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 Minyan bowls from Crete. One has been suggested to be made in banded travertine from the isald 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 rossso 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 isotope 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 25 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 Minyan 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: rossso 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; Gorgons 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 vase painting, 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 rossso 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 rossso antico.

Fig. 1 – MFA 09.399. Minyan bird's nest bowl, EM III-MM II (2200-1650 B.C.).

Fig. 2 – MFA 09.17. Minyan spouted bowl, EM II III (2600-2000 B.C.).
The material used for the bowl could also conceivably be a red stone (not marble) known as *Larthis lithos* or swniki that was used for sculpture on Rhodes in the Hellenistic period (Kirsten, 1959: 333-335; Gregorek, 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 Hadrian’s Villa at Tivoli. The stone of the Centaurs has been identified as *bigo morato* from the Mani peninsula of the Peloponnese. In recent decades the excavations at Aphrodisias itself have revealed that a dark grey marble was available there and used for sculpture (Ermi, 1986: 99, 146; Chase-Martín, 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 Aphrodisia with a central role in the production of black and grey marble sculpture, and the grey marble of Aphrodisia has been recognized in sculptures found outside of the city (Chase-Martín, 1999).

A sculpture in the Museum of Fine Arts offered the opportunity to test the thesis that Aphrodisian grey marble was exported for sculpture. A grey stone head of a Giant (1990.89) (fig. 3) greatly resembles the grey stone figures in the Gigantomachy from Silbatera near Istanbul and now in the Istanbul Archaeological Museum (Chase-Martín, 1999: 263, fig. 3). The Boston head is reputed to come from the same spot. The Silbatera sculptures have been attributed to the School of Aphrodisias and are thought to have been exported in pieces ready for assembly (Chase-Martín, 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 grey is fine-grained (Lazzaro 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-

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**Fig. 3** - MFA 1990.89. Under-life-size head of a giant in dark grey marble, 3rd c. A.D.

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**Fig. 4** - MFA 18.444. Elbow or knee partly wrapped with an animal skin. Top (A) and side (B) views.
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 Vermue, 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 statues 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 (Erin, 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 ±0.1‰ for both δ¹³C and δ¹⁸O. 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 sculture 18.444.

![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.](image)

![Fig. 6 - Thomas M. Swope statuette of Dionysos/Bacchus with a cluster of grapes, 3rd c. A.D.](image)

![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; P = Paros; PE = Pentelikon; Pr = Proconnesus; 1 = 1 hasos; U = Usak. Arrows indicate isotopic shifts between fresh and surface samples.](image)
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 Aphrodiasis. 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 Aphrodiasis and Dokimeion. For the bichrome knee/elbow (18.444), the isotopic results for fresh black marble are consistent with both Aphrodiasis 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 $\delta^{13}$C and up to 0.8% in $\delta^{18}$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 Aphrodiasis 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 Aphrodiasis 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 Aphrodiasis 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 Aphrodiasis was the likely source of bichrome sculpture during the later Roman empire, but it is clear that sculptural marble from Aphrodiasis was not always coarse-grained.

Acknowledgments

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