

Buildings from natural stones, erected by the Inca: secrets and technologies – a question of religion and faith?

One question: Is there any more appropriate time than the Christmas period for to verify stories and ask for their origin in religion and faith, for to look at these stories, maybe from another point of view? The author asks us these questions for some reasons in this month.



1 Buildings and temples have been erected in Machu Picchu, as you can see here in the case of the "Sun Temple", on stones created by Mother Nature.

The Empire of the Inca crashed in the year 1533 with the murder of the Emperor Atahualpa by the Spanish conquerors who wanted to feather their nest at the expenses of the Inca with the existing treasures and to force the people to accept the Christian religion. Until that time, the glory of the Inca Empire lasted for 100 years only.

The Andean city of Qosqo, situated at an altitude of 3 400 meters, the capital of a huge Inca Empire in South America, has been renamed by the Spaniards into Cuzco. A huge number of unique buildings from natural

stones have been destroyed in order to erect new Christian buildings. In many cases, the churches have been erected over demolished Inca buildings which highlight the big contrast between the unique technologies of the construction of walls without gaps of the Inca people and the walls with wide mortar joints constructed above these Inca walls by the Christians, which have a disdainful effect in comparison with the Inca buildings. This catches the eyes of the beholder in particular in the case of the ancient Sun Temple of the Inca "Koricancha" in Cuzco; the church of Santo Domingo has been erected on the foundations of this temple.



2 Sun Temple of the Inca Koricancha in Cuzco which can be recognized by the original darker natural stones that you can see in the centre of the picture. On the foundations of this temple, the church of Santo Domingo was erected.

The life and the buildings of the Inca really attract all sorts of speculations as there are no written documents existing. As a consequence, one can affirm and attribute everything. There are particularly many contradictory interpretations with regards to the unique skills of the people in the handling of natural stones. In the present article, the author would like to go shortly into some of these particularly persistent interpretations.

Analyzing the way to proceed in the community of Machu Picchu, one will understand more easily also the construction of the walls of Sacsayhuaman on the outskirts of the former Inca capital of Cuzco without involving mystical or extraterrestrial aspects.

Walls out of dimension stones

The Inca have been masters regarding the construction of walls out of massive natural stones. On the one hand, simple walls from broad stones have been constructed; on the other hand there are wall constructions in which there aren't even two equal stones. However, all these constructions have in common the execution "without joints". The stones are so close to one another that in many cases it is not possible to even put a knife between two stones. The most famous stone is the block with the 12 edges in the foundations of the current palace of the archbishop and the former temple of the Inca Roca in Cuzco. It would be really desirable that the stone masons of our times would show at least some of these skills of the Inca as regards natural stones wall constructions.



3 The most famous stone of all is certainly the stone with the 12 edges in the foundations of the former palace of the Inca Roca and of the current palace of the archbishop in Cuzco.

With regards to the processing of the natural stones, the attempts of explanation go even until the help of alien life forms or the use of "stone softeners". Even professional geologists don't shy away from adventurous theories. One of these theories (Watkins, 1990) says that it would be pos-

sible to carry out some sort of flame cutting procedure with bundled sunbeams by the help of golden parabolic mirrors.

Independently from the question whether the stones let themselves impress by that, it has been unfortunately forgotten that not only quartziferous magmatic stones have been used but limestone for the most giant blocks in Sacsayhuaman. A flame cutting procedure, the basis of which is the sudden transformation of the quartziferous minerals into their high temperature modification at a temperature of 573°C so that these minerals and the adjacent stones burst as a consequence, is not very effective in case of limestone. Also the affirmation that due to its geographical situation in the South of the Equator, there is always sufficient sunlight available in Peru, tells that the author of this theory doesn't know the location very well.

According to Protzen (1986), the excavation and the treatment of the stones by manual treatment can be easily explained and carried out. Also Andrea (2002, Internet) has concrete and clear ideas as to how the stones can be treated to reach precise dimensions. Andrea has very well observed that the excellent precision of adjustment is often given on the front side only. This can be seen also when you look at the destroyed wall cuts in Machu Picchu.



4 Different walls: the lower part in Inca style, the upper part in the style of the Spanish conquerors. Which one has the better optic effect?

These dimension stone walls would not correspond to our technical regulations as in accordance with the Standard DIN 18332 – Works with dimension stones – the joints of massive pieces, broad stones and faced walls have to have a width of at least 10 mm. If one looks at the state of maintenance of dimension stone walls which have been constructed in accordance with this Standard after some years, and if one compares them to the walls without joints of the Inca, which are approximately 500 years old, then one can't find really many arguments against natural stone walls without joints. Even temperature oscillations are much higher in the Andean regions than in our latitudes and can't serve at all as an argument for a caulking of natural stone walls with wide joints. Other aspects are the optical effect and the resistance against mechanical impacts.

Machu Picchu: Geographic "Patterns" have been used

The buildings of Machu Picchu are situated about 130 km north of Cuzco, at the slopes of the Machu Picchu (old top) mountain at a height of 2 350 m. The outcropping stone there is a light granodiorite. Exactly here it cannot be failed to notice that the Inca have been masters as far as the use of the existing geological conditions are concerned. Parts of massive walls, for instance of the so-called main temple, have been worked out of outcropping stones. Staircases have been incorporated into naturally inclined cleavage. Also for cavities, areas of inclined cleavage have been used.

There is a vast variety of interpretations and suspects about the sense of this settlement. Should it have been an astronomical centre, the Inca would have certainly used as well the existing cleavage which goes almost exactly from north to south.

The enigma of Sacsayhuaman

The biggest enigmas, however, are attributed to the transportation of the particularly giant stones as they have been used especially in Sacsayhuaman. In the northwest of Cuzco there are three walls from giant massive stones which rise one above the other. The literature says with regard to this that Stonehenge looks – in comparison to Sacsayhuaman – like the works of a pack of amateurs.

The city of Cuzco has been established by the Inca in the form of a puma, and Sacsayhuaman has been forming the head of this puma. For this reason, suspicions that the establishment has been a ceremonial centre sound much clearer and more reasonable than the suspicion that it could have been a fortress. The idea of the ceremonial centre would be confirmed also by the Inca throne which is situated immediately opposite the walls in northern direction and cleaned carefully in diorite.

In many descriptions of the location, false descriptions of the stones are adopted repeatedly. You see, these are not granites, andesites, diorites or the like, but its limestone of the Sangarara formation of the upper cretaceous system. Even in the geological map of Cuzco, the mapping of the outcropping stones is not correct. This might be the reason why the limestone is often described as a magmatic stone. Diorite, outcropping in the basal part of the limestone, shows only in the zone of the Inca throne out of the limestone – almost like an island.

The city of Sacsayhuaman has been destroyed by the Spaniards and partly dismantled. The stones have been used in parts for the construction of the cathedral and of other churches in Cuzco in order to build up the city in the “Christian” sense.

With regard to the origin of the wall stones, there is always the question as to how the Inca achieved to carry “those giant blocks with their hands only ... to the top of the mountain” (Stingl 1982). However, those who analyze how in Machu Picchu all the outcropping stones have been involved in the buildings, recognizes parallel items. The walls of Sacsayhuaman have been erected in a zone with outcropping limestone. From and on this massive limestone, they have erected also the walls. The same limestone is outcropping also at a distance of approximately 1 km to the east near the Inca location of Quenqo. A cave and the most different forms have been incorporated there into the outcropping stones.

At a distance of approximately 3 km towards NNW of Sacsayhuaman there have been used and incorporated natural corridors with the same existing outcropping limestone. On the outskirts of this region, also called Zone X, they have not only erected walls from natural stones in the proven way, but they have also carefully cleaned a pattern of joints, so that the beholder has the impression of seeing a work of natural stones.

¿Could it be that the place of worship has been a quarry?

In the adjacent regions, the outcropping limestone has always been processed and used nearby the respective location. In most cases, it is not taken into consideration that the locality of Sacsayhuaman itself must have been actually a quarry. The weight indications for the stones spoiled in building fluctuate between 150 and 300 t. However, at the end this is not important if the stones have been virtually excavated, processed and spoiled in building. If a block has the dimensions of 5 m x 5 m x 2,5 m, its overall weight should reach approximately 160 t and not 300 t as it is often affirmed. Furthermore, Protzen wonders why the stones don't show any drag tracks with the long-distance transportation over 35 km, assumed by him. At the latest then, one should have asked the question whether the stones have been dragged or transported in any way at all.

One should rather ask the question in how far some stones didn't have to be transported at all or only over a few meters respectively. Of course, it remains an enormous work in this case as well to have carried out the construction of walls with the aforementioned dimensions of the blocks almost without joints.



5 City of Sacsayhuaman, seen from the east (photos of the author)

The photo above shows an overview over the region of Sacsayhuaman from the east. At the left-hand side there is outcropping limestone. From the distance, the image, intensified by the walls, of a possible slope excavation becomes clear. Shortly before the ascension of the diorite hill and at the right edge of the photo, there is outcropping limestone again, the latter at the same altitude level as at the left edge of the photo. The here existing and clearly visible mass deficit can be explained by the excavation of limestone, whereby this zone might have been backfilled in parts by the Spaniards.

If the stones had their origin at other places, the Inca, or the sometimes speculated extraterrestrial beings, could easily have done the effort to put huge blocks above; they would have had to overcome the very steep mountain from Cuzco to Sacsayhuaman anyway. However, if one looks at the different rows of natural stones, it catches one's eyes that the size of the blocks diminishes towards the top.

One cause for speculations is always again the limestone situated immediately at the northern edge of the Inca throne in which a multitude of edges, steps, caves, etc., have been carefully cleaned. Unfortunately, the major part of this complex has been destroyed in the meantime.

Relicts of so-called intended ends of a wall which look like an inverse staircase, have lead again to the wildest speculations of UFO researchers who affirm that these zones have to be zones turned upside down and have to be created virtually by nuclear or extraterrestrial forces. However, I would like to comment first of all that stones which have been exposed to the forces of a nuclear power should certainly show the respective impacts and fissures; this is not the case in this region.

It is rather that one wonders if a place which looks like a camp for exercise, couldn't have been a camp for exercise in reality. In any event, the

numerous stonemasons must have learnt and proved their knowledge and skills somewhere – provided these skills didn't fall from heaven either. Now, prior to going away again immediately towards the extraterrestrial, further observations in the immediate adjacent regions are very helpful.



6 Sacsayhuaman is famous for three walls from giant stones, erected one above the other; the dimensions of the blocks diminish with the height.

It should make one think that immediately adjacent to the place, there are real steps of staircases in an accessible position; so how can it happen that some of the "staircases" are upside down? If one continues observing the works which still exist, it becomes very clear that the caves have been established in an angular form. Curves, with the exception of small curves on wall stones, do practically not exist. The Inca have been virtually clumsy as far as the production of curves goes; this is proven also by the formation near Quenqo which is said to be a solar clock. In the case of straight surfaces, they demonstrate, however, enormous skills. Insofar we can say that what the UFO researchers interpreted as upside down staircases are rather caves established in an angular form. The Inca have just been inclined to straight surfaces and didn't produce round vaults. Furthermore, it is well known that the Spaniards destroyed Cuzco. Sacsayhuaman and Quenqo as far as they could. All what one can still see are just remains.

Summary

If one studies the unique performances of the Inca and the numerous interpretations of these performances, one could easily get the impression that the extinct Empire virtually “seduces” to not really take into consideration obvious solutions but to develop ideas being as far as possible away. What one thinks of these ideas without a serious basis, is – at the end of things – also a question of religion and faith.

However, there is one thing where “questions of faith” are confronted with one another – this is the unique technology of the construction of walls almost without joints. The Empire of the Inca and their technology have been destroyed by the fanatic representatives of the Christian religion which cost lots of human lives. However, their walls, massive and stable, have been able to resist the complete destruction. This gives us the possibility of comparison as these Inca buildings have been followed, according to the opinion of the author, by optically less attractive and more instable buildings of the Christians.

We can only hope now that fanatic religious warriors don’t raze to the ground again the buildings of the enemies which they have chosen themselves to be their enemies as this happened with the stone monuments of the Bamiyan Buddha statues in Afghanistan and continued with the Twin towers in Manhattan. Then, the question of faith will give the opportunity also to the subsequent generations to assess whose values and buildings are the more resistant ones.

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