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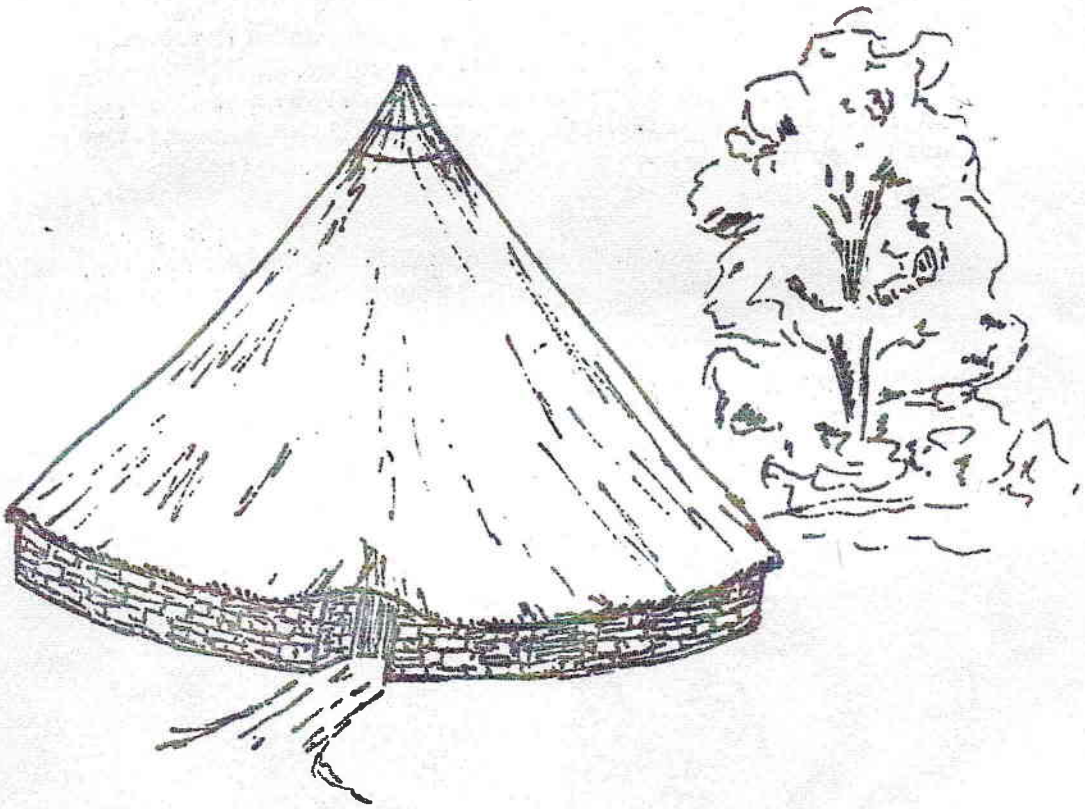

EXPERIMENTAL ARCHAEOLOGY

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Introduction.

This Easter, under the aegis of the Extra-Mural Department of Birmingham University, the first course in Experimental Archaeology was held at Avoncroft Museum of Buildings, Stoke Prior, Nr.Bromsgrove. Students drawn from universities and colleges were involved in a full programme of practical work, seminars and formal lectures.

This report is designed primarily as an immediate account of the content of the course and it must be stressed that the conclusions reached and the data obtained are in the raw state and in the majority of cases clearly need further detailed analysis and supporting argument. However, it was felt by all those who attended the course that an immediate account would have considerable value. More detailed papers will be published in due course.

In simple terms, Experimental Archaeology may be defined as asking the questions 'How?' and 'Why?' and offering some of the answers. Here the reader must bear in mind that negative evidence is just as valid and valuable as positive evidence. To determine how Iron Age man did not do something is as important as postulating how he did do something.

It was the aim of the course to illustrate this.

Peter J. Reynolds.

Lecture Programme.

Six formal lectures were arranged. The following is a very brief account of the subjects dealt with by each lecturer.

a) Christopher Musson. 'Prehistoric Structures with Ethnographic Parallels.'

The lecturer drew evidence for Iron Age buildings from two major sites, South Cadbury in Somerset and the Breiddin in Montgomery. A reconstruction from the latter site provided a major part of the practical work of this course - see 'Stake Round House' below. Thereafter the problems of building technique were viewed in the light of the practices of primitive societies, especially in Ethiopia and Africa.

b) Peter J. Reynolds. 'Experimental Archaeology.'

The lecturer described the work already accomplished on the site at Avoncroft and explained the principles behind the project. Attention was particularly given to the storage of grain in pits, and the results of recent research. One major point emerged, that seed grain can be successfully stored in an unlined grain pit on a marl subsoil.

c) Philip A. Barker. 'The Problems of Excavating Timber Frame Structures'.

A clear and concise account of the latest excavation techniques was given with illustrated examples drawn not only from the lecturers own sites, Hen Domen in Montgomery and the Basilica site at Wroxeter but also Van Essen's excavations in Holland. The ephemeral nature of the traces of timber buildings was convincingly demonstrated and the enormously destructive effect of the shallowest of ploughing emphasised. The only way to recover the maximum evidence from any site is by opening up large areas and examining each layer in the greatest detail.

d) Brian F. Perry. 'Iron Age Enclosure Sites in Hampshire, Dorset and Wiltshire.'

Dr. Perry discussed the various forms of small Iron Age enclosures with bank, internal ditch and tunnel entrance, which has been found in considerable numbers in the area under consideration. Evidence was drawn especially from the Bramdean site in Hampshire, and a reconstruction of the gateway to this enclosure formed part of the practical work - see 'Gateway' below. It was suggested that these enclosures were involved with some form of cattle control.

e) Kate Pretty.

Kate Pretty lectured on the historical background to archaeological thought leading to the present dichotomy between cultural and environmental schools (see Fig 1), as an introduction to a brief study of the British proto - historic periods immediately before and after the Roman occupation. She dealt with problems arising from the introduction of an historical factor, and particularly with the difficulty of recognising historical facts in an archaeological context

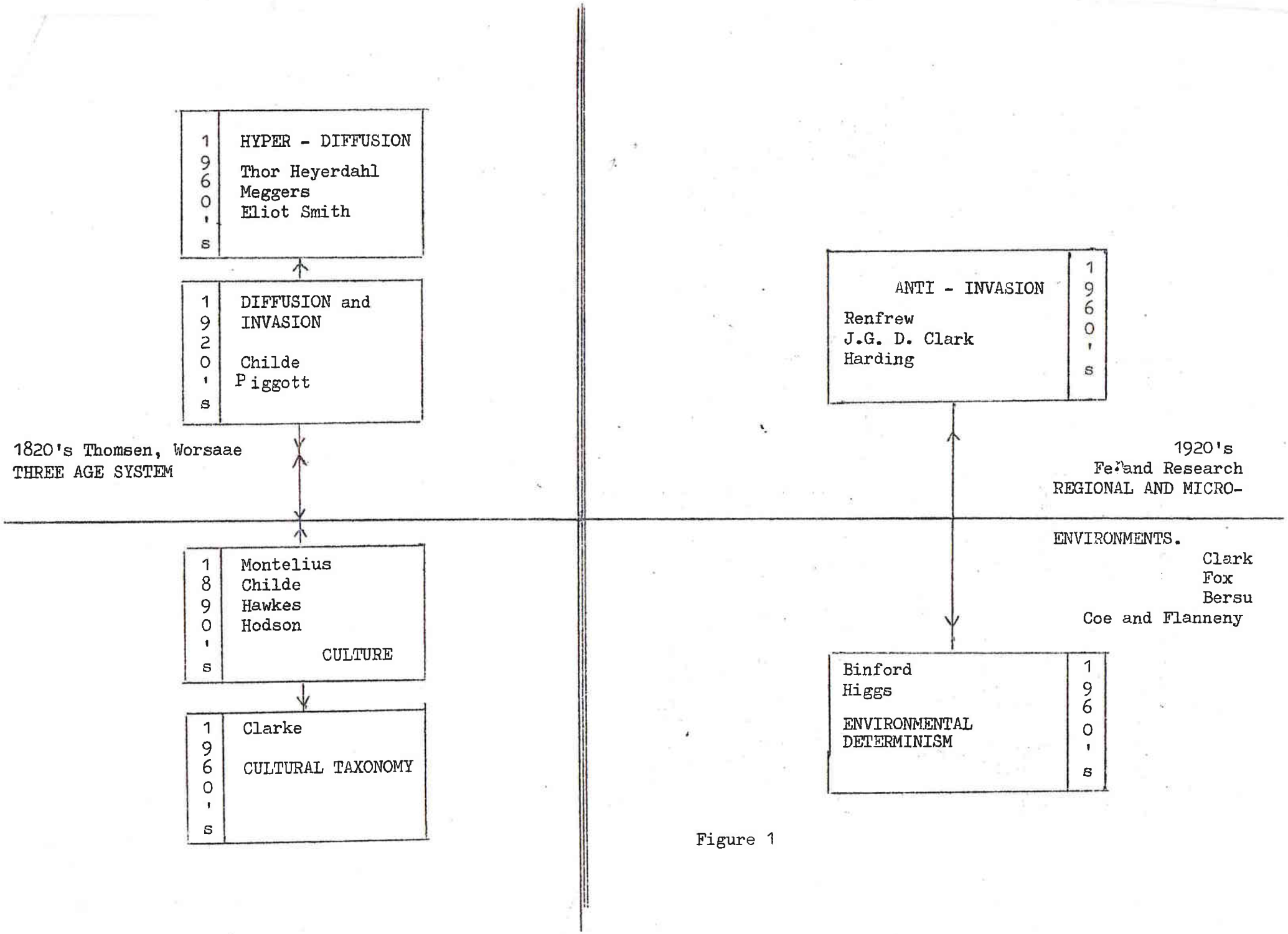

1960's
HYPER - DIFFUSION
Thor Heyerdahl
Meggers
Eliot Smith
1920's
DIFFUSION and INVASION
Childe
Piggott
1820's Thomsen, Worsaae
THREE AGE SYSTEM
1890's
Montelius
Childe
Hawkes
Hodson
CULTURE
1960's
Clarke
CULTURAL TAXONOMY
1960's
ANTI - INVASION
Renfrew
J.G. D. Clark
Harding
1920's
Field Research
REGIONAL AND MICRO-ENVIRONMENTS.
Clark
Fox
Bersu
Coe and Flanneny
1960's
Binford
Higgs
ENVIRONMENTAL DETERMINISM

Figure 1

using as illustrations, Caesar's reference to a Belgic invasion and Gildas's statement on the slaughter of the British.

f) Nicholas Thomas. 'The Excavation of Conderton Camp, Bredon Hill, Worcs!

This lecture was particularly valuable in that it covered the original evidence on which two of the major activities of the course were based: the reconstruction of the Conderton round-house,already in situ, and the pit storage experiments.

It was proved beyond reasonable doubt by using evidence of gateway construction that the two hill-forts on Bredon Hill, Conderton Camp and Kemerton Camp,(possibly three if Elmley Castle can be considered) are contemporary.

A discussion of the beautifully stone-lined storage pits at Conderton led to a most interesting conclusion. During the excavation of the pits voids were noted around the circumference of the pit walls suggesting that stakes had been placed on the inside edges of the pits. Only minimal traces of the voids were visible on the floor of the pit. One possible interpretation for these voids is that each pit was lined with a series of vertical wooden battens which acted as slides to carry a basket-work lining.After each storage period the basket could be hoisted from the pit and aired. Alternatively the basket could be hoisted full of grain by means of a simple block and tackle. In view of the difficulty experienced in attempting to withdraw a basket-work lining from a pit in the season 1970-71 this would seem a most reasonable explanation.

Seminars.

The fourth day of the course was entirely devoted to two seminars, the first on spinning and weaving, and the second on pottery making.

Mr D.K.Wright of Malvern demonstrated many techniques of weaving concentrating on those of the protohistoric period. One particularly fascinating system demonstrated was that called 'sprang' - an example of which was found in a bonnet on one of the Bog people from Denmark. A valuable discussion of the comparative size and weight of Iron Age spindle-whorls led to the conclusion that many of the small, light spindle-whorls were used to spin flax or, in the first century, nettle thread.

The seminar on pottery, conducted by Mr N.Johnson, was specifically devoted to the relative merits of differing types of clay and the manufacture of pots by different techniques.The culmination of the seminar was the firing of the prepared pottery in a pit-clamp and also, a bonfire. This exercise was repeated the following day by the students with attendant porosity tests.

Practical Work.

Each day of the course was spent on some form of practical work in which the students were required to approach the problems of physical interpretation of archaeological evidence from Iron Age sites and to suggest and attemptsolutions to those problems. Students were also actively involved in a long term research programme into the storage of grain in underground pits, the testing of a new device designed to expedite the excavation of post-holes and pits and finally an efficiency study of a weaver using an upright loom. The following account is a brief report of these activities.

a) The Breiddin Stake Round-house.

The basic ground plan and evidence for this reconstruction were provided by Christopher Musson from his recent excavations on the Breiddin Hill Fort in Montgomeryshire. The plan is, in fact, an amalgam of the evidence from several round-houses on that site, as well as from the excavation of stake round-houses on the South Cadbury Hill Fort in Somerset (information kindly provided by Leslie Alcock of University College, Cardiff.) The importance of trying to reconstruct a stake house is to seek answers to the difficulties that such a frail structure would pose.

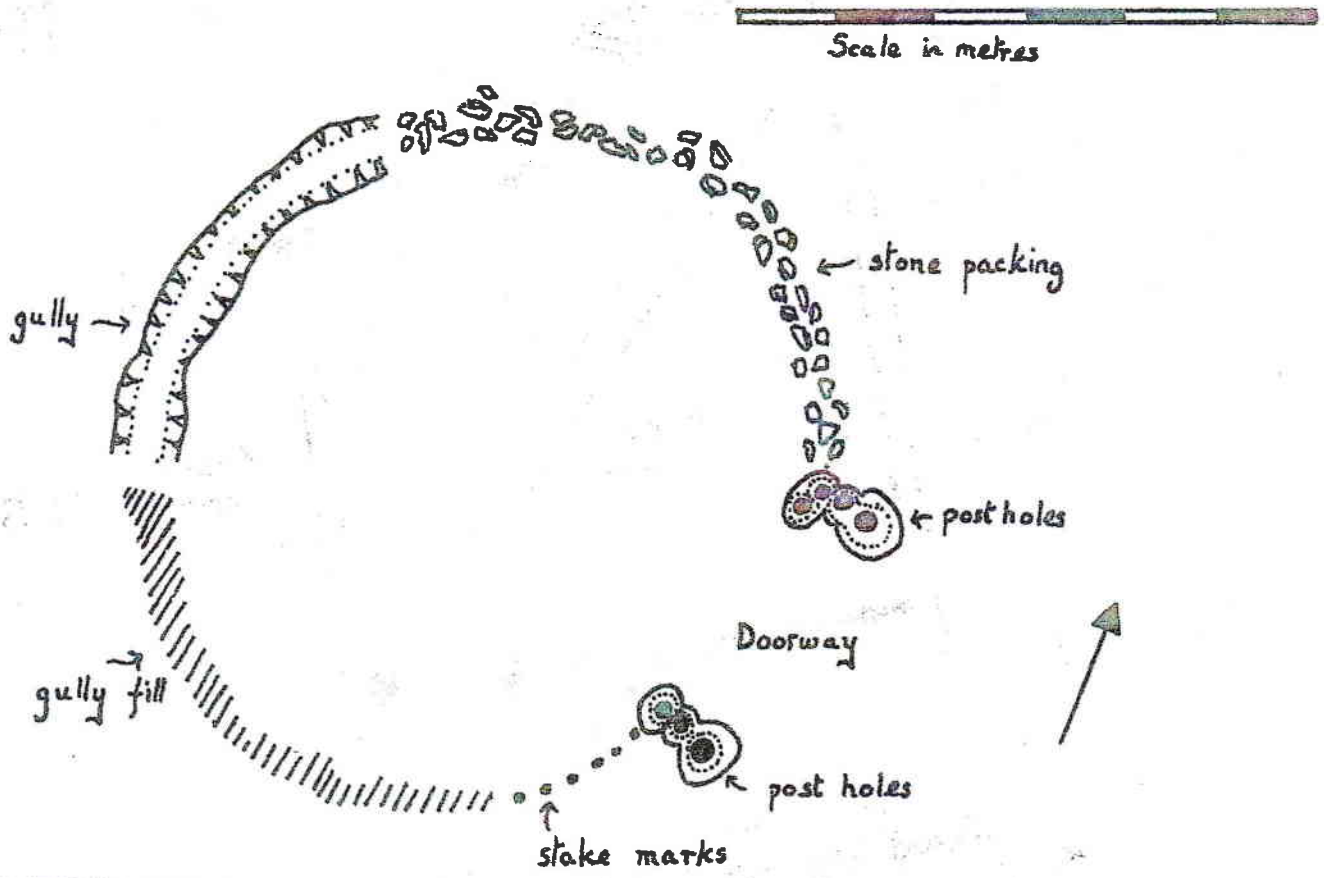
The details of the plan and postulated elevation can be seen in Figure 2. The sequence of reconstruction was as follows: a circular gully, 15cms deep and 30+ cms wide was dug, sharpened stakes 1m 80 long,and averaging between 5 and 7 cms in diameter,were driven 15 cms into the bottom of the gully 30-60 cms apart; withies were woven in and out of these stakes making a simple basket construction. The top of the stakes were notched both inside and outside to carry a ring-beam/wall-plate of withies which were lashed with leather thongs. The gully was then packed with stones and loose earth. The inner and outer door posts were set in position with a lintel being jointed into the latter pair of posts. The detail of the joinery adopted can be seen in Figure 2.

Six roof poles were raised, being notched and lashed both at the apex and at the wall-plate with leather thong. An interesting problem was encountered in the securing of the roof poles to the wall-plate. A single notch in the roof pole proved to be totally inadequate since all the thrust of the roof pole and ultimately of the roof itself would be exerted on the outer half of the wall-plate.The problem was to spread the thrust across both halves of the wall- plate and thence onto the wall itself.The solution adopted was a simple double notch and slight angling of the wall-plate which allowed each roof pole to sit across both inner and outer halves of the wall-plate.

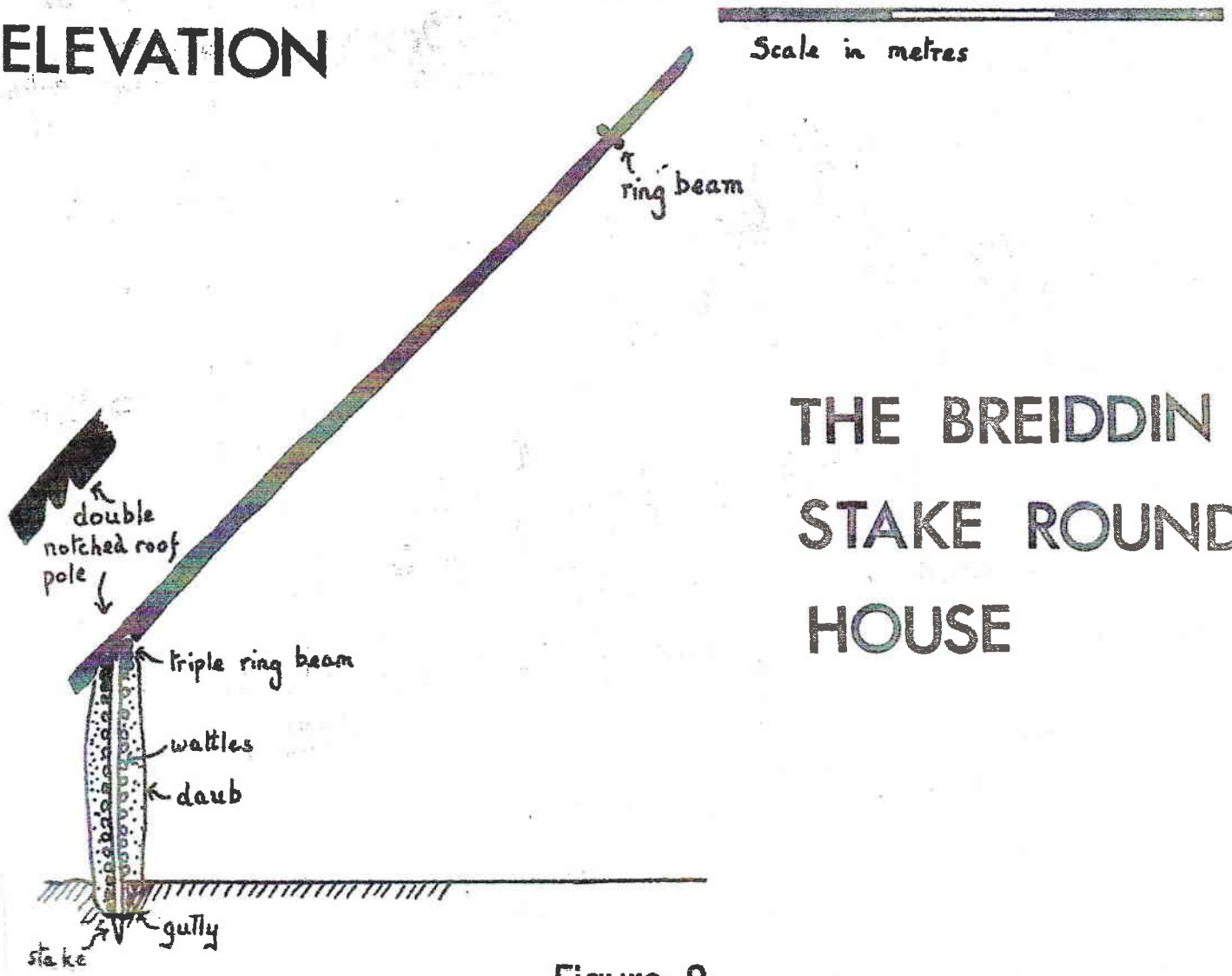
A major set-back in this reconstruction proved to be a lack of withies. Had it been possible to concentrate a sufficient supply on the site beforehand this structure would have been virtually completed in the five days of practical work. Nonetheless the stage reached with walls complete except for the daub and half a dozen roof poles in position was sufficient to demonstrate the problems and the validity of reconstruction work.

Briefly the major problems that arose were of joinery, emphasis being laid on functional simplicity, of spreading the thrust from the roof structure evenly around the walls of the round house, problems of the doorway construction, was the porch an addition or was it an integral part of the structure as a whole, and problems concerning the apex of the roof, since the need for at least one ring beam becomes quickly apparent as the apex becomes choked with timber.

PLAN



ELEVATION

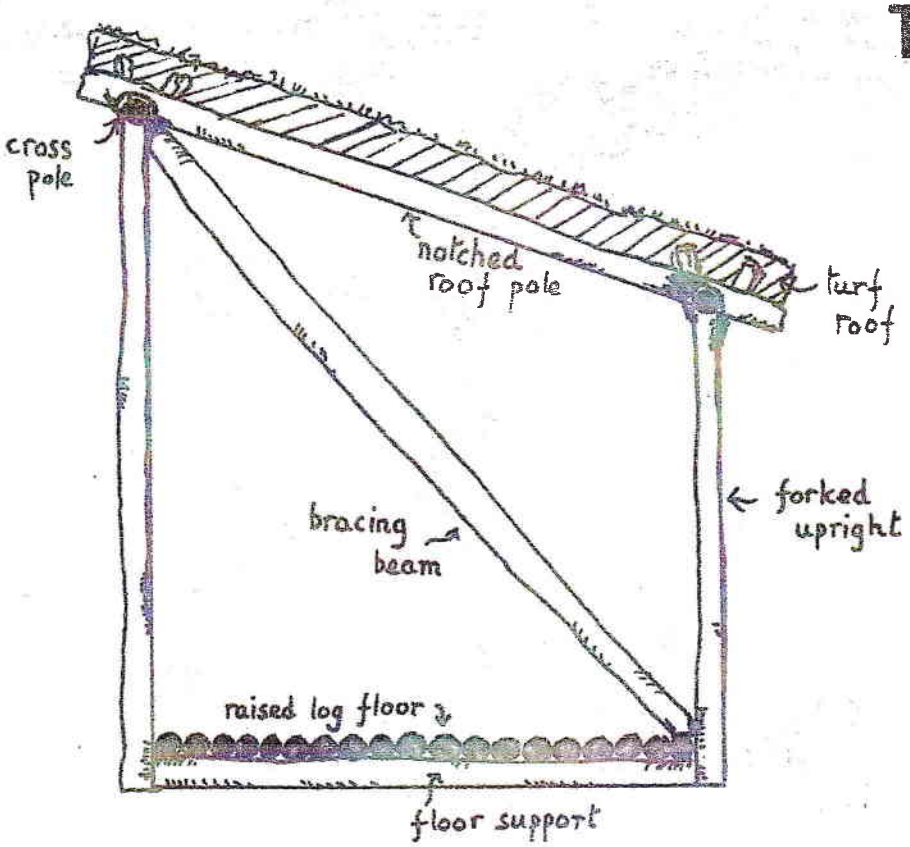


THE BREIDDIN STAKE ROUND HOUSE

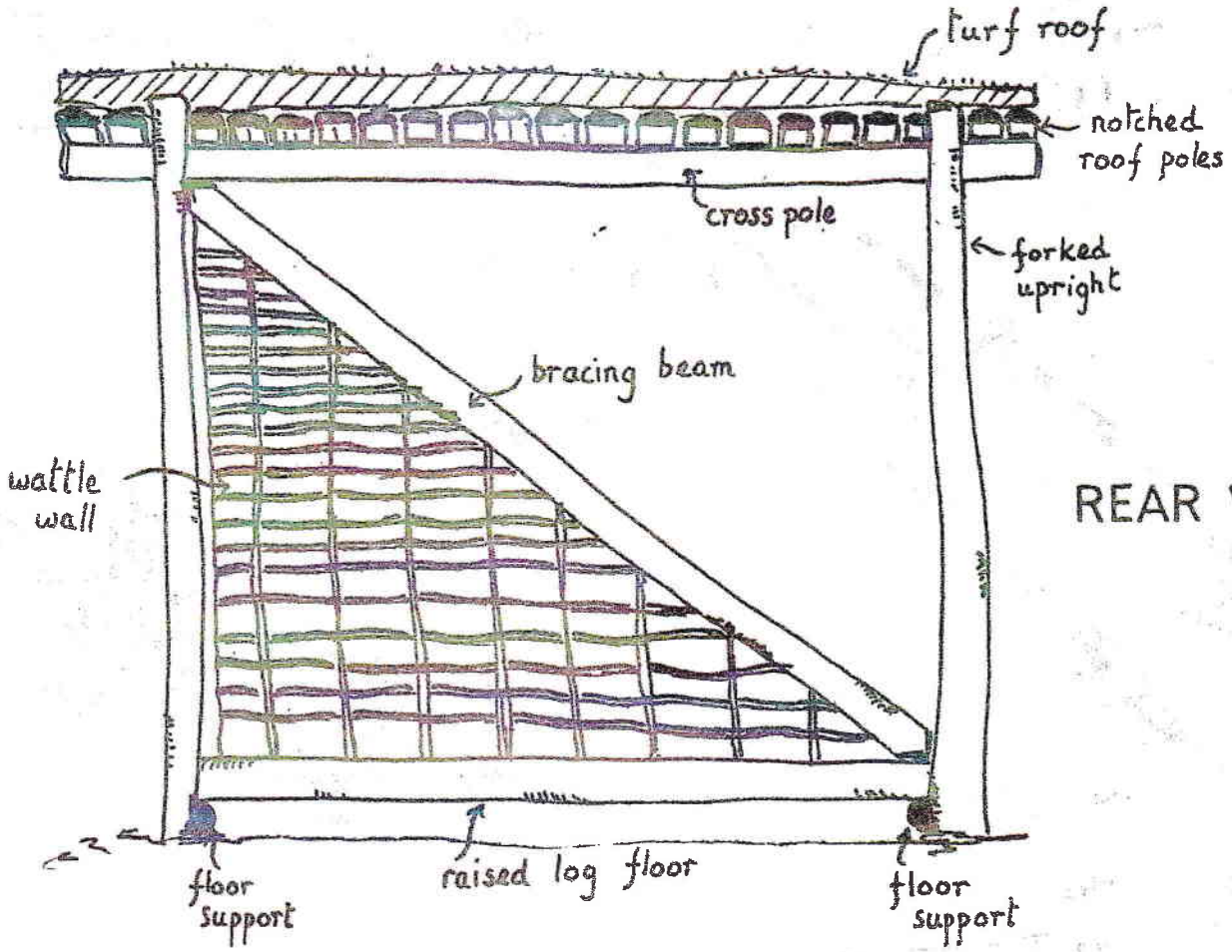
Figure 2

PJR

THE BARN



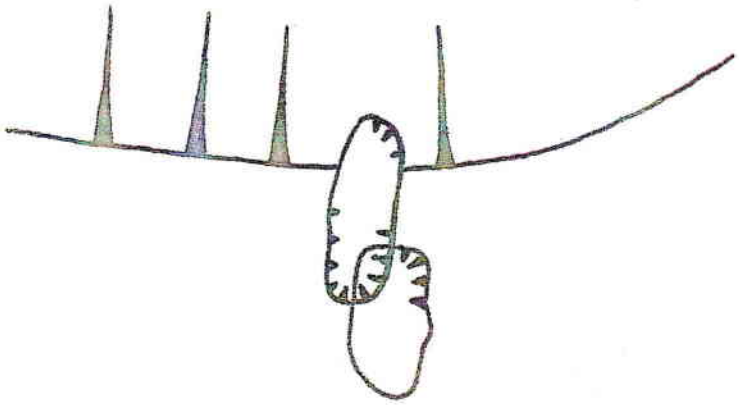
SIDE VIEW

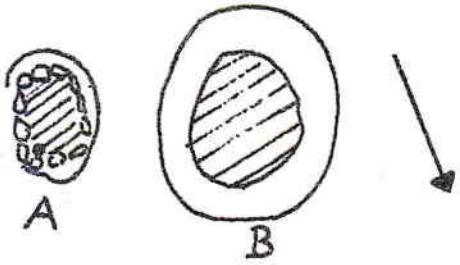


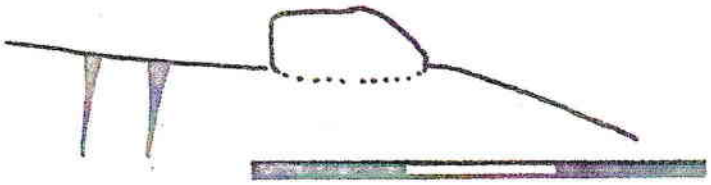
REAR VIEW

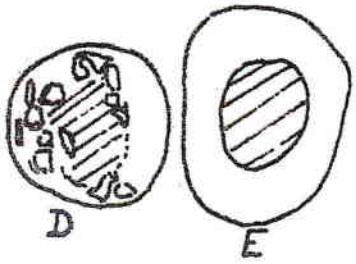
Scale in metres

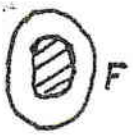
Figure 3



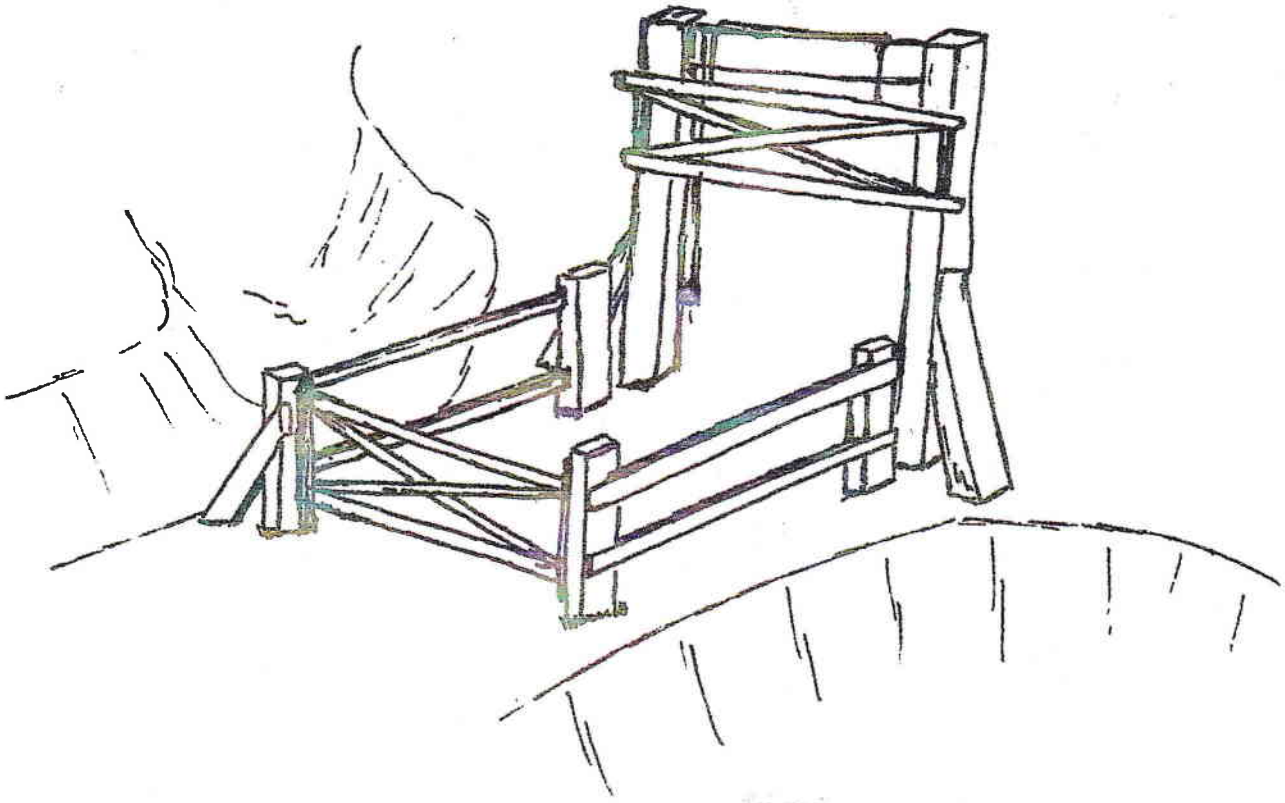








SKETCH PLAN AND INTERPRETATION OF BRAMDEAN GATEWAY



b) The Barn.

On many excavations of Iron Age sites rectangular four post-hole features have been observed, often set apart from the main occupation area and these have been invariably interpreted as overhead granaries. During the course considerable attention was focussed on these features; what they may have looked like, and what their real purpose was. It was concluded that they are most unlikely to be granaries for two major reasons, firstly because of their separation from the occupation area and secondly because seed grain, (the major argument for overhead ggranaries being the need to store seed grain) can be successfully stored in underground pits.Often the supporting argument for granaries being built apart from the settlement has been that of fire risk, but grain, however, is exceedingly difficult to set on fire. Straw, on the other hand provides a very real fire hazard. The tentative conclusion reached, therefore, is that these structures should more realistically be called barns and probably used for storing hay for animal fodder or straw, stacked in yelms ready for use in thatching.

A reconstruction of a barn was erected based on a ground plan excavated by G.K.Wainwright and reported in his paper on 'The Excavation of a Durotrigian Farmstead' P.P.S. Vol XXX1V pp 102. A four post structure with a flat sloping roof, similar to a lean-to shed was built, the ground plan being a rectangle 2m 44 by 1m 83. The details of the structure can be seen in Figure 3. Turf was used as a roofing material since as the roof had neither apex or ridge straw would be impractical.

An interesting calculation of the capacity of this arbitary structure yeilded the information that it would store the straw from over a $\frac{1}{4}$ acre of emmer or, in other terms, enough straw to thatch the roof of a round-house 5m in diameter.

c) The Bramdean Gateway.

This particular reconstruction was based upon an excavation of the to a 'banjo'-enclosure at Bramdean, Hampshire, carried out by Dr. B.T. Perry who also directed the erection of the structure. The ground plan and interpretive drawing of the gateway can be seen in Figure 4. In the reconstruction very light timbers were used whereas the original structure had contained fairly massive posts.

The major problem of interpreting archaeological evidence, especially a pattern of post-holes, lies essentially in being able to visualise a structure in three dimensions and, more important, to be able to test the theory by actually building the structure. Dr. Perry's theory was that the post-hole pattern represented a cattle gathering enclosure where the beasts might be concentrated for a specific purpose. The enclosure had a normal gate at one end while at the other, he postulated a guillotine type of gate based upon the proximity of post-holes A B and D E, and the bracing posts belonging to post-holes C and F which would be needed to support a structure carrying a guillotine gate. Clearly there had to be a reason for the gaps between posts A and B and D and E. In the event the reconstruction substantiated this theory. The next step must be further excavations of 'banjo' type enclosure entrances to see if this pattern of post-holes is repeated and, of course, the complete stripping of the interior of such an enclosure to establish it's purpose within the farmstead economy.

d) Grain Storage.

During the winter 1971-72 a total of nine experimental storage pits were put down. The dimensions of each pit are approximately 1m deep by 60cms in diameter, giving a wall area to volume ratio of 2:1. The general results of the experiment can be seen in the table. Considerably more data has been collected both during the storage period and during recovery, and this will be collated and published in due course. Especially interesting is the thermal pattern within a grain storage pit.

One general comment that can be made is that after four years of grain storage experiments there is still no clear reason why a storage pit should become sour or go out of use. Also it has been conclusively proved that seed grain can be stored in a pit underground, especially if that pit is located inside a round-house or under some kind of cover.

It is interesting to record that while excavating pits that had been flooded over the winter, the diggers became slightly intoxicated by the aroma of fermenting grain. It needs little imagination to find the source of 'beer'!

SUBSOIL	CAPACITY	TREATMENT	GRAIN RECOVERY AND COMMENT
Clay	2¼cwts	Uncovered Unfired	All pits flooded during winter Grain wet, bitter and spoiled. Completely unfit for human or animal consumption.
	2¼cwts	Uncovered Fired	
	2¼cwts	Covered Unfired	
Sand & Gravel	2¼cwts	Uncovered Unfired	All pits dry, grain in good condition. c.20%-25% moisture content. Tests now in progress.
	2¼cwts	Uncovered Fired	
	2¼cwts	Covered Unfired	
Marl	4¼cwts	Uncovered Unfired	Partial recovery: ⅓ pit dry: Tests in progress.
	2¼cwts	Uncovered Fired	Completely flooded: grain wet but still edible.
	2¼cwts	Covered Unfired	Completely recovered: grain dry: tests in progress.

e) The Protophit.

A machine, nicknamed the protophit from it's original designation of a prototype post-hole and pit excavating aid, was tested during the course. Basically it is a simple measuring device which can be used in the excavation of pits and post-holes whether the features are sectioned, or, more properly in the view of the writer, excavated in area layer by layer. The device simply restores the sections that are lost by using the area/layer technique with the important advantage that a minimum of four sections can be recorded especially if those sections follow the major compass points. The further important advantage the device offers is ease of recording to a 2cm accuracy level.

The protophit will be tested again at Wroxeter in August and at Butser in September. Should these tests be as successful as the preliminary trial further details will be published thereafter.

f) An experiment on the variable efficiency of a weaver.

A weaving experiment on indoor and outdoor looms was conducted with the aim of showing how different light conditions affect efficiency. The light measurements were taken on the working surface, the warp and weft, with a 'Weston Illuminator' which gives a reading in lux. The accompanying table shows the raw data obtained. Each reading that required the use of filter and tissues needs to be corrected under laboratory conditions.

Briefly the experiment involved the use of two looms of the same design, one placed inside the Conderton Round-house in it's postulated original position, the other immediately outside. The wool used was a rough, hand-spun kempy yarn from a Welsh ram. Apart from the normal tools employed by a weaver on an upright loom, the shuttle and sword, two kinds of comb were employed. First an ordinary metal dinner fork and second, an Iron Age bone weaving comb.

The experiment was divided into eight separate sections, each of fifteen minutes duration and arranged so that an equal amount of time was spent both inside and outside the roundhouse but in a fixed order to facilitate direct comparison. Each fifteen minute session was further subdivided into five minute sections and a row count was recorded for each section. Light readings were taken at the beginning and end of each fifteen minute period. Brief notes on the weather conditions and any other factors that may have affected the weaver were also recorded. Throughout, only plain weaving was attempted.

A great deal of interesting information was gained during the experiment. The weaver commented on various factors which would have improved the weaving or made his task easier. The chief of these was the use of the bone weaving comb which proved far better for it's job than the dinner fork he normally used on this type of loom. The tangs were quite short and had obviously been cut out cleanly rather than a splinter of bone removed or slots merely worn into the bone. No great pressure falls on this tool since it is only used to push the weft roughly into place before it is beaten firmly into position by the weaver's sword. Some difficulty was experienced by the awkward positioning of the leash rod and the roughness of the leashes themselves. One can conjecture that the leashes would have been smooth leather or even metal loops. As the weaving progressed the outer threads of the warp were pulled slightly inwards, a factor that could be corrected by using heavier loom-weights on these particular threads. Further, it would seem necessary to provide either a table or a working surface adjacent to the loom on which the weaver might place the sword, shuttle and comb when not in use. Alternatively, there might have been attachments to the loom for this purpose. During the experiment much time was lost

	Reading in Lux			Row Count							
Position	Start	Finish	Difference	Mins	Rows	Total	Average Per 5 Mins	Quality	Weather Conditions	Fork or Bone Comb	Remarks
Inside A	0.4	0.5	0.1	5 5 5	5 5 4	14	4.6	Fair	Cold, Bright, Windy, fitful sunshine. Much colder in Round - House.	Fork slung round neck	
Out B	19.7 Filt 2 and 1 tissue	24 Filt 2 and 1 tissue	4.3	5 5 5	3 6 6	15	5	Fair	Wind Colder	" "	Made mistake and went back.
Out C	10.9 Filt 2 and 1 tissue	14.7 Filt 2 and 2 tissues		5 5 *2	6 5 2	13		Fair	V. Cold wind gusting	Bone Comb	Last 5 rows of third period done in two halves - see bottom time. Public distracting weaver - beam fell from bottom of loom
In D	1.5	0.3	1.2	5 5 5	6 5 4	15	5	Fair	Warmer than out-side but still cold	Fork slung round neck	Public darkening doorway. Made mistake and went back. Coffee break.
In E	0.5	0.7	0.2	5 5 5	6 5 4	15	5	Fair	Overcast duller than test 1.	Bone Comb	

Reading in Lux | Row Count

Position	Start	Finish	Difference	Mins	Rows	Total	Average	Quality	Weather Conditions	Fork or Bone Comb	Remarks
Out F	21.2 Filt 2 and 2 tissues	13.9 Filt 2 and 2 tissues	7.3	5 5 5	5 6 6	17	5.6	Good	Warmer, Bright defined sunlight	Bone Comb	Public distracting weaver.
Out G	14.0 Filt 2 and 2 tissues	16.2 Filt 2 and 2 tissues	2.2	5 5 5	6 6 6	18	6	Good	Dull and windy becoming sunny	Bone comb slung round neck	Leash rod moved lower - great improvement.
In H	1.2	0.3	0.9	5 5 5	6 4 4	14	4.6	Fair	Sunny - colder inside than out-side	Bone comb slung round neck	Public darkening doorway and talking to weaver.
*Out C	21.8 Filt 2 and 2 tissues	21.5 Filt 2 and 2 tissues	0.3	3	3	3		Fair	As H.	Bone Comb	

Key.

Filt. = Filter.

by the weaver having to put these implements on the ground. At the end of the experiment the bone comb showed a clear lanolin gloss.

The experiment attracted considerable public interest but it was fascinating to note how people felt much freer to question the weaver when he was working inside the roundhouse rather than in the open air. Throughout, the weaver insisted that the distraction caused by public had no effect on his work although the observer felt time was lost by answering questions. However, it was extremely difficult to determine whether more time was lost inside or outside. There is only marginal indication of this from the figures.

At the end of the experiment the two peices of weaving were examined side by side. It was clear that in both cases the side away from the weaver was smoother and neater than that towards him and that overall, in terms of regularity of texture and weave, the one woven inside the house, though eight rows shorter, was marginally better than that woven outside. Approximately eight minutes would have been required to make the two pieces of cloth of even length.

General Conclusion.

It is difficult in so short a compass to set out all the facets of experimental work and to evaluate it's contribution to archaeology as a whole. There is no doubt that it has a most important role to play and in many cases it provides the only real hope of understanding evidence obtained by excavation. Clearly as more data is gained excavation techniques will be influenced and improved.

With regard to this present course, perhaps the most important aspect of the work has been to teach the students to think about and question the evidence from excavations and to involve themselves in the difficult and complex task of interpretation and to retain at the same time flexibility of approach and avoidance of dogma.

Clearly this is the first of many such courses in Experimental Archaeology to be held at both Avoncroft and at Butser in Hampshire where in the near future a working ancient farm will be set up.

Peter J. Reynolds.
April 1972.

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I would like to record my special thanks to the above mentioned people and to all those, too numerous to list here, who helped to make this course possible and last but not least, to those students who dared to venture into the world of experimental archaeology