EXPERIMENTAL RECONSTRUCTION
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The Reconstruction Exercise

The remarkably detailed evidence of the house or houses recovered by excavation at Pimperne Down allowed a rare opportunity to explore the physical nature of a large Iron Age roundhouse by attempting a one-to-one scale reconstruction. That there were two houses, the replacement built most probably immediately after the first, has been ably demonstrated by the excavators. Similarly, that the porch area in the south-east quadrant of the house was common to both structures is beyond question. The simple objective of the reconstruction, however, was to examine in detail the actual building as represented by one of the phases identified by the excavators and to evaluate, if possible, the significance of ancillary evidence, additional to the obvious circles of post- and stake-holes, for the structure itself (v. supra) or its construction.

For the purposes of the reconstruction Phase One was chosen as the building plan. The building of the structure was carried out specifically within the parameters of the data. At no time were the data ignored or manipulated to solve a problem. Rather all problems which occurred, of which there were a considerable number, were solved by direct recourse to the evidence from the excavation. Philosophically it is perhaps wrong to employ the term' reconstruction', which implies rebuilding a known and understood structure. Reconstruction, however, has by common usage in this connection become the normal description. In reality the evidence is simply a plan, in this instance a very good example, but nonetheless a plan. The structure built upon that plan must be regarded as conjectural despite the logical hypotheses. All the arguments and conclusions presented below must be regarded in this context.

The critical evidence for the structure comprises a plan of two concentric rings, the inner of postholes and the outer of stake-holes, being respectively 32 feet (9.75m) and 42 feet (12.80m) in diameter. A complex break exists in the outer ring in the south-east quadrant, comprising a rectangular plan c. 10 feet x 5 feet (3.04m x 1.52m) of four massively disturbed large postholes. The stake-holes fall short of the inner pair of postholes by some 4 feet (1.21m). Beyond the ring of stake-holes are further disturbances comprising curving slots and elongated scoops, located concentrically to the ring and some 5 feet (1.52m) from it. Because the evidence for the stake-holes and postholes is so clearly defined, these latter ill-formed features were initially dismissed as either subsequent to the construction and associated with its maintenance or, if integral to the construction, were not representative of an outer wall. The interior distribution of stake- and postholes was similarly disregarded, because there was no discernible structural pattern. In effect, only the recognizable structural elements were employed.

By definition, a roundhouse is a cylinder surmounted by a cone. Variations on this theme are few: one particular variant, the beehive house typically found in Swaziland in Southern Africa (Denyer, 1978), is entirely inappropriate on account of size and unsuitability to climate. It is of some importance to underline the dangers of drawing parallels between cultures separated by time and space. Because of the roundhouse tradition of the Iron Age in Britain, the western seaboard of France and north-west Spain, parallels have been and still are drawn between these structures and the roundhouses typically seen in Africa. Roundhouses with cone-shaped rooves will always appear similar to one another, but with appearance the overall similarity ends. African houses are constructed in direct response to their locality and available building materials and are naturally subject to their topographical and bioclimatic location totally aside from any motivation brought about by requirements of social organisation and tradition (Rudofsky, 1964). The vast majority of African round houses, for example, have an average life expectancy of little more than a decade. Their use, given the hostile nature of the climate, is entirely different. More time is spent outside the house than within it. Similarly, because climatic extremes are the norm, degradation of houses is dramatically enhanced without taking into account fungal and insect damage to wood. In direct contrast, archaeological evidence indicates that prehistoric roundhouses built in Britain had a life expectancy of many decades, perhaps even centuries. Their use, given the nature of an Atlantic climate, similarly differs quite considerably, in that the house had to play a central role in the life of its occupants.

Analogous interpretation is perhaps the most attractive, but yet the most dangerous and potentially spurious method of understanding the remote past. There is no doubt that the range of options in interpretation can be enhanced by studies of less developed cultures, especially with regard to functions and processes which can be precisely and fully correlated with the archaeological evidence. The impossible step is the inference of human activity and the presumption of human relationships, first with each other in terms of interactivity within a society and, second, human relationship with an environment. Analogous interpretation in effect must be bounded by topographical and bioclimatic similarity before it can have value, and even then it must be restricted to function and process. Within the same locality, on the other hand, analogous interpretation denies the potential of different development. Therefore, the interpretation of the remote past is limited to the exploration of the boundaries of probability by virtue of empirical trial, given that the realm of probability is continuously capable of expansion. Explanations of social order and kinship without documentary evidence must lie in the compass of the imagination, as insubstantial scenarios beyond the possibility of corroboration. The interpretation which does not disagree with the given data is of considerably less value than the interpretation which is raised by the data.

Thus the construction of the Pimperne House was effected by analysis of the available data without reference to parallels of any kind. In practice, the whole approach was deductive and specifically constrained by the available evidence. The essential requirement of the cone set upon a cylinder in building terms is for the cylinder to be in itself a powerful and complete entity. The upper rim of the cylinder must be itself level, whatever the contours of the ground may be like. The cone is set upon the cylinder in such a way that the pressure is evenly expressed downwards, and thus counteracted by the ground. Disproportionate pressure, brought about by irregular weight distribution, will cause the cone to twist and distort the cylinder, bringing about a collapse of the structure. Given these simple principles, the roundhouse is virtually the perfect design. It is extremely powerful, in that stress and thrust are contained within the shape and ultimately all the weight pressure is expressed vertically. As a structure it is again ideal, in that it presents as aerodynamic an all-round shape as is compatible with the functional space it affords.

The execution of the above principles was the objective in the construction of the Pimperne House. The original site of the house has a slight slope from the north-west to the south-east quadrant, indicating that the cylinder, which in ground-plan comprises two concentric rings, one of posts, the other of stakes, has to be levelled above the ground. Given the deductive process, which only brings into play evidence as it is required or recognized to be necessary, the construction followed the evidence closely. The ring of stake-holes was taken as the outer wall, and their close spacing argued that this wall was made by interweaving hazel or willow rods in and out of the uprights to form a huge basket of wattlework. Similarly the recovery of fragments of daub in the excavation indicated that this wall was subsequently plastered with daub. The first basic assumption which had to be made, and which dictated virtually every other calculation, was the height of the wall. An arbitrary height of 5 feet (1.52m) was chosen, purely from the point of view of headroom within the building once the roof was in place. The second assumption, well substantiated by documentary and archaeological evidence, was that the roof was thatched. This, in turn, dictated a minimum effective angle or pitch of 45 degrees. In practical terms, the rafters tend to push the wall-uprights outwards at less than 45 degrees and inwards at greater than 45 degrees. The economic argument concerns simply the roof area. With 45 degrees as the minimum efficient pitch, greater angles increase the roof area and, therefore, the amount of straw needed to cover them. The fact that the traditional pitch of thatched rooves is 45 degrees would seem to indicate the force of these arguments, and the implication that in the Iron Age, a period late in the development of vernacular building, the same conclusion would have been reached. Ironically, in parts of Africa roundhouses regularly have thatched rooves with pitches below 45 degrees, but when it rains, which is seldom, they leak.

The inner ring of postholes, given a solid outer wall of wattle and daub, argued for free-standing posts with a horizontal ring attached to their tops. Given the distance between the inner and outer ring of 5 feet (1.52m), the height of the inner ring of posts had to be 10 feet (3.04m) to accommodate a pitch of 45 degrees.

This established building model, however, had to overcome a number of problems. The most important of these is presented by the porch. In effect, this structure represents a considerable break in the circle. The postholes are larger and much more disturbed than any of the others, a point which is discussed below. Similarly, there is a clear gap on either side between the inner posts and the stake wall. Since the building depends upon the overall strength of the completed cylinder, the zone of seeming weakness had to be counteracted. Houses of similar scale and plan had been excavated at Longbridge Deverill Cowdown, Wiltshire, unpublished details of which were shown to the writer (pers. comm. S. Hawkes). In some of these examples the gap between the wall ends and the inner porch posts was bridged by what appeared to be a timber slot. Although no evidence of such a device was observable at Pimperne, the principle was adopted to bridge the gap with a frame which rested on the ground surface, which, while completing the circle, did not create an archaeological trace.

At this point, it is of value to reflect upon the nature and role of postholes and stake-holes in the construction of roundhouses. Because of the construction technique, once a roundhouse is completed, it would be theoretically possible to pick the whole entity up and move it from one place to another. The ground primarily acts as a counter-thrust to the weight of the building and as a lateral anchor for any free-standing posts. This is made possible because the outer wall is in reality a high basket, the active and opposed forces of the interwoven hazel rods performing the same role as in a shopping basket. The roof, itself a fully stabilised cone, simply sits on top of the walls, neither pushing outwards nor inwards, only downwards. Thus the completion of the cylinder is the critical element, whether it be below or on the ground. The slots from Longbridge Deverill Cowdown simply confirm that the circular plan of the wall is continued to the porch posts.

The porch itself represents a more difficult problem. With a span of 10 feet (3.04m) and no basketry wall, the gap offers a considerable weakness against the weight thrusts of the roof. Bridging the gap is essentially simple by attaching horizontal lintels across the tops of the posts, and in effect creating a massive four post structure. It is with this phase of the building that the much greater scale of the four porch postholes was appreciated. The whole of the porch provided a dead weight counterthrust to the live thrust of the roof during construction. This was especially important since three rafters needed to be supported by the inner lintel of the porch. Finally, there is one further break in the outer wall, diametrically opposite the porch, the most logical interpretation of which is for a back door. Since this break is just 4 feet (1.2m) wide, and postholes rather than stake-holes are on either side, a lintel completes the cylinder with little difficulty.

The location of the reconstruction was within the Demonstration Area of the Butser Ancient Farm Project Trust. A ground area of similar contours to the original site on Pimperne Down was selected, and the building programme began in 1976. The initial phase was the exact planning of all the stake- and postholes on site. Given the above conclusions of wall height, timber was collected from local woodlands. All the stakes arid posts were green or unseasoned oak. It was decided that the time and effort required to gather the materials for the house should not be recorded, since the information is of little value in terms of the time taken by the original builders. On the other hand, the sheer quantity of timber is very relevant indeed, particularly in terms of the number of trees needed. Most surprising was how few stakes (bearing in mind that the evidence clearly indicated round stakes) could be obtained from one tree of the appropriate girth. At most, only two stakes per tree we possible and generally only one. The outer ring of stakes required no fewer than fifty-seven trees. With ancillary posts for the back door and the framing either side of the porch, this number increased to sixty-five trees. All were, of course, young trees averaging between ten and twenty years old and were thinnings from a managed woodland. The posts, on the other hand, required much more mature trees averaging between forty-five and fifty-five years old. A total of thirty-six trees was needed for the inner ring and the porch.

Postholes were carefully excavated for the inner ring, each tailored for the specific post it was to accommodate. Again it was important to appreciate that a posthole discovered by archaeological excavation, unless in the exceptional circumstances of a waterlogged deposit when the post actually survives, is representative of the end of its functional life. During its life span, the posthole and its immediate environment is subjected to considerable activity. Its original form does not necessarily have any direct relationship to its final form. In fact, one of the long-term programmes relating to the completed structure was directed towards monitoring what happens to postholes on independent subterranean structures (q.v. below) The stakes, on the other hand, were driven into place with a wooden beetle. These too have a 'birth, life-span and death-state'. A stake can either be sharpened to a point and then simply hammered into the ground. In this case, the hole is entirely filled by the wood, the ground being compressed around it by virtue of its introduction under pressure. Alternatively, a preparatory hole can be made by a smaller pointed stake or bar, the stake being hammered into place subsequently. This is normal practice when the underlying rock is close to the surface, as throughout the chalkland regions where the topsoil averages some four inches (100mm) in depth. Excavation of stake-holes is a remarkably difficult exercise if maximum evidence is to be recorded. In the case of a house wall constructed of stakes, interwoven with hazel or willow rods and then plastered with daub, the life-span is going to be one of almost total protection, with minimum movement and virtually no climatic effects. The only distortion is likely to occur when the building is removed or destroyed. The stake-holes of the Pimperne House are clearly defined, and in comparison to the postholes are primarily uneroded and undamaged. In contrast, stakes which form a fence line will leave very different traces, not least of which will be the creation of an oval rather than round plan at the ground surface caused by prevailing wind pressure. In addition, there will be a degree of opposite undermining at the base of the stake-hole caused by the pivotal action of the stake under wind pressure.

Implicit in the above is the overriding problem which besets all reconstruction work. Can the time taken to build a structure have any significant value for the understanding of prehistoric and historic labour input? A supplementary question concerns the tools with which a structure is made. Should such tools be replicas of the originals? To both principal and supplementary questions the answer has to be firmly negative. The main question of time taken to construct a building, especially since the process is essentially one of trial and error, is entirely superfluous. Even if one acquired skills in the construction techniques, comparable to a qualified modern bricklayer, the question is still meaningless since the motivation factor is unknown. The analogy of the modern bricklayer holds good in that, depending upon pay return, two hundred or a thousand bricks may be laid in a day. With regard to tools, the answer can be suggested by refining the question. The object of study is the building itself and, given the irrelevance of the labour input, modern equivalents to the original tools are sensible and adequate. The study of ancient tools is specific to the tools themselves, in that one's major interest is the effect of the work on a replicated tool. Tool manipulation immediately encroaches upon skill and labour input associated with time expenditure. In the present case, the only tools used throughout the building programme were mallets, chisels, hand saws and axes, all of which, in admittedly different forms, were available in the Iron Age. The most useful of these were the mallet and the chisel.

Discoveries and decisions during the construction of the cylinder were numerous. Initially the outer wall of stakes and the back doorway were completed, the wall being interwoven with hazel rods. To complete the walls, the product of fifty hazel stools averaging seven rods per stool was needed, a total weight in excess of four tonnes. Subsequently, the inner ring of posts was erected. The proposition of prejointing the continuous ring around the top of the posts had to be abandoned because the distances between the posts were not the same. Thus each post had to be jointed in turn and the horizontal timber approximately fitted in place. The joints used for attaching the ring to the posts, and the component timbers of the ring to each other, were respectively mortice and tenon joints and pegged scarf joints. Such joints are well-evidenced from waterlogged timbers recovered from Iron Age sites. The horizontal timbers were carefully selected for the appropriate curve. Most were bough branches of oak, although two sections came from actual stems. In practical terms, this process of fitting the ring on top of the posts, rather than pre-assembling in units, slowed down the building work considerably. However, because the spacing of the upright posts in the inner ring was irregular, there was no other alternative but to build *in situ*. The simple but important consequence is that the ring was stronger being built in this way. The porch presented a major problem, since it projected from the building line by 5 feet (1.52m) and, therefore, could not be contained within the roof cone itself, because the pitch would be necessarily lowered to below the critical angle of 45 degrees. Given its plan of 10 feet (3.04m) by 5 feet (1.52m), the logical assumption was that it supported a pair of doors, each five feet wide, which would open inwards against the side walls of the porch. Again, an arbitrary height of 8 feet (2.43m) was chosen for the height of the doorway, a height which was determined by purely aesthetic reasoning. There was no indication of height in the archaeological evidence, and none has since been forthcoming to corroborate this measurement. The roof of the porch necessarily had to integrate with the cone but still to obey the pitch requirements. The only conceivable way this could be achieved was to build a simple pitched roof over the porch, and to marry it into the cone. This led to inevitable 'valley' problems between the cone and the porch rooves, but none more severe than can be observed on vernacular thatched houses today. The porch construction, based upon four massive oak posts, was built as a simple four-post structure. Horizontal timbers were attached by mortice and tenon joints to the long side. These in turn were locked together by timbers across the short sides with half lap joints. The 'A' frame rafters were pegged to these short side timbers with the ridge pole being placed in the cross trees and extended into the cone.

At this point, all the clear archaeological evidence for the structure had been utilized. The gaps either side of the main porch remained as an issue of some importance since, until the wall was locked into the porch, a major break in the base cylinder existed. Clearly the gaps were significant and the clue offered by the Longbridge Deverill Cowdown evidence of these elements being joined together argued a real purpose. The simplest interpretation was to infer the presence of a pair of small doors either side of the main porch, each door being set into a frame which was jointed to the end of the wall and to the inner porch upright. The reason for two doors, one either side of the porch, can only be a requirement of aesthetic symmetry not of function. In practical terms, these small doors make excellent sense for everyday use, the large doors being heavy on the one hand and on the other opening the house unnecessarily to the elements.

At this stage of construction, the base cylinder was complete. The application of the cone posed a totally different set of problems, the answers to which alone arguably justified undertaking the reconstruction at all. At the outset it was realized that the cone of the roof had to be raised rafter by rafter, if only because of the length and weight of each one. In order to achieve the necessary pitch with an appreciable eave over the wall, and to provide a cross tree at the apex, the rafter length had to be 34 feet (lO.36m). In effect, the rafters were individual trees weighing on average between three and four hundredweights (c. 740-985 kilos). A further necessity was a bracing device to counteract the natural sag of timber along its length. To achieve this the cone had to be braced in exactly the same way as an 'A' frame in a standard roof. In three dimensions rather than two, a horizontal ring beam had to be inserted into the cone a third the way down the slant height of the rafters. Finally it was appreciated that the rafters had to be positioned in such a way as to counteract each other's weight thrust. The ideal method, again because a three-dimensional approach to construction is required with a round structure, was the tripod system.

It was decided to notch the butt of each rafter on to the outer wall-stakes and on to the inner ring, the latter notch being reinforced with a wooden peg driven through both the rafter and the ring. The first rafter was thus prepared, but when offered into place toppled into the middle of the building, the inner ring being below its point of balance. The ensuing urgent re-examination of the archaeological evidence focused attention upon the previously dismissed disturbances around the circumference of the stake-wall and situated some 5 feet (l.52m) beyond it. These disturbances tend to be curving slots, and six clusters can be discerned more or less evenly disposed around the building. With a wall 5 feet high (l.52m) and a roof pitch of 45 degrees, the rafter butt produced to the ground surface coincides exactly with these features, any discrepancies being subsumed in the irregularity of the timbers themselves. Initially, it was not understood why there should be such disturbances, if only a shallow butt-stop was needed. These features were used first to argue for six principal rafters, in effect, a double tripod. These were duly notched and pegged into position. However, because the overall measurement had been distorted by extending the butts of the principal rafters to the ground, it was not possible to form a cross-tree at the apex. Nonetheless, before any other rafters could be put into position, the upper horizontal ring-beam had to be tied in place. The ring, of course, was an hexagon which in turn was cross-braced across the angles. On completion, a plumb-bob was fixed to the centre of the hexagon thus formed, to check that the cone was centrally placed over the cylinder. The realisation that the cone was some 6 feet (1.82m) off centre led to an immediate understanding of the curved disturbances which formed the butt-stops on the ground. It proved possible the alter the position of the ring-beam by moving the rafter butts. Actually centralising the cone required each one of the six principal rafters to be moved with concomitant disturbance of the ground. In one particular instance the disturbance created was virtually the same as the original excavated disturbance.

This discovery alone allowed a major step forward in the analysis of the archaeological data, since it proved possible, first, to explain what previously had not been understood, and second, to distinguish between structural and constructional evidence. Once the building had been completed, the ground support for the principal rafters was removed to demonstrate that these were not load-bearing elements and, indeed, could be cut off just below the eave. It was actually decided to leave these *in situ* and to monitor the time it took for the butts to rot away.

The choice of native tree to use for rafters was limited to ash and elm. In the event, six elm trees were used for the principal rafters, the remainder being ash. With the completion of the ring-beam, the positioning and jointing of all the supplementary rafters was straightforward. The opposing tripod rule was used throughout this phase of the construction, so that a disproportionate stress was never applied to the building. In all, fifty-five trees were used for rafters. The final requirement to stabilize the cone was to add the purlins. These were hazel rods, tied on to the rafters in prepared axe-cut notches in concentric rings just 8 inches (20cms) apart. The heaviest purlin ring was attached to the butts of the rafters. The total weight of the timber which formed the cone was in excess of ten tonnes.

Once all the purlins had been tied in place, the cone became a finished entity, with all lateral thrust negated. At this stage, the cone only exerted downward weight-thrust. Since the rafters were physically set on top of the posts in the inner ring and on the stakes in the outer wall, the possibility of the roof settling downwards was completely removed.

The final phase of the building programme comprised the thatching of the roof and cladding of the walls with daub. Unfortunately, it proved impossible to gather adequate supplies of thatching-straw from the research programmes devoted to crop-production at the Ancient Farm. Consequently, modern thatching-straw was bought in. The prehistoric cereals would undoubtedly have been superior to the modern varieties, not least because of their length. The straw was sewn or tied on to the roof using a fibre twine. Because of cost restrictions, the thickness of the finished thatch was a mere 4 inches (l0cms) instead of the traditional and desirable 12 inches (30cms) (*q.v.* below). Even so, approximately seven tonnes of thatching-straw was applied to the roof. Despite the strictures above about time taken to achieve an end product, and its irrelevance to prehistoric studies, three professional estimates were obtained for thatching the house. These all agreed at six six-day weeks to completion. In fact, these estimates agreed with the reality, although it was the writer who actually carried out the work. Yet, even in such a seemingly simple observation as this, there is a great degree of inaccuracy. The straw used was combed reed. This arrives in yealms, or bundles of straw, cleaned and thrashed and immediately ready to put on the roof. In contrast, research into prehistoric crop-production has demonstrated how the fields are pervaded by arable weeds at an average ratio of 2:3 per square metre (Reynolds 1981). Before such straw can be used, it has to be cleaned out down to the cereal stalks. In the case of Emmer and Spelt wheats this includes stripping away the flag leaf as well. This problem of straw preparation in the historic period is well described by Thomas Hardy in *Tess of the D'Urbevilles*, where women pull the straw into bundles from a prepared heap. The heap of straw was set between two upright posts and weighed down by a heavy timber laid across the top of the heap. This particular system has been tried and found to be an efficient method. Nonetheless, as in Hardy's time, it is boring and tedious as well as relatively slow. The issue is simple. In any estimation of thatching time, an allowance has to he made for straw preparation, an allowance which is virtually impossible to quantify since it involves the motivation element quoted above. The system described by Hardy, however, does offer yet another potential interpretation of pairs of postholes, where all functional traces would be entirely absent. Also, the posts would most probably have an extremely short life-span, being required only during the thatching period itself.

The thatching process, like any finishing to a structure, removes the irregularities introduced into the roof by using natural timbers. Dips and hollows are quite easily evened out by applying various thicknesses of straw.

Thatching involved a conscious decision concerning the finished appearance of the house. The scale of the structure, which is impressive by any standards, almost demanded that the end product should be visually satisfactory. Consequently, the straw butts were carefully dressed so that the finished roof appeared quite uniform. Occasional criticism has been levelled that "surely the house would have looked less beautiful" or alternatively "shouldn't the thatch be much cruder in appearance". The counter to such charges is basically twofold. Primarily, by making the thatch smooth and even, it is more efficient. Secondly, the inspiration of the criticism lies in the premise that the remote past by necessity was crude and uncultured, a premise which is palpably untenable as any examination of the metalwork of the period will prove. The ultimate rider to all such arguments, apart from the fact that it is impossible to know, is that the building tradition by this time spans at least three millennia, by which time the best and most efficient system would have been the norm.

The last major phase of construction was the daubing of the walls. This activity was the only one which involved a group of people, the rest of the structure having been built by just two people. In fact, one of the most important aspects of the construction was the realisation that it was not a group exercise. At no time during the building process were more than two men required and, indeed, more than two would have been positively counter-productive. This same observation is true in the African building tradition, where daubing is directly associated with alcoholic gatherings. Beer, while not a component element of the daub, proved nonetheless to be an integral part of the process. The actual composition of the daub comprised equal parts of clay and earth, with an admixture of animal hair, hay, straw, in fact any fibrous material available. The mixture, with liberal quantities of water, is trodden into a homogeneous plastic consistency and then applied to both sides of the wattle wall with vigour. The objective is to force the daub around the hazel rods in the wall, so that the fibrous material within the mix is inextricably wrapped around the woodwork. Thus, when it dries out and inevitably cracks, it does not fall off the wall. The cracks were subsequently filled with more daub, the final finish being achieved by hand smoothing. Just over ten tonnes of clay were needed to complete the walling. The end product of the daub preparation was a considerable hollow adjacent to the house, not dissimilar in form to the ubiquitous so-called 'working hollows' on Iron Age sites.

The house was completed with the fitting of the doors. The principal double doors of the house, as discussed above, were five feet wide, so that they would open inwards flat against the side walls of the porch. A simple rectangular frame, half-jointed and pegged at the corners, was wattled vertically and covered with a complete cow-hide. The hinge system, borrowed from the waterlogged evidence from Biskupin, Poland, comprised two wooden pivots, set into the framework of the door, and fitted into sockets drilled into the lintel and into a horizontal sill beam. For this latter there was no evidence in the excavation, and consequently it was braced between the outer porch posts, but laid on the ground surface. In practice, the upper pivot was firmly wedged into the door frame itself, while the lower pivot was simply set into a prepared hole in the door frame and into the socket in the sill-beam. As long as it was firmly seated there was no need for the pivot to be fixed solidly into place. In fact, this device had to be adopted in order to fit the door into position. Exactly the same system was adopted for the remaining small doors on either side of the porch, and for the back door.

Maintenance and Monitoring

When the reconstruction of the Pimperne House was finally completed in 1977, the first phase of the experiment had been fulfilled. The evidence from the excavation allowed a full-scale building to be erected with the minimum of creative hypothesizing. The only 'assumed missing evidence' concerned a few of the outer wall-stakes; all the remaining physical evidence necessary to the structure was present and arguably understood and utilized. The second phase now commenced. This comprised the long-term study of the building, and would have continued over a number of years, had circumstances permitted. This study was broadly divided into three areas. First, the physical structure itself was carefully studied with respect to its success in withstanding the natural elements, the degradation of its component parts and their repair, and with regard to the effect the structure had upon its immediate vicinity. The second area of study looked at the effects the structure had upon the ground area it encompassed, with particular reference to phosphate enhancement of the subsoil and magnetic susceptibility of the soil. A third area of study was concerned with the educational and museological value of the building. Interpretation and communication are key issues in need of continuous assessment and revision.

Structurally, the building was still perfectly sound after twelve years. It was inspected in 1986 by a structural engineer, whose only comment of note concerned the 'scantling timber' utilized in the hexagonal ring-beam in the roof. His recommendation was to increase the strength of these elements, a perfectly reasonable observation had the house been of rectilinear plan with a simple pitched roof. The scantling in question averages some 100mm in diameter, and is more than adequate as bracing within a cone which itself is bound externally by the concentric rings of purlins set just 200mm apart. However, during the time-span of the building a major repair was, indeed, effected after eight years. It was occasioned by the rotting of the outer porch-posts at the interface between ground and air. Originally these posts, green or unseasoned oak posts, slightly over 350mm in diameter, were set into tailored postholes, the massively disturbed postholes evidenced in the excavation being used as location points. The explanation of their disturbance was a prime reason for this second phase of experiment. Of all the primary posts in the building, these were the only two in continuous contact with the outside environment. The continual wetting and drying of the posts at the ground surface engendered a steady rotting process, restricted to just a foot (300mm) along the length of each post, four inches (100mm) immediately below the ground surface and eight inches (200mm) above it. The posts were virtually 'gnawed away' in the manner a beaver fells a tree. The result of this rotting caused the porch to tilt slightly, until a gale induced an alarming angle. Given the reasoning during the construction, that the massive weight of the porch acted as a counter to the thrust of the roof across the three metre wide gap in the cylinder, the prospect of replacing the porch posts was approached with considerable caution.

It was decided to take down the porch, replace the porch-posts with new ones and to re-use the rest of the porch timbers, introducing only new purlins. To achieve this, the inner ring of uprights was tied around under tension by twisting a heavy rope on the principle of a tourniquet. Gingerly the porch was dismantled and props set in place to counter any potential movement of the building. In the event, all the precautions were of virtually no value, beyond the allaying of the fears of the builder. During the repair period, which spanned several days, a person or persons unknown ventured on to the site one night and not only removed the props but also undid the support rope. One only hoped the perpetrators incurred severe injury when the tourniquet unwound. The reason for the non-collapse of the building is quite straightforward, and underlines again the difference between the constructional and structural phase. Until the building was completed and all the forces were equalized, disproportionate thrust was always critical. However, once the cone of the roof was completed with its multiplicity of ties, but particularly the concentric rings of purlins, it became quite stable, its weight only being expressed in vertical downward pressure. In addition, the timbers of the building had also had time to dry and set in place. The porch repair was subsequently carried out without any major building difficulties.

Of most interest were the implications for the interpretation of the archaeological evidence. One of the porch-posts actually snapped off, leaving the stump in the ground. This had to be dug out carefully in order to keep disturbance at a minimum. Similarly, the other posthole also had to be cleaned out prior to new posts being set in position. All this activity increased the size and disturbance of the original holes quite significantly. The replacement posts already began to show the first signs of decay after four years and presumably would have had a similar life-span to their predecessors, thereafter again requiring replacement leading to still further disturbance. All this accords quite specifically, not only to the recorded evidence of the original Pimperne house-plan, but to the vast majority of such structures, which show far greater disturbance of these two particular postholes than anywhere else.

Future repairs and replacements, however, would be accomplished in a less dramatic manner, but in all probability will lead to even more disturbance of the postholes. The lintel would be raised by using props and opposing wedges, the traditional building system being displaced by the modern acro-prop or jack. In practice, the lintel would have to be raised sufficiently to free the tenon on top of the porch-post. Then the post could be released by digging a slot into the side of the posthole and sliding the post free from its original position. The reverse procedure can be employed for replacement.

In fact, this is exactly the nature of the disturbance recorded in the excavation of these postholes. In both porch postholes such elongation can be observed. In particular, the left-hand posthole seems to show an inner slot, perhaps created by the need to lever the base of the post from its position. An alternative explanation for this feature, that it retained a door support, seems unlikely if the deterioration is as swift as described, since less substantial timbers will rot even faster.

The only other timbers to experience severe degradation were those principal rafters which, during the construction, butted on to and into the ground. These, although demonstrably not load-bearing when the building was completed, were left *in situ*. Gradually they had rotted away at the interface zone where wetting and drying was a continuous process. All the internal timbers with just one exception remained perfectly sound. The exception was an upright of the internal ring immediately adjacent to the back door of the building. In heavy rain, water seeped into the building via the doorway and affected this one timber, but not sufficiently to warrant replacement. Significantly, it is perfectly possible to replace any of the free-standing upright timbers in the building. Indeed, once the structure was completed and set, it would continue to be viable even if a number of uprights were removed. In fact, it would be possible to chock up a rotted internal upright in exactly the same way as cruck frames can be supported by stone piers. However, this is only possible during the life of the building and cannot be done at the construction stage.

The wall structure, essentially wattle and daub, was deliberately not refurbished for ten years in order to assess degradation rates. Internally, degradation was minimal, with most damage being occasioned by people investigating cracks too enthusiastically. Eventually, the interior wall was re-plastered with another layer of daub. The exterior of the wall similarly remained in relatively good order, but this was protected, first by the eaves of the roof, and secondly by stacking firewood billets beneath the eaves. The role of the daub, both in supplying a rigid fabric and in providing a damp-proof protection, has been admirably demonstrated.

The roof, by contrast, yielded some problems. Structurally, it remained in perfect order. Even the hazel purlins proved strong and powerful, which is remarkable when one compares the performance of a wattle hurdle, which at best has a life-span of seven years, at worst just three. Essentially, the problems are all associated with the thatch and in this case could ultimately be attributed to the malaise of inadequate funding. The roof was thatched with wheat straw to a depth of four inches (100mm). Traditionally, the straw should have been applied at a depth of one foot (300mm), when life expectancy would be assumed to range from twenty to thirty years. In practice, given the fact that it was clad at a third of the ideal thickness, the bulk of it quite reasonably lasted ten years, just a third of the normal life-expectancy. However, over a decade it had to be patched repeatedly. The traditional depth of one foot (300mm) is, of course, the result of trial and error spanning thousands of years. Bearing in mind that thatch was used as a roofing material from the Neolithic, it is not unreasonable to assume that the ideal depth was received knowledge by the Iron Age. The major enemies of thatch of whatever kind, straw, reed or even heather, are birds, wind and rain. Birds steal nesting material in the spring, thus causing weaknesses in the bundles tied on to the roof. Wind will seek out these weaknesses, bending loose straws upwards and thus creating a greater resistance barrier. In a remarkably short time, the wind will tear holes in the straw, ripping individual straws out of position. If such holes are left unattended, further wind can actually strip a roof clean in a single storm. Rain is the insidious enemy. repeated wetting and drying of the exposed straws gradually makes them brittle and rotten, the fragments being subsequently blown away. The action of wind and rain literally wears the roof away. Once the wearing process reaches the ties, the roof has to be re-thatched. Thus the tradition of 300mm was arrived as the optimum to counteract the effects of wind and rain. If the depth is too shallow, the rotting of the surface straws is too rapid and penetration is quickly achieved. Conversely, if the straw is layered at greater depths than a foot (300mm), no additional advantage is gained, since the critical factor at all times is the need to tie the straw on to the roof tightly. Thus the rotting rate is exactly the same. Life-expectancy is naturally enough determined by the local climate, but an average of some twenty to thirty years is regarded as normal. Thatched houses today are further protected by a wire netting mesh stretched across the roof, which counteracts particularly wind damage and lessens the depredation by birds.

In any consideration of the success of the Pimperne House roof, therefore, it is necessary to take into account the climatic extremes experienced during its lifetime. The house was situated in a narrow valley running broadly north-west to south-east and, therefore, was subject to funnelled wind directions. Also, since it was in the base of the valley, it had the added burden of being in a frost hollow. Over ten years or so, it was subjected to numerous gales and, on one occasion, a tornado. Generally, the gales arrived from the north-west, and this quadrant of the house regularly suffered the worst damage. Whenever a hole was created by the wind, it was always repaired, but it must be emphasised that repairs in thatch, because it is virtually impossible to protect the ties successfully, are always ultimately vulnerable. Subsequent damage is invariably in the place of a repair, or immediately adjacent to it. The tornado, or whirlwind, a phenomenon which is not infrequent in Britain, arrived from the north-west, uprooting in its path wattle fences, plants and crops. It tore holes in the thatch on the north-west and south-east quadrants of the roof and finally obliterated a haystack before it passed on to woodland, where it devastated several trees in its path. An even greater test than a tornado was experienced on the night of 16th October, 1987, when a full-scale hurricane devastated south-east and central southern England. Some fifteen million trees were felled by the hurricane, including the mature trees on the Demonstration Area. The house, however, withstood the full force of the hurricane with only minimal damage to the thatch on the north-east segment. This particular segment had yet to have its second coat applied. The thatching, which is done as a demonstration when the site is open to the public, had progressed steadily but had been interrupted by the advent of winter. The remainder of the roof, where the half-coat had been completed, survived completely unscathed. This, more than any other example, testifies to the ideal building form of a cone set upon a cylinder. Perhaps it is worth observing that climatic phenomena yield the most significant results in terms of extremes of capability or potential. The effects of normal degradation can occasionally be observed through such phenomena. However, while it is extremely interesting and valuable to have the information created by extremes, the normal is still the primary focus, especially if the life-expectancy of the structure is the subject of study.

Rain in this country barely needs any specific reference, but perhaps it is worth recording that the house had been remarkably dry even when over an inch of rain (30mm) fell within an hour. During the winter, when rainfall is persistent, the straw becomes progressively wetter and, of course, heavier. It is estimated that straw will contain its own weight in moisture before it will leak so that, although the roof never leaked except through a hole occasioned by wind damage, the roof weight must have sustained at least seven tonnes of moisture. Snow similarly was a regular hazard, and was recorded on the roof at a depth of 450mm. This, too, expressed as weight easily exceeded some seven tonnes.

It was during one snowy winter that the house was completely flooded to a depth of over one metre. Heavy snow blanketed the landscape to a depth of 600mm. A sudden thaw, accompanied by torrential rain, melted the snow on the hill slopes within the space of two hours, the resultant flow of water sweeping down into the base of the valley to create a lake. The only damage sustained on this remarkable occasion was the disintegration of the cooking-oven within the house. The flood waters receded after just four hours.

Frost represents a further natural enemy of thatch in that it, too, is part of the wetting/drying regime which attacks straw. Given the location of the house in a frost hollow as described above, temperatures in excess of minus 15 degrees Celsius have been recorded on numerous occasions. Thus, despite the shallowness of the straw thatch at just four inches (100mm), it survived surprisingly well. Undoubtedly, had it been applied at a foot (300mm), damage would have been minimal in comparison, but similarly, much less would have been learned so quickly.

The scientific return from the construction of a building from a specific excavation can be quantified in a number of different ways. Critically, such constructions only yield a valid return if they are based specifically on actual excavated examples. In this case, it was possible to approach directly the problems posed by the archaeological evidence, whereas a generalized reconstruction, almost by definition, obfuscates these very particulars which demand solution. The preceding text demonstrates this point particularly clearly in isolating structural and constructional evidence which otherwise would never have been resolved. The return from construction is perhaps best illustrated as a learning curve. The actual building process yields a very high return, which then steadily tails off until the phases of deterioration and subsequent repair come into effect. The interval involved may span between eight to ten years, and is directly associated with timber rot at the interface between soil surface and the atmosphere. This deterioration was entirely expected, but the time interval was considerably shorter than anticipated. Such peaks of learning are extremely important, but need to be balanced against the steady inflow of data which accrues almost on a daily basis. In effect, while the building of the structure may seem to be a justification of the enterprise, given the high return of information, the actual return through time, while it may not be similar in scale, is equally, if not more, important in terms of quality and significance. This particular factor dictated the delay between building and publication, and was inspired by a different building experiment at the Butser Ancient Farm. In 1972 a construction based upon Hut Db, excavated at Maiden Castle in Dorset (Wheeler, 1943), had been made on the research site of the Ancient Farm. The house itself was quite simple, the evidence being a circle of postholes with a central posthole. Eschewing all sophisticated joinery and deliberately adopting the minimalist view of construction technique, a house was built comprising interwoven wattle walls, subsequently daubed, and a doorway, the lintel of which was lashed to the porch-posts with rawhide strips. The roof similarly utilized a forked post as its central support, the initial sextripod of rafters being set into the fork. The rafters were in turn lashed with rawhide strips to the side of the wall-posts without any joinery or notching whatsoever. To provide a base for the thatch the rafters too were interwoven with hazel rods, in exactly the same manner as the walls, and then thatched with straw.

The completed building was undeniably successful and entirely persuasive as an accurate and valid interpretation of the data. Like its successors, it withstood extremes of climate, including severe gales, deep snow, indeed the full range of weather offered by the British climate. Environmental effects yielded considerable information, including the wear-pattern in the doorway, exacerbated by the splash syndrome in wet weather (Reynolds, 1979), and the humic lump which occurs beneath the eaves of a thatched roof in direct contravention of the expected drip-gulley (Reynolds, 1982). However, exactly ten years after its construction, a fundamental error in building became apparent. The rawhide lashing tying the rafters to the wall-posts began to lose tension and power. The resultant downward movement of the roof was brought about by its weight. This averaged some two and a half tonnes, but the weight varied according to the moisture retained through the different seasons. The gradual sinkage of the roof literally caused the building the self-destruct within three years. Ironically the central pole, beloved in paper reconstructions and proven to be quite unnecessary to the structure, actually accelerated the destruction process, by causing the roof to close and twist like an old umbrella. The critical point, however, is the fact that the fault in building construction did not become evident until ten years had passed. The abundance of archaeological evidence indicating considerably greater longevity for Iron Age houses than a decade only serves to underline the need for long-term testing of a reconstruction.

Such long-term testing necessarily lacks the human factor, in the sense that reconstructions are never utilized as habitation units. Thus any tests can only be applied to the structural elements, in so far as the interaction of environment and design may be monitored. This may seem to be a shortcoming, but there is no way in which habitation can be satisfactorily simulated. The attempt to re-enact an Iron Age way of life by B.B.C. T.V. some years ago only serves to underline how futile such an exercise is. There have been claims that such re-enactment can enhance our comprehension of structures and provide insights into potential function, but such claimed results are so subjective as to lack credibility. In the case of the B.B.C. simulation, not only was the group of people ill-fitted for the task in terms of both ability and age-range, but they actually formed a peer group and psychologically took with them all the inhibitions of a peer group. The great house, approximately a metre less in diameter than the Pimperne House, was turned into a communal dwelling-house. The philosophy of communal living is hardly the norm in social organisation and historically has never been a European practice. In modern times, it is an expression of collective irresponsibility, which originated on the west coast of the United States of America. As an instance of peer group inhibition, the toilet arrangements can be singled out. Although it is difficult to isolate from the archaeological data exactly what were the normal toilet facilities in a settlement, it is unlikely to have included a bridge across the enclosure ditch and bank giving access to a wooded and, therefore, private area. Privacy in toilet accommodation, almost above all else, is a hallmark of the modern world.

In real terms, it is only sensible to examine structures physically and as far as possible to dehumanize the examination process. Re-enactment is best left as a dramatic indulgence to the imagination, which can be recognized as singularly valueless and instantly forgettable. Unfortunately, this approach more and more pervades museology and is at the heart of the new wave of heritage interpretation. History, and by implication prehistory, is swiftly becoming a tabloid newspaper sub-editor's view of the past.

This argument in no way denies the educational value of a construction like the Pimperne House. Inspired as it was by a research stimulus and the immediate data yield from the building process, supplemented by the steady flow of information through time as the structure deteriorated and required repair and refurbishment, its physical entity was a most powerful teaching tool. It had considerable impact right across the academic field. Over one hundred thousand schoolchildren visited the house and experienced for themselves the scale and volume of the building. While, quite properly, argument may be raised over fine detail like the joinery, the logic of the construction and the materials with which it is built are beyond dispute. Similarly, at the other extreme, academicians have come from all over the world and have left with a different and enhanced insight into the domestic structures of the Iron Age. The implications of the building outweigh the archaeological evidence as recovered by excavation. The nature and quantity of the materials as described above, even from the minimalist approach adopted, exceed by far the most conservative estimate based upon the archaeological data and, indeed, even when archaeologists are confronted by the building itself, still exceed a simple visual analysis. It is only when the building is subjected to careful scrutiny that the material requirements truly emerge. The implications of the building, however, extend beyond it into two specific areas. First, although no detailed information has been given concerning the time taken to build the house, its scale and complexity is such as to indicate originals of this magnitude were built and thatched professionally. Critically, it is not the product of many people working for a short time. It can only have been built by few people working for a long time. Second, if the archaeological data has been correctly interpreted in determining the building as a domestic dwelling, an interpretation persuasively supported by the presence of hearth and oven as well as pottery sherds, then its scale has implications for status within the social organisation. Further, a tenuous argument can be offered that, given the life-expectancy of the building of at least a hundred years, implied by the archaeological data and supported by the construction itself, then ownership and subsequently inheritance of status and wealth was an accepted social norm. It is most unlikely that such buildings served a single generation.

Similarly, there are clear agricultural implications, beyond the simple provision of materials, including the principle of woodland management. If the above arguments are valid, the problems of soil exhaustion, a major element in the hypothesis that prehistoric agriculture operated at a subsistence level, can be dismissed. The permanence and success of the agricultural economy is elegantly demonstrated by a building of this scale, built and re-built to last generations. That the hypothesis of soil exhaustion has been further invalidated by the crop research experiments at the Ancient Farm only serves to sustain the proposition that such houses represent ongoing status and wealth.

To conclude, the Pimperne House was built in 1976 and twelve years later, given a new half coat of thatch, was in intrinsic good order. It successfully withstood all the vicissitudes of the British climate, including a full hurricane, an event regarded as occurring once every three hundred years or so. In effect, it fulfilled all the basic criteria of a successful building, the more so when one considers that it was never lived in and therefore did not receive the careful attention that its occupants may have been expected to expend upon it. The yield of information from the construction has been remarkable, both in terms of the initial building and its subsequent life. One of the most critical discoveries resulting from the building process, which in a sense totally justified the experiment, and notwithstanding all the other data gathered, was the ability to distinguish between structural and constructional data in the archaeological evidence. The exercise was one of steady accumulation of information, including the on-going effects of the building on the soil it covered, as recorded by electronic and chemical techniques. The ultimate value of any experiment designed to elucidate archaeological data is assessed by its return to archaeology. This is the first time that a report of an excavation and its subsequent empirical examination have been presented at the same time. The long period of time between the excavation and the discussion of the construction based upon that excavation may be justified by the information yield and enhanced comprehension of the original data.

The Dismantling of the Pimperne House

The decision to dismantle the Pimperne House and the public exhibition area at the Queen Elizabeth Country Park was not determined by archaeological considerations, but by the fact that the Ancient Farm Project was given notice by Hampshire County Council to vacate both the Little Butser and Littlehampton Down sites by the end of September, 1990. Rather than the dramatic disposal of the Pimperne House by fire, it was decided to take the structure apart in order to examine its real physical state after fifteen years of life and use. This report is a brief resume of the dismantlement; a more detailed description will appear in a subsequent Year Book. The house was carefully taken apart over a two-week period during the month of September.

An initial examination of the building showed it to be in good structural condition, with the exception of the outer porch-posts, which had again virtually rotted through at the soil interface. The same condition had occurred in 1983 *(v.supra)* and it had been predicted then that the average life span of these posts would be some seven to eight years duration. When they had been replaced in 1983, the adjoining porch walls had been strengthened along with the superstructure, the effect of which was, in a sense, to hold the outer porch-posts upright, despite their lack of ground support. It was quite probable that a different porch construction was utilised in antiquity, possibly using split horizontal beams in the porch walls, which would make this part of the structure more like a self-contained box, which would not depend entirely upon the condition of the porch-posts. Given the normal pattern of disturbance usually recorded for these two particular postholes from a large number of excavated examples, replacement certainly took place in antiquity, but perhaps not as frequently as every seven years. The replacement of the horizontal sill-beam which supported the door-pivot hinges would undoubtedly have happened at regular intervals, but this would have caused little disturbance.

All the visible timbers of the house were in good order and well secured. The worm infestation observed in the first years of the house had penetrated no more than two millimetres into the pith wood. The initial drying out of the timber uprights of the inner ring in particular had caused the bark to peel off, a process which had been deliberately completed in order to ensure no major worm infestation was taking place. Many of the rafters were still covered in bark, primarily because of the multiple ties of the purlins holding them in place. Here, too, worm infestation hardly penetrated the pith wood beneath the bark. During dismantling the bark fell away from the rafters as the purlins were cut away.

The outer wall of wattle and daub was also in good condition, except in one location to the right of the porch, where a persistent leak in the roof had degraded the daub. There was a pronounced ridge directly under the eaves where the vegetation enjoyed a protected habitat. The only drip-gully to be observed anywhere occurred in the back doorway, where the earth was bared by the passage of feet. Drip-gullies will only form if there is no vegetation and there is bare earth directly beneath the eave. A good example of a drip-gully can be observed beneath the eaves of Iron Age house reconstructions at Craggaunowen in County Clare, Ireland. Here the simulated crannog is sprayed each year with a systemic chemical to remove all plant life. In a nearby simulated ring-fort, where the grass is allowed to grow, there is no sign whatsoever of a drip-gully.

The thatched roof was in first-class condition, having received a new half coat only three years previously. The leak referred to above resulted from a possible technical failure to thatch to a sufficient thickness the gully between the porch and the main roof. During this inspection, however, a glaring error manifested itself. The pitch of the porch roof and the pitch of the main roof were both at the ideal 45 degrees. Joining two different planes at the same pitch, however, inevitably meant the angle of the join was less than 45 degrees, and would consequently leak in time. Thickness of thatch would only postpone the inevitable; it would never defy the simple geometry. For this join to be successful, i.e. at a 45 degree pitch, the porch roof has to have a pitch approaching 60 degrees. This apart, the rest of the thatch would certainly have lasted the average fifteen years before it would need to be replaced.

The invisible elements of the inner ring of posts in the upper reaches of the postholes, had been regularly probed on an annual basis. The process was that used by surveyors everywhere when dealing with timber buildings. A long-bladed knife was thrust into the offending timber to measure any resistance. Over the years, although the knife had penetrated further, it always met with stout resistance, except for one particular post to the right of the back door. Since the house, like the original at Pimperne Down, had been built on a slight slope from back to front, when torrential rain occurred a degree of flooding ensued, which meant that this particular post was occasionally inundated. The flow was such that only this post was affected. Every effort was made to obviate the flooding, but the gullies cut for this purpose had never to penetrate as deep as the chalk rock itself, since there was no evidence in the original excavated plan for such corrective action. Probing had established that this post effectively had no stump left in the posthole after the first ten years. In simple terms, the roof was holding it up and only the upper neck of the posthole checked it from swinging free. The outer porch posts, as indicated above, were also severely affected, especially the right hand post; it, too, had come adrift from its stump, which was best described as pulpy. The left-hand post still had an appreciable and strong stump.

After preliminary survey, the dismantling of the house began in reverse order to its construction. The thatch was stripped off and burnt. Examination of the purlins, rafters and the twine ties showed everything to be in an excellent state of repair. The hazel rods which formed the purlins were still extremely strong and not brittle, as might have been expected of similar hazel rods in a hurdle or interwoven fence. They had, of course, set in position, but still afforded sufficient strength to be used as a ladder to clamber over the roof. All the rafters were, without exception, in excellent condition, hard, well-seasoned and certainly re-usable. The ties similarly were still firm and the twine strong. The effect of smoke blackening of the timbers, ties and straw was limited to the upper third of the roof, in effect the part of the roof from the ring-beam to the apex. The purlins were cut free from the rafters working from the roof apex downwards. These, too, were burned.

The supplementary rafters were cut free from the apex and the ring-beam, and prised away from the pegged seating on the inner ring. The peg through the notch joint on to the outer wall had to be sawn through to release each rafter.

The removal of the principal rafters presented almost as great a problem as their original erection. First, the ring-beam was cut away section by section, which ultimately meant the ladder being rested against a single rafter. Safety considerations notwithstanding, it was surprising how rigidly fixed these rafters were, especially since they were only attached to the inner ring and the wall. The extension to the ground for all six principal rafters had long since rotted away. This supplementary experiment had been designed simply to prove beyond any doubt the archaeological evidence for constructional and structural elements of the house. The pegs for these rafters, too, had to be cut away before they could be released from the outer wall. In the process of removing these last rafters, several of the pegs holding the scarf joints of the inner ring sheared through, the worst being the joint either side of Post 016, which fell during the removal of Rafter 04. All the rafters were carefully stored for re-use in the construction of the Longbridge Deverell Cowdown house, scheduled for 1991 on the new site at Bascomb Copse.

The next phase of the operation involved the removal of the ring-beam from the circle of inner posts. This proved relatively straightforward, as the mortice and tenon joints had dried out and seasoned, thus loosening the tenon from its original tightly-wedged state. All the joints were, nonetheless, in good order. These horizontal timbers were burnt.

At this stage the process of dismantling had reached the point at which archaeologically significant evidence could be expected. The roof had been strictly conjectural, without any proof for the detail of its form beyond the six principal rafters. Each of the posts in the inner ring was removed individually, starting with Post 001 immediately to the left of the entrance porch. For this exercise, it was evident that the different parts of the posts needed to be defined. That part above the ground is thus described as the post, that part below the ground, whether attached to the post or broken off, is defined as the stump. The part of the post which stands at the interface between above- and below-ground level is described as the collar. In addition, the state of the pith wood and heart wood was carefully recorded.

The removal of the first post (001) was tackled extremely carefully. The surface soil was brushed away to reveal the upper face of the stone packing, which had been rammed around the post to hold it upright. This meant the removal of no more than 25-30mm of soil. It is a signal point that the surface of the house floor co-incides almost exactly with that of the uppermost surfaces of the posthole packing material. The implication must be that, in the process of excavation, once the surface of the posthole packing is revealed the uppermost floor surface has been trowelled away. By the time the posthole itself has been clearly identified at the subsoil layer, all floor evidence has been totally destroyed.

In the case of post 001, a small area of soil surrounding the packing was cleared away until the post was free-standing, surrounded up to the collar by packing stones. During this process, it was observed that the packing stones were, in fact, not in real contact with the post collar at all, and that the post itself was not actually held in place. An inadvertent push on the post caused it to lean at a rather drunken angle. Subsequently the post was carefully lifted out of the posthole to reveal that, immediately below the collar, all the pith wood had rotted away, leaving just a stump of heart wood reaching to the base of the posthole. Examination of the posthole itself showed all the stone packing still firmly in place around the circumference, but a clear cavity between it and the post stump. In addition, the original bark from around the post stump still survived in good condition and retained its original girth against the packing stones. In effect, after the pith wood had rotted away, perhaps over some eight years or so, if the probing records are a reliable indicator, a tubular air-filled cavity surrounded the heart wood stump. On recovery, it was dry to the touch and the approved method of stabbing the wood with a pointed metal blade made virtually no impression. This situation makes no difference whatsoever to the functioning of the post. The weight it sustains is expressed in terms of vertical thrust, and the subterranean loss of the pith wood is, therefore, of no consequence. The vertical column of heart wood through the post is still intact. In fact, the column of air around the post which obviates contact with the sides of the posthole itself seems to have been positively beneficial. Had there been any lateral thrust, the situation would have been quite different. The loss of pith wood inevitably robs the post of some strength and introduces a weakness, particularly at the collar zone, as was evidenced with a number of the posts further around the ring.

The posts in an arc from 001 to 009 were all exactly similar. Each post lifted neatly out of the posthole with heart wood stump firmly attached, with a clear cavity between stump and post packing. However, the adjacent arc of posts, 010 to 015, proved slightly different in that the stumps broke off during removal. The first of these, post 010, was known to have had a longitudinal curve below ground. This meant that, although the post was perfectly straight and upright above ground, below ground it was tight against the south rim of the posthole and equally tight against the north base of the posthole. The packing itself did not form a neat tube about the post, but rather locked it in place in an irregular fashion. Because of the pressure of time to clear the site, brute force was applied, leading to the post snapping off at the collar. Close examination showed that rotting had advanced into the heart wood and that the stump itself was, in fact, quite damp. At this point it was decided to exert lateral pressure on all the remaining posts prior to their removal. A further seven posts sheared off at the collar zone; the remainder were still strong although all moved within their respective postholes because of the cavity as described above. Posts 010 to 015 inclusive all showed the same characteristics of dampness and rot. Each of the stumps was still strong except for the shear plane at the collar. It proved quite a simple task to remove each stump from its respective posthole, since a similar cavity between packing and stump existed in all the postholes. The reason for this particular arc being more affected than the rest can be attributed to a period immediately before the roof was thatched with its new half-coat, when a serious leak had developed below the ring-beam caused by gale damage. The rainwater had followed the line of the rafters and the inner ring, finally trickling down the posts to the surface around the rim of the posthole. Being absorbed by the soft earth in this zone, humid conditions were set up which immediately promoted microbial activity. No such explanation can be offered for Posts 021 and 022; the reasons for the rotting here can only be attributed to the storage of damp material in the immediate vicinity of the two adjacent posts. The inner porch-post right, separate from the inner ring, was directly affected by water penetration through the technical difficulties of thatching the joint between the main roof and the porch. The reason for the complete pulping of the post stump of Post 016 has been explained above.

While the above may seem to indicate a state of ongoing deterioration of the structure, this is actually not the case. In structural terms, given only a minor arc of posts being affected, the roof, which was itself a rigid cone held at the apex and on the perimeter wall, literally held these posts in position. The same is also true for Post 016, 021 and 022. In maintenance terms the state of the post stumps had been established fairly early on, and the easiest remedy would have been to introduce further fill into the cavity as it formed. The ultimate state, in the case of Post 016 for example, would have been for the whole of the posthole to have been filled and for the post itself to have stood on the secondary packing material. This material would, of course, have been made up of smaller stones than the original packing or even stony earth. In practice this would mimic exactly the same process as used in supporting the base of crucks in cruck-framed buildings. It is not uncommon to find these eventually raised on stone piers. The objective in both cases is simply to sustain the vertical thrust of the roof through time. It would have been quite impossible to build the structure as new in this way.

This particular observation lends a new perspective to the archaeological analysis of postholes, especially those within a structure and regarded as fundamental to its ongoing stability. It would be perfectly feasible for all the postholes of the inner ring to have been back-filled subsequent to construction. In other words, the posthole itself would have come to the end of its functional life long before the structure or building had done so. This factor may well account for many of the artefacts which are recovered from postholes, especially potsherds, which may have been deliberately pushed into the cavity beneath the upright timber post along with other material. More valuable objects like brooches and pins would easily have been lost by falling into the cavity, to be covered irretrievably by the backfilling process. It certainly accounts for the relatively easy identification of primary packing and post-pipes. Otherwise it is quite difficult to envisage the process by which ostensibly valuable objects might find their way into a posthole at the abandonment of a house. The normal human inclination is to strip the place bare of any valuables on leaving. This could well have included the removal of fixtures like carved portals or posts. In the case of a house burning down, the arrival of special objects in postholes becomes even more difficult to explain.

With the removal of the inner ring of posts, all that remained were the porch-posts and the outer wall of wattle and daub. Undoubtedly the outer pair of porch-posts would have had to have been replaced in 1991. The significance of the highly disturbed state of these postholes as normally recorded cannot be ignored. These posts were at the greatest risk, but it is important to realise that they are not integral to the main structure of the house. A complete porch can be replaced without major difficulty. The outer pair of posts can be replaced with minimum disruption to the life of the building and without even having to dismantle the porch.

The outer wall of the house was in remarkably good condition. The daub was still firmly in place and extremely strong. Throughout the life of the building good care had always been taken of the wall, bearing in mind that it formed a critical support element for the cone of the roof. Cracks were always filled and occasionally another layer was added as an extra skin to smooth the interior. The inner face had been whitewashed - literally limewashed - following the reference to this practice by Tacitus *(Germania,* 16). The only damage to the wall which had not been meticulously repaired was the section immediately below the leak area between porch and main roof. Since this particular part of the wall was of timber-frame construction, there was no immediate weakness, despite the lack of brittle daub support.

Destroying the outer wall proved to be the most arduous job of all. Sledge-hammers had to be used to break the daub down. This became quite a dangerous exercise, because once the bulk of the daub had been beaten off, the remaining patches still adhering to the wattle work actually bounced back. The wattle work was dry, strong and had not become brittle as one would have expected. In fact, it was in a very similar condition to the purlins. It was possible to bend individual lengths of hazel rod quite considerably before they snapped. Examination of the base of the stakes of the outer wall showed a degree of rotting. The pointed stakes had been driven into pre-bored holes to a depth of just 300mm. The rot was largely confined to the sharpened areas, an average of 150mm on each stake. Otherwise all the stakes were in good condition. Even this amount of rotting is largely irrelevant, and one suspects that it would not be particularly important had the stakes rotted to the ground surface. Provided the daub was fully maintained and the hazel rods sustained their dry strength, the wall would continue to work as a perfectly sound support for the roof. The key lies first of all in the way the hazel rods clasp the stakes of the wall in tension, and secondly by the daub holding the rods in place by virtue of its brittle strength. The damp-proofing effect of the clay in the daub mix had clearly been effective. The wall itself is further protected by the projection of the eaves of the roof. Even the wall stakes next to the rear door, where occasional flooding occurred, were in good condition, the daub having protected them perfectly well.

Removal of the wall, daub, wattle and stakes left a distinct gully behind. The earth between the stakes had degraded into a gully beneath the cover of the wall, simply because of the breakdown of the vegetation and fibre material in the soil. The gully itself was punctuated with holes where the stakes had been, the difference in depths being 150mm and 300mm respectively. However, this observation is rather an academic one, since all evidence of these structural remains, which are entirely within the topsoil, will promptly disappear at the next soil disturbance episode. Failing such a disturbance, it would have to be a brilliant piece of touch excavation to reveal their presence. The possibility of the house area being left to settle and revegetate in order to observe the kind of field evidence it might leave is, sadly, remote. Local management of the land, even though it is public, is aggressively unsympathetic to long term research requirements. Continuing the observation of archaeological trace evidence left by the house, only an arc of ten postholes, nos. 7-17, actually penetrated into the underlying chalk rock, and then only to a depth of 100mm. These would at best justify the description of shallow post-sockets rather than full-scale posts which had sustained a roof weighing in excess of twenty tonnes. All the remaining posts were simply earth fast.

Prior to the house being dismantled, the interior floor area and the exterior ground surface were subjected to a full magnetic susceptibility survey. The results of this survey will be the subject of a paper in the 1991 Year Book. The house floor area itself was of considerable interest. Because the earth had been covered by the structure, within the space of no more than three years all traces of vegetation had completely disappeared, along with much of the fibre content of the soil. The normal fibre content of grassland, prior to the structure being built, was 24%. After five years this had reduced to less than 5%. Dessication similarly reduced particle size so that the floor became a fine, dry dust. Unfortunately, a sample to assess the seed content of the floor area was not taken and subsequent observations will be invalidated for the reasons stated above. However, because of the loss of vegetation, the whole of the interior floor area sank some 50mm in comparison to the external ground surface. In addition, the area within the inner ring of posts sank a further 100mm, leaving a raised perimeter shelf between the inner post ring and the outer wall. To a very large extent this was caused by usage, the passage of feet and cleaning out. Where matting had been laid down for any length of time in the same place, a raised platform occurred which rapidly disappeared once the matting was taken up and moved. There is little doubt that this process would have continued through time. In fifteen years of use the main floor area sank an appreciable 150mm. It would be dangerous, however, to calculate an ongoing sinkage rate on these figures. A matting floor evidently checked the process and there is every reason to suppose that the interior of such a house would have been well appointed, including some form of floor covering. Nonetheless, the phenomenon itself would have occurred to a greater or lesser extent. After abandonment, and given no major subsequent soil disturbance, the field evidence would be a dished depression. Such evidence has been encountered by the author on field walking trips in Northumberland, where one finds not only dished depressions, which must have been prehistoric house platforms, but also the holes of the posts themselves.

In conclusion, it must be recorded that it was a sadness that the Pimperne House had to be dismantled. How much better it would have been to allow it to disintegrate through time, recording the process at regular intervals in appropriate detail. That it was an important construction, which fulfilled all the criteria of the archaeological evidence, is beyond question. The opportunity to study its degradation would have been a remarkably valuable one, but such was denied. Nonetheless, the information gained from its dismantlement is quite remarkable and perhaps of equal significance, if only from the analysis of the postholes. The data achieved should be of considerable service to field-workers and excavators alike. Certainly it focuses upon the nature of evidence, and how it occurred, and will provide comparative material to enhance the excavation process. Finally, the house will live on, if not in whole, certainly in part. The majority of the roof timbers will be re-used in another major reconstruction, where lessons learned from the Pimperne House will be applied, especially in so far as they relate to excavated evidence, and further the techniques of excavating that evidence.

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