

# Euromos of Caria: the Origin of an Hitherto Unknown Grey Veined Stepped Marble of Roman Antiquity

---

**Bruno, Matthias; Attanasio, Donato; Prochaska, Walter; Yavuz, Ali Bahadir**

*Source / Izvornik:* **ASMOSIA XI, Interdisciplinary Studies on Ancient Stone, Proceedings of the XI International Conference of ASMOSIA, 2018, 639 - 649**

**Conference paper / Rad u zborniku**

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

<https://doi.org/10.31534/XI.asmosia.2015/05.04>

*Permanent link / Trajna poveznica:* <https://um.nsk.hr/um:nbn:hr:123:819821>

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

*Download date / Datum preuzimanja:* **2025-04-02**



*Repository / Repozitorij:*

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





# 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 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
<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. 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
<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 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
<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 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
<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

# EUROMOS OF CARIA: THE ORIGIN OF AN HITHERTO UNKNOWN GREY VEINED STEPPED MARBLE OF ROMAN ANTIQUITY

Matthias Bruno<sup>1</sup>, Donato Attanasio<sup>2</sup>, Walter Prochaska<sup>3</sup> and Ali Bahadır Yavuz<sup>4</sup>

<sup>1</sup> Via dei Vascellari 34, Rome, Italy (matthiasbruno@libero.it)

<sup>2</sup> Istituto di Struttura della Materia, Consiglio Nazionale delle Ricerche (ISM-CNR), Rome, Italy (donato.attanasio@ism.cnr.it)

<sup>3</sup> Department of Applied Geological Science and Geophysics, University of Leoben, Leoben, Austria (walter.prochaska@unileoben.ac.at)

<sup>4</sup> D.E.Ü Engineering Faculty, Geological Engineering Department, Izmir, Turkey (bahadir.yavuz@deu.edu.tr)

## Abstract

During a site survey in 2012 an unknown marble quarry was discovered near the ancient city of Euromos (Milas), where a very typical grey veined stepped marble was extracted. A systematic archaeological investigation of the quarry site was undertaken and extensive sampling was carried out for archaeometric analyses (isotopes, EPR, MGS) in order to obtain a reference data bank, even if the macroscopic aspect of the Euromos marble allows an easy preliminary autoptic distinction, thanks to the frequent presence of stepped grey veins, due to shear fractures of the marble outcrop. The use of the Euromos marble was not limited to the region, where it was employed at Euromos and Iasos, but it was diffused all over the Roman Empire probably from the Hadrianic period onwards and it is attested in several coastal cities of Asia Minor, Palestine, north Africa and obviously also in Rome.

## Keywords

Euromos, Caria, marble provenance, archaeometry

## Introduction

Marbles were quarried in Roman antiquity all over the Mediterranean basin from east to west, and Asia Minor was certainly one of the most important exploitation areas. White and coloured marbles were quarried from the 1<sup>st</sup> century BC in western Anatolia and distributed in Rome and several cities of the Roman Empire. *Caria* was an especially marble-rich region and produced several important marbles extracted close to the ancient cities of Aphrodisias, Muğla, Stratonikeia, Milas and Iasos.<sup>1</sup>

Occasionally, during the surveys conducted in Asia Minor from 2006, we had the opportunity of passing alongside the hill that stands south-east of the Temple of Zeus at Euromos. Quarries with their debris were clearly visible, but supposing they were just a few of the many marble quarries intended for local use we always postponed any visit to them. When we finally decided to visit these quarries in 2012, not simply with the aim of grasping their size but also realizing the quality of the produced marble, we came upon an unexpected surprise: the site revealed itself in all of its relevant extent and its very particular marble quality, one that has already been found in many archaeological sites, allowing its importance to be thoroughly understood.

## The Euromos quarry district

The quarries were opened at the top, along the slopes and at the foot of a hill that lies to the south-west of the ancient Temple of Zeus Lepsynos at Euromos and to the right of the national road that leads north from Milas towards Söke and west to the nearby village of Kızılcakuyu (Fig. 1). The district can be divided into three different sectors: the largest one located on top of the hill; the second on the slopes leading downwards to the nearby village; and the third, southwards at the foot of the hill, close to a modern food factory.

The first sector stretches out over nearly the entire summit of the hill, and some of its slopes also face onto the south-western side and are very visible from the nearby national road with their heaps of debris. The first site, which can be reached after a steep climb (Fig. 2), hosts four still abandoned rectangular medium-sized blocks, one of which is not separated from the bedrock, as a rough column shaft, and another sporadic one lying in the same area. Further on to the right stands another quarry, while a larger and deeper extraction site, with a wall reaching approximately 15 metres in height, is

1 BRUNO *et al.* 2012, 564-566.

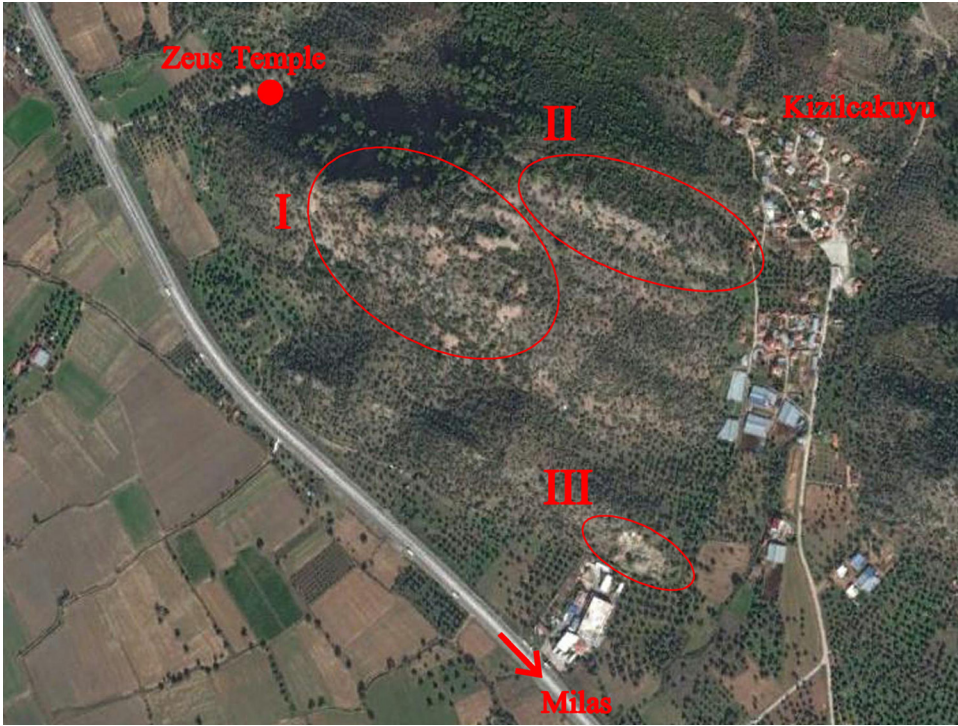


Fig. 1. The location of the Euromos quarry district with the three different sectors



Fig. 2. Euromos. Quarry front on the south-western slopes of the hill in sector I



Fig. 4. Euromos. Partial view of quarry sector II from the bottom of the hill



Fig. 3. Euromos. Abandoned column drums and shafts in the upper area of sector I



Fig. 5. Euromos, quarry sector II. Large unfinished labrum in an upside-down position





Fig. 6.  
Euromos. General  
view of quarry  
sector III

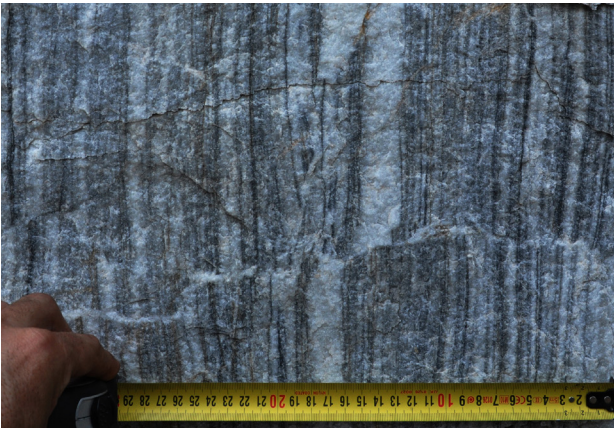


Fig. 7. Macroscopic aspect of grey veined stepped Euromos marble

located towards the interior. There are at least 8 rough-hewn shafts of medium and large size that lie abandoned in the vicinity (Fig. 3); some of them are compatible with the dimensions of those used in the nearby Temple of Zeus. Proceeding towards the peak and the inner part of the hill, one notices a remarkable sequence of depressions and quarry fronts that testify to the whole area having been subjected to intense mining activities during ancient times.

The second sector is developed along the northern slopes of the hill and heads downwards toward a country dirt road that, from the village of Kızılcakuyu (Fig. 4), heads southwards while skirting the hill. It is a wide sector that develops vertically, quarry walls still preserving evident traces of processing and extraction that, especially in this area, seemed to have been also fostered by the frequent presence of cracks in the rocks. Oddly enough there is an almost total absence of quarry artefacts in this sector, with the exception of a single

large semi-finished *labrum* for a fountain, currently lying in the lower part of this quarry area in an upside-down position (Fig. 5).

The third sector is the one located a short distance away from a modern factory, at the foot of the southern extremes of the hill (Fig. 6); it is one great mining site that in recent times has been the object of partial sporadic exploitation, as is attested by modern core holes used for inserting explosives. This site has also been partially filled by ancient debris thrown inside, coming from adjacent overlying extraction areas, as attested by the presence of a great parallelepiped block still attached to the bedrock that has been discovered over the western quarry front.

### Grey veined stepped Euromos marble

Euromos marble is very particular since it has peculiar macroscopic features that allow its identification even on a simple macroscopic basis. The marble is characterized by a close sequence of parallel grey veins that can be of different thickness, alternating with other white veins that tend to be linear, but at times can also be rippling and wavy. But the main characteristic is determined by the peculiarity of the marble outcrop: subsequent to the bedrock being shattered with a prevalently orthogonal trend compared to the veins, a slight shift of the same and its subsequent re-compacting has endowed the marble with characteristics that allow its definition as the grey veined stepped marble of Euromos (Fig. 7). This unique feature in the broader panorama of white-grey veined marbles from Asia Minor used in Roman antiquity allows for its simple macroscopic identification also supported by analytical results obtained from a wide sampling in the Euromos quarries.

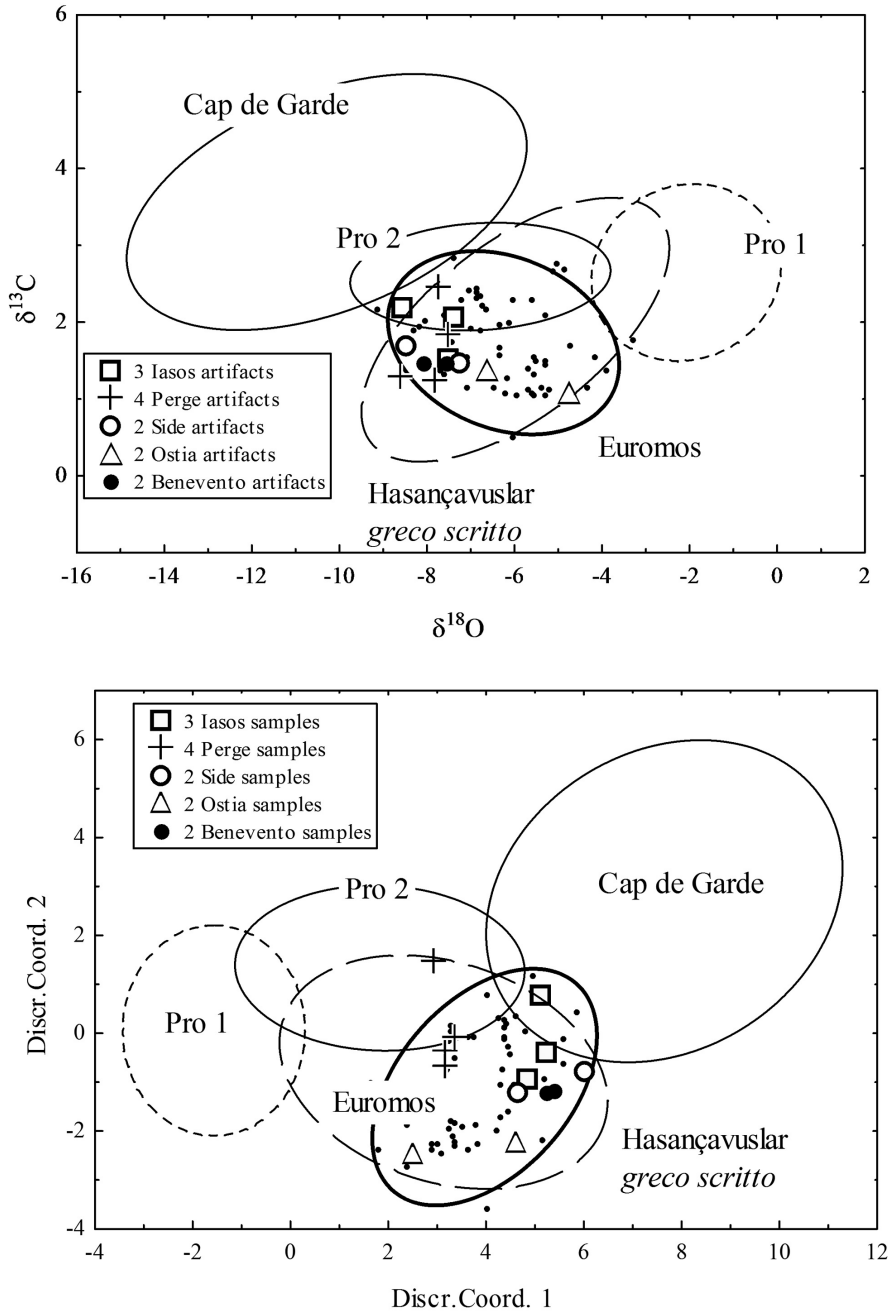


Fig. 8. Isotopic (above) and statistical (below) plots of the Euromos marble quarries and the archaeological artifacts tested. Despite the unique macroscopic appearance of Euromos marble, sites that might provide vaguely similar marbles have been included for comparison



Fig. 9. Euromos, Temple of Zeus Lepsynos (Hadrianic age). The column shafts, set together with three different drums, are in the local variety of the grey veined stepped Euromos marble, while the Corinthian capitals, the attic column bases and the elements of the entablature are in the white marble of Milas

N.	Site artifact	MGS Mm	$\delta^{18}\text{O}$ ‰	$\delta^{13}\text{C}$ ‰	EPR intensity %	EPR linewidth %
Euromos, 56 samples		1.3 0.9/2.5	-6.25 -9.1/-3.3	1.73 0.5/2.8	131.9 19/691	56.2 45/72
1	Iasos, south stoa, plinth cat. 2	0.9	-7.49	1.52	131.8	56.6
2	Iasos, south stoa, plinth cat. 6 (fig. 11)	0.7	-8.53	2.17	72.4	60.5
3	Iasos, east stoa, column cat. 3 (fig. 10)	1.1	-7.37	2.06	212.1	63.2
4	Perge, agora, north external portico, column cat. 3	0.9	-8.57	1.29	13.3	70.8
5	Perge, agora, north external portico, column cat. 4	1.7	-7.52	1.84	15.3	53.9
6	Perge, agora, north external portico, column cat. 5	0.9	-7.82	1.23	17.3	57.7
7	Perge, agora, north external portico, column cat. 6 (fig. 15)	1.1	-7.70	2.45	7.6	55.0
8	Side, state agora, column cat. 1	1.1	-7.24	1.47	125.3	56.6
9	Side, state agora, column cat. 2	1.6	-8.44	1.69	158.4	53.4
10	Ostia, entrance to the direction of excavations, column (fig. 17)	1.7	-6.61	1.38	330.2	77.7
11	Ostia, Decumanus – Via della Foce, column	1.3	-4.74	1.10	78.7	51.9
12	Benevento, Theatre, column cat. n. 9	1.4	-8.07	1.45	131.4	56.4
13	Benevento, Theatre, column cat. n. 26	1.1	-7.56	1.46	175.9	55.5

Table 1. Analytical properties of Euromos quarry samples and related artifacts. For the quarries average and min/max values are given. Isotopic and EPR variables are given in ‰ or % with respect to specific standards (Pee Dee Belemnite for isotopes and Dolomite N368 BCS for EPR)

### Archaeometry of Euromos marble

Based on its very characteristic and peculiar appearance mentioned above, the marble of Euromos should not be considered as a grey veined variety but rather as a true polychrome marble, perhaps used in many instances as a substitute of the more renowned Euboean *cipollino*. Despite the fact that macroscopic identification is in general easy and unmistakable, archaeometric studies of the quarry and artifact samples were carried out to provide quantitative support and to avoid misclassification of occasional less-than-typical items. Fifty-six quarry samples and 13 artifacts originating from different archaeological sites were investigated by isotopic analysis, EPR spectroscopy and grain size measurements. Analytical data, summarized in Table 1, are illustrated by the isotopic and statistical graphs (Fig. 8), where sites that may provide marbles vaguely similar to Euromos are also shown for comparison. The results indicate that the marble of Euromos is a medium grain variety exhibiting relatively light oxygen ratios but unexceptional values of the carbon isotopes. The EPR intensity is medium to high and the samples are dolomite free (only one quarry sample contains ca. 20% of this phase). On analytical grounds the marble is difficult to distinguish from the Hasançavuslar *greco scritto* both in terms of isotopes or EPR parameters. Obviously, however, the peculiar aspect

of the Euromos marble as well as the even distribution of the archaeological samples within the source site ellipse do not leave any doubt on the provenance that is fully confirmed by the statistical probability values.

### Use and distribution of grey veined stepped Euromos marble

The discovery of this yet unknown marble of Euromos obviously calls for a historical and archaeological framework for this stone, and comprehension of its distribution during Roman times.

As already mentioned, this marble was used for the fluted column shafts of the nearby Temple of Zeus Lepsynos at Euromos (Fig. 9), where the dedication engraved on the architrave of the doorway to the cella allows it to be dated to the Hadrianic age.<sup>2</sup> The fluted columns of the peripteral temple, totalling 36 in number, were made using three different drums and were not monolithic artefacts. They host some engraved panels that testify how local magistrates and high-priests of the temple were involved in the construction and building activity of the temple, offering at their own expense the

2 HARPER 1978, 384.



Fig. 10.  
Iasos, east stoa.  
Column shaft, n. 3, of  
grey veined stepped  
Euromos marble



Fig. 12.  
Ephesos, Marble  
Street. Fragmentary  
column shaft of  
grey veined stepped  
Euromos marble



Fig. 11. Iasos, south stoa, plinth of grey veined stepped  
Euromos marble, n. 2, of the central piers

columns whereupon they wrote their own commemorative inscriptions.<sup>3</sup> The use of Euromos marble has also been detected in nearby Iasos, where it was employed in the monolithic shafts of the agora's eastern portico (Fig. 10; Tab. 1, n. 3), whose construction can reasonably be dated between 136 and 138 according to an inscription engraved on an architrave,<sup>4</sup> whereas in the southern sector one can observe the use of Euromos marble for the dado plinths in the central row of piers (Fig. 11: Tab. 1, n. 2). Four out-of-context column shafts were discovered even in nearby Milas, and they are presently deposited in the gardens of the local Archaeological Museum.

3 BARRESI 2003, 348-350.

4 PUGLIESE CARATELLI 1987, 151.



Fig. 13. Kaunos, northern road along the terrace temple. Entrance decorated with a pair of grey veined stepped Euromos marble column shafts

The marble was relatively widespread, always used for column shafts, even in Ephesus, where 5 examples were discovered along the Arcadiane (2), the Marble Street (1, Fig. 12), the Gymnasium of the Theatre (1) and the lower agora (1). In Magnesia on the Maeander, two shafts lie in the area of the Market Basilica,<sup>5</sup> while in Miletos two shafts and a plinth are lying on the stacks close to the Archaeological Museum.

At the present state of research, this marble seems to have followed a preferential route southwards and eastwards, as testified by its presence in Knidos, in the lower stoa of the town (3) and in the nearby lapidary (4). Also at Kaunos,<sup>6</sup> two shafts are at an entrance along the northern road that skirts the terrace temple dedicated to Zeus Soterios (Fig. 13), while two more lie along the opposite southern side, and another two out of context lie respectively in the agora and in the nearby Basilica. However, the most striking testimony of the grey veined stepped Euromos marble can be found in the city of Perge, where its boundless use is testified by its prevalent employment for the urban Colonnaded Street (Fig. 14), the ancient

Decumanus, which was rebuilt during the twenties of the second century AD. From the Arch of Plancia Magna, close to the ancient Hellenistic Gate, after approximately 500 metres it reaches the monumental *Nymphaeum* on the foothills of the acropolis.<sup>7</sup> At least 170 shafts were used in this Colonnaded Street, together with the more limited use of Troad granite and Proconnesian marble, the latter being employed only for a section of the eastern portico of the same road.<sup>8</sup> Euromos marble was also used in at least 20 shafts that decorated the northern external side of the agora (Fig. 15; Tab. 1, n. 6), running alongside a road that led to the Colonnaded Street. In the nearby city of Side, the so-called State agora from the 2<sup>nd</sup> century AD,<sup>9</sup> was probably supposed to have had the colonnade of the vast square adjacent to the great Marble Hall, exclusively decorated in huge columns with protruding shelves at the top; there are still 28 of these lying in the monument area (Fig. 16), whose square was probably also decorated with fountains, as testified by a great fragmentary *labrum*, again in the same grey veined stepped Euromos marble. And finally, further eastwards, at least one shaft has been discovered in the coastal area with sand dunes in the ancient city of *Elaiussa Sebaste*.

Grey veined stepped Euromos marble continued to spread towards the east, as witnessed by a shaft that was reused towards the mid-second century AD for an engraved cippus discovered in *Caesarea Maritima*<sup>10</sup> and two others that were reused in the ancient cathedral of *Hippo Sussita* in Palestine from the end of the sixth century, which were evidently recovered from abandoned monuments in the town dating back to the Roman age.

A single fragmentary shaft of grey veined stepped Euromos marble was even discovered in the city of Lepcis Magna in Tripolitania, close to the so-called temple dedicated to an unknown divinity along the Decumanus Maximus; this attests to its distribution, albeit a sporadic one, in north Africa.<sup>11</sup>

But its spread was not only limited to the eastern part of the Empire: at Salona in Croatia, different column shafts lie along the road behind the Episcopal Centre (4) and in the central courtyard of the great urban Baths (1), while another one can be found in the Archaeological Museum in Split.

And ultimately, grey veined stepped Euromos marble is not lacking in the Italian Peninsula, where a

5 BINGÖL 2007, 117-125.

6 ÖGÜN 1995.

7 ABBASOĞLU 2001, 179; HEINZELMANN 2003; PINNA CABONI, 1996, 324.

8 HEINZELMANN 2003, 210-211.

9 AKURGAL 1985, 340; PINNA CABONI, 1997, 256.

10 BURRELL 2015.

11 BRUNO, BIANCHI 2015, 77-78, Tav. XXXVII.2.



Fig. 14.  
Perge, Colonnaded Street.  
General view of the  
south western part of the  
street, with column shafts  
in grey veined stepped  
Euromos marble



Fig. 15.  
Perge, northern  
external side of  
the agora. Column  
shaft in Euromos  
marble n. 7

few examples can be recalled amongst the marble depots of the Roman Theatre in Benevento (2) and in the Archaeological Museum in Venafro (1). In Rome this *Carian* marble is attested as some supports produced with ancient columns in the Vatican Museums and in the National Archaeological Museum of Palazzo Massimo alle Terme, or in ecclesiastical buildings, like the two small shafts reused for the altar in the San Benedetto chapel of the eponymous church situated in Piazza in Piscinulla in the Trastevere district of Rome.<sup>12</sup> One should keep in mind two more examples that can be found in the nearby city of Ostia, where a fragmentary shaft has been placed close to the entrance to the direction of the excavations (Fig. 17; Tab. 1, n. 10), while another one lies out of context at the junction between the Decumanus Maximus and Via della Foce.

### Conclusions

It can be understood from the picture describing the spread of grey veined stepped Euromos marble how its use and distribution was not limited to the restricted regional area (Fig. 18). According to the present state of research, its diffusion, which seemed to be mainly addressed towards the eastern part of the Mediterranean basin, involved some of the principal coastline cities in Asia Minor, even reaching Palestine and North Africa; whereas regarding the opposite side, its use is not only attested on the eastern shore of the Adriatic Sea, but also

12 These columns were identified as cipollino, CORSI 1845, 385.



Fig. 16.  
Side, State Agora.  
General view of the  
monumental hall  
on the east side. In  
foreground, some of  
the large column  
fragments in grey  
veined stepped  
Euromos marble of  
the porticoes of the  
Agora



Fig. 17.  
Ostia Antica,  
entrance to the  
excavations.  
Fragmentary column  
shaft of grey veined  
stepped Euromos  
marble n. 10

in cities in southern Italy, Rome and Ostia.<sup>13</sup> Its striking macroscopic aspect, grey veined and “stepped”, allow us to consider it with polychrome marbles, perhaps allowing it to be considered, in a broader sense, a substitute marble for the more renowned karystian *cipollino* marble from Euboea. Its use for column shafts for the Temple of Zeus in Euromos and in the eastern portico of the Iasos agora, where grey veined stepped Euromos marble was coupled with the white local marble quarried in the surroundings of Milas, seems to support this hypothesis. But this suggestion is especially corroborated by the Colonnaded Street in Perge, where an incredible use of column shafts in Euromos marble also confirms the production capacities of the large quarries discovered and localized on the hill in the vicinity of ancient Euromos. While on one hand these three monuments were supposed to be part of a single project, and this is especially true for the Colonnaded Street in Perge, certainly defined by the pertinent authorities of the city itself due to its large scale extension in the city, it is also particular in the way that private citizens or city officials were involved in the financial support in all the three mentioned examples. It is very likely that in all three cases there was a single request by a figure authorized by the clients at the Euromos quarries for the necessary production of all the artefacts and it would be improbable to believe that every single contributor turned to the workshops operating in the district in an independent manner, as suggested by some scholars.<sup>14</sup>

13 BRUNO, BIANCHI 2015, 77-78.

14 HEINZELMANN 2003, 215-217.

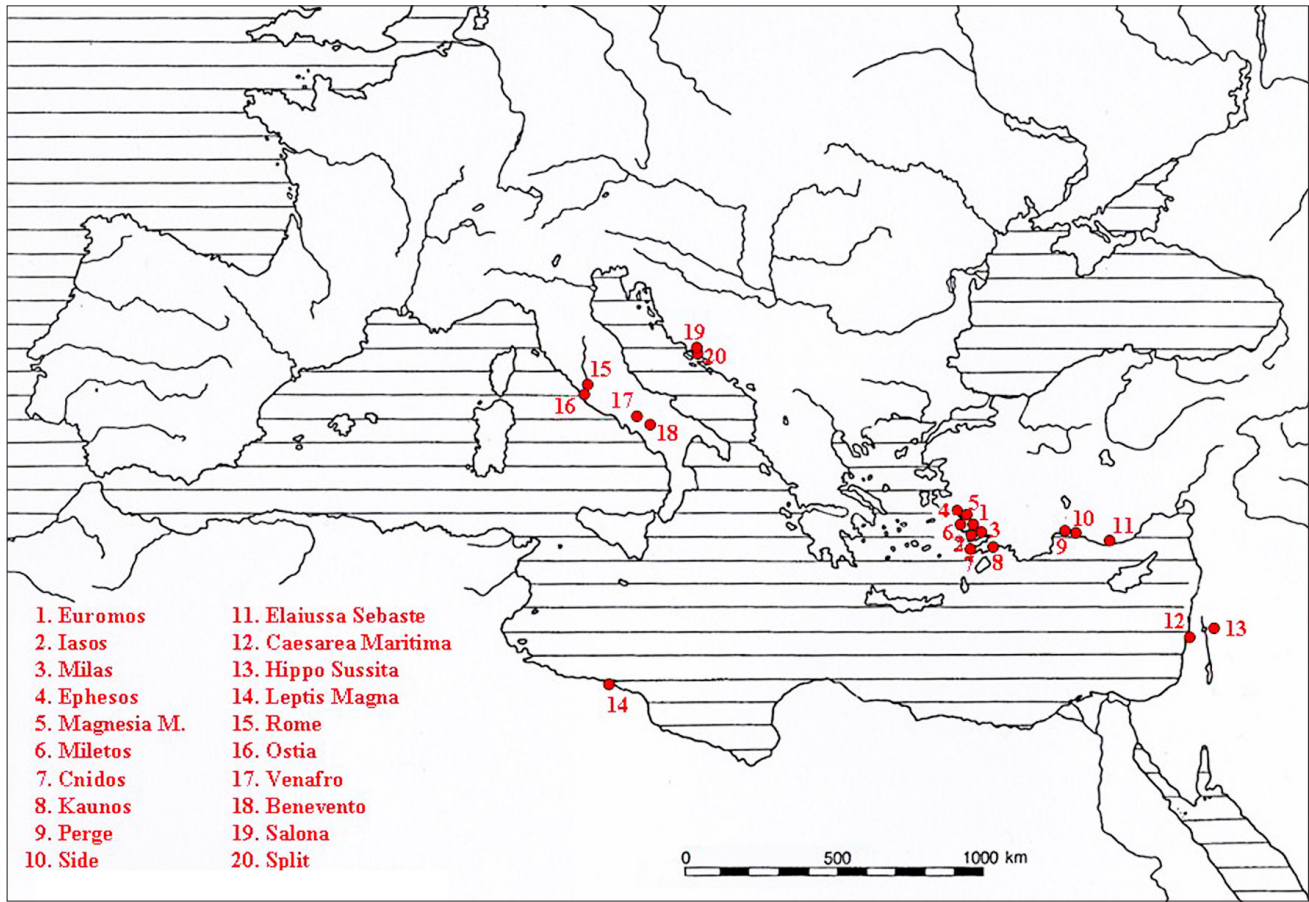


Fig. 18. Distribution map of the grey veined stepped Euromos marble in the Mediterranean Basin

There is no certainty regarding the exact opening of the quarries and the starting of extraction activities at Euromos; at the beginning, the quarries were most likely the property of the city, standing in the urban territory. It seems evident that production increased exponentially in the Hadrianic period, so as to satisfy the growing demands not only local but also more distant clients, as confirmed by the construction of the Temple of Zeus in Euromos, the Colonnaded Street in Perge and the porticoes of the Agora in Iasos, all to be dated to the middle and the end of Hadrian's age, while the State agora complex in Side can generically only be attributed to the second century AD. Very probably the management during this flourishing production period in the Euromos quarries was controlled by the central authority, or at least was given in management to third parties according to the *locatio – conductio* scheme, hence allowing the imperial administration to earn an appropriate amount of money. It is also very probable that grey veined stepped Euromos marble was not a particularly expensive marble, thus satisfying the “marble” needs of the local elites who perhaps did not have the opportunity to obtain other more valuable polychrome marbles while, due to its striking macroscopic aspect, it could have been considered as a Roman imperial coloured marble. Its presence

even in other cities of the Mediterranean basin, at times attested by one single example such as *Elaiussa Sebaste*, *Caesarea Maritima* or *Leptis Magna*, also seems to indicate the unplanned spread of Euromos marble that might have taken place even in a totally sporadic and random way, as products accompanying other loads of artefacts that were exported by sea towards other cities in the Mediterranean basin.

The use of grey veined stepped Euromos marble seems to have been linked almost exclusively to the production of column shafts of small, medium or large dimensions, highlighting its remarkable macroscopic aspect; the two *labra* that have been discovered, a semi-finished one lying in the quarry and a broken one in the central area of the State agora in Side, seem to be the only two exceptions in the use of this marble that did not seem to have been employed for veneer slabs for floors or walls.

In conclusion, it can be noted how the discovery of the Euromos quarries and the exact attribution of a marble that was particularly noticed previously in different ancient monuments allows us not only to expand the panorama of coloured stones used during Roman times, but perhaps also to indicate new and different ways for the administration of some quarries and the distribution of their marble.



## BIBLIOGRAPHY

- ABBASOĞLU H. 2001: "The founding of Perge and its development in the Hellenistic and Roman periods, in D. PARRISH (ed.): *Urbanism in Western Asia Minor. New studies on Aphrodisias, Ephesos, Hierapolis, Pergamon, Perge and Xanthos*, JRA suppl. Series, 45, Portsmouth, Rhode Island, 173-188.
- AKURGAL E. 1985: *Ancient Civilizations and ruins of Turkey*, Ankara.
- BARRESI P. 2003: *Province dell'Asia Minore. Costo dei marmi, architettura pubblica e committenza*, Roma.
- BINGÖL O. 2007: *Magnesia am Mäander – Magnesia ad Maeandrum*, Istanbul.
- BRUNO M., BIANCHI F. 2015: *Marmi di Leptis Magna*, Roma.
- BRUNO M., ELÇI H., YAVUZ A. B., ATTANASIO D. 2012: "Unknown ancient marble quarries of Western Asia Minor", in *ASMOSIA IX*, 562-572.
- BURRELL B. 2015: "Multiple reuse of imported marble pedestals at Caesarea Marittima in Israel", in *ASMOSIA XI*, XI International Conference, Split, Croatia, 18 - 22 May 2015, Abstracts, 83.
- CORSI F. 1845: *Delle Pietre antiche. Edizione III con notevole aggiunta al III libro*, Roma.
- HARPER R. P. 1978: "Two Carian Notes", in *Studien zur Religion und Kultur Kleinasiens: Festschrift für F. Dörner*, Leiden, 384-388.
- HEINZELMANN M. 2003: "Städtekonkurrenz und kommunaler Bürgersinn. Die Säulenstrasse von Perge als Beispiel monumentaler Stadtgestaltung durch kollektiven Euergetismus", *AA*, 1. Halbband, 197-220.
- ÖGÜN B. 1995: "Kaunos", *EAA*, 2° suppl. 1971-1994, III, Roma, 178-180.
- PINNA CABONI B. 1996: "Perge", *EAA*, 2° suppl. 1971-1994, IV, Roma, 323-328.
- PINNA CABONI B. 1997: "Side", *EAA*, 2° suppl. 1971-1994, V, Roma, 254-259.
- PUGLIESE CARATELLI G. 1987: "Le due dediche della stoà orientale", in *PAGELLO et al. (eds.): Studi su Iasos di Caria*, Suppl. BdA, Roma, 151-154.