

New Evidence for Ancient Gilding and Historic Restorations on a Portrait of Antinous in the San Antonio Museum of Art

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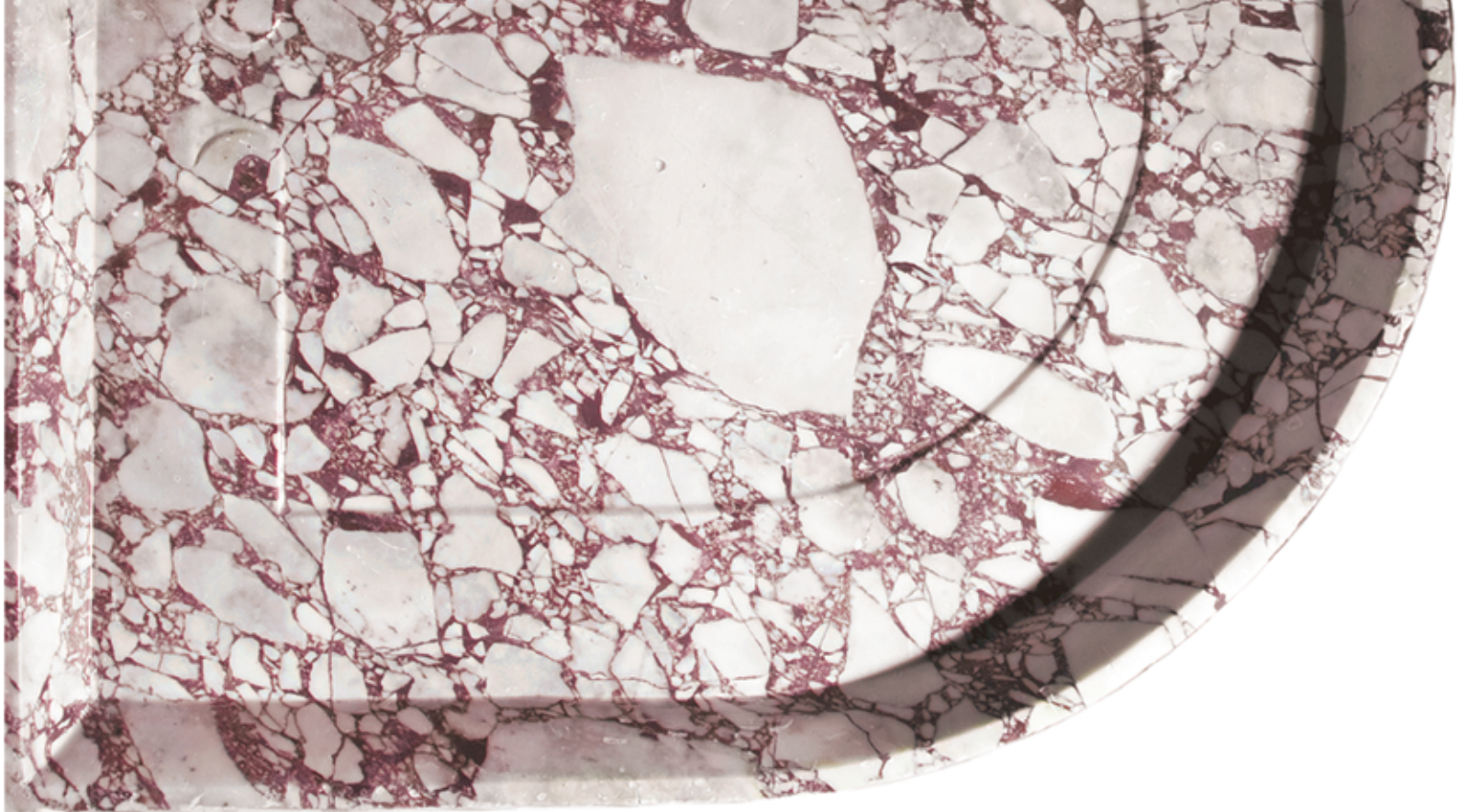
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CONTENT

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

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

Two Imperial Monuments in Puteoli: Use of Proconnesian Marble in the Domitianic and Trajanic Periods in Campania <i>Irene Bald Romano, Hans Rupprecht Goette, Donato Attanasio and Walter Prochaska</i>	267
Coloured Marbles in the Neapolitan Pavements (16 th And 17 th Centuries): the Church of <i>Santi Severino e Sossio</i> <i>Roberto Bugini, Luisa Folli and Martino Solito</i>	275
Roman and Early Byzantine Sarcophagi of Calcitic Marble from Thasos in Italy: Ostia and Siracusa <i>Donato Attanasio, John J. Herrmann, Robert H. Tykot and Annewies van den Hoek</i>	281
Revisiting the Origin and Destination of the Late Antique Marzamemi 'Church Wreck' Cargo <i>Justin Leidwanger, Scott H. Pike and Andrew Donnelly</i>	291
The Marbles of the Sculptures of Felix Romuliana in Serbia <i>Walter Prochaska and Maja Živić</i>	301
Calcitic Marble from Thasos and Proconnesos in Nea Anchialos (Thessaly) and Thessaloniki (Macedonia) <i>Vincent Barbin, John J. Herrmann, Aristotle Mentzos and Annewies van den Hoek</i>	311
Architectural Decoration of the Imperial Agora's Porticoes at Iasos <i>Fulvia Bianchi, Donato Attanasio and Walter Prochaska</i>	321
The Winged Victory of Samothrace - New Data on the Different Marbles Used for the Monument from the Sanctuary of the Great Gods <i>Annie Blanc, Philippe Blanc and Ludovic Laugier</i>	331
Polychrome Marbles from the Theatre of the Sanctuary of Apollo Pythios in Gortyna (Crete) <i>Jacopo Bonetto, Nicolò Mareso and Michele Bueno</i>	337
Paul the Silentiary, Hagia Sophia, Onyx, Lydia, and Breccia Corallina <i>John J. Herrmann and Annewies van den Hoek</i>	345
Incrustations from Colonia Ulpia Traiana (Near Modern Xanten, Germany) <i>Vilma Ruppinić 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 Brilli 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>Marmora</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. Peréz Agorreta and Eva Zarco Martínez</i>	567
The Use of Alcover Stone in Roman Times (<i>Tarraco, Hispania Citerior</i>). Contributions to the <i>Officina Lapidaria Tarraconensis</i> <i>Diana Gorostidi Pi, Jordi López Vilar and Anna Gutiérrez García-M.</i>	577
4. ADVANCES IN PROVENANCE TECHNIQUES, METHODOLOGIES AND DATABASES	
Grainautline – a Supervised Grain Boundary Extraction Tool Supported by Image Processing and Pattern Recognition <i>Kristóf Csorba, Lilla Barancsik, Balázs Székely and Judit Zöldföldi</i>	587
A Database and GIS Project about Quarrying, Circulation and Use of Stone During the Roman Age in <i>Regio X - Venetia et Histria</i> . The Case Study of the Euganean Trachyte <i>Caterine Prevato 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 Denktaş</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

NEW EVIDENCE FOR ANCIENT GILDING AND HISTORIC RESTORATIONS ON A PORTRAIT OF ANTINOUS IN THE SAN ANTONIO MUSEUM OF ART

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Abstract

This paper presents results of an interdisciplinary investigation of a marble portrait head of Antinous in the San Antonio Museum of Art following the discovery of traces of gilding on the head's ivy wreath in 2011. This study focused on understanding the relationship of the gilding to areas of purple coloration on the marble surface. Surface examination and laboratory analysis of samples suggest that the purple layer is composed of gold nanoparticles resulting from the deterioration of the gilding. In addition, our study has revealed previously undocumented aspects of ancient and post-excavation interventions on the head. Our combined analysis of the portrait's polychrome effect, iconographic elements, marble type and various phases of alterations leads to a reconstruction of the head's evolution from initial creation to its current appearance.

Keywords

polychromy, restoration, marble analysis

Description

The head was given to the museum in 1986 by San Antonio attorney and philanthropist Gilbert M. Denman, Jr. In its current state the sculpture preserves the head, part of the neck and the right hand and wrist from an over-life-size statue of a male figure in the so-called Apollo Lykeios pose (Fig. 1). The head turns to the proper left and wears an ivy wreath consisting of thirteen leaves on a twisted band. The thick hair falls in curving locks around the sides of the face and in several tiers down the back of the head. A longer lock at each side of the neck is now broken away. The oval face features almond-shaped eyes under puffy lids, smooth cheeks, a round chin, and a slightly pursed mouth with full lips. Light chisel marks denote the eyebrows (Fig. 2). On top of the head, in front of the hair, is a cavity for the attachment of an additional element of head-gear (Fig. 3). The sculptor made limited use of the drill for the leaves and locks of hair around the face as well as the corners of the eyes and mouth. The individual strands of hair in the locks around the face and those at the back of the neck are finely worked with the chisel, while those on the top of the head are more coarsely carved.

Post-antique interventions

The head's current appearance reflects several episodes of restoration, cleaning, damage, and de-restoration that collectively suggest a complex post-antique history. In the absence of archival documentation of the head prior to its appearance on the New York market in 1984,¹ however, it remains difficult to assign these interventions to distinct phases, and indeed in some cases to distinguish post-antique restorations from ancient repairs. The restorations included attaching the head to a torso with joins at the right arm and neck, where a plaster-lined cavity for a large

The discovery of minute traces of ancient gilding on a Roman marble head in the San Antonio Museum of Art in 2011 prompted a thorough re-examination of the sculpture. The head presents a complicated surface reflecting multiple ancient and modern interventions. In addition, its identity has been the subject of debate, arising in part from the absence of the forehead locks critical for the identification of any Roman portrait. This study concentrates first on distinguishing the post-antique interventions and assessing evidence for the head's identity and possible ancient reworking. We then present the gilding and its relationship with areas of purple surface coloration. This examination has in turn shed new light on how the statue to which it belonged was displayed in antiquity.

1 Sotheby's, New York, March 1, 1984, lot 59.



Fig. 1.
Head of Antinous,
h. 36.2 cm, w. 30.0
cm, d. 28.3 cm, San
Antonio Museum of
Art, gift of Gilbert
M. Denman, Jr.,
86.134.164 (photos:
P. Tenison/San
Antonio Museum
of Art)



Fig. 2.
Head of Antinous,
San Antonio
Museum of Art,
86.134.164. Detail:
eyes and eyebrows
(photo: P. Tenison/
San Antonio
Museum of Art)



Fig. 3.
Head of Antinous, San Antonio
Museum of Art, 86.134.164.
Detail: top of head with a
cavity (1.3 x 2.8 x 2.7 cm) for
attachment of a crowning
element (photo: P. Tenison/San
Antonio Museum of Art)



Fig. 4. Head of Antinous, San Antonio Museum of Art,
86.134.164. Detail: prepared join surface on forehead
(photo: P. Tenison/San Antonio Museum of Art)

dowel is visible. The join surface at the arm was prepared with shallow picking and lightly smoothed at top and bottom. A rectangular dowel and a clamp (only its upper end remains), both of copper alloy and both leaded into place, secured the join. The now visually obtrusive join surface at the forehead (Fig. 4) is the result of two phases of restoration. In the first, the surface was carefully prepared with anathyrosis, and its contours closely follow the pre-existing line of the wreath above the forehead as well as the locks across the forehead. Subsequent damage to this restoration resulted in a break through the upper anathyrosis border. The heavy picking now visible across this area and intruding into the smoothed borders seems to be the result of a second, less careful phase of restoration. This second restoration was secured with an iron pin leaded into place;

the lead pour-channel remains, as do traces of a white joining plaster in the tool marks. The tip of the nose was also restored: the area of the left nostril has been carefully smoothed, and a pin hole with traces of resin was exposed and re-filled during treatment at the museum in 1989.

Considerable burial accretion remains on the top, sides and back of the head, and much of the surface appears yellowish-brown. This coloration is probably the product of a combination of ancient and post-antique sources. The dark brown appearance of the break surfaces flanking the pour-channel and of the cutting for the clamp in the right arm must have been acquired after these restorations and suggests that the head may have been displayed outdoors for a prolonged period after its discovery and restoration. Analysis of microsamples from the head's surfaces by Fourier transform infrared spectroscopy (FTIR) has revealed calcium oxalates consistent with weathering, but the exact nature of the brownish film(s) has remained elusive. Aggressive cleanings of the face, the surrounding locks and ivy leaves, and the front of the neck removed any burial accretions and most traces of the brownish film from these areas. These cleanings also removed the ancient surface finish and thus frustrate understanding of the facial features, carving techniques and polychrome treatment. The orange-pink fluorescence of these cleaned surfaces under ultraviolet light (Fig. 5) probably attests to the application of one or more coatings that included organic materials. In a more recent phase, the join at the neck failed, resulting in breaks through the dowel hole and the two long locks. After this damage, the broken neck was trimmed and consolidated, and the head was re-mounted for display



Fig. 5. Head of Antinous, San Antonio Museum of Art, 86.134.164. Ultraviolet-induced luminescence (UIL) image (photo: P. Tenison/San Antonio Museum of Art)

as a stand-alone piece. It may have been at this time that the other restorations were removed, as was widely done from the late 19th century up to the 1970s.

Identity and the question of ancient reworking

These extensive post-antique interventions have complicated interpretation of the head's ancient subject, which has been identified as Dionysos, as Hadrian's companion Antinous, or as Dionysos recut into Antinous.² All previous discussions of this question, however, appear to have been based solely on the few published Sotheby's photographs. Our direct examination of the sculpture confirms that it is a portrait representing Antinous. The medium-length curved locks around the face, across the forehead, where their approximate contours can be traced along the lower edge of the join (Fig. 4), and down the back recall the hair on accepted portraits of Antinous.³ The horizontal brows rising slightly toward the temples and the puffy upper eyelids correspond closely

to portraits of Antinous (Fig. 2).⁴ The chiseling of the individual hairs of the eyebrows, although reduced in the post-antique treatment of the face, is likewise a feature shared by many portraits of the youth.

The cavity for attachment of a crowning element further secures the head's identity; a similar feature is attested on portraits of Antinous in marble and on coins, but is unknown on Roman statues of Dionysos. Portraits in Florence and Baia both have supports for an attribute above the forehead, and the Antinous Braschi had a cavity with traces of iron.⁵ Like the San Antonio head, the Florence and Vatican portraits also combine the attribute with a Dionysiac ivy wreath, and a cutting on the Baia head indicates that such a wreath was probably added in metal. Hugo Meyer proposed that the missing element on the latter three portraits was an Egyptian *hem-hem* crown, which appears on coins of Antinous from Alexandria and Tarsus.⁶ Holes for the insertion of crowning elements on portraits of Alexander the Great and the Ptolemies have likewise been provisionally identified as evidence for now-missing *hem-hem* crowns.⁷ Together with the Lykeios pose and the ivy wreath, this feature would have emphasized Antinous' posthumous divine status and his close association with Dionysos and with Egypt.

Close examination of the head indicates that Meyer's hypothesis that this portrait of Antinous was reworked in antiquity from a statue of Dionysos must be considered improbable. Meyer attributed the large forehead join surface to an ancient effort to change the statue's subject by replacing this part of the hair and pointed to subtle variations from the facial proportions and hairstyle of Antinous' established portrait types as further evidence of recutting.⁸ We have argued above that the join at the forehead reflects instead a post-antique restoration; regardless of its date, the repair clearly followed the previous hairline of short, curved locks and therefore cannot have changed the figure's identity. As preserved, the upper part of the head displays several

2 SCHRÖDER 1989, 180, no. Z4 (Antinous); MEYER 1991, 128, no. V3 (Dionysos reworked as Antinous); EVERS 1995, 451 (Dionysos); GOETTE 1998, 35, 40 (Dionysos); MAMBELLA 2008, 254, no. 128 (Dionysos perhaps reworked as Antinous).

3 CLAIRMONT 1966; MEYER 1991. VOUT 2005 argues for admitting more variation within the portrait type, rebutted by FITTSCHEN 2010, 244-46.

4 Cf. Louvre Ma 238 (MEYER 1991, 61-62, no. I41); Naples, Museo Archeologico Nazionale 6030 (GASPARRI 2009, 90, no. 64).

5 Florence, Palazzo Pitti (MEYER 1991, 44-46, no. I21); Baia, Museo Archeologico dei Campi Flegrei 315316 (MEYER 1991, 60-61, no. I40; ZEVI *et al.* 2008, 229); Vatican Museums 540 (MEYER 1991, 88-90, no. I67); cf. FITTSCHEN, ZANKER 1985, 60.

6 MEYER 1991, 149, Mü 7.

7 THOMAS 2001, 10, 49-52; SVENSON 1995, 127-28.

8 MEYER 1991, 128, no. V3; doubted by EVERS 1995, 451 and GOETTE 1998, 35, 40, both of whom saw the head as Dionysos.

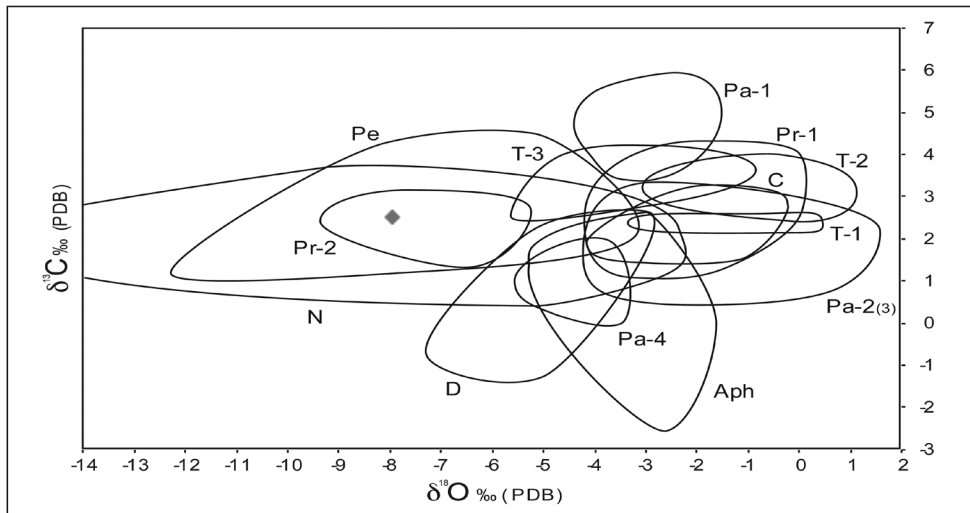


Fig. 6.
Isotopic value of the head
of Antinous $\delta^{13}\text{C}/\delta^{18}\text{O}$
plotted against the database
from GORGONI *et al.*
2002 (image: S. Pike)

awkwardly worked areas, including the coarse nub of marble between the first two fingers (Fig. 1) and tool marks together with a ridge of marble where the leading edge of the wrist and hand were cut back to make room for the cavity above the forehead (Figs. 3, 4). Taken together, however, the surviving surfaces do not provide conclusive evidence for the substantial recutting advocated by Meyer; rather, the statue was most likely created from the beginning as a portrait of Antinous.

Marble provenance

Stable isotope analysis on a marble sample taken from beneath the neck produced $^{13}\text{C}/^{12}\text{C}$ and $^{18}\text{O}/^{16}\text{O}$ isotope ratios (expressed ‰ relative to the international PDB standard for carbon and oxygen isotope ratios) as follows:

$\delta^{13}\text{C}$	$\delta^{18}\text{O}$
+2.5	-7.9

These values were compared to the white marble isotopic databases of Herz and Attanasio, Brilli and Ogle using the least-squares statistical program of Pentia.⁹ This analysis identified the following potential source quarries with a 15% or greater probability: Naxos-Apollonas (82%), Pentelikon (74%), Naxos-Apeiranthos (73%), Iznik (66%), Sardis (55%), and Doliana 1 (46%) (Fig. 6). It is important to note that the statistical values are only used to identify potential source quarries; the higher probabilities do not necessarily indicate a stronger likelihood of assigning a provenance to that source quarry.

The marble is a fine-to-medium grain white marble with vertical foliation bands of grayish-green visible

through the face and neck, likely caused by graphite and possibly white mica. A thin but elongated linear fracture runs vertically down the right side of the neck. The fracture is parallel to the observed foliation and was likely caused by a textural plane of weakness within the marble block. The marble texture alone can preclude a Naxian source, as Naxian marbles have significantly larger grain sizes. The Turkish quarries are also unlikely sources as their marbles do not exhibit foliation to the same degree. Therefore, the stable isotope data along with the textural analysis strongly suggest that the marble is Pentelic. This result is unsurprising; the widespread popularity of Pentelic marble as a sculptural material in the imperial period is well-known from statues in this medium documented at sites around the Mediterranean.¹⁰

Gilding and polychrome effect

Small amounts of gold leaf are discernible on the leaves, stems and band of the ivy wreath on both sides and the back of the head (Fig. 7). In microscopic examination (5-90x) intact gold leaf is found preferentially underneath and adjacent to areas of intact burial accretion (Fig. 8), while on exposed areas minute vestiges of gilding exist in combination with a distinct purple staining on the marble surface (Fig. 9). In all areas the gold leaf appears to have been applied to the marble surface without a preparation layer. The distribution of the gilding suggests the whole of the ivy wreath was gilded as opposed to a more limited gilding of distinct elements of the wreath or visual highlights. In-situ X-ray fluorescence spectroscopy (XRF) and scanning electron microscopy (SEM-EDS) on microsamples indicate the present alloy composition of the gold leaf to be 97.2% Au and 2.7% Ag by weight, with

9 HERZ 1987; ATTANASIO, BRILLI, OGLE 2006; PENTIA 1995.

10 RUSSELL 2013, 180-82.

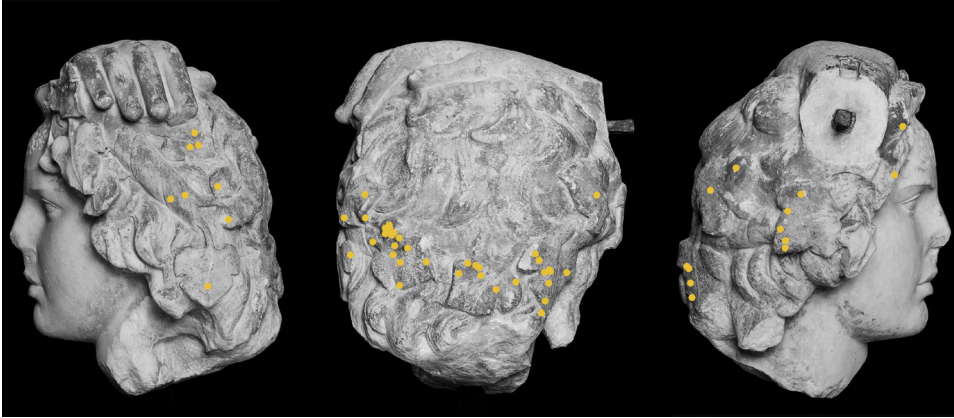


Fig. 7.
Head of Antinous, San Antonio Museum of Art, 86.134.164. Map of gold leaf (image: P. Tenison/J. Powers)



Fig. 8.
Head of Antinous, San Antonio Museum of Art, 86.134.164. Details:
a) ivy leaf;
b) surface detail
(photos: P. Tenison/San Antonio Museum of Art)



Fig. 9.
Head of Antinous, San Antonio Museum of Art, 86.134.164. Details:
a) ivy leaf;
b) surface detail
(photos: P. Tenison/San Antonio Museum of Art)

no other trace metals (such as copper) discernible. This composition, though undoubtedly deteriorated in burial, is consistent with analyzed alloys of gold leaf from other late Hellenistic and Roman sculptures.¹¹

The appearance of the localized areas of purple staining—ranging from violet to dark purple—on the head is similar to areas of purple surface discoloration found on other classical marble sculptures, often present in combination with extant gilding. This important

surface phenomenon has, to date, been only cursorily noted, both in the archaeological literature and in discussions of ancient polychromy. The proper identification and interpretation of such purple coloration has remained largely elusive.¹² Such coloration often appears remarkably diffuse under optical microscopy (5–120x) with neither discernible distinct particles nor a recognizable pigment layer (Figs. 10, 11). The purple often appears to be embedded in the marble, even behind and between its grain structure, and/or on the surface of intact gold leaf. SEM images of microsamples from the San

11 ARTAL-ISBRAND, BECKER, WYPYSKI 2002, 197; BOURGEOIS, JOCKEY, KARYDAS 2011, 649–50; KARYDAS *et al.* 2009, 821–23.

12 Cf. PIENING 2014; REICHE *et al.* 2013.

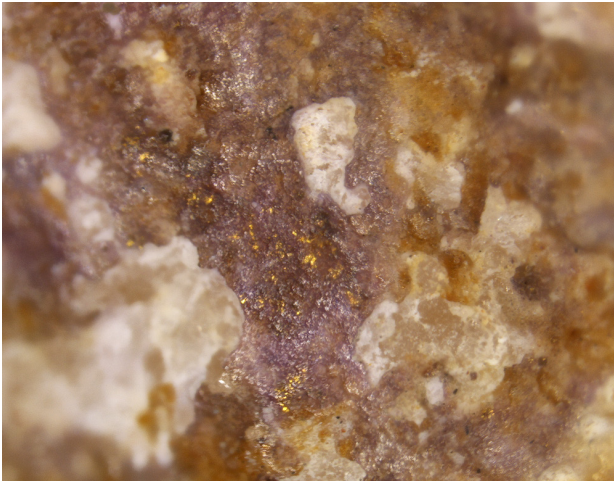


Fig. 10. Head of Antinous, San Antonio Museum of Art, 86.134.164. Microscopic view of ivy leaf *in situ*, gold leaf and purple areas (photo: M. Abbe)

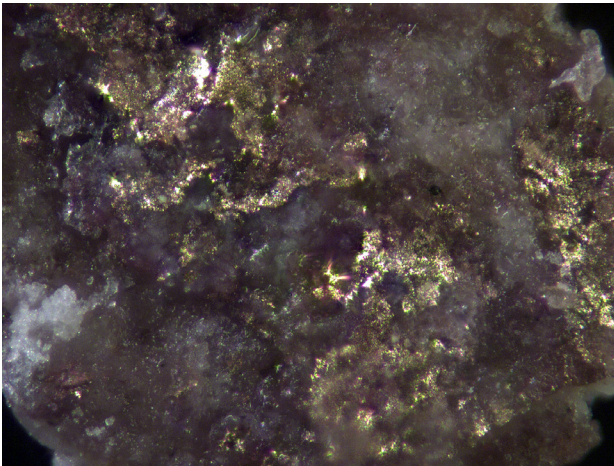


Fig. 11. Head of Antinous, San Antonio Museum of Art, 86.134.164. Microsample from ivy leaf, gold leaf and purple areas (photo: M. Bushey)

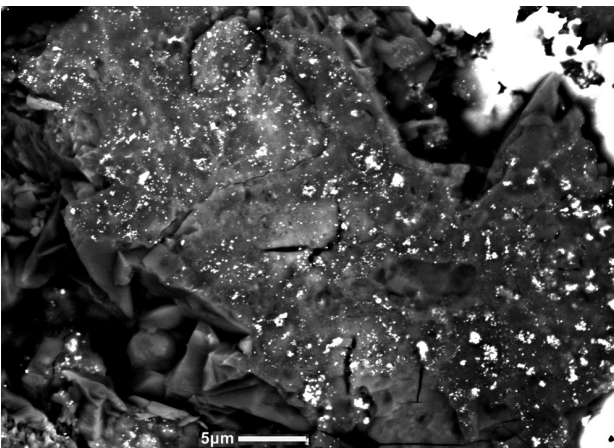


Fig. 12. Head of Antinous, San Antonio Museum of Art, 86.134.164. SEM-EDS image of microsample from ivy leaf with gold nanoparticles (appearing white) (photo: M. Bushey)

Antonio Antinous reveal numerous sub-micron, that is, nanoscale particles of gold in areas of purple staining (Fig. 12). These vary in size, and while some are quite large, many measure in the range of 70–150 nm.

At the nanoscale, gold loses its brilliant yellow color and in transmitted light, as in colloidal dispersions like water, displays an intense range of colors. When deposited on the surface of translucent white marble, gold nanoparticles can appear purple, violet, or blue at scales larger than 100 nm, and red, when smaller than 100 nm. Gold, though seemingly inert at the macroscale, is in fact slightly soluble in naturally occurring aqueous soil environments that are highly saline and acidic, as recent research has highlighted. Moreover, both microbiota in soils and the electrochemical deterioration of gold-silver alloys significantly facilitate the formation of gold nanoparticles in such contexts.¹³ The formative conditions are highly varied, and on both the San Antonio head and numerous other ancient marbles, the apparent formation of purple gold nanoparticles seems to be a very local phenomenon, suggesting the appropriate conditions were highly localized in their terrestrial burial contexts. Such a purple color on the surfaces of marble sculptures therefore need not be deliberate ancient coloration, as is often assumed, but rather could be the natural degradation product of ancient gold leaf, visible or not. This understanding promises to have an important role in accurately reconstructing the original polychromy and aesthetics of Hellenistic and Roman marble sculpture.

Although no other secure traces of ancient painted polychromy have been identified on the San Antonio Antinous, visible-induced luminescence (VIL) imaging revealed the presence of isolated particles of Egyptian blue pigment (confirmed by polarized microscopic examination) amidst burial accretions in the hair (Figs. 13, 14, 15). These particles display no discernible stratigraphy or pattern of distribution, however, and may originate from the head's burial environment or from re-deposited vestiges of the statue's ancient polychromy.

Conclusions: material aesthetics, display context, and meaning

The statue to which this head belonged, when complete, must have been an arresting work, probably carved from a single block of marble and standing more than two meters in height before it was raised on its ancient pedestal. The carving techniques correspond to a date between A.D. 130 and 138, the period of Hadrian's reign following Antinous' death to which portraits of him have traditionally been dated. Few of the nearly 100

13 LOUIS 2012; HOUGH *et al.* 2008; *cf.* MINGOS 2014.



Fig. 13. Head of Antinous, San Antonio Museum of Art, 86.134.164. Visible-induced luminescence image (photo: P. Tenison/San Antonio Museum of Art)

surviving marble portraits of Antinous preserve traces of their ancient polychromy, and the discovery of gilding on the San Antonio head adds to this small corpus.¹⁴ The translucency of the marble substrate, which was increasingly masterfully exploited in subtle polishes on second century sculptures, would undoubtedly have contributed to the statue's overall effect. This statue thus participated in the enhanced, polychrome material language of contemporary Roman marble sculpture, while forgoing the most dramatic sculptural techniques of the period, such as the contrasting surface textures, inlaid eyes, or added bronze wreaths attested on other portraits of Antinous.

The portrait's distinctive features—the sensual pose, the gilded wreath, and the Egyptian crowning motif—must have been selected in relation to its specific patrons, setting, and intended viewers. Only two other statues of Antinous in the Apollo Lykeios pose are known,

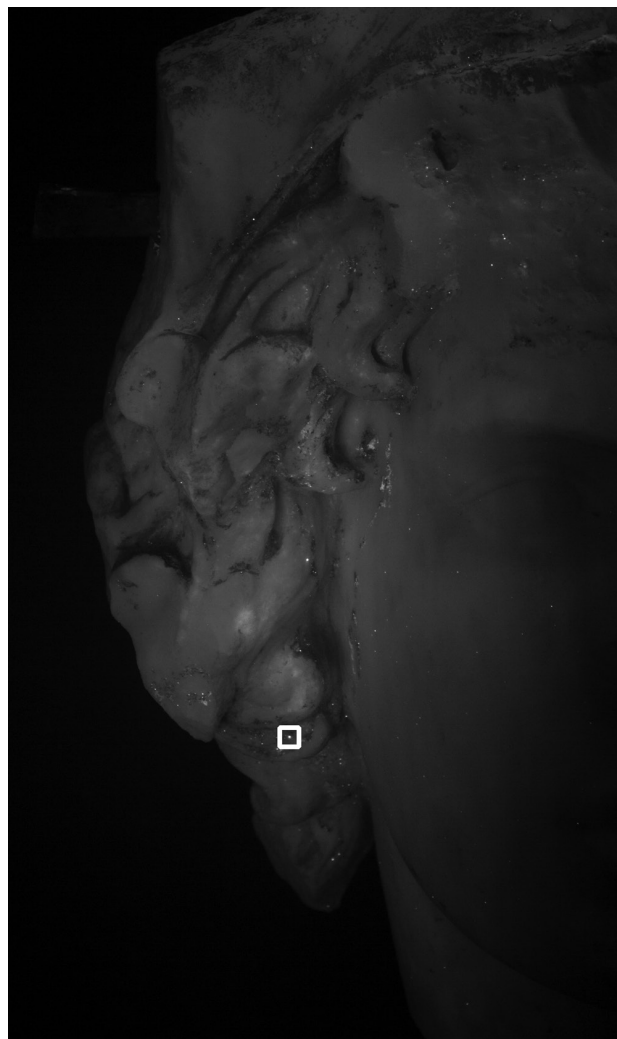


Fig. 14. Head of Antinous, San Antonio Museum of Art, 86.134.164. Detail: hair at proper right side of face, visible-induced luminescence (VIL) image (photo: P. Tenison/San Antonio Museum of Art)

one from the theater in Corinth, and the other from the baths in Leptis Magna.¹⁵ The Corinth Antinous was displayed as a pendant to a statue of Dionysos, while that in Leptis Magna formed part of a sculpture assemblage that included several statues of Apollo. Like these statues, the San Antonio portrait may have been designed to complement other sculptures of gods with similar compositions. The surviving layer of gilding on the San Antonio head was presumably added only after the statue was set on its base. The complete sculptural finish and gilding on the head's reverse suggest that this statue of Antinous may have been displayed in the round with these details visible.

Although the *hem-hem* crown appears on coins of Antinous from Alexandria and Tarsus, portraits of

14 Known to the authors are: red painted irises on the Farnese Antinous (Naples, Museo Archeologico Nazionale 6030; GASPARRI 2009, 90, no. 64); yellow and red preparatory painting on the hair of the head from the Temple of Magna Mater in Ostia (Museo Nazionale Romano, Palazzo Massimo 341; GASPARRI, PARIS 2013, 180, no. 120); red painting on the hair and pink on the berries on the ivy wreath of a head in New York (Metropolitan Museum of Art 1996.401; MILLEKER 1997); and the reported red underpainting on the hair of the nude Antinous from Delphi (Delphi Museum 1718; MEYER 1991, 36-38, no. 115).

15 Corinth Museum (STURGEON 2004, 128-31, no. 25); Tripoli Museum 12 (FINOCCHI 2012, 61-63, no. 25).

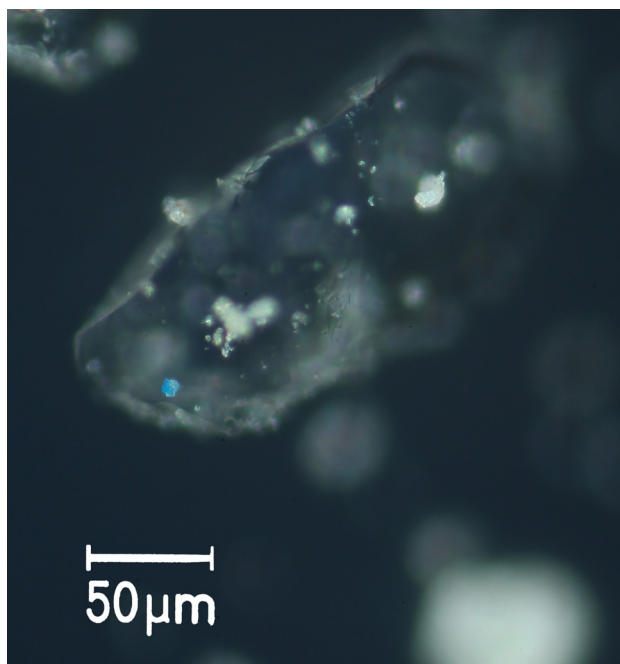


Fig. 15. Head of Antinous, San Antonio Museum of Art, 86.134.164. Polarized light view of microsample with particle of Egyptian blue (photo: M. Bushey)

Antinous with attachment points for such a feature are thus far known only from Italy. The sequence of post-discovery interventions reconstructed here also suggests that the statue to which the San Antonio portrait belonged may have been displayed in Rome or central Italy in antiquity, as these were the areas most actively explored by the 16th to 18th century “archaeologists” whose finds were given similar restorations. In its ancient setting, this complex image vividly linked Antinous to Dionysos and to the gods of Egypt, and thus reinforced the youth’s posthumous divine status.

Experimental parameters

FTIR was performed on a Nicolet Nexus 670 optical bench equipped with a Continuum Microscope, with 264 scans collected at 4 cm⁻¹ resolution.

In-situ XRF was conducted with a Bruker Tracer III-SD handheld X-ray fluorescence spectrometer, with and without a Ti-Al filter, typically with a tube voltage of 40 kV at 13.30 mA, without a vacuum, for an exposure of 45 or 60 seconds.

A Hitachi S-3400N SEM was used for the determination of the gold alloy in the backscatter mode at 20 kV with a pressure of 30 Pa. A Jeol 6010LA SEM was used for the nanoparticle measurements, with multiple pressures and voltages, typically 50 Pa at 15 kV.

PLM was performed with an apLeica DRX compound polarizing light microscope. A PL Fluotar 2x objective with a 2.5x zoom was used with a Canon EOS 5D Mark III digital camera for photography.

Marble analysis by continuous flow mass spectroscopy was conducted at the Stable Isotope Laboratory, Department of Geology, University of Alabama.

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