



# Sacred well Sant'Anastasia, Sardinia (Pozzo Sacro Sant'Anastasia, Sardegna)

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## Abstract

Archeoastronomy as the science of using the Universe, planets, sun or moon - their positions and relations in space, with visual traces on Earth, is important also in architecture.

Some of waterwells were constructed by means of a construction system called corbelling, in which horizontal layers – in a dry stone walling system - overlap each other. It can be in a longitudinal shape (in staircases) or in circular form (in central rooms, called a false dome).

Sant'Anastasia 'pozzo sacro' is a circular stone construction in corbelling, with a staircase covered by corbelled elements. Its orientation is north-south. Citizens of Sardara use its water by means of an electrical pump but the original level of the water would have been to the first stair, about 75 centimetres. Archaeologists date the well in Sardara to the 12th century BC, to the Nuraghic culture (1700 BC to 238 BC).

Twice a year, the sun's rays pass through the staircase to the water level and are reflected back again through the circular opening in the top of the corbelled false dome. At the same time, the sun enters through the top opening of the chamber into the dome, touching the water surface. The angle of the construction means that it happens twice a year, on April 21 and at the end of August. The sun merging with the water and a sunbeam simultaneously rising out of the ground certainly provide a miracle.

There are five pieces of evidence of this: physical phenomena, the naming of the medieval church after the pre-Christian well, the name originates from 'anastasos' or 'ressurrection', miracle occurs twice a year, and it happens every year on the saint's name day.

Keywords: stone, dry stone walling system, corbelling, well, sun, miracle, Sardinia

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### Fig. 9

Corbelled chamber: upstairs the top hole, in the centre stairs: the sun is coming from both entrances, with different effects

*next page*

### Fig. 4

Sacred well outside: on the right side staircase, on the left the hole as the top of the corbelled chamber

## Introduction

Architectural theory uses archaeoastronomy as important part: the use of the Universe, planets, sun or the moon - their positions and relations in space, with visual traces on Earth.

All the planets are theoretically spheres, and the rotating elements of the









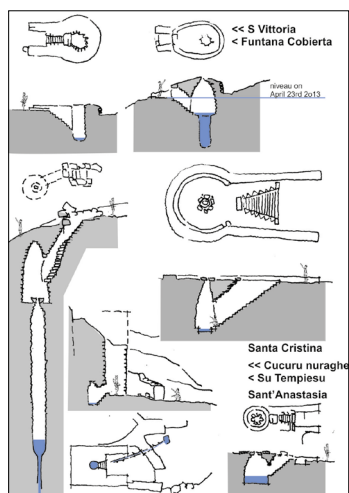


Fig. 1  
Sacred wells in  
Sardinia: Santa  
Vittoria Serri as an  
open well; Funtana  
Cobierta (Italian:  
Fontana Coperta)  
near Ballao as a  
covered construction;  
Cucuru Nuraxi near  
Settimo San Pietro;  
Santa Cristina from  
Paulilatino; the holy  
spring Su Tempiesu,  
Orune and, finally,  
Sant'Anastasia in  
Sardara. Longitudinal  
sections and  
groundplans as viewed  
from above

Universe cast a shadow on Earth. The shadow constantly changes but appears twice a year in the same effect: once at the midsummer solstice and once at midwinter.

The oldest architectural structures are menhirs, rows of stones, circles, dolmens and other objects, which use orientation, exposed elements, openings and marked places.

While lines of stones can show, for instance, the same position of the sun over the year (Bailloud 1995: 3), a tumulus uses light, cast onto a special stone plate (Newgrange in Ireland; Peet 1912: f8). Rows of stones, composed into rectangles, can tell us more, for instance the shortest or longest day of the year. Such compositions can be found in Carnac, Brittany (Bailloud 1995: 65).

The most interesting constructions are circles, where the shadow of the sun moves gradually from one stone to another. The most important monument with this effect is Stonehenge in England, the purpose of which has not been established (Peet 1912: f1).

The shadow effect is not used only in prehistoric architecture. The architect of Chartres Cathedral designed certain windows to throw light onto a particular place on a particular date: the architect's birthday. Le Corbusier used certain numbers, derived from the golden section, for simplification of the work. Some of his projects (Notre Dame du Haut in Ronchamps, for instance) have the same effect as at Chartres Cathedral.

### Problematics

Water is crucial for our lives.

Running water is needed for all human beings. Saltwater is not usable for drinking; it can only be used only for other things. It can be used for religious purposes - such as in Cucuru Nuraxi, Sardinia. Other wells, even religious ones, use more or less fresh water; rain water collected from the roofs and stored in underground cisterns is used.

Many wells can be found on the island of Sardinia and a lot of them are 'sacred', in use for thousands of years.

Water is very important, used even in pre-historical monuments and also used today. Sant'Anastasia, the well in Sardara, which is an important historical monument, is used for the everyday water supply of the village.

The wells in Sardinia date from Nuraghic times (Lilliu 2006: from 1700 BC to 238 BC) but were used in the pre-Christian period, at the time of Classical Rome, as well as in medieval times.

The differentiation into underground wells and horizontal fountains is interesting. Numerous wells can be found in the literature: of 63 objects only 12 are sacred springs (fonti sacri), the other 51 are sacred wells (pozzi sacri).

### Corbelling

Some of those objects are constructed by means of a system called corbelling, in which horizontal layers – in a dry stone walling system - overlap each other. In the wells of Sardinia, it is constructed in a longitudinal shape



(for staircases) or in circular form (in the central room, called a false dome). Corbelling, as the construction of space, can only be used with intelligence. Corbelling is a construction principle of composing horizontal layers of either dressed or undressed stones, which overlap each other to the top of the construction. In groundplan, corners and the problems associated with them are avoided with a circle (Juvanec 2013: 62). Corbelling constructs a false dome.

### Orientation of wells

Wells are oriented in all directions from west, through south to east. This is very important: some of them are oriented toward the rays of the sun or moon.

The orientation shows the use of some physical phenomena of sight, mostly with the effect of a reflection from the water surface onto the walls. Some rare and unusual reflections have been understood as miracles.

The orientation has to be logical: neveras or icehouses need shade and coolness at the entrances; wells need light on the staircases.

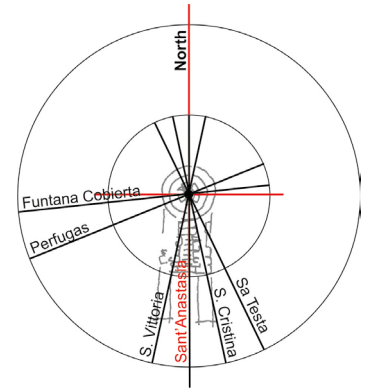
Wells are fairly deep, and usable sunbeams draw shadows onto the walls, stairs and even onto the water surface - if and when they reach it.

While the well of Sant'Anastasia is oriented strictly towards the north (from the entrance, though the stairs, to the top opening over the corbelled central room), other wells have different orientations.

Orientations found from west, through south to east, are very different.

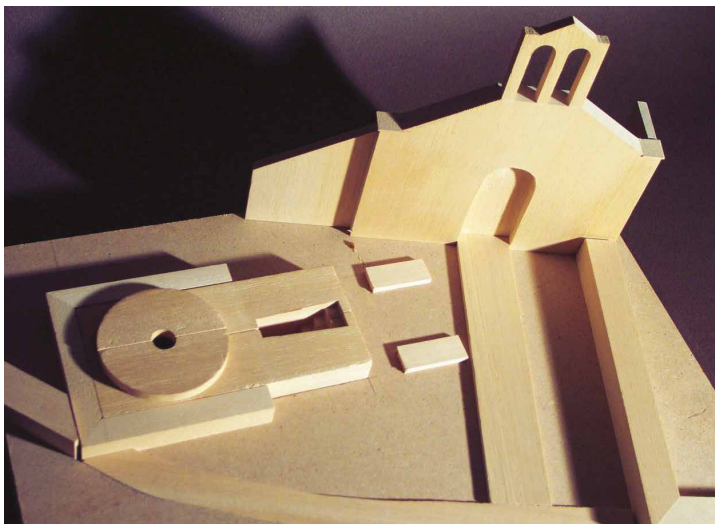
Funtana Cobierta (Italian: Fontana Coperta) and Perfugas are oriented from west to east; Santa Vittoria and Santa Cristina are close to Sant'Anastasia or near to a south - north orientation; Sa Testa is the only well oriented from southeast to northwest.

So no single direction is most important, except south - north at the Sarda-ra sacred well, used for the effect of the sun.



**Fig. 2**  
Orientation of the wells: no two are the same. Orientation from the staircase toward the central cell (the hole on the surface)

**Fig. 3**  
A view to the complex: sacred well from 12th Century BC with the church



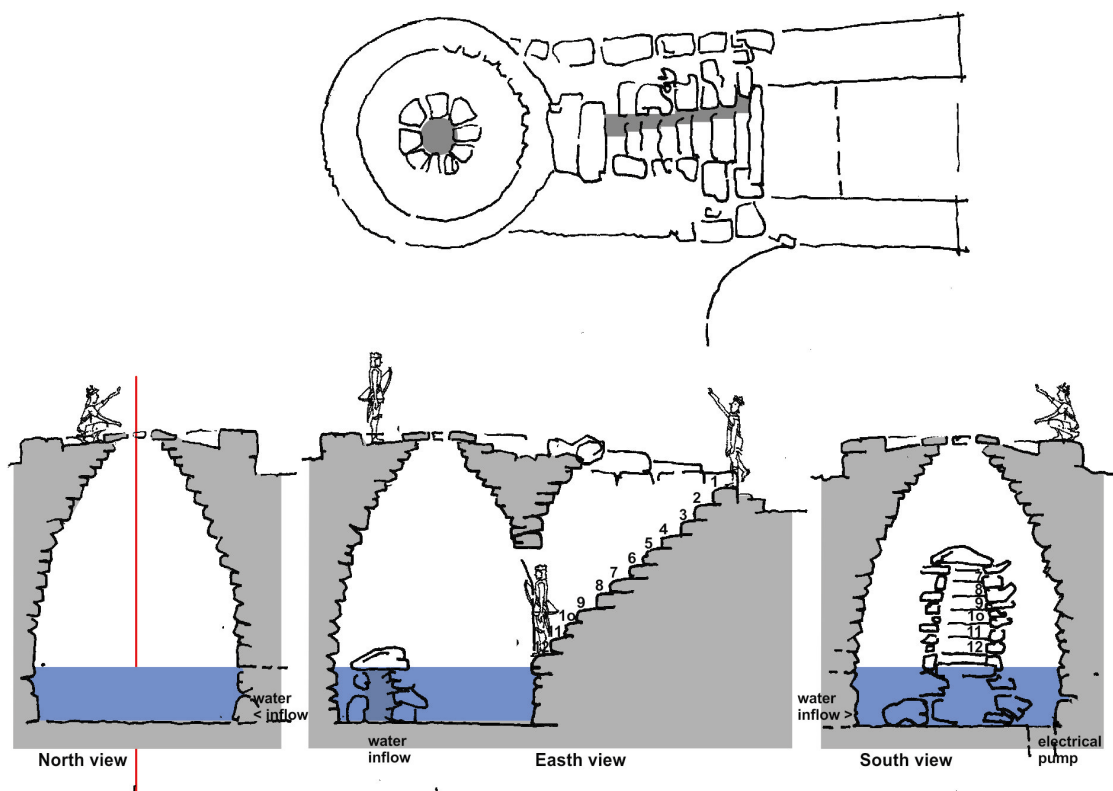
## Wells and springs in Sardinia

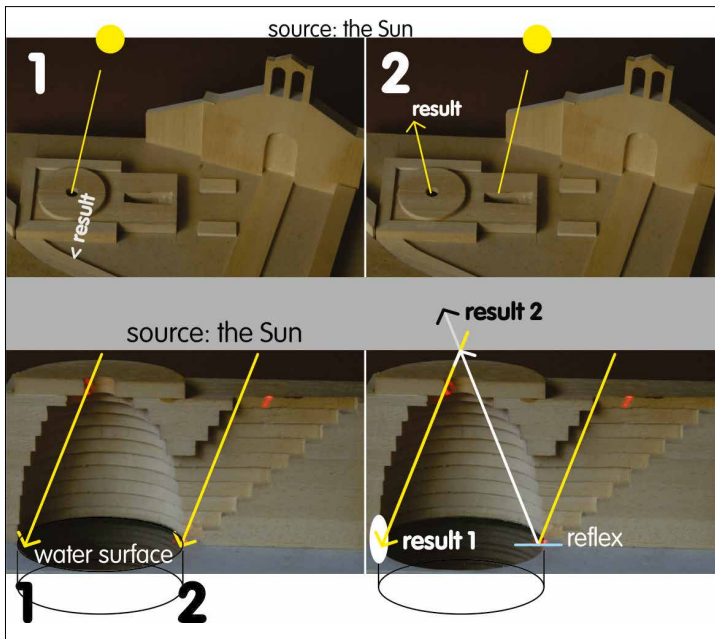
The composing elements of wells are: entrance as vestibule, staircase down to the water, main cell below the stairs, with an opening onto the upper level. The vestibule is an open space, encircled with a low fence, outlining a funnel in the longitudinal axis. The main chamber is circular, sometimes open and sometimes closed with a corbelled false dome. The stairs are in a single length down to the water level, with partial roofing - in longitudinal corbelling.

Wells are open or closed: with vertical walls in the main cell with an open view to the water, and enclosed wells with a corbelled construction, with a small opening at the top of the construction.

Pozzo sacro or sacred well is an underground well, using fresh water. These wells can be entirely vertical, or built in the dry stone walling system, without any cement or mortar, as a low structure, sometimes covered with turf. Such wells have a staircase down to the water level. The depth of water is from about metre and half (Funtana Cobierta) to more than six metres (Santa Cristina). The main structure is entirely circular, because of the construction: corbelling. The circular shape avoids problems with edges, corners in the groundplan; in cross-section it is a false dome, which enables the hole at the top.

Fonte sacro or sacred spring is a horizontal composition, with running spring water at ground level. While the holiest water in wells is collected en-





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**Fig. 5**  
Groundplan and sections of Sant'Anastasia: on the left the north view, on the right the view to the south, to the staircase

**Fig. 6**  
The sun enters through the entrance and through the top hole of the central cell: the result can be seen from outside both within the composition, on the northern face of the chamber (result 1) and in the hole (result 2)

tirely by hand tools (ladle or barrel), running water from the springs runs into a basin or over the edge into a channel to the people waiting for it.

The difference between a well and a spring is theoretically in the ceremony: while in a well only the priest touches the water (because of lack of space), as a mediator between the holy water and the people (technically the interface between god and the ordinary people), a spring is a widely social object, to which all individuals come for water.

The latter principle is used in the 'salla dei reunioni' (the common hall in a Nuraghe village), in which the socialization of Nuraghi culture reaches its peak - with equality in the space as well as in reality. It is a circular room with a bench around the wall: all are equal, in the same position and face each other.

The story is the same today: religious and civil government did not like too much socialization. So there were many sacred wells and only a few holy springs.

The most important or the most typical wells and springs are as follows:

### ***Sacred wells (pozzi sacri),***

some of them, from north to south of Sardinia

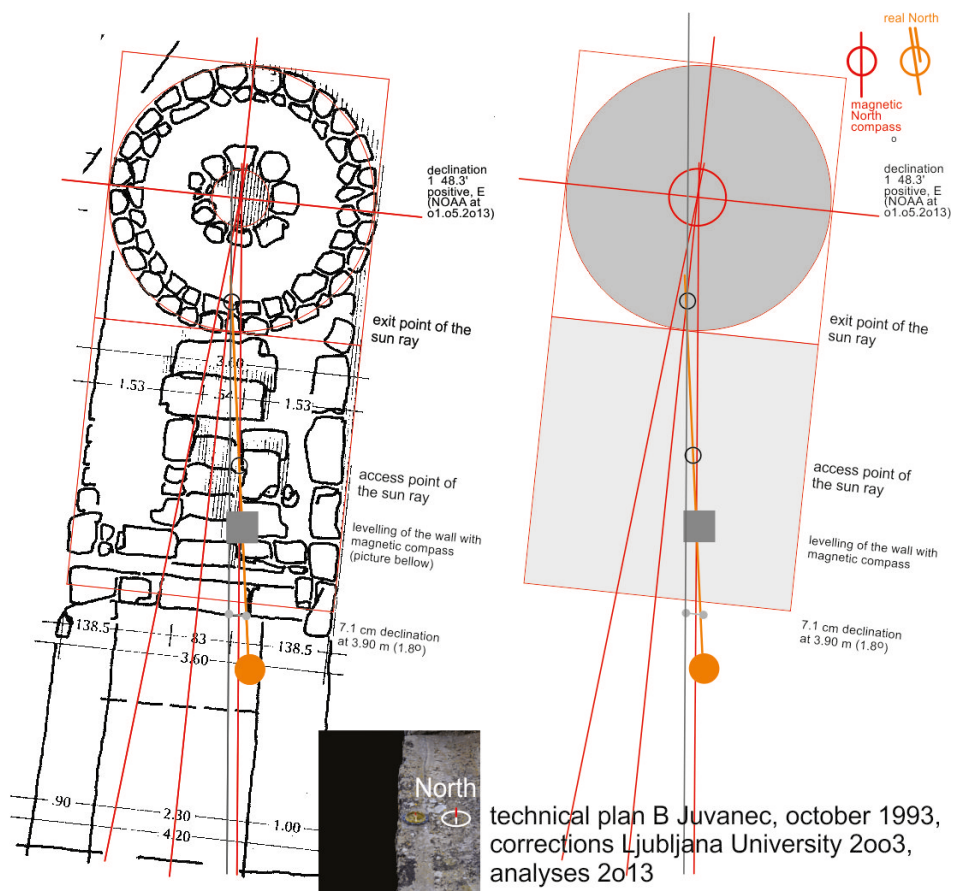
#### ***Sa Testa, Olbia***

Open well with clearly designed surroundings: outer fence, groundplan can be seen over a low stone wall, staircase and open circular well.

#### ***Pozzo sacro di Predio Canopoli, Perfugas***

Underground well with open central cell with vertical walls, well executed stonemasonry work. Under reconstruction, but can be seen from the street.





### *Santa Cristina, Paulilatino*

Perfect construction with elegant stonemasonry: the fence, accented groundplan with exact stone hole at the top of the central room; the staircase has been reconstructed but in keeping with the corbelling above it. The most important aspect is the design of the stones of the wall, which are inclined inwards - for collecting water. Archaeologists say it is from the 8<sup>th</sup> century BC (Lilliu 2006: 80). Some scientists believe that this well is closely connected to the moon (Cavedon 1992).

### *San Salvatore, Cabras*

The well itself lies beneath sea level. The underground well has been rebuilt; its location now is in the cellar below the church (Anati 1985: 159). The underground body of the well is reflected in the hole in the ceiling - outside it is on the floor of the church. However, the church is smaller than the original Nuraghic monument. This well deserves professional reconstruction of the upper object, as well as a technical explanation for visitors.

### *Sant'Anastasia, Sardara*

The sacred well lies in the middle of a small city, at the entrance to the church.

ch. External elements are the staircase and the hole, encircled by a low stone wall, showing its groundplan. The inner room is corbelled, 4.6 metres high (Juvanec 2010: 36). There is still water in the well, which is used by the village people. It is described in the literature as a monument from the 12<sup>th</sup> century BC (Contu 1981: 128; Anati 1985: 146).

#### *Funtana Cobiarta, Ballao*

This interesting well is located in the hills, far from any settlement or monument. It is built in oval form, one metre high, with a staircase leading to the water. In April 2013, the top of the corbelled construction had collapsed and the level of water was up to the top of the entrance staircase.

#### *Santa Vittoria, Serri*

The well is located at an archaeological site (Anati 1985: 230) with other monuments from the 9<sup>th</sup> century BC (Lilliu 2006: 66). It has an open central cell, well-preserved stairs, with good stonemasonry work.

#### *Cucuru Nuraxi, Settimo San Pietro*

This is the most interesting well technically. It is located near a nuragic settlement, on top of a hill, and is more than 30 metres deep. There is believed to be salt water at the bottom.

The central room is corbelled, as well as the top of the vertical shaft. In the middle of the central cell, over the top of the shaft, there is a sacrificial stone as an altar: circular, with a hole connecting the upper, public room with the water below.

The position of the well and the unusable liquid testifies to the religious purpose. The well is certainly a monument.

### **Sacred springs (fonti sacri)**

#### *Su Tempiesu, Orune*

The sacred spring has water in a basin, covered by a corbelled construction on the interior; the exterior is a real building or 'house': with walls, sloped stone roof and fine elaborated details. Water flows from the sacred basin into a ditch in the sacred space encircled by a wall - evidently for clergymen only. Outside can be found another basin for the masses, for ordinary people.

There is an interesting similarity to some other wells in history: in Egypt, for instance, and Garlo in Bulgaria (Contu 1981: 129), dated to the 14<sup>th</sup> to 12<sup>th</sup> century BC.

### **Sant'Anastasia, description**

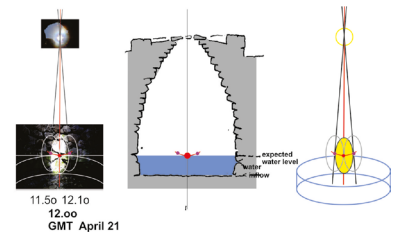
Sant'Anastasia 'pozzo sacro' or sacred well is a circular stone construction in corbelling, with a staircase covered by corbelled elements. Its orientation is south to north. The citizens of Sardara use its water by means of an electrical pump but the original level of the water would have been to the first stair, about 75 centimetres. Archaeologists date the well in Sardara to the 12th century BC (Contu 1999: 128; Lilliu 2006: 69), into the Nuragic culture (1700 BC to 238 BC). It is the oldest well in Sardinia.

Technically, the well is composed by two cubes: the surrounding on the

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**Fig. 7**

The orientation of some wells from the entrance (staircase) toward the holy cell (the water). Drawing: Sant'Anastasia, Sardara with orientation from south to north (magnetic north pole)



**Fig. 8**

Groundplan: faced towards magnetic north by the upper longitudinal edge of the entrance (in the lower section is the azimuth compass). Geographical north at 39° 37.00 north and 8° 49.11 east has its declination at +1° 48.3 (according to NOAA data: National Geographical Data Center USA on 01.05.2013)

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**Fig. 10**

North direction and the time (13.00 DST = 12.00 GMT + 1 hour)





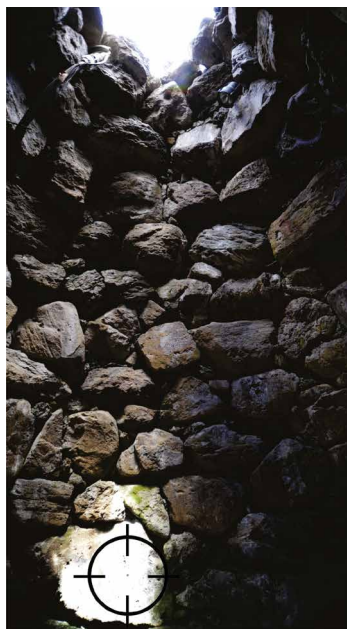




**Fig.11**  
Result no. 1 on the north face of the chamber: on the left north, in the middle photo of the effect on April 23rd 2013 at 12.00 (actually at 13.00 DST, Daylight Saving Time - 1), and on the right the track of the sunbeam at ten minute intervals (11.50, 12.00 and 12.10 in real time DST -1)

*next page*

**Fig.12**  
There is no evidence of the originality of the small hole in the stone, in the middle of the effect – but the position is genuine



ground with the hole in the centre lies in one, and the staircase in the other. The chamber, centred on the hole at the top, is circular in groundplan, in cross section it is typical corbelling in undressed stones. The hole through which the water enters the well is covered by a lintel, the same as at the main entrance.

The staircase has 12 steps: the covering structure is made of corbelled lintels, until the seventh stair.

This well has typical elements for such objects in Sardinia, in both construction and composition.

There is a little confusion about the name and the gender of the saint: in *Acta Sanctorum* can be found St. Anastasio on April 21<sup>st</sup> (Henschenio 1865: 847); in *Bibliotheca Sanctorum* 20<sup>th</sup> April (il Sinaita, *Bibliotheca Sanctorum* 1961: 1060) and 21<sup>st</sup> April (Antiochio, 1961: 1066); the *Encyclopaedia of the Early Church* says Anastasius Cagliari 19<sup>th</sup> April, and Anastasius the Sinaite 21<sup>st</sup> April (Bernardino 1992: 658 and the latter one 37); Anastasios of Sinai is also mentioned in *The Oxford Dictionary of Byzantium* on April 21<sup>st</sup> (Kazhdan 1991: 87).

However, the Catholic church celebrates the name day of Sant'Anastasia in Sardara at the end of December. If the date was changed - to override the pre-Christian event (1200 years before Christ) – it is possible they also changed the gender of the saint: from Anastasio to Anastasia. Such things happened not infrequently in Catholic history.

### Facts and speculation about the action

Twice a year, a sunbeam enters through the staircase to the water surface and is reflected back again through the circular opening in the top of the corbelled false dome. At the same time, the sun enters the dome through the top hole, touching the water surface in the body of the well.

This uses a sophisticated idea: a physical phenomenon, such as a reflection from water, a sunbeam on a particular day, can be used as a miracle (Juvanec 2013: 54).

### Sant'Anastasia, the sun

Different aspects of the sun can be used: its position in the sky and the shadow or beam it casts on the earth. When talking about the sun and water, it is very important to realize that a dark water surface gives the same result as a mirror.

The angle of incidence is the same as the angle of reflection. The course of the sun and moon has long been familiar to experts, who have been able to use this phenomenon for various purposes. Historically, such things are not produced by ignorant people and an object with a clearly demonstrable physical phenomenon is worth using: by its owners, by leaders. Some phenomena can be predicted and can be explained to the unlearned masses as a miracle (Juvanec 2010: 38).

## Result

The sun emerging from the black Earth – seen outside - and, on the other side, touching the water surface inside, can only be a miracle.

The question is whether this well was constructed to use the beam on a particular day, or whether the beam emerged on this day 'by chance', unplanned. A clever builder could have known the physical phenomenon and planned it all, or the well may have been named after the appearance of the miracle (Juvanec 2010: 39). The result is the same.

Because of the angle of construction, it happens twice a year, on April 21 and 21th of August.

This effect was tested on April 23, 2013, close to the exact dates.

## Five elements of proof

The evidence is provided by physical phenomenon, naming the medieval church after the pre-Christian well, the phenomenon occurs every April 21, so the miracle happens every year on the saint's name day, the name originates from the word 'anastasos' or 'resurrection'.

1. The physical phenomenon of the light beam: the incoming beam on a mirror surface has the same angle as the outgoing beam.
2. Sant' Anastasia is the patron saint of the nearby church (built more than two millennia later), clearly named after the pre-Christian sacral monument.
3. This phenomenon can be observed every year on April 21 and on August 21.
4. April 21 is the name day of the saint.
5. The name Anastasia and Anastasos has its origin in Greek 'anastasis':





something that rises. It means literally '**resurrection**', according to The New Testament Greek Lexicon ([www.searchgodsword.org](http://www.searchgodsword.org) /October 14, 2003). I found the same in the Catholic Encyclopaedia, on the internet, on 20 October 2003.

Given such evidence, the event cannot be any coincidence.

### Conclusions or need for restoration and presentation

The wells of Sardinia are so unique in European culture that the European Union should recognize them as an essential part of its culture, important for all European architecture, for the European people as a whole, not just in terms of culture but also for their contribution to the local economy (Juvanec 2010: 46). **It could be listed into the UNESCO List of World Heritage as a system, not only as details.**

Outside the well in Sardara, there is a well-preserved archaeological site with metal galleries; inside, though, the pump, electrical wiring and pipes are visible. Archaeologists made their work perfectly, technicians did not.

### Entire Sardinian project

In relation to religious ceremonies, could the miracle stimulate cultural tourism (Juvanec 2010: 46), with a festival on the old name day of Sant'A-nastasia (April 21<sup>st</sup>) as well as thematic paths over the Sardinian island: a sacred wells trail.

The entire island of Sardinia is a real open air museum. It needs organization, an information system and open access to the monuments throughout the year. General information and organization are the main problems of archaeological and museum sites today. This could be executed very simply with help of smart phones and computers and shows new ways in open air museums.

### Informative indications on the place

Some restoration works had been already done: in comparison of Sardara Museum, which is an excellent work in architectural and in museum sense, the steel construction of runways have not such perfect details – anyway, they work properly. Technical details, like electrical installations and pipe fittings (now they are all visible!) would be improved.

At least a technical information about the miracle would be explained on the boards outside and in the exhibition hall.

Presentation of physical event would be illustrated by the laser beam (in steps, from the current-time to the real-time presentation, with laser point or simulation of the shadow), and the projection indications of the essential points on the stones (without any physical marks) would be preferable.

'Sardinia - open air museum' would be very large project and not cheap, but the investment could be returned in a few years. It would be an economically sound investment.

Scientists can do their work; some of it is already done, mostly in archaeological sense. The next step is up to Sardinians.

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Fig.13

Measuring of the well.  
The team of Ljubljana  
University: Borut Juvanec,  
Domen Zupancic, Domen  
Kusar, Edo Wallner, 2003  
(Tomaz Novljan)

Fig.14

Interview at the well  
for the RAI, Sardinian  
television 2003 (Tomaz  
Novljan)



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