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## **Irradiation Method in the Protection of Cultural Heritage Objects Endangered by Massive Biodegradation**

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Cultural heritage artefacts of organic origins are susceptible to deterioration by the action of insects, moulds, fungi and bacteria. The infestation of museum store rooms, collections and sacral places is a serious permanent worldwide problem to the safekeeping of such objects.

Protecting cultural heritage objects against biodeterioration becomes especially urgent when provoked by sudden changes of their stable and optimum storage conditions, caused either by natural catastrophes (floods, earthquakes, tempests, etc.) or by human activities (wars, riots, street unrest, etc.). The emergency recovery of many objects in the course of a rescue operations can bring infested and non-infested objects into contact, engendering an abrupt development of pests and endangerment of whole collections.

The commonly used methods for suppressing massive biocontamination (capable of fast processing of large numbers of objects), are treatment with poisonous gasses and treatment with ionizing radiation. While the use of ethylene oxide gas is now severely restricted, irradiation has proven an effective physical, noncontact method of preservation, applicable to massive treatment of cultural heritage objects.

In its ~ 50 years of application to cultural heritage preservation, the irradiation method has most often been used for disinsection, i.e., eradication of insect pests from objects. In the course of safekeeping, massive treatments of entire museum collections during regular and/or urgent maintenance and clean-up procedures provide examples of especially appropriate applications of irradiation method.

Likewise, in cases of simultaneous endangerment of many objects by mold, literally for entire collections caught up in catastrophes, the irradiation method has proven to be the method of choice. Professional literature presents some especially successful cases of massive decontamination by irradiation and it will be briefly presented in the lecture.

Croatian experience in the field gained at the irradiation facility of the Radiation Chemistry and Dosimetry Laboratory of the Ruđer Bošković Institute in Zagreb during the past 25 years will be illustrated by two groups of examples of successful application of irradiation to the protection of large numbers of cultural heritage objects endangered by massive biocontamination: a) Massive radiation disinsection in the

process of maintenance of museum collection and interventive treatment of an entire polychromic altar; b) Radiation treatment in the massive process of rescuing and protecting art objects endangered during the war in Croatia (1991–1995).

In co-operation with the Croatian Conservation Institute, one third of evacuated objects, mostly polychromic wooden sculptures, parts of altars and other wooden pieces, comprising almost 1500 complete altars, were irradiated for disinsection, or disinfection by the RBI facility. Besides halting degradation, irradiation was used as the first step of conservation to enable safe object storage without the risk of cross-contamination before final conservation and restoration.

## **Country/Organization invited to participate**

Croatia

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