Interdisciplinary Studies on Ancient Stone
Proceedings of the IX Association for the Study of Marbles and Other Stones in Antiquity (ASMOSIA) Conference (Tarragona 2009)

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ALABASTRO A PECORELLA, AÏN TEKBALET, AND BOU HANIFIA, ALGERIA: A PRELIMINARY REPORT

J. J. Herrmann Jr., A. van den Hoek and R. H. Tykot

Abstract
Alabastro a pecorella, a vividly colored and strongly patterned travertine widely diffused in Roman Imperial times, is generally believed to come from quarries at Aïn Tekbalet in Algeria. A trip to these quarries, however, made it clear that this cannot be their place of origin. A visit to the quarries of Bou Hanifia, also in western Algeria, on the other hand, made it evident that this was, in fact, the source. Analysis of stable isotopes of carbon and oxygen of the samples collected at Bou Hanifia is underway and the few available results are presented. Optical inspection is the basis for assigning a number of previously unrecognized artifacts in Algeria, Tunisia, and Sardinia to Bou Hanifia, and it is possible to support one of these attributions with isotopic analysis. Artifacts from Aïn Tekbalet are proving more difficult to identify with confidence.

Keywords
Alabastro a pecorella, Algeria, Bou Hanifia, Aïn Tekbalet, onyx marble, alabaster-travertine, Cherchel, Timgad, Hippo Regius, Djemila, stable isotopes.

Introduction
An ornamental stone with vivid markings predominantly of red and white with subordinate areas of brown and yellow was used in extensively in Roman Italy and in small quantities elsewhere in the Empire. The stone was highly prized for decorative panels in the Renaissance and Baroque periods (Gnoli 1971, 195; Lazzarini 2009, 462, 470, fig. 8). A spectacular example is an ancient column shaft in the Museo Capitolino, Rome (Fig. 4) (Bertoletti 2002, 386, cat. no. 88). The patchy patterns were thought to resemble sheep’s wool, leading to the name “alabastro a pecorella.” The stone, which could be termed onyx marble, calcitic alabaster, or travertine, has such distinctive optical characteristics that visual evidence has been considered sufficient for reliable identification, and it has not yet been the subject of archeometric study. In 1971, Raniero Gnoli recognized that the stone came from Algeria and ascribed it to the quarries of Aïn Tekbalet in western Algeria near Oran (Fig. 1)1. His views have been followed by scholars ever since (Gnoli et al. 1997, 149; Lazzarini 2002, 244).

In the effort to understand Algeria’s place in the international marble trade, the authors made trips to Algeria in 2005, 2006, and 2008. The quarries visited were, primarily those managed by Enamarbre (Entreprise Nationale du Marbre, Spa), which has been in charge of Algeria’s principal marble sources since the country’s independence from France. The company’s brochure gave an idea of the range of products available, but extraction is not currently taking place in their quarries.

Quarry inspection
A trip to Aïn Tekbalet in 2008 revealed that these once-famous quarries produce a banded travertine or onyx marble that does not resemble alabastro a pecorella. The colors are different, and the wooly-looking patterns of alabastro a pecorella are absent. Long white and beige strata predominate (Figs. 2-3). Orange, brown, beige, and rust-red lines separate the gray and white bands. There are also some areas of convoluted formations. All surfaces visible in the quarry were modern, but at least one irregular slab preserves ancient pick marks along one edge. The quarries are thought to have been used in antiquity, and were heavily exploited in the Middle Ages2 and again in the 19th century, when it was called “Algerian onyx”3. Beautiful pieces of the stone were used by sculptors, such as Charles Cordier4. The finest veins of the stone seem to have been exhausted by the early 20th century5.

A visit to the quarries of Bou Hanifia (ancient Aquae Sirenses), which is also in western Algeria near to the city of Mascara (Fig. 1), revealed, on the other hand, the characteristic colors and patterns of alabastro a pecorella, and on the basis of macroscopic examination alone there can be no doubt that this was the source of that stone (Fig. 5).

The Bou Hanifia area has two quarries of travertine-alabaster, Sidi Sliman and Douar Krerma, but only the latter presents alabaster a pecorella, or what might be called the “export version” of the travertine-alabaster of Bou Hanifia. Amid debris and modern blocks (Fig. 7) lie dozens of ancient blocks shaped with pick and pointed chisels (Fig. 5). The blocks are parallelepiped (i.e., more or less rectangular prisms), at times with beveled facets. The

2. Playfair 1895, 81, 270-1 (mosques and museum at Tlemcen), 278
3. Comynet 1854; Hull 1872, 149-150; Eassie 1876, 506-507; Winearls Porter 1907, 38, 44-45; Merrill 1908, 259, 281-284; Meunier 1919, 282.
workmanship is generally careful and regular, and in one case a yellow zone was partially chiseled away, apparently with the intention of producing a more completely red- and-white block (Fig. 6). Many of these carefully squared blocks have broad bands of red, black, and yellow rather than the distinctive wooly patterns of alabastro a pecorella. A modern block displays large many-layered centralized patterns with a dominant presence of white and yellow-orange (Fig. 8). At the entrance to the quarrying area at Douar Krerma is a large roughed-out sarcophagus with double-sloped lid. Within the quarries there are also some amorphous blocks, which are shaped with a pick.

Rectilinear quarry-rough blocks of alabastro a pecorella are also known at Rome; one example, which is also finished with the chisel, came from the Fiumicino canal and now lies in the Piazzale dei Marmi at Ostia⁵. Another

6. Called to my attention in 2009 by Matthias Bruno (Bacini Leotardi 1989, 55, cat. no. 82; Pensabene 1994, 113, fig. 139, cat. no. 49, inv. 36774).
rectilinear block, which has a modern polishing on all but one side, is in the Vatican (in the room in front of the Apoxyomenos).

The Douar Krerma quarries follow a multitude of relatively short veins through the low mountain (Fig. 7). In the quarries’ walls are innumerable small areas of pick marks, which probably reflect testing to determine whether the stone was worth extracting.

At Sidi Sliman, which lies a few km to the west, there is a storage area containing largely modern blocks of a crystalline travertine with gently undulating bands of pink, orange, gray, and white. On a low hill above the storage area is a platform of similar ancient blocks shaped with the chisel. They are placed over a block or the top of a quarry front cut with a heavy pick. At a distance of about 200 m is a small ancient quarry with dozens of rectilinear and beveled blocks shaped with the pick and in some cases finished with the chisel. In this undisturbed ancient area the surfaces of both blocks and quarry fronts have a uniform dull brown color. This brown surface could either be the color of the stone or the result of many centuries of wind-blown sand.

Sampling and testing
Solid samples of the stone were taken with steel chisels at both Ain Tekbalet and Bou Hanifia. At Ain Tekbalet the samples were extracted at intervals of ca. 50 m, both vertically and horizontally. The quarries at Douar Krerma were short and irregular gulleys (Fig. 6), and high-quality alabastro a pecorella was rarely visible in the quarry fronts. Many of the samples were taken from blocks abandoned in the gulleys. At Sidi Sliman, samples came primarily from modern and ancient blocks. The location of each sample was described and photographed, and its GPS position was recorded. 26 samples were taken at Bou Hanifia and 20 at Ain Tekbalet. The samples are in the course of examination with a mass spectrometer at the University of South Florida (USF). The ratios of δ13C and δ18O are plotted against the PDB standard.

At the time of this report only 9 test results from Douar Krerma, which include 2 samples presented to us in 2006 by Enamarbre, were available (Table I). This preliminary group of results tends to indicate that the isotopic characteristics of the area is relatively compact. δ13C ranges from 0.4 to -0.9, and δ18O ranges from -10.7 to -16.4. Maximum grain size (MGS) was measured on the surface of the stone rather than on thin sections, leading to a wider range of grains to choose from and a surprising range of variations: 1 mm to 7 mm. The Douar Krerma isotopic field, it should be noted, does not overlap the fields for other alabaster-travertines already known7.

Products and exportation: Bou Hanifia

Finished ancient artifacts made of stone from Bou Hanifia can be identified on an optical basis in Algeria itself. Alabastro a pecorella is rare though widespread. Panels remain place in the Large Baths at Djemila of 177-192 AD, and fragments are displayed in the museum at the site8. The small columns flanking the niches in the triumphal arch at Timgad are alabastro a pecorella (Fig. 9). Although the columns have been pieced together and reinstalled in modern times, the fragments themselves are ancient9. Fragments of alabastro a pecorella veneering are incorporated in the floor of the Timgad Museum.

The limited isotopic data available at present is useful in confirming the presence of alabastro a pecorella in the basin of a fountain at Hippo Regius near the eastern border of Algeria. The fountain was added to a house on the seafront of Hippo in a phase datable between 280 and 330 AD (Lavergne 2005, 135; Blanchard-Lemée 2005, 143). The veneering of the basin includes three colorful panels separated by gray-and-white streaked marble from the local quarries of Cap de Garde. The colored panels have patterns that are not typical of alabastro a pecorella of the type familiar from Italy, but the red and white color scheme and rounded spots of one of the panels is close enough to make an origin in Bou Hanifia very likely (Fig. 10). The other two panels have large many-layered, centralized blotches, one red and white and the other yellow and white (Fig. 11). Isotopic analysis of the red-and-white blotchy panel (not illustrated) supports its assignment to Bou Hanifia (Tables I and II). The similarity of the yellow and white panel (Fig. 11) to a block in the Douar Krerma quarry (Fig. 8) makes it very likely that this panel too came from that source. These uncharacteristic patterns and colors may in part be due to cutting the stone at a different angle, but they also seem to represent qualities of the stone that were considered less desirable and hence less worthy of shipment to Italy.

In recent years several teams of researchers have pointed to the superioriority of strontium-isotope analysis as a method for provenancing calcite-alabaster/travertine10. In at least one case, the Sr isotopic results contradicted the Ca/O isotopic results, and the researchers prefered the Sr results (Antonelli et al. 2010, 585, fig. 10). In the case of the present analyses based on C and O isotopes, it seems very likely that the attribution of the panel in Hippo is correct. Not only do the isotopic ratios correspond to those of the Douar Krerma/Bou Hanifia quarries, but also the panel tested is part of a group that includes a panel attributable to Bou Hanifia on optical grounds.

Optical evidence indicates that pieces of alabastro a pecorella were also exported to Tunisia. Triangles of

8. Gnoli 1971, 195; Antonelli et al. 2010, 577, fig. 2b, 4d (right middle).
the stone are used in an opus sectile panel in the “Horse Mosaic” in the Maison des Chevaux, Carthage, datable 300-320 AD. A plaque from Bou Hanifia also seems to be used in a panel of the opus sectile pavement of the Domus de la Chasse, Utica. Lorenzo Lazzarini has also noted the use of alabastro a pecorella in Dougga, Tunisia, and in Libya, Spain, and Egypt (Lazzarini 2009, 462, 470, fig. 8). Matthias Bruno has pointed

11. Dunbabin 1978, 253, no. 33dii, figs. 84-85, panel at upper right; Yacoub 1995, 320-321, fig. 163a.
out panels of alabastro a pecorella in the theatre at Nora, Sardinia⁴³.

**Products and exportation: Aïn Tekbalet**

It seems highly probable that the onyx marble of Aïn Tekbalet was also used in Algeria during antiquity. Banded travertine with colors and markings similar to those of the quarries appear in the antiquarium of Bettioua (ancient Portus Magnus) on the coast near Oran, in the museum of Djemila, in the West Baths, Cherchel, and the courtyard pavement of the Cherchel museum. The examples in the storage area in the West Baths include supports decorated with volutes (Fig. 12), in an elegant, archaistic style, of the first or 2nd century. An inscribed pedestal there mentioning *P. Aelius Peregrinus*, a magistrate of the time of Septimius Severus⁴⁴ could also be stone from Aïn Tekbalet. Isotopic testing will be used to test some of these hypotheses.

In the 19th and early 20th centuries it was widely believed that the Romans exported the onyx marble of Aïn Tekbalet to Europe⁴⁵. It is nonetheless difficult to confidently recognize ancient examples of this stone on the northern shores of the Mediterranean. A slab in a pavement from the Horti Lamiani (1st century AD) in Rome might be the variant of this stone with convoluted veins⁴⁶. The typical horizontal banding of onyx marble from Aïn Tekbalet resembles alabastro fiorito (Gnoli et al. 1997,

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⁴⁴. On this magistrate, see Klebs, Rohden, and Dessau 1897, 20, no. 165 (*P. Aelius Peregrinus Rogatus*); Benseddik 1997.
⁴⁵. Hull 1872, 149-150; Eassie 1876, 506-507; Merrill 1908, 259, 281-284; Winearls Porter 1907, 38, 44-45.
but its grayish tones and soft undulations are hard to parallel exactly. Isotopic testing, now under way on samples from Algeria, may eventually provide a basis for identifying the stone among the many other types of onyx marble/banded travertine imported into ancient Italy.

**Conclusions**

Optical evidence makes it clear that alabastro a pecorella was quarried at the Douar Krerma quarries of Bou Hanifia. This source also produced marble types with a different balance of colors and a variety of veining-patterns. Analysis of samples from Douar Krerma established a fairly compact field for ratios of stable isotopes of carbon and oxygen. Several previously unrecognized artifacts scattered throughout Algeria could be confidently identified by eye as alabastro a pecorella, and a group of marble plaques with uncharacteristic colors and veining at Hippo Regius could be identified as this stone with a combination of optical evidence and stable isotope analysis.

Inspection made it clear that the Aïn Tekbalet quarries produced alabaster-travertine but not alabastro a pecorella. It has so far proven difficult to confidently recognize stone from Aïn Tekbalet in ancient artifacts from Algeria or Italy.

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Table I. Quarry samples from Bou Hanifia, Algeria: analyzed at the University of South Florida (USF).

<table>
<thead>
<tr>
<th>USF number</th>
<th>(\delta^{13}C)</th>
<th>(\delta^{18}O)</th>
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<th>Sample number</th>
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<td>provided by Enamarbre</td>
<td>Bou Hanifia</td>
<td></td>
</tr>
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<td>-0.9</td>
<td>-13.9</td>
<td>provided by Enamarbre</td>
<td>Bou Hanifia</td>
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<td>Bou Hanifia</td>
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<td>-10.7</td>
<td>2.5mm Douar Kremma quarry</td>
<td>14b</td>
<td>Bou Hanifia</td>
</tr>
<tr>
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<td>-13.1</td>
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Table II. Analysis of revetment panel, Hippo Regius, Algeria: analysed at the University of South Florida.

<table>
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<th>(\delta^{18}O)</th>
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<th>Site</th>
<th>Location of sample</th>
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<td>-13.4</td>
<td>BouHanifia</td>
<td>Hippo Regius</td>
<td>Red revetment panel in fountain, Quartiere de front de la mere, villa des notables romaines</td>
</tr>
<tr>
<td>9348b</td>
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<td>-13.2</td>
<td>BouHanifia</td>
<td>Hippo Regius</td>
<td>Red revetment panel in fountain, Quartiere de front de la mere, villa des notables romaines</td>
</tr>
</tbody>
</table>

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