ANALYSIS AND REMOVAL OF DEPOSITS FROM THE IRON AGE CERAMICS OF MAPUNGUBWE

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Many of the earthenware artifacts recovered from the archaeological sites of Mapungubwe in South Africa are covered in disfiguring deposits. In 2008 / 2009, research was undertaken at Queen’s University in order to analyse the deposits and explore chemical methods of removal. The study revealed that the deposits are primarily composed of calcium carbonate and quartz and may be removed using controlled acid treatments with no adverse effects on the ceramic substrate.

INTRODUCTION:

Mapungubwe:
Located in the northernmost region of South Africa, Mapungubwe is the site of South Africa’s earliest known civilization. The kingdom of Mapungubwe flourished from 900 AD – 1300 AD and is considered the most complex early African state in southern Africa. After its fall, the state was largely forgotten until the early 1930s, when archaeological material was discovered on Mapungubwe Hill. Subsequent excavations of the area have yielded thousands of artifacts. These artifacts are housed at the Mapungubwe Museum at the University of Pretoria, Pretoria, South Africa.

The Ceramics:
The museum’s collection contains hundreds of earthenware figurines and vessels and thousands of potsherds recovered from the archaeological sites of Mapungubwe. Many of the ceramic objects are at least partially covered in disfiguring and potentially damaging deposits. The deposits disguise the finishing, colours, decorative details, and workmanship of the ceramics. A variety of methods, including mechanical cleaning, wet cleaning, and steam cleaning, have been employed in the past in an attempt to remove the deposits; however, these past efforts have met with little success.

The Project:
Preliminary testing in the summer of 2008 to explore alternative methods of deposit removal suggested that acids could be used to remove or reduce the deposits. During this testing, a citric acid and CMC poultice was proven to dissolve the deposits, but it was unclear whether the treatment adversely affected the ceramic. Thus, a two-stage research project was undertaken at Queen’s University in 2008 / 2009 in order to analyse the deposits and explore the use and effects of five different acids on Mapungubwe ceramics.

RESULTS AND CONCLUSION:

The deposits are primarily composed of calcium carbonate and quartz. They form a discreet layer atop the ceramic substrate and range from soft to compact in structure. With the exception of 1,2,4-triazole, all of the acids effectively removed the softer deposits when applied using cotton swabs and when applied in poultices. None of the acids effectively reduced the compact deposits when applied using cotton swabs, but formic acid, citric acid and sulfamic acid did reduce the deposits to varying degrees when applied in poultices. Based on the results, a 1M acetic acid solution applied using cotton swabs may be recommended to remove the soft deposits, and a 1M solution of sulfamic acid in a CMC poultice may be recommended to remove the more compact deposits with no apparent adverse effects upon the ceramic substrate.

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