

# ASMOSIA XI, Interdisciplinary Studies on Ancient Stone, Proceedings of the XI International Conference of ASMOSIA

---

**Edited book / Urednička knjiga**

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

*Publication year / Godina izdavanja:* **2018**

*Permanent link / Trajna poveznica:* <https://urn.nsk.hr/urn:nbn:hr:123:845203>

*Rights / Prava:* [In copyright](#) / [Zaštićeno autorskim pravom.](#)

*Download date / Datum preuzimanja:* **2025-01-24**



*Repository / Repozitorij:*

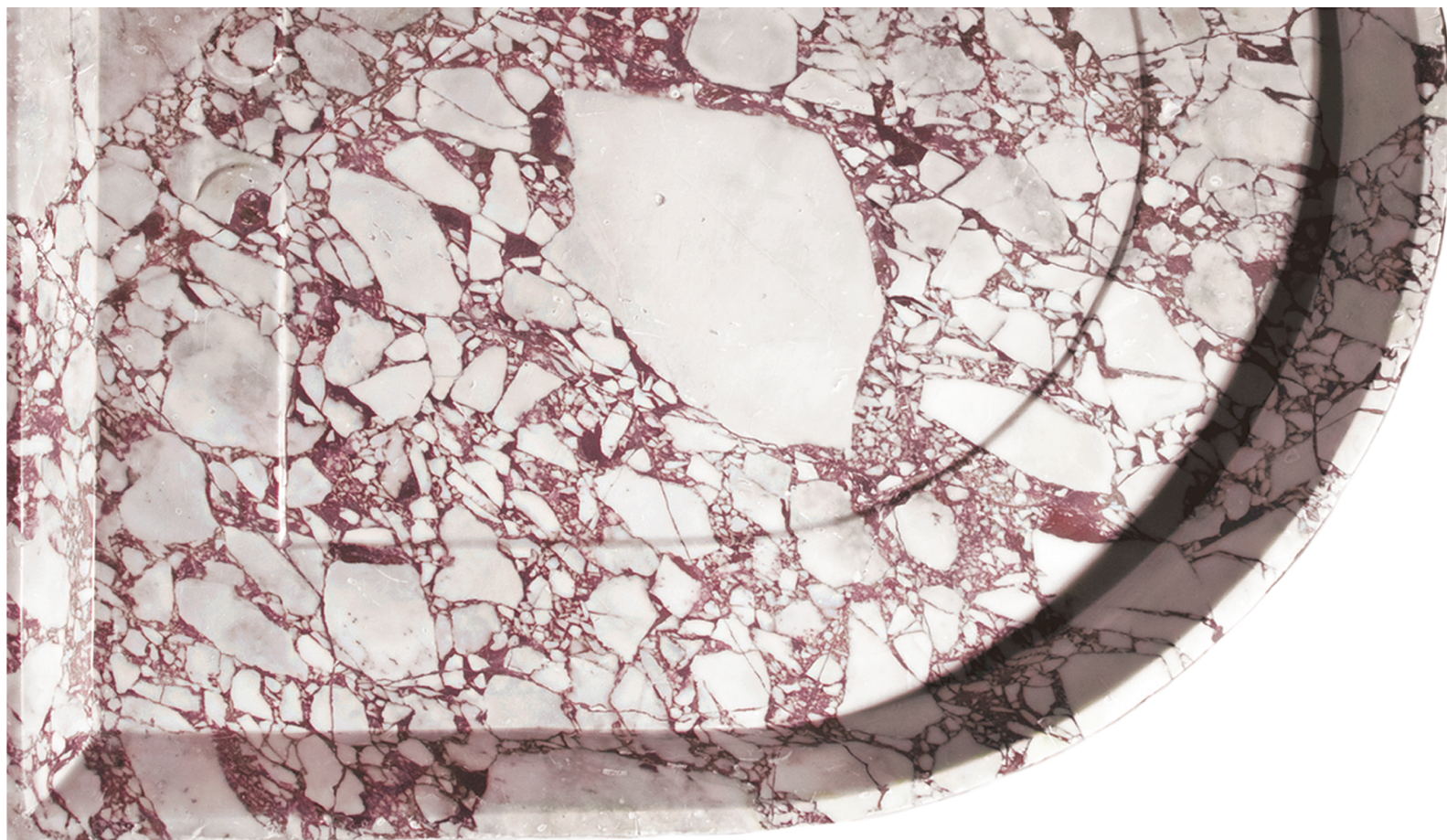
[FCEAG Repository - Repository of the Faculty of Civil Engineering, Architecture and Geodesy, University of Split](#)



UNIVERSITY OF SPLIT



DIGITALNI AKADEMSKI ARHIVI I REPOZITORIJI



# 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.

The quality of the images relies on the quality of the originals provided by the authors.

## CONTENT

<b>PRESENTATION</b> .....	15
<b>NECROLOGY: NORMAN HERZ (1923-2013) by Susan Kane</b> .....	17
<b>1. APPLICATIONS TO SPECIFIC ARCHEOLOGICAL QUESTIONS – USE OF MARBLE</b>	
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 <sup>th</sup> C.) and the Basilica of San Lorenzo (5 <sup>th</sup> 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 <sup>nd</sup> C. Bc – Late 1 <sup>st</sup> C. Ad) <i>Stefan Ardeleanu</i> .....	155
<i>Amethystus</i> : Ancient Properties and Iconographic Selection <i>Luigi Pedroni</i> .....	167
<b>2. PROVENANCE IDENTIFICATION I: (MARBLE)</b>	
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 <sup>th</sup> And 17 <sup>th</sup> 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
<b>3. PROVENANCE IDENTIFICATION II: (OTHER STONES)</b>	
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
<b>4. ADVANCES IN PROVENANCE TECHNIQUES, METHODOLOGIES AND DATABASES</b>	
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
<b>5. QUARRIES AND GEOLOGY</b>	
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
<b>6. STONE PROPERTIES, WEATHERING EFFECTS AND RESTORATION, AS RELATED TO DIAGNOSIS PROBLEMS, MATCHING OF STONE FRAGMENTS AND AUTHENTICITY</b>	
Methods of Consolidation and Protection of Pentelic Marble <i>Maria Apostolopoulou, Elissavet Drakopoulou, Maria Karoglou and Asterios Bakolas</i> .....	749
<b>7. PIGMENTS AND PAINTINGS ON MARBLE</b>	
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
<b>8. SPECIAL THEME SESSION: „THE USE OF MARBLE AND LIMESTONE IN THE ADRIATIC BASIN IN ANTIQUITY”</b>	
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
<b>INDEX OF AUTHORS</b> .....	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 4<sup>th</sup> 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)<sup>1</sup>

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.<sup>1</sup>

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 2<sup>nd</sup> World War and served in the Corps of Engineers and the Air Force. He was commissioned as a 2<sup>nd</sup> 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 2<sup>nd</sup> 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

## SELECTED PUBLICATIONS

- HERZ N. and PRITCHETT W. K., *Marble in Attic Epigraphy*, «AJA», 57, 1953, 71-83.
- Geology of the Building Stones of Ancient Greece*, New York, Academy of Sciences, «Transactions of the New York Academy of Sciences», ser. II, 17, 7, 1955, 499-505.
- Petrofabrics and Classical Archaeology*, «AJA», 253, 1955, 299-305.
- HERZ N. and WENNER D. B., *Assembly of Greek Marble Inscriptions by Isotopic Methods*, «Science», 199, 1978, 1070-1072.
- HERZ N. and WENNER D. B., *Inscriptions sur marbre: leur assemblage par methodes isotopiques*, in *Encyclopaedia Universalis*, Paris, 1979, 297-299 [in French].
- HERZ N. and WENNER D. B., Stable Isotopic Analysis: a new tool for the Classical Archaeologist, «The Classical Outlook. Journal of the American Classical League», 58, 1980, 37-39.
- HERZ N. and WENNER D. B., *Tracing the origins of marble*, «Archaeology», 34, 5, 1981, 14-21.
- Geological Sources of Building Stone*, in *Conservation of Historic Stone Buildings and Monuments*, Washington (dc), The National Academies Press-National Research Council, 1982, 49-61.
- HERZ N. and VITALIANO CH. J., *Archaeological Geology in the Eastern Mediterranean*, «Geology», 11, 1983, 49-53.
- HOWARD S., CAHILL T. A., HERZ N., HIGGINS C., KINMONTH E. and KUSKO B. H., *Computer-Assisted Accelerator-Based methods of Determining the Provenance of Ancient Marbles*, in L Corti (ed.), *Automatic Processing of Art History Data and Documents, Papers*, Pisa-Los Angeles, Scuola Normale Superiore-The J. Paul Getty Trust, 1984, vol. 2, 259-271.
- Isotopic analysis of marble*, in G. Rapp Jr. and J. A. Gifford (eds.), *Archaeological Geology*, Cambridge (ma), Yale University Press, 1985, 331-351.
- RIDGWAY B. S. and HERZ N., *The Ludovisi Head once again*, «AJA», 89, 1985, 519.
- Stable Isotopic signatures applied to problems of Classical Greek Marble*, «Nat. Geog. Soc., Research Reports», 20, 1985, 353-363.
- HERZ N. and DEAN N. E., *Stable Isotopes and Archaeological Geology: the Carrara Marble, Northern Italy*, «Applied Geochemistry», 1, 1986, 139-151.
- Mineral Resources: an Overview*, in *Encyclopedia of Materials Science and Engineering*, Oxford, Pergamon Press, 1986, 3070-3073.

- HERZ N., KANE S. E. and HAYES W. B., *Isotopic Analysis of Sculpture from the Cyrene Demeter Sanctuary*, in P.A. England and L. van Zelst (eds.), *Application of Science in Examination of Works of Art*, Boston, Museum of Fine Arts, 1986, 142-150.
- Twenty-Fifth International Symposium on Archaeometry*, «Geoarchaeology», 2, 1987, 69-70.
- Carbon and Oxygen isotopic ratios: A data base for classical Greek and Roman marble*, «Archaeometry», 29, 1987, 35-43.
- HERZ N. and VITALIANO CH. J., *Penrose Conference Report - Archaeological Geology*, «Geoarchaeology», 2, 1987, 241-242.
- VITALIANO CH. J. and HERZ N., *Archaeological Geology: Environmental siting and material usage*, «Geology», 15, 1987, 577-578.
- HERZ N. and WAELKENS M., *Preface*, in Iidem (eds.), *Classical Marble: Geochemistry, Technology, Trade*, Dordrecht, Kluwer, 1988 («nato asi Series», 153), xi-xii.
- Geology of Greece and Turkey: Potential marble source regions*, in N. Herz and M. Waelkens (eds.), *Classical Marble: Geochemistry, Technology, Trade*, Dordrecht, Kluwer, 1988 («nato asi Series», 153), 7-10.
- The Oxygen and Carbon isotopic data base for Classical Marble*, in N. Herz and M. Waelkens (eds.), *Classical Marble: Geochemistry, Technology, Trade*, Dordrecht, Kluwer, 1988 («nato asi Series», 153), 305-314.
- FOSTER G. V., LOATES H., HERZ N. and WENNER D. B., *Marble Provenience by Computer-Assisted analysis of Xeroradiographs* (1988), in N. Herz, M. Waelkens (eds.), *Classical Marble: Geochemistry, Technology, Trade*, Dordrecht, Kluwer, 1988 («NATO ASI Series», 153), 357-367.
- Isótopos estáveis como assinaturas geoquímicas de objetos de mármore*, «Geochimica Brasiliensis», 1, 2, 1988, 73-80.
- Classical Marble Quarries of Thasos*, in G. A. Wagner and G. Weisgerber (eds.), *Antike Edel- und Buntmetallgewinnung auf Thasos*, Bochum, Deutsches Bergbau Museum, 1988, 232-240.
- Workshop on marble in ancient Greece and Rome: Geology, quarries, commerce, artifacts*, «Geoarchaeology», 4, 1989, 177-178.
- HERZ N., GRIMANIS A. P., ROBINSON H. S., WENNER D. B. and VASSILAKI-GRIMANI M., *Science versus Art History: the Cleveland Museum head of Pan and the Miltiades Marathon victory monument*, «Archaeometry», 31, 1989, 161-168.
- CARR D. D. and HERZ N., *An Introduction to Mineral Resources*, in Iidem (eds.), *Concise Encyclopedia of Mineral Resources*, Oxford, The mit- Pergamon Press, 1989, xvii-xxiii.
- Stable Isotope Geochemistry and Archaeology*, in N. P. Lasca and J. Donahue (eds.), *Archaeological Geology of North America*, GSA Centennial Special Volume 4, 1990, 585-595.
- Classical Greek and Roman marble: determination of provenance and reconstruction of artifacts*, in P. G. Marinis and G. C. Koukis (eds.), *The Engineering Geology of Ancient Works, Monuments, and Historical Sites*, Rotterdam, Balkema, 1990, vol. 4, 1987-1994.
- Stable Isotopic Analysis of Greek and Roman Marble, in Provenance and Authenticity: in Marble: Art, Historical, and Scientific Perspectives on Ancient Sculpture*, Malibu (ca), The J. Paul Getty Museum, 1990, 101-110.
- HERZ N. and DOUMAS CHR., *Marble sources in the Aegean Early Bronze Age*, in E. Pernicka and G. A. Wagner (eds.), *Archaeometry '90*, Basel, Birkhauser, 1991, 425-434.
- Authenticating Antique Marbles*, «The Journal of Art», 4, 3, 1991, 62.
- HERZ N., BARKER W. W. and SHOWERS W. J., *Detection of artificially induced weathering patina in sculptural marble*, in D. Decrouez, J. Chamay and F. Zezza (eds.), *The Conservation of Monuments in the Mediterranean Basin*, Geneva, Musée d'art et d'histoire, 1992, 477-482.
- White marbles of the Ancient Greeks and Romans: Geology, Sources and Determination of Provenance*, in R. Francovich (ed.), *Archeologia delle attività estrattive e metallurgiche*, CNR-Università degli Studi di Siena, Firenze, All'insegna del giglio, 1993, 17-47.
- Stable Isotope Applications to Problems of Greek and Roman marbles: Provenance, authenticity and assembly of artifacts*, in *International Symposium "Les Marbres Blancs des Pyrenees: Approches scientifiques et historiques"*, St. Bertrand de Comminges, 1995 («Entretiens d'Archeologie et d'Histoire»), 12-23.
- MATTHEWS K. J., LEESE M. N., HUGHES M. J., HERZ N. and BOWMAN S. G. E., *Establishing the provenance of marble using statistical combinations of stable isotope and neutron activation analysis data*, in Y. Maniatis, N. Herz and Y. Bassiakos (eds.), *asmosia iii*, Transactions of the Third International Symposium of the Association for the the Study of Marble and Other Stones in Antiquity (Athens, May 17-19, 1993), London, Archetype, 1995, 171-180.
- VAN DER MERWE N., HERRMANN J., NEWMAN R., TYKOT R. and HERZ N., *Stable carbon and oxygen isotope sourcing tracing of marble sculptures in the Museum of Fine Arts, Boston and the Sackler Museum, Harvard*, in Y. Maniatis, N. Herz and Y. Bassiakos (eds.), *ASMOsia III*, Transactions of the

Third International Symposium of the Association for the the Study of Marble and Other Stones in Antiquity (Athens, May 17-19, 1993), London, Archetype, 1995, 187-198.

DOOLEY K. and HERZ N., *Provenance determination of American Marbles*, in Y. Maniatis, N. Herz and Y. Bassiakos (eds.), *ASMOSIA III*, Transactions of the Third International Symposium of the Association for the the Study of Marble and Other Stones in Antiquity (Athens, May 17-19, 1993), London, Archetype, 1995, 243-252.

HELLER D. and HERZ N., *Weathering of dolomitic marble and the role of oxalates*, in Y. Maniatis, N. Herz and Y. Bassiakos (eds.), *ASMOSIA III*, Transactions of the Third International Symposium of the Association for the the Study of Marble and Other Stones in Antiquity (Athens, May 17-19, 1993), London, Archetype, 1995, 267-276.

#### BOOKS WRITTEN AND EDITED

HERZ N. and WAEKENS M. (eds.), *Classical Marble: Geochemistry, Technology, Trade*, Dordrecht, Kluwer, 1988 («NATO ASI Series», 153).

CARR D. D. and HERZ N. (eds.), *Concise Encyclopedia of Mineral Resources*, Oxford, Pergamon Press, 1989.

WAEKENS M., HERZ N. and MOENS L. (eds.), *Ancient Stones: Quarrying, Trade and Provenance*, Leuven, Leuven University Press, 1991 («Acta Archaeologica Lovaniensia. Monographiae», 4).

MANIATIS Y., HERZ N. and BASSIAKOS Y. (eds.), *ASMOSIA III*, Transactions of the Third International Symposium of the Association for the the Study of Marble and Other Stones in Antiquity (Athens, May 17-19, 1993), London, Archetype, 1995.

HERZ N. and GARRISON E. G., *Geological Methods for Archaeology*, Oxford, Oxford University Press, 1997.

## 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

**ASMOSIA I**

N. HERZ, M. WAEKENS (eds.):  
Classical Marble: Geochemistry, Technology, Trade,  
Dordrecht/Boston/London, 1988.

**ASMOSIA II**

M. WAEKENS, N. HERZ, L. MOENS (eds.):  
Ancient Stones: Quarrying, Trade and Provenance,  
Interdisciplinary Studies on Stones and Stone Technology in Europe  
and Near East from the Prehistoric to the Early Christian Period,  
Leuven 1992.

**ASMOSIA III**

Y. MANIATIS, N. HERZ, Y. BASIAKOS (eds.):  
The Study of Marble and Other Stones Used in Antiquity,  
London 1995.

**ASMOSIA IV**

M. SCHVOERER (ed.):  
Archéomatériaux – Marbres et Autres Roches,  
Actes de la IVème Conférence Internationale de l'Association  
pour l'Étude des Marbres et Autres Roches Utilisés dans le Passé,  
Bordeaux-Talence 1999.

**ASMOSIA V**

J. HERRMANN, N. HERZ, R. NEWMAN (eds.):  
Interdisciplinary Studies on Ancient Stone,  
Proceedings of the Fifth International Conference of the Association  
for the Study of Marble and Other Stones in Antiquity,  
Museum of Fine Arts, Boston, June 1998,  
London 2002.

**ASMOSIA VI**

L. LAZZARINI (ed.):  
Interdisciplinary Studies on Ancient Stone  
Proceedings of the Sixth International Conference of the Association  
for the Study of Marble and Other Stones in Antiquity,  
Padova 2002.

**ASMOSIA VII**

Y. MANIATIS (ed.):  
Proceedings of the 7th International Conference of Association  
for the Study of Marble and Other Stones in Antiquity,  
Thassos 15-20 septembre 2003, BCH supplement 51,  
Athènes 2009.

**ASMOSIA VIII**

P. JOCKEY (ed.):  
Leukos Lithos, marbres et autres roches de la méditerranée Antique:  
études interdisciplinaires,  
Paris 2009.

**ASMOSIA IX,**

A. GUTIERRÉZ-GARCIA, P. LAPUENTE, I. RODÁ (eds.):  
Interdisciplinary studies on ancient stone.  
Proceedings of the IX ASMOSIA Conference,  
Tarragona 2012.

**ASMOSIA X**

P. PENSABENE, E. GASPARINI (eds.):  
Interdisciplinary Studies on Ancient Stone,  
Proceedings of the X ASMOSIA International Conference,  
Rome 2015.

**SPONSORED BY**