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

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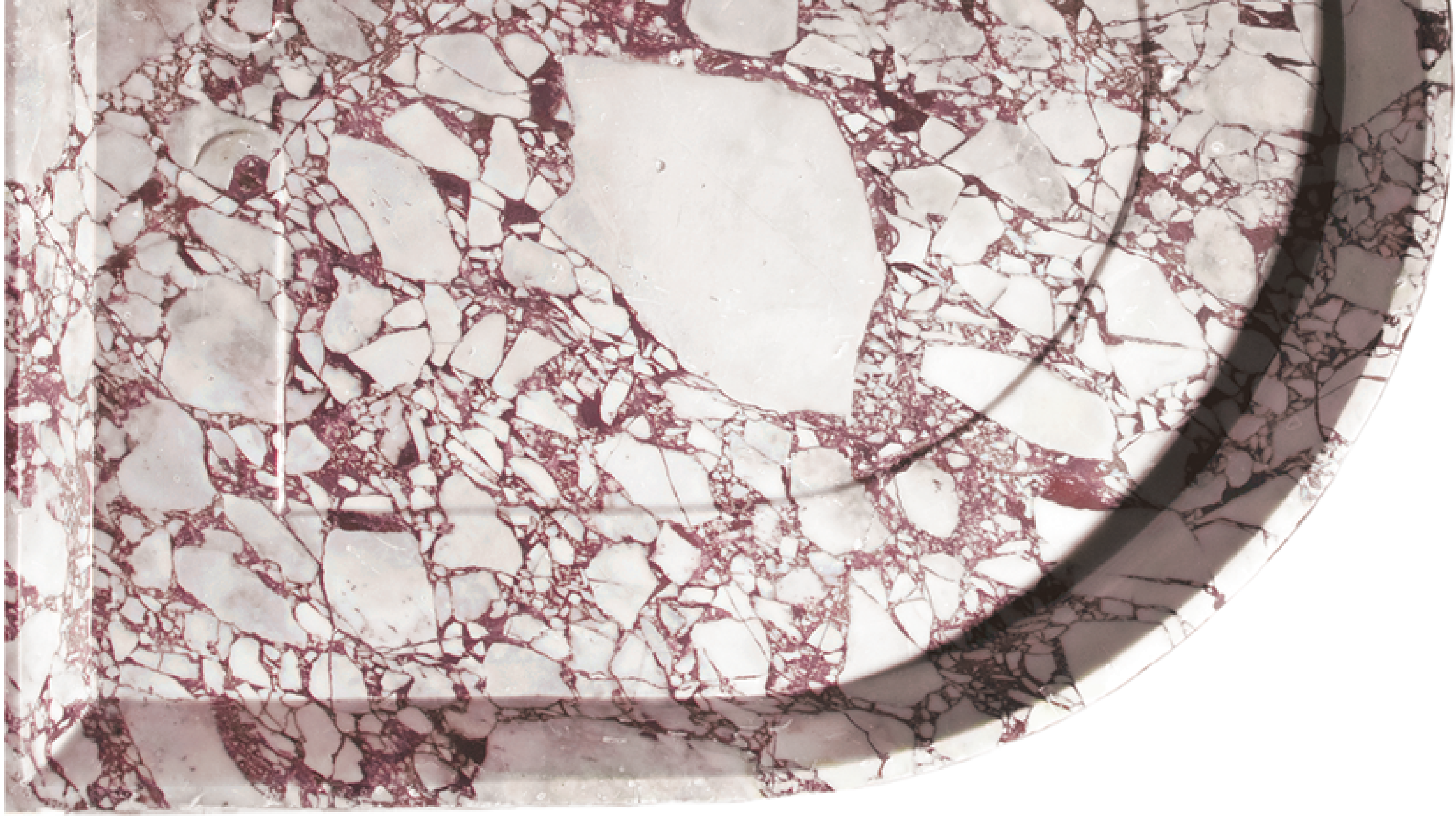

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CONTENT

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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

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.

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 hand, is a cavity for the attachment of an additional element of headgear (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

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.

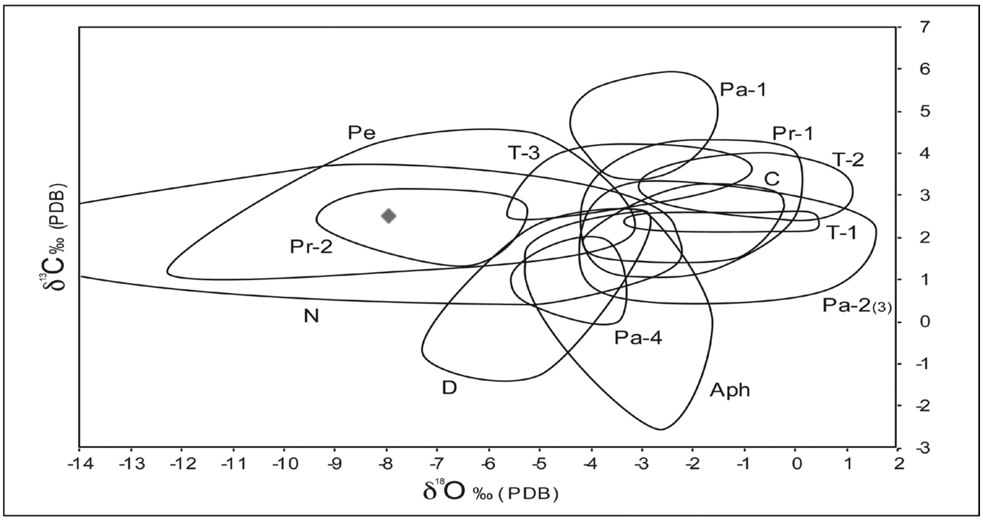

Fig. 6.
Isotopic value of the head of Antinous δ13C/δ18O plotted against the database from GORGONI *et al.* 2002 (image: S. Pike)

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 $^{13}C/^{12}C$ and $^{18}O/^{16}O$ isotope ratios (expressed ‰ relative to the international PDB standard for carbon and oxygen isotope ratios) as follows:

$\delta^{13}C$	$\delta^{18}O$
+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.

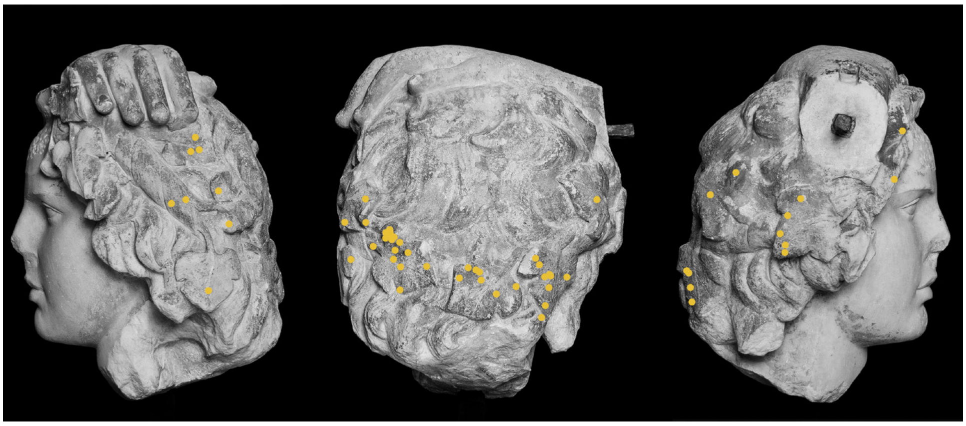

Fig. 7.
Head of Antinous, San Antonio Museum of Art, 86.134.164. Map of gold leaf (image: P. Tenison/J. Powers)

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)

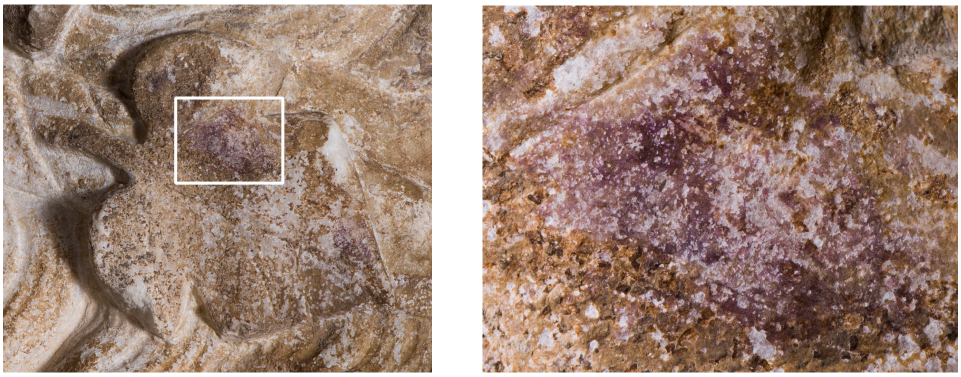

Fig. 9.
Head of Antinous, San Antonio Museum of Art, 86.134.164. Details:
a) ivy leaf;
b) surface detail
(photos: P. Tenison/San Antonio Museum of Art)

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.

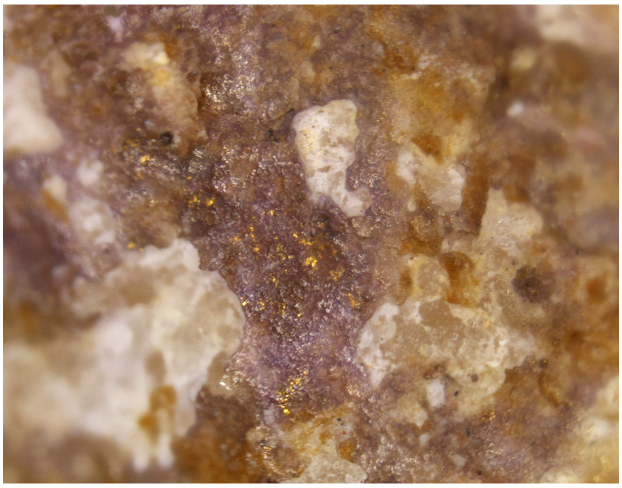

Fig. 10. Head of Antinous, San Antonio Museum of Art, 86.134.164. Microscopic view of ivy leaf *in situ*, gold leaf and purple areas (photo: M. Abbe)

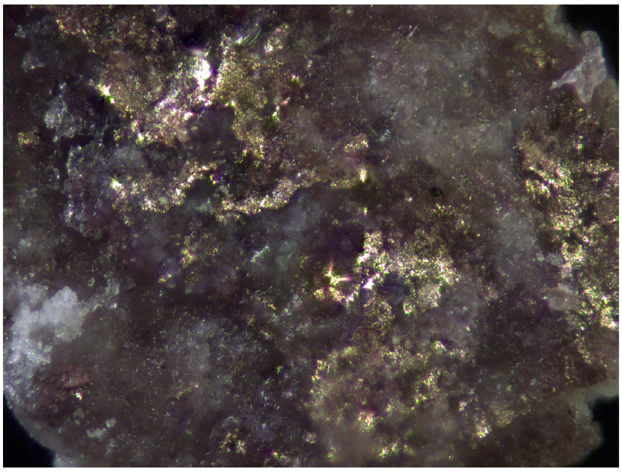

Fig. 11. Head of Antinous, San Antonio Museum of Art, 86.134.164. Microsample from ivy leaf, gold leaf and purple areas (photo: M. Bushey)

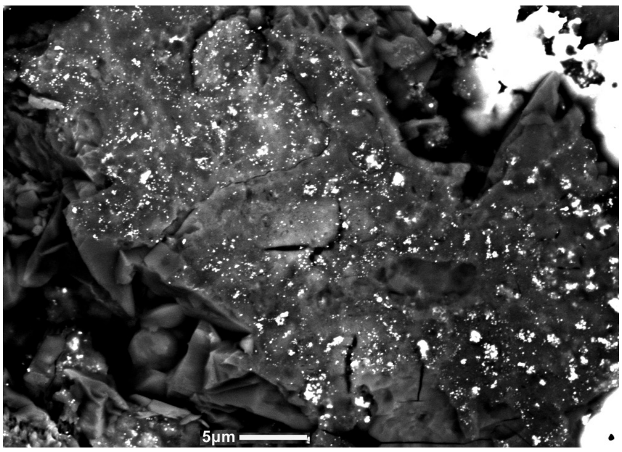

Fig. 12. Head of Antinous, San Antonio Museum of Art, 86.134.164. SEM-EDS image of microsample from ivy leaf with gold nanoparticles (appearing white) (photo: M. Bushey)

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, 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

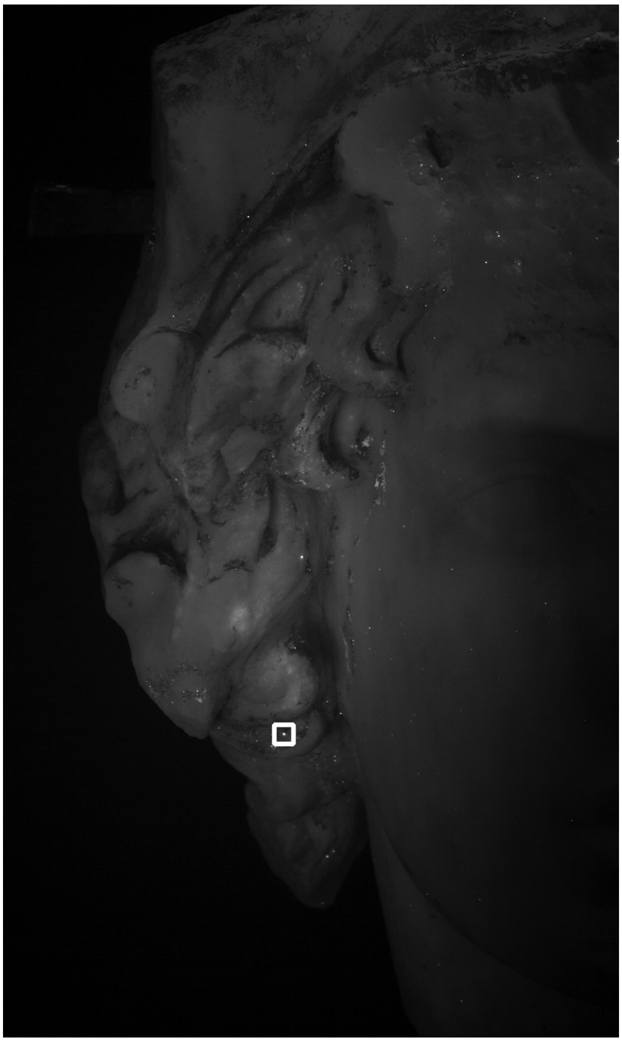

Fig. 14. Head of Antinous, San Antonio Museum of Art, 86.134.164. Detail: hair at proper right side of face, visible-induced luminescence (VIL) image (photo: P. Tenison/San Antonio Museum of Art)

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. I15).

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

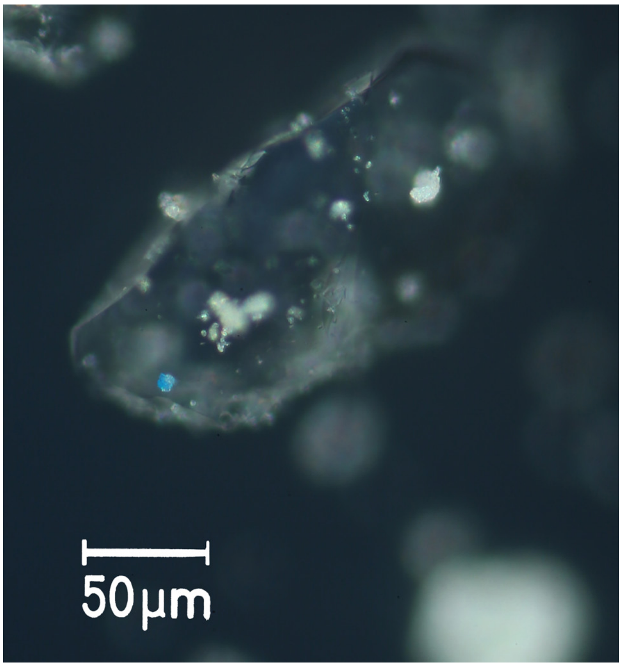

Fig. 15. Head of Antinous, San Antonio Museum of Art, 86.134.164. Polarized light view of microsample with particle of Egyptian blue (photo: M. Bushey)

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 m A, 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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