A NEW PERSPECTIVE ON COURTYARD HOUSE STRUCTURES

INTRODUCTION

In the upland area of West Cornwall known as West Penwith, bordered by the low- lying lands between Marazion on the South coast and Hayle on the North coast is a particular type of prehistoric dwelling known as the courtyard house. These occupied during the Iron Age and Romano-British period.

The term courtyard house was first used in preference to hut clusters by H. O'Neil Hencken in 1933(Hencken 1933 237 - 84). This distinguished them as a separate entity to clusters of hut circles found in the area. The site at Chysauster, by contrast, was not fully excavated until 1933 by Hencken, followed by Hirst's excavation, in 1937 of the Porthmeor courtyard house site. Later that year came Hirst's national publication of courtyard house sites (Hirst 1937 b).
This paper endeavours to put forward a workable hypothesis that courtyard houses were in fact large buildings having one large roof (West Cornwall Galleried houses). In order to formulate this theory it is necessary to devise a method whereon the roofs could have been built following the conventional hypothesis, with a central open courtyard. Hut 6 at Chysauster (Fig 2 a) and Hut 4 at Chysauster (Fig 2 b)will be used to illustrate the various theories.

Typical features of Courtyard Houses

These include:
a. A number of rooms or enclosures which conform to a definite plan.

b. Covered drains or water systems both inside and outside houses.

c. One fogou in each village is common. (A fogou is a subterranean structure, resembling Irish Souterrains and Scottish Earth-Houses.)

d. Paving of entrances of houses; occasional paving inside rooms or ways and paved courtyards outside the houses.

e. No ditches found outside the houses.

f. Hearths lined with sherds were common

g. Terraces found outside the houses often filled by hand.

h. The round rooms of houses commonly contained basins cut into granite slabs.

i. Certain types of beach stones and beach boulders appear to belong to the period, and suggest that special industries were practised of a type at present unknown. Though possibly the tin trade was involved.

j. The period covered is thought to be late Iron-Age to the end of the Romano-British period.
(Hirst 1937b)

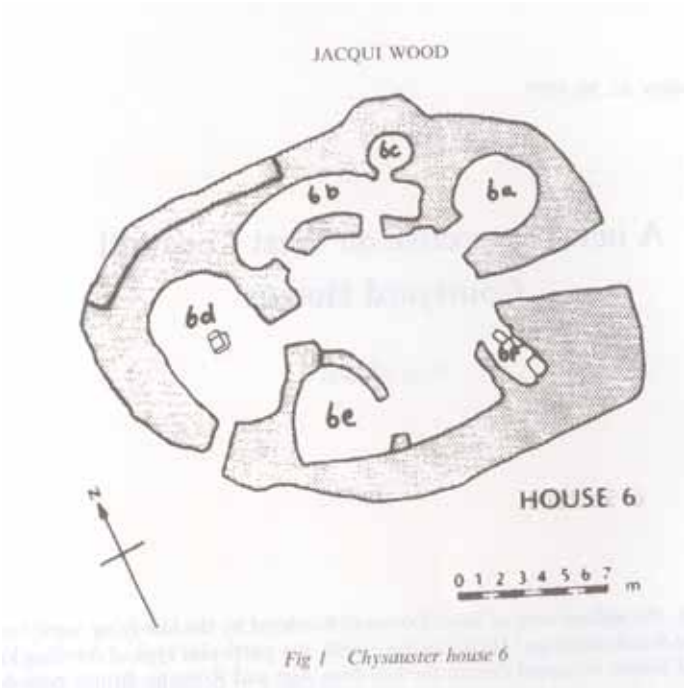


Fig 1 Chysauster house 6

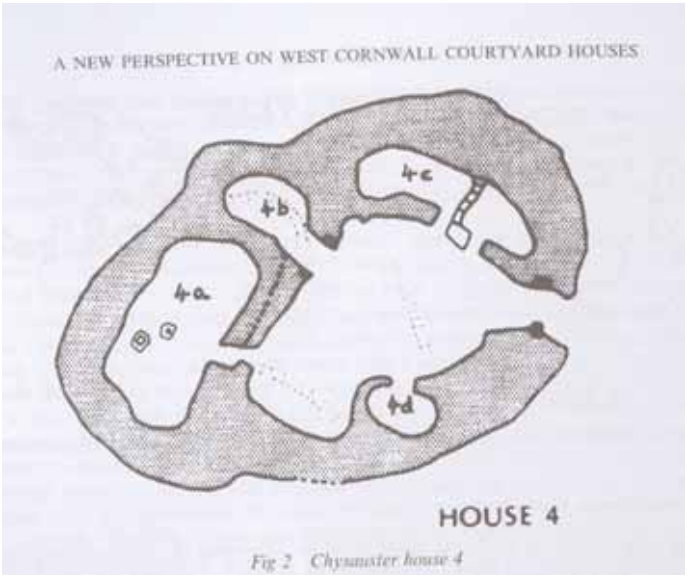


Fig 2 Chysauster house 4

Courtyard House Walls

Courtyard house walls are impressive structures, with massive granite stone blocks,and constructed with inner and outer faces. The space between was infilled with rubble and soil, in some cases to a thickness of two metres. There appears to be two possible methods of construction. The first method would be first to construct the interior walls. Taking Chysauster Hut 4 (See Fig. 2 b) as an example, the walls of the oval-shaped room, 4a, would be built next room 4b, to which was added 4c, the long sub-rectangular subdivided room. The overall oval shape of the building was retained throughout, a gap being left for an entrance into the courtyard followed by an anomalous sub-triangular area of stone. Following the line of the oval building a small circular room, 4d would be constructed the structure would be completed by building a wall linking 4d to 4a.

The walls would be possibly then built to a height of approximately six feet. Once this construction was complete the building of the outer walls would commence. This was carried out in an anti-clockwise direction commencing at the courtyard doorway. A double wall construction, later infilled with rubble, was achieved by leaving a three foot gap between inner and outer walls. The line of construction moved from 4c to 4b, too sharp an angle being avoided by leaving a large gap between the walls to be infilled later (Fig 2 b). The wall line would continue to 4a, smoothing off any sharp angles in the process. As the wall continued round to the courtyard doorway, a rough oval would be created and the anomalous, sub-triangular infill, described earlier, created. With the double wall construction complete, an infill of rubble would create a strong support for the roof.

The second and less likely method used in wall construction started with the building of the exterior walls. Assuming that the objective of the builder was to build a large thick walled oval structure, building the outer walls first would be the most logical approach. However, when one looks at Hut 4 at Chysauster one immediately notices that the outer walls of this structure is not a perfect oval shape. There is a very definite bulge in the outer wall in at room 4b. This indicates that the first method described is the most likely to have been used. Viewing the outer wall construction in this light the rough bulging oval shape becomes the necessary result of smoothing off any angular exterior edges. Furthermore, the resulting large infills simply became the natural by-product of this construction method.

Applying this hypothesis to for example to Hut 6 (Fig 2 a) at Chysauster, the rounding off of external walls becomes more explicable. Hut 6 manifests a very detailed room plan which, if the initial construction of internal walls is accepted, explains the thickness of the infill. The infill between the walls of Hut 6 is very thick in places, particularly to the left of the entrance to the courtyard, also the area between 6a and the small store 6c. The outer walls of this house are distinctly oval shape this can be seen clearly from aerial photography. The only visible exception being a bulge in the outer wall behind 6c, the possible store room. This emphasises the supposition that the building of the inner walls took place first, because the builder had to deviate from the overall smooth lines of the outer wall to accommodate the possible storeroom 6c.

A survey of other courtyard houses in the area adds weight to this theory of construction of the walls. On the next ridge to the West of Chysauster is the courtyard house settlement of Mulfra Vean. Here are two good examples that strengthen the theory. Courtyard house 1 has, it appears, two courtyard entrances, although this could be the result of a section of the outer walls having fallen in antiquity. The diagram (Fig 3a) indicates an oval room at the back of the courtyard, and what appears to have been two rooms in areas b and c, with a possible partition wall between them. The outer walls behind area b and c are good examples of this smoothing of the lines of outer walls. Additionally at Mulfta Vean the general oval line of the outer wall of Courtyard house 3(fig3b) is flawless, except where it has to loose its shape to accommodate room 3a.

Another courtyard house settlement on the next ridge to the West near Lanyon, is Boswarva. At this site there are two examples of this possible construction practice. Courtyard house 2 (Fig 4a) has a very simple outer contour, apart from the area behind room a. This is consistent with the plan at Mulfra Vean. House 3 at Boswarva (Fig 4b) has a complicated interior wall plan, yet the outer wall is a simple oval. In consequence, this leaves two large infilled areas between rooms a and b and also between rooms b and c. the evidence suggests that logically the inner walls were constructed first. To construct the required size and type of room would be relatively simple. The outer walls could then be erected to supply strength, stability and insulation to the structure.

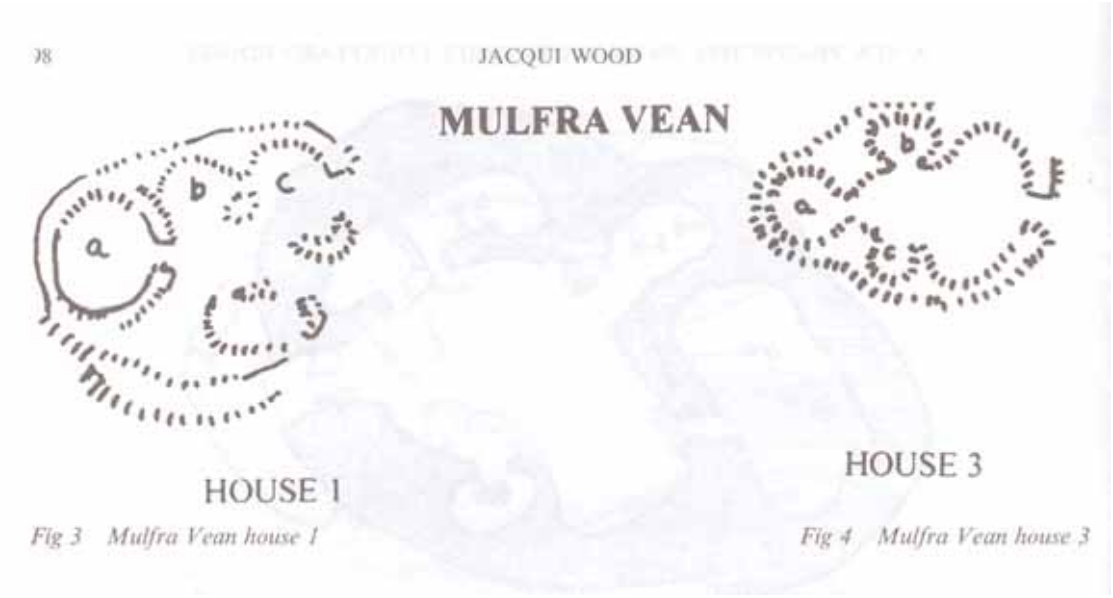


Fig 3 Mulfra Vean house 1

Fig 4 Mulfra Vean house 3

The Courtyard House Roof Structure

One of the most intriguing questions asked since the discovery of courtyard houses has been, 'how was it roofed'? Only when there is a prospect of reconstructing one, can its practicality be taken into account. There are two possible methods of roofing these structures. The established interpretation is to leave an open courtyard in the centre of the dwelling.

Starting with Chysauster's room 6d in Hut 6 one can examine how the posts would support the roof rafters. In Hut 6d the shape of this room is oval, therefore a typical conical roof would not be successful. There are, however, various examples of hipped roofs being built on oval post structures. The requirement for this type of roof is two internal support posts close to the ends of the building, as at Heuneburg and Appelshofen, Bavaria (Audouze & Buchsenschutz 1991:65).The two support posts could be placed on flat granite slabs for stability. Once the rafters and thatch were added, it would be impossible, given the roof load bearing down on them, for them to move. If these two supports were large timbers with a natural fork at the correct height, the cross member could be slotted into them. Rafters would then be added across the two straight sides culminating in a fan shaped rafters at both ends. These rafters should be approx. 18"apart and have concentric circles of battens attached. The pitch of the roof would depend on the height of the two supporting posts. This interpretation is based on my own research and inspired by the German, House Urn from Konigsaue (Audouze & Buchsenschutz.1991 :82). This is a pottery house-urn, a model of a thatched house, shows a very steeply pitched roof approximately 55 degrees, which seems to indicate a much steeper roof pitch than has been used at research centres in this county. In view of this, at the Cornwall Celtic Village research centre we constructed a roundhouse having this roof pitch to test its durability. It was found that a roof with this 55 degree pitch appeared to be most efficient.

The skeleton roof structure is first constructed, followed by the thatching of the roof. Due the steep pitch of the roof the thatch does not need to be very thick to provide adequate cover from the elements. When a roof pitch

is as steep, as 55 degrees, rain runs off too quickly to penetrate the thin thatching layer. In fact it is a positive disadvantage to thatch these structures in the conventional way, as where the roof usually has a pitch of 45 degrees, and a considerable thickness of thatch is required to stop rainwater from seeping through the roof. Builders of reconstructed prehistoric dwellings in this country have found, when using this conventional method of thatching, that dwellings become unbearably smoke filled**,** once a fire is lit in the hearth. On the other hand the smoke filters quite freely through the thinner thatch, providing a smoke-free environment for the occupants.

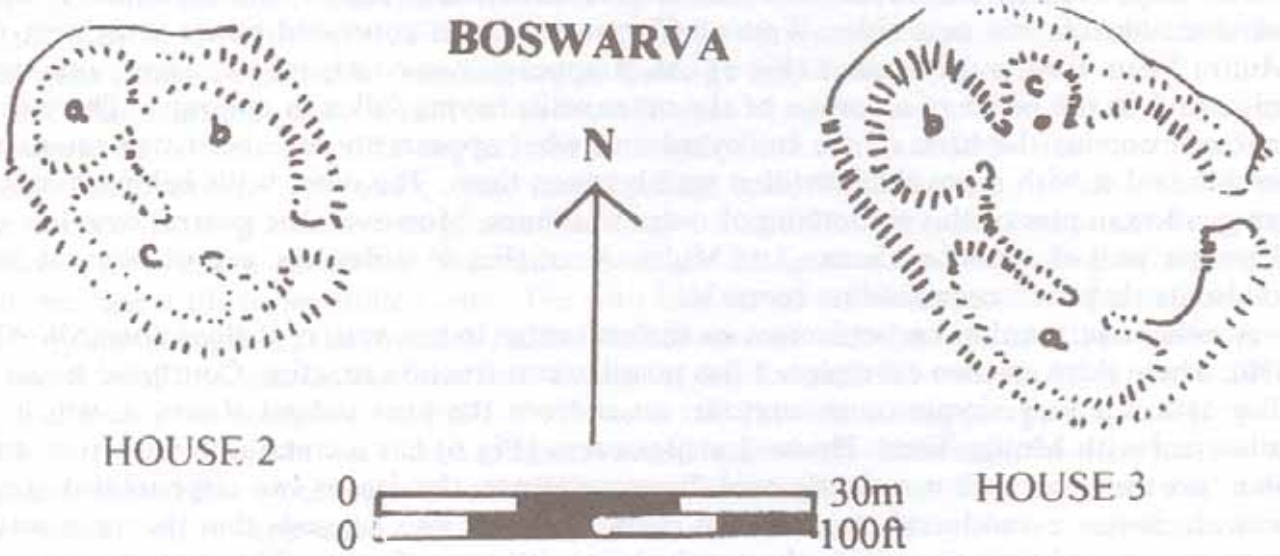


Fig 5 Boswarva house 2

Fig 6 Boswarva house 3

The Roof and Open Courtyard Hypothesis

There are two possible methods for roofing these dwellings. The conventional theory of roof construction, with a central open courtyard (Fig 5). Looking a Hut 6at Chysauster for this comparison, beginning with Room 6d. Due to its oblong shape it would require a hipped roof 6d. After constructing the hipped roof on room 6d the ends of the roof, must be set on to the centre of the Courtyard house walls. This is represented in the English Heritage interpretation boards at the site.

This interpretation has flaws when looked at in practical terms. It is not possible to prevent rain from pouring

Fig 7 The conventional theory for roofing courtyard houses

into the infill in the walls between room 6e and room 6d, and also between room 6d and room 6b. (see Fig. 5). Next the partitioned room, 6b, viewed as one room, has to be roofed. Another hipped roof would be appropriate here, with two supporting forked posts, as this is it would not merit three supporting posts, with a cross member placed between the two forks. The usual artists impression of this type of room in a courtyard house has an almost flat lean-to roof over these side rooms. In my opinion, this would not be weatherproof, as the pitch would not allow the thatch to drain. The oval ends of 6b/6c buttress up to the bottom of the thatch of room 6d and will do the same between 6b/6c and room 6a. Room 6a is a near perfect round, so a typical conical roof indicative of normal roundhouses, with the steeper pitch would be required. As the walls are so thick at the courtyard entrance side of this room, it would be very difficult to have all but a small overhang of the thatch of room 6a. The area between 6f and 6e is normally also shown on artists interpretations as a long flat roof. Which, as noted above, this would not withstand the rainfall characteristic of the area.
Room 6f would also provide a roofing problem as it is a very small rectangular , so small that it would perhaps only be possible to make a small cone shaped roof resting entirely on the walls. The span makes this possible, and a supporting post would not be necessary. The last room to thatch is 6e, a small workshop like area that could have a small conical roof as in 6f, with one side of the thatch buttressing up to the thatch for Room 6d. A central courtyard with individually thatched rooms leading off would be created, with possibly a wooden door at the entrance to the courtyard .

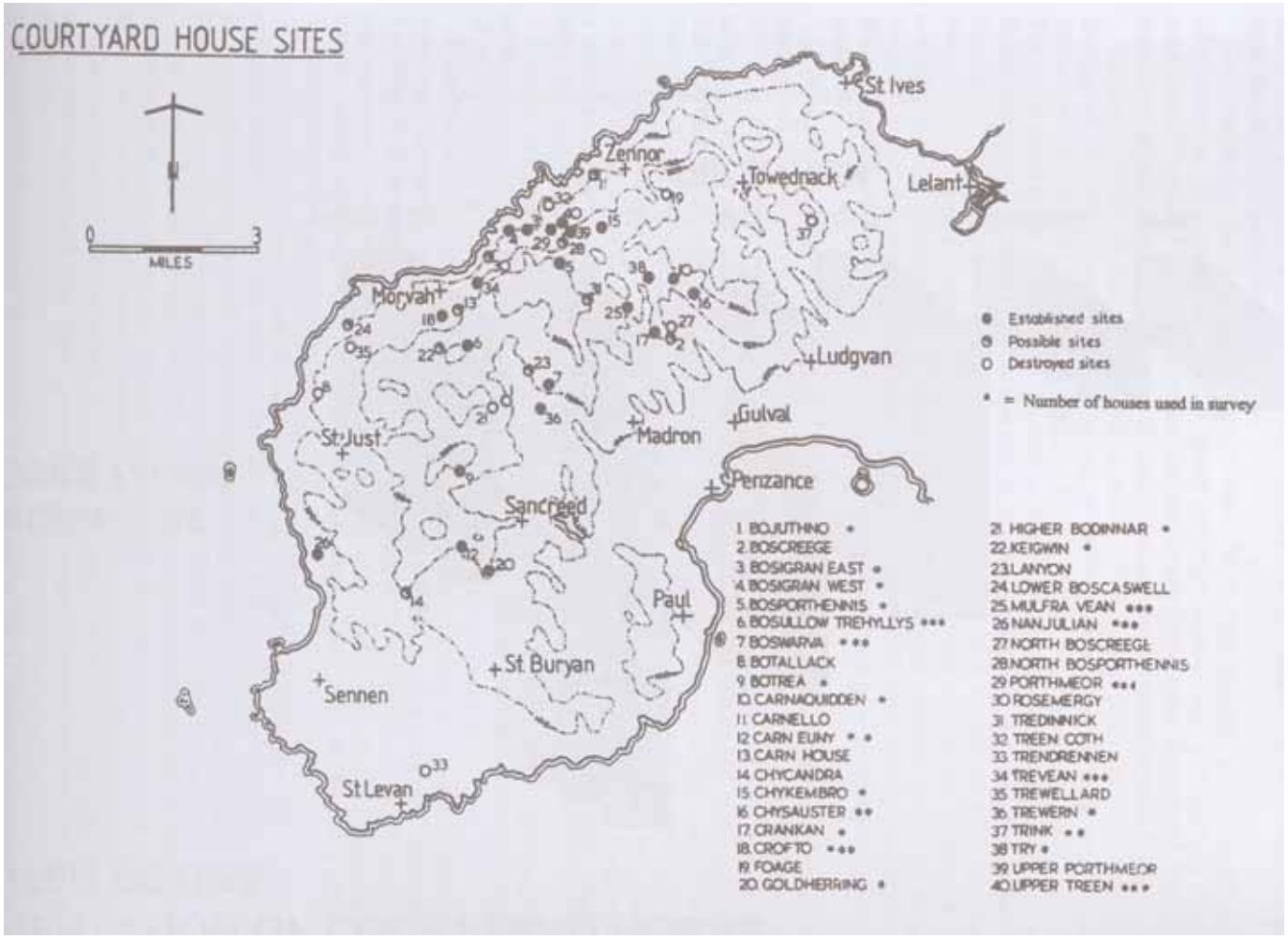
One of the most striking features of the typical courtyard house, is the preponderance of drains and drainage systems, indicating a wet climate, and a people keen to keep themselves dry within it. This invalidates this type of roof structure because rain water from these steeply pitched roofs, would be pouring gallons of water at a time, especially during a thunderstorm, into the soil and rubble infill of the walls of the buildings. Therefore the areas that join the rooms, and where the thatch does not overhang, must in some way be made waterproof. A solution to this problem, would be to hard pack Rab subsoil in these areas and line this with a layer of puddled clay. On top of the clay, Birch trees could be stripped of their bark, as was the practice when American Indians made Birch Bark Canoes (Schneider 1972 : 223 - 247). This bark could be laid on top of the clay and Rab with an overhang to allow the rain to pour away from the walls. This type of guttering, would have been well within the capability of the courtyard house dwellers.

The Large Roof Hypothesis

Courtyard houses are generally situated along ridges on moorland, on the north coast of West Penwith. The topography is bleak, with the prevailing wind from the west, the first land reached by the Atlantic Gales. Therefore, the direction of the wind would have been considered when building a dwelling. All the known courtyard house sites in West Penwith were examined with a view to establishing in which the direction of the main courtyard doors were set. Of 53 known courtyard house sites, 11 faced directly South, 14 South East, 14 East and 6 North East. Altogether 45 were sites faced away from the prevailing wind. Only 2 sites faced West, 3 South West and 3 North West (Fig 6). The 3 North West sites had some form of shelter from the wind, either a house directly in front of them or in a sheltered valley. This is compelling evidence, that the orientation of the courtyard doors took into account prevailing winds.

Hut 6 at Chysauster provides an important clue to the type of roof structure employed, due to the raised floor in room 6a. The inspiration for writing this paper came from some experimental work carried out in the summer of 1994 at Chysauster. English Heritage decided that a temporary thatched roof should be added to Hut 6 at Chysauster, for an Ancient Technology project it was funding for school children (see Fig 7).To give the children a better impression of the appearances houses might have had in antiquity. The room chosen for this purpose was room 6a.. It was my task to supervise this work. A simple conical roof was erected from local timber and water reeds from the nearby marsh at Marazion. The ensuing event was a great success with the reed thatched roof helping to recreate the atmosphere of a Romano-British settlement. However, on the last day of the event, a strong wind blew from the west, as is usual in this area. A fire had been made in hut 6a, to experiment with ancient cooking techniques etc. Due to this strong westerly, it became increasingly difficult to keep the temporary door covering in place. Whenever anyone came in from the outside, the wind blasted all those within, making the central fire flare fiercely, as the doorway faced directly into the wind. Coupled with the fact that the room had a raised floor, it made the wind problem insurmountable. Due to the elevated posi-

tion of the floor the surrounding walls of the courtyard gave no protection from the wind.



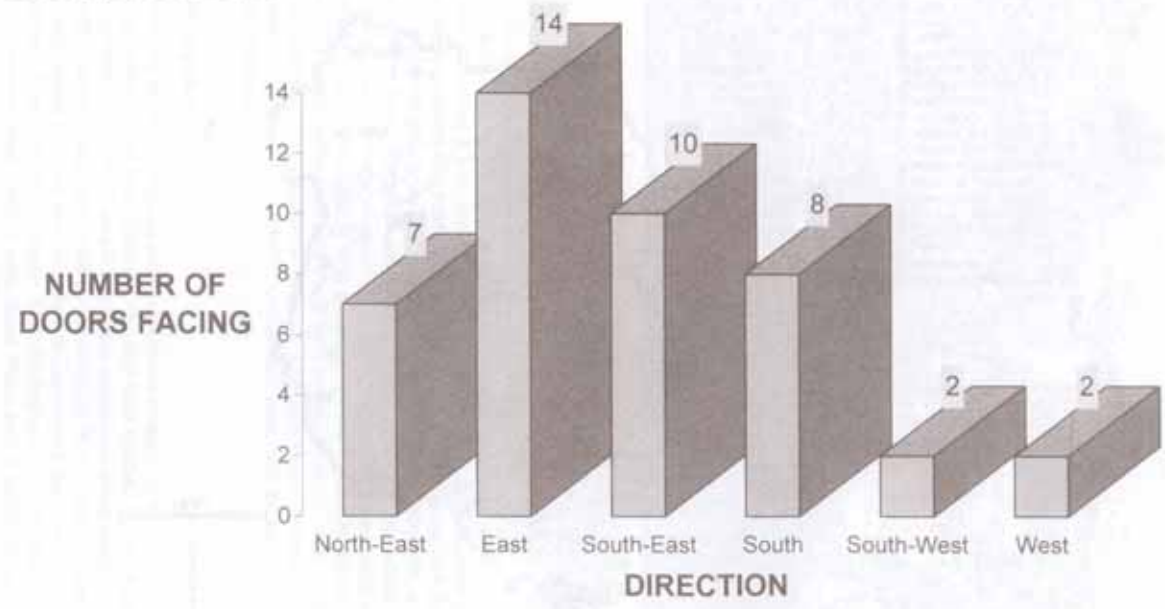


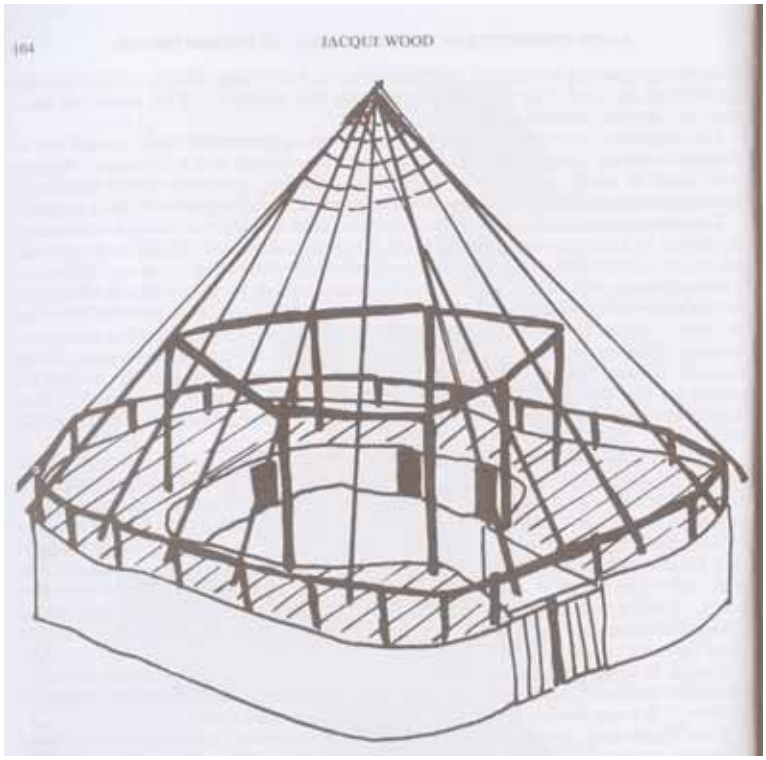
Fig 9 The orientation of courtyard houses' outer doors

If the courtyard had been roofed in the accepted way with an open courtyard, due to the elevated floor in this room, there would be nothing to stop the wind from entering this part of Hut 6. In addition because of the elevation of room 6a, the roofs on the other side of the courtyard, would not have helped to break it. The survey of courtyard door orientations indicate that they are all with just a few exceptions face away from the prevailing wind. I suggest that the entire structure was roofed, and that the courtyard was a central hall, with rooms leading off it. Their outer doors would be courtyard doors, with but a few exceptions, all facing away from the prevailing wind. Looking again at the Room 6a it is clear that it is irrelevant that it is facing west, as it would have been an interior door, with the raised floor facing west particularly draft free, when the outer east facing doors were opened.

It might be argued that this large roof would be too large to construct. However, surveys of prehistoric structures in Europe indicate such sizes are not at all uncommon, with diameters of 49' to 52' known (Audouze & Buchsenchutz 1991 : 74). There is also an interesting comparison with house sizes particularly oval houses, relevant here, for example roofing the house at Trethurgy, St Austell (see Fig 8). The structure at Trethugy is dated at the same Romano British period as Chysauster, is 13 metres by 9 metres diameter. As clear from the site plan, that the post supports were integrated with the top of its inner walls.

> "From the Neolithic Period buildings were erected in Orkneys and Shetland Islands that were oval, circular or trefoil-shaped, whose plan was conditioned by the use of very thick (2-3m) dry stone walls faced on both sides. Some internal posts in an irregular ring supported a roof which rested for the most part on the walls."(Audouze & Buchsenchutz 1991 :74)

This type of roof, however, would need the support of a substantial ring beam, to acquire the necessary height, to pitch the rafters at the right angle. The posts of this ring beam would have to be placed on top of the walls surrounding the central hall. The purpose for the substantial infill of the walls would now come into its own (diagram Fig 9). There could have been another shorter ring of posts to create another ring beam nearer to the outer walls, adding stability to the roof. Looking at the structure from this viewpoint another possible use for the large infills becomes evident. The large flat areas at the top of the walls could be covered with timbers to create another well supported floor. The Ariel photograph of Hut 6 and Hut 4 at Chysauster (Fig 10) demonstrates just how large the infilled areas are between the inner and outer walls relative to the size of the rooms within. The dwelling space in an house of this type could, be almost doubled.



Conclusion

The feasibility of the hypothesis of the open Courtyard, surrounded by individually roofed rooms, does not stand up to close inspection. There are matters of drainage. How was the rain water prevented from pouring into the infilled cavity walls? As indicated in this paper, the drainage systems of the courtyard house were a prominent feature of this type of dwelling. Therefore, it is questionable that rain water pouring into these large cavity walls would have been tolerated by its occupants. However, as portrayed earlier this could have been overcome, by hard packing the Rab infill, and adding a thick layer of puddled clay on the top. With the addition of a primitive bark guttering system, this would possibly have coped with most of the rain water. There is furthermore, the difficulty of making the flat roofed areas waterproof. In a climate well known for its considerable annual rainfall, this would be a formidable undertaking.

The survey, of the orientation of the outer courtyard house doors indicates an awareness of the importance of the prevailing westerly winds. The preponderance of south, south east and easterly outer courtyard doorways, seems to indicate this. The raised floor of Hut 6a, with its doorway facing directly into the prevailing westerly winds, and the ensuing problems this would incur to the inhabitants of this dwelling is an anomaly. This leads to the supposition that the entire structure was roofed, and that the courtyard was actually a central hall. There may possibly have been another floor structure on top of the room walls, supported by the large infilled areas, between the separate rooms. As indicated in (Fig 9). This suggests that the courtyard house was a substantial dwelling, capable of housing large, extended families. With its substantial central hall, (possibly re-named galleried houses) the upper gallery floor would be an impressive sight on entering the central hall. This area would have been warm and dry benefiting from the rising hot air of the pit fires on the ground floor. The rooms below could have been stores or workshops which would be a considerable advantage during winter. This paper perhaps throws new light on these structures, that are such a predominant feature in the West Cornwall landscape.

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