

# Island of Korčula - Importer and Exporter of Stone in Antiquity

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**Parica, Mate; Borzić, Igor**

*Source / Izvornik:* **ASMOSIA XI, Interdisciplinary Studies on Ancient Stone, Proceedings of the XI International Conference of ASMOSIA, 2018, 985 - 993**

**Conference paper / Rad u zborniku**

*Publication status / Verzija rada:* **Published version / Objavljena verzija rada (izdavačev PDF)**

<https://doi.org/10.31534/XI.asmosia.2015/08.18>

*Permanent link / Trajna poveznica:* <https://um.nsk.hr/um:nbn:hr:123:749788>

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*Download date / Datum preuzimanja:* **2024-05-20**



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# ASMOSIA XI

Interdisciplinary Studies on Ancient Stone

## PROCEEDINGS

of the XI ASMOSIA Conference, Split 2015

Edited by Daniela Matetić Poljak and Katja Marasović



Interdisciplinary Studies on Ancient Stone  
Proceedings of the XI ASMOSIA Conference (Split 2015)

Publishers:

ARTS ACADEMY IN SPLIT  
UNIVERSITY OF SPLIT

and

UNIVERSITY OF SPLIT  
FACULTY OF CIVIL ENGINEERING,  
ARCHITECTURE AND GEODESY

Technical editor:  
Kate Bošković

English language editor:  
Graham McMaster

Computer pre-press:  
Nikola Križanac

Cover design:  
Mladen Čulić

Cover page:

*Sigma shaped mensa of pavonazzetto marble from Diocletian's palace in Split*

ISBN 978-953-6617-49-4 (Arts Academy in Split)

ISBN 978-953-6116-75-1 (Faculty of Civil Engineering, Architecture and Geodesy)

e-ISBN 978-953-6617-51-7 (Arts Academy in Split)

e-ISBN 978-953-6116-79-9 (Faculty of Civil Engineering, Architecture and Geodesy)

CIP available at the digital catalogue of the University Library in Split, no 170529005



Association for the Study of Marble & Other Stones in Antiquity

# ASMOSIA XI

## Interdisciplinary Studies of Ancient Stone

Proceedings of the Eleventh International Conference of ASMOSIA,  
Split, 18–22 May 2015

Edited by  
Daniela Matetić Poljak  
Katja Marasović



Split, 2018

**Nota bene**

All papers are subjected to an international review.

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# ISLAND OF KORČULA – IMPORTER AND EXPORTER OF STONE IN ANTIQUITY

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## Abstract

The island of Korčula is characterized by a physical geography that was a prerequisite for a stable population and an efficient land use throughout Antiquity. Roughly 30 villa rustica sites, dated mostly from the 1<sup>st</sup> to the 6<sup>th</sup> century AD, testify to this observation. Numerous exquisite archaeological finds directly illustrate the intensity of the economy on the estates and the material status of the owners. Accordingly, various types of stone material made its way to Korčula from local and regional sources or those much further afield. Stone was used to manufacture diverse products: architectural structural and decorative elements and monuments of various kinds. Apparently, local high-quality limestone material originated from Korčula and the surrounding archipelago. Unfortunately, exploitation on a practically industrial scale can be safely attested to only for the late medieval period onwards. The exploitation of stone during Antiquity is represented by specific archaeological contexts, namely the submerged operational quay at Sutvara and the underground gallery quarries at Sutvara, Kamenjak and Vrnik, which will be presented in greater detail.

## Keywords

Korčula, Antiquity, marble, quarry

The island of Korčula has excellent natural and geographical traits which were a prerequisite for sustaining a stable population throughout prehistoric and historical periods (DOKOZA 2009; FORETIĆ 1940; RADIĆ 2001, 25-47). The same is true for the entire period of classical antiquity, with the exception of the still elusive Greek colonies from the 6<sup>th</sup> and 3<sup>rd</sup> centuries BC (BRUNŠMID 1998; LISIČAR 1951; RENDIĆ-MIOČEVIĆ 1980, 229-250; SUIĆ 2001, 161-168). Numerous locations have been discovered and documented, featuring traces of inhabitation from a period spanning from the first to the sixth century AD (RADIĆ 2001, 25-47; BORZIĆ 2007; 2010, 27-42) (Fig. 1). Such sites are defined as estates, is the economy of which was primarily based on agricultural production – Roman *Villae Rusticae*. Such a determination is suggested by their position in the landscape, their size and the characteristic archaeological finds discovered at these sites. The intensity of settlement as well as the wealth displayed by the inhabitants is well illustrated by particular archaeological finds. These include, among other things, various stone products, including structural and decorative elements as well as monuments. Some of the estates mentioned above feature truly exceptional finds of stone products of various kinds. Their owners were in a position to procure for and embellish their residences with exquisite pieces of décor. The island of Korčula is thus included

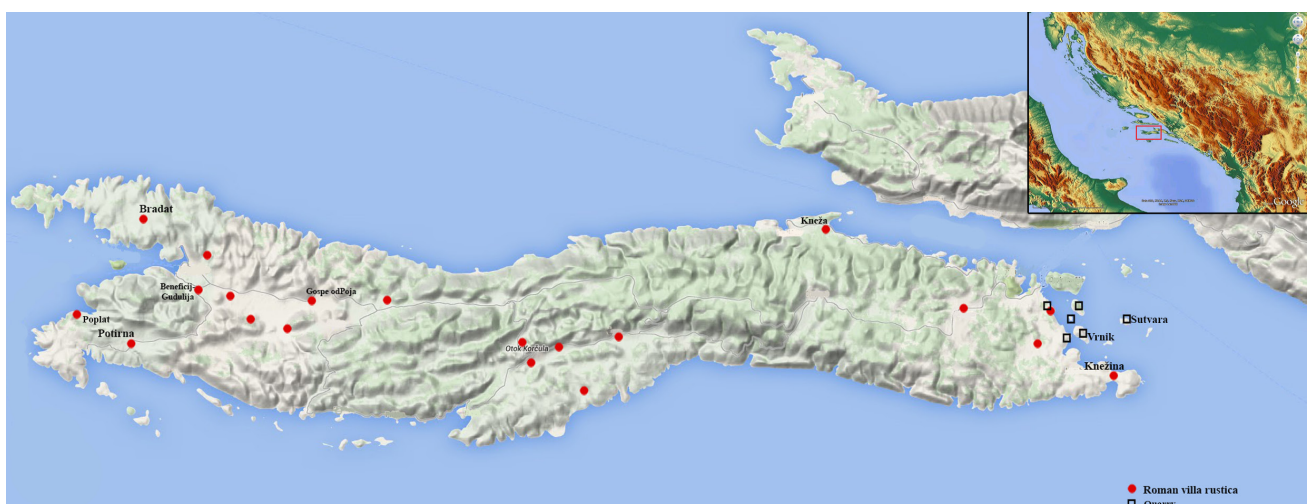


Fig. 1. Map of the island of Korčula with major archaeological sites



Fig. 2. Stone monuments from the Beneficij-Gudulija site

in the network of the supply and distribution of luxury stone material and stonemasonry products from leading production centers in classical antiquity.

Although research into villa sites is still largely deficient, some of sites stand out for the exceptional artifacts they have yielded. It is not surprising that such sites are mostly situated on the wealthy, western side of the island. Beneficij - Gudulija was, actually, the site of trial research. The excavations produced the remains of Roman architecture and relatively numerous portable finds dated to the period between the 1<sup>st</sup> – 6<sup>th</sup> centuries (NOVAK 1954, 46-48). A relevant find for our paper is a richly decorated marble composite capital. The capital measures 41 cm in height and the diagonal across the entire abacus measures 70 cm (Fig. 2). The capital itself is by all accounts a product of developed Roman antiquity, according to the style and production technique. A column base was also found in the same context as the capital (the measurements are, unfortunately, unknown). Nevertheless, the entire assemblage testifies to the existence of an exquisite, possibly sacred, building at this site. This conclusion seems to be corroborated by the finds of two marble plaques from the same site. These finds lead us to believe that the walls or floors of this building or perhaps a different one were dressed in marble executed in the *opus sectile* technique (Fig. 2).

Potirna - Mirje is the site of an extremely wealthy estate. Admittedly, the site was never researched but data to make such a claim abound. Potirna is the finding site of several inscriptions. The remains of a Roman cistern are still visible and the bottom is executed in the *opus*

*tesselatum* technique. A plain marble votive inscription is particularly significant. The text informs us that a temple (*templum*) has been erected, furnished with a Venus Pelagia statue (*signvm*) accompanied by a titled marble beam (OSTOIĆ 1878, 39; CIL III 3066/10083) (Fig. 3). The exact location of this religious complex is unknown. Nevertheless, the finding site of the inscription as well as a fragment of red – green painted mortar could suggest that the complex was located somewhere in the vicinity of the still visible cistern mentioned above. Furthermore, these finds suggest that a luxuriously decorated building existed at this site. Over the course of the next few centuries the estate maintained a high profile. Several sarcophagi fragments found at the site testify to this (Fig. 3). One sarcophagus is built from Proconnesian marble and the find is built into the altar of the Sv. Juraj [St George] church in Potirna. It is possible to reconstruct the frontal side of the coffin: vertical strigils frame the central inscription panel (tabula ansata form) richly decorated with plant motifs. This type of sarcophagus, undoubtedly dated to the 3<sup>rd</sup> century AD, can be classified among non-standard Salona sarcophagi modeled after Proconnesian marble products (CAMBI 2010, 31, cat. no. 5). The same period and model can be suggested for a sarcophagus fragment with vertical strigils, the upper zone decorated with a rather rustic string of astragal patterns and Lesbian kyma of the same quality as the astragal. This type of sarcophagus commonly features a pelta-shaped inscription panel. Unfortunately, the fragment is incomplete and this typological feature cannot be confirmed (analogies at CAMBI 2010, 27, kat. br. 37 and 130).

The next location relevant for our subject is a Roman villa at the Bradat – Mirje site. The site has never been excavated. Nevertheless, based on the available information, it falls into the category of one of the most prosperous estates on the island. Older records mention numerous finds of Roman architecture. Some finds feature prominently among these, such as mosaic floors (OSTOIĆ 1953, 12 – 13; OREB 1972, 125), two funerary *stelae*, obviously products of some already renowned workshop, probably from Salona, and two particularly interesting fragments of marble sculpture (OSTOIĆ 1878, 38; OREB 2003) (Fig. 4). The first fragment features a neck, torso and some form of garment. According to Ostoić it is a lion hide which falls over the chest by way of the right arm. The second fragment features an upper torso without the head or arms. A garment is visible, though, covering the right shoulder and lower torso leaving the chest bare. Considering that the sculptures are fragmented and known only through descriptions and sketchy drawings, it is not possible to attribute them with any level of certainty. Nevertheless, based on the little information available, the religious character of the sculptures can be suggested. Furthermore, the first



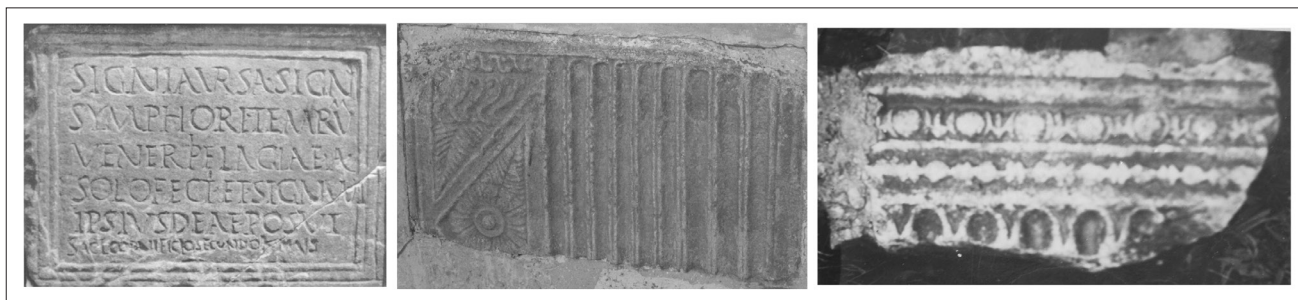


Fig. 3. Stone monuments from the Potirna-Mirje site

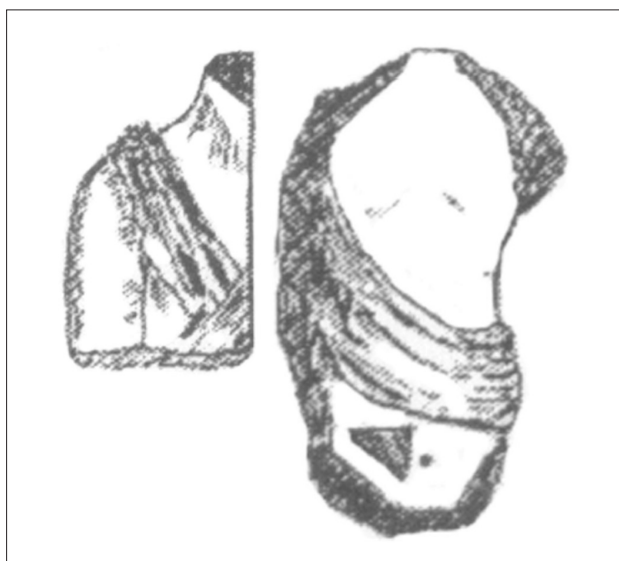
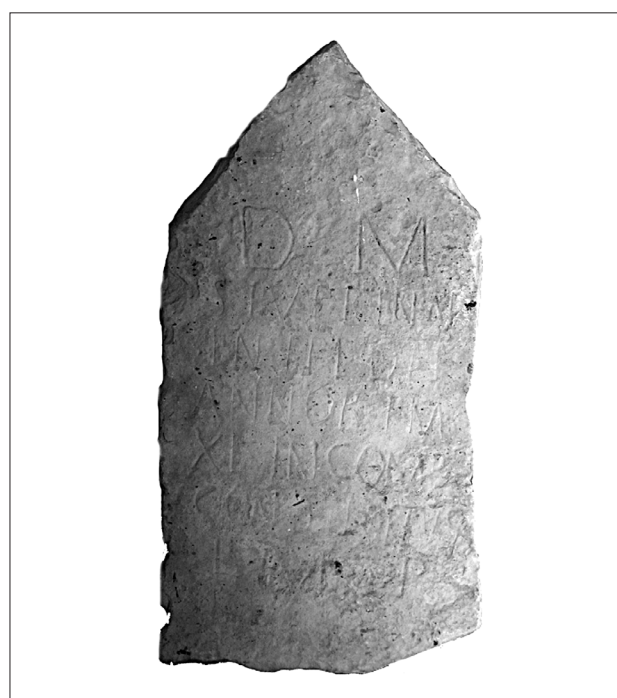


Fig. 4. Stone monuments from the Bradat-Mirje site

Fig. 5. Funeral stela from the Poplat-Mirje site  
(photo: I. Borzić)

fragment clearly features the depiction of Heracles, while the second features a figure depicted in divine nudity.

An interesting antithesis to the stone monuments mentioned above and found on this part of the island is a completely preserved burial monument, made from local limestone and utterly rustic in form. It is probably a direct product crafted by a certain Poetus (*Poetvs*). He erected the monument to his fellow slave Severina (CIL III 10091; LISIČAR 1985, 128) (Fig. 5). The monument was discovered at the Poplat – Mirje site. According to the available information, the site also featured a mosaic floor.

A similar site is documented at the opposite side of the island – the Kneža site. The site featured a cistern with mosaic flooring. Green marble plaques are also mentioned, suggesting the presence of a luxurious building situated on the coast of the Pelješac channel (RADIĆ 1887, 75; 1892a, 78-79).

Several funerary monuments should be noted in the context of Korčula as a consumer of imported stone products. The products were imported from well-established coastal stonemasonry production centers and they include finds from sites such as Prapatna – Mirje (CIL

III 3069, 3070/10085) and Čara – Sutudar (CIL III 3072, ILJUG 25., 411). Generally speaking, the stone products discovered at these sites are a vivid reminder of the wealth certain estates displayed. It is also evident that this population kept track of fashion trends. The trends were channeled to this island – a rural environment – through intermediaries such as Salonae, as well as other eastern Adriatic stonemasonry distribution centers.

The sheer number of settlement sites on the island, the architecture of various kinds and numerous finds all suggest that apart from the import of stone products and as master stonemasons, a stone-related economy must have developed locally during the period of Roman antiquity. Stone production was focused primarily on the demand of the local market for building material as well as other commodities. The answer to these questions lies in the still open debate over whether numerous stone quarries in the eastern part of Korčula

Island and the surrounding islets originated in the period of Roman antiquity. The quarries have been discussed in scholarly literature since long ago. It should not be surprising that numerous studies have been dedicated to this subject since the late 19<sup>th</sup> century (RADIĆ 1892; GJIVOJE 1970; FISKOVIĆ 1955; 1971; FORETIĆ 2004; DOKOZA 2009; PARICA 2014; RUSSELL, GLICKSMAN 2015). Almost all the authors emphasize the long tradition of stone masonry, especially in the late medieval and early modern periods. However, the problem remained how properly to identify quarrying activities dating from the Roman period. The basic problem is in the uncertain dating of underground gallery quarries found on the islets of Sutvara, Kamenjak and Vrnik. Gallery quarries were formed because surface layers with low quality material are positioned above the high quality raw material. In open-pit quarries the surface layer is removed by the same technique as the high quality rock mass. However, if the surface layer of low quality rock is too thick, removal from the surface is unsustainable. Explosives were used in early modern quarries to remove the surface layer of unusable stone raw material. Upon removal, the stone was quarried by hand tools. After the discovery of gunpowder, the rock mass of high quality was approached from the slope side, directly into the quality raw material. Once the appropriate vein is targeted, the exploitation continues using mining methods. Gallery mines originated in ancient Egypt during the period of the Middle Kingdom. The mines are located on hill and mountain slopes, as deep as 200 m into the hill. Pylons were formed from unexcavated rock mass. The extraction technique of the majority of blocks is identical to what is practiced in open mines (WAELEKENS 1992, 6). The gallery quarrying technique was employed widely across the entire Mediterranean. Examples preserved to this day include Bibémus - Aix-en-Provence in France (STOREMYR 2006), El-Dibabiyai Zawiyat al-Sultan in Egypt (HARRELL, STOREMYR 2009, 11; HORI 2010, 82), and La Savinosa and Coves del Llorito in Spain (GUTIÉRREZ GARCIA-MORENO 2009, 184, 187). Recently, a stone quarry of the same type dating to the Roman period was discovered in Zvornik, Bosnia and Hercegovina (RIŽNAR, JOVANOVIĆ 2006). Gallery quarries are rather rare in the Dalmatian area. An Antique quarry on the St. Ilija hill slope near Trogir features a preserved small part of the quarry with a frontal approach to the rock mass and all the elements characteristic for the gallery quarrying technique (PARICA 2014, 84). The only other finding sites of gallery quarries in Dalmatia are the islets in the vicinity of Korčula – Sutvara, Kamenjak and Vrnik (GJIVOJE 1970, 71).

Sutvara is a small island in the Korčula archipelago with an area covering 9 ha and the altitude at the highest point is 38 m. Rock raw material contains a surface layer of low quality cracked limestone 4 m thick. Underneath

is a compact layer of white limestone of excellent quality. Two larger and a few smaller trial quarries can be discerned at Sutvara. The first quarry is positioned on the northern coast where an artificially formed cliff is clearly visible, stretching irregularly for about 70 m. Various techniques of exploitation are documented at the quarry, such as common trenches, drilling using the “hole to hole” technique, individual trenches and the use of gunpowder. F. Radić documented two gallery type quarries in 1891, one still visible today. He claimed that the other quarry was positioned on the northern side of the hill, meaning precisely at the area in question (RADIĆ 1891, 51). M. Gjivoje mentions three spots at Sutvara where mining techniques are evident: on the northeastern side of the island by the sea and at two other spots located in the center of the island (GJIVOJE 1970, 71). The remains in the quarry area suggest that a gallery type quarry operated in this area. Fig. 6 clearly shows traces of rock separation by the drilling of a series of holes with a mechanized drill. However, the remains of a gallery quarry are discernible underneath. This demonstrates that a gallery type quarry was in operation at this very location, precisely as claimed by F. Radić and M. Gjivoje. Quarries with traces of various exploitation techniques were commonly in use throughout different periods. The analysis of stratigraphic relations between different mining techniques demonstrates how earlier techniques cut into the later ones and disturb them in the process. The demarcation of earlier and later exploitation patterns is of extreme importance because the chronological relations between them are thus available for analysis. The Fig. 6, 1 shows a segment of the northern quarry at Sutvara where three techniques of rock exploitation are discernible. Trenches and wedging traces descending under the base rock are visible in no. 1. These are probably the traces of the earliest phase when a gallery quarry was the exclusive mining technique in this area. Curving of the trenches and tool traces suggest frontal trenching, which is characteristic only of gallery pits. Since the two other techniques have obliterated the gallery quarry, this is the earliest system of exploitation still visible.

The procedure which commenced the devastation of gallery quarry is an early modern “hole to hole” mechanical drilling technique. Following the drilling, the blocks were already separated from the rock mass. Fig. 6, 2 clearly shows three rows separated by the technique described above. The final technique visible in Quarry 1 is rock breaking using explosives and the “hole to hole” technique. The cliff was completely destroyed in the process. The first phase of this process is to drill several holes, either mechanically or by hand, into the cliff side. Afterwards, explosive charges are set into the holes and the detonation breaks the rock (Fig. 6, 3). Amorphous blocks fall to the ground where they are reduced to the desired size.





Fig. 6.  
Traces of a quarry on the north-eastern part of Sutvara Island with various quarrying techniques (photo: M. Parica)



Fig. 7. Gallery quarry in the central part of Sutvara Island (photo: M. Parica)



Fig. 8. Traces of rock exploitation in the gallery quarry on Sutvara Island (photo: M. Parica)

The final two phases of exploitation in Quarry 1 can be dated to the Modern period, roughly the last 120 years, definitely after F. Radić visited the site in 1891.

The gallery quarry in the central area of Sutvara Island is the most representative example of this type of quarry in Croatia. The underground gallery is 25 m long, 20 m wide and the maximum height is 6 m. The information concerning the quarry height should be taken with caution. The quarry bottom is covered with spoil rock and at some places it is evident that the depth is greater than commonly assumed. The entrance section of the quarry is irregular. However, drill holes are visible in this part, representing the use of explosives. It is difficult to determine the extent of ceiling disturbance in this process. Nevertheless, it is evident that this spacious gallery stretched further than previously assumed. The rock mass inside the gallery is extremely compact without a trace of geological incursions, including in the ceiling.

The gallery is not supported by pylons, which are quite common in quarries such as this. The ceiling is concave in shape, formed in a compact rock mass and sufficiently stable for the danger of collapse to be minimal. All visible gallery cliffs, including the ceiling, feature tool marks and traces of techniques employed to separate the rock blocks. Traces of vertical and horizontal trenches are also visible as well as zones where blocks were separated from the base. They are also visible on lateral cliffs and ceilings. Each block is separated from the base in the following manner: a "V" shaped wedge slot is carved inside a common trench (dug using a pick hammer). The wedge slot spans the entire block width. Iron wedges are inserted in the wedge slot. The wedges are hammered, the block cracks, separating it from the base rock in the process.

The expansion of the gallery is defined based on marks at the upper gallery edge (Fig. 8). The base rock was penetrated at these spots by another row, after which





Fig. 9. Stratigraphy of the spoil mound inside the gallery quarry on Sutvara Island (photo: M. Parica)

the flat area was lowered, similar to the open-pit mines. This is visible in the central part of the gallery where a smaller section, regular in plan, is located. Lateral walls contain clearly discernible tool marks which surround the larger blocks (2.5 m wide and 1.5 m high).

The central section of the hall features a quarry segment that is considerably deeper than the quarry bottom. This is perhaps the final phase of the original gallery quarry when the rock was extracted in a single place from the deep, and spoil was scattered on the remaining parts of the gallery. This also might be the reason why the bottom of the original quarry is not visible.

It is precisely at the edge of the lowest section of the quarry where the refuse material is clearly visible enabling stratigraphic analysis of the spoil mound (Fig. 9). Three layers are clearly discernible. The uppermost layer is a mixture of gravel and gray-brown soil, 60 cm thick. The second layer contains dark-brown sterile soil, about 10 cm thick which is the result of a prolonged inactivity on the gallery. Finally, the lowermost layer consists of a mixture of gravel and rock powder. This composition of spoil material is characteristic of trenches dug using pick hammer or hammer and wedge. The thickness of the final layer is impossible to determine

because it stretches under the subsequently deposited material. It is possible that the lowermost (the earliest) layer is representative of the rock exploitation at the lowest part of the quarry, when the material was deposited in the immediate vicinity. A prolonged hiatus is evident following this sequence, clearly demonstrated in the layer of dark soil characteristic for speleological objects during periods when either human or natural activity is absent for hundreds of years. The upper layer probably represents the refuse material from the final phase of rock exploitation at the site. To be more precise, this activity can be dated to the Modern period when the entrance section of the gallery was damaged by dynamite. The stone debitage contained in the layer suggests that the gallery quarry hall was used for finer block processing. Actually, the gallery is an ideal shelter from the elements such as rain, sun, wind or the cold.

A particular feature of gallery as well as later medieval quarries is the type of wedge slots used for final block separation. The quarries across the Mediterranean often feature a single wedge slot used to separate the block from the base rock. The galleries at Korčula all feature the same type of block separation i.e. an elongated “V” shaped wedge slot carved into the trench bottom. Finally, massive wedges are placed and hammered until the block cracks. The fracture is concave in most cases. However, the cause is not the rock mass structure but the form and shape of lateral trenches. The force resulting from hammering the wedges into the rock mass runs precisely in the direction of the placed wedges. However, the rock mass cracks at the weakest point i.e. in the direction where there is no contact with the lateral sides. Therefore, the force is distributed by the direction of lateral trenches.

As well as on Sutvara, gallery quarries are documented on Kamenjak and Vrnjak islands (GJIVOJE 1970, 71). However, the latter are partially or completely disturbed by later quarrying activities. The oldest inhabitants still remember the gallery quarries destroyed by subsequent exploitation<sup>1</sup>.

The dating of quarries at Korčula archipelago islands is extremely problematic for several reasons. The first problem is an absolute lack of archaeological material directly connected to the quarries. The second problem consists of the small discrepancies in the block extraction technique when compared to gallery quarries from Antiquity in the Mediterranean. First and foremost, the discrepancies include the V-shaped wedge slots, concave ceilings and the absence of pylons supporting the ceiling. However, there are several arguments to suggest that the quarries are to be dated to the period of Roman antiquity (earlier and late periods). Firstly, it should be pointed out that

1 The information provided orally by the last Vrnjak stonemason, I. Foretić.

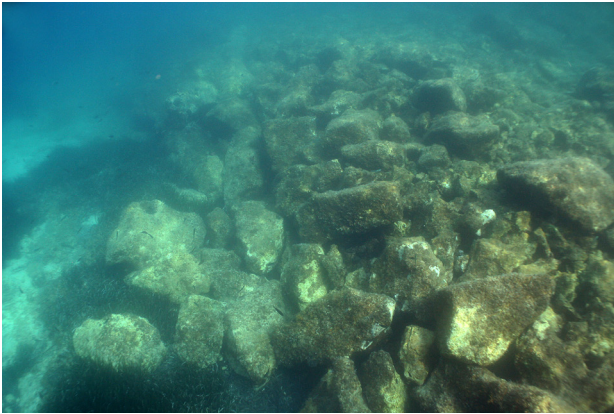


Fig. 10. Submerged harbour installation on the northern part of Sutvara Island (photo: M. Parica)

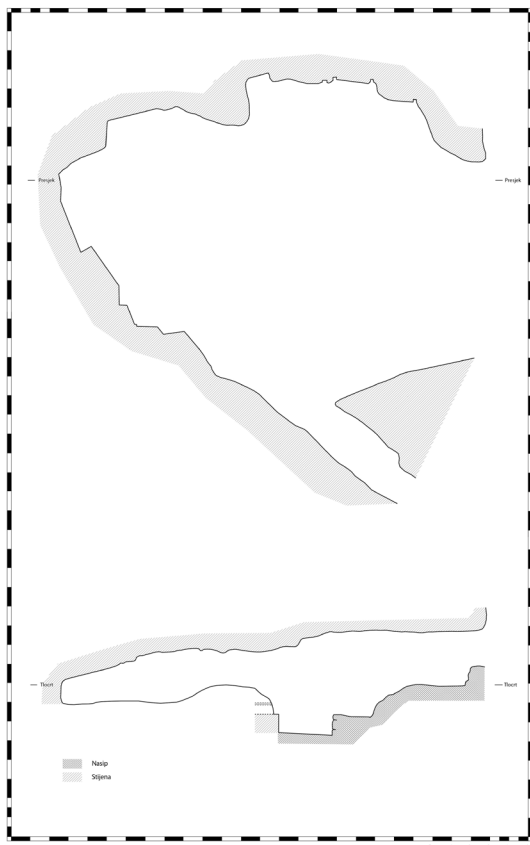


Fig. 11. Plan of the gallery quarry on Sutvara Island (author: M. Parica)

gallery quarries were used in Roman antiquity on a massive scale. Perhaps the most important argument implying a Roman antiquity dating for the quarries is the harbor installation found at Sutvara. The fact that the installation is submerged 2 m below the present sea level strongly suggests a Roman antiquity date for the quarries (Fig. 10, 12). Furthermore, the fact of the matter is that gallery quarries do not cut any other exploitation technique, while, conversely, all other techniques cut the gallery phases.

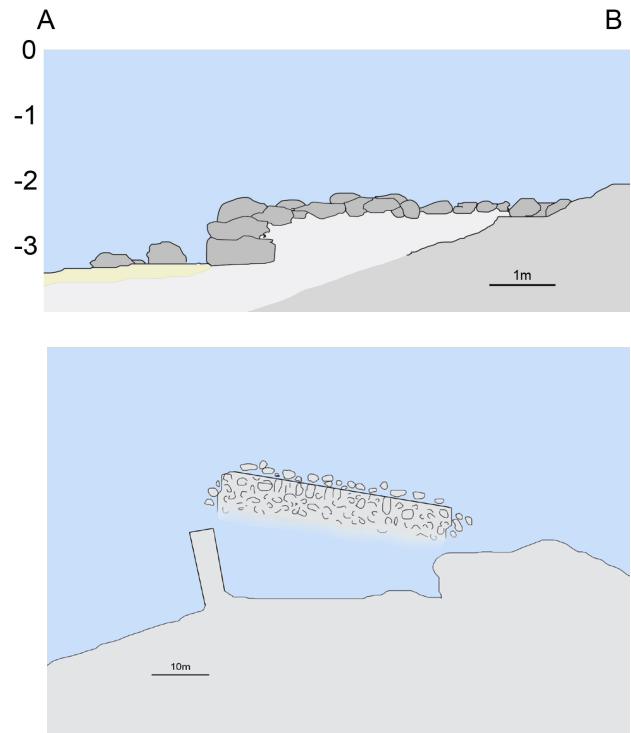


Fig. 12. Plan of the Submerged harbour installation on the northern part of Sutvara Island (author: M. Parica)

Generally speaking, the rock quarrying tradition in this part of Korčula is beyond any doubt. One only has to look and see certain parts of the landscape literally “gnawed” away. It is still not clear, though, how long this tradition stretches into the past. But the arguments suggested here in favor of a Roman antiquity date outweigh the argumentation based solely on the typology of quarrying techniques. Even if stratigraphic relations, regularly placing the exploitation of gallery quarries on the Korčula islets at the temporal bottom, are excluded, for they are not necessarily of Roman antiquity date, the submerged coastline at Sutvara certainly suggests such a date. A lot of research was conducted recently to determine the relation between coastline movements and archaeological sites. Based on that research, the dating of the Sutvara submerged coastline to the Roman antiquity is certainly plausible (SURIĆ, 2009, 181-199; LAMBECK *et al.* 2010; ANTONIOLI *et al.* 2007, 2463-2486; FAIVRE *et al.* 2010, 91-99).

Several indirect arguments could suggest a Greek or Roman antiquity date for quarrying activities and for certain isolated quarries in this part of the island. The intensive dynamics of life at the island is suggested by two possible Greek colonies mentioned above, wealthy Roman estates with the Velo polje/Knežina site as the main representative (RADIĆ 1887a, 10-24; ZANINOVIĆ 1967, 360-361) and, finally, a substantial late Roman antiquity phase represented by several early Christian cult buildings (Majsan, Lučnjak, Sutvara and Gubavac) and a

significant Porphyrogenitus *castron* (FISKOVIĆ 2001, 52-74; DOKOZA 2009, 33-35). The nature, scale and scope of quarrying activities are difficult to determine at this point. Were they directed at meeting exclusively local demands or, was it, even at that period, directed at the wider market, as is the case with later medieval and early modern periods. Furthermore, were these activities directed at the production of building material or some more ambitious products such as sculptures, as is the case, for instance, with the Brač or Trogir quarries (CAMBI 2005; PARICA 2014). Fragments of architectural decoration and funerary monuments found at Gradac near Posušje site (FIALA PATCH 1895, 259-260), supposedly made from Korčula stone, are particularly interesting in the context of this paper. Unfortunately, by the time this paper was submitted we had been unable to track these finds, analyze them, and possibly determine their provenance. It is precisely such issues that point to further directions for research into Korčula quarries that arouse particular scholarly curiosity.

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