croatia
istra, krk, dalmatia, hvar, korcula
documentation
borut juvanec

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croatia
istra, kažun
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Kanfanar 2, near highway
Stone shelter, named KAŽUN, lies near the new highway from Pazin (Rijeka, Učka) to Rovinj. It seems to be newer one: very rigorous proportional system, on meter base, is the proof. Unless the ground plan is not exact circle (circumference between largness and depth is less as 20 cm or less than 5 percent. Construction is pure corbeling: stone wall over the bench is mistake, and it's origin is from recent days. The walls are made of stones, on the outer side hewed only. Outer wall is vertical, until the overhang, which is approximately ten centimeters width. Entrance is orthogonal, with a huge lintel beyond overhang. On the all surface of inner wall there is a bench: aprr. 15 by 25 to 35 cm. On top of the roof there is a capstone as visual accent, ceiling has a plate on the highest part, with indefinite shape. Kažun has two small windows with flat lintels, vertical slopes are inclined.

At the entrance there are small enclosure and bigger stone with a hole to fasten (donkey). It could be hinge for entrance to the enclosure, but there is no other details preserved, so this is uncertain. The roof is composed over corbeled construction: the bell shape follows inner construction - it is matter of too much material in the top as well at the borders.
Kanfanar 2

west (entrance) elevation

cross section
Entrance elevation on the eastern side. Right is enclosure for live-stock.

Back view with the window: view from the orchard (from the East)
Kanfanar 2
analyses of proportions

egyptian triangle

equilateral triangle

circle (sqrt2, 1, sqrt2/2)
Inner wall with bench around and around. The wall on bench is just a mistake: it is unusable and out of order in corbelling construction.

Entrance: big lintel beyond circular overhang. Right is entrance to enclosure.
Capstone on the top of the roof is just a visual accent.

Stony sling near entrance can be prepared for fasten animal, but it can be possible an axle for the door too.

The roof is bell shaped, on the top as well as near overhang, especially over entrance.
View from North - West (sketch)

Situation

orchard

dry walling fence

entrance

enclosure

North
Każun is placed in the stone fence, at the border of the field (partly orchard). The field is hidden from the road, and kažun stands very near the big fig tree.

Construction of the object has orthogonal plane ground: the front width is very close to the total height, and the side depth is the same as height without the cap stone. This is important because of two squares, which are essential parts of the composition.

The accents on the outer border of the roof: (not hewed, but selected) stones on the important points are essential for the object in whole.

The front elevation has entrance to the South West: but this seems to be more according to the wall (and the wall represents ownership) and it is not oriented to the chosen direction.

Over the lintel of entrance there is a small window, and there are two on both sides.

Interior has a bench, a small niche in the wall, and in the middle of the floor there is unarticulated hearth.

The roof has four flat surfaces, and the bell form is not designed: it is result of gradual subsiding of construction stones.

This kažun is one of the most beautiful, for me it is real jewell, even between all nice kažuns in Istra.
Smoljanci

ground plan

N

+310

+155

+0.00

cross section

entrance elevation

construction

view
Smoljanci

situation (dimensions)

the points

structure

areas

the cube
Entrance view of the kažun, situated in the wall: from the fig tree

View from the field to the door, with the roof: on the extreme points there are stones as accents
Smoljanci

Detail of the roof: stone plates for overhang and point stones on all the four extreme sides of ground plan. Cap-stone on the top.

Cap-stone on the top lies on bigger horizontal plate: together it seems to be very nice composition
Smoljanci

Near the small window there is a stone sling to fix animals

Inner composition of the stones: vertical wall and circular corbelling to the top
Smoljanci
Istra, hrvatska
kažun

Krmed
Simple kažun is situated in the fence, with entrance along it and small window to the field. It is interesting and unusual that the wall cuts the object - back side of kažun is out of the field. It is perfectly corbeled, with rectangular ground plan, which comes to the top in ovale shape. The roof is simple four-sided, without any accent stones on it. North orientation of the entrance makes possibility of use the place in shadow behind the door.
Entrance view along the wall

View from the stone wall: height of the whole object is just like a man
Kažun is situated in the fence, with entrance to the field. Outer side of the wall is in the line as the wall itself. There is no window. It is good corbelled, with rectangular ground plan, which comes to the top in ovale shape of corbelling construction. The roof is simple four-sided, with accent: simple stone.

West orientation of the entrance makes possibility of use the place in shadow on the Northern side, to the fence.
istra, hrvatska
kažun
Svetvinčenat
Circular kažun is situated in the fence, with entrance to the field. Outer side of the wall is in the line as the wall itself. There are two small windows, on both sides of the entrance.

It is good corbelled, with round ground plan to the top of corbelling construction. The roof is simple, with accent: one simple stone.
Svetvinčenat

Kažun, hidden in the bush, but well preserved
Svetvinčenat

Natural construction of kažun: it is hard to find in the bush

Bell shaped roof without overhang at the end of vertical wall
istra, hrvatska kazun

Kanfanar
Unipical two-store kažun is situated at the Northern edge of village Kanfanar.
The lower kažun has typical construction: corbelling, but two objects lie one above another (like nuraghi in Sardegna). Entrances are situated: one to NE, and another to NW - because of access from the top of stone fence (back level of the field is for one meter higher as front entrance level.
Lower is made for sheltering, people at first, but the upper one has excellent view to the field and more. But - the height of one meter and some shows for use of children only.
It is the only kažun with two stores I know in Istra.
Sketch of double-stored kažan at the end of village Kanfanar
View from the wall, back elevation
Entrance, front elevation and view to the back, from the wall, in which kazun is incorporated: entrance in ground floor lies in front of the wall, to the upper level is situated toward the wall.
istra, hrvatska
kažun

Vodnjan / Dignano
Kažun is situated near the old (national) road from Pula (Vodnjan) to North, to Koper S1, on left side in the field enclosure. Construction of this shelter has inclination toward the center, of course only up to the overhang of the roof.

Ground plan is almost circular, with a small declination of back wall, which is a little dicker than front wall at the entrance. Entrance with stone lintel is small as the whole object.

The roof is inside corbelled to the top, outside conical, but because of stronger height above the top it is bell-shaped. On the top there is a plate, and vertical cap-stone, standing vertically. Position of the shelter is central on the field, but very near to Northern wall of the fence. Two little niches in side walls speaks about its use: sheltering of people, who needed small tools for living in.
Vodnjan / Dignano

Proportions: squares

two squares (1:2)
eight squares (2:4)
four squares (2:2)
Vodnjan / Dignano

Proportions: square in square

square by diagonal

\[ \sqrt{2} \]

square in the square

four squares and circle

\[ r = \sqrt{2} / 2 \]
Vodnjan / Dignano

Proportions: equilateral triangle

baseline

angles (width of the wall)

height of triangle
Small kažun, circular in ground plane, with soft roof

Entrance is so small: it is hardly believed that it was in use for people - it is inappropriate for animals only.
Detail of the top: cap-stone on vertical plate. Behind is bell tower of Vodnjan/Dignano church.

Entrance elevation with door, small overhang and soft roof with cup stone.
Vodnjan 2 / Dignano 2
Circular kažun is incorporated in the wall of the field near the road between Peroj and Vodnjan, not far from Fažana. It is bigger object, using for storing tools and sheltering workers. Material, found inside, speaks about its use today too. Basic body is constructed with bigger stones, lintel of the door is also very big and heavy. Inside there are two small windows and a niche for storing small tools (maches, candle etc). There is no bench inside, but three small stones as the chairs, to sitting. Construction is perfect corbelling, and because of thin depth of the roof construction the roof is not bell-shaped, but strictly conical until the top, where is cap-stone on a couple of plates. Combination of brown field color, green vegetables and the trees this shelter is about the brilliant of its kind in Istra. The most important is use: wooden fence doors and cultivated ground together is a perfect combination.
Vodnjan / Dignano 2

Proportions: squares

1:1.5 (2:3)

squares

four squares (2:2)

the wall

niche

bench-stone

stone

stone

window

window

n

the stones
Vodnjan / Dignano 2

Proportions: equilateral triangle

angles
(width of the wall)

$\frac{w}{2}$

$w$

$60^\circ$

$60^\circ$

$60^\circ$

$\sqrt{3}/2$

$1/2$

height of triangle
Side view to the window
Entrance and height of the whole object is close to the man: its excellent position on the edge of the field is adequate to the composition of stone shelter.
Brilliant corbelling of half-cut stones: on the top there is merely circular 'opening' with the top plate

Circular inner part with stone as a chair and small, but effective window
Istra, hrvatska kazun
Ravni, Rabac
This interesting circular kažun is situated just alone in the middle of no-where, not far from the sea, but high over it, with wonderful view to the Kvarner Islands Cres, Mali Lošinj. Situation on the slope, in the stone enclosure of pasture, in the bush. It seems to be built for people, but even nowadays one can find there flock of sheep, looking for shadow.

Circular shape of ground plane is exact, and corbelling of the ceiling is like the dome. Outside had been used mud for the putty: slope of the roof is almost vertical, without any visible corbelling on the roof.

The cap-stone is composed of several stones, with bigger plate on the top. It seems to be made for ventilation: in the time there should live shepherds, with fire in the hearth.

Entrance is situated to South, because of approach to the object, on Northern side would about half meter higher than existente. It is very nice kažun, but hard to find.
Kazuni is situated on the slope, in bush, but near the sea.

The object has been built for sheltering the people. Today it is used for living stock. Sheep in the shelter are not very comfortable, but they are in shadow anyway.
Perfect view to the object in the slope with sea in background

Interesting view through the window hole, into the kažun, to another side, and to another photographer
Ravni / Rabac

View to the ventilation hole ('the chimney') from outside

The top; stone plate covers the hole

View from inside to the top hole
croatia

krk, komarda, bunar, zdenac, gumno, mošuna
documentation

borut juvanec

ver. 0801

Ljubljana University
ljubljana
komarda va Starih Frušćeli, PUNAT

supervised by dr Berislav Horvatić, Zagreb CROATIA
Rožč, Ljubljana University SLOVENIA
Va Starih Frušćeli

Measurement: O. Pudak, architect and D. Benkovic, engineer.
Va Starih Frušćeli

Egyptian triangle 4:3

Golden section

Square root of two

Equilateral triangle

Equilateral triangle

Equilateral triangle

Measurement: Omerica Hukalo, architect and de Bonifalho Hrvacić.
Va Starih Frušćeli
komarda na Vrh Prgona, PUNAT
Na Vrh Prgona

+190
+85
+70
+0 00

190 130 60

30
100
230
50

N
Two circles and golden section

\[ \frac{1 + \sqrt{5}}{2} \]
komarda Malantruš, PUNAT
equilateral triangle
Malantruš
komarda na Vrh Pucunela, PUNAT
Na Vrh Pucunela

one to square root of three
Na Vrh Pucunela
water wells
bunar
zdenac
Island of Krk, Croatia

Borut Juvanec, Ljubljana University SLOVENIA
Ljubljana
The cistern located at 'Na Ohodu' is situated within a private dry stone paddock (locally: grajo), i.e., not on the unenclosed, communal grazing land (komunada). It stands in the vicinity of the dry stone wall bordering the paddock. It is oval-shaped, with a round inner part, the pit. The basic construction is corbelled, outside it is a typical dry stone masonry, with almost vertical walls. The entrance is widely open, in contrast to most other cisterns on the plateau, and protected from livestock only by an inserted bunch of thorny branches. There is a small (17x21 cm) tunnel connecting the entrance with the perimeter, who knows what for.

On 26 May 2001 it contained only some 0.43 cubic metres of water, and its total capacity is also surprisingly meagre for all the construction. The building apparently had to swallow up a large amount of stone cleared from the paddock. The cistern is a nice architectural composition, almost hidden beyond the dry stone wall fencing off the paddock from the road passing by.

Cisterns are scattered over the common grazings (rough pasture, locally: komunada) of the village of Dragu Bašćanska (locally: Baska Dragu or just Dragu), on the Northeastern plateau (locally: Gornji/Gornji Vrh, "The Upper Plateau") of the Southern part of the island of Krk in the Northern Adriatic. They have been built, maintained and used by the local shepherds who keep their sheep in the corresponding "patches" (pejtic) of the common grazings during the summer half of the year.

supervised by dr Berislav Horvat, Zagreb CROATIA
Borut Juvanc, Ljubljana University SLOVENIA
ground plan

 longitudinal cross section

scale 1 : 50

*water level on May 26, 2001
Na Ohodu
The cistern is named bunar (pl. bunari) by its builders and owners in the village of Draga Baščanska (locally: Baška Draga or just Draga), while the term zdenc (pl. zdenci) is in use by other inhabitants of the island of Krk.

The cistern is oval-shaped in the ground plan, with almost vertical outer walls. The roofing material is unworked stone, gravel mostly.

The cistern has a vertical shaft covered by a corbelled false dome. The lintel above the entrance is made of a bigger stone slab. The ground plan shows a narrow entrance - a squeeze stile - consisting of two wall heads built close together (preventing access to livestock), and a vestibule, where a curved staircase leads down and inside to the water.

The main thing is the roof: made of stone slabs or even plain unworked stones, it has all the attributes of corbeling, but of a water-permeable one, since its main purpose is collecting rainwater. It also protects the drinking water from pollution, and ensures natural cooling due to the constant streaming of air through the dry wailing, driven by sunshine heating one side of the building at a time.

The water contained on 26 May 2001 was about 4.80 cubic metres or a little more than one half of the estimated full capacity.

A lower part of the cistern itself is made in soft stone, cut, or is constructed with smaller stones with help of clay (yesterday) or concrete or mortar (nowadays).

The peasants of the village of Draga Baščanska graze some two thousand plus sheep on the plateau above the only valley with running water, and the cisterns are simply a necessity for their economy, for surviving.

May 2001

Cisterns are scattered over the common grazings (rough pasture, locally: komunada) of the village of Draga Baščanska (locally: Baška Draga or just Draga), on the Northeastern plateau (locally: Gornji Gornji Vela, "The Upper Plateau") of the Southern part of the island of Krk in the Northern Adriatic. They have been built, maintained and used by the local shepherds who keep their sheep in the corresponding "patches" (pajic) of the common grazings during the summer half of the year.

supervised by dr Berislav Horvatić, Zagreb CROATIA

Borut Juvanec, Ljubljana University SLOVENIA
Navrth Vala

view from above (the roof)

North

scale 1: 50

+205
+195

+0 00
+0 35

front elevation
The cistern at the location Za Kijcen belongs to the bigger ones on the Northeastern plateau above Draga Bašćanska on the island of Krk.

Its oval shape is a logical consequence of its ground plan: the circular vertical shaft has a longitudinal corridor with a staircase, deep to the bottom. The bordered roof, making a kind of gutter, is not typical for local constructions, but is very functional. Rainwater comes directly to the lower part of the construction, hewed in stone.

On 26 May 2001 the cistern contained about 2.1 cubic metres of water, which amounts to approximately one third of its full capacity.

The ground plan has a narrow entrance - a squeeze stile - preventing access to livestock, and a round open vestibule, where the stairs start from the entrance basement into the body of the cistern. The latter is cut in stone and bordered by a 50 cm wide shelf around the pit. Its surface is sloped inside, to collect rainwater.

The entrance to the inner part of the cistern is constructed with a massive stone lintel. Further elements of the ceiling are horizontal stone slabs, lzing in a row over inwardly sloping walls, reaching to the bottom of room, where the corbelled construction starts.

The cistern Za Kijcen is one of the biggest and the most beautiful objects on the island of Krk.

May 2001

Cisterns are scattered over the common grazings (rough pasture, locally: komunada) of the village of Draga Bašćanska (locally: Baška Draga or just Draga), on the Northeastern plateau (locally: Gornji/Gornji Vrh, "The Upper Plateau") of the Southern part of the island of Krk in the Northern Adriatic. They have been built, maintained and used by the local shepherds who keep their sheep in the corresponding "patches" (pajiz) of the common grazings during the summer half of the year.

supervised by dr Berislav Horvatić, Zagreb CROATIA

Borut Juvanec, Ljubljana University SLOVENIA
Za Kijcen

view from above (the roof)

entrance elevation

+170
+160
+050

cross section

+170
+160
+050
+085
-000
-080
-170

water level on May 26, 2001

scale 1:50
$r = 60\text{cm} + 50\text{cm} = 110\text{cm}$

$2r = 220\text{ cm}$

$220\text{ cm} / 7 = 31.42\text{ cm}$

$31.42\text{ cm} = 1\text{ foot}$
well
‘zdenac na Kandiji’
open dry stone cistern
Kandija, Krk Island Croatia
dry stone cistern KANDIJA near Punat on the Krk Island, Croatia

GPS (Global positioning system) coordinates:
N 4 983.884 m
E 33 470.665 m
20.08.202

The well at Kandija (zdanic na Kandiji), also known locally as "the well o' eleven stairs", is located at the microlocality of Kandija at the southern outskirts of the place of Punat on the island of Krk in the Northern Adriatic. The dialectal term zdanic literally means "well", but locally it refers mostly to dry stone cisterns for collecting and storing rainwater rather than to wells in the more usual sense of the word, those with underground water. (Also, it denotes only the cisterns in the field, while another word (golubnica) has been reserved for a classical, fully closed and mortared cistern.) In some fortunate cases a "well" like that does have an underground source of water, in addition to rainfall. This seems to be the case with this particular one, which has reportedly never been found completely dry.

The well is built-in in the thickness of a consumption dyke (accretion wall, gomila) bordering a plot of arable ground, with the access from the path along the outer side of the wall, which suggests its communal, public use.

A stone staircase of 11 stairs leads down and into the pit to the water. The staircase is L-shaped, bending at right angle after the first six stairs.

The pit is constructed in dry stone that is not plastered over, and it is only the surrounding loamy soil that holds the water to some extent. Wells like that are termed na jilo, na zemlju, na obje, na teren ("on loam, on earth, on mud, on terrain"), and are less reliable (as storage tanks for rainwater) than those with pits plastered over with concrete or baked clay, since their pits are not absolutely watertight.

Nowadays the well bears no trace of a covering, but its pit might have been covered by a corbelled false dome in the past. An elderly local informant remembers a ring of stone slabs along the rim of the pit, which might have been the remains of a fallen-in false dome, or at least a covering of some kind.

The well was mentioned as a well-known landmark in a local legal document from the very beginning of the 18th century, which confirms it to be at least three centuries old. Moreover, among the locals it has been traditionally known as the "Greek well". In the local vernacular of the island the term "Greek" refers to the "late Greeks", i.e., the Byzantines, but is indiscriminately applied to the material remains of Illyrians or even earlier peoples as well. So, the closest rendering of "Greek" is "pre-Slavic", i.e., "earlier than the 7th century". If the well was built by local Illyrians, it might as well be more than two millennia old. With dry stone constructions one can never tell, but it is quite possible.
dry stone cistern Kandija

photo: Berislav Horvatić
dry stone cistern Kandija

photo: Berislav Horvatčić
threshing floor

gumno

MURAJ

Island of Krk, Croatia
threshing floor, MURAJ on the island of Krk, Croatia

GPS (Global positioning system) coordinates:
N 4 988.658 m
E 33 468.511 m

Threshing floors have been preserved in those smaller settlements on the island of Krk that have not been affected too heavily by mass tourism. The one in the village of Muraj is rather exceptional for being completely in dry stone, without any cementing material, as well as for its beauty of construction and its being in a perfect state of preservation. Although situated at the center of the village, this threshing floor has not been a communal one, it has been owned and was used by a single village family. As it had a lot of joint owners, there used to be a queue in the harvest time. It was reportedly in use till soon after the 2nd World War, when the whole system of traditional farming was mostly abandoned.

The base is in uncoursed, rough dry stone masonry, but the crown (top edging) is constructed with carefully dressed stones forming a perfect circular border. The working surface is paved with smooth rectangular stone slabs.

The access for people to the working surface is enabled by a stone step stile in the southern elevation, comprising three steps protruding from the base walling and two classical steps in the upper course of the wall, while for oxen there is a stair with six stone steps in the northwestern elevation. Its sides are constructed with half-dressed stones. When the threshing floor is not in use, this entrance is closed by an inserted bunch of thorny branches. On top of the stair there is a threshold with a hole at the level of the working surface, which serves as an outlet for rainwater, as well as for the water used for washing the working surface. On each side of the top of the stair there are two built-in niches for keeping the drink cool for the workers - harvest time is in summer!

Dr. Berislav Horvatic
gumno, threshing floor MURAJ
gumno, threshing floor MURAJ

Antica R., 23. 08. 2001.

visina ričića

GUVNO

2004
photo: Denis Lešić
gumno, threshing floor KORNČIĆ
gumno, threshing floor LAKMARTIN
Mošuna / mašuna / mošunja / mašunja is a traditional monocellular roofed dry stone shelter for livestock, mostly a sheeepcote. A typical dry stone sheeepcote in the Northern Adriatic is rectangular in the ground plan and covered with a thatched roof (ston), supported on a wooden frame, mostly a double-slope one. The sheeepcottes of the village of Draga Bašćanska on the island of Krk are rather exceptional: they are more or less oval in the ground plan and have an oblong opening (zjalo, literally: a gape) along the middle of the roof. The opening serves three purposes: (1) ventilation, to prevent overheating of livestock during the night; (2) moistenig (by rain) of manure, to promote its fermentation; (3) skylight (for milking inside).

The oval sheeepcote presented here is the only and the last object of this type that has been fully preserved and is still usable and in use. It is located 'Pod Svetim Jurjem' ("Below St. George's") at the beginning of the village of Draga Bašćanska (locally: Baška Draga or just Draga). The owner is Anton Gulešić (born 1934). The ground plan is rectangular, with rounded inner corners. The walls are in uncoursed dry stone masonry. The entrance is located at the corner of the front elevation.

The most remarkable thing is the construction of the roof: on four vertical posts (like pillars), with forked ends as join elements, there are two longitudinal ridge poles. Because of the extreme length (7 metres) of these poles, the roof construction has two cross tie beams. Those tie beams are bent (as we today know 'reinforced concrete girder') to enlarge their load capacity. This construction supports the rafters, laid very close one to another, covered by the roofing material, fastened with elastic shoots of white willow (Salix alba L., locally: žukva).

The roof covers all of the construction except the middle, where a longitudinal oblong opening (zjalo) appears. The gate (locally: zatoka) closing the entrance is typical of the region, a thin grid made of wooden poles.

supervised by dr Berislav Horvatić, Zagreb CROATIA

 Borut Juvanec, Ljubljana University SLOVENIA
wooden elements (original names)

- rafter (linez)
- ridge pole (žrda)
- vertical post (stabar)
- thatched with 'travina'
Croatia
Dalmatia, Bunja
Documentation
Borut Juhanec

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Ljubljana University
Ljubljana
1998, 2000