to their original value. The magnitude of the change is large and would indicate that the opening of forest cover is close at hand. There is a small Burtle Bed close by on which Honeygar farm is situated today, and this light sandy soil would have been appropriate for early agriculture. The Burtle Bed "island" is relatively small and it is likely that after a short time the area would become unsuitable for agriculture due to the rapid impoverishment of the soil. This would account for the fall of herbaceous pollen seen in the composite pollen diagram. Although no radiocarbon dates are available to date the length of this period more precisely, taking account of the peat accumulation rates at the time, it is unlikely to have lasted more than 200 years.

The position of the trackway is seen to coincide with the peak of this agricultural phase and it is likely that the two were associated. The brief nature of this forest clearance phase contrasts markedly with the pollen diagrams from Chilton, some distance to the west of Honeygore alongside a much larger Burtle Bed, where the activity is more intense and is prolonged with a number of peaks (Coles, Hibbert and Clements 1970). The Bell track, alongside Westhay island, to the east, shows little forest clearance (Coles and Hibbert 1968). These facts indicate that the lighter soils derived from the Burtle Beds were those soils found most suitable for early agriculture. A much more detailed study of a peat monolith from the Abbot's Way, some 150 m from this Honeygore exposure, is now being completed. This analysis, together with close dating by radiocarbon, will assist in the interpretation of the vegetational history in this area of the Levels.

The fen wood peat, forming a stable surface over which the trackway was built, persisted and similar deposits eventually overwhelmed the trackway. These indicate progressively drier conditions, and, apart from times of seasonal flooding, would afford passage across the Levels without the need for a trackway.

Pollen analysis and peat stratigraphy show that at 45 cm there is an abrupt

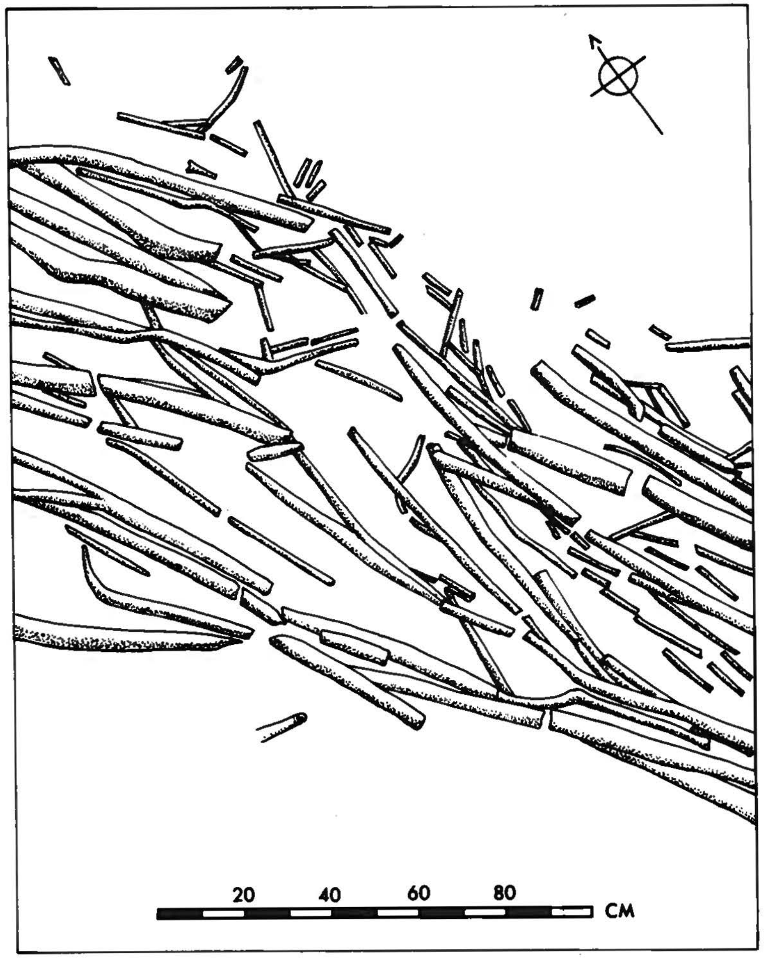


Fig. 9 The Honeydew track in GVII.1.

change to raised bog conditions. Such conditions persisted throughout the remainder of the deposit to the present day surface.

The Honeycat track

The Honeycat track was discovered by Godwin in 1959 and appeared to him to lie at the same stratigraphic position in the peat as the Honeygore. Both lie about 2·1–2·2 m above OD in the area. The single exposure of Honeycat known at this time lay more or less on the same alignment as the Honeygore, but radiocarbon dates suggested a later third millennium bc age. The published photograph depicts a very slender track, with timber 20–25 mm in diameter (Godwin 1960, pl. IV). In 1970, excavations in GV and GVI yielded more data and posed certain problems. The basic construction, and the woods employed, have already been noted above, but considerable variation exists in the areas actually observed. A dense brushwood track laid in bundles and fully 1 m wide was recovered in the westernmost exposure (fig. 8, pl. 4), but to the east the track diminished in width and in size of timber until it resembled very closely (fig. 6, north) the original Honeycat described by Godwin. Radiocarbon dates for the newly-excavated timbers are consistent, 2490 ± 70 bc and 2420 ± 80 bc which may be compared with the previous dates 2376 ± 130 bc and 2265 ± 130 bc. It is on the basis of the dates, the alignment and the admittedly varying character of the trackway that the exposures on the field plan are considered to represent the Honeycat track of Godwin (fig. 3). The track is known to exist only in this western area (fig. 2) and it has not been looked for elsewhere. In section it does not appear substantial (pl. 5) and in the absence of fresh peat-cuttings near to the known site it remains indistinct. The presumption that it originally ran between Burtle and Westhay is nothing more than that.

The Honeydew track

The third definite track in the area, the Honeydew, again conforms to the general brushwood type, but it has only been seen in one small area (fig. 9). It too is a rather narrow track, 40 cm wide, and built of slender timbers. Its alignment is not well-known, and its radiocarbon date of 2510 ± 90 bc suggests that this was a contemporary of the Honeycat track. Its presumptive junction with the Honeycat, and overlap with the Honeygore, lies in densely vegetated and disturbed ground to the east. To the west, and the same could be said for the Honeycat and the Honeygore, old peat-cuttings mask potential recognition of the tracks, and beyond these the lower peats remain uncut; the three tracks are preserved beneath about 1 m of peat in these areas.

In the same area as these tracks, and 100 m to the south-west of the Honeygore–Honeycat exposures in GVI.5, a find was made in 1969 during drainage operations. The bucket of an earth-moving machine brought up a heap of local Lias stones, which must have lain deep in the peats. An excavation in 1970 failed to find any further trace of this deposit, but it appears to have consisted of eight water-rounded stones each about 15 cm in diameter, bearing no trace of having formed a hearth or any particular structure, and seemingly rather large for net-sinkers. The original peat surface upon which they fell or were placed may have been as much as 1 m below that of the Honeygore track, as it seems unlikely such objects could have sunk through consolidated fenwood peat. The level at which these objects lay may date to *c.* 3500 bc but their purpose remains unknown. It would seem at least a possibility that they came to rest in reed-swamp peats through some activities involving a boat in open water conditions.

The Honeygore complex is not one of the more simple prehistoric structures in the Levels, and there is now increasing evidence that particular areas of the Levels were sufficiently favoured by man to persuade him to construct multiple tracks through or to these areas. The complex of trackways on Shapwick Heath (Godwin 1960, 3) is a relatively simple affair when compared with the groups of structures on Chilton Moor (Coles, Hibbert and Clements 1970), in Skinners Wood (ST418394), on the Honeygore line, or at Tinney's Ground (elsewhere in this volume). The reasons for such favoured areas are likely to be environmental and economic; some of these aspects have recently been described (Coles, Hibbert and Orme 1973; Coles and Hibbert 1975) but much further work remains to be done.

THE ECLIPSE TRACK

by J. M. COLES, B. J. ORME and F. A. HIBBERT

In August 1973 the Eclipse Peat Works renewed peat cutting in an east–west direction in the field known as Diffords, revealing a thin layer of brushwood cut in cross-section in several heads (fig. 10). The line of exposures suggested that this brushwood might form part of a trackway running approximately north–south. A small excavation by the Project field archaeologist, R. Palmer, confirmed the existence of deliberately laid brushwood. Shortly after this, more brushwood was noted in the north–south cuts immediately to the south, this time exposed along the length of the heads (pl. 9). Over the winter of 1973–4 the field was mapped by Project members, all the areas of brushwood were plotted in, and a further small area was excavated by J. Plouviez in advance of a second cutting. Meanwhile the Eclipse Peat Works offered to reserve a large area of peat, where the track was known to be, for full-scale investigation in 1974.

The excavation of the track, called the Eclipse by virtue of its proximity to the peat works of that name, took place in July 1974. A trench approximately 13·5 × 4 m was laid out in the reserved area, at ST 44954065, along the presumed line of the trackway. As the brushwood was known to be close to the modern peat surface, no machinery was used, and the excavation was carried out entirely by hand, with people working from planks or boards laid on the peat along the sides of the trench, or raised to form a bridge across the track. In this way damage to the wood was kept to a minimum.

The top 15 cm of peat was removed by carefully supervised spading over the entire area. The peat was dry and the upper part somewhat disturbed, probably during peat cutting earlier in the century. Subsequent excavation was carried out using plastic spatulae and bare hands, teasing away the peat in order to expose the brushwood *in situ*. The outline of the track along the whole trench was established, leaving enough covering peat to prevent drying out. The site was watered regularly, and covered with polythene at night from this stage until the final lifting. The undisturbed layer of peat immediately above the track contained numerous patches of cotton grass, making a thick tangled mat that was in places very difficult to remove. It was realised that this cotton grass might form part of the trackway, but detailed examination suggested that it was natural, and the final clearing of the brushwood proceeded. This proved a painstaking and delicate operation, necessitating the use of paint brushes and very small plastic spatulae to clear away sufficient peat to reveal the detail of the brushwood construction. At the northern end of the site the brushwood proved very rotten (fig. 11, 0–3 m) and it was not possible to recover the track in a complete state, due possibly to previous machine damage and also to difficulties of excavation.

The exposed trackway is illustrated in plate 6, and the plan, originally drawn at 1:10, is given in fig. 11. Once the structure had been fully recorded by photography and scale drawing, it was levelled, sampled for wood identification, and dismantled in places to ascertain how it had been built. Finally, two small areas at 4·2–5 m and 8–8·7 m were lifted and the peat below examined, showing that there was no associated substructure.

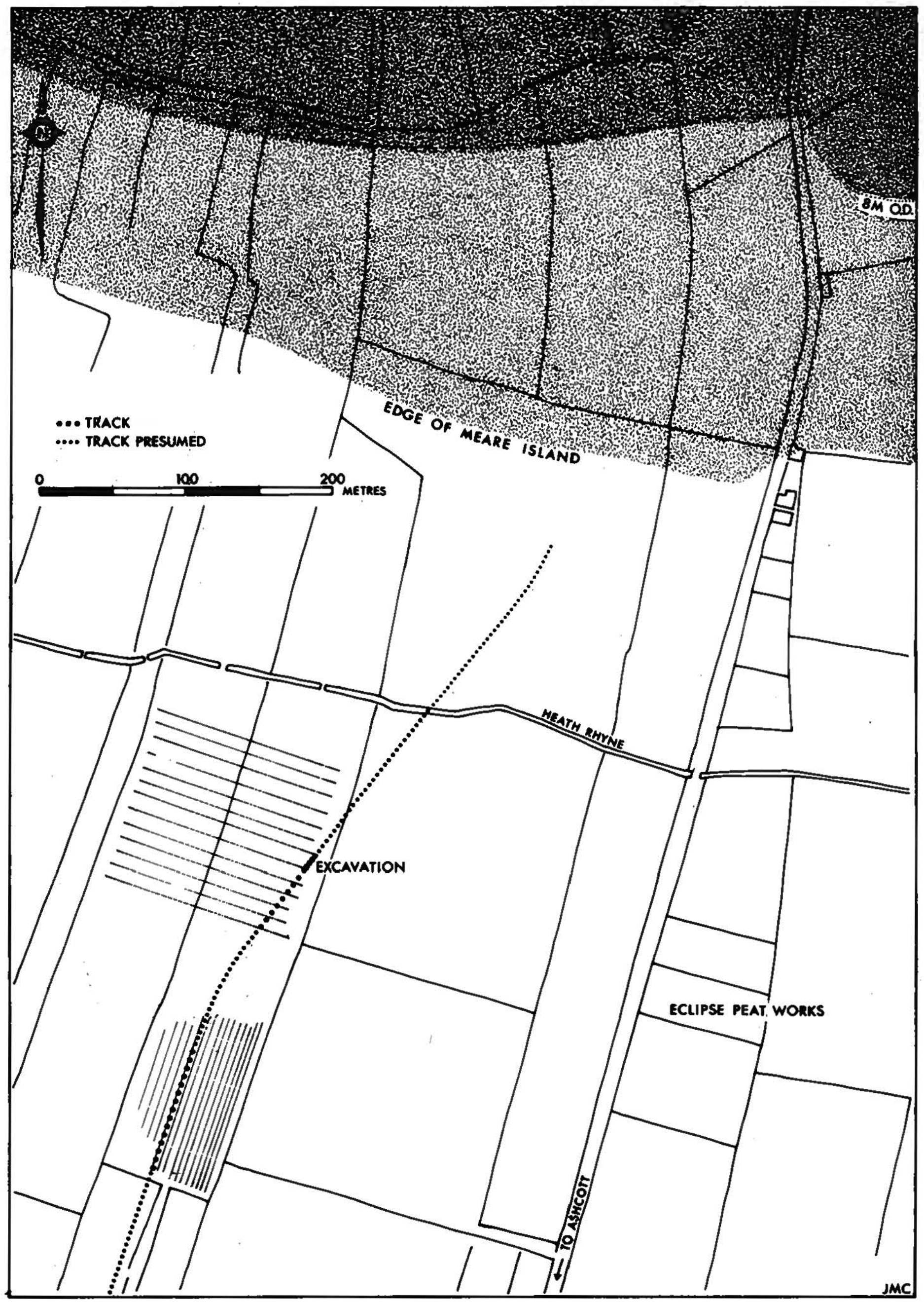


Fig. 10 Field plan of the Eclipse track south of Meare island.

The excavation of 13 m of the Eclipse confirmed the suggestion from the preliminary investigations that it was made of interwoven pieces of brushwood. Plate 6 shows that it was a more or less straight and continuous structure consisting of panels, each made of 35–45 longitudinals, forming a path about 1 m wide. At intervals of about 35 cm there were interwoven transverses, the detail of the weaving being shown in plate 7 and plate 8. The weaving was not regular across the whole width of the track, nor was there any regularity of pattern from one transverse to another, but it seems from the excavation that they were all woven in and out of the mat of longitudinals at some point, giving a structure like wattling or hurdle-work. The longitudinals were on the whole slightly thinner than the transverses, their diameters ranging from 10–25 mm, whereas the transverses were mostly 30–40 mm thick, with some slighter ones. There was one rather solid longitudinal running from 1–4 m on the east side of the track. There was nothing to suggest why this larger piece was used.

Of the 198 samples identified from the Eclipse, 187 were hazel. This was used for both transverses and longitudinals. The remaining 12 pieces, identified as ash, viburnum, alder, oak and field maple, were not restricted to any particular section of the track, nor apparently did they serve any special function.

Many of the pieces had traces of bark, sufficient to suggest that they had not been stripped before use. Many of the better preserved pieces had clearly cut ends, and it was possible to distinguish the individual facets (fig. 12). It was this feature, the clearly faceted ends, that showed the Eclipse had been built of separate panels (fig. 11). Careful dismantling of the track at 11·8 m revealed that all the longitudinals came to clearly-cut ends here, faceted and not merely squashed or broken as elsewhere (pl. 8). Further dismantling at likely junctions revealed hurdle ends at 9·8 m, 8 m and 6·3 m, and possible ends at 4·2 m and 2 m. It appears that the track was made by jamming hurdle ends together, giving an overlap of about 20 cm, strengthened by a few short joining pieces. In some places a slight change in direction is apparent where two hurdles meet (see pl. 6). The hurdles were not of a standard length, varying from 1·8–2·3 m long. It is just possible that each hurdle as shown in fig. 11 in fact consisted of two pieces, although this was not apparent during the excavation.

The discovery of these separate hurdles suggests that they were made by the track builders somewhere else, brought to the line of the projected trackway and then joined together. To have made them on the spot would have been awkward and unnecessary, and there are no signs of woodworking. To have made *long* lengths and carried them in would have been unwieldy and impractical. It seems in this instance that both the positive archaeological evidence in the form of the hurdle ends, and the negative evidence in the lack of woodworking debris, combined with the practical demands of the situation, support the idea that the Eclipse was made of short pre-fabricated sections, joined together on the site.

A few small white grits were found during excavation, scattered thinly through the peat. Two possible short pegs were retrieved from the west side of the track, but they were not tied in to the structure. Apart from these, no finds were made other than the track itself.

A single radiocarbon date has been obtained for the Eclipse track, giving a result of 1510 ± 70 bc. This agrees with the relative date suggested by the peat stratigraphy, and the absolute level of the track at 2·35 m OD.

Peat stratigraphy (fig. 13)

The peat stratigraphy of the monolith taken from the track was mainly a heterogenous mixture of the remains of *Calluna* and *Sphagnum*, there were small twigs of birch and, throughout the whole monolith, scattered remains of monocot rhizomes. The top 8 cm showed a change to a peat with more constant monocot rhizomes including *Cladium* and had indications of being less oxidised than the lower peat. Nevertheless the trackway was at 30–32 cm depth and was well below the indication of renewed flooding and bog regeneration typified by the top 8 cm of the monolith.

The pollen spectra are indicative of the Bronze Age with the presence of such trees as *Fagus* (beech) and *Acer* (field maple). An indication of open ground in the area is given by the low but constant records of pollen from *Artemesia* (mugwort), *Matricaria* (mayweed), *Cirsium* (thistle), *Plantago* (plantain) and *Rumex* (dock). With the exception of *Plantago* the values reached are not high. Such high values for *Plantago* may indicate that a pastoral economy was practised rather than extensive areas of land being under arable cultivation. Values for *Calluna* and *Sphagnum* fall towards the top of the monolith. This is consistent with the change in peat stratigraphy recorded at this point, also with the rise in pollen from aquatic plants which begin at 8 cm. The composite pollen diagram showing the relative balance of plants of dry land, and so removing the large local dominance, shows little marked change in relative frequencies with the exception of a peak at 20 cm. This is not indicative of a major trend in the relative frequencies since the figure settles back to the general level immediately after the peak. The indications are therefore that there is a general level of agricultural activity in the area. It must be remembered, however, that the site at which the Eclipse track was excavated and from which the pollen samples were taken was some considerable distance from the dry land at the time the trackway was built. The pollen diagram from such a position would not be expected to be the best record of such activities (Coles, Hibbert and Orme 1973).

The position of the trackway in the peat in relation to flooding horizons is not clear since it is found some 23 cm beneath the *Cladium* peat and the macroscopic remains around the trackway itself do not show any indications of increased wetness. This consideration is best left aside until more detailed work on the stratigraphy of these later peats is carried out. Several of the pollen diagrams shown by Clapham and Godwin (1948) show Bronze Age trackways to be some small distance beneath the actual *Cladium* peat yet within the zone of renewed raised bog growth, which led them to believe that the trackways were built in response to a deteriorating climate.

Conclusion

The Eclipse track has now been traced over 250 m (fig. 10). It runs more or less northeast to southwest, the northwest exposure being 500 m from the edge of Meare Island. It is likely that the track was laid down to give access from Meare Island to the marshy area of the peat, and probably to the Polden ridge (see fig. 1). However, the track has never been reported south of the old railway line, and it should not be taken for granted that it joined the two areas of high ground.

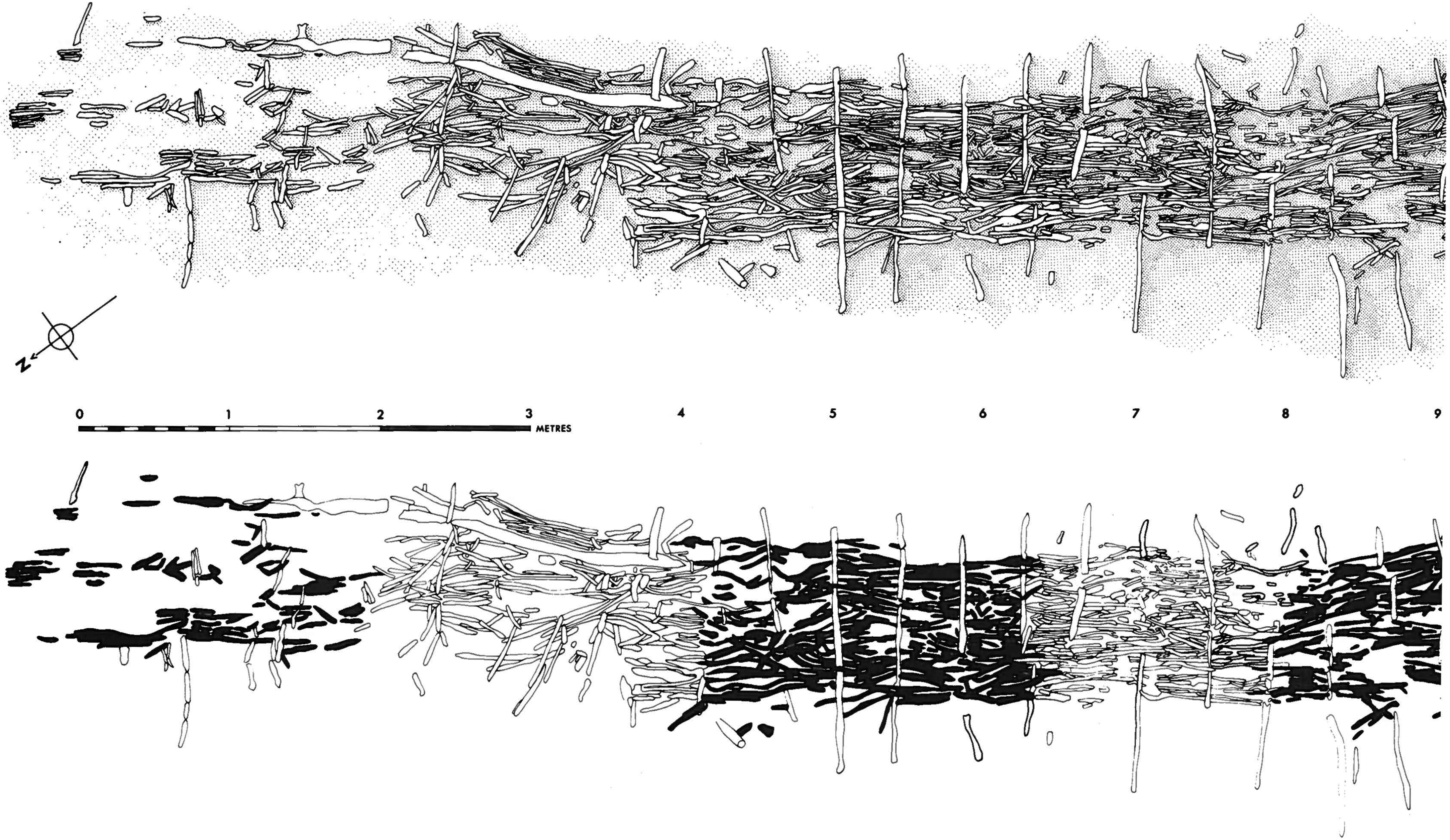
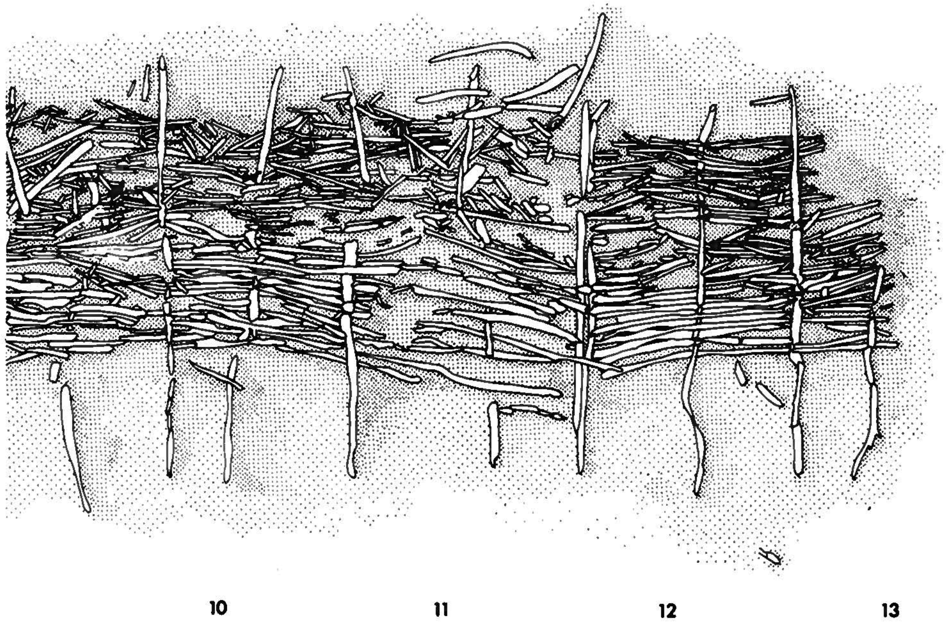
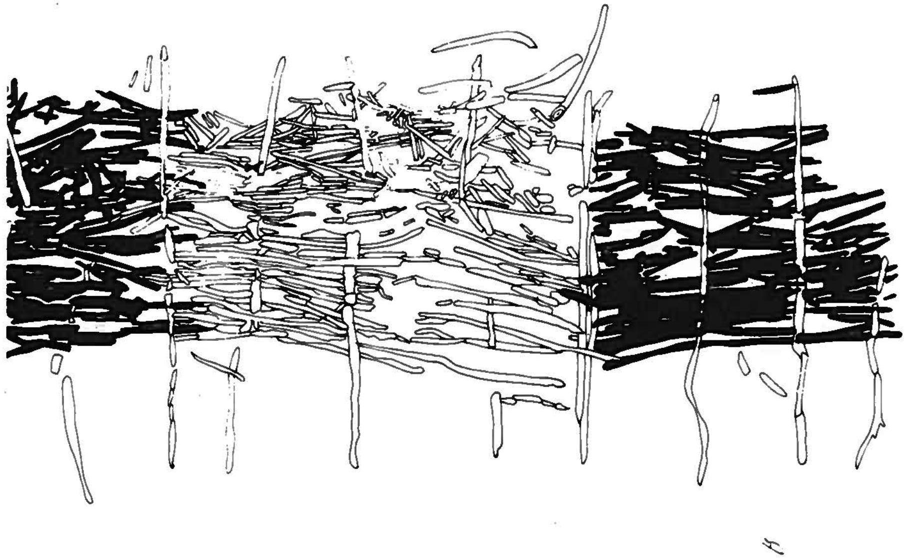


Fig. 11 The Eclipse track: upper





general plan; lower, separate hurdles.

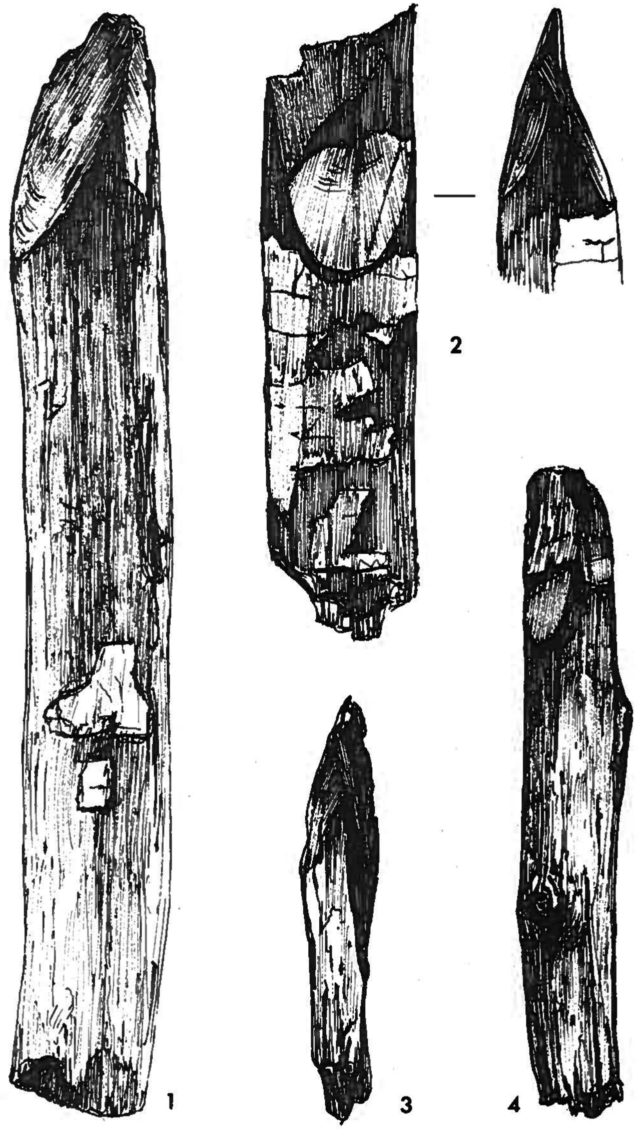


Fig. 12 Wood from the Eclipse track: faceted ends of hazel. Scale $\frac{1}{2}$.

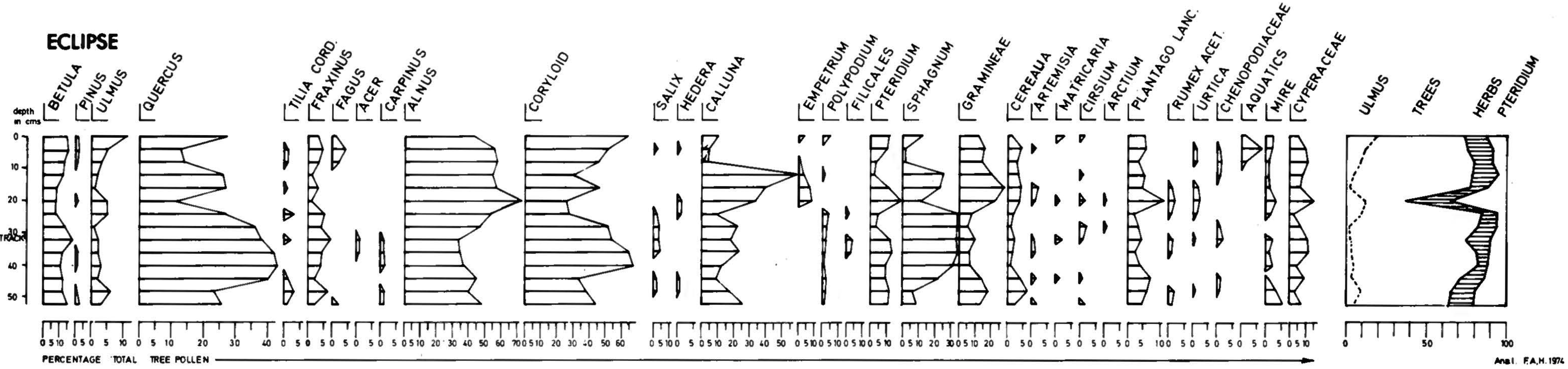


Fig. 13 Pollen diagram of the Eclipse track.

The pliant interwoven hurdles would have provided a stabilised pathway across the marsh, not unlike rough coconut matting. The track would probably not have been suitable for rough use such as the passage of cattle, but it would have taken heavy loads despite its fragile appearance. The strength was provided partly by the interwoven transverses, and partly by the pliant nature of the track, which would have yielded to pressure and moulded itself to the ground surface, without breaking.

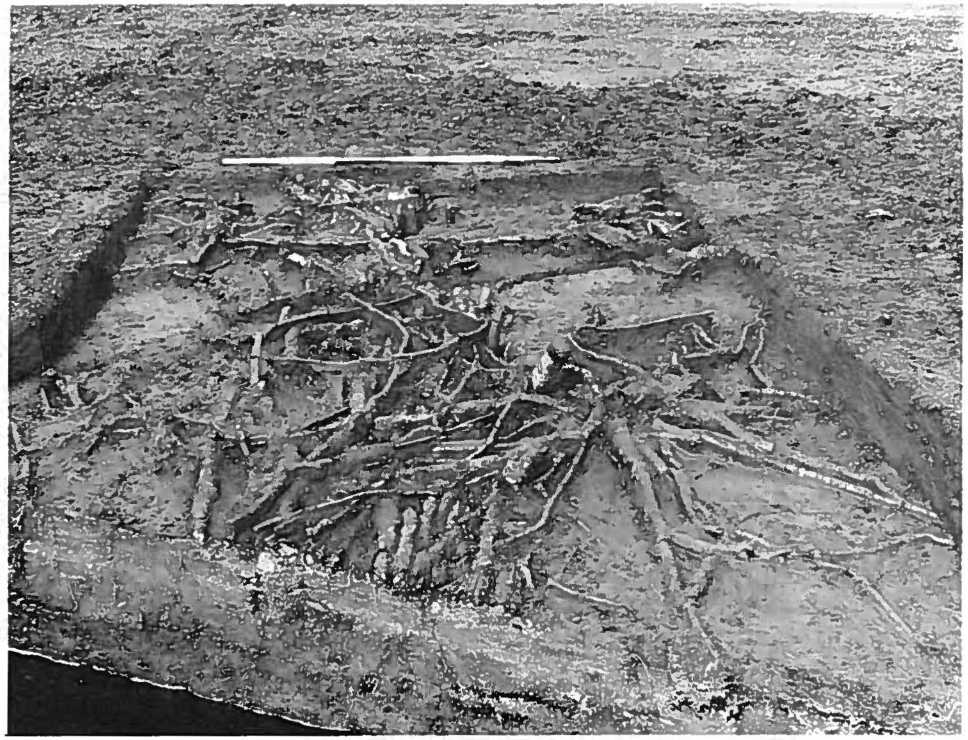
It is difficult to estimate the length of time the Eclipse track was in use, but two factors suggest a short life span. In the first place, no clear evidence for repairs was found. Secondly, while the rate of peat growth is not known, it appears that the track was fairly rapidly engulfed in cotton grass and other plants, which both concealed it and preserved it in a relatively unweathered state, the bark and cut ends being protected. The period of use was perhaps 10 years at the most, and may have been only one or two seasons. As with other tracks in the Levels, it is assumed that they were submerged annually by winter flooding (Coles, Hibbert and Orme 1973, 281). The longer estimate may be preferred in view of the care and effort involved in building the track.

The purpose of the Eclipse is equally hard to deduce. It was built by people to enable them to cross an unstable marshy surface, probably starting from Meare Island and maybe reaching the Poldens. Their desire to cross the marsh caused them to make at least 125 hurdles to cover the known length of the track, and if the track reached the Poldens, a distance of 2·5 km, 1250 hurdles would have been required. In any system of values, the effort involved can hardly have been negligible. No other length of woven brushwood track is known from the Levels, although a short piece of hurdling has recently been recovered from Withy Bed Copse. Thus the Eclipse track is unique in the area, and adds a very different type of construction to the range already known. In addition, the date of the track indicates for the first time that trackway construction may have been a necessity throughout the period from the late fourth millennium to the late first millennium. The previous second millennium gap in the occurrence of such structures in the Levels has been filled by this track and others discovered in 1974. This suggests a continuing interest in the Levels and permanent occupations throughout the Neolithic and Bronze Age.

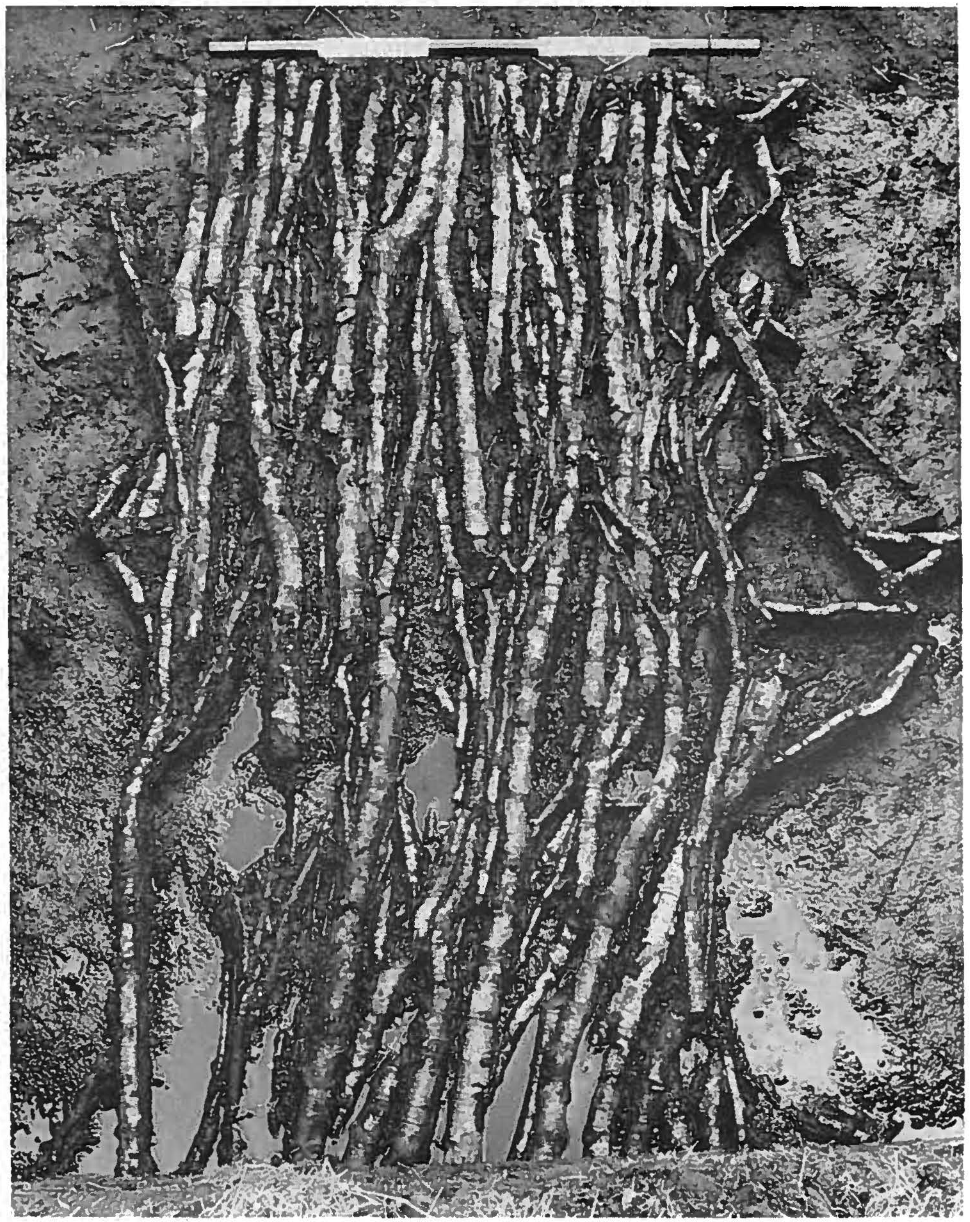
The Eclipse date is also relevant when one considers this structure in the broader context of British prehistory, because in general there is a scarcity of mid-second millennium bc dated sites, and the problems with the archaeological evidence from the adjacent territory of Wessex will readily come to mind. The Eclipse track provides new evidence for human activity in the Early Bronze Age, a period which is largely known through burials and metalwork. Here, instead, there is evidence for the *use* of axes in the cut-marks on the branches, and probably evidence for coppicing in the abundance of long straight pieces of hazel (*c.* 50 000 may have been used). The hurdles themselves are a new item in the inventory of Bronze Age material culture, although known in earlier contexts by imprints on sites such as the Skendleby and South Street long barrows (*Antiquity* 42, 1968, 138–42). Later traces occur on sites such as the defences of Iron Age settlements, or as the linings of Iron Age storage pits (*Bull. London Inst. Arch.* 7, 1968, 1–14). The Eclipse hurdles must surely be the best preserved of any British examples, though the circumstances of conservation facilities in 1974 did not allow their continued preservation. It is technically possible to lift and treat such fragile and fragmentary material, but more storage, conservation and display facilities would be required than have been available up to the present. Such facilities are now being developed by the Somerset Levels Project.

Pl. 1 The Honeygore complex, GV.5. The main Honeygore track runs in the foreground from the left (west) to the right, and appears here to consist of two main units, not aligned exactly upon one another. In the background is the slender track identified as the Honeycat, lying at a higher level. Scale totals 1 m.

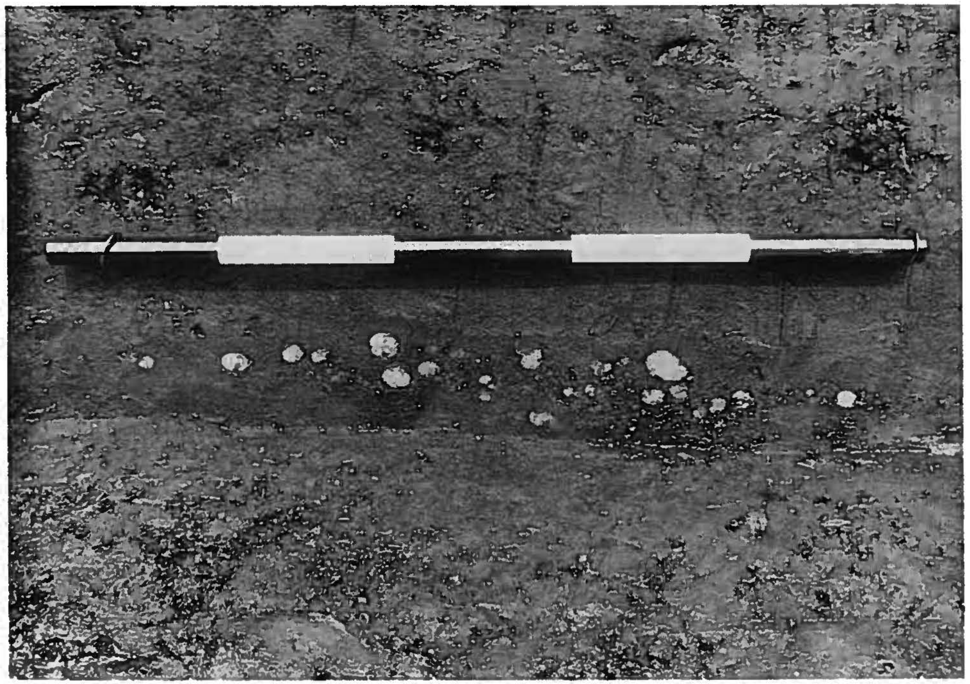
Pl. 2 The Honeygore track, GV.2. Although rather sparsely represented here, the birch timbers are substantial. Most of the small brushwood between the timbers has been removed. Scale totals 1 m. Date 2800 bc.



Pl. 3 The Honeygore track, GI. The brushwood track is here beneath the root systems of nine trees, most of alder, which grew directly upon the track after its abandonment. The scale totals 6 ft, excavations 1969.



Pl. 4 The Honeycat track, GV.1. The birch timbers here are slender but tightly packed in a single thin bundle. Scale totals 1 m. Date 2400 bc.



Pl. 5 The Honeycat track, GV.1. Section through the track to show the spread timbers of birch with small brushwood packed beneath and between the main pieces. Scale totals 1 m.

Pl. 6 The Eclipse track, 1974. View of the track as excavated looking north-west. A slight change of direction is evident in the foreground, at the junction of two hurdles. Scale totals 1 m. Date 1500 bc.

Pl. 7 The Eclipse track. Detail of the central area of the excavation, 4·50–7·50 m, looking east. Note the weaving of the transverse timbers.

WITHY BED COPSE, 1974

by J. M. COLES, B. J. ORME, F. A. HIBBERT and R. A. JONES

The field known as Withy Bed Copse is situated close to the slopes of the Poldens (fig. 1), at the southern edge of one of the most intensively exploited areas of peat (ST 43553940). In July 1973 it was cut by machine in an east–west direction, and further cuts were made in December 1973, and April and October 1974. In the last cutting, some of the old heads were backfilled for the machine to move along. The resulting complex pattern of heads is illustrated in fig. 14.

The Project's field archaeologists observed the cutting as it progressed, and examined both the sections and the mumps. Several exposures of wood were noted at each cutting, and a field plan was drawn in order to keep an accurate record of these. It was found necessary to establish several fixed reference points along the field edge, owing to the constantly changing pattern of the heads. The wood recorded in fig. 14 was never all visible at any one time, and it only gradually became apparent that the Withy Bed Copse archaeological material formed a generalised pattern on the western side of the field.

The first cut in July 1973 (cut 1, fig. 14) revealed a scatter of branches, brushwood and some worked timbers from the mumps, including one notched piece which confirmed the archaeological importance of what was otherwise rather unimpressive material. The December cuts added a few more find spots, and it was noted that these did not necessarily correspond with the earlier finds. In other words, timbers visible in section in July had ended within the next cut, and whilst a few pieces might be found in the mumps, the December cuts left the July find spots bare. This implied that Withy Bed Copse contained a scatter of timbers, and not a continuous structure as with many other discoveries.

In April 1974 the Field Archaeologist, J. Plouviez, excavated a small area *c.* 1·0 × ·8, m at A (fig. 14), in advance of renewed cutting. This spot was selected because several cut timbers were visible in section, and excavation revealed these as split planks. Area A was then left uncut by the Eclipse Peat Works, who agreed to reserve it for archaeological excavation.

The excavation of A was carried out in July 1974, revealing several worked planks to be described below. Areas B and C were opened after the completion of A, with the agreement of the peat operators, as it was felt that more information was required before the area could be interpreted. Area D was excavated by A. P. Fowler in November 1974 after the fourth series of cuts had been made, and more brushwood noted in section.

Site A

Site A was laid out between the first and second heads at the south end of the field, where 9 m of undisturbed peat was available from north to south. The area cleared was 4 m wide, with the small April excavation falling centrally at the northern end. The site was therefore dug with some knowledge of what to expect at the northern end, and at what depth below the surface. In the event, the northern end contained all the archaeological material, as the southern area was completely barren; this southern end is omitted from the site plan (fig. 15).

The surface peat was dry and disturbed, with some suggestion of animal burrows to the north, and what appeared to be the base of a hole dug from a higher level, to the south. However, undisturbed peat was reached before any timbers were exposed, indicating that they were *in situ* in their prehistoric contexts. The peat contained cotton grass, broken heather stems and some small pieces of squashed wood and root. As excavation proceeded, the timbers were gradually revealed, and it was noticeable that they lay at varying slight tilts, for a level peat surface was maintained over the whole site and the ends or edges of the timbers projected above this. With the information from the April excavation, it was possible to predict where some of the major timbers lay, and a square of peat, *c.* 25 × 25 cm, was reserved over and below one of them as a monolith for pollen analysis.

Excavation continued to the base of the timbers, which were found to be concentrated in the northern 3 m of the site. The peat contained more cotton grass and heather stems, and a few white grits similar to those from the Eclipse site were recovered. Possible animal disturbance continued. The heather was found in patches near the timbers. The cotton grass became more dense lower in the peat, and was in places very thickly packed below the timbers. However, the distribution of these two plants in the peat appeared to be natural, rather than the remnants of deliberate packing by man.

As excavation proceeded, the timbers of site A were revealed as six large planks, with scatters of wood and roots around them. Five of the planks lay clustered together at the northern end of the site, and the sixth was found immediately to the south; the brushwood scatter extended a further 50 cm south. The roots and the more rotten brushwood were removed, leaving the site timbers as illustrated in pl. 10 and fig. 15.

Plank 1 was made of ashwood, split almost parallel to the growth rings (fig. 16). It was 18 cm wide and 1–3 cm thick, with a preserved length of 1·63 m, the northern end having been destroyed during peat cutting. The southern end was cut back by about 3 cm, in antiquity, and three holes had been cut through the plank at *c.* 30 cm intervals along the western edge. The holes were D-shaped, 5–6 cm across, and the two to the north showed signs of having been cut on a slant, or they had possibly been worn by pegs inserted at an angle. The northern hole was not recovered intact, but all the evidence suggested it was a broken hole and not a notch. Apart from a long split down the centre, the surface of the plank was smooth, and it showed no trace of axe or adze marks. Two possible notches along the eastern edge may have been due to later interference, the southern one having roots growing through it and the northern one apparently damaged by earlier peat cutting at a higher level.

Plank 2 was also split from an ash trunk, in the same manner as 1 (fig. 16). It was 60 cm wide, 4 cm thick, and had a preserved length of 1·08 m, the northern end having been lost. The southern end was not well-preserved, and may have been damaged in antiquity. One D-shaped hole had been cut through the plank *c.* 8 cm from the southern end, the straight edge being parallel to the length of the plank. The hole was 8–10 cm across; the bar of the D was cut at a slant through the thickness of the plank, whereas the curved edge had been cut vertically. One long facet had probably been cut along the underside of the eastern edge, but apart from this and the hole, there were no signs of working.

Plank 3 was made of ash, and split in an unusual fashion across the centre of the tree (fig. 16). It was the smallest of those recovered from site A and had also been damaged by the machine cut along the northern section. It was 15·5 cm wide, 6 cm thick and at least 66·5 cm long. A single hole had been cut *c.* 8 cm from the southern end; it was square, *c.* 6 cm across, and the facets of the cutting were visible (pl. 11). Both surfaces of the plank were very smooth. The end had been squared and the sides were slightly curved as if following the line of the growth rings.

Plank 4, although superficially like 3, was made of alder. It had been split off the side of a trunk; some of the outer bark had been removed, but not all, leaving strips along the sides and across the lower surface at the eastern end (fig. 16). The plank was recovered in its entirety; it was 19 cm wide and 6 cm thick at the eastern end, 13 cm wide and 3 cm thick towards the other end, and 85·5 cm long. The eastern end had been cut to a point and a hole had been made through the plank 16 cm from this point. On the upper surface this hole was pentagonal, 8 × 5·5 cm, and it was slightly larger and more rectangular on the lower surface. The second hole was cut at a similar distance from the rather ragged western end; it was severely distorted by splits in the plank, but looked as though it too was originally straight-sided. A few very shallow axe marks were observed on the lower surface at the eastern end, where the bark had been removed.

Plank 5 lay diagonally across 4, and was separated from it by 1 cm of peat. It was in poor condition and the northern end had been damaged by machine. The recorded dimensions were 16·5 cm wide, 2–5 cm thick and at least 1·31 m long. The plank had been taken from an ash trunk, possibly as a radial split (fig. 16), although its very rotten condition did not allow any detailed examination of the section. At least two and possibly three holes had been cut along the eastern edge, at the same intervals as the holes in Plank 1. The centre hole was badly damaged, but is presumed to have existed. The northern hole was more or less oval, 5 × 5·5 cm, and judging by the section (fig. 16) it may have been cut through from both surfaces. The southern hole was similar, but it had been roughly cut and was slightly smaller than the northern one. This plank was too rotten to be examined for axe marks.

Plank 6 was immediately recognisable as oak, and appeared to be preserved in its entirety being 87 cm long, 21–26 cm wide, 4·5 cm thick at the southern end and 5·5 cm thick at the northern end. The direction of the growth rings and the generally even surfaces suggest that it was split tangentially to the rays, across the grain (fig. 16). Three holes had been cut through the plank, one near either end, and a central one near the western edge. The southern hole was almost square, 6 × 5 cm; it would appear to have been cut from either surface, but not quite accurately aligned. The central hole was cut only 8 mm away from the edge of the plank, and the slant inward from the upper surface suggests it was cut from one side only. The northern hole was square, 6 × 6 cm, and cut at a slight slant in the opposite direction to the central hole. Three axe marks could be seen along its southern edge on the lower surface. Around the edges of plank 6 there were various notches (fig. 15); these may have been deliberately cut, or they may have appeared as the plank decayed slightly, for oak does fragment in an angular fashion, giving a deceptive appearance of deliberate working. The upper surface of the plank was grooved and split, suggesting weathering; the undersurface was well-preserved, and a group of axe or adze marks could be seen between the northern and central holes, as if the surface had been smoothed down in this region after the initial splitting.

The scattering of wood around the planks was lifted, examined, and sampled for identification. It proved to consist of slivers and cut pieces of oak, ash and field maple, rather than complete stems as appeared at first sight. The whole gave the appearance of wood-working debris, although it is hardly likely that it was the debris from the making of the planks.

The wood from Site A exhibited no structure at all, the individual pieces not being connected or held together in any way, nor were they laid on the surface in any deliberate fashion. Instead, they were found tumbled in a diffuse and haphazard heap. They do not form part of a built trackway, therefore. It was thought that they might be old timbers thrown down to consolidate a wet patch of ground, or that they had floated into position and come to rest in a slight hollow or pool. Either possibility would account for the scattering of smaller pieces. However the timbers could also represent a dismantled trackway, a possibility that would account for the general alignment of wood across Withy Bed Copse, and it was with this last hypothesis in mind that two further sites were opened, to see if any further evidence might be recovered.

Site B

Despite the occurrence of brushwood in the mumps, Site C proved to be sterile, a reflection of the general peculiarities of timber distribution at Withy Bed Copse. Site B, however, yielded wood in the southeast corner and across the northern end (fig. 17). The latter consisted of brushwood and stakes, concentrated at either corner in two spreads of about 1·5 m separated by *c.* 1 m, with most pieces aligned north–south. The northern edge of the wood had been cut by the machines, but a number of the preserved ends to the south had clear axe marks. The wood was identified as alder, hazel, willow, field maple and white-beam. The pieces were complete stems ranging from 1 to 5 cm in diameter, with most pieces being either *c.* 2 cm or *c.* 4 cm in diameter. Some side branches had been trimmed off the larger pieces. There was no indication of any structure along the northern edge, nor any evidence for the wood having been tied together in bundles or pegged *in situ*.

At the southern end of the site a patch of brushwood *c.* 2 × 1·50 m was found in the eastern corner. It was very slight and fragmentary, consisting of short broken pieces *c.* 1–2 cm in diameter and a mass of smaller broken twigs. Most of the pieces lay in a north–south direction, with two cross-pieces that may have lain over and under the others (fig. 17). Although this area was not well-preserved, and the wood was very broken, it gave the appearance, during excavation, of a possibly woven structure, and in view of the subsequent discovery of a similar feature at D, this interpretation now seems the more possible.

Site D

This site was a small area cleared by the Field Archaeologist, because wood was observed in section immediately below the cleared peat surface. The wood consisted of slight pieces of brushwood similar to those at the south of B, and undoubtedly interwoven (fig. 18). The cross-pieces were at intervals of about 20 cm, and extended slightly beyond the edge of the mat of longitudinals. The whole was very fragmentary, having been squashed by more than one machine; it appears to have been a piece of hurdling similar in construction to the Eclipse trackway. It was

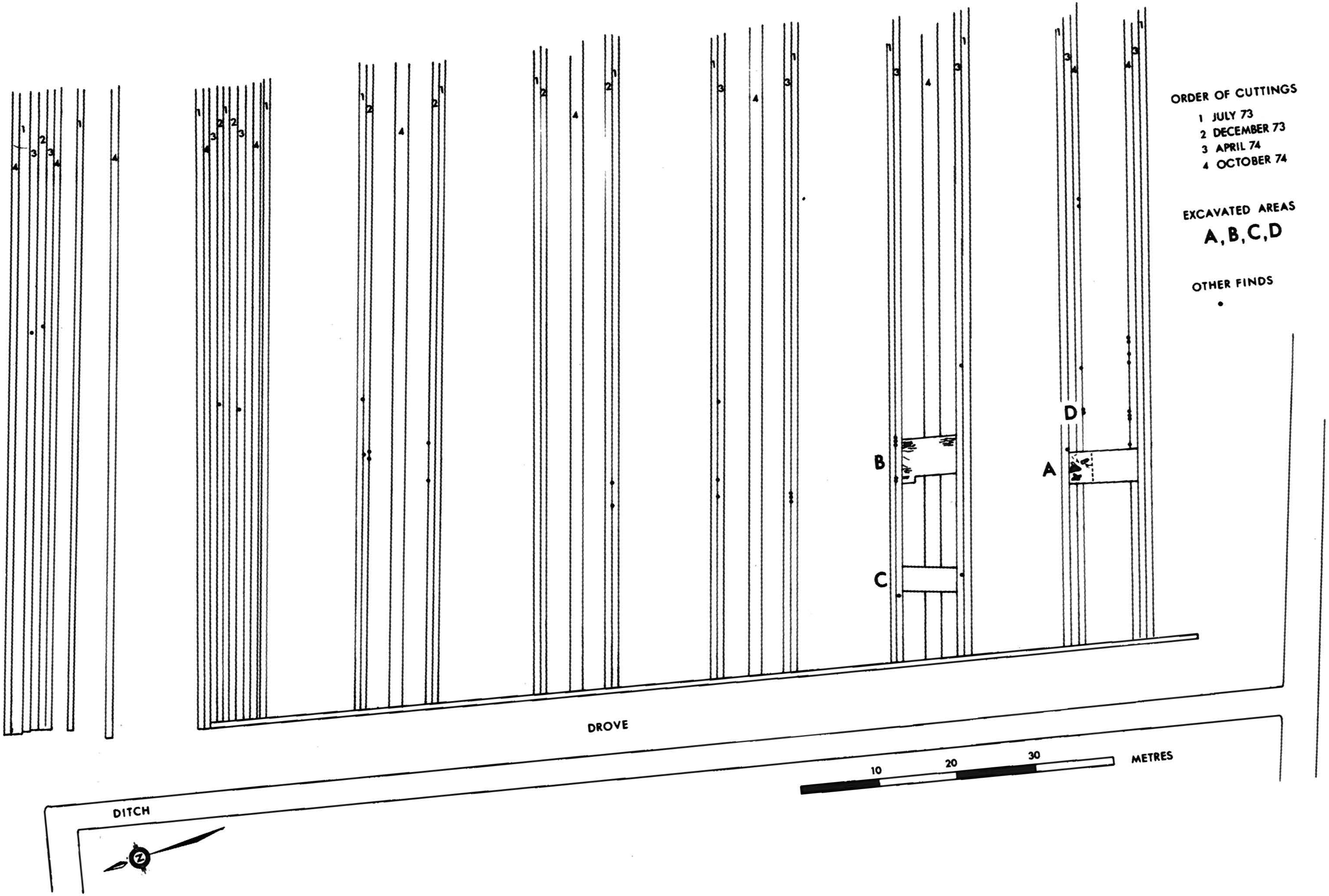


Fig. 14 Field plan of Withy Bed Copse, showing the order of cutting, excavation sites, and field discoveries.

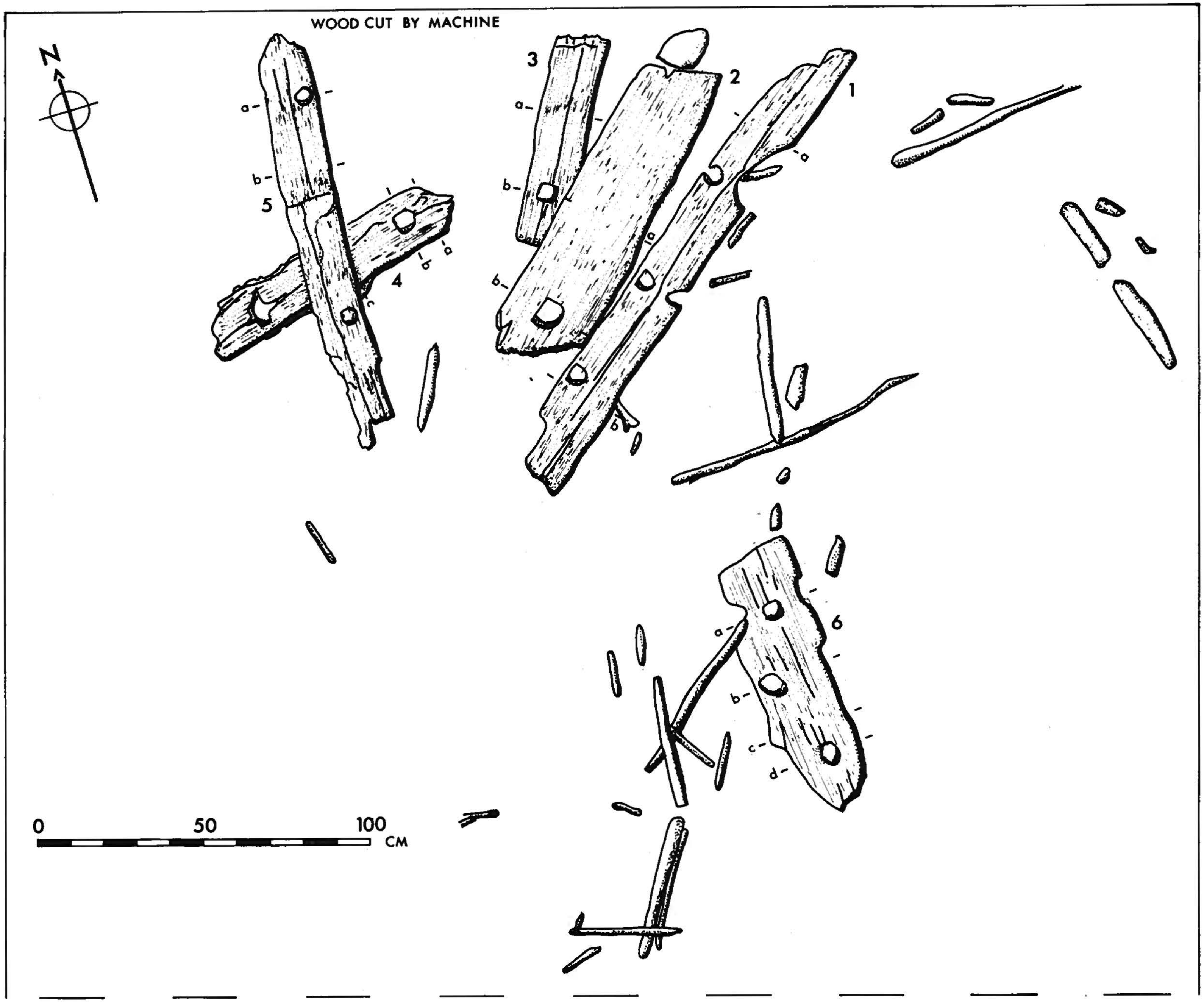


Fig. 15 Withy Bed Copse, Site A.

not continued to the south, and the northern end is unrecorded. Therefore it cannot be said whether it was associated with any other structure or not, or whether it was continuous from D to B, given that B may have contained the remains of a similar feature. It is as likely to have been an isolated piece of wicker-work, as a trackway.

The question of association of all the Withy Bed Copse finds is important. All the sites produced wood at the same level in the peat (*c.* 2·60–2·80 m OD) and the exposures to the north were a few centimetres higher. This, together with the alignment, suggests that all the wood was contemporary, and formed part of the same prehistoric feature, whatever that may be. Tree-ring analysis of some of the timbers has supported this interpretation, and pollen analyses have given some indication of the relation of the timbers to other structures and to the environmental situation.

Peat stratigraphy

The peat stratigraphy at Withy Bed Copse (fig. 19) is mainly that of a raised bog with twigs of *Calluna* (ling) and remains of *Sphagnum* (bog moss). Within this general picture however there is a concentration of *Sphagnum* species associated with wetter pool situations, being rather better preserved, together with a local concentration of monocot rhizomes, at a depth which is the same level as that of the trackway itself. The pollen diagram has a brief record of pollen from aquatic plants at about the same level. These facts would mean that at the time the trackway was laid down the conditions were temporarily much wetter. The sediments above the monolith examined had been removed by previous peat cutting so it was not possible to establish by what extent this brief wetter period preceded the major shift towards a *Cladium* peat as shown at the Eclipse and Tinney's sites and recorded elsewhere in the levels (Clapham and Godwin 1948). A trial boring through the deposits beneath the trackway showed no occurrence of this peat-type until peat associated with the Neolithic fen-wood phase was reached.

The marked appearance, and increasing representation, in pollen of open-ground plants is of interest in this pollen diagram. With the exception of plantain and sorrel the remainder all begin at around 16 cm and pollen of Cereals shows a marked rise. The Withy Bed Copse site is in a marginal position close by the contemporary dry land surface, and the appearance and high values of those plants more closely associated with arable cultivation (mayweed, thistle, cereal and mugwort) indicate an emergence of an arable economy in the area at a time soon after the trackway was built.

The composite pollen diagram of dry land plants clearly indicates this marked change. The pollen of grass and sedge are excluded from this diagram but both make large gains at this time. It is possible that some of the grass pollen may be associated with the change, the pollen of Cyperaceae is likely to reflect input from the marginal reedswamp and the sedges on the renewed raised bog surface. Values for tree pollen indicate that whilst oak has high values, and must be considered to be a major component of the dry land forest, the extremely high values for hazel show it to be flourishing, not as an understory tree where it seldom flowers, but as a free-standing tree. The use of hazel timbers in Bronze Age trackways and the large frequencies reached by the pollen values point to the deliberate opening of the forest cover to allow the tree to flourish. It is possible that the tree was coppiced which would produce, in a few years, stout straight poles of infinite use to prehistoric man. Trees treated in such a way would have a cycle of cutting around 7–10 years; such branches would flower freely within that period and so contribute to the high pollen values. Pollen of *Myrica* (sweet gale) is difficult to distinguish from *Corylus* and contributes to the total value of Coryloid pollen (*Corylus* + *Myrica*). Plants of sweet gale would be found on the relatively dry bog surface. *Alnus* (alder) would be found in the marginal zone between the dry land areas and the bog itself. As such it would be a consistent and important tree all around the base of the high land masses. Further comments on the peat stratigraphy appear in the succeeding report on Tinney's Ground.

Tree-ring analysis of wood

At Site A, six planks of varied shapes and numbers of holes were exposed during the 1974 excavations. Samples from five were collected for tree-ring analysis; the last was a nicely worked plank of oak (*Quercus* sp.) with three holes on the edges of which the annual ring boundaries were visible. They showed that the rings were extremely wide, and that the plank had been cut parallel to them, that is, the rings ran along rather than across the width of plank, thus giving the minimum number of rings. It was therefore considered unsuitable for analysis.

One of the five, with bark still remaining, proved to be alder (*Alnus* sp.) with very wide rings which were difficult to distinguish; it had been formed by splitting a trunk lengthwise.

The remaining four planks (1, 2, 3 and 5) were all of ash (*Fraxinus* sp.). They had been split from the trunk across or close to the pith to include the inner rings; as ash tends to split naturally around the rings, it is not easy to split radially as with oak which splits naturally along the rays, from pith to bark. Between 16 and 37 annual rings could be counted and measured—evidently growth had been very fast since widths often reached 5 mm, and as ash is a light-demanding species, it must have been growing in a suitable open situation.

The four tree-ring curves could be correlated, although too short for computer analysis of the degree of similarity, into a 37-year mean curve (fig. 20); the mean values are listed in Table 1.

TABLE 1 Withy Bed Copse. The annual mean values of the four ash planks in tenths of millimetres.

	1	2	3	4	5	6	7	8	9	10
1	20·0	27·5	18·0	16·0	21·5	12·5	18·5	37·0	58·0	40·0
11	37·5	37·0	52·5	38·0	39·0	44·0	23·0	35·0	24·0	45·0
21	29·5	27·5	27·0	19·0	22·0	33·0	22·0	26·0	20·0	28·0
31	14·0	10·5	14·0	14·0	12·0	15·0	24·0			

These values indicate that the planks are contemporary, although since all the curves referred to here are so short, any results must remain fairly tentative. Planks 1 and 5 resemble each other, but between these and 2 and 3 there is such variety of plank and hole shape and size that it is of interest to find that they are synchronous.

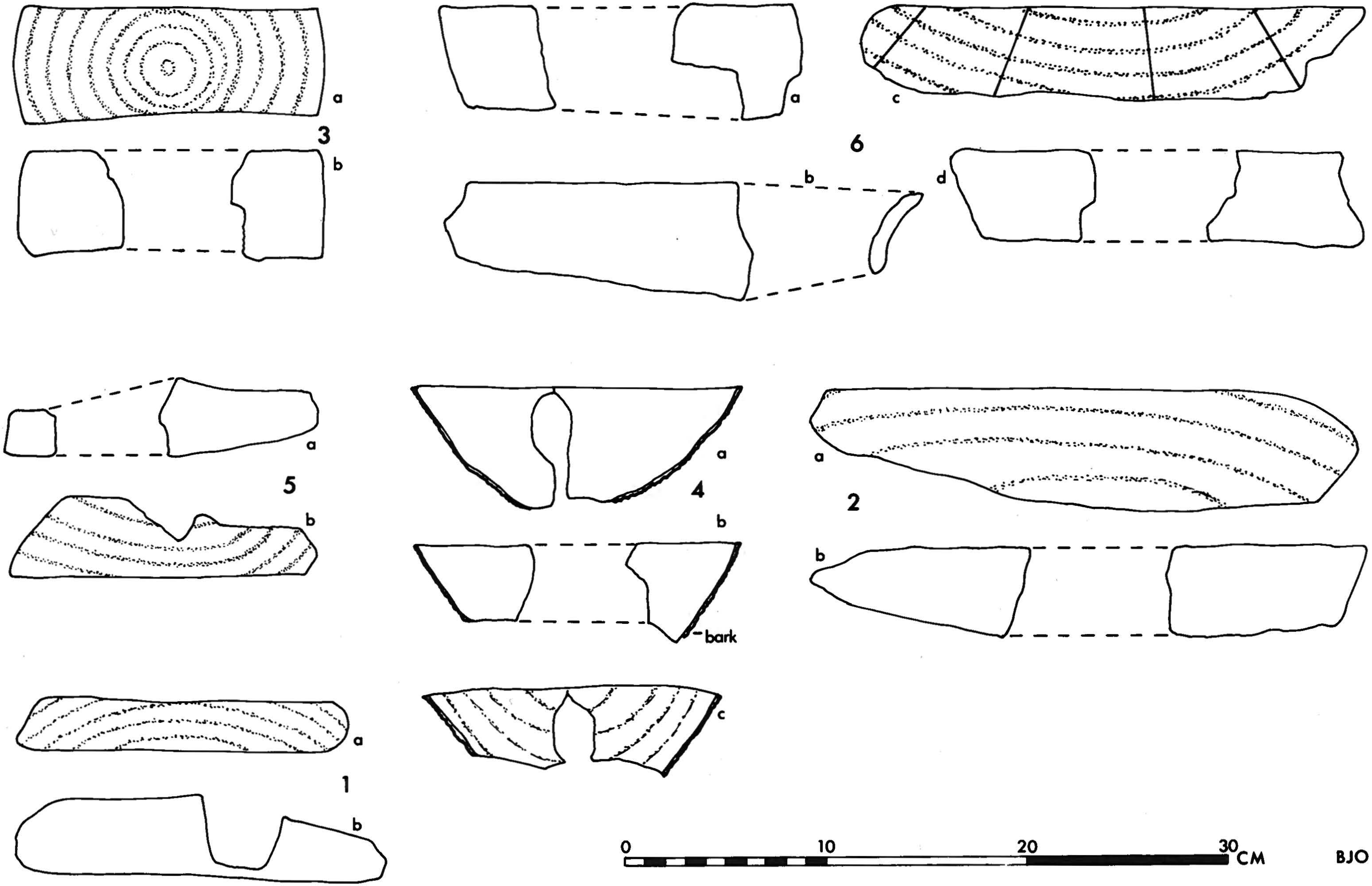


Fig. 16 Plank sections from Withy Bed Copse, Site A.

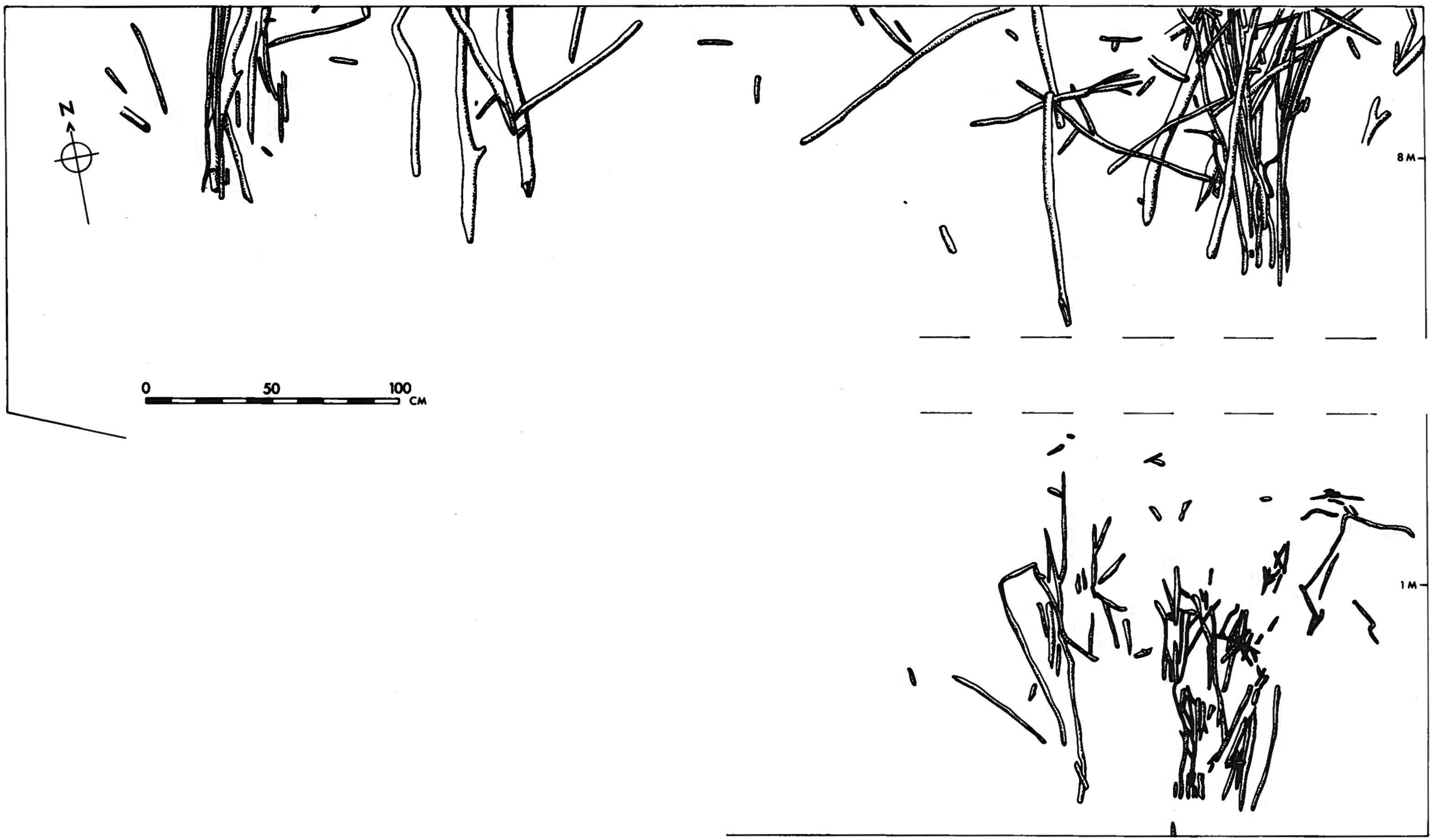


Fig. 17 Withy Bed Copse, Site B.

Their isolation, although there is a scatter of varied track remains over the field, may indicate that they originated in another trackway, and were either reused to traverse a wet area or were flooded off to settle at this point. Since they are contemporary, they must have come from the same source. The planks do resemble those illustrated by Godwin (1960, 4) from the Meare Heath trackway, thought to lie only a few hundred metres to the east of Withy Bed Copse.

Samples of ash and oak were collected from the brushwood scatter around and south of the planks, which provided ring sequences of between 10 and 24 years. All the oak samples were tiny radially cut pieces, while the ash consisted of two complete stems and two radially cut fragments.

The four short ash curves could be correlated, of which two end in the same year, and the pattern also corresponds to that of the ash planks with the latest ring ending one year before; since one of the fragments is a complete stem, the last ring probably represents the felling date, although it was too decayed for the bark edge to be distinguished.

Thus in all probability the ash brushwood is contemporary with the planks, although this could argue against their reuse from elsewhere.

In addition, three of the oak samples appear to correlate, although very short, and also show much the same pattern as the ash. It is not common practice to attempt dating by a comparison of the growth patterns of different species since little is known of their comparative reactions to growth regulators, and this agreement must therefore remain tentative. All the curves are shown in their synchronous positions in the form of a block diagram in fig. 21.

In the north trench of Withy Bed Copse, the small areas of brushwood could not provide particularly suitable samples for tree-ring analysis, but a total of six sections were collected from larger timbers in order to ascertain if they were contemporary. All came from a group of sharpened stakes which had been laid down, in the north end, and proved to be of birch (*Betula*) and alder with from 7 to 19 rings of which the two youngest were not measured or plotted. The four other ring sequences, two of each species, appear to correspond, with the two alder curves ending two years later than the birch; since all have bark or the bark edge remaining, the outermost ring represents the year of felling. No correlation was attempted with the samples from the south trench, which, due to the variety of species and the shortness of the sequences, would be extremely tentative at best.

Conclusion

There is no doubt that much remains to be done at Withy Bed Copse before any conclusive interpretations of the archaeological material can be made. However, certain features can already be distinguished as significant, or of potential interest, and these are discussed below in an attempt to define those problems which future excavations may settle.

Withy Bed Copse is immediately to the north of the dry ground of the Poldens. In conditions of raised bog a domed peat surface is produced and the edges slope downwards, tending to be wetter than either the inner domed surface or the adjacent slopes. Rainwater from the slopes will collect in this lagg, and Withy Bed Copse may well have been one of these particularly wet areas, a factor which affects any

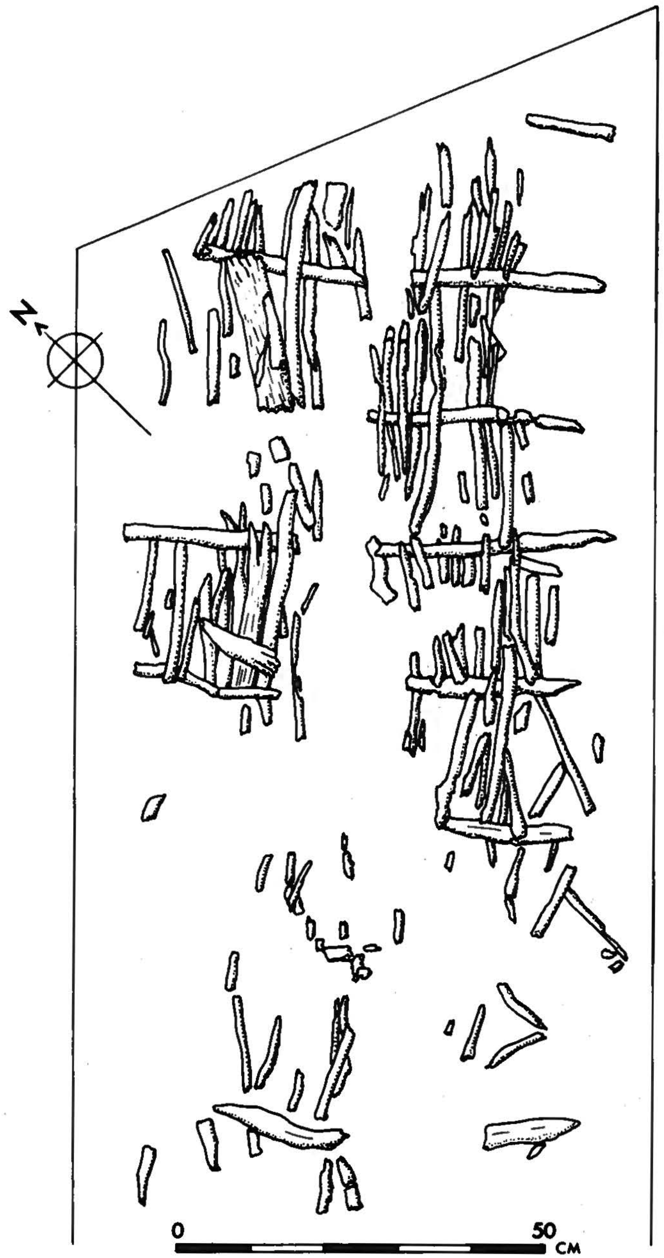


Fig. 18 Withy Bed Copse, Site D.

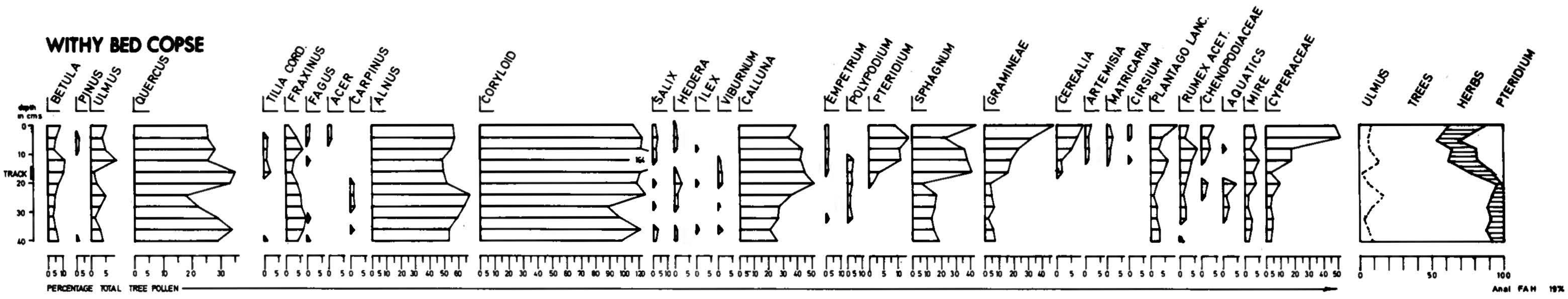


Fig. 19 Pollen diagram of Withy Bed Copse.

interpretation of the material.

Considered separately, none of the Withy Bed Copse excavations amounts to anything impressive as a site, although the planks from A are interesting examples of Bronze Age woodwork. In fact, compared with other sites from the Levels, the material is exceptionally disjointed, disorganised and lacking in deliberate arrangement. However, if one considers the field as a whole (fig. 14), it may be seen that the wood occurs scattered in a broad line from the southwest corner towards the north, veering slightly eastwards. The existence of this line running due north from the Poldens indicates that the wood is a relic of a path, and not merely debris redeposited after a flood, as might be suggested for Site A in isolation, for example. Considered as a path, several explanations may be put forward to account for the scattering of the wood. It may have been laid down in the wettest parts of a generally wet area to enable people coming from the slopes of the Poldens to reach the central area of raised bog, in which case the alignment would represent a continuation of a pathway on the dry ground. If, on the other hand, the timber is all that remains of a constructed trackway, the definite alignment is more readily accounted for, but the reasons for the dismantling remain a mystery, unless subsequent severe flooding washed away most of the structure, leaving only disjointed members lying near the original line. In this case it seems strange that no pegs were left *in situ*.

The wood is very diverse and does not suggest any particular interpretation in itself. The planks are heavily worked, as if they had been discarded from some other construction that required the holes of varying shapes. The woven piece might have been old hurdle-work or fencing, unless one should think of it in terms of fish-traps and the like. The brushwood can only be brushwood and not part of any other artefact. Each separate element may be compared with other material from the Levels: the similarity of the woven piece to the Eclipse track has already been noted (cf. fig. 11); the brushwood is paralleled at Tinney's (cf. fig. 25); the Meare Heath track (Bulleid 1933) has produced planks with a similar arrangement of holes. It is only at Withy Bed Copse that all three features are found together, although Meare Heath had both planks and brushwood. If one projects the line of the Meare Heath track from Bulleid's two find spots and a recent exposure now being excavated, it reaches the Poldens in the vicinity of Withy Bed Copse. Along this alignment a bronze spearhead was found some time ago (Dewar and Godwin 1963, 32). A tentative suggestion can therefore be made that the Withy Bed Copse is the dismantled southern end of Meare Heath track, rather than a random selection of old wood used to consolidate wet hollows. As such it may date to *c.* 900 bc; new samples for dating have been collected.

Since Withy Bed Copse was first observed in August 1973, each successive peat-cutting and each site has produced new material. Possible interpretations have altered as the evidence accumulated, and as further cuts are made, and new areas excavated. The interpretation suggested above may well be proved wrong. The one constant feature has been recognition of the steadily increasing archaeological importance of the area.

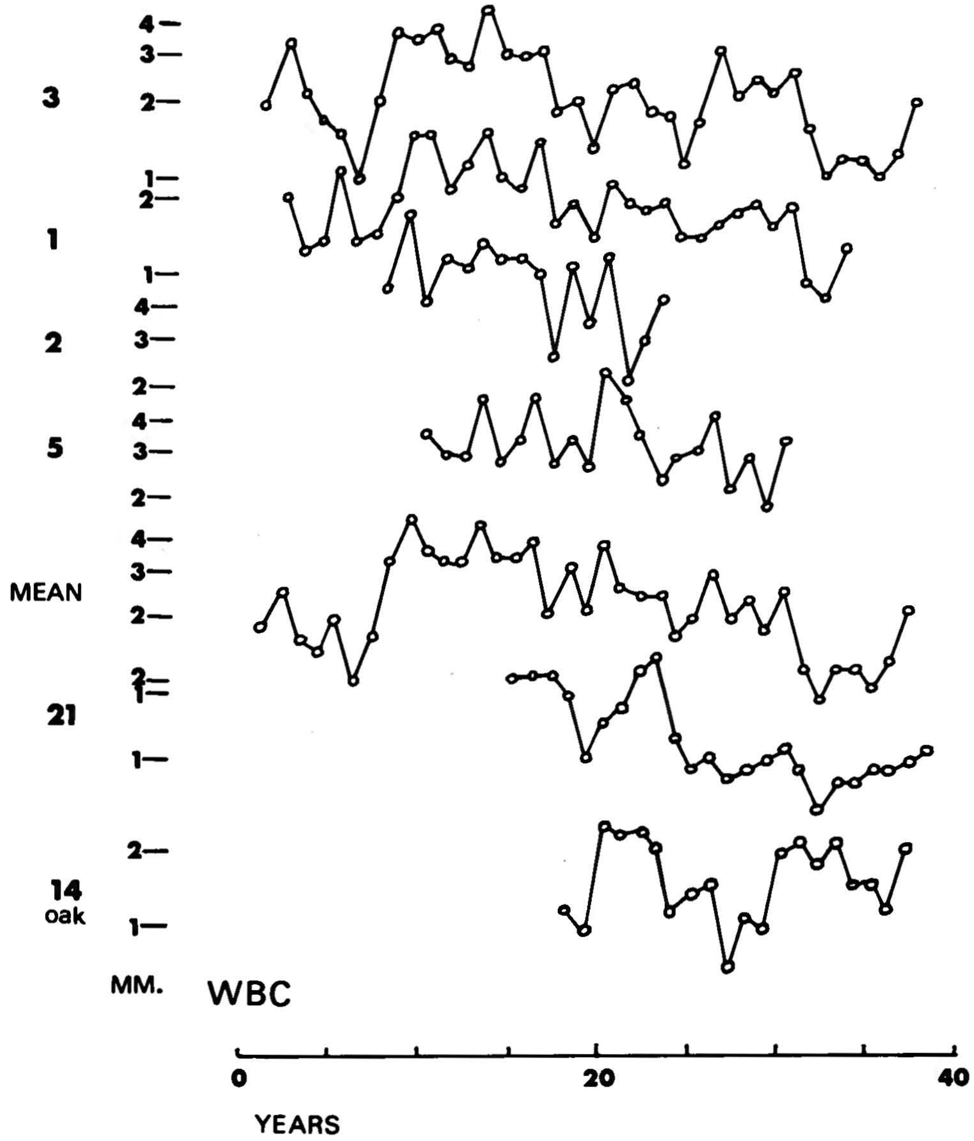


Fig. 20 Tree-ring sequences from Withy Bed Copse: four ash planks (1–3, 5) with their mean curve, and two brushwood fragments, one of ash (21) and the other oak (14). Each circle represents the width of one annual ring; the scale is logarithmic.

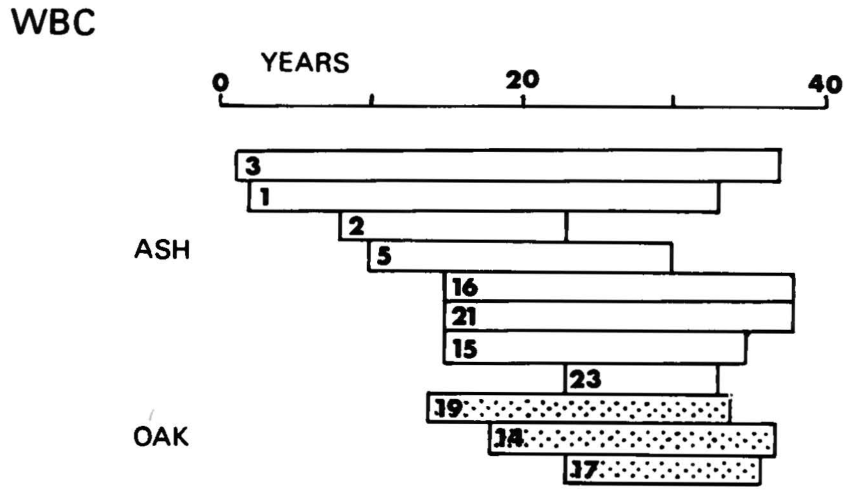
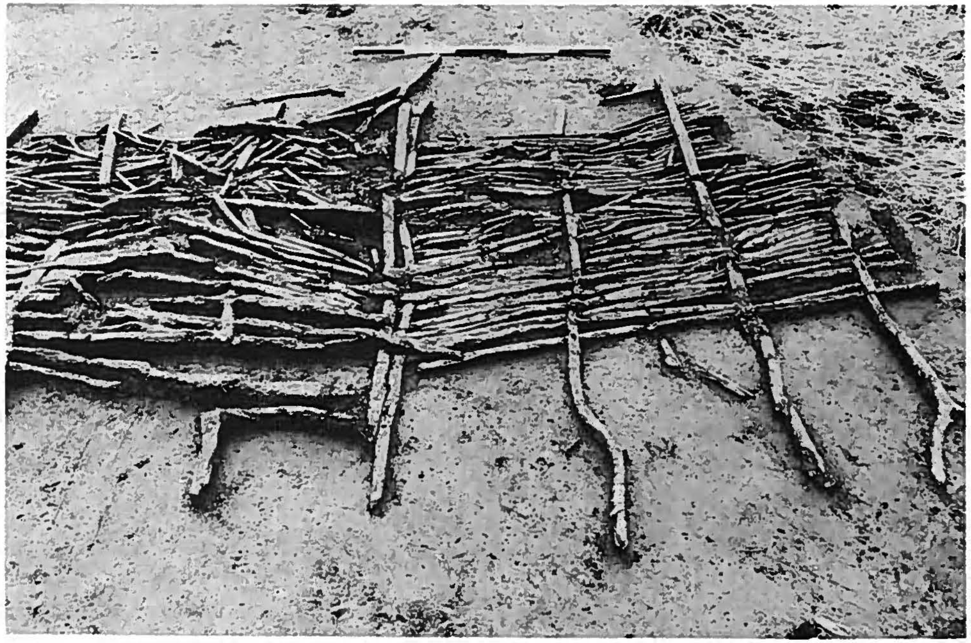


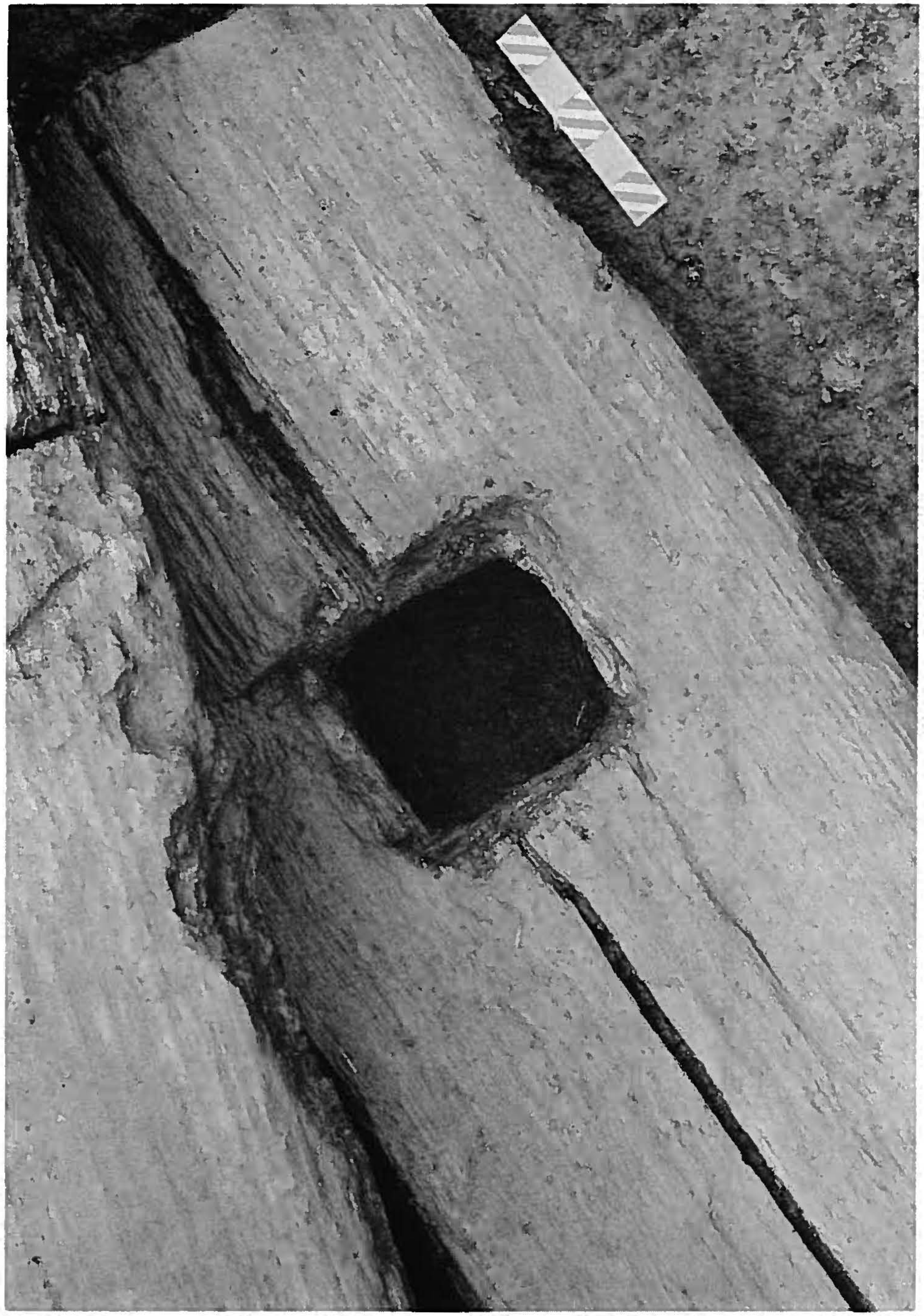
Fig. 21 Tree-ring sequences from Withy Bed Copse: block diagram showing the relative positions of each tree-ring sequence; the right edge of samples 16 and 21 probably represents the year of felling.



Pl. 8 The Eclipse track. Detail of the south-east end of the excavated area, looking west. Note the change of direction at the double transverse timbers, and the clear evidence of separate hurdle work.

Pl. 9 The Eclipse track in section south of the excavated area, to show the small longitudinal pieces passing over and under the transverse timbers.

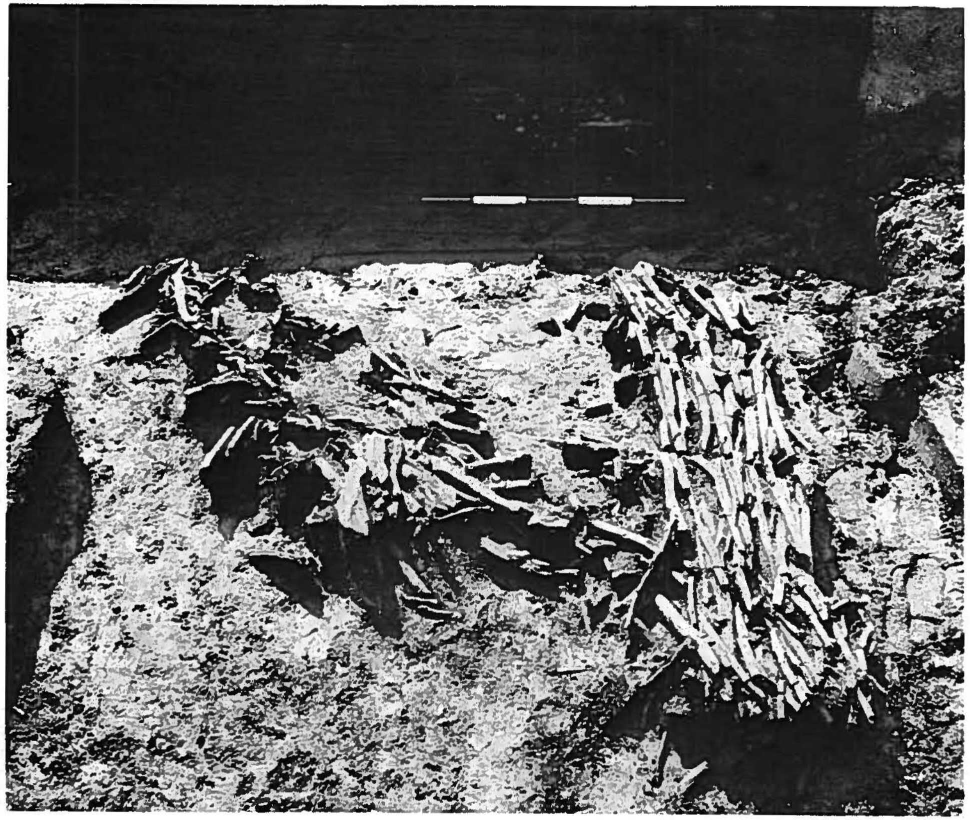
Pl. 10 Withy Bed Copse, 1974. Site A, looking south, to show the planks *in situ* with machine-cut ends in the foreground. There are no vertical pegs holding the planks in position. Scale totals 1 m.



Pl. 11 Withy Bed Copse. Plank 3 *in situ*, to show its squared hole at south end.

Pl. 12 Tinney's Ground, 1974, Heads 17–18. Three damaged tracks lying at identical levels in raised bog peat. The more distant pair has survived only between the heads where previous machine-cutting did not penetrate as deeply as the recent operations. The nearest track has been cut through (right) by the blades of the machine, but the slightly raised surface of the peat here allowed part of the track to survive.

Pl. 13 Tinney's Ground, 1974. Heads 19–20. Track at southern end of the reserved area, looking north-east. Machine damage occurs at the far end of this track exposure. See fig. 23 for site plan and indication of small pegs. Note smaller brushwood body of the track with heavier material along the edges. Scale totals 1 m.



Pl. 14 Tinney's Ground, 1974. Heads 17–18. Dense brushwood track on right with more damaged structure joining it at abrupt angle, the precise junction lost by peat-cutting. Date 1100 bc.

Pl. 15 Tinney's Ground, 1974, Heads 13–14. Brushwood bundle lying upon substructure of heavier timber, totally destroyed by machine-cutting in foreground and background. Note angled cuts left by the machine blades at base of run, and weathering effect on peat section to left and right.

TINNEY'S GROUND, 1974

by J. M. COLES, B. J. ORME, F. A. HIBBERT and R. A. JONES

In the course of systematic fieldwork over the Levels in late 1973, renewed peat-cutting in Tinney's Ground, Sharpham, was observed by the Project field archaeologist S. M. Buchanan. Tinney's Ground consists of four fields centred at ST 4708 3820, now combined by the Eclipse Peat Works into one field for the purpose of machine cutting in a north–south direction (fig. 22). A total of 41 heads had been cut by late 1973, and the machines had progressed up and down the field as indicated on the plan. Well before 1973, however, the fields had been extensively cut over and although no archaeologist was present, records did exist that some wooden stakes had been seen by the machine operators in the field immediately to the north, running from 47003835 to 47053855. In Tinney's Ground itself, other timbers had been seen but their precise position had not been recorded accurately enough to allow their plotting; however, it was stated by Mr A. Foster that a group of upright posts forming a square or rectangle had been observed at *c.* 47203835, that is, in the north-east corner of the fields shown on the plan (fig. 22).

In late 1973, during machine cutting in the Ground, it was observed that a very large series of artificial wooden structures had been cut through and lay in disarray along with their associated peat beside the 21 actual trenches cut. The machines tend to place cut mumps slightly behind the actual place of extraction, so in the recording of discoveries some small error can easily occur unless the direction of machine movement, and the type of machine, can be ascertained. In this case, however, the machine was still cutting in the fields and so the source of all the material recovered in the mumps could be readily determined. Incidentally, it is one of the tasks of field archaeologists in the Levels to familiarize themselves with the various machines and their operational movements.

In late 1973, the fields were mapped at a scale of 1 : 500 by members of the Project, with each head individually chained from datum lines. The field measured about 350 × 300 m, yet its survey involved several people each walking well over 50 km (30 miles). Before the field plan was completed, each head was searched three times, material from the mumps and the actual *in situ* timbers in the heads (sections) marked and measured in, and samples for dating and identification taken. An area 26 m long and 2 m wide, near the middle of head 19, was marked off for excavation as it appeared that two or three wooden structures lay close together here; a small drainage ditch running west–east across the centre of the field prevented machine-cutting in one sweep from south to north, and so the potential area for excavation was selected at the end of one of the machine runs where archaeology would cause as little interruption as possible. In the event, it was apparent that almost any area in the fields could have yielded useful results by excavation, and the selection of head 19 for detailed work was perhaps not the best choice. However, in late 1973 the trenches were already flooded and very little *in situ* material could be seen. As the field had been cut previously, it appeared that the only remaining archaeological material actually in place was in head 19, as the relatively firm peat between the heads was all backfill. Tinney's Ground seemed to represent the very end of an important archaeological site, cut away in years past.

In July 1974, during a season of excavations in the Levels, a small group of archaeologists undertook the excavation of the reserved area in head 19. Two others began a routine search of the heads, as the waters had receded. At once it became apparent that there was sufficient original peat still in the sections, generally 10 cm thick, to have held fragments of the wooden structures. The method of hand or machine cutting in the final stages of successive strips relies upon the time needed for backfilling to have consolidated enough to carry the weight of machinery, and to retain a section for cutting and gathering operations in general. Here the allowance of 10 cm between old cuts and new facilitated peat operations and successfully preserved enough archaeological remains to allow their exact identification.

In addition to this fortunate development, it appeared that traces of the structures remained in places in the bottom of the trenches between the heads (e.g. pl. 15); often these were only the lowest timbers of a structure, but sometimes almost all of the wood was present. All had been masked by the deposition of topsoil by machine clearance prior to the arrival of the peat-cutting machines, and subsequently flooded. Consequently there remained a very substantial proportion of the structures, most in a partially damaged state but nonetheless of great potential interest.

A team of archaeologists was assembled, and systematic searching and clearance by spade allowed the further excavation by hand of about 160 sites. Many of these sites consisted of only fragments of brushwood bundles, but the alignment of such as remained began to show quite conclusively that Tinney's Ground contained a series of connecting brushwood bundles forming a scatter of narrow trackways running in general from south-west to north-east. In most cases the actual excavation was carried out rapidly by teams of two archaeologists who were responsible for the clearance of disturbed peat overlying the presumed structure, then its careful excavation followed by recording on Polaroid or other film, drawing when time allowed, and sampling for worked pieces of timber, tree-ring studies, and radio-carbon dating.

Sites for these excavations were selected on the basis of the fieldwork already completed, but many new discoveries were made during a systematic cleaning of sections along the heads. On one or two occasions the small team directed to a particular site began work in the wrong place, and found hitherto unknown structures beneath the backfill. On 35 other occasions, excavation failed to reveal any trace of any artificial structure; the explanation for this is that the original timbers had been totally cut away by the machines, and had therefore been observed only in the mumps, subsequently removed as they dried. In many cases the 1973 machine cut had exactly conformed to the previous line and so the thin but vital section of undisturbed peat was missing. The fact that the brushwood tracks in Tinney's Ground lie at different levels in the raised bog peats, as detailed below, means that higher tracks were totally removed by machine, intermediate tracks were truncated in their thickness, and lower tracks were more or less intact.

Through the very intensive archaeological activity conducted in July 1974, and through further work in the succeeding months, a record has been built up of the surviving traces of prehistoric structures in this area. Further peat-cutting in autumn 1974 included lower level cuts, where the machines descended into the trenches between the heads, e.g. between heads 1 and 2, and these low cuts exposed the

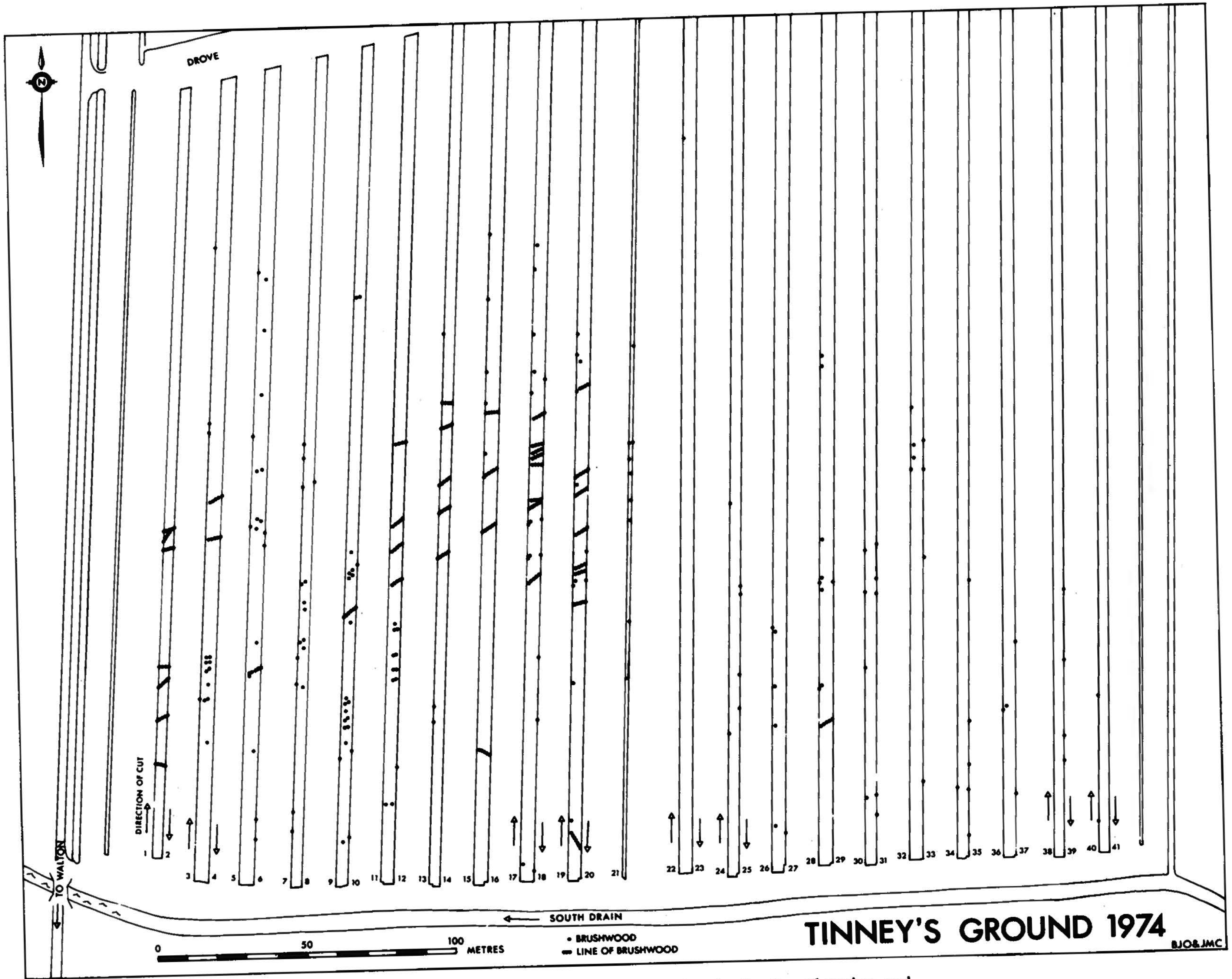


Fig. 22 Field plan of Tinney's Ground, showing the 41 heads, direction of cutting, and positions of prehistoric structures recovered by fieldwork and excavation. Individual numbers of structures in each head have been omitted.

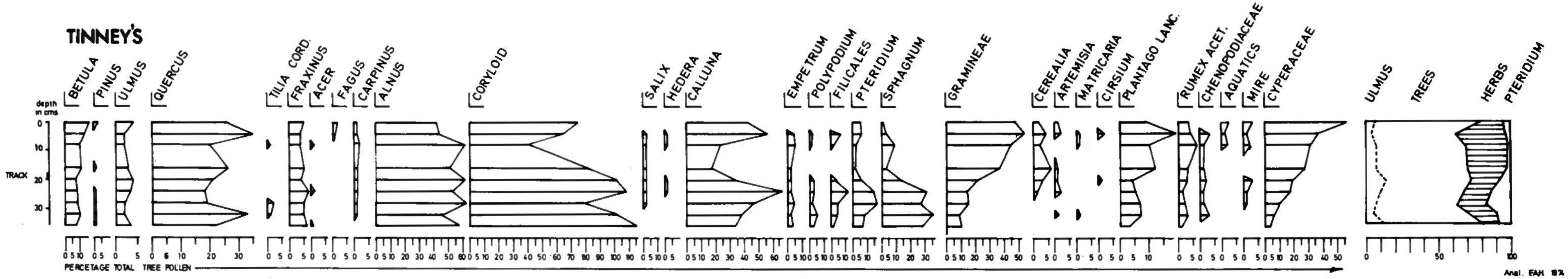


Fig. 23 Pollen diagram of Tinney's Ground.

lower timbers of a number of brushwood tracks that had in some cases not been discovered before; heads 3–4, 9–10 and 11–12, benefited in particular from these new low cuts. Indeed, the fact that these seem to be the first of a series of low cuts by the Eclipse Peat Works suggests that the lower part of many trackways will be available for future archaeological work and that the north-eastern part of Tinney's Ground, at present more or less a blank, will again be available for investigation.

Peat stratigraphy (fig. 23)

The uppermost 12 cm of the peat in a monolith from Tinney's Ground (Head 19) show a change to *Cladium*—monocot peat. The remainder is rather well humified *Calluna—Sphagnum* peat. The trackway here occurs at 18–20 cm which is beneath the fen-flooding horizon, yet the *Sphagnum* peat at this level is lighter in colour and rather less oxidised, showing that conditions were relatively wet. The change from the established raised bog conditions is further marked by the fall in values of pollen from *Calluna* and *Sphagnum* and a rise in values of pollen from aquatic plants.

Pollen from dry land plants associated with cultivation have increasing representation from rather low earlier levels. Most marked are the rises in Cereal and plantain pollen. Tinney's ground was some distance from the nearest dry land in the late second millennium but the high values must be taken to indicate an intensive activity in the area. The mixture of open-ground plants and the high values for Cereal pollen, together with the high plantain figures, indicate a mixed arable-pastoral economy. The percentage representation of herbaceous pollen shown in the composite diagram is relatively high in comparison to the Eclipse and Withy Bed Copse sites, the latter having a higher representation of *Pteridium* (Bracken) spores. These high values for herbaceous pollen may be taken to indicate an appreciable area of open-ground, possibly under continuous cultivation, in the area. Coryloid pollen values are high and reflect the input of pollen from hazel which would have been growing on the nearby slopes.

There are, however, several points of similarity in the pollen diagrams from all the three sites reported in these *Papers.* Differences are those of detail rather than of major significance. The pollen diagrams from Tinney's and Eclipse both cover the transition from dry raised bog to rather wetter bog and eventually to *Cladium* fen. The period of time represented by the fen deposits is greater at Tinney's than at Eclipse and this would account for the large increases at the former site in the values of plantain, grass, and Cereal pollen, all of which are characteristic of later Bronze Age activities. The radiocarbon dates from the wood of the Tinney's tracks are younger than that from the Eclipse track and this is in agreement with the relative positions of these in the peat stratigraphy and in terms of pollen zonation. The marked fall in the values of *Calluna* and *Sphagnum* occurs at the time of trackway construction at Tinney's, but is some time later than the building of the Eclipse trackway.

The Withy Bed Copse site is more difficult to interpret. There is no evidence of a change to fen conditions in the peat stratigraphy nor is there the parallel fall in the values of *Calluna* and *Sphagnum* as shown in the pollen diagram. The lack of "weed" indicators in the early part of the pollen diagram and the general trends shown elsewhere suggest that, on the basis of palaeobotanical evidence, the trackway would be at least as old as the Eclipse and possibly even earlier.

The final interpretation of these trends awaits the completion of a long continuous profile from a nearby site (Meare Lake) which is one of the few remaining sites with complete peat stratigraphy, possibly up to Roman times. In the meantime comparison with earlier work in the region (Clapham and Godwin 1948) shows little major differences with the trends in pollen frequencies and the stratigraphy recorded at that time.

Tinney's tracks

The mass of details about the archaeological excavation and investigation of over 200 sites in Tinney's Ground includes descriptions and records of all of the brushwood structures found in 1974, each numbered within its appropriate head. By the positioning of the timbers in the peat stratigraphy, their alignment, and their constructional features, a number of recognisable trackways have been identified. The field plan (fig. 22) presents a summary of the results, and it will be apparent that one easily-recognisable track runs from the southern part of heads 1–2 across the successive heads for 190 m to heads 19–20 by which time its general character has changed (fig. 24 and 25, description below). In addition, several other probable

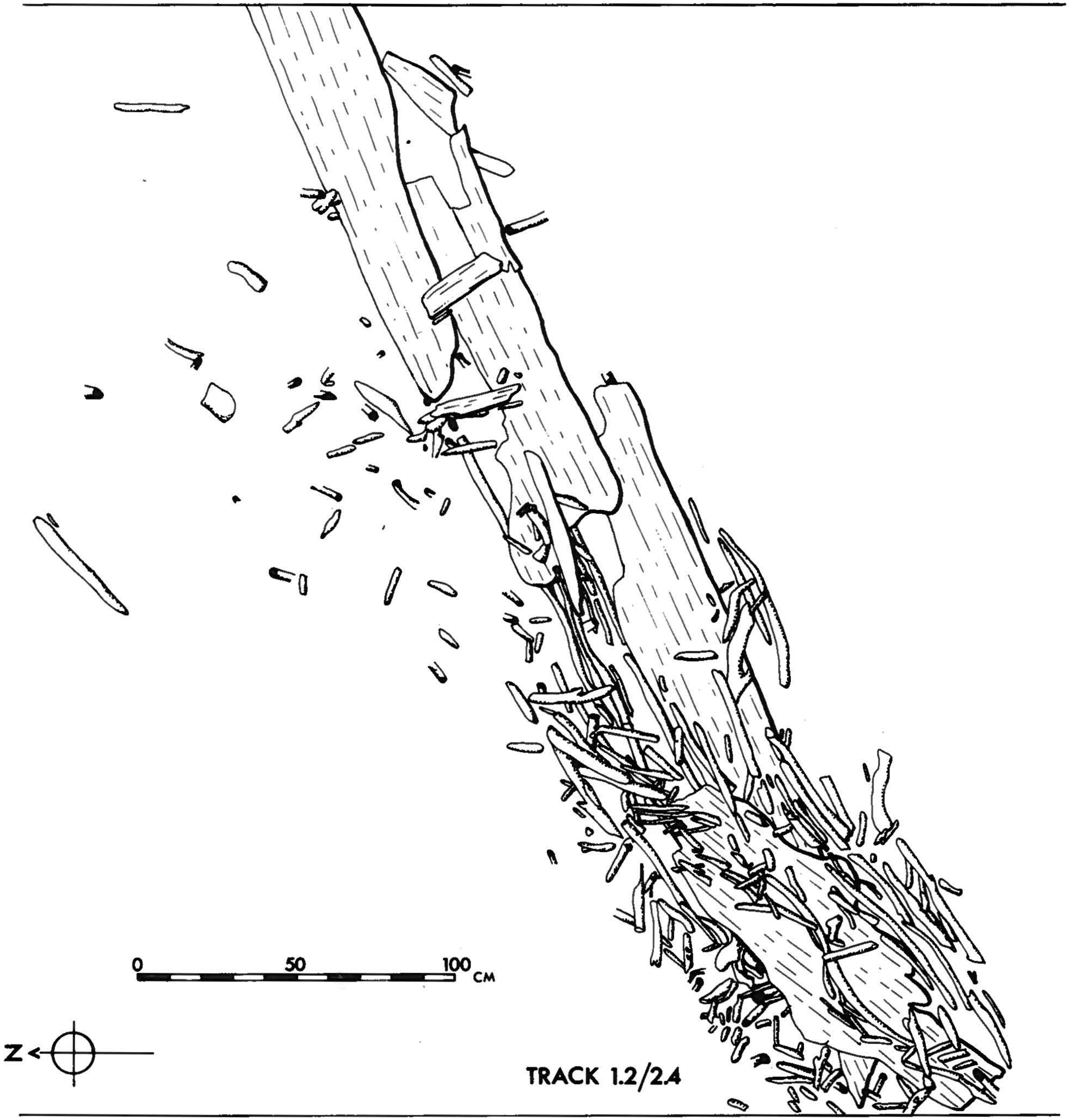


Fig. 24 Tinney's Ground, Heads 1–2, track 1.2/2.4.

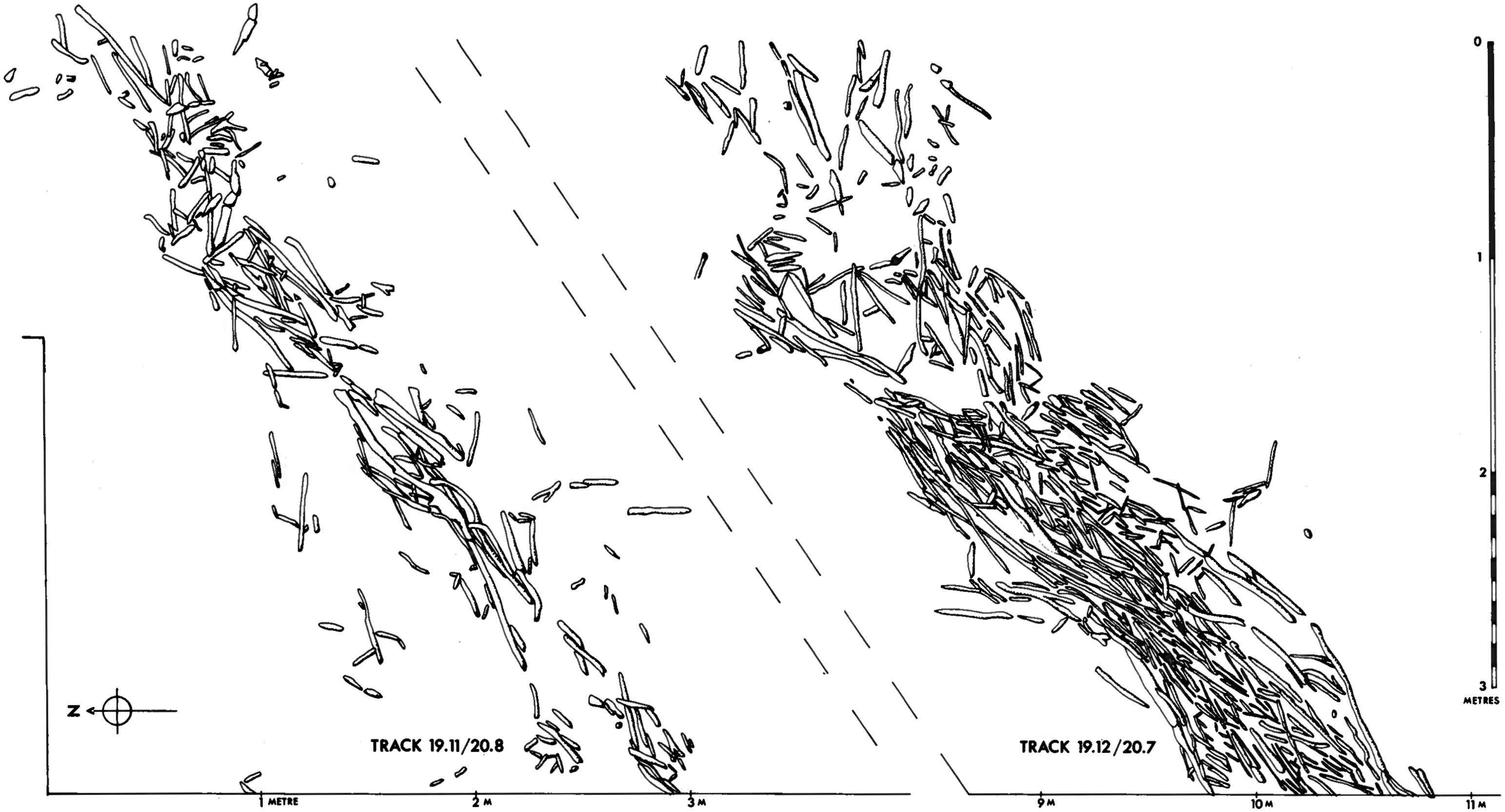


Fig. 25 Tinney's Ground, Heads 19–20, tracks 19.11/20.8 and 19.12/20.7.

tracks can be identified, all in heads 11–18, and several of these may relate to lines determined in heads 1–4. There still remain many single observations of brushwood unconnected to other exposures at the moment, although some can be postulated as forming likely units. The certain recognition of at least two instances where trackways join together, from the west, in heads 1–2, and 17–18 (pl. 14), shows that reliance upon alignments alone of isolated exposures can create difficulties, and the best example of the problem is in the Honeygore complex described elsewhere in this volume. In any case, the proximity of brushwood tracks or fragments to one another in certain areas, for example heads 17–18 (pl. 12) make informed guesswork a hazardous procedure.

The absolute levels of the trackway fragments in Tinney's Ground do little to help separate or link possible related units. The range in heights above OD extends only from 2·75 to 3·10 m, although the base of the most northerly exposure, in head 22, lies at 3·25 m. Within certain track alignments, for example the track running from head 1–20 noted above, the variation recorded was 31 cm and the track clearly lay upon an undulating raised bog surface. A radiocarbon date for this track has been obtained from young wood, which yielded 1090 ± 70 bc. A track running parallel and to the north, identified in heads 11–20, and possible traces in heads 7–10, lying at 2·90–3·00 m, has been dated to 1070 ± 70 bc. More dates are awaited, but it would seem from the absolute levels, and from certain and potential junctions, that many if not all of the tracks in Tinney's Ground were broadly contemporary, that is, they represent one phase of activity and interest in this area, perhaps extending over a century. The relatively rapid growth of *Sphagnum* moss and other plants would soon creep over and submerge a slender track, and after only several seasons it would probably have been more easy to build a new footpath along a preferred line newly-chosen on the basis of local dry patches, particularly on the upper domed surfaces of the raised bog, and avoiding wet pools, rather than attempt to rebuild or strengthen a half-buried or waterlogged track. However, that the latter event sometimes occurred can be seen in the long track between heads 1 and 21, which was refurbished two or three times on the west by adding solid timbers and brushwood; this is described below. This explanation would also account for the junctions which in the two observed cases clearly represent a track joining a previously-existing one; if local wet conditions, or an otherwise damaged or unsuitable track position was abandoned, a new length might be built across a more favourable stretch of ground to join the old track, bypassing the damaged portion. The fact that no stray finds, of flint, pottery, and the like, were recovered in the 200 excavations, might be taken to support the above interpretation of limited period use of individual tracks, but it still is a matter of some interest that the tracks were apparently used by individuals who neither tarried nor dropped their equipment.

The detailed excavation of the area reserved by the Eclipse Peat Works in head 19, and the uncovering of the many tracks which lay across the bottom of the heads, together provide the information upon which the following description of the Tinney's trackways is based.

In most cases, the exposures of wood consisted of closely packed slender branches lying parallel to each other, and best described as a brushwood bundle (pl. 13). These provided a consolidated area ranging from 25 cm to 1 m in width, and in almost every instance the effective width was 40 cm. The depth of brushwood varied from 10 to 40 cm; in some instances the full depth has yet to be recovered. The diameter of individual pieces ranged from 20 to 40 mm, with the majority falling between 25 and 30 mm. Thus the same type of wood was used to build the Tinney's trackways as for the Eclipse, both of which used slighter pieces than the Neolithic brushwood tracks at Honeygore.

The wood used at Tinney's has been identified as predominantly alder, with a little ash, birch, hazel, viburnum, willow, and occasionally more substantial pieces of oak, which will be discussed below. The woods were mixed, with no particular species being selected for any special purpose.

At first sight, the tracks consisted solely of longitudinals, but dismantling revealed that in some cases short pegs had been driven into the ground along either side of the brushwood, and occasionally through the bulk of it. Such pegs were used to retain the track illustrated in fig. 22.

Dismantling also revealed that many of the pieces of brushwood had beautifully preserved faceted ends, some of which are illustrated in fig. 26–27. These ends show individual axemarks very clearly, and provide a wealth of data for the comparison of Bronze Age woodworking with that of other periods. The wood is sufficiently well-preserved to show that some axemarks are identical, suggesting that the same tool was used in the cutting.

Other evidence was revealed for the methods employed in track construction. It was possible, for example, to distinguish separate bundles of brushwood, as in heads 19–20 where the southernmost track consisted of one well-preserved bundle, and another more fragmentary one with a slightly different alignment. In heads 15–16 the southernmost exposure consisted of a single bundle lying diagonally in the middle of the cut area; it was about 2·25 m long and 30 cm wide, with the thicker end of the stems being to the east. In heads 1–2, several of the tracks may have consisted of superimposed bundles, although the evidence for this was not conclusive.

One other feature first encountered in heads 1–2 was the use of oak timbers in the track construction. In the second track from the south, illustrated in fig. 25, several very solid oak planks were found amidst the brushwood, the whole being held in place with small vertical pegs. Several other exposures had fragments of solid oak (pl. 15), but nowhere else were the pieces as large as in the example illustrated, where 200-year-old timbers were used. These pieces could well have been chosen to consolidate particularly wet and soft patches, perhaps after a season's use had damaged and depressed the initial layer of brushwood. The timbers do not appear, to have had any holes or joins, and were only tied in to the trackway by the small retaining pegs. The surface was probably soft enough for them to become embedded in place.

The discovery of junctions should also be noted. In two places clear evidence was revealed for the junction of two tracks. In heads 1–2, two scatters of broken brushwood, appearing in the western section, apparently merged into a single track running to the east. In heads 17–18, one rather fragmentary track abutted onto a more solid one, as shown in pl. 14. Here again, the two tracks came from the west with a single line continuing to the east.

The excavation of the reserved area yielded a patch of broken brushwood as well as two tracks. This brushwood was very fragmentary, and no alignment was discernible in the area recovered, which was about 2 × 2 m. Similar patches were noted elsewhere, and some of the brushwood recorded in section but not confirmed as part of a track may also belong in this category. These patches might be the remnants of wood thrown down to consolidate boggy patches for one reason or another, and as yet there is nothing to relate them to the hunting platforms recorded elsewhere on Shapwick Heath (Godwin 1960, 15). Alternatively these patches could be all that remains of tracks dismantled by Bronze Age man, but the evidence is too slight to allow any conclusive interpretation.

Tree-ring analysis of wood

A total of 40 wood samples was obtained from the varied trackways running across Tinney's field; since most were of brushwood, suitable tree-ring material was not available in many cases, but sufficient has been analysed to provide tentative results for several areas of excavation. The main groups came from three areas in Heads 1–2, 5–6 and 17–18 (1.7/2.6, 5.1/6.3L and 17.5A/18.7A), which are in alignment across the field, and it was hoped to ascertain their contemporaneity or otherwise, since, due to extensive peat-cutting, there was no possibility of following them up.

Thirty-five of the samples were of oak (*Quercus* sp.), and the remaining five were alder (*Alnus*) which provided no information. The majority of oak samples were very small worked pieces of between 3 and 10 cm in width, mostly radially split with one or two cut parallel to the rings and one representing a quarter section of the trunk. In addition, there were three large planks, two of which exceeded 30 cm in width (1.7/2.6 24 and 25), which must have originated in large oaks over half a metre in diameter. None had any sapwood remaining.

In all, 31 samples were measured and plotted, of which only nine had more than 50 annual rings preserved; thus, results based on the short sequences below 50 years must remain tentative. The ring pattern itself was of interest; in most cases the ring widths fluctuated in an almost cyclic manner, with groups of very narrow rings separated by one or two wider ones, and many show very sudden increases or decreases in width, for example from 2 to 0·5 mm. It is possible that this pattern is a result of forest clearance, thus freeing the trees from competition for a short time, or of intermittent coppicing and the growing up of new shoots on the old stools.

The two very wide planks provided ring sequences of 214 and 193 years (24, 25), without which it probably would have been impossible to link the other samples. Correlations were carried out using the Hamburg program for all curves over 40 years in length; resulting coefficients ranged between 60·5 and 79·0% and in several cases samples had evidently come from the same tree, for example 5.1/6.3L: 12 and 14 (fig. 28) as well as 1.7/2.6: 4 and 6 which could not be fitted into the overall pattern. Tree-ring sequences below 40 years had to be fitted visually and their positions must remain tentative.

Two individual groups which correlated well were first meaned (1.7/2.6: 24 and 25; 5.1/6.3L: 3, 12 and 14; also 5.1/6.3L: 2 and 4; 1.2/2.4: 9 and 17.5A/18.7A: 3) into average curves which were compared with the Belfast program, giving a correlation of 5·20 (Student's t value). It was then possible to calculate the mean values for each year for all these curves and those fitted visually (listed in the table). The mean curve is sufficiently sensitive to allow correlation with other contemporary or overlapping material from the area. It covers 215 years and is represented by a maximum of 10 samples at any one point.

References to the Hamburg and the Belfast programmes are given in the introductory section on the Vegetational History of the Levels.

The distribution of the 18 correlated ring curves is shown in the form of a block diagram in fig. 29. Since no sapwood remains, at least 30 years must be added to the final ring to reach the felling date of the timber. It is difficult to reach any conclusions from the relative positions of the sequences. There are two possibilities, either that the three areas are contemporary and the ring sequences are from wood from various parts of the trunk or have been trimmed, or that the areas are not contemporary, but differ in time by several decades. The scatter of samples from 17.5A/18.7A, with one contemporary with 1.7/2.6, suggests that they merely represent different parts of a large trunk and are in fact synchronous; samples from 5.1/6.3L could be explained in the same way, with loss from sample 2 through trimming. The evidence therefore suggests that the three areas are contemporary. It is impossible to reach any interpretation of the two odd samples from 1.2/2.4 and 33.3.

TABLE 2 The mean annual values of the 215 year curve from Tinney's samples, in tenths of millimetres. The curve provides the opportunity of relating other late Bronze Age trackways in the area to each other.

	1	2	3	4	5	6	7	8	9	10
1	25·0	33·5	28·0	37·5	35.0	32·0	44·0	36·5	34·5	31·0
11	33·0	41·0	40·0	41·0	25·5	36·5	28·5	30·0	35·3	38·2
21	29·0	29·5	27·5	22·5	23·2	24·2	23·0	21·4	22·6	24·0
31	27·4	23·8	22·2	24·0	19·1	20·6	17·3	15·7	25·4	25·4
41	19·9	14·4	18·7	20·9	16·6	27·7	20·1	23·7	22·7	20·4
51	17·9	13·6	13·1	14·2	14·6	13·1	12·6	14·8	18·4	16·7
61	15·9	14·7	15·1	12·6	14·7	11·8	12·2	13·9	13·9	13·3
71	13·7	10·2	12·1	10·2	11·0	11·9	11·2	14·1	12·4	11·9
81	13·2	16·1	13·9	11·6	13·3	11·1	14·9	12·7	13·2	14·7
91	12·3	10·0	10·6	10·8	12·3	12·0	11·7	9·2	9·2	10·0
101	13·1	12·7	11·1	13·4	11·3	12·3	10·0	14·0	14·9	11·9
111	11·9	13·7	11·1	11·0	10·4	13·9	13·7	15·9	8·1	8·1
121	7·6	8·0	8·0	11·0	10·0	9·1	9·0	10·2	10·6	11·0
131	11·0	7·7	7·0	7·7	7·2	8·2	9·0	9·7	6·2	5·2
141	6·0	7·7	6·8	7·4	7·4	7·6	7·0	8·6	11·6	8·5
151	6·0	6·7	7·7	9·7	11·2	8·0	10·2	8·7	9·5	9·2
161	8·8	8·3	9·0	12·5	10·0	6·8	8·5	10·0	8·8	11·0
171	10·7	5·4	8·0	9·6	9·2	9·2	9·2	10·8	11·8	13·7
181	17·3	19·1	18·8	17·0	13·4	16·8	14·4	11·0	12·0	7·0
191	8·2	10·5	15·0	6·0	7·0	13·5	6·5	7·5	10·5	9·0
201	11·0	16·0	13·0	7·5	7·5	8·0	10·5	13·0	8·0	17·0
211	11·0	9·0	10·0	12·0	12·0					

The 215 year mean curve provides the opportunity to establish a relative dating system for the late Bronze Age, to which period many of the Somerset Levels' trackways belong. A study is being carried out on the degree of correlation with other tree-ring sequences; computer analysis suggests that a 92 year sequence from Meare Lake, a site which is still being investigated and which should provide more material to supplement and perhaps extend the present curve, may fit into the early part of the Tinney's mean curve, as corroborated by the radiocarbon dates. A tree-ring sequence of over 300 years from oaks buried below peat on Thorne Waste in South Yorkshire is also being compared; the radiocarbon dates are about 1100 and 1300 bc but the geographical distance may be too great for satisfactory correlation. The Tinney's curve should, however, find useful application in dating other contemporary trackways in the same area.

Conclusions

Most of the excavations and related observations of tracks in Tinney's Ground

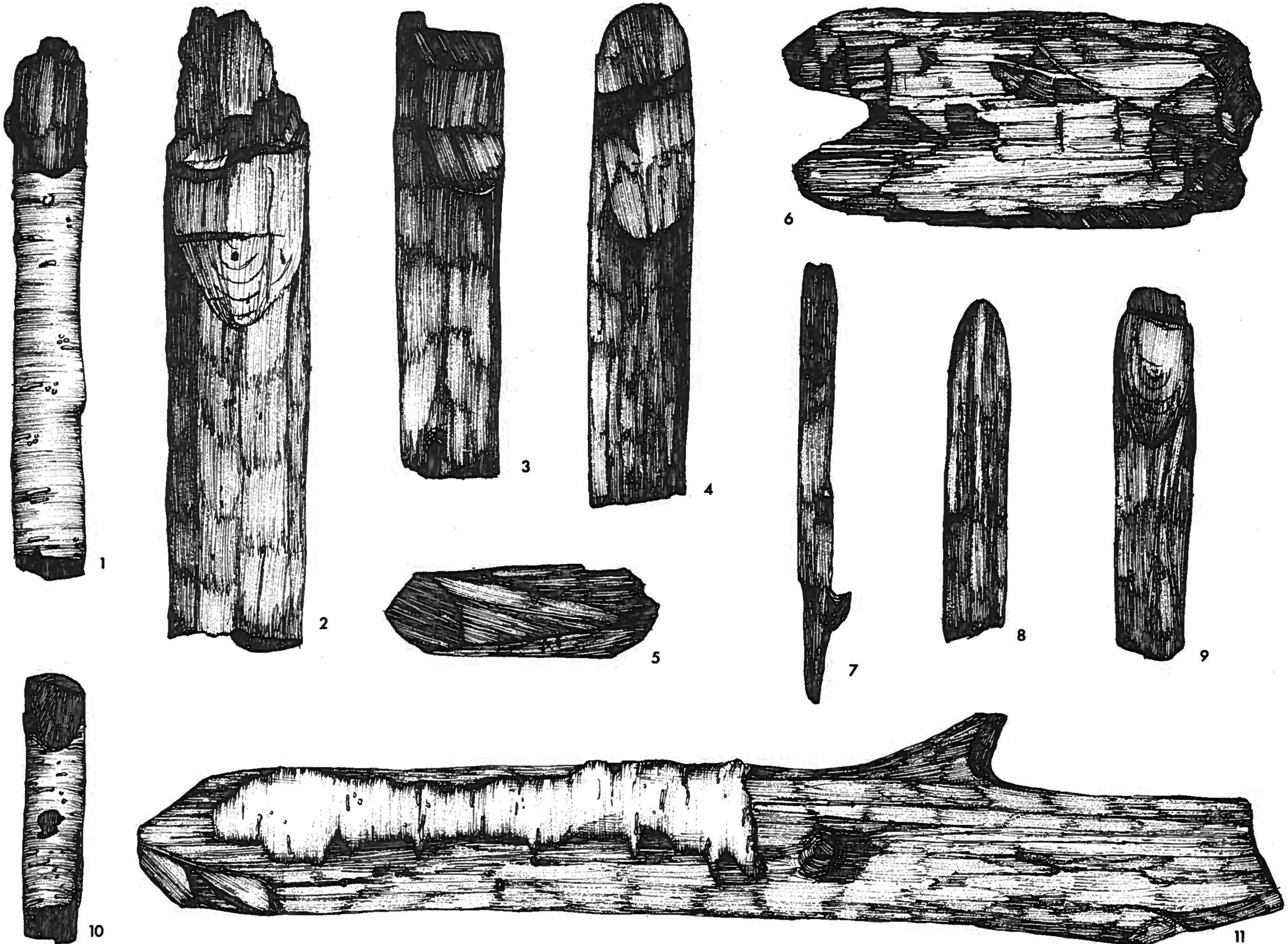


Fig. 26 Wood from Tinney's Ground. 1, track 1.7/2.6; 2, track 5.1/6.3; 3, track 17.5/18.7; 4, track 17.6/18.8; 5, track 1.2/2.4; 6, track 1.7/2.6; 7, track 1.2/2.4; 8, track 9.3/10.3; 9, track 1.3/2.1; 10, track 17.11/18.10; 11, track 1.3/2.1. Scale ½.

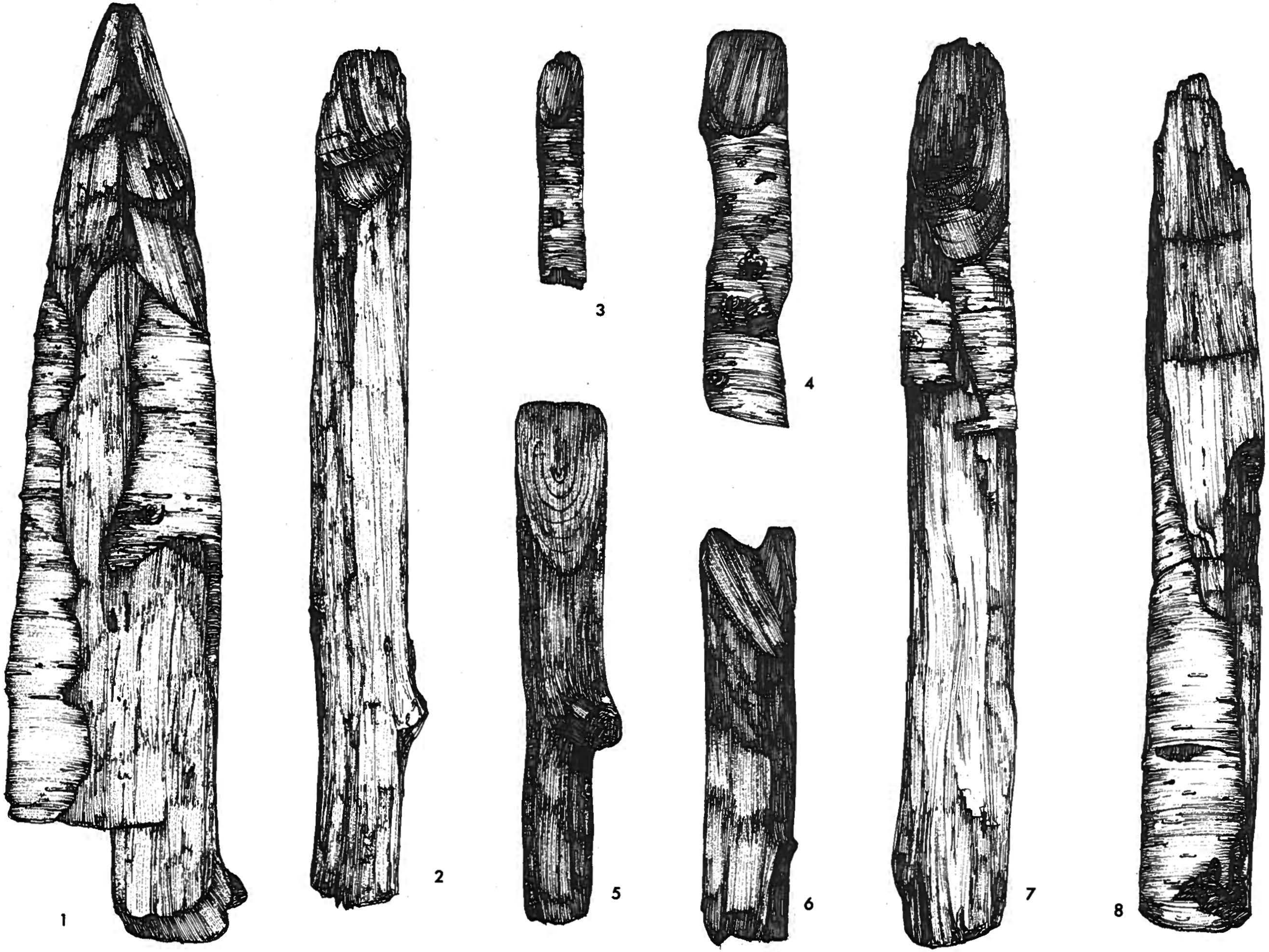


Fig. 27 Wood from Tinney's Ground. 1, track 17.6/18.8; 2, track 1.7/2.6; 3, track 1.7/2.6; 4, track 13.4; 5, track 17.7/18.9; 6, track 1.7/2.6; 7, track 1.7/2.6; 8, track 7.4. Scale ½.

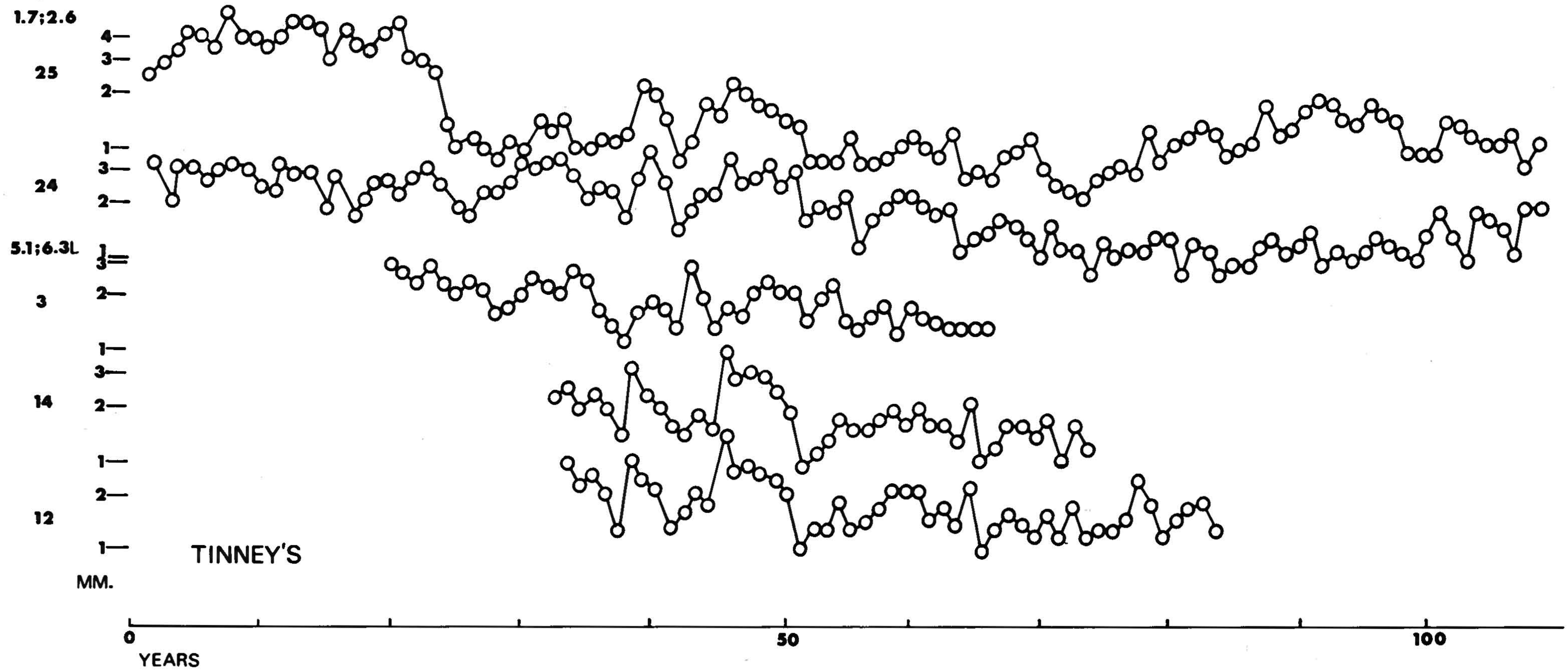


Fig. 28 Tree-ring sequences from Tinney's Ground: only the early part of the long sequences from 1.7/2.6 (24 and 25) is shown, in comparison with three shorter sequences. The scale is logarithmic.

have been made in the western part, in Heads 1–20, and the alignments here seem assured in some cases, and probable in others. In the eastern part of the field, however, the work has not succeeded in finding many traces of the trackways, and the reasons for this are uncertain. Although the sections of peat along heads 22–41 were not so well preserved as elsewhere, careful search of the mumps in 1973 did not yield many finds; those that were made lie at the same levels as the wood in the western area, and so it seems likely that the tracks as seen in the western part actually ended in Tinney's Ground somewhere around head 21 (fig. 22). The reason for this is obscure at the moment, but it should be recalled that earlier oral records of structures in this area include the vertical post-setting in the north-eastern part. It is tempting to relate this structure, which must certainly have been unlike the tracks, to the definite possibility that this area was particularly wet, perhaps a pool, where tracks were unsuitable, where boats could be employed, or where fishing could be carried out from the structure represented by the posts. To the east of Tinney's Ground, across several uncut peat fields, is higher and drier land upon which the contemporary settlement lies, and there may be other occupation or activity areas to the east as well.

This report on the archaeological investigations in Tinney's Ground is in the nature of an interim note on work carried out in 1974. Further peat-cutting is in progress here, and it is expected that more discoveries will be made. The final assessment of the structures must therefore await additional confirming or denying information. Meanwhile, the details of the many observations and the 200 excavations have been deposited with the records of the Project, where they are available for further consideration in the light of new discoveries. In view of commercial peat operations in this area, as elsewhere in the Levels, it is likely that such discoveries will not be long delayed.

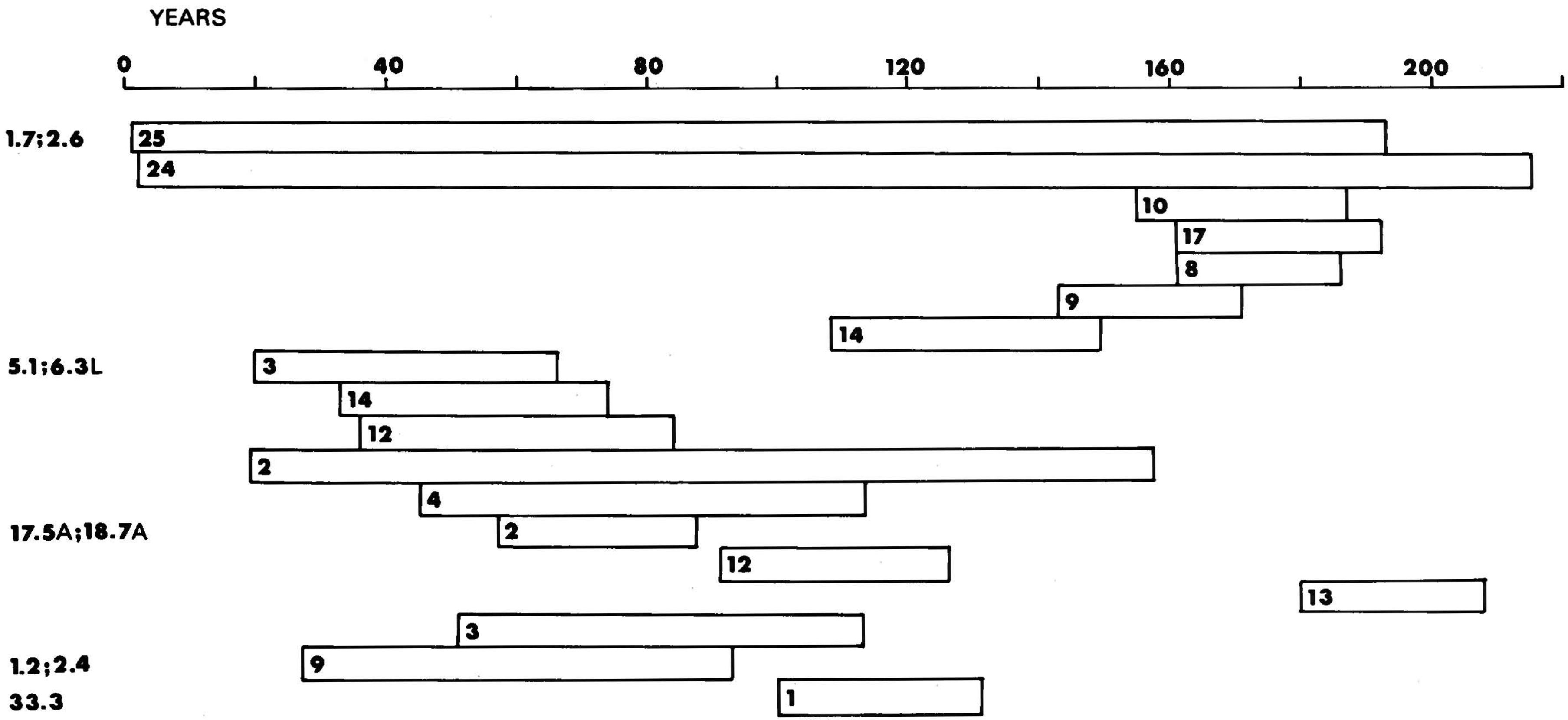


Fig. 29 Tree-ring sequences from Tinney's Ground: block diagram showing the 18 tree-ring sequences in their synchronous positions; at least 30 years must be added to the final ring to reach the felling date due to the absence of sapwood.

CHECK-LIST OF RADIOCARBON DATES RELATING TO ARCHAEOLOGICAL SITES IN THE LEVELS

compiled by J. M. COLES and M. M. COLES

All dates in this list are shown in radiocarbon years (half-life 5568) and expressed as bc and bp (1950). To convert to the new half-life (5730), multiply by 1·03. No attempt is made here to calibrate into calendar years. Further details about individual samples can be obtained from the bibliography (Godwin 1960; Coles, Hibbert and Clements 1970; Coles, Hibbert and Orme 1973) and from the C.B.A. Archaeological Site Index to Radiocarbon Dates for Great Britain and Ireland.

Of the 70 radiocarbon dates in this check-list, only two appear to conflict with the sequence built up through detailed peat stratigraphy, absolute levels OD, and the evidence of archaeological stratification. GaK-1939, Honeygore, is clearly far too old for the closely-dated series from this site, and it does not agree with the radiocarbon dating for the inception of peat formation in the area; it is recommended that the date be withdrawn on these grounds, the source of error lying probably in an inadequate sample size. Heavily waterlogged wood can contain over 90 per cent water, and this allowance was not fully made in the original selection of the sample. GaK-1600, Bell B, conflicts with dates from both the underlying Bell A track and the stratigraphically earlier adjacent Baker site, as well as the BM-384 date for the same timber position; it is suggested that the date be withdrawn on the same grounds as the other GaK date. It might be noted that the first date obtained from the Abbot's Way (Dewar and Godwin 1963), Q-674, has now been discarded by the laboratory for technical reasons, and it does not therefore appear in the check-list.

All of the other dates listed here are useful chronological indicators for the relative and absolute ordering of the prehistoric structures so far recovered from the Levels. Dates relating to peat stratigraphy alone have not been listed, and may appear subsequently. Taken as a whole, the radiocarbon dates are remarkably consistent and show that prehistoric man was active in the Levels from 3200 bc for about three millennia; in calendar years this is likely to approach four millennia.

Q-968	Sweet track	peat over track	5224 ± 75 bp 3274 bc
Q-963	Sweet track	Corylus peg	5218 ± 75 bp 3268 bc
Q-966	Sweet track	Corylus slat	5159 ± 70 bp 3209 bc
Q-962	Sweet track	Corylus peg	5150 ± 65 bp 3200 bc
Q-1102	Sweet track	peat beneath rails	5140 ± 100 bp 3190 bc
Q-967	Sweet track	peat over track	5108 ± 65 bp 3158 bc
Q-1103	Sweet track	peat packing	5103 ± 100 bp 3153 bc
Q-991	Sweet track	Betula pegs	4887 ± 90 bp 2937 bc
GaK-1939	Honeygore track	Betula	5640 ± 120 bp 3690 bc
Q-1028	Honeygore track	Betula	4780 ± 50 bp 2830 bc
Q-909	Honeygore track	Betula peg	4773 ± 80 bp 2823 bc
Lu-297	Honeygore track	Betula	4760 ± 65 bp 2810 bc
Q-999	Honeygore track	Corylus	4757 ± 70 bp 2807 bc
Q-431	Honeygore track	Betula	4750 ± 130 bp 2800 bc
Q-1027	Honeygore track	Betula	4742 ± 50 bp 2792 bc
Lu-327	Chilton 4 track	Betula longitudinal	4760 ± 65 bp 2810 bc
HAR-649	Chilton 1–2 track	Betala longitudinal	4760 ± 80 bp 2810 bc
Q-646	Meare Heath bow	peat	4650 ± 120 bp 2700 bc
Q-598	Ashcott Heath bow	peat	4625 ± 120 bp 2675 bc
Q-430	Shapwick Heath axe site	peat	4540 ± 130 bp 2590 bc
HAR-651	Honeydew track	Betula	4460 ± 90 bp 2510 bc
HAR-653	Honeycat track	Betula	4440 ± 70 bp 2490 bc
Q-427	Honeycat track	Betula	4326 ± 130 bp 2376 bc
Q-429	Honeycat track	Alnus	4215 ± 130 bp 2265 bc
Q-320	Honeycat track	Betula	4065 ± 130 bp 2115 bc
HAR-652	Honeycat track	Corylus	4370 ± 80 bp 2420 bc
HAR-682	Garvin's track	Betula longitudinal	4380 ± 70 bp 2430 bc
BM-385	Baker	Fraxinus peg	4450 ± 110 bp 2500 bc
Lu-328	Baker upper platform	Alnus timber	4280 ± 65 bp 2330 bc
Q-987	Baker upper platform	Alnus timber	4230 ± 60 bp 2280 bc
Q-1035	Burtle Bridge track	Betula	4355 ± 60 bp 2405 bc
Q-1038	Burtle Bridge track	Betula	4327 ± 60 bp 2377 bc
Q-1037	Burtle Bridge track	Betula	4231 ± 60 bp 2281 bc
Q-460	Blakeway track	Corylus	4280 ± 130 bp 2330 bc
GaK-1600	Bell B track	Fraxinus transverse	4840 ± 100 bp 2890 bc
Q-927	Bell A track	Betula stump	4570 ± 80 bp 2620 bc
BM-382	Bell A track	Betula stump	4266 ± 131 bp 2316 bc
BM-383	Bell A track	Fraxinus peg	4021 ± 103 bp 2071 bc
BM-384	Bell B track	Fraxinus transverse	3975 ± 92 bp 2025 bc
GaK-1940	Abbot's Way	Alnus transvase	4040 ± 90 bp 2090 bc
Q-926	Abbot's Way	peg	4018 ± 80 bp 2068 bc
Q-908	Abbot's Way	peat	3964 ± 60 bp 2014 bc
Lu-298	Abbot's Way	peg	3940 ± 65 bp 1990 bc
BM-386	Abbot's Way	Alnus	3934 ± 111 bp 1984 bc
HAR-680	Eclipse track	longitudinals	3460 ± 60 bp 1510 bc
HAR-683	Meare Lake track	longitudinal	3290 ± 70 bp 1340 bc
Q-699	Catcott Burtle bow	Taxus bow	3270 ± 110 bp 1320 bc
HAR-681	Tinney's tracks	brushwood	3040 ± 70 bp 1090 bc
HAR-684	Tinney's tracks	brushwood	3020 ± 70 bp 1070 bc
Q-52	Meare Heath track	stake	2840 ± 110 bp 890 bc
			2850 ± 110 bp 900 bc
Q-53	Meare Heath track	peat below track	3230 ± 110 bp 1280 bc

Q-308	Westhay track	Betula	2800 ± 110 bp	850 bc
Q-306	Toll Gate House track	Corylus longitudinal	2600 ± 110 bp	650 bc
Q-309	Toll Gate House track	peat beneath track	2790 ± 110 bp	840 bc
HAR-650	Skinner's Wood	Fraxinus peg	2630 ± 70 bp	680 bc
Q-312	Viper's track	small timbers	2630 ± 110 bp	680 bc
Q-7	Viper's track	Acer post	2520 ± 110 bp	570 bc
Q-313	Nidon's track	morticed timber	2585 ± 100 bp	635 bc
Q-316	Nidon's track	peat around track	2590 ± 120 bp	640 bc
Q-318	Nidon's track	peat below track	2642 ± 120 bp	692 bc
Q-317	Nidon's track	peat over track	2628 ± 120 bp	678 bc
Q-319	Nidon's track	peat below track	2482 ± 120 bp	532 bc
Q-39	Shapwick Heath track	Corylus longitudinal	2470 ± 110 bp	520 bc
Q-44	Shapwick Heath	peat beneath track	3310 ± 110 bp	1360 bc
Q-43	Shapwick Heath track	Myrica twigs on track	2220 ± 150 bp	270 bc
			2197 ± 150 bp	247 bc
Q-311	Platform track		2410 ± 100 bp	460 bc
Q-311 bis	Platform track	repeat of Q-311	2410 ± 100	460 bc
			2460 ± 110	510 bc
Q-357	Shapwick station boat	wood from boat	2305 ± 120 bp	345 bc

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