



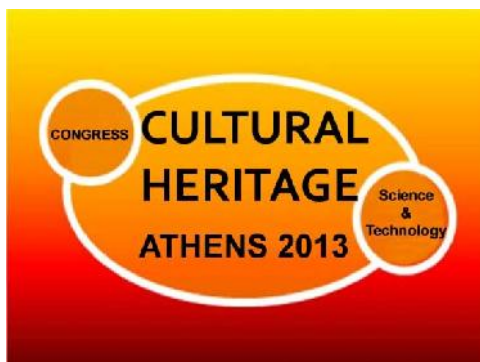
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THE ACQUALADRONE ROSTRUM: A PHYSICAL-CHEMICAL INVESTIGATION TO UNDERSTAND THE MATERIAL HISTORY

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Abstract

The aim of this work is to define the conservation state and to ascertain the provenance of raw materials used in the construction of the Acqualadrone Rostrum. In 2008 the rostrum (an offensive naval weapon mounted on the prow at the waterline), from an ancient warship was recovered from the Mediterranean near Acqualadrone, Messina, Sicily. The archaeological discovery has led to the need for scientific research in order to plan the conservation treatment of this artefact. The discovery is exceptional because of the presence of a wooden section from the original ship.

The physical-chemical investigation, by using some complementary spectroscopic techniques, was focused on the characterization of both the metal alloy and the wooden fragments.

The results reveal the use of leaded bronze (Cu, 70%; Pb, 20%; Sn, 10%) in the manufacturing process of the alloy and the use of lead whose isotopic composition is referable to either Spanish or Cypriot mines.

The analysis of the results relating to the wooden samples indicates construction from pinewood. A derivatized extract of black wood yielded forms of abietic acid and sandaracopimaric acid consistent with pine pitch waterproofing. In summary, the rostrum was manufactured of pine wood and subsequently waterproofed with pine pitch.

The subsequent 2300 years included battle, foundering, and marine burial followed by anoxia, bacterial colonization, sulfate reduction, and mobilization of transition metals, which produced pyrite and copious appended sulfur functionality.

Furthermore a quantitative determination and the cristallinity degree evaluation of the holocellulose were performed through solid state NMR on a wooden sample obtained by coring.

Finally results obtained by solid state NMR relaxometric experiments and 2D heterocorrelated analyses will be the subject of a forthcoming work.