

ISOTOPIC ANALYSIS OF *ROSSO ANTICO* AND BICHROME MARBLE OBJECTS FROM THE MUSEUM OF FINE ARTS, BOSTON

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Abstract

Results are reported here from the isotopic analysis of several non-white marble objects from the Museum of Fine Arts, Boston, as part of our continuing collaboration on the source tracing of classical marble sculpture.

Grey- or black-and-white bichrome sculpture seems to be a characteristic product of Asia Minor and is usually attributed to Aphrodisias where several have been found. Based on visual inspection and grain size analysis, however, it appears that Dokimion could also be the source of some bichrome marble objects. This hypothesis is tested with the results of stable isotope analyses of both white and grey (or black) samples from four bichrome sculptures.

Stable isotope analysis was also performed on several Minoan bowls from Crete. One has been suggested to be made in banded travertine from the island of Dia, from which geological specimens were also tested. Our results indicate that this bowl is not from Dia, so that alternative potential sources must be sought. Other vessels, lighter in color than the perfect purple characteristic of *rosso antico*, could be from Mani. Reddish stone is also known from Rhodes, where it was used for sculpture in the Hellenistic period. The results of our isotopic analysis are consistent with a quarry source at Mani.

Keywords: ROSSO ANTICO; BICHROME MARBLE; STABLE ISOTOPE ANALYSIS

Introduction

Results are reported here from the isotopic analysis of several non-white marble objects from the Museum of Fine Arts, Boston, as part of our continuing collaboration on the source tracing of classical marble sculpture (TYKOT *et al.*, 1999; 2001; VAN DER MERWE *et al.*, 1995; 1999).

In his fundamental work on the stone vases of Bronze Age Crete, Peter Warren identified at least 23 different kinds of stone employed (WARREN, 1969: 124-156). The sources of many, however, could not be precisely located. Moreover, in many cases Warren was uncertain whether the stone used was a material well known in international trade or some ill-defined local Cretan look-alike. Warren did not study Boston's notable collection of Minoan vases, which largely come from excavations on Mochlos, an island just off the coast of eastern

Crete. Lacking his experienced eye, the uncertainties in the identifications of the Boston vases are especially great.

A red stone bowl in Boston (*fig. 1*) was tested to investigate the possibility that it was a celebrated, long used material: *rosso antico*. This is the commonly used name for the purple-red marble of the Mani peninsula, the central of the three peninsulas projecting from the southern Peloponnesus (LAZZARINI, 1990; GORGONI *et al.*, 1992). Although it was most intensely exploited during Roman times, this source is known to have been used during the Bronze Age for architectural decoration in the Peloponnesus and for vases, lamps, and a table on Crete. The bowl in the Museum of Fine Arts, however, is a lighter red than in the most prized examples of *rosso antico* and has large white areas with rather soft, ill-defined borders. The question arises if this could be the «fine-grained maroon/red limestone with white inclusions» that Warren distinguishes from *rosso antico*



Fig. 1 – MFA 09.599. Minoan bird's nest bowl, EM III-MM II (2200-1650 B.C.).

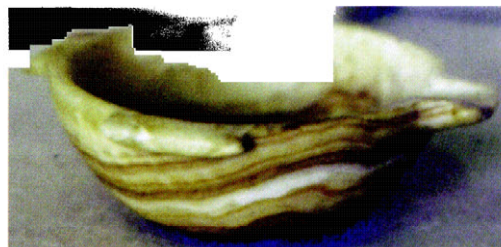


Fig. 2 – MFA 09.17. Minoan spouted bowl, EM II-III (2600-2000 B.C.).

(WARREN, 1969: 126). The material used for the bowl could also conceivably be a red stone (not marble) known as *Larthios lithos* or *swmaki* that was used for sculpture on Rhodes in the Hellenistic period (KIRSTEN, 1959: 333-335; GREGAREK, 2001).

Another problem is posed by the banded travertine used in several Minoan bowls in the Museum of Fine Arts. This material was especially popular at Mochlos, the source of the bowls in Boston. The source of this travertine, however, is unknown. Warren spotted similar rocks at the Kakon Oros breccia site just east of Herakleion and in the hills behind the bay of Mallia on the northern coast (WARREN, 1969: 127). Samples from these sites are not available to us, but Malcolm Wiener provided us with a sample of a very similar stone from the island of Dia off the coast of Crete. The sample came from



Fig. 3 – MFA 1996.89. Under life-size head of a giant in dark grey marble, 3rd c. A.D.

a quarry there that also contained fragments of Minoan pottery. One of the MFA bowls (fig. 2) was sampled to see if the Dia quarry could have been its source.

Sculpture of black and dark gray stone has long been a field of great interest because of the many handsome Roman sculptures known in these materials and the intriguingly somber symbolism connected with them (GNOLI, 1971: 165-66; FORNASERI *et al.*, 1995; BORGHINI, 1997: 158-160, 254-55). At times the sculptures would be entirely black, but on occasion sculptors would use black marble for the clothing and separate pieces of white marble for the head and limbs of the figures. A third option, seen mainly in statuettes from Asia Minor, was to carve a single piece of black and white marble in a kind of cameo technique so that the flesh parts emerged in white and the rest was left in black. Sculptors from Aphrodisias have long had a close association with black marble sculpture because of the famous Centaurs signed by a pair of Aphrodisians in the Capitoline Museums, Rome from

Hadrian's Villa at Tivoli. The stone of the Centaurs has been identified as *bigio morato* from the Mani peninsula of the Peloponnese. In recent decades the excavations at Aphrodisias itself have revealed that a dark gray marble was available there and used for sculpture (ERIM, 1986: 99, 146; CHAISEMARTIN, 1999). Several small sculptures making use of a single block of black and white marble carved in the «cameo technique» have also emerged at Aphrodisias. As a result of these discoveries, scholars have credited Aphrodisias with a central role in the production of black and gray marble sculpture, and the gray marble of Aphrodisias has been recognized in sculptures found outside of the city (CHAISEMARTIN, 1999).

A sculpture in the Museum of Fine Arts offered the opportunity to test the thesis that Aphrodisian gray marble was exported for sculpture. A gray stone head of a Giant (1996.89) (fig. 3) greatly resembles the gray stone figures in the Gigantomachy from Silahtaraga near Istanbul and now in the Istanbul Archaeological Museum (CHAISEMARTIN, 1999: 263, fig. 3). The Boston head is reputed to come from the same spot. The Silahtaraga sculptures have been attributed to the School of Aphrodisias and are thought to have been exported in pieces ready for assembly (CHAISEMARTIN, 1999: 263). The marble of the Boston Giant appears to be fine grained, which is consistent with recent studies of the Aphrodisian quarries, where the white marble tends to be coarse-grained while the gray is fine-grained (LAZZARINI *et al.*, 2001: table 1, nos. 76, 12, 17). A sample of the head was taken for isotopic study.

Several sculptures in the Museum of Fine Arts and on the art market were carved from a single piece of black and white marble cut in the cameo technique and provide the oppor-

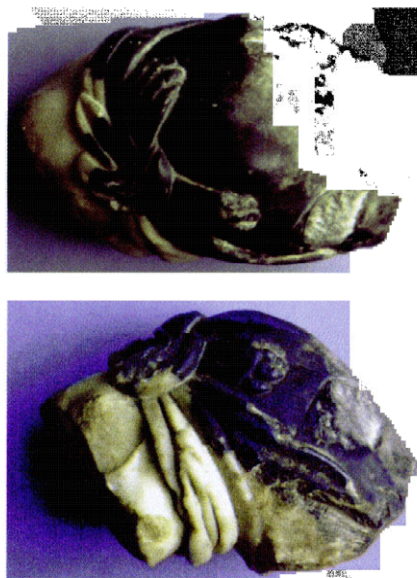


Fig. 4 – MFA 18.144. Elbow or knee partly wrapped with an animal skin. Top (A) and side (B) views.



Fig. 5 – MFA 1974.581. Under-life-size head of Alexander or a mythological hero, 3rd c. A.D. Frontal (A) and profile (B) views.

runity to test whether this material also came from Aphrodisias. The bichrome figures appear to have fine grain, which is again consistent with findings in the Aphrodisian quarries (LAZZARINI *et al.*, 2001). The white areas of these sculptures have the fine, even texture of marble from Dokimeion, but no quarries of black-and-white marble seem to be known there.

The first bichrome sculpture is an elbow or knee partly wrapped with an animal skin (COMSTOCK and VERMEULE, 1976: cat. 222) (fig. 4). Samples were taken from both fresh and weathered areas of black and white marble. The sculpture is richly modeled in the style of the second or third century and is much like a black and white Triton found in Istanbul and attributed to Aphrodisias (CHAISEMARTIN, 1999: 1).



Fig. 6 – Thomas M. Swope statuette of Dionysos/Bacchus with a cluster of grapes, 3rd c. A.D.

Two other bichrome pieces are smaller-scale, later in style, and with a somewhat weaker contrast of black and white. One is an under-life-size head of Alexander or a mythological hero (probably Meleager) said to have come from Constantinople and now in the Museum of Fine Arts (COMSTOCK and VERMEULE, 1976, cat. 127A) (fig. 5). Samples were taken from the white flesh and cloak and the gray hair. The other bichrome statuette represents Dionysos and was formerly in the Thomas M. Swope collection (SOTHEBY'S, 1996) (fig. 6). Samples were taken from the white flesh and the dark gray hair and grapes. Both are quite stylized, with simplified faces and undulating waves of hair rendered with parallel drill channels. They probably date from the third or fourth century, although some scholars consider marble statuettes in this style even later. In any case, there are strong stylistic reasons for connecting them with Aphrodisias, since a similar head (entirely in white marble) has been excavated there (ERIM, 1986: 147).

Analysis and Discussion

All samples were prepared in the Archaeological Science Laboratory at the University of South Florida and analyzed on a VG Isogas SIRA II mass spectrometer equipped with an individual acid bath multiprep system. All results are reported using the delta (δ) notation in parts per mil (‰) relative to the VPDB standard. Analytical precision is $\pm 0.1\text{‰}$ for both $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$. Results are reported in Table 1 and compared with marble quarry data from MOENS *et al.* (1992) in figure 7. Thin sections were also made from two samples of sculpture 18.444.

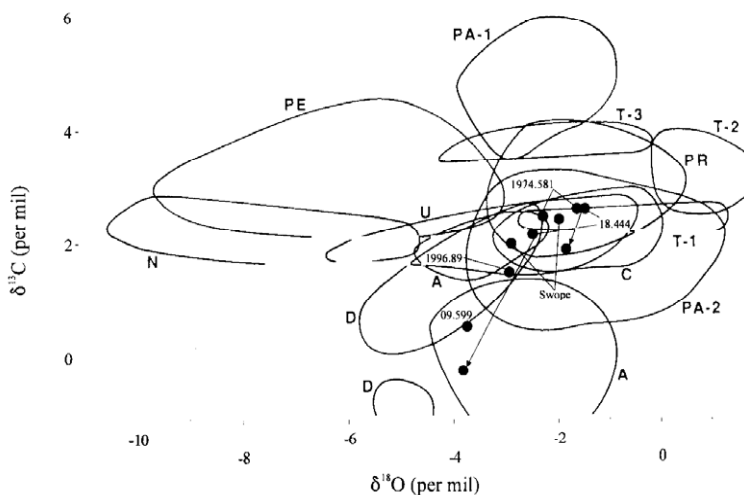


Fig. 7 – Carbon vs. oxygen isotope ratios for samples in this study. Isotopic fields from Moens *et al.*, 1992. A = Aphrodisias; C = Carrara; D = Dokimeion; N = Naxos; Pa = Paros; Pe = Pentelikon; Pr = Proconnesus; T = Thasos; U = Usak. Arrows indicate isotopic shifts between fresh and surface samples.

For our first Minoan bowl (09.599), the isotopic results are consistent with a quarry source at Mani despite the bowl's atypical coloration. For the second Minoan bowl (09.17), however, the isotopic results are inconsistent with a quarry source at Mani, nor do they match the geological specimens from Dia that were also tested. Alternative potential sources must be sought.

For the bichrome sculptures, we had hoped that at least some would have isotopic results that fall outside of the area of isotopic overlap between Dokimeion and Aphrodisias. Unfortunately, the isotopic results for all four sculptures fall in an area of isotopic overlap between the two quarry sources (fig. 7). For the head of a giant (1996.89), the isotopic results are consistent with both Aphrodisias and Dokimeion. For the bichrome knee/elbow (18.444), the isotopic results for fresh black marble is consistent with both Aphrodisias and Dokimeion, while the results for fresh white marble are seemingly outside of the range of both of these sources. Weathering crusts on both white and black portions of this sculpture show typical isotopic depletion of 1-2.5‰ in $\delta^{13}\text{C}$ and up to 0.8‰ in $\delta^{18}\text{O}$ (Tykot *et al.*, 1999). The thin sections made from

two separate chips produced maximum grain size measurements of 0.7 and 0.6 mm, which is identical to the measurements obtained for a white marble portrait (1971.18) actually excavated at Aphrodisias and dated to the late fifth century A.D. For the Alexander head (1974.581), again the isotopic results for fresh black marble are consistent with both Aphrodisias and Dokimeion, while the results for fresh white marble are seemingly outside their range. Lastly, for the Swope Dionysos the isotopic results for fresh black marble are consistent with both Aphrodisias and Dokimeion, while those for white marble are perhaps slightly outside the range of both of these sources. Additional analyses using other methods will be necessary to conclusively demonstrate that Aphrodisias was the likely source of bichrome sculpture during the later Roman empire, but it is clear that sculptural marble from Aphrodisias was not always coarse-grained.

Acknowledgments

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Table 1 – Stable isotope results for samples in this study.

Lab. No.	Museum Cat. No.	Location	$\delta^{13}\text{C}$ (‰)	$\delta^{18}\text{O}$ (‰)
HI-1506	MFA 1996.89	black area	1.7	-3.5
HI-1533	MFA 1974.581	white area	2.8	-2.4
HI-1534	MFA 1974.581	black area	2.6	-3.3
HI-1536	Swope Dionysos	white area	2.5	-2.8
HI-1537	Swope Dionysos	black area	2.2	-3.6
USF-89	MFA 18.444	white core	2.8	-2.3
USF-91	MFA 18.444	white crust	1.9	-2.6
USF-90	MFA 18.444	black core	2.4	-3.4
USF-86	MFA 18.444	black crust	0.0	-4.2
USF-83	MFA 09.17		-1.5	-4.6
HI-1539	Dia 1		-8.0	-5.5
HI-1540	Dia 2		-6.1	-6.0
HI-1541	Dia 3		-5.7	-5.8
HI-1542	Dia 4		-5.5	-5.5
USF-93	MFA 09.599		0.9	-4.1

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