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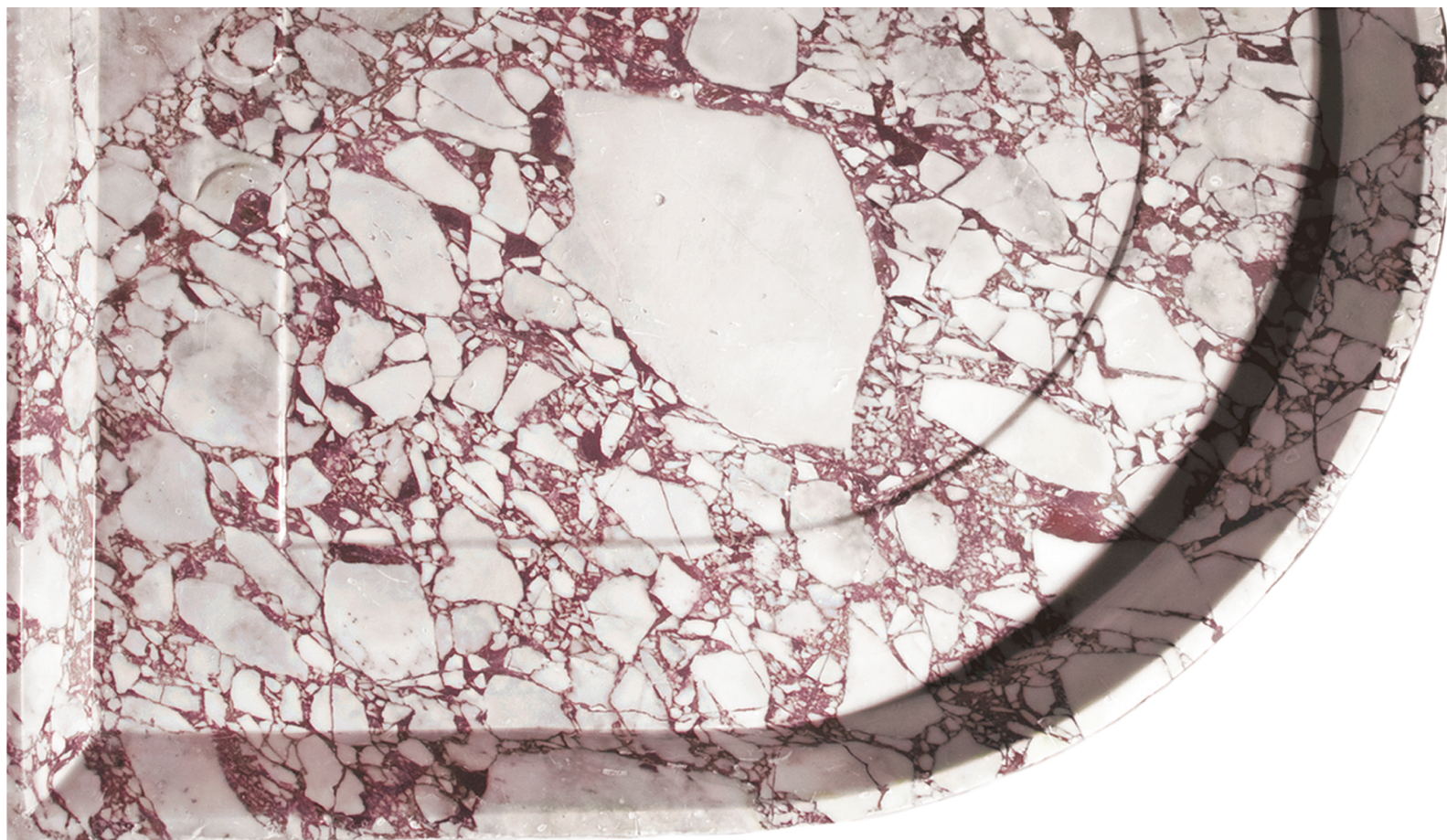
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Interdisciplinary Studies on Ancient Stone

PROCEEDINGS

of the XI ASMOSIA Conference, Split 2015

Edited by Daniela Matetić Poljak and Katja Marasović



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Association for the Study of Marble & Other Stones in Antiquity

ASMOSIA XI

Interdisciplinary Studies of Ancient Stone

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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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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,</i> <i>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,</i> <i>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 Brillì and Marie-Claire Savin</i>	391
New Data on Spanish Marbles: the Case of <i>Gallaecia</i> (NW Spain) <i>Anna Gutiérrez Garcia-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>Marmora</i> from the Late Roman Palatial Building at Carranque (Toledo, Spain) in the Visigothic Necropolis <i>Virginia García-Entero, Anna Gutiérrez Garcia-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. Peréz 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 Barancsik, 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 Larisaean 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

PRESENTATION

The limestones of Istria and Dalmatia, two Croatian regions along the Adriatic coast, have long been recognised for their quality and have been exploited since prehistoric times. Largely due to the use of this durable material, the architectural heritage of these regions is still remarkably well preserved. In contrast to the abundant high-quality limestone, however, marble is very scarce along the Croatian coast, and this material began to be imported at the beginning of the 4th century BC, following the Greek colonisation of the Adriatic islands. Later on, as the area became a part of the Roman Empire, Roman civilisation became the dominant cultural influence on the local population, and the characteristically Roman standardisation of construction methods and the large-scale production of architectural elements, sepulchral monuments, and sculptures increased the demand for both limestone and marble. At that time numerous limestone quarries were opened up, some of which still remain in operation today. In Roman times the exportation of local limestone products began to spread within the Adriatic basin and beyond, but the Roman fashion for imported marble also affected the populations of the Roman colonies on the eastern Adriatic coast. During the Roman Imperial and Early Byzantine periods, Parentium, Pola, Iader, Salona, Aequum, Narona, and Epidaurum, brought expensive marble products to decorate their buildings from different Mediterranean regions, particularly Greece, Egypt and Asia Minor. Since the importation of marble was interrupted during the Middle Ages, these durable and often colourful materials were reutilised for the production of church furniture, tombs, and sarcophagi. These witnesses of ancient splendour are also found in Renaissance and Baroque buildings in second or even third reutilisation, extending their life span to the present day.

At the ASMOSIA X Conference held in Rome in 2012, the Association Executive Committee members suggested the forthcoming conference be held in Split, and we enthusiastically accepted the proposal. Nearly one hundred sixty scientists and scholars in the fields of archaeology, art history, architecture, geology, chemistry, physics, restoration and conservation of stone coming from twenty-eight countries took part in the ASMOSIA XI Conference, held from May 18 to 22, 2015. Ninety lectures were presented in 8 thematic sessions at the conference: Use of Marble; Provenance Identification I (Marble); Provenance Identification II (Other stone); Advances in Provenance Techniques, Methodologies and Databases; Quarries and Geology; Stone Properties, Weathering

Effects and Restoration; Pigments and Painting on Marble. The tradition of exploiting and the techniques of extracting and processing stone, the quality and types of limestone in ancient Dalmatia and Istria, the export of stone products from this area to the Mediterranean Basin, and the various types of marble imported into the area during Roman times, as well as their reutilisation in later historical periods were presented in the Special Theme Session: The Use of Marble and Limestone in the Adriatic Basin in Antiquity. In two sessions dealing with these topics, seventy-three posters were exhibited as well.

The ASMOSIA XI Conference was organised by the Faculty of Civil Engineering, Architecture and Geodesy and the Arts Academy of the University of Split. All the sessions were held in two Gothic palaces situated within Diocletian's Palace (the Split City Museum and the Zlatna Vrata Centre for Culture and Lifelong Learning), which contributed to the special ambience of the conference. On this occasion, the "*Marmore laudata Brattia*" exhibition by Ivo Donelli was also set up, presenting all the limestone types of the island of Brač, as well as the quarries, traditional tools, and stone extraction techniques. A visit to the archaeological site of the city of Salona and a visit to the Archaeological Museum in Split were organised as part of the conference. Upon the closing of the conference, an excursion to the island of Brač was arranged as well, within which the participants visited the ancient Rasohe quarry, Škrip Museum, the Stonemasonry School, and the contemporary stone quarry in Pučišća. The trip ended with a lunch that enabled the participants to enjoy authentic Dalmatian cuisine within a traditional setting.

We would like to thank the Executive Committee for the honour they bestowed upon us by entrusting us with the organisation of the ASMOSIA XI Conference in Split, thus providing us with the opportunity to introduce our foreign colleagues to our built-in-stone heritage. We would like to thank Yannis Maniatis, President of the ASMOSIA Association, whose detailed instructions helped significantly in the organisation of the conference. A special debt of gratitude is owed to Pilar Lapuente who provided us with precious advice and support. We would like to take this opportunity to thank all the members of the Organising Committee and the staff whose enthusiasm contributed to the successful organization of the conference.

We hold before us the Proceedings of the ASMOSIA XI Conference held in 2015 in Split, containing 96 articles written on 1,012 pages and accompanied by 1231 illustrations. The articles are listed in 8 chapters,

corresponding to the themes of the conference. We would first like to extend our thanks to all the authors for their scientific contribution to the Proceedings. Furthermore, considering all of the papers were subjected to a scientific review, we also thank all the reviewers who performed this demanding task pro bono. Enormous gratitude goes to Kate Bošković, the conference secretary and the Proceedings technical editor, who took care of the overall correspondence with the authors and all the technical work on preparing the publication. Lastly, we would like to say that we are more than pleased with the excellent response from authors who deal with limestone and imported marble on the eastern Adriatic coast, and to express our hopes that this volume of proceedings will encourage further elaboration of the topic, thus ensuring that the region continues to enjoy its well-deserved recognition and continues to expand the understanding of its place on the map of marble and other stone in Antiquity.

Daniela Matetić Poljak and Katja Marasović

NECROLOGY: NORMAN HERZ (1923-2013)¹

Professor Emeritus Norman Herz died on 28 May 2013 in Athens, Georgia. He was one of an increasingly rare breed of scholar in the modern academic world: he was both a scientist and a humanist who truly understood the value of interdisciplinary work.¹

Herz was an early pioneer in the field of geoarchaeology. As he stated in the *Preface* of his useful book, *Geological Methods for Archaeology* (co-authored with Erv Garrison in 1997), his intention in writing that book was to “show archaeologists the many ways that geological sciences can help solve their problems”. And so he did, bringing the new discipline of geoarchaeology into the mainstream of archaeological studies and forever changing the way we look at the study of stone in the ancient world.

Born in New York City, Herz received a Bachelor of Science degree from the City College of New York in 1943. He enlisted in the us Army in the 2nd World War and served in the Corps of Engineers and the Air Force. He was commissioned as a 2nd lieutenant in the Air Force in March 1945. His book *Operation Alacrity: The Azores and the War in the Atlantic*, published in 2005, reveals his participation (he was unaware of its importance at the time) in a top-secret operation in the Azores that may well have changed the course of the 2nd World War.

Herz was awarded a Ph.D. in Geology by The Johns Hopkins University in 1950. A year (1951-1952) in Greece as a Fulbright Senior Research Scholar led to a life-long interest in the applications of geology and geochemistry to archaeological research. In his ground-breaking article, co-authored with W. K. PRITCHETT, *Marble in Attic Epigraphy*, published in “American Journal of Archaeology” in 1953, Herz pointed out that the methods of marble identification then used by archaeologists relied too heavily on subjective visual inspection. He argued for a more geologically based approach. This article began the work that led him to develop a methodology that utilized petrographic (thin section and grain size), geochemical (stable isotopes), and statistical analyses in order to identify the sources of the different white marbles in the Mediterranean that were used in antiquity.

Herz had a stellar career as a hard rock research geologist that included work in the United States and Brazil. From 1952-1970 he was a Research Geologist with the United States Geological Survey; 1956-1962 was spent working in Brazil on a technical assistance program to map



and help develop resources of the country and also as a visiting Professor at the University of São Paulo. In 1970 he was appointed Professor in the Geology Department at the University of Georgia (Athens, ga), a position he held until his retirement in 1994. To augment the standard geology curriculum at the University of Georgia, Herz founded the Center for Archaeological Sciences (cas) in the mid-1980s, creating a place where students could be trained in interdisciplinary work in archaeology and the sciences, one of the very few places of its kind in the United States.

His most notable contribution to the field of geoarchaeology was the promotion of a geochemical technique: the comparative use of two stable isotopes – $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ –, plotted as a ratio against a standard mean in order to identify the sources of white marble used in antiquity in

1 From *Marmora* 9 (2013), pp. 11-14, courtesy of Fabrizio Serra ed., Pisa-Roma.

the Mediterranean. This technique, pioneered by Craig and Craig, was refined by Herz and then employed as an effective sampling technique to characterize white marble quarries in the Mediterranean. After creating an extensive database of quarries in Greece, Italy, and Turkey, Herz then used the same practice of isotopic analysis on individual marble artifacts in order to determine their provenance (their results were compared to his database of quarry samples), as well as to associate broken pieces of statuary or inscriptions, and to determine the authenticity of weathering patina. Herz's work set the standard for the study of the provenance of white marble in the Mediterranean. His generous publication of his database in 1985 allowed other scholars to build upon and to extend his work.

In 1988, Herz was a founding member of the Association for the Study of Marbles and Other Stones used in Antiquity (ASMOSIA). The purpose of this very active and successful association was to bring archaeologists, art historians, museum curators, geologists, and chemists together in the interdisciplinary study of stone in antiquity. The creation of ASMOSIA reflects everything that Norman Herz stood for as a scholar and researcher and he remained closely involved in the organization until his death.

Herz is the author or co-editor of many books and over two hundred articles. His research was supported by grants from the National Endowment for the Humanities, the National Geographic Society, the National Science Foundation, the Samuel H. Kress Foundation, the American Philosophical Society, the nato Science Committee, and the National Research Council-National Academy of Sciences.

Herz received many honors for his work. In 1995 he was awarded the Archaeological Institute of America's Pomerance Award for Scientific Contributions to Archaeology. In 2007 he received the Geological Society of America's Rip Rapp Archaeological Geology Award for his outstanding contributions to the interdisciplinary field of archaeological geology. In 1981 he won the University of Georgia (Athens, GA) Creative Research Medal. For his accomplishments and teaching in Brazil, he was elected a Foreign Member of the Brazilian Academy of Sciences in 1991.

Norman Herz was a respected scholar, a considerate colleague, and an inspiring teacher. He was also a warm and unpretentious human being with a great sense of humor. He helped many young scholars get their start in the field, was generous with his data and resources, and remained an engaged and positive presence in the field even after his retirement. As a pioneer in the field of geoarchaeology, his visionary work will continue to serve as a paradigm for future research.

Susan Kane

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INDEX

A

ABBE Mark 783
ABRAMITIS Dorothy H. 89
ALDUK Ivan 957
ÁLVAREZ Aureli 693
APOSTOLOPOULOU Maria 749
ARDELEANU Stefan 155
ATIENZA FUENTE Javier 683
ATTANASIO Donato 175, 185, 207, 267, 281, 321, 457, 481, 639

B

BAKOLAS Asterios 749
BARANCSUK Lilla 587
BARBIN Vincent 311
BARKER Simon J. 45, 65, 215
BELTRÁN José 143
BIANCHI Fulvia 321
BLANC Annie 331, 373
BLANC Philippe 331, 373
BLEVINS Susan 501
BONETTO Jacopo 337
BOROVAC Tonči 995
BORZIĆ Igor 985
BOSNIĆ Krešimir 741, 855
BOUZIDI Ouahiba 467
BRAUNSTEIN Danièle 711
BRILLI Mauro 247, 379, 391
BROMBLET Philippe 195
BRUNET-GASTON Véronique 763
BRUNO Matthias 175, 185, 481, 639, 651
BUCCINO Laura 481
BUENO Michele 337
BUGINI Roberto 79, 231, 275
BURRELL Barbara 117
BUSHEY Michelle 783
BURŠIĆ-MATIJAŠIĆ Klara 925
BUTZ Patricia A. 109

C

CAMBI Nenad 827
CANCELLIERE Stefano 255
COOPER Anthony H. 195
CSORBA Kristóf 587
CUCHÍ José Antonio 379

D

DAVID Massimiliano 33
DENKTAŞ Ertunç 633
DE STAEBLER Peter D. 95
DJURIĆ Bojan 523, 545
DOMINGO Javier Á. 613
DONNELLY Andrew 291
DRAGANITS Erich 557
DRAKOPOULOU Elissavet 749

F

FANT J. Clayton 65, 215
FISCHER Moshe 443
FOLLI Luisa, 231, 275

G

GAIED Mohamed 659
GALLALA Wissem 659
GALLOCCCHIO Enrico 247
GARCÍA-ENTERO Virginia 427, 567
GASPARINI Eleonora 101
GASTON Christophe 763
GAUNT Jasper 501
GAZZOLI Silvia 79
GIUSTINI Francesca 247
GLAVIČIĆ Miroslav 951
GLUHAN Antonija 995
GOBIĆ-BRAVAR Đeni 871, 879, 899
GOETTE Hans Rupprecht 267
GONZÁLEZ SOUTELO Silvia 401
GOROSTIDI PI Diana 577
GUERROT Catherine 195
GÜNEY Hale 621
GUTIÉRREZ GARCIA-M. Anna 401, 427, 567, 577

H

HEINRICH Maria 557
HERRMANN John J. 89, 207, 239, 281, 311, 345, 457, 467, 501
HODITS Barbara 363

I

INSULANDER Sophie 363

J

JARAK Mirja 887
JOVANOVIĆ Divna 523

K

KAROGLOU Maria 749
KELE Sándor 545
KITZ Isabella 557
KLOPPMANN Wolfram 195
KOCH Guntram 909
KOLLAR Albert D. 491
KOZELJ Tony 131
KREMER Gabrielle 557
KRONBERGER Michaela 363

L

LAPUENTE Pilar 379, 391, 413
 LAUGIER Ludovic 331
 LAZZARINI Lorenzo 215, 255
 LEIDWANGER Justin 291
 LE POGAM Pierre-Yves 195
 LEROUX Lise 195
 LIPANOVIĆ Ivka 979
 LÓPEZ VILAR Jordi 577
 LOZA María Luisa 143
 LOZIĆ Edisa 915

M

MANIATIS Yannis 443
 MARASOVIĆ Katja 839
 MARESO Nicolò 337
 MARINKOVIĆ Vinka 839, 963, 979
 MARIOTTINI Francesco 793
 MARIOTTINI Maurizio 793
 MARMÍ Ramdane 673
 MATER Gizem 633
 MATETIĆ POLJAK Daniela 899
 MATIJAŠIĆ Robert 925
 MATULIĆ Branko 741, 855
 MENTZOS Aristotle 311
 MESISCA Antonio 255
 MIGNON Jean-Marc 373
 MIGOTTI Branka 537
 MILIŠA Miona 963
 MOSHAMMER Beatrix 557
 MOSSER Martin 363
 MOUREAUD Séverine 717
 MUDRONJA Domagoj 855
 MUSSO Luisa 481

N

NERI Elisabetta 79
 NIKŠIĆ Goran 863
 NOGALES-BASARRATE Trinidad 391, 413

O

ONTIVEROS Esther 143

P

PARICA Mate 941, 985
 PAVLETIĆ Mira 879
 PEDRONI Luigi 167
 PEIRANO Diego 123
 PENSABENE Patrizio 25, 101, 247, 613
 PERÉX AGORRETA María J. 567
 PERNA Simona 45, 215
 PIKE Scott H. 291, 783
 PODANY Jerry 413
 POLLINI John 413
 POP LAZIĆ Stefan 523
 POWERS Jessica 783
 PREVIATO Caterine 597, 933
 PROCHASKA Walter 175, 185, 267, 301, 321, 481, 523, 639

R

RADOŠEVIĆ Nikola 995
 REZKALLAH Younes 673
 RIŽNAR Igor 545, 915
 RODÀ Isabel 613
 RODRÍGUEZ Araceli 143
 RODRÍGUEZ Oliva 143
 ROFFIA Elisabetta 231
 ROHATSCH Andreas 363
 ROMA Mauro 793
 ROMANO Irene Bald 267
 ROUX Elsa 373
 ROYO PLUMED Hernando 379, 391, 401
 RUPPIENÉ Vilma 351
 RUSSELL Ben 733

S

SALVADORI Monica 255
 SAVIN Marie-Claire 379, 391
 SCHÜSSLER Ulrich 351
 SIOTTO Eliana 773
 SKINNER Anne R. 501
 SOLITO Martino 275
 STEIN Renée 501
 STEPIŠNIK Uroš 951
 SUCCI Stefano 33
 SZÉKELY Balázs 587

T

TAMBAKOPOULOS Dimitris 443
 TAYLOR Ruth 143
 TOMA Natalia 513
 TURCI Marcello 33
 TYKOT Robert H. 239, 281, 467, 501

V

VAN DEN HOEK Annewies 207, 239, 281, 311, 345, 467
 VIDAL ÁLVAREZ Sergio 427, 567
 VIGNAROLI Gianluca 793
 VILLA Igor M. 215
 VINCI Maria Serena 699
 VINGTAIN Dominique 195

W

WILLIAMS David F. 435
 WORLEY Noel 195
 WURCH-KOZELJ Manuela 131

Y

YAVUZ Ali Bahadır 185, 639
 YOUNES Ameer 659

Z

ZARA Arturo 597
 ZARCO MARTÍNEZ Eva 567
 ZÖLDFÖLDI Judit 587
 ŽIVIĆ Maja 301

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