

Renate Löbbecke

CORBELLED DOMES  
Outer Hebrides, Scotland

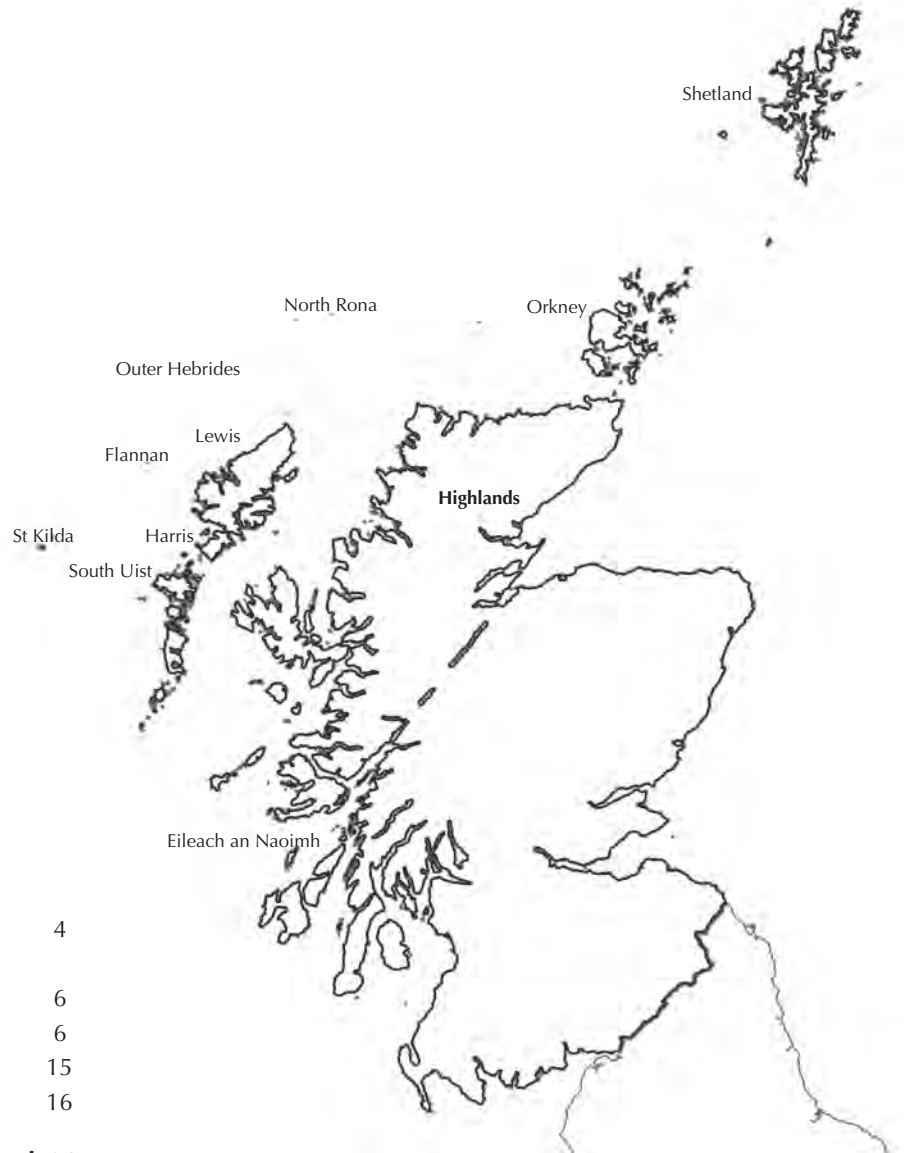


# SCOTLAND

## Outer Hebrides 2013

Lewis, Harris, St. Kilda

## Highlands and Orkney 1989



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My interest in **corbelled dome structures**<sup>1</sup> led me to the Outer Hebrides in the summer of 2013.

Descriptions by F. W. L. Thomas<sup>2</sup> written in the 19th century had piqued my curiosity, and after some investigation on the internet, I'd hoped that some of the shepherd's huts called **bothan** might still exist. The **cleitean**, storage buildings on **St. Kilda**<sup>3</sup>, also caught my interest, so we planned a boat trip to that island. As it turned out, we were very lucky to be able to go on the day we'd booked, because the boats can only land when the wind is low. The only thing that marred this successful tour was the fact that the island became increasingly shrouded in fog over the course of our four-hour stay there. Prior to our tour, I'd made careful research into the temporary summer huts—the **bothan**—and located some of the buildings described by Thomas. With the help of *Grid Reference Finders*<sup>4</sup>, I noted them on the map. But Kevin Murphy, an archaeologist at the Museum nan Eilean in Stornoway, was very skeptical that I'd be able to find any of them in these very remote regions.

And he was right. We simply didn't make it to the ruins north of the Loch Rèasort (Plate XV, p. 9), which I was particularly curious about. I couldn't even find an up-to-date description of this site. We were told that the best way to get there would be to win the lottery; you can only arrive by means of helicopter or chartered boat—and both, unfortunately, were unthinkable for us. Our hiking tours were already difficult enough to cope with: we had to use map and compass to find our way, with no dry foot-paths in sight, mire everywhere, always watching out for water holes, hopping from one patch of grass to another. We were also plagued by rain, wind, and fog, so that, ultimately, we were happy to have managed to find even three sites.

I've found detailed, dedicated descriptions of the buildings dating from earlier centuries, and I'm sure that the structures have not changed fundamentally since. It would be interesting to study the decay that has taken place over time, as these

buildings didn't decay on account of use by later inhabitants, but from natural processes alone. In these inhospitable regions, nobody needed stones, nobody needed to find shelter there any longer, and, apparently, nobody even has a desire to visit the structures anymore.

For precisely this reason, these historical reports on rural construction are very interesting. Many researchers<sup>5</sup> aside from F. W. L. Thomas—particularly in the 19th century—expended great effort to visit remote areas. Full of enthusiasm, they even sought out and described insignificant ruins, unspectacular relics of human activity, intent on dating them chronologically and exploring the functional significance of their discoveries. Despite the fact that many stone huts had already become ruins by the second half of the 19th century, you can still feel the researchers' great enthusiasm when they came across summer huts that were still in use and could experience the simple lifestyle of the people there.

Their observations are characterized by a distance that is only made possible by living conditions that have become significantly more comfortable. The observers found the lifestyles and construction styles of ordinary people almost exotic, and they clearly already understood that they were documenting something that had only survived in rudimentary form.

I must confess that I've reacted in a similar manner. Even though I was traveling in the height of summer, I couldn't imagine how anyone could spend even one night in these simple stone huts, these **bothan**, in the middle of this cold, wet lonesomeness. I've never had this impression when visiting comparable corbelled dome structures in southern Europe.

In 1866, **Arthur Mitchell** gave a very vivid description of a visit to *beehive houses* or **bothan** on Lewis, which were inhabited in the summer:

“we found one of these beehive-houses actually tenanted, and the family happened to be at home. It consisted of three



young women. None of them could speak English; but they were not illiterate, for one of them was reading a Gaelic Bible. They showed no alarm at our coming, but invited us into the bo'h, and hospitably treated us to milk. They were courteously dignified, neither feeling nor affecting to feel embarrassment. There was no evidence of any understanding of their part that we should experience surprise at their surroundings.

I confess, however, to having shown, as well as felt, the effects of the wine of astonishment. I do not think I ever came upon a scene which more surprised me, (...)

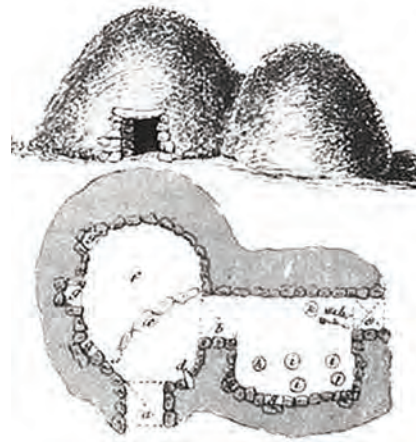
By the side of a burn which flowed through a little grassy glen – a sort of oasis in the midst of a great waste of bog and rock – we saw two small round hive-like hillocks, not much higher than a man, joined together, and covered with grass and weeds (...).

Out of the top of one of them a column of smoke slowly rose, and at its base there was a hole about three feet high and two feet wide, which seemed to lead into the interior of the hillock – its hollowness, and the possibility of its having a human creature within it, being thus suggested. (...)

but it was really in the inside of these two green hillocks that they slept, and cooked their food, and carried on their work, and – dwelt, in short. (...)

The greatest height of the living-room – in its centre, that is – was scarcely six feet. The door of communication between the two rooms was so small that we could get through it only by creeping. The great thickness of the walls, six to eight feet, gave this door, or passage of communication, the look of a tunnel, and made the creeping through it very real. The creeping was only a little less real in getting through the equally tunnel-like though somewhat wider and loftier passage which led from the open air into the first or dwelling-room.

At the right hand side on entering there was the fire-place. The smoke escaped at a small opening at the apex of the dome. The floor was divided into two spaces by a row of curb-stone eight or ten inches high. These served as seats, the only seats in the house; but they at the same time cut off the part of the floor on which the inmates slept, the bed in short – the whole space behind the row of stones being covered with hay and rushes. In the part of the wall bounding the bed there were three niches or presses, in which, among other things, we observed a hair-comb and some newly-made cheeses. The lids of the little milk-tubs consisted of roughly-made disks of slaty stone (...).



*Bothan* described by Mitchell; n. F. W. L. Thomas, vol. VII, Plate XXXI

The walls of these beehive-houses are built of rough, undressed stones, gathered from the moor, which are of fair size, but not larger than one or two men could easily lift and put into position. The dome shape, or beehive form, is given by making the successive courses of stone overlap each other, till at length they approach so closely all round as to leave nothing but a small hole, which can be either closed by a large sod or left open for the escape of smoke or the admission of light. (...)

When we made this visit to Larach, we felt that we had been almost introduced to the stone period without going either to far-off lands or far-off times to find it. We were in a dwelling in the construction of which neither wood, nor iron, nor cement had been used. Stone and turf, and nothing else, had gone to make it. No tool had been needed; scarcely even a wooden spade, and not a hammer of any kind.”<sup>6</sup>

During my journey through Lewis and Harris, I was surprised by the phenomenon of **travelling back 2,000 years** when seeing these **residential and utility buildings**: the compact towers of the **brochs**, references to **wheelhouses** and earthhouses (**souterrains**); remains of **Iron Age houses**, similar to the residential buildings that would later become typical (**black-houses**); grain mills (known as **norse mills**); the residential buildings and storage buildings (**cleitean**) on St. Kilda; and the temporary shepherds’ huts (**bothan**). If you factor in the late **Stone Age settlement Skara Brae** on Orkney, **Scotland offers more than 5,000 years of insights into everyday architecture**—buildings where stones played an important role as a construction material, and corbelled domes appear again and again.

**I. Corbelled Domes:  
Outer Hebrides**

**Both / bothan** (pl.) (gaelic), **bothy** (engl.), **beehive-house, shieling**

A *shieling* or *bothy* is a hut that was inhabited only temporarily during the summer grazing period. They were very common in **North Harris** and especially in **West Lewis**. A great many of them are plotted on the trail maps, especially in regions that are largely inaccessible today. They had different forms. Some were covered with plant material and were called *airidh / aridhean*. Most, however, consisted of only stones, and consequently had corbelled domes. These were called **both / bothan** or **beehive-houses**.

**F. W. L. Thomas** described some of these *bothan* in greater detail in **1858**. He knew similar buildings from Ireland, and was surprised to find similar stone buildings covered by corbelled domes on Lewis and North Harris. According to him, the *bothan* could only be found in the Uig province and on Lewis, St. Kilda, the Flannan Isles, and (a few) on North Harris. But at the time he wrote, only a few of them were inhabited during the summer.

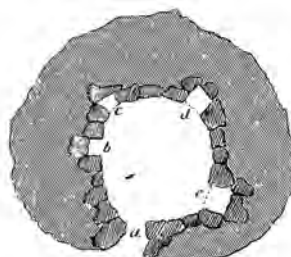
“But the ruins exist in great numbers, commonly by the side of some stream where the grass grows luxuriantly in summer, often at the foot of a land-cliff where the huge fallen blocks have been adopted to form one side of the house,” „Wherever placed, all the natives agree that no one knows who built them, and that they were not made by the fathers nor grandfathers of persons now living.”<sup>7</sup>



BEETHIVE HOUSES (BOTHAN) MEABHAG, FOREST OF HARRIS



Fig. 3, 4, 5, 6



Plan and Elevation of A

Scale of Feet.



Transported blocks in situ

n. F. W. L. Thomas, vol. III, Plate X

**Sròn Smearasmal, north of the Loch Meabhag (Mhiabhaig), North Harris (NGR NB 08990748)<sup>8</sup>**

“I was stationed last summer on the borders of the Forest of Harris,— a mountainous region bare of trees, but with abundance of excellent pasture, which is now wholly abandoned to sheep and deer. (...) Loch Meabhag is a narrow creek running five-sixths of a mile into the land; it is still green upon both shores from the labours of a former peasantry, but a solitary gamekeeper's lodge is now the only sign of human life. I was informed that on the moor, about half a mile from the head of this loch, there was a circular house, roofed entirely with stone and without a bit of

wood in its construction.

On visiting the place indicated, I found two beehive-houses; one of them (Plate X., fig. 1) is quite complete and entire, but the walls of the other (fig. 2) alone remain; they are but a few yards apart, and are situated most romantically under the shelter of a land-cliff, and, as is always the case, in the neighbourhood of good pasture. The ground is here as rugged as usual, the boulder clay is scraped up into a thousand little hills, and huge transported blocks of gneiss are scattered far and near. These "bothan," as they are called in Lewis, are from a short distance hardly to be distinguished from the granite blocks around, and in fact I was unsuccessful in finding them on my first search.”<sup>9</sup>





#### Bothan Sròn Smearasmal

We actually managed to find these *bothan* and identify them with certainty on the basis of the drawing and the description of their position. What Thomas described as a simple hut with an intact corbelled dome including a cap stone had apparently collapsed in the meantime and been "renovated" with large stone beams. The walls become very thick toward the bottom and are covered with peat. Untreated, irregular stones. Outer  $\varnothing$ : 5.50 m, inner  $\varnothing$ : 2,40 x 2,15 m, H: 1,80 m, E: 0.9 x 0.6 m, facing south.

The neighboring ruin is lower than it was back then, but the long lateral niche up to the rock still exists. Thomas speculated that it might have been a sleeping cell. Nearby are scattered other foundations from previous buildings.

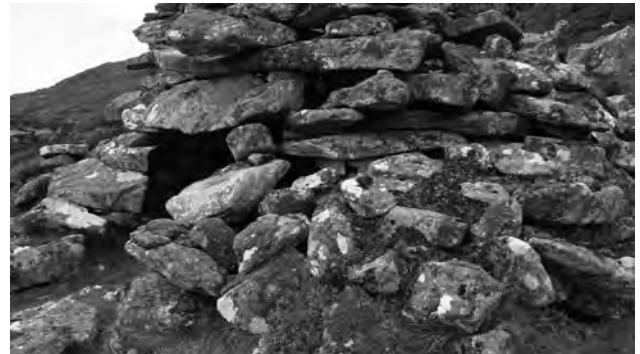


Ruin:  $\varnothing$ : 1,8 m; the long lateral niche (dark hole): L: 1,4 m, cross section: 0.6 x 0.4 m.





Looking out from the *both*, there is an expansive view of the sea and the islands offshore.



It's difficult to imagine that, inside these piled heaps of stones surrounded by rocks, there are stable interior spaces.

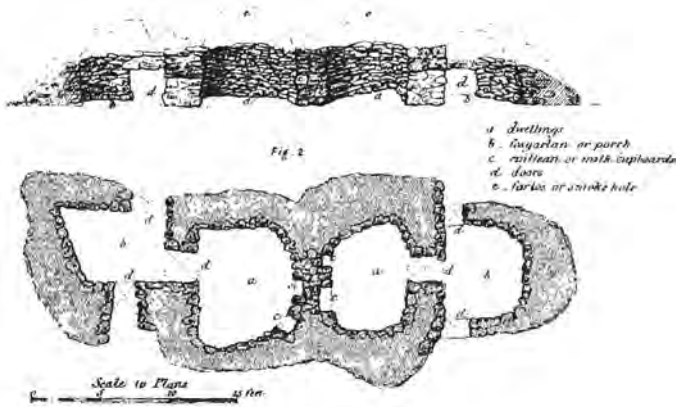


Recessed niches in the wall at ground level, where the wall is especially thick.



Makeshift roof with large stone beams.





n. Thomas, vol. III, Plate XIV

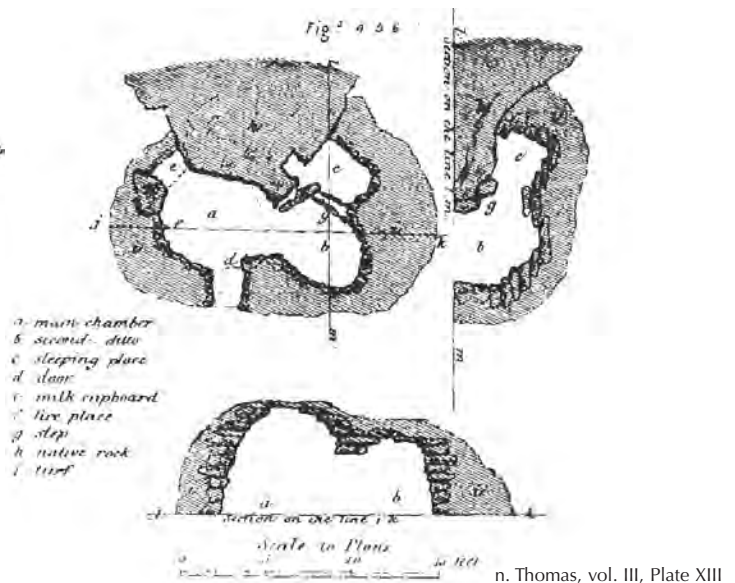
The basic construction of the *bothan* corresponds to type 1 (see page 45). The dome rises like a beehive above a more or less regular, circular floor plan; hence the common name *beehive-house*. Unworked stones in the surrounding environment were piled up in very thick walls, particularly at the base. A grass-covered sheathing of peat helped to insulate the rooms.

**Thomas' illustrated plates** show that the huts rarely consisted of individual buildings and were capable of having different structures inside. A fire pit and sleeping places—often separated by stones, also sometimes built into the wall (Thomas, Plate XIII, c)—could be found in the “living room”. Wall niches and some stones to sit on served as the only “furniture”. Often, there were two entrances to regulate the flue and wind drafts. No window openings, only a hole on the top of the dome that could be sealed. An extension or another hut was used to store tools, butter, and milk.

Thomas discovered the ruins of complex structures on the banks of Loch Rêasort, West Lewis, (Plate XV). Twelve huts abut each other and, in some cases, are connected. The complex is about 14 m in diameter and apparently accommodated four families until 1823. Considering their proximity to the sea, they were probably residential buildings. .

In the 19th century, the **crofting system**<sup>10</sup>, which granted small tenant farmers only very small plots of land to farm for their livelihood, created a division of labor between men and women. The men had to find additional work, and the women and children tended the cattle in the interior. They lived in summer huts, mostly in the type of *bothan* we've described, which were often a considerable distance from the residential buildings on the coast. Here, they produced butter and cheese.

It is interesting that nobody knows who originally built these domed structures. By Thomas' time, most of them were already ruins, and only a few were inhabited in the summer.



**W. M. Mackenzie** pursued the question further in **1904**, and found an informant whose family had used the huts, but said, “The ‘beehives’ were as ancient and mysterious to my grandfather as they were to my father and me. There is not the slightest recollection of the tradition of who built them.” He suspected that the summer shielings were piled anew from existing ruins<sup>11</sup>. That sounds plausible, since, surrounding the *bothan* that are still intact, we always saw other foundation walls attesting to an earlier, possibly permanently inhabited settlement.



### Both a' Chlair, Nord-Harris

(NGR NB 1161 1479)

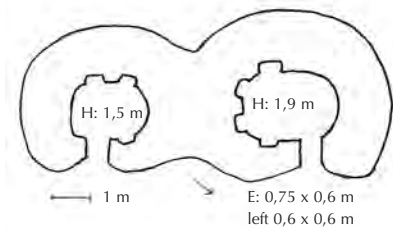
From the Loch Meabhag (Mhiabhaig) a road leads northward to the Loch Bhoisimid, then it cuts to the northeast over a ridge, then down to the river Abhainn a 'Chlair Bhig. You can see a group of rocks from a great distance away; inside, some *bothan* are hid. We were on the move for seven hours, and, in addition to the wet, boggy soil, we ran into lashing rain. On both sides of the river, there are remains of nine round huts and a rectangular enclosure. The two remaining *bothan* are located on the northwestern side, and were probably built on the ruins of predecessors.

At the bottom, the huts are very thickly masoned, and niches are built in at ground level. The vaults have a constant



curvature as they rise into single-layered domes.

The larger one is open at the top, and the smaller is covered with large stone slabs. The outside is partially covered with peat and grass.







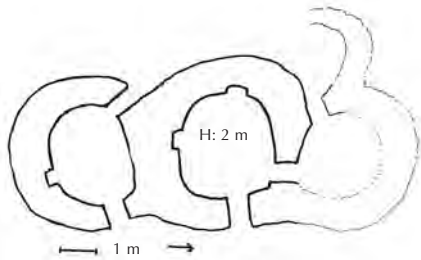
Smaller hut





**Gearraidh Bheinn na Gile, West Lewis**  
(NGR: NB 13155 19996)

These *bothan* were relatively easy to access. You can drive your car up to Loch Morsgail from the street B 8011, and from there it's about an hour's walk. You first head east of the river Abhainn a Lòin because the bridge is broken, and then you have to find the trail marked on the map—however, it is often lost in the mire. Again, the huts stand next to a stream, which is crossed by a simple bridge. You can see several ruins, but only one hut has an intact corbelled dome.



Middle ruin and its adjacent neighbour to the south with entrance.



The entrance to the northern ruin is still intact.



What looks like a raised forecourt to the north is actually a collapsed hut, and only its covered entrance can be seen. Accordingly, the entrance to the intact both is very low, and you have to crawl to get in.



In front of the eastern opening (very small: 0.45 x 0.65 m.) lies a large stone, possibly used to close it.

Double niches at the bottom of a ruin.



Portable covering stones on the roof. In the background are further ruins.

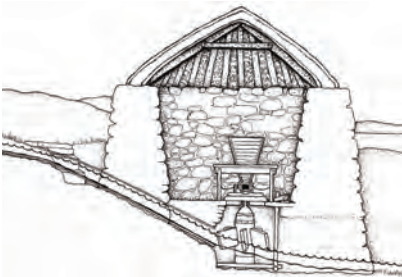






### ***Norse mill, horizontal mill***

Above streams, you can occasionally see ruins of the so-called *norse mills* or *horizontal mills*. The water would drive the mill wheel, which rotated horizontally, and thus powered the millstones in the space above. This type of mill was found throughout the Western Islands and also found on Orkney and Shetland.<sup>12</sup>



Rekonstruktion n. Christopher Burgess

### ***Tràigh na Beirigh mills, Lewis***

Near Cnip on Lewis, four mills were built over a creek in a steep canyon above the Traigh na Beirigh beach.

Only the lower rooms have been preserved. They were built entirely of stone. The upper structure, which was possibly covered with plant material, can only be conjectured on the basis of some remains of walls.



The rooms that are still visible are covered with large stone slabs. One room is round and has a rough corbelled dome with an open top, which is covered with millstones. G: ca. 1,20 m, H: 1 m, E: 0,7 x 0,5 m, facing north.

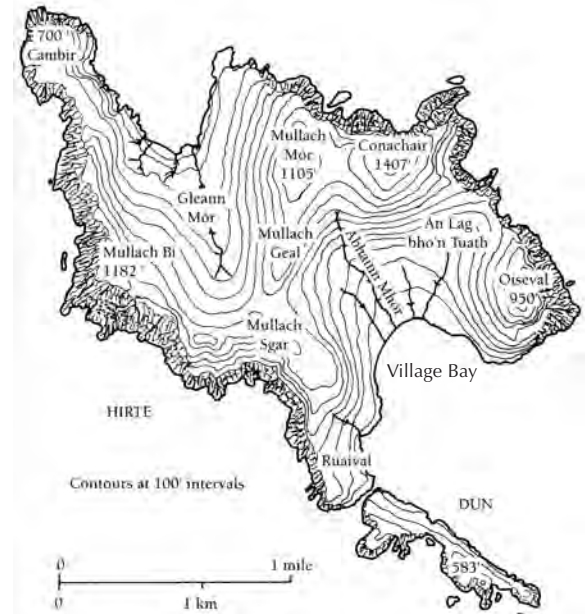


## St. Kilda

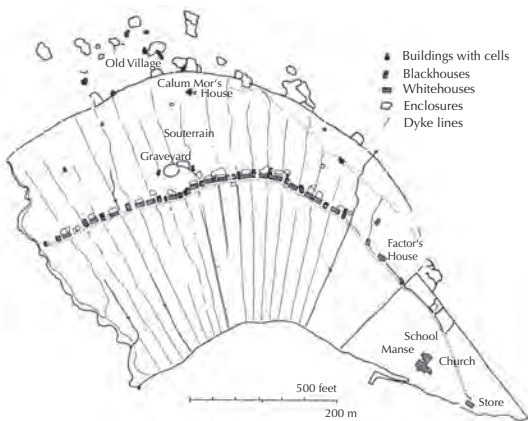
The volcanic archipelago of St. Kilda is located on the North Atlantic more than 100 km west of Harris. Its main island, Hirta, has the highest cliffs in the UK and was inhabited until 1930. There is evidence that people have lived there since the Neolithic age.

Although living conditions on the barren island were certainly always very difficult, the drawing shows very clearly how people could survive with the resources at hand, and in later times were even able to pay taxes in the form of barter. The sea provided fish and seaweed, while domesticated animals provided food and clothing. Grain could even be grown, as the meager soil was fertilized with seaweed, ash, and refuse. The large population of sea birds that lived there was particularly important to life on the island, delivering meat, eggs, and feathers.

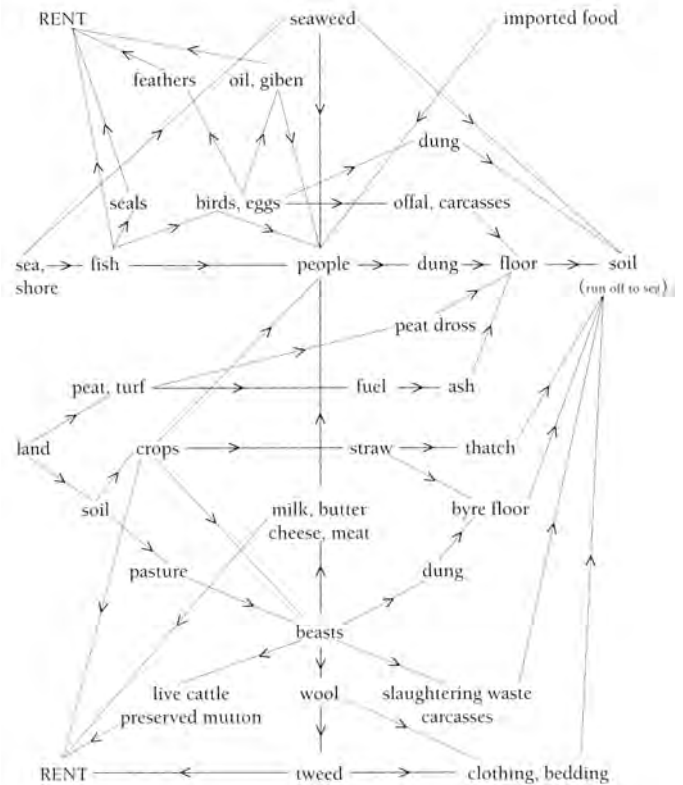
The large number of storage huts, or *cleit* (plural *cleitean*), that exist only on St. Kilda are very unusual.



n. Harman: Hirta



n. Harman: Hirta



n. Harman: Hirta





"Village street" with foundations of *blackhouses* and renovated *whitehouses* from the period after 1830. Above, you can see *cleitean* and the wall built in 1834 that was meant to separate the village and the fields from the cattle grazing outside.



Remains of *blackhouses* and *whitehouses*. Right, an intact *cleit*.

In 1830, the older houses on Hirta were given up, and new houses were built further south along the village road. These were largely built using material from the old houses. Initially, *blackhouses* (p. 38) were constructed; in these, people and cattle lived under one roof. After a strong storm destroyed

many houses in 1860, houses were built that featured mortar, zinc roofs, and chimneys (*whitehouses*), and the old *blackhouses* were used as stables. But the new houses were poorly insulated, and the roofs were not very thick, so that later they were covered with tar. In 1930, the last inhabitants left the

island and the roofs of the "new buildings" collapsed swiftly. The *cleitean* have been better preserved.



Unfortunately, we can only guess how the **houses** looked **before 1830** on the basis of previous descriptions. They were likely round and oval rather than elongated, as is typical of the *black-houses* on the Western Islands. It seems that installing bed cells into the thick outer walls was typical. Fertilizer was even produced inside the living room—which is frightening from today's perspective. Of interest are the descriptions of the adjoined houses; it was possible to walk on the connecting walls. Sometimes the roof is described as flat with plant cover, while sometimes it is described as a corbelled dome.

#### **MacAulay, 1758**<sup>13</sup>

"The dry stone walls, 'of a rough gritty kind of stones, huddled together in haste, without either lime or mortar' were eight or nine feet high, and the roofs almost flat, to minimise storm damage, while in the thickness of the walls were the bedchambers – large enough to accommodate three people, and entered at the side by a very small opening. The main body of the house was divided into two by a partition wall, the cattle spending the winter in the larger part nearer the door, while the inner area was the living room. It was here that 'compost' was made on the floor, turf or peat ash being carefully spread, then covered with 'a rich friable sort of earth' and peat dust was scattered over; these layers were watered and well trodden until they formed a hard floor, (...) 'their method of preparing a sort of manure...proves that they are very indelicate' and it seems that the St Kildans, who valued their compost as a 'commodity inestimably precious' were so reluctant to waste anything which might benefit their poor arable land, that they incor-

porated their own faeces into their floors. They were living on a deep litter system, so deep, indeed, that by spring sowing time the floor had risen by four or five feet; this was the reason for the unusual wall height and the use of beds made within the thickness of the walls."

#### **Brougham, 1871**<sup>14</sup>

"Several green tufts of grassy sod, upon heaps of loose stones – these we at last discovered to be the houses, twenty six in number; on the hills, more such molehills (Maulwurfshaufen), rather smaller, for cutting peats. This is the town, or city of Hirta. The view of this village is truly unique. Nothing in Captains Cook's voyages comes half so low."

#### **MacKenzie, 1911**<sup>15</sup>:

"They are circular or nearly so, and roughly built. The walls are six or seven feet thick, with spaces for beds left in them. (...)

The walls are not arched, but contracted gradually by overlapping of the stones to nearly a point. The entrance is about three feet by two and a half feet. The outside is covered with earth and rubbish and appears like a green hillock. In some places they are almost entirely underground."

"As most of the houses touched each other, there was thus left from house to house a broad grassy walk on the top of the walls."

"In front of the doorway, and extending well into the tunnel, was a hollow into which were thrown all the portions of the bird not used for food, the entire carcasses of those not edible, and all and every abomination you can think of. Stooping low, you groped your way

over this till you reached the door: Inside the door you had to climb over the manure to among the cattle, (...) you got helped along and over the dividing fallan. Here you had to creep along on hands and feet, and it was only near the centre of the space that you could even sit upright. Carefully creeping along in almost total darkness, you made your way to the top of the steep slope which led down to the bed opening. Down this you went head foremost, nothing visible above but your legs (...). The wonder rather is that under such conditions of living they survive at all."

#### **Calum Mor House**

(According to legend, Calum Mor built the house in a single day to prove his efficiency.)

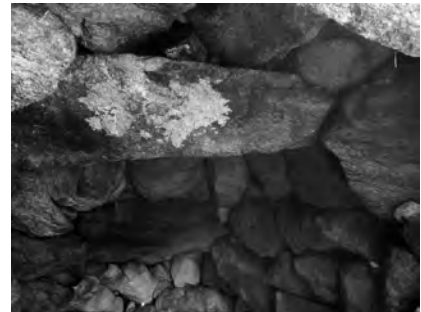
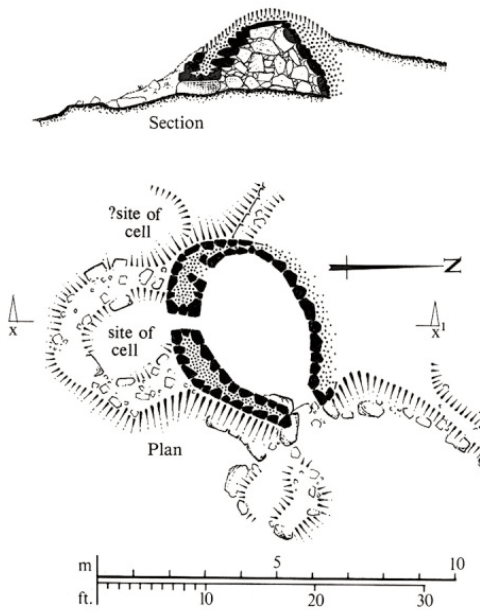
Inside the broad, flat-domed, partially overgrown building is a corbelled dome that curves uniformly upwards. The floor is set deep in the earth, and is now covered with water. The room was probably originally linked to one or two adjacent cells. Very irregular stone blocks, some of which are very large.

G: 4,57 x 2,85 m, H: 2 m

Because the building is in the old village area, one can assume that it is one of the old houses. MacKenzie reported that a house in which a widow lived was still standing in 1830.



Calum Mor House



In its shape, the Calum Mor House recalls the *bothan* described before on Lewis / North Harris.

As shown by Thomas' illustrated plates (p. 9), also incorporated built-in sleeping alcoves and similar subdivisions as those described in the older residential buildings on St. Kilda.



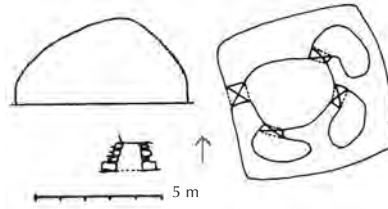
n. <http://canmore.rcahms.gov.uk>

## Amazon's House, Tigh na Banaghaisgeich

In the northwestern valley of Gleann Mor, there are several very interesting building structures that are thought to be particularly old. The building known as the Amazon's House is bound up with a legend about a female warrior.<sup>16</sup>

**Martin** described the building in **1698**<sup>17</sup>: "the whole is built of stones, (...) and is in the form of a circle pyramid-wise towards the top with a vent in it, the fire being always in the centre of the floor; the stones are long and thin, which supplies the defect of wood: the body of this house contains not above nine persons sitting; there are three beds of low vaults at the side of the wall, which contains five men each, and are separated by a pillar;"

**F. W. L. Thomas, 1860**<sup>18</sup>: "The house, when perfect and covered with a layer of turf, would have been of a depressed beehive form, and about ten feet high. (...) The central chamber is 9 x 11 feet, and 8 feet high, irregularly oval; and the



n. F. W. L. Thomas

arch is formed by overlapping stones in the usual way. (...) There has always been a hole (farleus) at the apex, to allow the smoke to escape and to admit light; the farleus would be closed with a flagstone or turf in bad weather. Around the central chamber are three doorways entering to irregular beehive chambers."

Largely intact until 1875, many of its stones were then used to construct new *cleitean*, so that today only a few structures can be discerned in the great heap of stones. Unfortunately, I was unable to visit the remains of buildings in Gleann Mor. But, according to the historical descriptions, it might have been a former residential building similar to the *wheelhouses* (see page 34), but with



n: <http://canmore.rcahms.gov.uk>



Photo: <http://canmore.rcahms.gov.uk>

a complete corbelled dome construction over the central living space as well.

A similar, even larger building (Taigh Stallair) was described in 1697 on the neighboring island of **Boreray**. It featured six sleeping niches in the walls and a central inner room, but was destroyed by the 19th century.<sup>19</sup>

## House of the Fairies, Tigh an t-Sithiche, souterrain

The underground *souterrain* (see page 33) located north of the cemetery can be dated to the **Iron Age (AD 200)** thanks to archaeological findings. It was discovered and excavated in 1840.

It is interesting that its construction—with lightly corbelled walls and a cover made of large stone slabs—clearly resembles the overground *cleitean*.



Photo: <http://canmore.rcahms.gov.uk>







**Cleit, pl. cleitean**

The island is dotted with these elongated stone structures; more than 1,200 have been counted on Hirta, and 120 on the neighboring islands. We don't know when they were built, but in 1687 Martin already counted more than 500 on Hirta.<sup>20</sup> When you consider that no more than 180 people lived on the island at a time, and usually much fewer, one wonders how it was possible to pile up such a huge amount of stones.

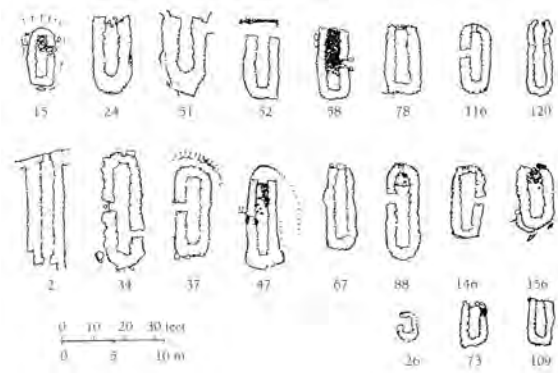
They are exclusively **storage buildings**, where everything necessary for life was kept: bird meat, lamb meat, fish, bird eggs laid in peat ash, bird feathers, cereals such as wheat, barley and oats, potatoes, hay, peat (for fire), manure (fertilizer), wool, equipment for fishing, and climbing ropes for bird hunting.

Today they are only used for shelter by the Soay sheep who've remained on the island.

*Cleitean* floor plans always take an elongated shape. In most cases, the entrance is on the narrow side facing away from the sea, but sometimes it's positioned laterally, and rarely both. The other end is rounded. Occasionally, there are small openings at the bottom (for water drainage, ventilation); the entrance could probably be sealed with stacked stones or wooden doors, whose remains can occasionally still be found.



Distribution map of *cleitean*, n. Harman

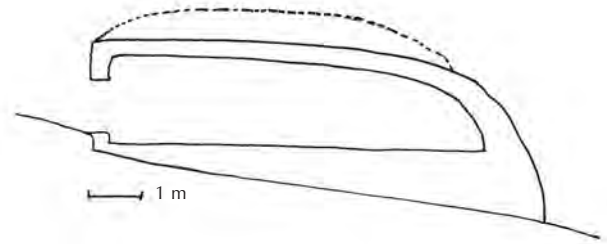


*Cleitean* in the village area, n. Harman

Although most of them are positioned on a slope, inside their floors are mostly level—steps lead down into them, and the steep slope was apparently terraced.

The roofs are covered with a waterproof layer of earth and peat, but the walls are permeable so that wind can dry the materials stored inside. A similar construction principle can be found among the fish-drying huts (fiskbyrgja) in Iceland.<sup>21</sup> In the village area, the cleitean are mostly larger: 3.5 – 7 m long, 0.8 – 1.5 m wide, 1.5 – 2.5 m high. More distant huts: 2 - 3.5 m long, 0.6 to 0.9 m wide, 1.5 m high.

The walls of the longer side form a slight corbelled vault as they rise, and are topped with large stone slabs. In the back, the building is lower, and arches in the direction of the roof slabs. Large stones are installed inside the huts (photo below), while the outer brickwork is also interspersed with smaller stones.



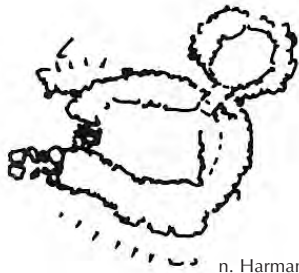




The entrances to the buildings I measured in the vicinity of the village were about 1.2 x 0.9 m. Elsewhere they're even smaller. The masonry is about 1 m thick. Below: a *cleit* entrance that was incorporated into the long surrounding wall (the dyke). Is the small hole at the bottom for water runoff?



This building (no. 122) is a little different than the typical *cleitean*. It isn't as elongated, is somewhat taller, and probably was originally attached to a round cell. Maybe an old residential house? G: 4 x 2,3 m, H: 2.5 m, E: 1.3 / 1.5 x 0.8 m, facing west. Steps lead below. At the rear left, a small opening.



n. Harman; Hirte



The stone structures are typically made of granite, but on the western part of the island the rock changes to the volcanic gabbro, which is significantly darker. Here, you can see the stream that flows from the former village out to the sea (Abhainn Mhór).





Above: large enclosures in a depression in the vicinity of An Lag. Their age is unknown. It's possible that plants were raised inside the walls to protect them from grazing cattle and the wind. Many small *cleitean* are built on the slopes above.

Below: enclosure near the village.





## II. 5,000 Years of Stone Structures in Scotland

### Skara Brae, Orkney

Neolithic (ca. 3,700 - 2,500 B.C.)

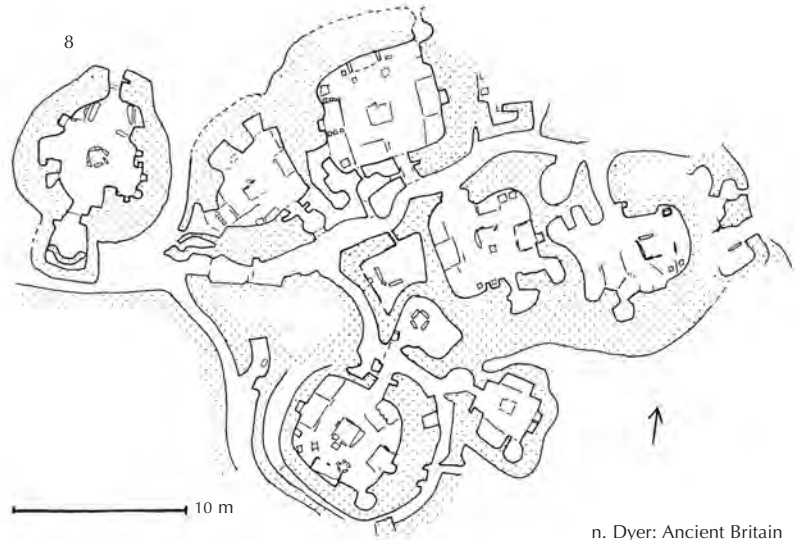
In the winter of 1850, a storm in the Bay of Skailf swept the grass cover off of the Skara Brae dune on the west coast of Mainland, the largest of the Orkney Islands in northern Scotland. The storm uncovered old ruins.

According to radiocarbon dating, the ruins were from 3,200 – 2,500 B.C., a settlement period of more than 600 years. The buildings were renovated and expanded by a second phase of construction, but not significantly altered. The climate was warmer at the time, and the settlement was further away from the sea and surrounded by fertile land. But wood was apparently still scarce, such that the rooms are surrounded up to a height of 3 m by dry stone walls made of sandstone, a stone that is easy to cleave.

We don't know how these rooms were originally roofed. Although they have a partial corbelled vault structure, one suspects that the roofs were made of driftwood or whalebone, and covered with earth and grass. **Small spaces with corbelled domes** are built into the walls.

Since the houses are still very well-preserved, it was speculated that, like Pompeii, they'd been covered up by a natural disaster—here, by a sandstorm. But there are many indications that the settlement was abandoned before possibly being covered by a sand drift.

The masonry is about 1 m thick. The interconnected houses were embedded in a **mantle of** what is apparently centuries' worth of the residents' **accumulated waste (called midden)**. Childe /



n. Dyer: Ancient Britain

Clarke<sup>22</sup> have suggested that the current building structures were built like caves into the waste that had already been accumulated, and then fortified with stone walls, so as to obtain optimum insulation against the wind and weather.

The floor plans of the houses vary between 6.4 x 6.1 m and 4.3 x 4 m, and although they are mostly rectangular in shape, they have rounded corners. The rooms are connected together by means of passageways covered with slabs of stone and open paths. The entrances have thresholds and are 1,2 x 0,6 m tall. Recessed holes indicate door frames. No windows. There are covered drains that lead to the outside. House 8 stands alone, and considering that many flint remains have been found there, it could have been a workshop.

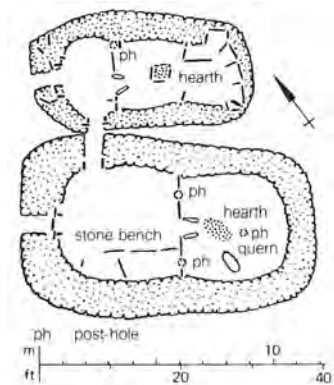
What is most unusual is that the **stone furnishings** are still intact. Next to the fireplaces situated in the middle of the houses, there are bed frames, dressers, shelf-like wall cabinets, storage containers, and niches built into the walls.

Numerous objects from everyday life have been found, as well as stone beads and possible ritual objects.

The inhabitants lived mainly on livestock and fishing. Barley residue also indicates that grains were cultivated.

### Knap of Howar, Papa Westray, Orkney (3,700 - 2,800 B.C.)

Another, slightly older structure on Orkney consists of two interconnected, elongated houses. In their layout, they resemble the later *blackhouses* (p. 38).



n. Ritchie: Orkney







Calanais / Callanish, Lewis, around 3,000 B.C., the largest megalithic site in the British Isles

### A link to Neolithic ritual and burial sites

The significance of the late Stone Age settlement at Skara Brae only becomes clear when you consider that residential buildings from the high cultures of the time, if preserved at all, are only preserved as simple foundation walls. In contrast, the **contemporaneous cult and burial sites**—which were erected with great care and sophistication, and created for “posterity”—have been much better preserved into the present day. Stone circles and tumulus tombs were being built at the same time in the vicinity, and the builders had much experience in handling stones. Immense stone boulders were erected against the forces of gravity, arranged in rows and circles of stone that, directed at the sky, attained a unique ritual significance—and likely also astronomical significance. The burial chambers built, carefully out of stone, were protected with large tumuli of earth and stone. Only a well-organized society was capable of accomplishing this. I continue to find it astonishing that such a sophisticated system of erecting and piling stones was, at the time, a phenomenon that was spread across the globe.<sup>23</sup>

What is interesting about the houses at Skara Brae is how the walls are **mantled in an amorphous waste material** (midden). Although it may not have completely enclosed the buildings like a grave tumulus, it perhaps arose from a similar need for protection.

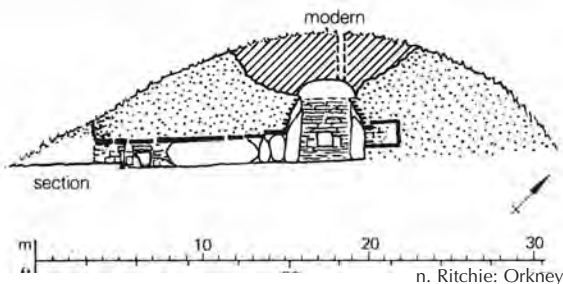


Stenness, Orkney, around 3,100 B.C.



Maes Howe, Orkney, around 3,000 B.C.

Central grave chamber: G: 4.5 m, H: 4.5 m (originally). The treatment of the stones is mostly seamless. Long, overhanging stone slabs on top, supported by vertical pillars in the corners. Today, the original corbelled dome has been covered with a concrete slab, because the grave was opened from above. It is interesting that, in the 19th century, F. W. L. Thomas interpreted these tombs as residential buildings (see page 42).







**Menhir da Meada, Portugal,**  
H: 7.15 m, weight: 16 t, about 4th millennium B.C.



**Hagar Qim, Malta, 3,600-2500 B.C.**



**Stonehenge, Wiltshire, England, about 3,000 B.C.**



**Taula Trepcú, Minorca, Spain, 2nd millenium B.C.**



Grave mound of **Knoth** and corbelled dome in the burial chamber of **Newgrange**, both of **Ireland**, around 3,000 B.C.





## **Broch**

### **Last centuries B.C.**

After the heyday of stone architecture in the 4th – 3rd millennium B.C., the traces of early settlements in Scotland largely disappear. The historical literature attributes this to the climate change that had already begun by the middle of the 3rd millennium B.C. Before this climate change, it was relatively warm, the soil was fertile, and there were trees in many regions. The land was therefore more densely populated during the Neolithic Era, which in turn meant that wood was used more frequently as a fuel and construction material. Increased cooling prevented the regeneration of the forests. Around 1,000 B.C., a major eruption of the Hekla volcano in Iceland possibly led to further climate change and more rain, resulting in the fact that Scotland's northwestern regions are generally treeless today, and large areas are covered with a thick layer of peat that has hidden many earlier human structures.

It wasn't until the Iron Age (which began around the middle of the 1st millennium B.C.) that buildings were built whose relics are still visible today.

Around 600 B.C., **roundhouses** began emerging. These are considered precursors to the *brochs*. Residential structures made of wood were built into the free-standing thick outer walls (with diameters of up to 5 m), and the roofs were made of plant material.<sup>24</sup>

The *brochs*, which have a very unique design, were only developed in western and northern Scotland after the middle of the 1st millennium B.C. The typical *broch*, from the outside, is a windowless tower, whose walls are made of two

concentric stone walls around an inner courtyard (circumference: 10–15 m). The walls might originally have been up to 15 m high. These high dry stone walls are connected by interior corridors and stairs, which give access to the upper floors. This double-wall construction, full of useful hollowed-out spaces and interconnections, enables the high walls to be constructed both solidly and with few materials. They required no further stone supports, unlike, for example, the Nuraghen (tower structures on Sardinia from ca. 1,600 B.C.), whose multi-storey interiors were built entirely of stone with corbelled domes.<sup>25</sup> **Corbelled dome structures** are found in the *brochs*, but only in the small spaces on the ground floor, like the so-called "guard cells" (see floor plan D), which were built into the wall next to the entrance.

We can only speculate about the interior of the *brochs* and how they were used, as the wooden constructions have fallen apart. It is thought, because of the protrusions on the inner wall, that the high walls served as the framework on which several floors of wood were installed. Light and air came through the vertical openings in the inner wall into the surrounding galleries. The openings probably also served as entrances to the various floors. The roof was made of plant material.

Cattle were probably housed on the ground floor, while the residents lived on the upper floors.

A frequent topic of discussion is whether the *brochs* were used for defensive purposes. It is now assumed, however, that they served as the homes of privileged farming families, and demonstrated wealth and status. At the

time and prior to it, the typical buildings were low to the ground, nestled close to the earth as protection against the wind and to spare timber. In contrast, the interior of the *brochs* required a great deal of this precious material, which probably had to be imported.

There is no evidence that they were used for war.

The *brochs* often stood on high ground, on prominent rocks near the sea, or on small islands in the Lochs (lakes). Smaller circular structures, contemporaneous with the *brochs*, are called *duns*, a Gaelic term which is also used for *brochs*.



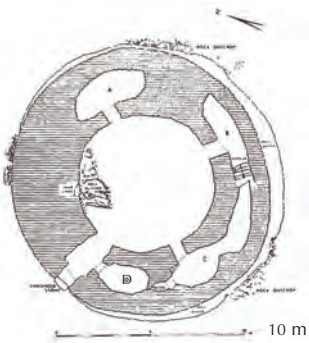
Dun Borranish, Lewis



Dun Telve, Highlands

**Dun Carloway Broch, Lewis  
(Dùn Chàrlabhaigh)**

Dun Carloway is one of the most well-preserved *brochs*. It was built around 100 B.C. and is still 9 m high at some points. It stands on a rocky hill with a wide view of the whole surrounding environment.



n. Armit/Fojut: Dùn Chàrlabhaigh







Under: corbelled dome in the “guarded cell” in the entrance wall. Corridors as corbelled arches.







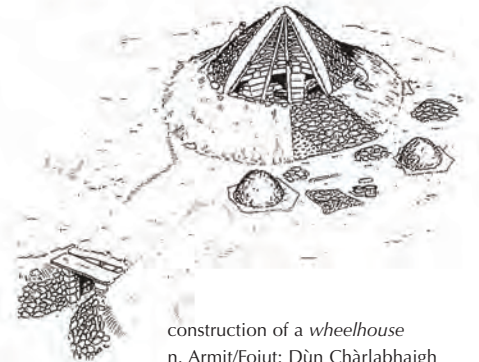
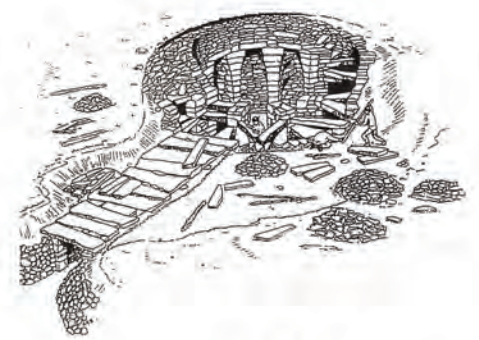
## Wheelhouse

First centuries A.D.

The construction of *brochs* ebbed away in the 1st century B.C. We have no specific indications of why. Perhaps the expense of acquiring wood became too great, or new social structures wouldn't permit the monumental construction of residential towers.<sup>26</sup> In their place, a new form of round houses called *wheelhouses* emerged on the Outer Hebrides and Shetland. From the outside, these *wheelhouses* resembled the traditional *roundhouses*, but they had an interesting **new interior structure**.

Inside, stone walls proceeded radially inward like the spokes of a wheel, and were conjoined with arched doorways in front of the central fireplace. The separate outer spaces that resulted were surmounted by corbelled domes. In contrast to the *roundhouses* and *brochs*, the building was **embedded into the ground**, and could only be reached through an underground passage covered by stone slabs. All that could be seen from the outside was the relatively small roof, which only covered the central area and was made of wood, peat, and straw. The outer rooms, which were roofed with stone, had to be made waterproof using only soil and peat. The refined design of these *wheelhouses* achieved a maximum of interior space while requiring only a minimum of precious materials like wood.

In 1867, F. W. L. **Thomas** described certain buildings that are reminiscent of these *wheelhouses*, but were apparently built **entirely of stone with corbelled domes**—like, for example, the Amazon's House on St. Kilda (see p. 20). The similarity is even more clear when one compares the floor plan and



construction of a *wheelhouse*  
n. Armit/Fojut: Dùn Chàrlabhaigh

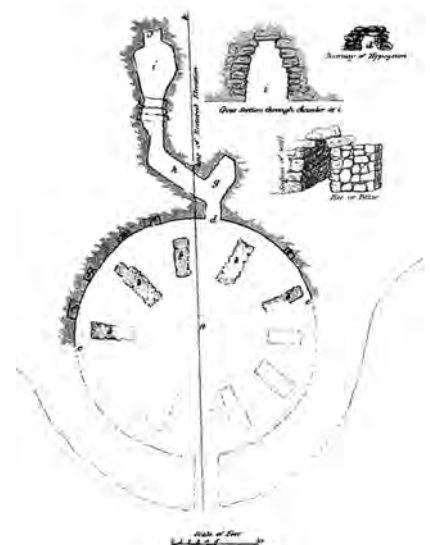


F. W. L. Thomas, vol. VII, Plates XXXIV and XXXV

reconstruction drawing of an "Ancient Both with Hypogeum, South Uist." (Plates XXXIV, XXXV) With an inner diameter of about 8.5 m., the building had enough space to fit some 40 people.<sup>27</sup>



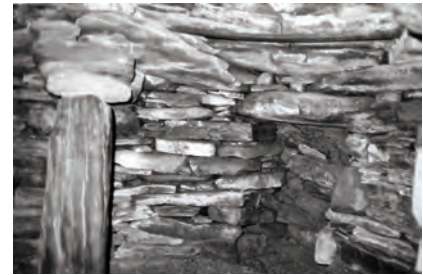
Wheelhouses on Shetland (Jarlshof).  
n. Ritchie: Scotland BC





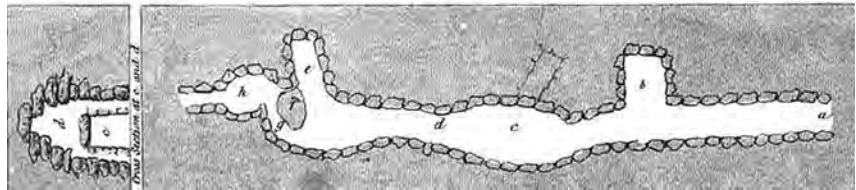
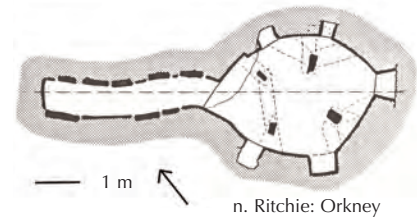
**Earthhouse, souterrain, fogou**  
**Middle of 1st millennium B.C. to mid-**  
**dle of 1st millennium A.D.**

The tendency to embed residential buildings into the ground can be observed again and again—for both structures like Skara Brae that were made of piled-up material or structures built into the existing soil like the *wheelhouses* and the houses at Bosta (see p. 36). The construction of so-called *earthhouses* was widespread, extending from northern Scotland to the south of England and to Ireland. These houses are called *souterrains* in Scotland and Ireland, and called *fogous* in southern England. Often, such structures are only underground passages, sometimes ending in chambers and possibly covered with corbelled domes. They are always found in conjunction with residential buildings. Their function is unclear. Many indications suggest they were storerooms, as well as possibly serving a protective function. A typical elongated souterrain was described on St. Kilda (see p. 20).



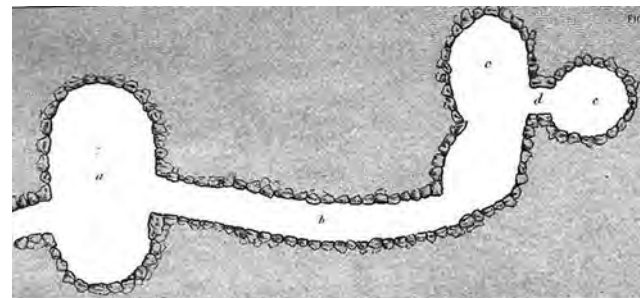
**Rennibister Souterrain, Orkney**

The narrow passage leads to a chamber (G: 3.35 x 2.6 m, H: 1.5 m), whose rough corbelled dome are supported of four pillars . 5 small recesses are introduced into the irregular outer wall. Probably 1st century B.C.

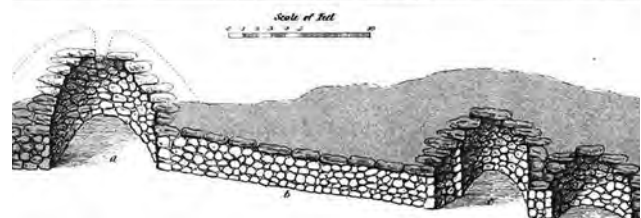


R. W. L. Thomas, vol. VII, plates XXXV und XXXIII

Again, the research conducted by R. W. L. **Thomas (1867)**<sup>28</sup> supplies important information. He refers to the underground structures pictured here as "**Pict's Houses**". He uses this expression whenever describing structures that are particularly old which he cannot place in a specific time period. A souterrain is joined to the *wheelhouse* pictured on page 34. He described other underground passages with dome spaces built into them on South Uist and elsewhere.



In Plate XXXIII, it is interesting how the passage leads away from a dome structure that is only partially embedded in the soil and proceeds to smaller underground circular buildings.



**Bosta Settlement (Bostadh), Lewis**  
Ca. 500 A.D.

In 1992, a storm uncovered ruins on the beach of Bosta (Bostadh) on Great Bernera, Lewis. Among the remains of Viking buildings was found a settlement of 9 houses from the period around 500 A.D. The houses were connected to one another via tunnels and were typical of residential buildings in northern and western Scotland in the **late Iron Age**. After archaeological investigations, the ruins were filled in again and only one of the buildings was reconstructed. It can be visited today.

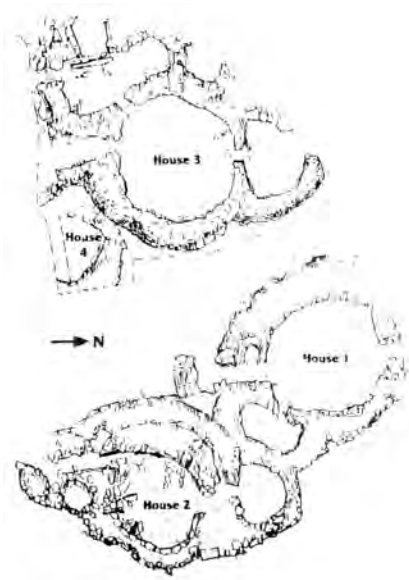
The buildings were embedded in the sandy soil, and had thick stone walls that surrounded a larger circular room (diameter: 6 m) with a firepit in the mid-

dle and a smaller room to the side.

A peat fire was burning when we visited, which clouded the room despite a small opening in the roof.

The roof was covered with wood, peat, and straw. A wooden structure in the larger reconstructed room leads to an upper floor.

The discoveries testify that the residents found an ideal living site. It was possible to fish within the protected cove. Good pasture, arable land, coupled with plenty of fresh water resulted in good living conditions.



n. Information panel on site





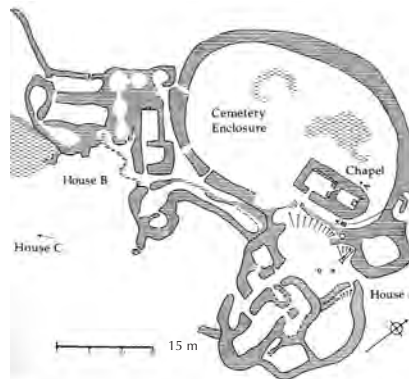
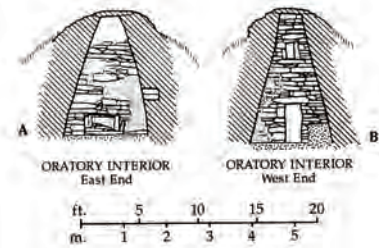
**Early Christian buildings**  
**From middle of 1st millennium A.D.**

**North Rona: St. Ronan**

In the 6th century A.D., missionaries from Ireland arrived to the Western Islands (e.g. St. Columba on Iona, 563 A.D.). Little has been retained from this early period; the only buildings lie in remote regions where they weren't restored later. One example is St. Ronan's Chapel on the small island of North Rona 72 km north of Lewis. It was probably begun toward the end of the 7th century or the beginning of the 8th century. It consists of two rooms. The eastward room, which is still covered, is thought to be the original chapel. It measures 3.4 x 2.1 m and has a fairly steep corbelled vault (3.2 m tall) that is covered with stone slabs. This elongated structure is reminiscent of *souterrains*, of some Irish chapels (like Gallarus), and of *cleitean* on St. Kilda. The residential structures date from the period after the 12th century.<sup>29</sup>



Left the chapel with corbelled vault.



St. Ronan, North Rona

Drawings & Photos n. Fojut/Pringle/Walker, Western Isles  
<http://canmore.rcahms.gov.uk/en/site/1472/details/rona+st+ronan+s+church/>

**Eileach an Naoimh**

On this small island in the Inner Hebrides, now uninhabited, an early Christian monastery was founded as early as the 6th century A.D. A double corbelled dome structure from this time period is partially preserved.<sup>30</sup>

Photo and further information:  
<http://canmore.rcahms.gov.uk/en/site/22361/details/garvellachs+eileach+an+naoimh/>



Eileach an Naoimh

## Blackhouse

Around about 800 A.D., the Scandinavian **Vikings** ("pirates," from Old Norse) appeared. Their presence was first felt in the form of raids, but the "Northmen" increasingly began to mix in with the indigenous population over the centuries to follow. They brought with them the **longhouse** construction form, which began to influence the design of residential buildings after the 9th century.

We know little about how the rural population's houses looked in the Middle Ages, as these buildings were not built to last a long time and had to be rebuilt constantly, usually with whatever building materials were at hand. But whenever the *blackhouses* are discussed, the former thousand years of tradition (or even longer) is always brought up. When you compare descriptions from the 16th century to the 20th century, there is evident a clear, consistent form of construction that, in principle, was already present in the Iron Age (Bosta, p. 36), and even in the Neolithic buildings (especially Knap of Howar, p. 26): thick walls made of dry stone, a roof made of plant material. The *blackhouses*, however, used this form of construction for longhouses.

The term *blackhouse* first appeared in the 19th century—among other places, in a report by the Royal Commission on the Housing of the Working Classes from 1885. "Black" here is not meant to designate the color, but rather the "inferiority," the "poor quality." *Whitehouses*, in contrast, were "better" houses, built with mortar, without cattle under the roof, and featuring more comforts like windows and chimneys.<sup>31</sup>

Travelers and researchers in the 18th and 19th centuries, who themselves certainly lived in *whitehouses*, were shocked by the poor living conditions of ordinary tenants in *blackhouses*.

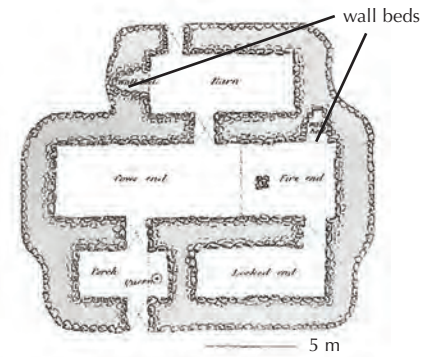
### Dr. Samuel Johnson, 1773<sup>32</sup>

"The wall of a common hut is always built without mortar, by a skilful adaptation of loose stones. Sometimes perhaps a double wall of stones is raised, and the intermediate space filled with earth. The air is thus completely excluded. (...)"

"We were driven once, by missing a passage, to the hut of a gentleman, where, after a very liberal supper, when I was conducted to my chamber, (...) The accommodation was flattering: I undressed myself, and felt my feet in the mire. The bed stood on the bare earth, which a long course of rain had softened to a puddle ... The petty tenants, and labouring peasants, live in miserable cabins, which afford little more than a shelter from the storms."

### F. W. L. Thomas, 1867<sup>33</sup>

"Externally, there is no smoke-hole nor window, (...) the custom arises from the desire to keep in the smoke until it fills and saturates the vault of the roof. (...) The fire, which never goes out, is about the middle of the floor; on the right-hand side is a bench of wood, stone or turf on which the men sit; on the opposite side the women perform their domestic duties. Tables and chairs are almost unknown; (...) Behind the dresser is the calve's location, because it is near the fire; and the cows are tethered in winter along the wall. The whole aspect is eminently archaic, when seen by the dull light of a peat fire."



n. F. W. L. Thomas, vol. VII, Plate XXX

In Thomas's drawing, there are still bed cells built into the thick walls; these were later replaced by wooden bed frames.

### Arthur Mitchell, 1881<sup>34</sup>

"The rafters do not overlap the outer face of the wall, but terminate toward its inner edge, so that the rain falls from the roof into and not over the wall, which therefore is of necessity nearly always damp."

"Such smoke as is not deposited in the thatch oozes out over the whole roof, giving the house, when seen from a distance, the appearance of a dung-heap in warm wet weather. The object of a roof is not simply to protect from rain and cold but to accumulate soot, and it is consequently never completely water-tight. After heavy rain the water comes through and blackens everything on which it falls, bringing with it the glistening pitchy pendicles of soot which usually fringe the rafters."

"I shall not dwell on the general wretchedness of these dwellings — the absence of privacy and separation of the sexes, the presence in the house of the cattle and their accumulated dung, the want of comforts, etc."



## Arnol Blackhouse, Lewis

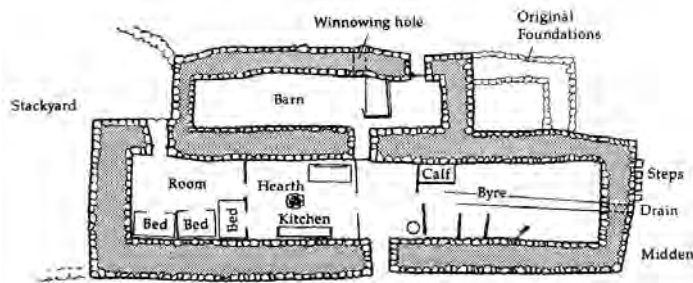
Built in 1885, inhabited until 1960, now a museum.

In contemporary descriptions of these *blackhouses*, it's clear that the basic construction of these buildings was quite useful for the residents.

"The plan derived from the need to maximise the shelter afforded by the croft buildings whilst utilising the heat given off by the livestock to supplement that from the peat fire."<sup>35</sup>

Some of the benefits of living under the same roof as the cattle included the body heat given off by the animals, and the ammonia odor given off by the animals' urine, which protected against tuberculosis. The thick, protruding stone walls served as protection from the wind, so that storms couldn't sweep under the roof and pull it off. Repairs could be carried out from the platform surrounding it.

Although a peat fire burned constantly



n. Fojut/Pringle/Walker,



Living room with central fire pit



Stable

without any chimney opening, filling the room with unpleasant smoke, this helped to preserve the roof: it protected against fungi, drove away mosquitoes, wood borers, and other pests, and served to dry and smoke both meat and fish. And the straw, enriched with soot, later served as fertilizer for growing grain and potatoes.

The Arnol Blackhouse is already "modernized" in comparison to descriptions from earlier centuries. It features wooden partitions to the stable as well as to a rear bedroom. Additionally, the living room was furnished with chairs and wardrobes. Window openings were installed later.



The renovated houses that can be seen in **Garenin (Gearranan), Lewis**, which were inhabited until 1974, are even more comfortable. The living rooms are lined with wood and plastered. Chimneys and windows have been installed. After 1952, there was electricity, and a water main followed in 1960. Workshop with a loom.



The stone walls of *blackhouses* can be seen everywhere on Lewis. This testifies to how widespread the method of building once was.





### III. Summary

#### Comparison of stone structures across over 5,000 years

When you compare the examples of residential buildings that have been documented since the Neolithic Era around 5000 years ago up to the middle of the 20th century, some clear similarities emerge:

#### Foundation walls made of piled dry stone.

This is even true of the *blackhouses* inhabited up to the 20th century, where the tenants of lords living in comfortable *whitehouses* carried out their lives—simple lives, but lives functionally suited to their possibilities. The walls are always very thick and often have an inner layer of filling, serving as insulation.

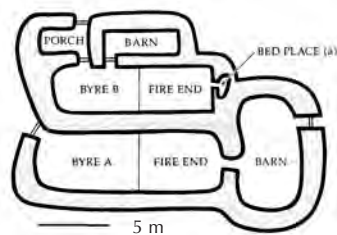
#### A tendency toward cellular accumulation

If you look at the floor plan of the Neolithic settlement at Skara Brae, you can already clearly discern structures that appear again and again. The rooms have irregular, rounded floor plans, with subsidiary cells embedded in the thick walls. They aren't arranged in linear fashion, but are grouped around each other like a bunch of cells whose walls touch, are shared, and merge into a complex structure. This principle is reinforced by the filling of midden, a waste material.

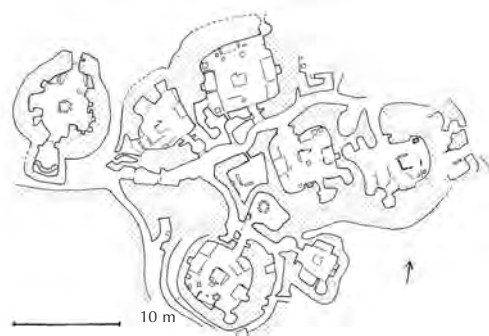
Later floor plans show a similar tendency toward rounded or round designs, interconnected with each other. This can be seen very clearly in the **Iron Age settlement** at Bosta, on Lewis (5th century A.D.), and in the plan of a *bothan* settlement described by Thomas in the

19th century (Thomas, Plate XV). The *wheelhouses* (early 1st century A.D.) also have a similar tendency. Although everything is concentrated within a single building, many smaller cells are arranged radially around a central room with fire pit. A similar principle can also be found in earlier **residential buildings on St. Kilda**. Cells are built into the very thick outer walls. Multiple people can sleep within their tight space, as seen in the Amazon's House (cannot be dated). But as late as 1830 it was reported that homes had sleeping cells in the walls, an architectural element that also occurred in older *blackhouses* (Thomas, Plate XXX). With the *blackhouses* as well, the elongated spaces were connected to one another in cellular fashion, and sometimes several houses were built adjoining, so that walls could be shared (Thomas, Plate XXX). Thus they became a climatically compact unit.

The *brochs* might seem to be built quite differently. But their floor plans also evince a cellular structure. The wooden construction inside allowed for several floors, which you could view as a form of vertical accumulation. It is interesting to compare them with the Nuraghen in Sardinia, Italy—here, this vertical principle is carried out with the inclusion of corbelled domes made entirely of stone, situated on top of one another (2nd millennium B.C.).<sup>36</sup>



Blackhouse, Thomas, vol.VII, Plate XXX



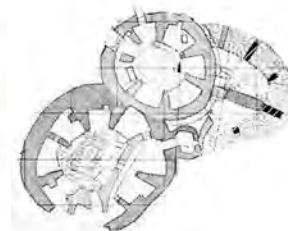
Neolithic settlement Skara Brae, Orkney



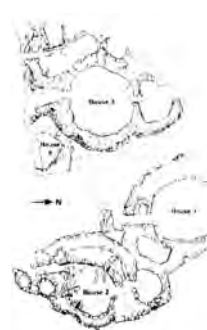
Bothan, Thomas, voll. III, Plate XV



Broch, Lewis



Wheelhouses, Shetland



Bosta, Lewis, 5th century A.D.



St. Kilda: "Amazon's House"

### Cladding with amorphous material

Some structures are fully embedded in the existing ground, such as *earthhouses*, *souterrains*.

The *wheelhouses* too were only accessible via an underground passage, and their outer rooms were entirely covered in stone and turf, so that only the central room could be seen from the outside. The late **Iron Age Bosta houses** on Lewis were also built partially into the ground.

In the **Neolithic settlement** at Skara Brae, a thick layer of midden—waste material—surrounded the foundation walls. The same is reported about later buildings, such as those on St. Kilda, which are said to have looked like “molehills.”

The *bothan* too were surrounded at their bases with a structurally unnecessary layer of thick stone and peat. Cladding the foundation walls with amorphous material served as protection and insulation against cold, wind, and rain, and helped stabilize the basic construction.

So it's not surprising that the Neolithic inhabitants of Skara Brae also employed this protective principle for their burial sites. As these were meant to survive for eternity, the grave chambers were built using only stone and completely protected by a hill.

In this context, F. W. L. **Thomas's (1858)** considerations are interesting: he compared the so-called “Picts' houses” with the *boths* / *bothan*: „the same method of forming the arch, the low and narrow doors and passages, the enormous thickness of the walls, when compared with the interior accommodation, exist in both. When a both is covered by green turf it becomes a chambered tumulus, and when buried by drifting



From a distance, *bothan* also appear like a “molehill.” Only the dome is visible above the diffuse mass of stone and peat.

sand it is a subterranean Picts' house. (...) But the Picts' houses (...) were made a thousand years ago;”

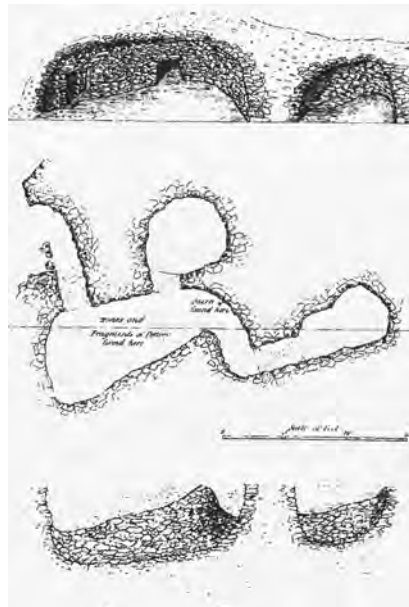
In the 19th-century literature, the term “Picts' house” was used whenever the buildings were considered particularly old, but no more specific indications could be given.

So Thomas seem to be referring here to the underground buildings that would later be called the *earthhouses* or *souterrains*. This applies, for instance, to

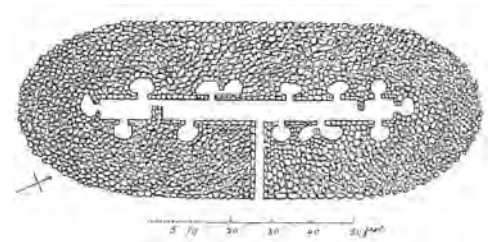
the “Picts' house” on Harris (Plate XVII).

And he interpreted the Neolithic tomb on Holm of Papa, Orkney (ca. 3,000 B.C.) as a residential dwelling:

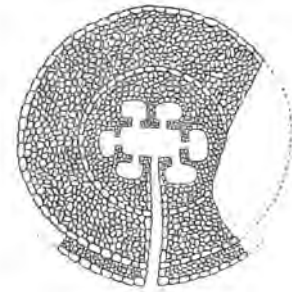
“I regard the comparatively large Picts' houses of the Orkneys as the pastoral residence of the Pictish lord (...), fitted to contain his numerous family and dependents.”<sup>37</sup>



Thomas, vol. III, Plate XVII. “Pict's House” at Nisibost, Harris



Neolithic tomb Holm of Papa Westray, Orkney n. [www.megalithic.co.uk](http://www.megalithic.co.uk)



Quoyness, Orkney. Similar Maes Howe (p. 28) n. [www.megalithic.co.uk](http://www.megalithic.co.uk)



## When and why were corbelled domes or corbelled vaults built?

It's clear that, **since the Neolithic days, people have had no problems building corbelled domes.** This is evident in the 5,000-year-old funerary architecture. Since these buildings were meant to survive as long as possible, the incorporation of perishable plant material was avoided. This aspect played no part when it came to everyday structures. Indeed, they should be adaptable according to one's needs—capable of being tailored to changing family situations. The types of **materials available** were decisive. In the regions of Scotland we have covered, there was apparently always an abundance of stones, so that foundation walls could be made of piled stone since the early days. Roofs, however, were rarely constructed of stone; they were usually made of wood or whalebone rafters, which were covered with peat and straw. The **size of the rooms** has played an important role here.

At the **Neolithic settlement at Skara Brae**, corbelled domes were already being used to cover the small side rooms, but the rather large dimensions of the main rooms (approx. 6 x 4 m) would have required very high domes.

The **brochs** also contained small chambers with corbelled domes, but the built-in rooms for living were made of wood. Since this building material was already in short supply at the time, its use was probably a luxury and a status symbol.

In the typical **wheelhouses**, the sophisticated mix of small, domed rooms and a central plant cover is astonishing. But, as the example from Thomas shows (p. 43, Plates XXXIV and XXXV), the cen-

tral covering could also be covered entirely with a corbelled dome.

**Souterrains** too occasionally have chambers with corbelled domes.

These early buildings are often only preserved in rudimentary form—and this only when they've been survived hidden in the ground.

It is practically impossible to know whether there were **free-standing corbelled dome structures** like the *bothan* from the earliest times up to the middle of the 1st millennium A.D., because, aside from protecting tumuli, such structures had short lifespans, and the building material was often reused again and again.

The oldest datable free-standing buildings with corbelled vault which are still preserved can be found on the now-uninhabited islands of the Outer Hebrides. The **early Christian chapel** of St. Ronan on North Rona (approx. 7–8th century A.D.) and the monks' cells on Eileach to Naoimh (6th century) (p. 37) are two examples.

In these two examples, **two basic types** can be identified that are repeated again and again:

### 1.

St. Ronan has no dome, but rather a **rectangular corbelled vault**. Similar spaces are already to be found in Neolithic graves, but also in other Christian chapels such as those of the Flannan Isles, west of Lewis<sup>38</sup>. There are also comparable buildings in Ireland (Skellig Michael, Gallarus Oratory). The same construction principle also applies to the underground passages of the *souterrains* and the elongated *cleit-ean* on St. Kilda.

### 2.

The beehive cells on Eileach to Naoimh, in contrast, are **round** and have **corbelled domes**.

The round building principle is generally typical of corbelled dome structures, as it is easier to pile stones into the shape of a dome on the basis of a round floor plan. The same method of construction can be seen in tombs as well as in many other buildings, such as small rooms in Neolithic houses, *brochs*, *wheelhouses*, rural huts, the *bothan*, and in some residential buildings, such as the "Amazon's House" and "Calum Mor House" on St. Kilda. These structures all correspond to Type 1 (p. 45)<sup>39</sup>, which predominates in the Nordic countries.

But these early Christian buildings could be proof that this construction method was used constantly when conditions were right: if an abundance of stones were available for construction material, and the building only had to enclose a limited space.

In reports from earlier centuries, writers repeatedly stress that nothing was known about the times when the buildings and ruins were constructed. This is true for instance of the summer huts, *bothan*, on Lewis and Harris. Since these were likely rebuilt on top of earlier ruins, it would be very interesting to learn more about the original buildings, whose relics are surprisingly common and suggest former residential structures. But here, as is so often the case, the anonymous architecture and way of life of ordinary people cannot be grasped by history, and goes practically unnoticed.

## A comparison with corbelled dome structures in other countries

As I attempted to make clear in my book about corbelled domes<sup>40</sup>, people in different countries and regions probably found their way to this method of construction entirely independently—practically compelled to use this method due to a lack of wood and the abundance of stones.

In the regions of **Scotland** described here, dry stone construction seems to have been used consistently since very early times. And, as far back as can be traced, it appears that corbelled domes were built.

The same is suspected of the *beehive huts* or *clochans* in **Ireland**, which have a similar fundamental form (Type 1). There are pointers toward **Sweden** and **Norway**, where there are similarly constructed storage huts.<sup>41</sup>

Corbelled dome structures of Type 1 have also been found on **Iceland**.<sup>42</sup>

### The situation is different in southern Europe.

There are indications that, in some regions of southern Europe, there is a long tradition of round huts with thatched roofs. Today, for example, there are shepherds' huts in Sardinia (Italy), in Extremadura (Spain), and in Portugal that are still built like the *nuragical* residences from the end of the 2nd millennium B.C. on Sardinia, or the buildings of the Celtiberian Castro culture in northwest Spain (1st millennium B.C.), of which only the foundation walls have been preserved.

**Corbelled dome structures built entirely of stone, however, do not appear to have developed as a widespread form of construction until the 18th century** (when it appears to have developed in



Shepherds hut, Sardinia, Italy



Shepherds hut, Extremadura, Spain



Settlement around the Nuraghe Su Nuraxi, end of the 2nd mill. B.C., Sardinia, Italy



Castro de Baroña, 1st mill. B.C., Galicia, Spain

different countries independently)—when wood became scarce as a building material, and in those places where stones were available in large quantities due to land-clearing.<sup>43</sup>

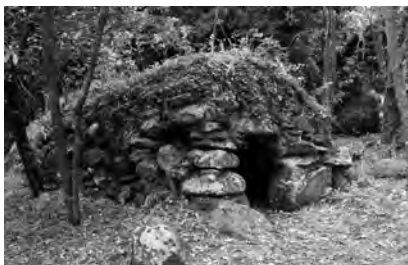
In addition to Type 1 buildings, various forms have been developed, such as complex stacked structures with cor-

belled dome, which can look quite similar in regions that are geographically very distant.

Thus, the elongated *cleitean*—the storage huts on St. Kilda—bear an astounding resemblance to some stables on Sardinia.



Cleit, St Kilda, Outer Hebrides



Stable, Sardinia, Italy





Type 1



Scotland: *Both*, Lewis



Iceland: *Fjarborg*



Ireland: *Clochan*, Dingle

Type 3



Spain: *Barraca*, Catalonia



Italy: *Capanno*, Sicily



Greece: *Mitato*, Crete

Type 4



Greece: *Tholos*, Thessaly



Croatia: *Kazun*, Istria



Italy: *Casella*, Apulia

Type 5



Morocco: *Tazota*



Malta: *Girna*



France: *Capitelle*, Gard

Type 6



Spain: *Barraca de bestiar*, Minorca



Italy: *Casedda*, Apulia



France: *Cabane*, Hérault

## Annotations

- 1 Renate Löbbecke: Corbelled Domes. Köln 2012
- 2 Thomas, F. W. L.: „Notice of Beehive-Houses in Harris and Lewis“. In: Proceedings of the Society of Antiquaries of Scotland, vol. III, 1858, pp. 127–144
- 3 Lassure, Christian: “The Cleitean of the St. Kilda Archipelago in the Outer Hebrides, Scotland“. In: [www.pierreseche.com](http://www.pierreseche.com)
- 4 <http://gridreferencefinder.com/#>
- 5 In addition to the descriptions of F. W. L. Thomas see more authors in the respective texts.
- 6 Mitchell, Arthur: The Past in the Present. What is Civilization?. 1881, p. 76f.
- 7 Thomas ( see note 2), p. 135
- 8 <http://gridreferencefinder.com/#>
- 9 Thomas (see note 2), p. 127f.
- 10 Stewart, Katharine: Crofts and Crofting. 1996.
- 11 Mackenzie, W. M.: “Notes on certain Structures of Archaic Type in the Island of Lewis - Beehive Houses, Duns, and Stone Circles“. In: Proceedings fo the Society of Antiquaries of Scotland, vol. II, 1904, p. 183
- 12 Fojut, Noel/Pringle, Denys/Walker, Bruce: The Ancient Monuments of the Western Isles. 1994, p. 70
- 13 After: MacAulay, Kenneth: The History of St Kildas. London 1758. In: Harman, Mary: An Isle called Hirte. History and Culture of the St Kildans to 1930. 1997, p. 144.
- 14 Brougham, Lord: Memoirs of the Life and Times of Lord Brougham written by himself. 1871. In: Harman (see note 19), p. 145
- 15 MacKenzie, Neil: Episode in the Life of the Rev. Neil MacKenzie, at St Kilda from 1829 to 1843. 1911. In: Harman (see note 19), p. 145
- 16 Muir, Thomas S.: “Notice of a Beehive House in the Island of St Kilda. In: Proceedings of the Society of Antiquaries of Scotland, vol. III, 1860, p. 228 f.
- 17 Martin, Martin: A Voyage to St Kilda, 1698. In: Harman (see note 19), p. 75
- 18 Thomas, F. W. L.: In: Muir, Thomas S. (see note 16), p. 226 f.
- 19 Harman, Mary: An Isle called Hirte. History and Culture of the St Kildans to 1930. 1997, p. 77 f. and descriptions of Thomas (see note 27), p. 173
- 20 Harmann (see note 19), p. 161
- 21 Löbbecke (see note 1), p. 341 ff.
- 22 Childe, V. Gordon/ Clarke, D. V.: Skara Brae. 1983, p. 8
- 23 The monumental buildings of high cultures of the time are well researched thanks to the existing written documents, such as the Egyptian obelisks and pyramids. But it is interesting to observe the international spread of stone pillars (e.g. standing stones) and grave chambers (e.g. Dolmen) in non-literate cultures of the time. See: Jousaume, Roger: Des Dolmens pour les Morts. 1985
- 24 Burgess, Christopher: Ancient Lewis and Harris. Exploring the Archaeology of the Outer Hebrides. 2008, p. 20
- 25 Löbbecke (see note 1), p. 224.
- 26 Armit, Ian/Fojut, Noel: Dùn Chàrlabhaigh and the Hebridean Iron Age. 1998, p. 27
- 27 Thomas, F. W. L.: “On the primitive Dwellings and Hypogea of the Outer Hebrides“. In: Proceedings of the Society of Antiquaries of Scotland, vol. VII, 1867, p. 166 f.
- 28 Thomas (see note 27), p. 164 f.
- 29 Fojut/Pringle/Walker (see note 12), p. 22 f.; Harman (see note 19), p. 298
- 30 Harman (see note 19), p. 302 f.; 31 Burgess (see note 24), p. 48; Fojut/Pringle/Walker (see note 12), p. 65
- 31 Fojut/Pringle/Walker (see note 12), p. 59
- 32 Johnson, Samuel, in: Fojut/Pringle/Walker (see note 12), p. 55
- 33 Thomas (see note 27), p. 155 f.
- 34 Mitchell (see note 6), pp. 70-72
- 35 Fojut/Pringle/Walker (see note 12), p. 65
- 36 Löbbecke (see note 1), p. 224 f.
- 37 Thomas (see note 2), p. 133. The Romans called the people in Scotland as the Picts. The definitions are quite contradictory. Here is interesting that the authors of the 19th Century described the "Pict's houses" as very old. See also: Petrie, George: The Pict's-Houses in the Orkneys. 1863. Petrie deals with this interpretation critically and suggested that, for example, the construction on Holm of Papa Westray was a grave system.
- 38 Burgess (see note 24), p. 27
- 39 Löbbecke (see note 1), p. 27
- 40 Löbbecke (see note 1)
- 41 Pettersson, Johan: Kupolbyggnader med falska Valv. 1954.
- 42 Löbbecke (see note 1), p. 338 f.
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[http://www.ambaile.org.uk/en/item/item\\_maps.jsp?item\\_id=63569](http://www.ambaile.org.uk/en/item/item_maps.jsp?item_id=63569) (Amazon's House)  
[http://commons.wikimedia.org/wiki/File:Maes\\_Howe\\_Cross\\_Sections.gif](http://commons.wikimedia.org/wiki/File:Maes_Howe_Cross_Sections.gif)  
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