

# EUREKA PROJECT E!396 - EUROCARE PROMOS

## 1. General description

<b>Project</b>	E! 396 - EUROCARE PROMOS	<b>Status</b>	Finished - 19-DEC-1994
<b>Title</b>	<b>Improved Methods And Products For Cleaning/Removal/Organism Growth Prevention/Restoration Of Roman Mosaics</b>		
<b>Class</b>	Sub-Umbrella	<b>Technological area</b>	Environment
<b>Start date</b>	01-JAN-1991	<b>End date</b>	01-JAN-1994
<b>Duration</b>	36 months	<b>Total cost</b>	0.32 Meuro
<b>Partner sought</b>	No		
<b>Summary</b>	Romain Mosaics In Southern Europe Are Severely Damaged By Lichens. Research On Improved Methods For Cleaning, Removal And Prevention Of Lichen Growth On Mosaics Is Needed; Should Deliver Basic Information On Methods And Products To Be Used		

## Budget and duration

Phase	Budget(Meuro)	Duration (Months)
Research stage	0.32	36
<b>Total</b>	<b>0.32</b>	<b>36</b>

## Member contribution

Member	Contribution	Position	Since
<b>Spain</b>	<b>87.00%</b>	<b>Notified Finished</b>	<b>19-DEC-1994</b>
Portugal	13.00%	Notified Finished	19-DEC-1994

## Participants

Company	Country	Type	Role
<b>Instituto De Recursos Naturales Y Agrobiologia, S.C.I.C.</b>	<b>Spain</b>	<b>Research Institute</b>	<b>Main</b>
Conjuncto Arqueologico De Italica	Spain	Governm./Nat. Admin.	Partner
Instituto De Ciencias De La Construcccion "Eduardo Torroja"	Spain	Research Institute	Partner
Museu Monografico De Conimbriga	Portugal	Governm./Nat. Admin.	Partner
Upm/Instituto De Geologia	Spain	University	Partner
Economica/Departamento Retrologia			
Universidad Politecnica De Madrid			
Ministero De Cultura	Spain	Research Institute	Partner
Universidad De Sevilla / Facultad De Farmacia	Spain	University	Partner

## 2. Project outline

### Project description

Stone materials in nature continually deteriorate as a result of physical, chemical and biological processes. The weathering of rocks and minerals is largely controlled by organisms, mainly bacteria, fungi, algae, lichens, plants and soil fauna. The biological weathering of stone buildings and archeological monuments is an extension of the biogeochemical cycle of elements. Microbial life on Earth returns to nature all the material that has withdrawn from one of the biological cycles.

One of the most important groups of organisms involved in biological weathering is lichens. Lichens are conspicuous pioneers on rocks and initiate stages of succession.

Lichen communities have the chance of developing to maturity over long periods of time when no regular cleaning and maintenance work on mosaics is done, since it is generally considered that a period of some years must pass before lichens establish themselves on new substrates.

Roman mosaics in Southern Europe are severely damaged by lichens. Colonization and establishment of lichen communities have been observed in outdoor mosaics in Italica (SPAIN) and Conimbriga (PORTUGAL), among other sites. Because regular cleaning hardly removes biological structures within the stones and because mosaics are covered by a patina of lichens, research on improved methods for cleaning, removal and prevention of lichen growth on mosaics is needed.

The results of this investigation should deliver basic information on methods and products to be used with the necessary care for protecting the colour and mineralogical properties of stones.

The aim of the project is:

- geochemical and petrographical study of tesserae and mortars
- investigation into the biocorrosion processes of lichens thriving on mosaics
- development of new products with algicide, fungicide and herbicide properties for mosaics
- testing and developing of methods for cleaning, removal and prevention of mosaics of further growths, both in the laboratory and in situ
- research on mortars with protective properties for restoration work.

### Technological development envisaged

There is not yet a way of preserving Roman mosaic pavements and opus signinum surfaces which are exposed to the open air, to keep them free from micro-organisms, mainly algae and lichens. Several existing biocides and cleaning methods are effective for temporary removal of those organisms and discolouration but the reactions are highly superficial and do not show residual effects, so our main objective is to help the development of new methods and products that guarantee long lasting results.

1. Technology of lime and mortars
2. Development of biocides to be used in this specific

field

3. Building up the base of understanding the processes of biological corrosion taking place at the selected sites.

4. Evaluation of the efficacy of tested biocide products to develop new conservation methods and products for outdoor Roman mosaics.

## Markets application and exploitation

- Field of conservation and restoration of monuments
- Treatment of mosaics with biocides
- European market for biocides and mortars in conservation.

Technological achievement will be exploited by the industrial partners concerned. Scientific information, practice, technology, and training will be developed by the MUSEU MONOGRAFICO DE CONIMBRIGA and the INSTITUTO DE CONSERVACION Y RESTAURACION DE BIENES CULTURALES through practical conservation.

## Project codes

### **BSI**

PJ	cleaning
RXH	construction materials
RXH.D	stone
RXH.R	mosaics
V	chemical technology
VC/VF	chemical technology processes
VJP.CC	fungus proofing
VP	cleaning agents and polishes technology
ZV/ZY	culture

### **NACE**

241	Manufacture of basic chemicals
2664	Manufacture of mortars
4521	General construction of buildings and civil engineering works
9252	Museum activities and preservation of historical sites and buildings

### 3. Main participant

**Company** **Instituto De Recursos Naturales Y Agrobiologia, S.C.I.C.**  
Avenida Reina Mercedes, S/N  
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**Contact** **Prof. Cesareo Saiz-Jimenez**  
Research Professor

Tel +34 95 462 4711  
Fax +34 95 462 4002

**Organisation type** Research Institute  
**Participant role** Main

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### Contribution to project

15,000,000 pesetas. Basic research on mosaic components and their deterioration. Research on scientific basis for conservation.

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### Expertise

Composition of tesserae and mortars, chemical and biological analyses, ultrastructural studies and organic chemistry. Professor Dr. Cesareo Saiz Jimenez has acquired experience in the field of biogeochemistry, organic geochemistry and microbiology over the last 20 years.

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### 4. Partner

**Company** **Conjunto Arqueologico De Italica**  
(Not Available),  
Santiponce  
Spain

Tel +34 95 392 784  
Fax

**Contact** **Mr. Jose Manuel Rodriguez Hidalgo**

Tel  
Fax

**Organisation type** Governm./Nat. Admin.  
**Participant role** Partner

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## Contribution to project

Historic and archeological research, excavation of Roman city, conservation and restoration.

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## Expertise

Historic research, archeological research, restoration work, maintenance of archeological sites.

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## 4. Partner

**Company** **Instituto De Ciencias De La Construccion "Eduardo Torroja"**  
Calle Serrano Galvache, S/N  
28033 Madrid  
Spain

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**Contact** **Dr. Maria Teresa Blanco Varela**  
Research Scientist

Tel  
Fax

**Organisation type** Research Institute  
**Participant role** Partner

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## Contribution to project

Immediate objectives: understand role played by mortar in mosaic decay and develop decay-resistant mortars. Mortars from Italica mosaics will be analysed and characterised mechanically/geochemically. Bedding mortars to be developed

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## Expertise

The proposed project will be carried out by a team of scientists working on the restoration and conservation of artificial building materials from the cathedral of Toledo. Previous experience will be of benefit for the attainment of the proposed objectives. This group is basically formed of scientists specialised in materials science. Their experience in investigating the building materials (cement, concrete, mortars, etc.) dates back 15 years and subsequently qualifies them for the study of mortar decay and repairing mortars design..

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## 4. Partner

**Company** **Museu Monografico De Conimbriga**  
Condeixa-A-Velha,  
3150 Condeixa  
Portugal

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**Contact** **Dr. Adilia Alarcao**  
Director

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Fax +351 239 91 14 74

**Organisation type** Governm./Nat. Admin.  
**Participant role** Partner

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## Contribution to project

5,000,000 escudos. Historic and archeological research, practical conservation and training.

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## Expertise

Museum activities: conservation research and practical work on archeological objects and structures. Historic and archeological research, restoration work. Dr. Adilia Alarcao, Director is a historian and experienced in the field of conservation and technology. She has been working for 25 years in archeology with special emphasis on practical conservation and training.

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## 4. Partner

**Company** **Upm/Instituto De Geologia Economica/Departamento  
Retrologia Universidad Politecnica De Madrid**  
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28040 Madrid  
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**Contact** **Dra. Maria Concepcion Lopez De Azcona**

Tel  
Fax

**Organisation type** University  
**Participant role** Partner

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## Contribution to project

15,000,000 pesetas.

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## Expertise

Dr. Concepcion Lopez de Azcona, experienced in the fields of petrology and geochemistry of Roman mosaics for 18 years. Her team has been working on Roman mosaics in EGYPT, GREECE, TURKEY, ITALY, TUNISIA and SPAIN.

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### 4. Partner

**Company** **Ministero De Cultura**  
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28040 Madrid  
Spain

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**Contact** **Dr. Concepcion Cirujano Gutierrez**

Tel  
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**Organisation type** Research Institute  
**Participant role** Partner

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## Contribution to project

2,840,000 pesetas.

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## Expertise

Dr. Concepcion Cirujano Gutierrez, experienced in the field of restoration of works of art. Her team will work on practical conservation and training.

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### 4. Partner

**Company** **Universidad De Sevilla / Facultad De Farmacia**  
Instituto De Biologia Vegetal,  
41 Sevilla  
Spain

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**Contact** **Prof. Jorge Garcia Rowe**

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<b>Organisation type</b>	University
<b>Participant role</b>	Partner

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## Contribution to project

2,000,000 Pesetas. Study of lichens, mosses and higher plants on mosaics and the testing of biocides.

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## Expertise

Professor Dr. Jorge Garcia Rowe, experienced in the botany and lichenology fields for 10 years.