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CONTENT

PRESENTATION	15
NECROLOGY: NORMAN HERZ (1923-2013) by Susan Kane	17
1. APPLICATIONS TO SPECIFIC ARCHEOLOGICAL QUESTIONS – USE OF MARBLE	
Hermaphrodites and Sleeping or Reclining Maenads: Production Centres and Quarry Marks <i>Patrizio Pensabene</i>	25
First Remarks about the Pavement of the Newly Discovered Mithraeum of the Colored Marbles at Ostia and New Investigations on Roman and Late Roman White and Colored Marbles from Insula IV, IX <i>Massimiliano David, Stefano Succi and Marcello Turci</i>	33
Alabaster. Quarrying and Trade in the Roman World: Evidence from Pompeii and Herculaneum <i>Simon J. Barker and Simona Perna</i>	45
Recent Work on the Stone at the Villa Arianna and the Villa San Marco (Castellammare di Stabia) and Their Context within the Vesuvian Area <i>Simon J. Barker and J. Clayton Fant</i>	65
Marble Wall Decorations from the Imperial Mausoleum (4 th C.) and the Basilica of San Lorenzo (5 th C.) in Milan: an Update on Colored Marbles in Late Antique Milan <i>Elisabetta Neri, Roberto Bugini and Silvia Gazzoli</i>	79
Sarcophagus Lids Sawn from their Chests <i>Dorothy H. Abramitis and John J. Herrmann</i>	89
The Re-Use of Monolithic Columns in the Invention and Persistence of Roman Architecture <i>Peter D. De Staebler</i>	95
The Trade in Small-Size Statues in the Roman Mediterranean: a Case Study from Alexandria <i>Patrizio Pensabene and Eleonora Gasparini</i>	101
The Marble Dedication of Komon, Son of Asklepiades, from Egypt: Material, Provenance, and Reinforcement of Meaning <i>Patricia A. Butz</i>	109
Multiple Reuse of Imported Marble Pedestals at Caesarea Maritima in Israel <i>Barbara Burrell</i>	117
Iasos and Iasian Marble between the Late Antique and Early Byzantine Eras <i>Diego Peirano</i>	123

Thassos, Known Inscriptions with New Data <i>Tony Kozelj and Manuela Wurch-Kozelj</i>	131
The Value of Marble in Roman <i>Hispalis</i> : Contextual, Typological and Lithological Analysis of an Assemblage of Large Architectural Elements Recovered at N° 17 Goyeneta Street (Seville, Spain) <i>Ruth Taylor, Oliva Rodríguez, Esther Ontiveros, María Luisa Loza, José Beltrán and Araceli Rodríguez</i>	143
<i>Giallo Antico</i> in Context. Distribution, Use and Commercial Actors According to New Stratigraphic Data from the Western Mediterranean (2 nd C. Bc – Late 1 st C. Ad) <i>Stefan Ardeleanu</i>	155
<i>Amethystus</i> : Ancient Properties and Iconographic Selection <i>Luigi Pedroni</i>	167
2. PROVENANCE IDENTIFICATION I: (MARBLE)	
Unraveling the Carrara – Göktepe Entanglement <i>Walter Prochaska, Donato Attanasio and Matthias Bruno</i>	175
The Marble of Roman Imperial Portraits <i>Donato Attanasio, Matthias Bruno, Walter Prochaska and Ali Bahadır Yavuz</i>	185
Tracing Alabaster (Gypsum or Anhydrite) Artwork Using Trace Element Analysis and a Multi-Isotope Approach (Sr, S, O) <i>Lise Leroux, Wolfram Kloppmann, Philippe Bromblet, Catherine Guerrot, Anthony H. Cooper, Pierre-Yves Le Pogam, Dominique Vingtain and Noel Worley</i>	195
Roman Monolithic Fountains and Thasian Marble <i>Annewies van den Hoek, Donato Attanasio and John J. Herrmann</i>	207
Archaeometric Analysis of the Alabaster Thresholds of Villa A, Oplontis (Torre Annunziata, Italy) and New Sr and Pb Isotopic Data for <i>Alabastro Ghiaccione del Circeo</i> <i>Simon J. Barker, Simona Perna, J. Clayton Fant, Lorenzo Lazzarini and Igor M. Villa</i>	215
Roman Villas of Lake Garda and the Occurrence of Coloured Marbles in the Western Part of “Regio X Venetia et Histria” (Northern Italy) <i>Roberto Bugini, Luisa Folli and Elisabetta Roffia</i>	231
Calcitic Marble from Thasos in the North Adriatic Basin: Ravenna, Aquileia, and Milan <i>John J. Herrmann, Robert H. Tykot and Annewies van den Hoek</i>	239
Characterisation of White Marble Objects from the Temple of Apollo and the House of Augustus (Palatine Hill, Rome) <i>Francesca Giustini, Mauro Brilli, Enrico Gallochio and Patrizio Pensabene</i>	247
Study and Archeometric Analysis of the Marble Elements Found in the Roman Theater at Aeclanum (Mirabella Eclano, Avellino - Italy) <i>Antonio Mesisca, Lorenzo Lazzarini, Stefano Cancelliere and Monica Salvadori</i>	255

Two Imperial Monuments in Puteoli: Use of Proconnesian Marble in the Domitianic and Trajanic Periods in Campania <i>Irene Bald Romano, Hans Rupprecht Goette, Donato Attanasio and Walter Prochaska</i>	267
Coloured Marbles in the Neapolitan Pavements (16 th And 17 th Centuries): the Church of <i>Santi Severino e Sossio</i> <i>Roberto Bugini, Luisa Folli and Martino Solito</i>	275
Roman and Early Byzantine Sarcophagi of Calcitic Marble from Thasos in Italy: Ostia and Siracusa <i>Donato Attanasio, John J. Herrmann, Robert H. Tykot and Annewies van den Hoek</i>	281
Revisiting the Origin and Destination of the Late Antique Marzamemi 'Church Wreck' Cargo <i>Justin Leidwanger, Scott H. Pike and Andrew Donnelly</i>	291
The Marbles of the Sculptures of Felix Romuliana in Serbia <i>Walter Prochaska and Maja Živić</i>	301
Calcitic Marble from Thasos and Proconnesos in Nea Anchialos (Thessaly) and Thessaloniki (Macedonia) <i>Vincent Barbin, John J. Herrmann, Aristotle Mentzos and Annewies van den Hoek</i>	311
Architectural Decoration of the Imperial Agora's Porticoes at Iasos <i>Fulvia Bianchi, Donato Attanasio and Walter Prochaska</i>	321
The Winged Victory of Samothrace - New Data on the Different Marbles Used for the Monument from the Sanctuary of the Great Gods <i>Annie Blanc, Philippe Blanc and Ludovic Laugier</i>	331
Polychrome Marbles from the Theatre of the Sanctuary of Apollo Pythios in Gortyna (Crete) <i>Jacopo Bonetto, Nicolò Mareso and Michele Bueno</i>	337
Paul the Silentiary, Hagia Sophia, Onyx, Lydia, and Breccia Corallina <i>John J. Herrmann and Annewies van den Hoek</i>	345
Incrustations from Colonia Ulpia Traiana (Near Modern Xanten, Germany) <i>Vilma Ruppiniè and Ulrich Schüssler</i>	351
Stone Objects from Vindobona (Austria) – Petrological Characterization and Provenance of Local Stone in a Historico-Economical Setting <i>Andreas Rohatsch, Michaela Kronberger, Sophie Insulander, Martin Mosser and Barbara Hodits</i>	363
Marbles Discovered on the Site of the Forum of Vaison-la-Romaine (Vaucluse, France): Preliminary Results <i>Elsa Roux, Jean-Marc Mignon, Philippe Blanc and Annie Blanc</i>	373
Updated Characterisation of White Saint-Béat Marble. Discrimination Parameters from Classical Marbles <i>Hernando Royo Plumed, Pilar Lapeunte, José Antonio Cuchí, Mauro Brillì and Marie-Claire Savin</i>	379

Grey and Greyish Banded Marbles from the Estremoz Anticline in Lusitania <i>Pilar Lapuente, Trinidad Nogales-Basarrate, Hernando Royo Plumed, Mauro Brilli and Marie-Claire Savin</i>	391
New Data on Spanish Marbles: the Case of <i>Gallaecia</i> (NW Spain) <i>Anna Gutiérrez García-M., Hernando Royo Plumed and Silvia González Soutelo</i>	401
A New Roman Imperial Relief Said to Be from Southern Spain: Problems of Style, Iconography, and Marble Type in Determining Provenance <i>John Pollini, Pilar Lapuente, Trinidad Nogales-Basarrate and Jerry Podany</i>	413
Reuse of the <i>Marmorata</i> from the Late Roman Palatial Building at Carranque (Toledo, Spain) in the Visigothic Necropolis <i>Virginia García-Entero, Anna Gutiérrez García-M. and Sergio Vidal Álvarez</i>	427
Imperial Porphyry in Roman Britain <i>David F. Williams</i>	435
Recycling of Marble: Apollonia/Sozousa/Arsuf (Israel) as a Case Study <i>Moshe Fischer, Dimitris Tambakopoulos and Yannis Maniatis</i>	443
Thasian Connections Overseas: Sculpture in the Cyrene Museum (Libya) Made of Dolomitic Marble from Thasos <i>John J. Herrmann and Donato Attanasio</i>	457
Marble on Rome's Southwestern Frontier: Thamugadi and Lambaesis <i>Robert H. Tykot, Ouahiba Bouzidi, John J. Herrmann and Annewies van den Hoek</i>	467
Marble and Sculpture at Lepcis Magna (Tripolitania, Libya): a Preliminary Study Concerning Origin and Workshops <i>Luisa Musso, Laura Buccino, Matthias Bruno, Donato Attanasio and Walter Prochaska</i>	481
The Pentelic Marble in the Carnegie Museum of Art Hall of Sculpture, Pittsburgh, Pennsylvania <i>Albert D. Kollar</i>	491
Analysis of Classical Marble Sculptures in the Michael C. Carlos Museum, Emory University, Atlanta <i>Robert H. Tykot, John J. Herrmann, Renée Stein, Jasper Gaunt, Susan Blevins and Anne R. Skinner</i>	501
3. PROVENANCE IDENTIFICATION II: (OTHER STONES)	
Aphrodisias and the Regional Marble Trade. The <i>Scaenae Frons</i> of the Theatre at Nysa <i>Natalia Toma</i>	513
The Stones of Felix Romuliana (Gamzigrad, Serbia) <i>Bojan Djurić, Divna Jovanović, Stefan Pop Lazić and Walter Prochaska</i>	523
Aspects of Characterisation of Stone Monuments from Southern Pannonia <i>Branka Migotti</i>	537

The Budakalász Travertine Production <i>Bojan Djurić, Sándor Kele and Igor Rižnar</i>	545
Stone Monuments from Carnuntum and Surrounding Areas (Austria) – Petrological Characterization and Quarry Location in a Historical Context <i>Gabrielle Kremer, Isabella Kitz, Beatrix Moshhammer, Maria Heinrich and Erich Draganits</i>	557
Espejón Limestone and Conglomerate (Soria, Spain): Archaeometric Characterization, Quarrying and Use in Roman Times <i>Virginia García-Entero, Anna Gutiérrez García-M, Sergio Vidal Álvarez, María J. Peréx Agorreta and Eva Zarco Martínez</i>	567
The Use of Alcover Stone in Roman Times (<i>Tarraco, Hispania Citerior</i>). Contributions to the <i>Officina Lapidaria Tarraconensis</i> <i>Diana Gorostidi Pi, Jordi López Vilar and Anna Gutiérrez García-M.</i>	577
4. ADVANCES IN PROVENANCE TECHNIQUES, METHODOLOGIES AND DATABASES	
Grainautline – a Supervised Grain Boundary Extraction Tool Supported by Image Processing and Pattern Recognition <i>Kristóf Csorba, Lilla Barancsuk, Balázs Székely and Judit Zöldföldi</i>	587
A Database and GIS Project about Quarrying, Circulation and Use of Stone During the Roman Age in <i>Regio X - Venetia et Histria</i> . The Case Study of the Euganean Trachyte <i>Caterine Previato and Arturo Zara</i>	597
5. QUARRIES AND GEOLOGY	
The Distribution of Troad Granite Columns as Evidence for Reconstructing the Management of Their Production <i>Patrizio Pensabene, Javier Á. Domingo and Isabel Rodà</i>	613
Ancient Quarries and Stonemasonry in Northern Choria Considiana <i>Hale Güney</i>	621
Polychromy in Larisaeon Quarries and its Relation to Architectural Conception <i>Gizem Mater and Ertunç Denктаş</i>	633
Euromos of Caria: the Origin of an Hitherto Unknown Grey Veined Stepped Marble of Roman Antiquity <i>Matthias Bruno, Donato Attanasio, Walter Prochaska and Ali Bahadır Yavuz</i>	639
Unknown Painted Quarry Inscriptions from Bacakale at <i>Docimium</i> (Turkey) <i>Matthias Bruno</i>	651
The Green Schist Marble Stone of Jebel El Hairech (North West of Tunisia): a Multi-Analytical Approach and its Uses in Antiquity <i>Ameur Younès, Mohamed Gaied and Wissem Gallala</i>	659
Building Materials and the Ancient Quarries at <i>Thamugadi</i> (East of Algeria), Case Study: Sandstone and Limestone <i>Younès Rezkallah and Ramdane Marmi</i>	673

The Local Quarries of the Ancient Roman City of <i>Valeria</i> (Cuenca, Spain) <i>Javier Atienza Fuente</i>	683
The Stone and Ancient Quarries of Montjuïc Mountain (Barcelona, Spain) <i>Aureli Álvarez</i>	693
<i>Notae Lapidinarum</i> : Preliminary Considerations about the Quarry Marks from the Provincial Forum of <i>Tarraco</i> <i>Maria Serena Vinci</i>	699
The Different Steps of the Rough-Hewing on a Monumental Sculpture at the Greek Archaic Period: the Unfinished Kouros of Thasos <i>Danièle Braunstein</i>	711
A Review of Copying Techniques in Greco-Roman Sculpture <i>Séverine Moureaud</i>	717
Labour Forces at Imperial Quarries <i>Ben Russell</i>	733
Social Position of Craftsmen inside the Stone and Marble Processing Trades in the Light of Diocletian's Edict on Prices <i>Krešimir Bosnić and Branko Matulić</i>	741
6. STONE PROPERTIES, WEATHERING EFFECTS AND RESTORATION, AS RELATED TO DIAGNOSIS PROBLEMS, MATCHING OF STONE FRAGMENTS AND AUTHENTICITY	
Methods of Consolidation and Protection of Pentelic Marble <i>Maria Apostolopoulou, Elissavet Drakopoulou, Maria Karoglou and Asterios Bakolas</i>	749
7. PIGMENTS AND PAINTINGS ON MARBLE	
Painting and Sculpture Conservation in Two Gallo-Roman Temples in Picardy (France): Champlieu and Pont-Sainte-Maxence <i>Véronique Brunet-Gaston and Christophe Gaston</i>	763
The Use of Colour on Roman Marble Sarcophagi <i>Eliana Siotto</i>	773
New Evidence for Ancient Gilding and Historic Restorations on a Portrait of Antinous in the San Antonio Museum of Art <i>Jessica Powers, Mark Abbe, Michelle Bushey and Scott H. Pike</i>	783
Schists and Pigments from Ancient Swat (Khyber Pukhtunkhwa, Pakistan) <i>Francesco Mariottini, Gianluca Vignaroli, Maurizio Mariottini and Mauro Roma</i>	793
8. SPECIAL THEME SESSION: „THE USE OF MARBLE AND LIMESTONE IN THE ADRIATIC BASIN IN ANTIQUITY”	
Marble Sarcophagi of Roman Dalmatia Material – Provenance – Workmanship <i>Guntram Koch</i>	809

Funerary Monuments and Quarry Management in Middle Dalmatia <i>Nenad Cambi</i>	827
Marble Revetments of Diocletian's Palace <i>Katja Marasović and Vinka Marinković</i>	839
The Use of Limestones as Construction Materials for the Mosaics of Diocletian's Palace <i>Branko Matulić, Domagoj Mudronja and Krešimir Bosnić</i>	855
Restoration of the Peristyle of Diocletian's Palace in Split <i>Goran Nikšić</i>	863
Marble Slabs Used at the Archaeological Site of Sorna near Poreč Istria – Croatia <i>Đeni Gobić-Bravar</i>	871
Ancient Marbles from the Villa in Verige Bay, Brijuni Island, Croatia <i>Mira Pavletić and Đeni Gobić-Bravar</i>	879
Notes on Early Christian Ambos and Altars in the Light of some Fragments from the Islands of Pag and Rab <i>Mirja Jarak</i>	887
The Marbles in the Chapel of the Blessed John of Trogir in the Cathedral of St. Lawrence at Trogir <i>Đeni Gobić-Bravar and Daniela Matetić Poljak</i>	899
The Use of Limestone in the Roman Province of Dalmatia <i>Edisa Lozić and Igor Rižnar</i>	915
The Extraction and Use of Limestone in Istria in Antiquity <i>Klara Buršić-Matijašić and Robert Matijašić</i>	925
Aurisina Limestone in the Roman Age: from Karst Quarries to the Cities of the Adriatic Basin <i>Caterina Previato</i>	933
The Remains of Infrastructural Facilities of the Ancient Quarries on Zadar Islands (Croatia) <i>Mate Parica</i>	941
The Impact of Local Geomorphological and Geological Features of the Area for the Construction of the Burnum Amphitheatre <i>Miroslav Glavičić and Uroš Stepišnik</i>	951
Roman Quarry Klis Kosa near Salona <i>Ivan Alduk</i>	957
Marmore Lavdata Brattia <i>Miona Miliša and Vinka Marinković</i>	963
Quarries of the Lumbarda Archipelago <i>Ivka Lipanović and Vinka Marinković</i>	979

Island of Korčula – Importer and Exporter of Stone in Antiquity <i>Mate Parica and Igor Borzić</i>	985
Faux Marbling Motifs in Early Christian Frescoes in Central and South Dalmatia: Preliminary Report <i>Tonči Borovac, Antonija Gluhan and Nikola Radošević</i>	995
INDEX OF AUTHORS	1009

QUARRIES OF THE LUMBARDA ARCHIPELAGO

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Abstract

Signs of quarrying that date back to Antiquity are evident on the central-Dalmatian island of Korčula. Most of the quarries from Antiquity recorded are concentrated in the Lumbarda archipelago. The quarries and their surroundings have been only partially explored, and have not been completely presented to the public. Stones that were exploited are of the highest quality, but have not been subjected to petrographic analysis. This paper brings a topographical view of the quarries set in the Lumbarda archipelago, today's state of the quarries in visual imagery and a description of stones based on visual analysis. All of the aforementioned is a modest base for the multidisciplinary research to be conducted.

Keywords

island of Korčula, ancient quarries, limestone

Introduction

Geologically speaking, the central Dalmatian island of Korčula is part of the Outer Dinarides area. It is composed of limestone and dolomite that accumulated during the lower and upper Cretaceous period (Fig. 1)¹. The upper-Cretaceous rudist limestone (white to yellow-brown colour) is one of the highest quality stones, very similar, in its mineral-petrographic characteristics, to the stone from the island of Brač. Due to its quality and large crystalline structures, both types of limestone are referred to as "marble" or "polymarble" by the local population.

It is obvious from the traces of exploitation on the group of islands east of Korčula (Lumbardian archipelago) that there has been systematic and organized stone exploitation on the island since Antiquity². Throughout the Middle Ages and later, stone exploitation was very vigorous, as shown by material evidence and numerous inscriptions and documents. Extracting and processing

the stone was very common on the island, which is confirmed by the Statute of Korčula dating from the year 1214. One part of the statute says expressly that "everyone who exports the stone from the island of Korčula is obliged to report it to the government and note down in the municipal office, just as every foreigner who exports the stone is obliged for every 100 *modijasol* in weight to give 1 golden ducat"³.

With the founding of the town of Korčula, numerous stonecutting workshops were formed, spreading their influence outside of the island and the Dubrovnik-Neretva County. Among the best known are the Andrijić Brothers stonecutting workshop, which was the core of the so-called Dubrovnik-Korčula school of architecture and stonemasonry. In that period stone was intensely exploited for the needs of building the city of Dubrovnik. Stone was exported also to Zadar, Kotor, Venice and Istanbul. Throughout history the exploitation was conducted in several zones of islands and also on the nearby smaller islands concentrated on the north-east side of the Korčula itself: Lučnjak, Badij, Planjak, Kamenjak, Vrnik, Sutvar, Gubavac and Sestrice (Fig. 2). Interestingly the exploitation of stone was the most intensive on the island of Vrnik, with an area of 0.282 km² (Fig. 3). On such a small footage there were 29 registered stone quarries. The extraction of stone was conducted until recently and visible by the inactive stone quarries are the stone houses (known under the name "trimi") in which the processing and preparation of stone was made.

Today the extraction of stone on the island of Korčula is done only in Humac quarry, while the Brendana and Krmača quarries were abandoned in the 20th century.

Clear testament to the tradition of stone extraction and processing is the longevity of the educational system for stonemasons on the island.⁴

Ancient quarries of Korčula

On a group of small islands called Vrnik, Sutvara, and Kamenjak (east side of the island of Korčula, positioned on the route from the town of Korčula to the

1 KRKLEC, LJUBENKOV, BENSA 2011, 5.

2 ZANINOVIĆ 1997, 38.

3 KLISURA 2009, 97.

4 KLISURA 2009, 97.

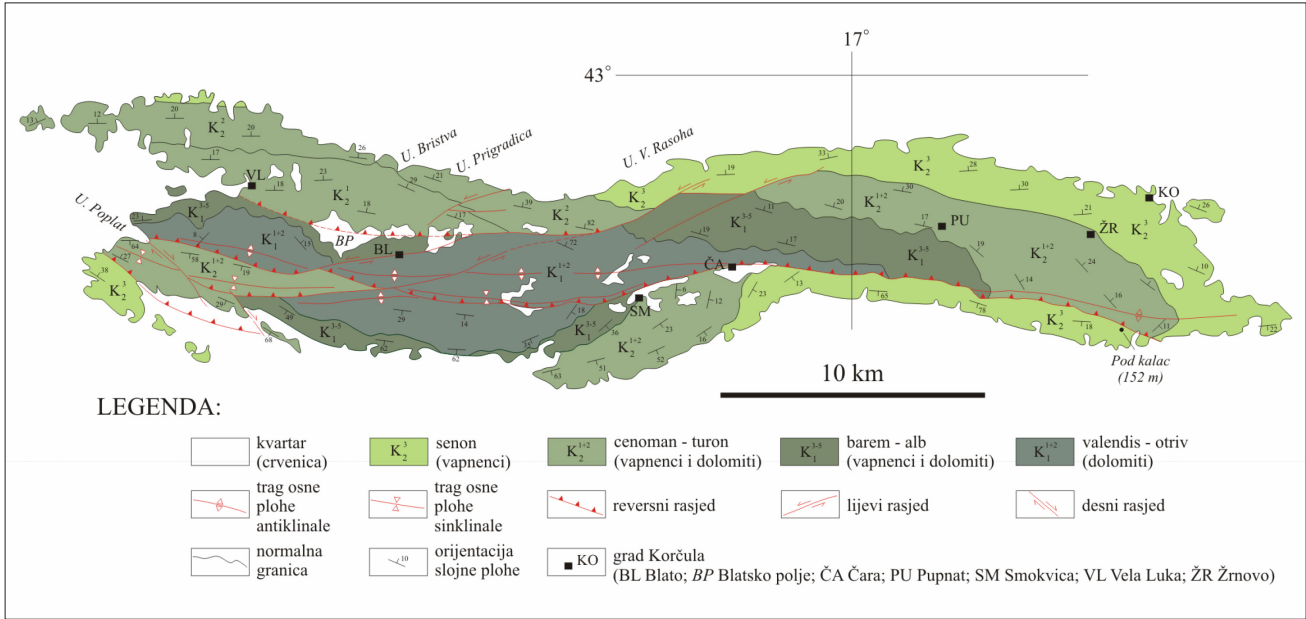


Fig. 1. Geochemical map of the island of Korčula (source: KOROLIJA *et al.* 1977)



Fig. 2. View of the eastern part of the island of Korčula with places from which stone was excavated marked (source: Google Maps)



Fig. 3. Island of Vrnik (photo: I. Lipanović, 2014.)



Fig. 4. Ancient quarry on the island of Sutvara, state today (photo: I. Lipanović, 2014.)



Fig. 5. Ancient quarry on the island of Sutvara, state today (photo: I. Lipanović, 2014.)



Fig. 6. Tool marks in the ancient quarry on Sutvara, state today (photo: I. Lipanović, 2014.)

town of Lombardia), there are signs of quarrying that date back to Antiquity. Encouraged by historical sources, descriptions and remains which bear witness to the exploitation of stone during the period of the Roman Empire, M. Givoje was the first to publish traces found by reconnoitering the terrain.⁵

In the *Periegesis* of Pseudo-Scymnus, a verse work dating from the 1st or 2nd century B.C. there is information telling of the exploitation of white stone on the islands of Korčula.⁶ On the northwest side of the island of Vrnik an early Christian inscription was found that dates from the 5th century⁷, while on the small island of Sutvara there are remains of a small Early Christian church dedicated to Saint Barbara.⁸ Formerly mentioned material remains tell of early use on the island, and correlate with the fact there were excavations and processing of stone on the island.

On the small island of Kamenjak Givoje recorded “indentations” which he dated to Antiquity.⁹ In one of those so-called indentations or rifts, which it was possible to interpret as *pašarini*, handcut channels preceding extraction, a prehistoric stone hammer had been found much earlier.¹⁰

Stone quarries of the gallery type have been recorded on Vrnik and Sutvara. The gallery quarry on Vrnik is completely blocked with remains of stone extraction and is impenetrable, today as in Givoje’s time. On the island of Vrnik in the past it was possible to record similar caves (quarries) on five zones of the island, as stated by Givoje.¹¹ Meanwhile on Sutvara, textbook examples of stone use were registered, and of mining methods in three places: by the sea on the north-east side of the island and on two locations in the middle of the island.¹² The biggest gallery (quarry) is on top of Sutvara, approximately 18 m deep, 12 m wide, and height up to 3 m.¹³ Blocks extracted were mainly dimensioned approximately 2 x 1 x 1 m.¹⁴ In a review of the terrain nearing the end of 2014, the same situation was confirmed: the quarry is well preserved and passable, and the traces of stonecut tools in the stone are still highly visible (Figs. 4, 5, 6).

The remaining two galleries on Sutvara are still not pervius.

5 GJIVOJE 1970, 68-70.

6 GJIVOJE 1970, 69.

7 RADIĆ 1887, 37-38; GJIVOJE 1970, 70.

8 RADIĆ 1891, 50-52.

9 GJIVOJE 1970, 71.

10 GJIVOJE 1970, 71.

Name	Petrographical name	The geological age	Colour	Quarry
SUTVARA	Limestone	Upper Cretaceous (Senonian)	whitish	Island of Sutvara, by Korčula - quarry from Antiquity
VRNIK SALDI	Limestone	Upper Cretaceous (Senonian)	whitish, yellowish	Island of Vrnik, by Korčula - not active quarry
VRNIK PIGAVAC	Limestone	Upper Cretaceous (Senonian)	yellowish, brownish	Island of Vrnik, by Korčula - not active quarry
HUMAC	Limestone	Upper Cretaceous (Senonian)	whitish, yellowish	Humac, east side of Korčula, active quarry

Table 1. Samples taken in 2014.

Characteristics of the stone from Korčula – selected samples

Although there is a mass of written evidence about quarrying on the island of Korčula, there has been no serious analyses and studies about the sort of stones and quarries. Stones that were exploited from the island of Korčula and the nearby smaller islands geologically mainly belong among Upper Cretaceous rudist limestones, and are very similar to rock from the island of Brač. Every locality (quarry) contains special varieties of stone.

During 2014, on several zones on the east part of the island Korčula, samples of stone were taken. A small number of samples were taken (4) from sites and quarries that were accessible. The samples were taken from the island of Sutvara (1 sample), the island of Vrnik (2 samples) and from Humac Quarry (see Table 1).

The samples of stone were polished to the highest shine and then macroscopically described. At this moment no other analyses are possible. Listed below is a modest survey, a starting point for the establishment of the multidisciplinary research effort to follow. The plan and purpose of this research is to form a detailed list of natural stone from the island of Korčula, charting ancient, medieval and recent quarries on the island and forming a data base. The creation of a database can be the foundation for the research of the provenance of ancient artwork and buildings, as well as for the defining of the dispersal of the products of stonecutting workshops on the island of Korčula.

On the island of **Sutvara** the samples taken were from an ancient quarry. The stone is thick and white with small remains of skeletal detritus (Fig. 7a). In contact with hydrochloric acid it shows a strong reaction. It is mentioned in literature that the stone was used for building facades, but too soft for certain elements (such as

stairwells).¹¹ This type of stone is similar to a type from the island of Brač called Veselje Unito.¹²

The island of **Vrnik** is built from Senonian rudist limestone, with layers that vary. Upper layers are made from porous, yellow to black limestone of poorer quality popularly called “pigavac” [something mottled, i.e., with small shells] (Fig. 7c). Thick white limestone is positioned in the lower layers (Fig. 7b). This stone is of high quality, resembling that from the island of Sutvara and similar to Veselje from Brač. Although it was not possible to sample stone from the ancient quarry, it can be assumed to be similar to this specimen.

The quarry **Humac** is positioned on the east side of the island of Korčula by the Korčula-Lumbardia road. According to recent data it is the only currently active quarry.

It produces organogenic stratified to banked limestone in two varieties, gray and thick whitish to yellowish crystalline limestone (Fig. 7d).

Suggestions for the future and conclusion

On the east side of the island of Korčula quarries from Antiquity of the gallery type have been adduced. Until this day, the quarries and their surroundings have not been adequately explored or presented. Exploring the quarries, the surrounding terrain, underwater terrain reconnaissance of Korčula could give new answers, correlating the ways of extraction of stone in Antiquity, activities and life on the island but also data about transport and the movement radius of the exploited stone. The last mentioned is still a complete unknown.

Ancient, but also medieval, quarries of Korčula

11 Croatian Geological Survey, 2008, 60.

12 More about stone from island Brač - CRNKOVIĆ, ŠARIĆ 2003, 55-60; MARINKOVIĆ, MILIŠA 2015.

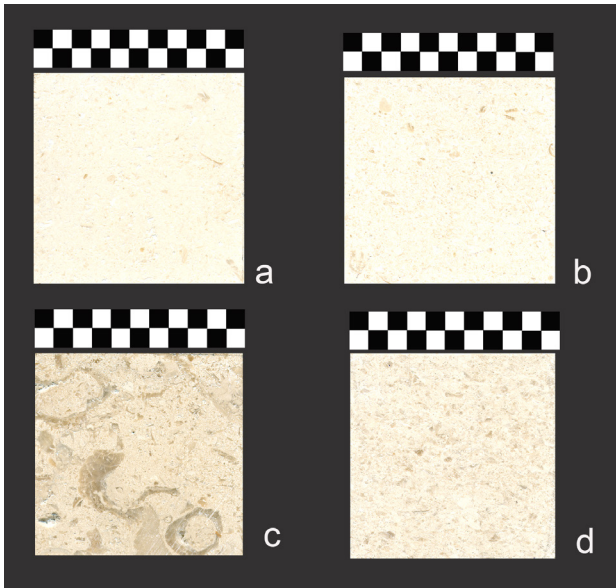


Fig. 7. Samples of stone from the island of Korčula
a) Sutvara b) Vrnik Saldi c) Vrnik Pigavac d) Humac
(photo: I. Lipanović, V. Marinković)

still have their use value. The exploitation of stone in strictly controlled forms offers the possibility of using the stone for restoration work on important buildings and artwork (Korčula, Dubrovnik etc.). Stone composed of the same mineral-petrographic characteristics is the best working material for conservation-restoration projects. But this has to be preceded by extensive research work that implies: forming a detailed list of natural stone on Korčula and charting ancient, medieval and recent quarries on the island. Furthermore it is necessary to carry out the sampling of stones from defined historic quarries, and then the analyses of the natural stone. Following these actions it will be possible to create a database. The creation of a database can be the foundation for the research of the provenance of ancient artwork and buildings, as well as for the defining of the dispersal of the products of the stonecutting workshops.

The organization and presentation of the old quarries represents a potential to the tourist offer of the island. Revitalized areas of the quarries offer a wide variety of possibilities: from using them for art colonies, plays and concerts, to utilizing them for sporting activities (for example climbing grounds, such as those at Ballykeefe Quarry in Ireland). All of the aforementioned could be a guideline for the revitalization and preservation of the stonecutting tradition of Korčula, which has unfortunately completely died out.

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