

SIX THOUSAND YEARS, AND MORE, OF CORBELLING AGE OF STONE SHELTERS

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SUMMARY

First architectural attempts in the history begun with observation of nature. Corbelling was the second constructional principle after lintel, but without enormous big stones like megaliths.

Stone shelters are architecture of today: age of them is very uncertain, but we can find documented origins from 1559 on stone (Puglia/I) and 1577 on paper documentation (Island of Krk/HR), but history tells us about use of them much before this: about six thousand years.

ARCHITECTURE: FIRST ATTEMPTS IN THE HISTORY: In the history the first architecture attempts begun with observation of nature, understanding the opportunities nature offers, as well as needs for human living.

Materials come from living and unliving nature: wood and stone. Wood was the first shelter - stalks and leaves, reed etc. But: today we have no traces of them, of course. The first use of stone is use of caves: compact soil and soft rock on one side, and on another there are harder stone, hewed and cutted. A lot of time after this, with use of brain, constructions are settled together with small parts of rock, with stones.

The second step was in using them and constructing alike objects with attainable materials.

CONSTRUCTIONAL PRINCIPLE: CORBELLING: Corbelling was the second constructional principle after use of lintel: but without enormous big stones (megaliths). While megalithi culture used extremely heavy and big stones both for slopes and for lintels. But the number of such stones was limited, and to build with them was

extraordinary hard work. So: the prime man had to find out another way to build his home with more suitable materials. And - he used another material, and for working on he used the tools, his hands and at first the brain. Heavy constructions: megalithi used a lot of material and just a little brains. There it was very hard to work and very little to think.

Corbelling is another case: little, strictly selected stones need a lot of thinking (brain, knowledge, experience) and pretentious, exact work, but it is not very hard work at all.

PRINCIPLE IN TIME: Constructional principle went from corbelling, chisel technique, corbelling again, dome, and compound techniques and dome. The oldest found constructions were in the caves, they repeat older constructions. Merely all the caves repeated the older constructions and other materials. It is the proof those constructions existed before caves themselves. In Sardegna, there is in domus de janas wooden lintel with canvas for the ceiling - but in stone. Hypogeum in Malta uses circular ground plane, but with corbelling in cross section. But the corbelling is in use as a principle only, showing cross section itself, but not the pieces of construction.

Table 1: **SOME CORBELLED CONSTRUCTIONS AND THEIR ORIGINS**

dated back to *	building *	location *	literature *
4850 BC	Circular settlements	Skorba, MALTA	T/138
4250	Menhir, dolmen, tumulus	Meghaliti, Carnac FRANCE	B/105
3800	Tombs	New Grange, Knowth, IRELAND	Tw/36
3600	Temples	Hagar Qim, MALTA	T/100
3500	HYPOGEUM	Hal Saffieni, MALTA	T/67
3100	Temples	Tarxien, MALTA	T/70
3100	Temples	Mnajdra, MALTA	T/100
3000	Temples	GGantia, MALTA	F
2650	Stepped pyramid	Saqara, EGYPT	L/83
2500	Pyramid	Giza, EGYPT	L/91
2000	Tomb	Navete de Tudons, Menorca SPAIN	H/49
1500	Information fortifications	Nuraghi, Sardegna ITALY	A/311
1300	Sacred well	Pozzo Sacro, S Anastasia, Sardegna I	A/146
1200	Treasury	Atreus treasury, Mikene GREECE	F/109
800	Civil architecture, pig stalls	Near Nuraghe S Cristina, Sardegna I	A/197
<u>500 BC</u>	<u>Tombs, tumulus</u>	<u>Populonia, Etrusci, ITALY</u>	<u>F/232</u>
200 AD	Sacral compositions	Maya culture, Copan, HONDURAS	Hoh/235
8 century	Sacral architecture	Gallarus oratory, Dingle IRELAND	F/406
8th century	Shelters: crot/scele	Graubuenden SWITZERLAND	W
11 century	Monk's house	Columba's house, IRELAND	Juv
	Suplja gromila	Sibenik CROATIA	Juv
1559	trullo	Marziolla, Puglia ITALY	A/402
1577	komarda, katastik	Island of Krk, CROATIA	Hor
1609	barraca	Catalunya SPAIN	Mes/35
1620	capitelle, cadastre	South of FRANCE	Las
1653	cabane	Provence FRANCE	Las/8
1660	cabane	Provence FRANCE	Fan/28
1990	pont de bestiar	Ciudadela, Menorca E	Juv
1995	cabane	St Margarido, Nimes, FRANCE	Juv

VISUAL ACCENTS: Shape in corbelled construction inward and outward is not the same: inside there is construction, outside is frame only, and very rare we can find both in

the same shape. The ground plan can be circular or rectangular, even rectangular outside and circular inside. But in height the horizontal cross section becomes circle or close to the circle: after one meter it is almost circle in all the constructions. Line of the wall inside has vertical wall at the beginning, then slopes it towards the top, and near the top there is very often the final cone to the horizontal plate.

There it is very rare vertical stone to wedge the top.

Outside we have several solutions: technically there are frame and counterweight, somewhere is the roof construction separated: by the shape and material.

CONSTRUCTIONS IN USE Use of constructions was in history close to gods, to kings and to dead. Today is more practical: for everyday's use. There are elements to store and to shelter.

Objects to store the food are smaller, for the tools are bigger, and to shelter depends on what they have to protect: people or living stock. And animals are different: from the sheeps to big bulls there is a big difference.

Another use depends on needs: in Puglia there is under trullo very often cistern, or it is used as vine cellar in the ground plan and in the cistern bellow. In Switzerland you can find crots, used as objects for chilling the milk, with very pretentious use of a small creek with cold Alpine water, running through it. On another hand shelters are in use for just normal living of shepherds: it is temporary use over the summer on Sardegna or on Corsica.

AGE OF STONE SHELTERS:

Stone shelters today: age is very uncertain, but we can find shelters with documented origin from 1559, but historians tell us about use of them some hundreds years before this. Enrico Degano found in Puglia shelter with the year 1559 on the lintel (Amb), in Croatia refers B Horvatic, in Catalunya there is barraca from 1609 (Mes/35), in France Chr. Lassure mentions 1653 (Lass/8), there it is found the cabane from 1660, and in Bau Majour 1711 (Fan/28).

The newest shelter I found above Margarido near Nimes in departement Gard, France. On the lintel there is year 1995 (documented in May 1998, Juv). It seems to be a weekend house: with the benches on both sides and the cistern, available from inside as well as from outside. The roof has a saddle for collecting water into the cistern.

Some authors say the corbelling principle in shelters are in use from Neolithic times in Dalmatia /Croatia (J Kale), and M Fsadni from Malta dated it back to some thousands years BC (Mikel Fsadni, personal correspondence to the author 1999).

There are interesting coincidences between Menorca's navete, Irish Gallarus oratory, Provençal cabane (from Gordes), and Suplja gromila near Sibenik in Croatia: construction is the same, but there are some thousands years between one and another.

Back to 2nd or 3rd century AD goes the false cupola of Maya culture (Hohmann), in Sardegna we have Nuraghic culture from 15 hundred years BC, with nuraghi (sing. nuraghe), some laic architecture as pig stalls and - especially interesting pozzi sacri (sacred wells). The last one is composition of construction (corbelling), use (water), and sacral (with a taste of wonder, by using knowledge of physical phenomena of universe).

Pictures open some questions:

***1 How many thousands years before it were the origins from?**

Figure 1: Hypogeum, Hal Saflieni, MALTA (3500 to 2000 BC)



The underground temple in Malta, some ten meters under niveau: hewed in soft stone. It shows the previous existence, knowledge and manner of work. Corbelling, cutted to the stone, is not construction. It shows bigger constructions: corbelling.

***2 Had they been made the same way like corbelled constructions thousands years later? Mnajdra and Hagar Qim, Malta (3600 to 3000 BC)**

On Malta and Gozo there are the temples, from one cell to six and more. Cross section shows megaliths, big stones, corbelled. After vertical slabs we can see two and more niveaus of corbelled stones. Is it proof for existence of covered temples.

***3 Did USE (for dead bodies) changed circular ground-plan into rectangle?**

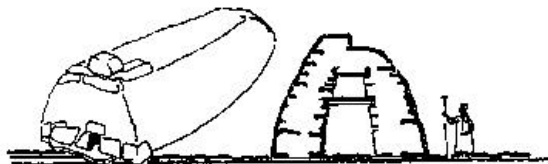


Figure 3: Naveta, 'up-turned boat', Menorca, Balears, SPAIN (2000 BC)

About 4000 years old tombs on Menorca are so called 'up-turned boat': construction with corbelling in cross section. The outer shape shows interior space - the outer and inner shape is the same (like later in cabane from Gordes,F).

***4 Do we know such miracles today?**

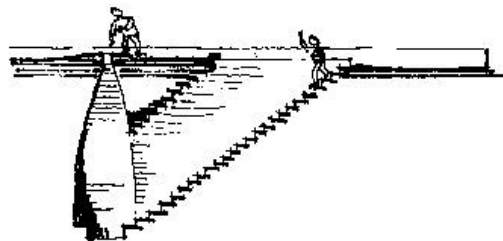


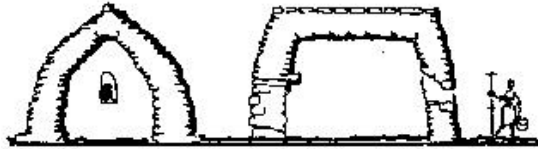
Figure 4: Pozzo sacro / Sant 'Anastasia, Sardara, Sardegna, ITALY (1200 BC)

Construction of sacred well on Sardegna are consisted of circular ground plan with corbelled ceiling towards the top: there we can find the hole. The hole is at Sant'Anastasia about 60 cm in diameter, on some other wells there are wider.

Entrance has staircase (negative of corbelling), covered by typical corbelled ceiling. The best professional work of sacred wells is at Santa Cristina (8th century BC, a perfect cutting stone work).

***5 Extreme quality of craftman's work: do we have it today? (with all the help of all technics and technologies: it is hard to say 'yes')**

Figure 5: Gallarus oratory, Dingle Peninsula, IRELAND (800 AD)



Like navete on Menorca is Gallarus oratory long building with corbelled construction. The same shape of outer and inner construction we can find also at cabanes near Gordes F. The cutting work is the same perfect like in sacred well at Santa Cristina on Sardegna.

***6 Inner shape is the oint.**

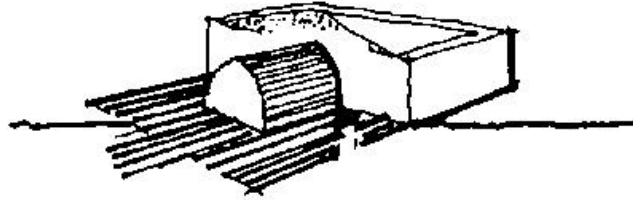


Figure 6: Suplja gromila, Sibenik, CROATIA (? AD)

It is typical corbelling construction inside: outside is a heap of stones without any known shape, theoretically in the fence. By literature it served for living (Ivekovic), but the perfect cutting work of the brilliant geometrical composition testify for something more important than living building. Age seems to be the same like Gallarus oratory (Fletcher: 8th AD). But: there is a lot of work for affirms this statement.

***7 Outer house, inner shelter only.**

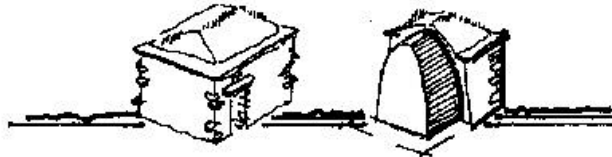


Figure 7: Pagliaddiu, Corse FRANCE

Very close to long cabane in Provence is construction of pagliaddiu on the Northern part of Corse. But: there is essential difference. The shape of inner part is absolutely different of its outer facades. The view to construction with vertical walls, with sills and with soft inclination of the roof is absolutely different to the corbelled construction in it. And: even inner elements of construction have the same principle, corbelling (hearth with connections to the chimney, which is from outer side invisible, covered with a flat stone).

***8 Outer shape as well as the inner one: sincerity of construction.**

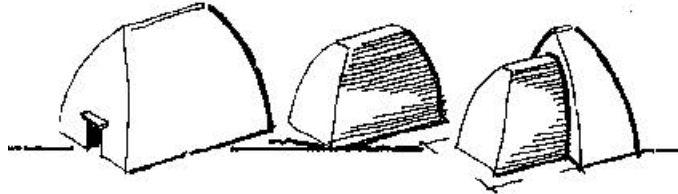


Figure 8: Cabane, long ground-plan, Gordes, Provence FRANCE

Cabanes in South of France have not the same composition, shape or dimensions. The only common thing is construction: corbelling. The long ground plan is very useful, they used it in height to. This is close to navetes as well as to Gallarus oratory. In different times, of course.

***9 Stone shelters in Europe**

Shelters in stone have no common groundplans: but there exist circular and rectangular outer shape of ground plans with the same or with circular shape of inner parts. Shelters, not older than two or three hundred years, served for practical purposes: storing, sheltering, living. They can be big for one bottle of wine, but for crowd of 40 horses too. Shelters appear mostly near Mediterranean, but can be found also in Ireland, Scotland, England and Wells.

*10 And with this example is out of question: where is the end of stone shelters? How many thousands years before the first realization were the origins from?

Margarido / St Margueritte near Nimes (FRANCE), 1995

The newest stone shelter I have found: it serves as weekend house at the vineyard on the hills above plane of river Rhone, not far from Nimes. It has perfect corbelled construction, and on the back side the roof is transformed to a saddle for collecting water to the cistern below construction. The year at the entrance appears as 1995.

Corbelled constructions: how they had been made in the same way thousands years later?

Did use changed circular ground-plan into rectangle?

Do we know (and do we use) miracles like in Pozzo sacro Sant'Anastasia today?

Extreme quality of craftman's work of sacred wells: do we know it today? (with all the help of all technics and technologies: it is hard to say 'yes')

Inner shape is the point: it is use. Outer shape shows the house, inner is shelter only.

If the outer shape is the same as inner one: it is sincerity of construction.

Just one logical question: can shelter be even more usable? Where is the end of stone shelters?

And answer: After six thousands years, yesterday life of shelter obviously has not reached its end. And today?

Conclusions: We can be sure the origins of corbelling are at least six thousand years old (before Hypogeum in Malta, 3000 BC). Corbelling itself is in use until the full cupola or dome in Pantheon, Rome (2nd century BC). We can find elements of corbelling in 8th century in Gallarus Oratory, Ireland, then three centuries after it in Columba's house, also in Ireland.

The next step is shepherd architecture: shelters from the 15th century until today.

And: constructions from Menorca, Balears (1990) to Nimes, France (1995) are the proof for continuous use of shelters and the thousands years of history throughout Europe until nowadays.

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