

Analysis of Classical Marble Sculptures in the Michael C. Carlos Museum, Emory University, Atlanta

Tykot, Robert H.; Herrmann, John J.; Stein, Renée; Gaunt, Jasper; Blevins, Susan; Skinner, Anne R.

Source / Izvornik: **ASMOSIA XI, Interdisciplinary Studies on Ancient Stone, Proceedings of the XI International Conference of ASMOSIA, 2018, 501 - 508**

Conference paper / Rad u zborniku

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

<https://doi.org/10.31534/XI.asmosia.2015/02.34>

Permanent link / Trajna poveznica: <https://um.nsk.hr/um:nbn:hr:123:125123>

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

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

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

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

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

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

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

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

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

ANALYSIS OF CLASSICAL MARBLE SCULPTURES IN THE MICHAEL C. CARLOS MUSEUM, EMORY UNIVERSITY, ATLANTA

Robert H. Tykot¹, John J. Herrmann², Renée Stein³, Jasper Gaunt³, Susan Blevins⁴ and Anne R. Skinner⁵

¹ Department of Anthropology, University of South Florida, Tampa, Florida, United States (rtykot@usf.edu)

² Museum of Fine Arts, Boston, Massachusetts, United States (jherrmannjr@gmail.com)

³ Michael C. Carlos Museum, Emory University, Atlanta, Georgia, United States (rastein@emory.edu; jaspergauntl@gmail.com)

⁴ University of Georgia at Athens, Athens, Georgia, United States (sludi@emory.edu)

⁵ Chemistry Department, Williams College, Williamstown, Massachusetts, United States (askinner@williams.edu)

Abstract

Fifty classical marble objects in the collections of the Michael C. Carlos Museum at Emory University have been analyzed, making use of several complementary techniques to determine the quarry sources for the marble. This collaborative project has been supported most generously over many years by the Andrew W. Mellon Foundation and the Thalia and Michael Carlos Foundation. Using a multi-method approach, including visual assessment, maximum grain size, testing for dolomite, stable isotope analysis, elemental analysis, and electron paramagnetic resonance, it was possible to assign most objects with a high degree of probability to a single source. Five objects, presented in chronological order, have been selected here for special attention either for art-historical reasons or for the use of marble from unexpected sources. These include an under life-size Hellenistic statue of a draped female (Aphrodite?) (Fig. 1), whose head is carved from marble assigned to the Paros 1 quarries, while the body is Pentelic. An archaistic relief of a woman carrying a jug (Fig. 2) is carved from Denizli marble, perhaps the first such identification for archaistic sculpture. A Roman statue representing Leda and the Swan (Fig. 3) is carved from Aphrodisias marble. A fine Roman statuette representing Apollo of the Anzio type (Fig. 4) is carved from Parian marble. An unusual Roman third-century relief of a ploughman (Fig. 5) uses marble from Göktepe.

Keywords

stable isotopes, electron paramagnetic resonance, x-ray fluorescence

Methodology

Following visual assessment of marble color, patterning, translucency, and maximum grain size (MGS), powder samples were drilled from each sculpture. In cases of sculptures assembled from different elements,



Fig. 1. Statue of a draped woman (Aphrodite?) (photo: B. White)

or repaired, samples were obtained from separate component parts. Carbon and oxygen stable isotope analysis was conducted on all fifty, using a Thermo Delta+XL stable isotope mass spectrometer with a Kiel III carbonate device, in the Paleolab at the University of South Florida. Standard procedures were followed, and results are reported relative to VPDB.



Fig. 2. Relief of a draped woman (photo: B. White)



Fig. 4. Statue of Apollo of Anzio type (photo: B. White)



Fig. 3. Statue of Leda and the Swan (photo: B. White)

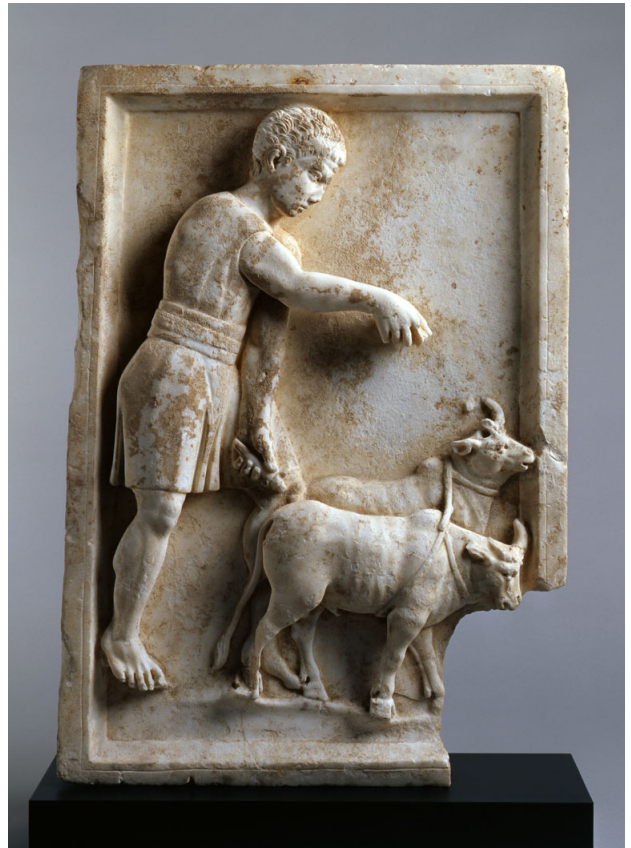


Fig. 5. Relief of a ploughman (photo: B. White)

The isotope data were compared to the isotopic diagrams for Mediterranean marble quarries by Carlo Gorgoni *et al.*¹, Scott Pike², and to the diagrams and data tables of Donato Attanasio³ and Norman Herz. Isotopic matches were then narrowed down using MGS and visual characteristics.

To narrow down possible quarry attributions further, a selection of thirteen objects was analyzed by electron paramagnetic resonance (EPR), mainly to examine the strength of manganese 2+. This was conducted using a JEOL RE1X spectrometer in the Department of Chemistry at Williams College. X-ray fluorescence spectroscopy also was conducted on a select number of samples to measure magnesium, manganese and strontium, using a Bruker III-SD equipped with a vacuum. The magnesium results confirmed that none of the objects tested were of dolomitic marble, while the Mn and Sr values were compared with data tables of Attanasio. Five case studies of special interest, either for art-historical reasons or for the use of marble from unexpected sources, are examined in greater detail below, while the results for all 50 analyses are listed in Table 1.

Case Studies

1. Statue of a Draped Woman, perhaps Aphrodite. Hellenistic, 4th – mid 2nd century BC.⁴ (Fig. 1)

Head: Macroscopic assessment: very translucent, pure white; medium to fine grain.

$\delta^{13}\text{C}$ 5.4, $\delta^{18}\text{O}$ -3.0. Quarry assignment: **Paros 1**

Body: Macroscopic assessment: very translucent, very white with a few micaceous flaws; very fine grain.

$\delta^{13}\text{C}$ 2.5, $\delta^{18}\text{O}$ -4.7. Quarry assignment: **Pentelikon**

This beautiful statue depicts a youthful female standing beside a tree. Into the top of the tree, two small dowel holes have been drilled, indicating that either an attribute (such as a lyre) or a secondary figure (like Eros) was attached. She wears a sleeved garment (chiton), kept from billowing out above by means of a cord that passes below her breasts and over her shoulders. Over this a mantle (himation) is twisted around her right hip and drawn up in a rich swag of drapery over her left forearm. The himation is marked with horizontal lines, indicating

press folds, and weights that would have allowed the garment to hang appropriately are also depicted. Traces of red pigment are visible on her proper left thigh. On her face, further traces of pigment are visible on her lips (red), eyes (black), and her ears are pierced for (gold wire?) earrings. The body was made in one piece. To this, four elements were added: her head, by insertion; and, using dowels, her forearms and the attribute or figure atop the tree.⁵ These latter parts are not preserved. The head is clearly the original: it sits precisely into the shoulder cavity, matching both circumference and depth without any sign of modern adaptation. A neo-classical repair is set into her left foot. The sculpture shares much in the arrangement of the drapery and the cord that holds it with representations of Artemis and Themis, and in some ways recalls images on gems of Muses leaning against pillars while playing the lyre. It is, however, perhaps most closely related to a series of late classical and Hellenistic sculptures of Aphrodite, sometimes leaning against a herm.⁶ The sensuous carving of the diaphanous chiton would tend to support this identification.

This sculpture is an early example of the practice of using different marbles for head and body – and probably also for the missing arms and the attribute. When white marble was used for all parts of a statue, it is probable that the more beautiful, unflawed, and prestigious stone was used for the flesh parts. Late classical temple inventories, like those of the Parthenon, usually refer to small marble objects such as pyxides using the generic term “lithos” or “lithinos”. Just occasionally, however, the

5 The dowel holes on top of the tree measure 0.7 cm in diameter, 3 cm deep and are separated by 2.4 cm. The dowel holes in the arms measure 0.9 cm in diameter; the right is 2.2 cm deep, and widened at the surface; the left is 3.5 cm deep.

6 For Artemis, compare a Roman version in Thebes of a late classical creation (Archaeological Museum BE 63: LIMC II 661 Artemis 528, pl. 488 [L. Kahil, N. Icard]). For Themis, compare two statues in Athens, National Museum 231 and Agora S 2370 (LIMC VIII 1201 Themis 8 & 9, pl. 829 [P. Karanastarsi]). For Muses, compare a glass paste gem in Florence (Museo Archeologico 14741: LIMC VII 997 Mousa, Mousai 210, pl. 718 [L. Faedo]); a cameo in Munich (Münzsammlung A 2918: LIMC VII 1019 Mousa, Mousai, Musae 45, pl. 731 [J. Lancha]); the drapery, although more chastely worn, somewhat recalls the so-called Melpomene Farnese (LIMC VII 993 Mousa, Mousai 172, 172a, pl. 716 [L. Faedo]). For the Aphrodites, compare perhaps a Hellenistic statuette in Vienna (Universität 723: LIMC II 44 Aphrodite 324, pl. [A. Delivorrias, G. Berger-Doer, A. Kossatz-Deissmann]) and a statue in Rhodes (Archaeological Museum 340: LIMC II 45 Aphrodite 340, pl. 33).

1 GORGONI *et al.* 2002.

2 PIKE 2009.

3 ATTANASIO 2003, data diskette; ATTANASIO *et al.* 2013; ATTANASIO *et al.* 2014.

4 Carlos Museum 2002.31.1 A/B. Carlos Collection of Ancient Art. Height: 102 cm. *Art Newspaper* 135 (April, 2003) 20; GAUNT 2005, 17 fig. 18.

fact that the object was made of Parian marble is specified. Since no other marble source besides Paros is ever mentioned, it can only be the exceptionally high esteem in which this marvelous stone was held that led to it being so recorded in what are otherwise merely bureaucratic accounts.⁷ Judging from the use of different marbles in this example, Parian also outranked Pentelic for statues.

2. *Relief of a Draped Woman*. Greek, Neo-Attic, 1st century BC.⁸ (Fig. 2)

Macroscopic assessment: not translucent, gray veins; very coarse grain.

$\delta^{13}\text{C}$ -0.1, $\delta^{18}\text{O}$ -8.6; low Mn, low Sr; EPR intensity 34.1. Preferred quarry assignment: **Denizli 2**; other possibilities: **Pentelikon, Naxos**

This relief depicts a richly draped woman, who wears a sleeved garment (chiton) under a longer dress pinned on the shoulder and belted at the waist (peplos). The wine jug (oinochoe) she holds in her right hand was probably complemented by a shallow bowl (phiale) held in her upraised left, suggesting that she may have been in the act of pouring a libation perhaps at an altar which may have been represented on the part that has broken away. The panel appears to have been re-used, for the upper left corner of the relief (now missing) has a worked surface on top that preserves part of dowel hole whose scale is much larger than what would have been required for a small repair.

The crisp, mannered style of carving, particularly the flourish of drapery that flutters behind her, the complexity of the (misunderstood) clothing, and the braided tresses of her hair, are characteristic of so-called Neo-Attic sculpture, an academic school of sculptors working in Athens from the 2nd century BC until the 2nd century AD.⁹ The artists drew on a repertoire of works from the archaic and classical periods (6th-4th centuries BC) to make decorative evocations for Roman connoisseurs.

The Neo-Attic style is especially associated with Attica, Athens, and Paros. The low oxygen ratio of this marble is, in fact, compatible with an origin on Mt. Pentelikon or the island of Naxos. The coarse grain is compatible with Naxos, and visually the markings are compatible with Pentelikon. The very low carbon ratio, however, points to an

unexpected Asiatic source in Denizli. This marble is also coarse-grained, and, while it usually tends to be grayish, at times it can be white (Denizli Şeker).¹⁰ The use of this marble is surprising since Denizli marble is not used for sculpture even in Aphrodisias, which lies only 30 km to its east.¹¹ The low carbon ratio of this relief might be considered an outlier of more commonly used quarries, but none of the intensive studies of Pentelikon¹² or Naxos¹³ have found carbon values remotely this negative. This relief was resampled and the same isotope results were produced.

It seems likely thus that this sculpture in a rare marble was produced in the neighborhood of the marble's source, that is, Denizli itself. There is no indication that the Neo-Attic style was practiced in the interior of Anatolia, and the relief must therefore be the work of a traveling sculptor from Athens or the Cycladic islands, where this style was at home. It is not unprecedented for sculptors from the Aegean to have traveled this far into the interior of Anatolia for a commission. A sculptor from Attica, in fact, traveled to Aphrodisias, where he signed a sarcophagus in the local marble.¹⁴

3. *Statue of Leda and the Swan*. Roman, 1st century BC/AD.¹⁵ (Fig. 3)

Macroscopic assessment: very translucent, slightly grayish, very coarse-grained marble

$\delta^{13}\text{C}$ 1.9, $\delta^{18}\text{O}$ -3.8; low Mn, low Sr; EPR Intensity 38.8. Preferred quarry assignment: **Aphrodisias**

The torso and much of the legs are preserved of a young woman, who turns and crouches slightly. Rich locks of hair are preserved on the neck, and an armlet is modeled on her upper left arm. Her drapery slips from her legs, as the swan, whose tail feathers are preserved, consumes her attention. Jörg Detterling has identified two replicas of the type, in Dresden and in the market.¹⁶

Grain size, isotopic ratios, and EPR intensity compare well with Aphrodisias.¹⁷ Grain size and Sr match

7 A pyxis in Parian marble is mentioned in the inventories of the Asklepieion in Athens: IG ii-iii² 1553, line 35. See further MILNE 1939, 249; GAUNT 2013, 384.

8 Carlos Museum 1986.9.15. Carlos Collection of Ancient Art. Height: 66 cm; width 44.8 cm. STAFFORD 1967, 143 no. 34, plate at p. 24.

9 On Neo-Attic sculpture see FUCHS 1959; HARRISON 1965; SAUSER 1987; ZAGDOUN 1989; FULLERTON 1990.

10 MONNA, PENSABENE 1977, 81-84.

11 ATTANASIO *et al.* 2014, 110.

12 PIKE 2009.

13 ATTANASIO 2003, data diskette.

14 ÖGÜS 2016.

15 Carlos Museum 1999.11.8. Carlos Collection of Ancient Art. Height 85 cm. From the collection of a French diplomatic family posted in North Africa.

16 DETTERLING 2015, 189 n. 28. For the replica in Dresden, see KNOLL, VORSTER, WOELK 2011, 339-342 no. 56 (entry by S. Oehmke). The replica in the market: Christie's, London, 13 October 2008, lot 24.

17 ATTANASIO *et al.* 2013, 4364-4365, table 2, fig. 8.

Paros 2 but the isotopic ratios do not, according to the data of Attanasio.¹⁸

The drapery of the statue is executed in a simplified, emphatic, and somewhat angular style, which may, like the marble, reflect an origin in the eastern Mediterranean. Similar drapery appears in a group of statues excavated in the theatre of Salamis, Cyprus.¹⁹ The absence of conspicuous drill channels probably indicates a relatively early date for all of them. The Salamis sculptures might well stem from the theatre's first phase, which dates from the Augustan period.²⁰ A late Hellenistic Leda in Mantua also shows the fleshy treatment of the midriff.²¹ The replica of the Carlos Leda in Dresden mentioned above is made of fine-grained marble and comes from Rome. The piece, which is dated 130-150 AD, has conspicuous drill work and lacks a fleshy midriff.

4. *Statue of a Nude Male Youth, Apollo of Anzio Type.*

Roman, 2nd century AD.²² (Fig. 4)

Macroscopic assessment: translucent, uniformly white, very fine grain.

$\delta^{13}\text{C}$ 2.2, $\delta^{18}\text{O}$ -1.8, low Mn, low Sr.

Preferred quarry assignment: **Paros 2**

The torso, and parts of the legs and support are preserved of a statue of a youthful nude male, who stands with his weight on his left leg. The sculpture is a small version of a well-known and widely reproduced type named after the Apollo found at Anzio.²³ Over the tree stump that functions as a support for the statue has been placed the god's mantle, with a large bulla to fasten it at the shoulder on top. A snake, Python, rears its head half way up the strut on the outside.

This high quality statuette is made of an unspotted, translucent piece of marble. The isotopes also match Carrara, but Carrara marble is usually rather opaque and flecked with gray. The statuette's isotopic ratios also fall on the borderline of the field for Paros 2, Chorodaki, which tends to be more translucent. The statuette's Mn is low, which also favors Paros 2; the Mn (=EPR intensity) is much lower

in Paros 2 than in Carrara, which is middling.²⁴ The statuette also has low Sr, and again Paros 2 has lower Sr than Carrara does. The statuette appears to have very fine grain, but Paros 2 can also have MGS as low as 0.47 mm.²⁵

A Parian attribution goes against the general pattern of marble use in the second century, when Parian marbles generally seem to have disappeared from the western Mediterranean.²⁶ Four sculptures of Paros 2 marble, including statues of athletes, have, however, been identified at Hadrian's Villa.²⁷ The soft treatment of this Apollo seems to be Antonine, and extends the use of Parian marble into the mid- to late-second century.

5. *Relief of a Ploughman.* Roman, 2nd quarter of the 3rd century AD.²⁸ (Fig. 5)

Macroscopic assessment: translucent, uniformly white, fine grain

$\delta^{13}\text{C}$ 2.3, $\delta^{18}\text{O}$ -3.1; low Mn, high Sr.

Quarry assignment: **Göktepe**

A ploughman of heroic size in relation to the pair of oxen he drives, guides the plough with his left hand and wields a stick in his right. Open fields in rolling countryside are indicated by an uneven groundline. He wears a short-sleeved tunic with a broad belt around the waist. The sensitive carving of the head of the figure very much recalls the portraiture of the emperor Severus Alexander (ruled 222-235 AD), and allows us to date the sculpture in the second quarter of the third century. The relief is framed by a flat raised band that is articulated with a groove towards the inner edge. While the back of the panel is roughly worked, the edges are finished, and the remains of a dowel are preserved in the centre of the top. The lower right corner has broken away.

The theme of a ploughman is relatively rare; it appears in a relief in the Graeco-Roman Museum, Alexandria and in several funerary reliefs in the Istanbul Museum, all of which have been described as "mediocre Roman work".²⁹ This relief is fine work, with much

18 ATTANASIO *et al.* 2013, 4364-4365, table 2, fig. 8.

19 KARAGEORGHIS, VERMEULE 1964, cat. nos. 52-54.

20 FREDERICKSEN 2002, 113, 119.

21 Mantua, Palazzo Ducale 13: LIMC VI, 232 Leda 7, pl. 108 (L.Kahil; Icard-Gianolio).

22 Carlos Museum 1985.16. Carlos Collection of Ancient Art. Preserved height: 78 cm.

23 Rome, Museo Nazionale Romano 121302: LIMC II 380-381 Apollon-Apollo 56, pl. 303 (E. Simon).

24 ATTANASIO *et al.* 2013, 4364-4365, table 2, fig. 8.

25 ATTANASIO *et al.* 2013, 4364-4365, table 2, fig. 8.

26 ATTANASIO *et al.* 2013, 4367.

27 LAPUENTE *et al.* 2012, 366, fig. 1, nos. 28-29.

28 Carlos Museum 2005.21.1. Carlos Collection of Ancient Art. Gift in honor of President and Mrs James W. Wagner. LACOVARA, GAUNT 2006, 16 fig. 27; GAUNT 2011, 61 no. 39. Height 58.4 cm; width 40.6 cm.

29 MENDEL 1914, 310: cat. 1027, 1058, 1074, 1075. All these ploughmen wear looser tunics without broad belts.

Acc. No.	Object	Date	$\delta^{13}C$	$\delta^{18}O$	MGS	EPR intensity	pXRF Analysis	Most Likely	USF #
1984.3	Acrolithic Female Head, fragment	Greek, 3rd century BC	2.0	-4.7	very coarse		low Mn, low Sr	Pa-4	8958
1984.16	Votive Relief with Hero at a Feast	Greek, 400-350 BC	2.3	-7.3	fine			Pe	8969
1984.17	Head from a Statue of Weary Herakles	Roman, 1st century AD	2.7	-2.4	very fine		low Mn, high Sr	G	8960
1985.16	Apollo, Anzio type	Roman, 2nd century AD	2.2	-1.8	very fine		low Mn, low Sr	Pa-2	8956
1991.3	Head from a Statue of the Diadoumenos	Roman, mid-2nd century AD	1.8	-3.7	very coarse	32.3		Pa-2, A	8954
1992.22	Head from a Statue of Venus, Medici type	Roman, 1st century BC - 1st century AD	2.1	-3.8	very coarse	43.2		Pa-2, A	8955
1993.2	Statue of Roman Citizen wearing Toga	Roman, 2nd century AD	2.0	-2.1	very fine			C	8977
1994.2	Veiled Female Head, "Demeter, Europa"	Roman, 140-160 AD	2.7	-7.9	very fine		low Mn, low Sr	Pe	8959
1995.7	Building Inscription	Roman, North Africa, c. 300 AD	2.4	-6.9	very fine			Pe	8978
1986.9.13	Head from a statuette of a Bearded Man	Greek, 4th century BC	3.6	-3.4	fine-medium			Pa-1	8961
1989.9.15	Relief with a Draped Woman	Greek, 1st century BC	-0.1	-8.6	very coarse	34.1	low Mn, low Sr	De-2	8973
1989.2.5	Cinerary Urn	Roman, 70-90 AD	2.0	-1.8	very fine		high Mn, low Sr	C	8972
1989.3.1	Sarcophagus Fragment with Boar Hunt	Roman, 2nd - 3rd century AD	3.4	-2.0	coarse			Pr-1	8974
1997.4.14	Cinerary Urn of Gaius Pompeius Irenaeus	Roman, 1st century AD	2.4	-2.6	very fine			C	8971
1998.13.1	Portrait of a Hellenistic Queen	Greek, 3rd-2nd century BC	3.2	-8.7	very fine			Pe	9847
1999.2.95	Head of a Young Boy from Sarcophagus	Roman, 2nd-3rd century AD	2.7	-2.6	fine		low Mn, high Sr	G	8962
1999.11.3	Votive Relief with Hero at a Feast	Greek, 4th century BC	0.4	-3.1	coarse	111.4		E-2, Pa-2	8964
1999.11.5	Statue of Mercury	Roman, 1st - 2nd century AD	1.4	-4.0	very coarse	36.9		A, Pa-2	8953
1999.11.7	Sarcophagus with the Four Seasons	Roman, Mid-2nd century AD	2.1	-2.4	very fine	68.5	low Mn, low Sr	C or D	8957
1999.11.8	Statue of Leda and the Swan	Roman, 1st - 2nd century AD	1.9	-3.8	very coarse	38.8	low Mn, low Sr	Pa-2, A	8970
2002.27.1	Cycladic Storage Jar (Kandila)	Cycladic, ca. 3000-2800 BC	2.1	-7.3	4-5 to 8-9 mm			N	10314
2002.31.1A/B	Statue of Draped Female - head	Greek, 4th - mid 2nd century BC	5.4	-3.0	medium - fine			Pa-1	8979
2002.31.1A/B	Statue of Draped Female - body	Greek, 4th - mid 2nd century BC	2.5	-4.7	.75 mm			Pe	8980
2003.4.1	Grave Stele of Glaukotas	Greek, 470-460 BC	1.9	-1.2	very coarse			Pa-2	8965
2003.5.1	Grave Relief of a Seated Man	Greek, Attic, 3rd quarter of 4th century BC	2.6	-4.3	very fine			Pe	8952
2003.18.1	Funerary Lekythos Fragment	Greek, 4th century BC	2.6	-6.2	fine			Pe	8967
2003.23.6	Votive Relief with Leto escaping Python	Greek, 4th - 3rd century BC	-0.8	-4.4	coarse			E-2	8968
2003.55.1	Portrait of Tiberius	Roman, c. 14 AD	4.6	-3.9	.55 mm			Pa-1	8981
2004.9.1	Relief with Scrolling Acanthus	Roman, early 1st century AD	2.1	-2.0	very fine		high Mn, low Sr	C	8963
2004.13.1	Portrait of a Bearded Man	Roman, late 2nd century AD	-0.6	-5.4	very fine			D	8976
2005.6.1	Portrait Bust of a Woman	Roman, late 1st - early 2nd century AD	4.2	-1.5	medium-coarse			Pa-1	8982
2005.21.1	Relief depicting a Ploughman	Roman, ca. 2nd quarter of the 3rd century	2.3	-3.1	fine		low Mn, high Sr	G	8966
2005.83.1	Head from a Statue of Sappho	Roman, 1st century AD	5.2	-2.5	coarse			Pa-1	10315
2006.38.1	Altar	Roman, 1st century AD	2.2	-1.8	fine			C	15113
2006.38.1	Altar, base fragment	18th century addition	1.9	-1.8	fine			C	15114
2006.38.1	Altar, rim fragment	18th century addition	2.0	-2.2	fine			C	15115
2006.38.2	Lintel Inscription	Roman, 1st century AD with 12th c	1.9	-2.3	fine			C	15116
2006.38.3	Altar, Top removed from	Roman, 1st century AD	2.4	-8.1	medium - fine	368.3		Pe	15117
2006.38.4	Altar, Base removed from	Roman, 1st century AD	2.0	-2.7	medium	81.4		?	15118
2006.40.1	Neo-Attic Krater fragment with Maenad	Greek, 1st century BC, 1st century AD	2.7	-5.5	fine		low Mn, low Sr	Pe	15112
2006.41.1	Statue of Venus, Medici type, head	Roman, 1st century AD	2.0	-3.6	very coarse	34.6		Pa-2, A	10319
2006.41.1	Statue of Venus, Medici type, base	Roman, 1st century AD	2.0	-3.6	very coarse	27.9		Pa-2, A	10320
2006.41.1	Statue of Venus, Medici type, dolphin fin	later repair, 18th c.?	4.2	-2.7	coarse			Pa-1	10317
2006.41.1	Statue of Venus, Medici type, right heel	later repair, 18th c.?	4.0	-3.0	coarse			Pa-1	10318
2006.41.1	Statue of Venus, Medici type, shin	later repair, 18th c.?	2.1	-3.6	1.5-1.8	33.2		Pa-2, A	10321
2007.1.1	Acrolithic Head of Demeter (?)	Greek, 2nd century BC	5.5	-2.5	coarse			Pa-1	10316
2008.41.1	Small Female Portrait Head	Roman, 2nd half of 1st century BC	4.7	-3.0	fine			Pa-1	15111a
2008.41.1	Small Female Portrait Head - base	Later addition, 18th-19th century AD	2.0	-1.8	fine		low Mn, low Sr	C	15111b
2012.11.1	Hellenistic Portrait Statue	Greek, 1st century BC/AD	2.0	-1.0	very coarse	44.5	low Mn, low Sr	Pa-2	19897
L2003.14.48a/b	Cinerary Urn and Lid	Roman, 1st century AD	2.5	-1.7	very fine		low Mn, low Sr	C	8975

Table 1. Analyses of marble of Classical Sculpture, Michael C. Carlos Museum

undercutting, excellent detail, and a sensitive portrait. Furthermore it distinguishes itself from other ploughing reliefs by the huge size of the man, his heavy belt, and the portrait head. The disproportionate size and a detailed portrait recall the famous relief of a circus official from Ostia in the Vatican, dated to the early 2nd century.³⁰ Like it, this relief could have been commissioned by a freedman to commemorate with cartoon-like exaggeration his rise from humble beginnings to wealth and prominence. The marble identification indicates that the sculptor came from Anatolia but that he was open to influences from Western Roman art of a century earlier. The empty background, rather than third-century Roman *horror vacui*, is another Eastern feature.

Conclusions

Scientifically supported marble identification offers a means to shed light on a multitude of issues for future study of ancient sculpture in the Michael C. Carlos Museum. In five cases, however, attempts have already been made to see what this light can reveal. In general, identification of the marble probably is an important clue to the geographic origin of the sculptor,³¹ but these five cases bring up other issues as well. In the case of the Hellenistic goddess (Case Study 1), it has been possible to define the marbles used for the different parts of a high-quality statue. In this case, the head was made of Paros 1 marble and the body Pentelic. Further research may determine whether these choices were made

because of the presence of different sculptors of Greek origin working on the same project or because of the inherent qualities of the marble. Was Parian chosen for the head because of its greater prestige, its greater cost, its easier workability, its less obtrusive flaws, or its more flesh-like translucency? The situation is further complicated by the possible original application of paint, which might tend to counteract the translucency of the marble.

The relief of a draped woman (Case Study 2) is intrinsically interesting as a good quality Archaistic work in a marble rarely used for sculpture. It provides a new case of a traveling sculptor from the Aegean executing a commission in a local marble in the interior of Asia Minor.

Recognition of the marble of the Leda and the Swan (Case Study 3) helps to place the sculpture in the Eastern reaches of the Mediterranean and reclaim it from the rootless category of generic Roman ideal sculpture.

The statuette of Apollo of the Anzio type (Case Study 4) shows how macroscopic evidence can legitimately play a role in assessing contradictory evidence from laboratory analysis. The case also helps to define and circumscribe the surprisingly reduced role that Parian marble played in the second century AD.

The relief of the ploughman (Case Study 5) is a fine and unusual work, and identification of the marble as Göktepe helps to strike a balance between Eastern and Western Roman elements in the work.

In any case, much work remains to exploit the insights offered by these new marble analyses. It is hoped that this publication of the analyses of all the classical marble sculpture at the Carlos Museum will prompt investigation from scholars working the field, and any enquiries will be warmly welcomed.

Overall, this research illustrates the utility of a multi-method approach to marble sourcing, combining both macroscopic examination and instrumental analyses while demonstrating that it can be done with minimal effects on important museum objects. The identification of the source of the marble used for the significant assemblage of objects on display in this museum provides important information for both museum visitors and those studying the acquisition of marble and its use in antiquity.

BIBLIOGRAPHY

- ATTANASIO D. 2003: *Ancient White Marbles: Analysis and Identification by Paramagnetic Resonance Spectroscopy*, L'Erma di Bretschneider, Rome.
- ATTANASIO D., BRILLI M., BRUNO M. 2008. "The properties and identification of marble from Proconnesos (Marmara Island, Turkey): A new database including isotopic, EPR and petrographic data", *Archaeometry* 50, 747-774.
- ATTANASIO D., BRUNO M., PROCHASKA W., YAVUZ A. B. 2013: "The Asiatic Marbles of Hadrian's Villa at Tivoli", *Journal of Archaeological Science* 40, 4358-4368.
- ATTANASIO D., BRUNO M., YAVUZ A. B. 2014: "On the provenance of some sculptural and decorative marbles used at Aphrodisias", *Rendiconti Mor. Accademia dei Lincei* s. 9, v. 25, 105-151.
- CARLOS MUSEUM 2011: *Handbook of the Collections*. Atlanta.
- DETTERTLING J. 2015: Review of Knoll, K., Vorster, C., Woelk, M., *Staatliche Kunstsammlungen Dresden. Katalog der antiken Bildwerke II. Idealskulptur der römischen Kaiserzeit (Munich 2011)*, *Göttingische gelehrte Anzeigen* 267, 186-196.
- FULLERTON M. D. 1990: *The Archaistic Style in Roman Statuary*. Leiden.
- FREDERICKSEN R. 2002: "The Greek Theatre. A Typical Building in the Urban Centre of the Polis?", in NIELSEN T. H. (ed.): *Even More Studies in the Ancient Greek Polis. Papers from the Copenhagen Polis Centre* 6, 65-124, Stuttgart.
- FUCHS W. 1959: *Vorbilder der neuattischen Reliefs*, Berlin.
- GAUNT J. 2005: "New Galleries of Greek and Roman Art at Emory", *Minerva* 16.1, 13-18.
- GAUNT J. 2013: "The Classical Marble Pyxis and Dextilla's Dedication," in R. KOEHL (ed.): *Amilla: the quest for excellence. Studies Presented to Guenter Kopcke in Celebration of his 75th birthday*, Philadelphia, 381-398.
- GORGONI C., LAZZARINI L., PALLANTE P., TURI B. 1964: "An updated and detailed mineropetrographic and C-O stable isotopic reference database for the main Mediterranean marbles used in antiquity", in *ASMOSIA* V, 115-131.
- HARRISON E. B. 1965: *The Athenian Agora: xi: Archaic and Archaistic Sculpture*, Princeton.
- KARAGEORGHIS V., VERMEULE C. 1964: *Sculptures from Salamis, Nicosia*.
- KLEINER D. 1992: *Roman Sculpture*, New Haven - London.
- KNOLL K., VORSTER C., WOELK M. 2011: *Staatliche Kunstsammlungen Dresden. Katalog der antiken Bildwerke II. Idealskulptur der römischen Kaiserzeit*, Munich.

- LACOVARA P., GAUNT J. 2006: "From Pharaohs to Emperors: Egyptian, Near Eastern and Classical Antiquities at Emory", *Minerva* Jan-Feb 2006, 9-16.
- LAPUENTE P., LEON P., NOGALES T., ROYO H., PREITE-MARTINEZ M., BLANC P. 2012: "White sculptural materials from Villa Adriana: study of provenance", in *ASMOSIA IX*, 364-375.
- LIMC. *Lexicon Iconographicum Mythologiae Classicae*.
- MENDEL G. 1914: *Musées Impériaux Ottomans: Catalogue des sculptures grecques, romaines et byzantines*, vol. 3.
- MILNE M. J. 1939: "Kylichnis," *AJA* 43, 247-254.
- MONNA D., PENSABENE P. 1977: *Marmi del Asia Minore*, Rome.
- ÖGÜS E. 2016: "Two Sarcophagi Made by Travelling Sculptors?" *Aphrodisias Papers 5: Excavation and Research at Aphrodisias, 2006-2012* (Portsmouth, RI), 325-331.
- PIKE S. 2009: "A stable isotope database for the ancient white marble quarries of Mount Pentelikon, Greece", in *ASMOSIA VII*, 699-708.
- SAUSER J. S. R. 1987: "The Twelve Gods Relief in the Walters Art Gallery", *Journal of the Walters Art Gallery* 45, 2-18.
- STAFFORD F. 1967: *Odyssey of an art collector*. New Orleans: Isaac Delgado Museum.
- ZAGDOUN M.-A. 1989: *La sculpture archaïsante dans l'art hellénistique et romain du Haut-Empire*. Paris.