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Type: **Invited Lecture**

INVITED LECTURE - Preservation of Cultural Heritage by Radioanalytical Techniques

Friday 21 September 2012 12:00 (20 minutes)

Ancient raw materials are degraded and finally destroyed, mainly by humidity taking up dissolved salts from soil, which are deposited on walls surface breaking plasters and material structure as time goes by. This process is added to environment humidity and temperature changes, but in any case is proportional to porosity materials. This is why, such materials as limestone, sand stone and volcanic stones are most difficult to preserve that feldspar or marble, for example. One easy way to measure the relative porosity of any stuff used in the past as raw material, is to cut samples in the shape of small prisms, to weigh each and to place their basis on a layer about 3 mm deep of a Na-22 (0.01 microcuries/ml)radioactive solution during 5 minutes. Once dry out and conditioned in test tubes or small plastic bags, annihilation gamma rays are detected in a low background, well type 3x3" NaI(Tl) scintillation detector, during suitable time to accumulate as much counts as possible. Counts per time unit (seconds or minutes) and per weight (grams of stuff) are a relative measurement of the material porosity, which is always proportional to its absorbing power. So, when other pieces of same stuff are cut in similar way and put in contact with a warm solution (60°-80°C)of french gelatin (5%), plus potassium sorbate (2.5%) and sodium benzoate (2.5%), warm solution tends to occupy the small air volumes of pores and channels quicker that if it were cold water. About 3 hours later, at room temperature, when the material looks little thicker and brilliant, it is added a concentrate solution (38%)of formaldehyde, about 10-15% of volume of gelatine employed, in order to get tougher and almost quite insoluble in water gelatin, as well as quite unsuitable to create some organic cultures in it, since potassium sorbate and sodium benzoate are used as food conservatives, and formaldehyde is used to preserve corpses. When these pieces are treated with radioactive solution in the same way that previous ones, detection counts per time and weight units are reduced dramatically by factors at inverse proportion than those obtained with no gelatin. Also, it is a reversible process, since it is possible to dissolve the gelatin just by washing with warm water (60°-80°C)while it resists perfectly washing with cold water (20°-30°C). Based on these laboratory results some prehispanic pieces have been treated in Mexico quite successfully, with no problem at all during 3-8 years. This paper presents these results and proposes to perform the procedure in some other mankind's prides such as Haga Sophia, Xian's warriors, Mithraeum in Sutri, Italy, Borobudur in Java island, Indonesia, Sukhothai, Thailand, Ajanta Caves and Maluti Temple in India, and many others all over the world.

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