GALLICA

Historical and Archaeological Interpretation

Glastonbury Lake Village House
Mound 59

An Experimental Construct of an Iron Age House

Preface

Experimental construct of a Glastonbury Lake Village House, late iron age.
Purpose of experiment was to explore materials,
record weights, quantities, and time taken to build.
The house was built using archaeological information, to be as acurate as possible,
and use the environmental report for the material available in period.
To record and describe the build methods in the construction.

Experimental Construct of the Glastonbury Lake Village House M59

Introduction

There are a wide range of houses revealed in the excavation of the Glastonbury Lake Village. By choosing one of the smallest to construct, it has given the chance to measure quantity and weight of materials, and the time it takes to build an iron age house.

Description from the excavation.

Glastonbury Lake Village
Bullied and Grey

Mound 59 (1895). #Spreads of clay at N edge of site. The clays represent 4 Floors, the uppermost (Floor 1) measuring 8m wide with extensions N and W. Max. thickness 750mm. Floor 4 was of dirty clay 5.2m diameter with no hearth and a line of hurdles at the N edge. Floor 3 was yellow clay 4.6m diameter with a baked clay hearth and wall post line with hurdles around all the Floor except at the S; this was probably a small round house. Floor 2 was 4.9m across, with a clay hearth, and was a renewal of the Floor 3 structure. Floor 1 marked a change in this area, with the removal of structures and replacement by a very large spread of clay over M59, M60 and M61. This spread was 26.0 x 7.0m in extent, with a long extension to the N. It is described under M61. There was a thick line of piles immediately to the W of M59; this represents a palisade line that once extended S past M79 and M64, and forming an old E palisade that ran S past M41, M26 and M19. M59 was one of the few structures outside this palisade when the latter was in use. The relics included pottery and a human clavicle.

Extract from 'Industrious and Fairly Civilised' - The Glastonbury Lake Village
John Close - Stephen Minnitt

The foundation of M59 itself was substantial; Bullied considered that a very soft peat existed here, effectively a wet depression which was filled by domestic debris of pottery, bone and wood; it was the village dump. Upon this a number of logs and timber was laid, on the N, with brushwood laid all over the area. The layer of compressed rush which was sealed this may have been of natural origin, representing a few years interval once the hollow had been filled and made good. Thereafter the clays of Floor 4 were laid down. The house was approximately 4.6m in diameter. Stake size 5-8cm with a maximum spacing of 25cm. This house was found in the North-Centre of the Lake Village.

Modifications

In the excavation, the position of the doorway is missing, so taking into account of the surrounding houses, and the edge of the island, it was decided to place the doorway of the construct on the South side of the house. (Fig.00)

Extras

The decision to calculate the weight of the construct was made out of curiosity. As the original house was built on a made up patch of ground, any heavy-weight house may have run the risk of subsidence.

Experimental Aim

To construct one of the smallest round houses, using materials available in the original environment.
To use the tool types from the period to complete the construct.
To build a house using minimum materials.
To record the quantity of materials used to construct.
To record the weight of materials used to construct.
To record the time taken to construct.
To monitor long term the maintenance required to keep the house in good order.

Statistics

Constructed:	2009
Location:	North side of the Iron Age enclosure at Butser Ancient Farm
OS Grid Ref:	SU 72001 16486
what3words	///tightest.quicker.vital
Diameter:	4.6m diameter
Shape:	Sub-circular
House Height:	4.5m
Wall Height:	2.1m
Wall Surface	50m²
Door Orientation:	315º
Door Width:	1.5m

Gross weight: 2,400 kgs

Time Taken by one peron, working 5 hour winter days.

Duration of Build: 85 hours

Wall Stakes	2 days
Willow Wattle	2 days
Rafters	1 day
Purlins	2 days
Thatching	5 days
Wall Daubing	5 days

This timing does not include how long it would have taken to source, and bring the materials to site.

Materials by Weight

Wall Stakes	42 @ 2kgs
Willow Wattle	09 @ 18kgs
Door Posts	02 @ 5kgs
Rafters	18 @ 10kgs
Reed Thatch Bundle	117 @ 4kgs
Daub	1.5m³@ 1500kgs (dry weight)
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Total Weight	2,404kgs

The Construction

Wall Stakes

Considering the small diameter of the wall stakes (5-8cm), the best material suitable was coppiced hazel. A total of 42 rods were used, cut to length at 2.5m, to give an internal wall height of over 2m. This wall height makes the interior light and spacious. To erect the wall stakes, and in keeping with the method used on the lake village, a hole was punched into the ground using a heavy iron bar, to a depth of approx 10cm. Using a hand tool, the bottom of the wall stake was tapered, and the stake was then pushed into the hole. The spacing of the stakes was between 20-25cm.

The two door posts of 8cm diameter, were dug in. The post holes were excavated by hand, using a small iron chisel to loosen the earth, and dug to a depth of 30cm. The posts were placed in the post holes, and were packed tight with some of the excavated material. To maintain the correct width of the door at the top of the wall, a temporary lintel was attached between the posts, above head height, locking the width of the doorway. To keep the stakes in line, a number of small rods were lashed horizontally around the circumference of the house, at the top of the stakes.

Time taken to complete, two days. (Fig.1)

Wattle Choice

The material to be woven into the wall was a choice of hazel (Corylus avellana), or willow (Salix viminalis). As there is no evidence of rods being split in the iron age, both materials would have to be used “in the round”.

Hazel was the first candidate to be seriously considered, as it can be grown and managed as coppice, to produce a large number of rods of consistent size and quality. With a wall stake spacing of 20-25cm, the hazel rods could be no older than three years old, to keep the rod diameter small enough to weave between the wall stakes. At three years old the hazel will only be around 1.5-2m in length. This results in a much greater number of rods required to weave the wall. Also, hazel has to be grown on solid dry land, and would be some considerable distance from the Lake Village, so it is unlikely to have been used in any quantity.

By comparison, willow grown on an osier bed will produce rods of a similar diameter in only two years, but with a rod length of up to three metres. This extra length also has the advantage of covering more wall stakes per rod, resulting in a flatter, stronger wall. In the excavation, there is a lot of willow identified under, and on, the Lake Village site, supporting the decision that willow rods are probably the most suitable for the job. (Fig.2) (Fig.3)

Other materials were considered, and a small experiment was undertaken to weave with thatching reeds, but it was unsuccessful as the reeds broke easily due to the close nature of the stakes, and the reeds being too dry. It may have been possible to have used the reeds green, as they would have been more flexible (Fig.04). A second experiment was tried using Yellow Flag Iris leaves (Iris pseudacorus). A 1m x 1m frame was setup and woven with the leaves from the Yellow Iris. On completion, it was stood under the eaves of a neighbouring round house, and left to dry. After it had dried and compressed, it was considered as a possible alternative for wattle material. (Fig.05) (Fig.06)

Wattle Weaving

The weaving of a wattle wall starts with the base against the ground surface. The first rod butt is placed against a door post, inside the wall, and whilst keeping it in place, the rest of the rod is woven inside and outside of the wall stakes, progressing away from the door. The whole length of the rod is woven into the wall. It is then pushed down to the ground to form the base of the wall.

The second rod butt is then placed against the inside surface of the first wall stake next to the door post. The length of the rod is then woven into the wall, resulting in the rest of the rod being woven on the opposite sides of the wall stakes, until the length of the rod runs out. The next rod butt is placed against the inside surface of the second wall stake, and process of weaving is continued, rod by rod, stake by stake, around the circumference of the wall, until the second door post is reached. As the tenth or so stake from the end is reached, the thin end of the willow rod will project beyond the second door post. The end of the rod can be wrapped around the post until it is possible to weave it back into the wall. As each rod added gets closer to the second door post, there is more of the rod returning into the wall after the wrap around. The last rod to complete this process starts on the wall stake next to the door, and almost all of the rod is woven into the wall. The act of weaving the door post into the wall makes it very secure. (Fig.07)

The return (in the opposite direction) from the second door post to the first door post can now be undertaken. The first rod on the return is placed against the inside of the door post, and the rest woven into the wall. The second rod is placed against the inside of the first stake from the second post..... etc.! The return journey when complete will take you back to the first door post. (In practice you will discover this is quicker to do than describe).

Throughout the whole of this process, all woven rods are compressed downward onto the wall to create a solid structure. During the weaving, care must be taken to observe and correct all of the stakes in turn, to ensure that they remain as upright and evenly spaced as possible. The danger is that they will be inclined to splay out as the wall progresses, and the top of the wall will be a different circumference to the base.

This full cycle of weaving was timed at 40mins, and produced a wall height of 20cm around the circumference, door to door, of the wall. The whole of this weaving cycle was repeated a further nine times (back and forth), until the entire height of the wall was completed. The final stage of the weaving was the manufacturing of a wall plate, a strong band around the top of the wall, to lock it together, and onto which the rafters will be lashed. This was achieved by using a basket weaving method to weave a rim. The temporary lintelwas replaced with a permanent one, that was long enough to include the first stake in the wall next to both door posts. (Fig.08)

In practical terms the wattling was completed over the course of two days.

Rafters

The rafters were selected from mature rods of hazel and ash of approx seven to eight years old. This ensured they were heavy enough to create the roof structure, and be self supporting. They were cut to an initial length of 4.5m, giving the roof a 45º pitch, and an overhanging eave of around a metre.

The roof frame was started by three rafters being lashed together, a short distance from the tips. It is best to have 10-20cm extending beyond the lashing. The bundle of three rafters are taken into the house, and then stood up, with the butt ends on the floor. The rafters are then spread out into a tripod, with the bottoms of the rafters evenly spaced around the wall (measured carefully), with the butts still on the ground. Using a sharp tool (a billhook), notches are cut, 1m off the ground, on the inside surface of the rafters. These notches will eventually engage with the top surface of the wall. A narrow wedge was pushed into the top of the wattle, vertically in line with the foot of the rafter, to create a gap wide enough through which the end of a thin rope can be pushed. Ideally the wedge should be pushed in below the woven rim of the wall top. Repeat this for the other two rafters.

The mounting of the tripod on the wall is undertaken as follows. Whilst inside the house, take hold of one of the rafters and lift it off the ground, keeping the base of the rafter against the wall. The base of the rafter can be stepped up the wall, keeping the weight against the wattle, until it gets to the top of the wall. The base should rest securely against the top rim, with the other two rafters still on the ground. Go outside the house to where the rafter is on the wall top (or ask a

friend), stand on something if necessary to reach, and gently lift the rafter over the rim, keeping the weight on the wall, and be prepared for the rafter to attempt to slide off the roof! Under control, slide the rafter outwards until the notch, previously cut, settles onto the wall rim. Using a cord or rope, square-lash the rafter into place on the rim, running the cord through the gap under the rim created by the wedge. This lashing will be flexible enough to allow movement whilst the other two rafters are manoeuvred into place. Go back inside the house, and repeat the lift and lashing with the other two rafters, one at a time. This will complete the first three primary rafters for the start of the roof. As the rafters were lashed into place, the wedges were removed. (Fig.09)

The next three rafters are put up individually. A notch is cut 1m up from the base, the rafter slid up onto the wall, evenly spaced between the three primaries, from the outside of the house. The tip of the rafter is engaged by resting it into the top of the first primaries. The rafter is then lashed in place by the same method as the primaries. The remaining rafters (12) are evenly spaced between the six rafters that are on the roof, and erected by the same method as those previously. This gives a spacing of approx 1m between all rafters (18).

Rafter erection took five hours. (Fig.10)

Purlins

The purlins were lashed horizontally in concentric rings, from the eaves to the peak, on the outside of the rafters, using a square lash to secure them. This creates a surface on the roof onto which the covering material can be fastened. The bottom rim of the roof was constructed of five year old hazel rods to produce a strong base to the roof. In keeping with the use of willow for the wattle, willow rods were used for the rest of the purlins on this house. Choosing the thickest rods, the purlins were spaced out vertically at 0.5m apart. The rafters were notched with a billhook before the purlins were lashed into place. This produces a tighter joint, avoids slippage, and maintains the spacing. Overlapping length-ways, by around 50% maintains purlins thick enough to support weight. As the purlins extend up the roof, they become a framework for climbing up the structure.

This took around a hundred rods in total, and two days work.

Cordage

All lashing, tying, and binding was done with assorted sizes of spun vegetable fibres. Available in period was nettle, flax, ivy, lime bast, clematis. Add to that, other materials such as hair or leather strips, there were plenty of ways of making cords. To extend the life span of the cordage, birch-bark can be heated and sweated to produce a thin tar, and the cordage soaked in the resulting liquid.

Thatch

A simple decision was made as to the materials for thatching the house. There are, and were, great beds of reed (Phragmites australis) across the Somerset Levels. To have brought in large quantities of straw by boat would have been a great undertaking, whereas the cutting of reed from around the island would have been a simple task. The next decision is the style of thatching. There is a choice of a modern surface, where the roof appears to be a continuous slope, or, the much older ringed, or stepped thatch, where each layer is visible and looks more like tiles. There is also an advantage to the stepped thatch in that it take less materials to complete. On a small house it may not be a huge difference, but the bigger the house, the greater the saving.

In the case of M59, it was thatched in rings, and will be part of the attempt to keep the weight to a minimum. Reed stands at around 1.5m – 1.75m high which gives a long overlap when using it as thatch, and allows methods of fastening to be covered two or three layers down into the

surface, thereby protecting it from decay. The physical process of thatching used on M59 was to tie the thatch in bundles (yealms) to the purlins. (Fig.11) (Fig.12)

The base ring around the edge of the roof is the thickest, with the thatch being around 15cm deep. The bottom edge of the roof has to cope with all of the rainfall that runs down a roof. The purlin on the rim of the roof is primarily for support, and has no thatch attached to it. The bottom ring of thatch is composed of two layers. The first layer of reed is placed on the roof, with the base (butt ends) of the thatch extending beyond the purlin by 10cms. The bundle (yealm) of thatch is spread out sideways until the reed is around 7.5cms thick. The reed is then lashed into place on the second purlin (first above the rim) with cordage. The width of each bundle was around 20cms, with each yealm sitting against the side of the previous one. As the thatch progresses in width, it becomes possible to start the next layer on top of the first. Covering the base layer, the second layer is laid on top of the first, with the butt ends in line with the first layer. As before, the bundle (yealm) of thatch is spread out sideways until the reed is around 7.5cms thick. The lashing for the second layer is to the third purlin (two above the rim), and has to include the first and second layer of reed, tying both together to the purlin. This makes the bottom rim 15cms thick, and composed of two layers of reed. Continue in the same manner increasing the width of the thatch around the base of the roof. (Fig.13)

To minimise the movement when using a ladder, the next ring can be started at any stage on top of the base ring. The application of the second ring of thatch is on top of the first ring. The butt ends of the yealm are placed 10cms below the level of the second purlin, The yealm of thatch is spread out sideways until the reed is around 10cms thick, and the reed is lashed in place through the first ring, and onto the fourth purlin (three up from the rim). The width of the lashed bundle will be around 20cms. This will produce a total thatch thickness at that point, of 15cms - 10cms of new thatch on top of 5cms thickness of the first ring underneath. This should result in the two rings of thatch having 0.5m between the lines of reed butt ends. This entire process is used to cover the entire roof. The thatching can be completed one ring at a time, working up the roof a layer at a time, or, to minimise ladder work, thatching a number of rings simultaneously, working around the roof until complete. The addition of a second layer at the point of the roof adds extra protection from the weather, with the peak of the thatch being lashed into a point. This minimises rain penetration of the roof. If maintenance of the peak is undertaken every three or four years, the reed thatch should have a life span of up to twenty years.

Thatching was completed over the course of seven days. (Fig.14)

Daub

The wattle wall of the house is structural, but not weather proof. As per the archaeology across a number of sites, the wall has to be plastered with daub to be wind-proof, and create a water resistant surface on the wall. Daub is a mixture of what ever is local to the location, and can comprise of soil, clay, hair, straw, hay, cow droppings, horse droppings, and water. On the Glastonbury Lake Village this mixture is clay heavy, and in the archaeology the daub is almost impossible to identify separately, because of the quantity of clay used throughout the island as part of each and every house platform. In the case of M59, a very light soil was bought in that was a fine silt/sand. This was mixed with clay and hair, as both hay and straw may have been in short supply on the island. Allowing the daub mix to stand, preferably overnight, increases the plasticity, and evens out the water absorption.

The daub is plastered onto the wall by throwing hand-fulls at the wattle to push it into the weaving, then smoothed down by wiping a hand over the surface. The daub is put on the wall at around 2-3cm thick. This is sufficient to mask variations in the wattle weave, and produce a flat surface on the wall. Using a minimum of daub keeps the overall weight down. The house is daubed on the inside first (Fig.15). This allows the daub to dry quickly through water evaporation. Once the daub is dry to the touch, the outside of the house is daubed next. Care is taken inside to daub up into the thatch, filling and covering the soffits (gap between the wall and the roof). Any large gaps can

be stuffed with reed, before applying the daub. Outside, the daub can be plastered on the wall, up to the thatch, but the top of the wall is not too critical for a fine finish, as it will be well hidden under the eaves. As the daub dries, it may crack with shrinkage. This is best corrected and filled whilst the daub is wet/damp. (Fig.16)

Daubing took a total of two days for the inside, and three days for the outside.

Decoration

There are three colours of clay available on the Somerset Levels, plus an outcrop of ochre on the Southern edge of the Mendips, so it would be easy to have used any of these sources to decorate the houses on the Lake Village. There is no direct evidence of this happening, but in view of the extensive decoration used on many of the artefacts from the settlement, it is reasonable to expect the occupants to have taken the opportunity to have decorated the houses to some extent. As part of the interpretation of M59, the house has had some application of decorations. The inside and outside were given a simple wash of ball clay (white/pale grey). This resulted in making the interior much lighter. A simple band of decoration was created around the inside, at waist height, using yellow, red, and black, and the pattern based on the decoration found on a Glastonbury ware pot. (Fig.17) (Fig.18)

References

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Footnote

Fig.00 – Fig.18 can be downloaded as a *.zip file here
www.gallica.co.uk/papers/M59 Photos.zip

Video of the construct

https://www.youtube.com/watch?v=FLZbAe_nL7s

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