INSECTS ELIMINATION IN HISTORIC COLLECTIONS USING LOW OXYGEN ENVIRONMENTS. VELOXY SISTEM

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COLLECTIONS DE-INFESTATION: EXPERIMENTATION OF VELOXY BY MARCIANA NATIONAL LIBRARY

Tiziana Plebani
Head of Preservation and Restoration.
Biblioteca Natzionale Marciana – Venezia. (Italy)

BIODETERIORATION

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VELOXY® is the outcome of the European funded project:

SAVE ART (1998 - 2000)

R.G.I. Resource Group Integrator
(project co-ordinator)

Central Science Laboratory
MASTER
Instituto del Patrimonio Cultural de España
Istituto Centrale per la Patologia del Libro
Naturhistoriska Riksmuseet

LOW OXYGEN ENVIRONMENTS USING INERT GASES

FOR INSECTS ELIMINATION AND MICROBIAL CONTROL

PREVIOUS RESERACH

1987-1989. Nieves Valentín. The Getty Conservation Institute

WORKS DEVELOPED USING LOW OXYGENENVIRONMENTS

Valentin, N. *"Mummy deterioration halted by nitrogen atmosphere"* Nature". Vol 338: 463 (198

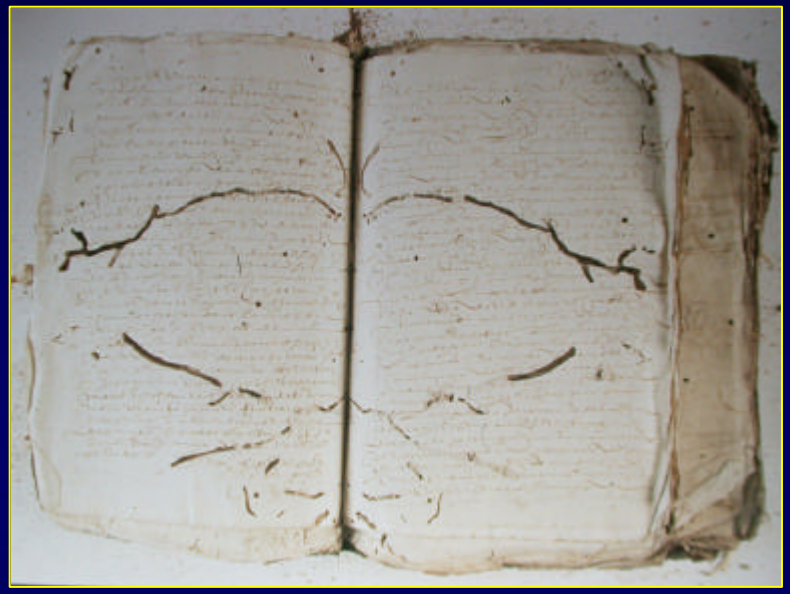
Valentin, N. and Preusser F. *"Insect control by inert gases in museum, archives and libraries"* Restaurator. 11: 22-33 (1990)

Valentin, N., Lidstrom, M., and Preusser, F. *"Microbial control by low oxygen and low relative humidity environments"* Studies in conservation. Vol. 35. 4: 222-230 (1990)

Valentín, N. *"Comparative analysis of insect control by nitrogen, argon, and carbon dioxide in museum archive and herbarium collections"*. International Biodeterioration and Biodegradation. 32: 263-278.(1993)

Valentin, N., Bergh, J.E., Ortega, R., Åkerlund, M., Hallström, A. & Jonsson, K. (2002) *"Evaluation of a portable equipment for large scale de-infestation in museum collections using a low oxygen environment"*. 13th Triennial Meeting. Preprints of ICOM Committe for Conservation 1: 96-101. Paris: ICOM

DI-INFESTATION TREATMENTS USING NITROGEN IN SPANISH MUSEUMS, ARCHIVES AND LIBRARIES 1991-2005



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INSECTS IDENTIFICATION


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m. Alio modo potel[illegible]cipi ratio e-
a essentia originalis pe[illegible]ti. In omni
rdinata dispositione v[illegible]as speciei
itur ex parte causæ, vnitas autem se-
numerum ex parte subiecti: sicut pa-
jtudine corporali. sunt enim diuersæ
nes species, quę ex diuersis causis pro-
puta ex superabundãtia calidi vel fri-
ex læsione pulmonis, vel hepatis: vna
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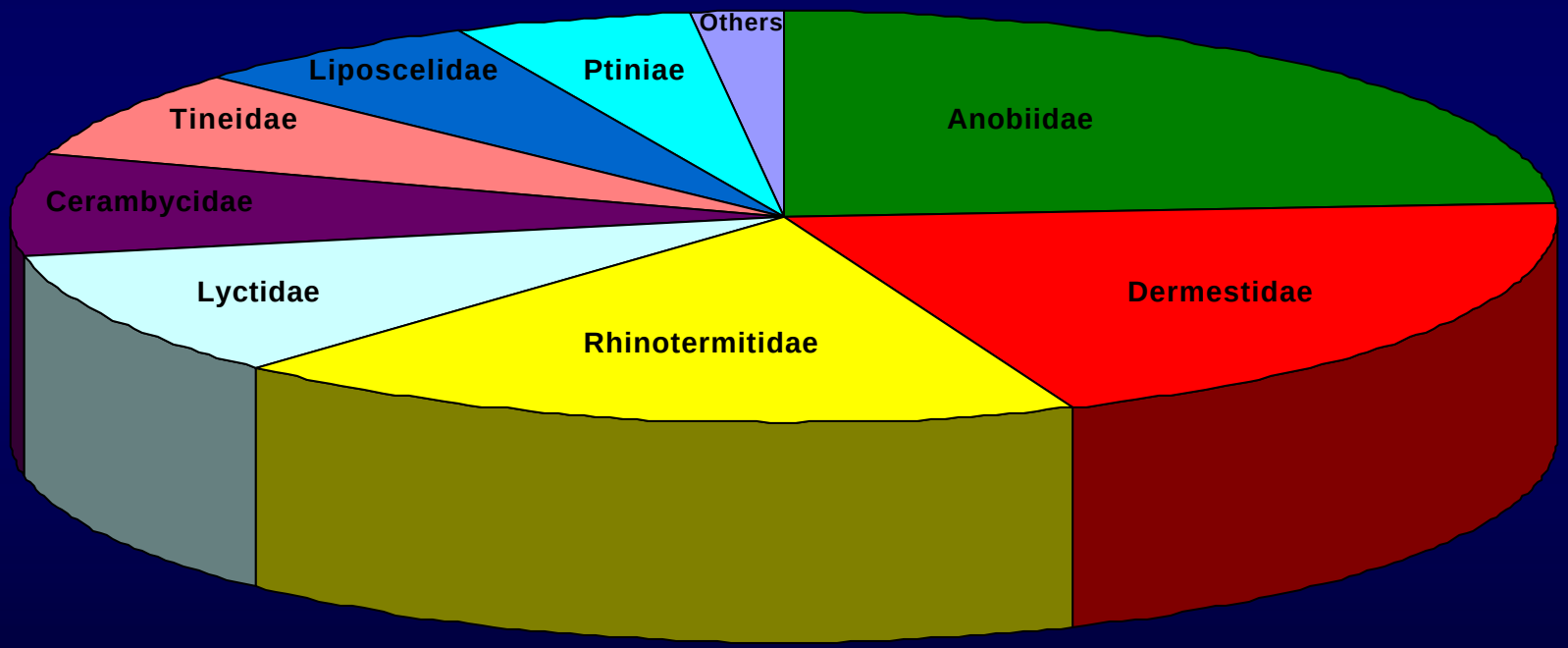
Piedraterjam Mat. Orgánicos IPCE

Insects commonly identified in Spanish Museums



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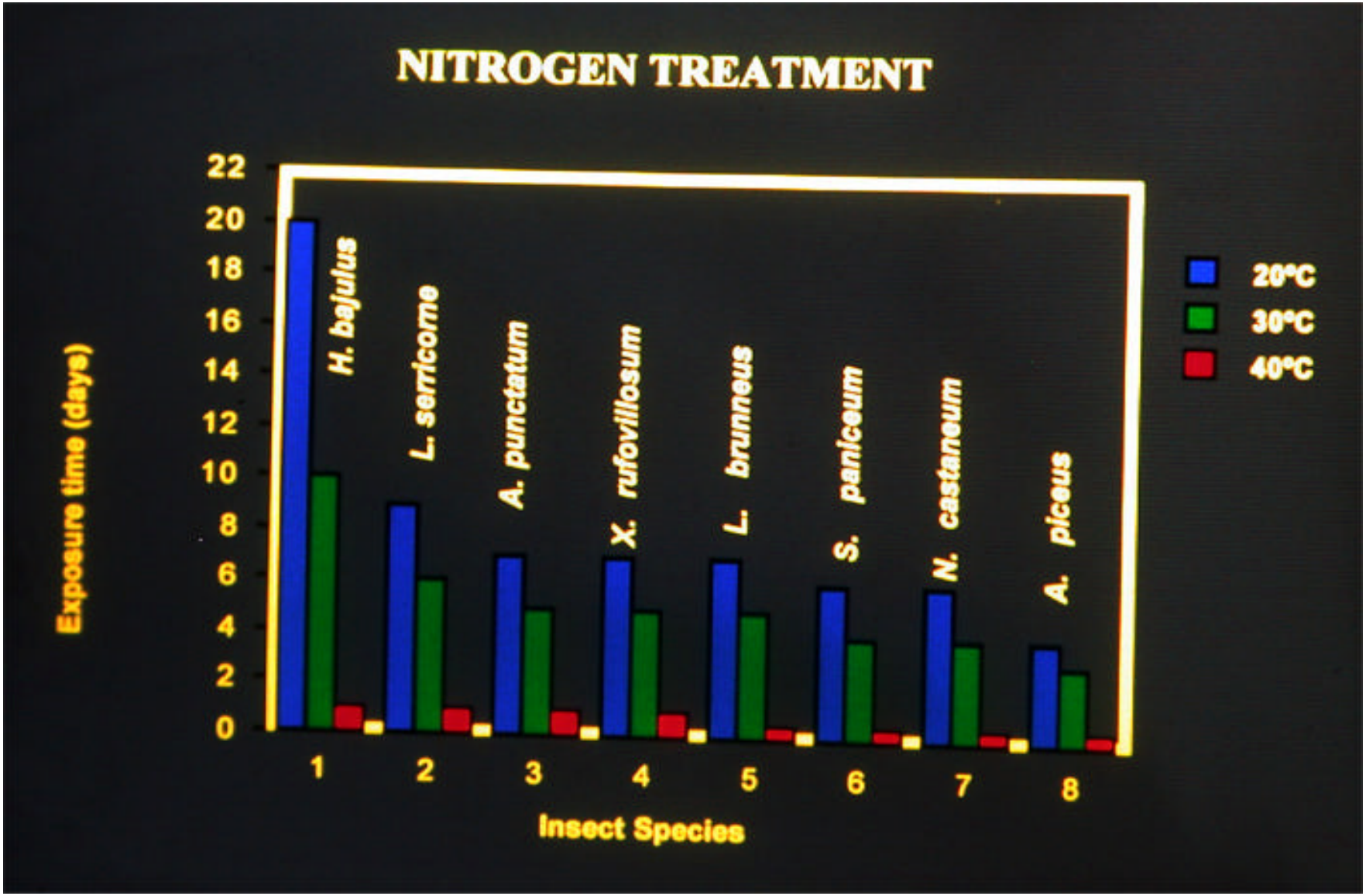

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TREATMENTS USING NITROGEN

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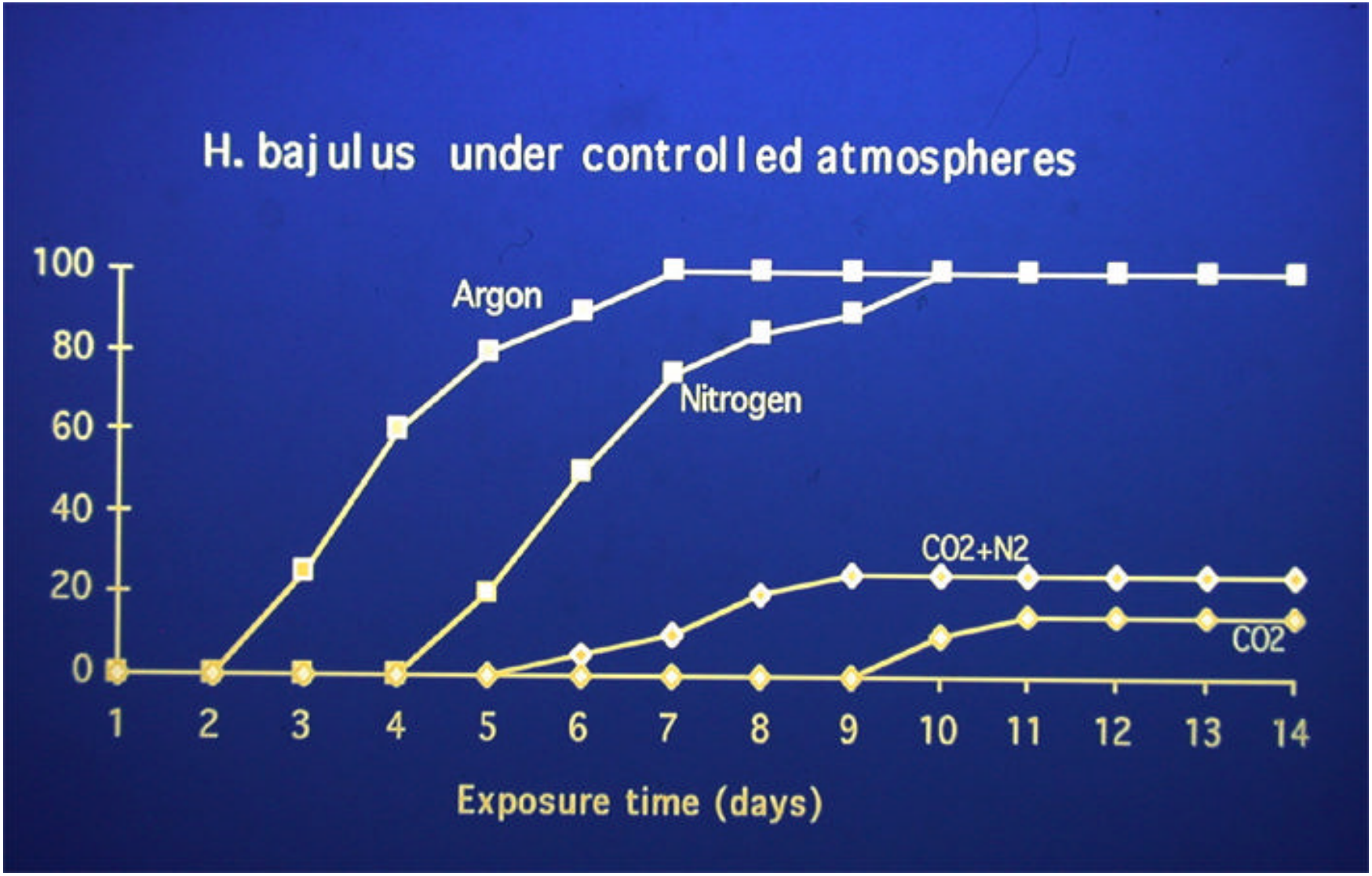

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SAVE ART: TO SAVE THE ARTISTIC HERITAGE FROM INSECTS WITHOUT USING TOXIC CHEMICAL COMPOUNDS (1998 - 2000)

ITALY

R.G.I. Resource Group Integrator
Dr. Ercole Gialdi. (Co-ordinator)

MASTER
Dr. Bernardo Castellaro

Istituto Centrale per la Patologia del Libro
Dr. Carlo Federici

ENGLAND

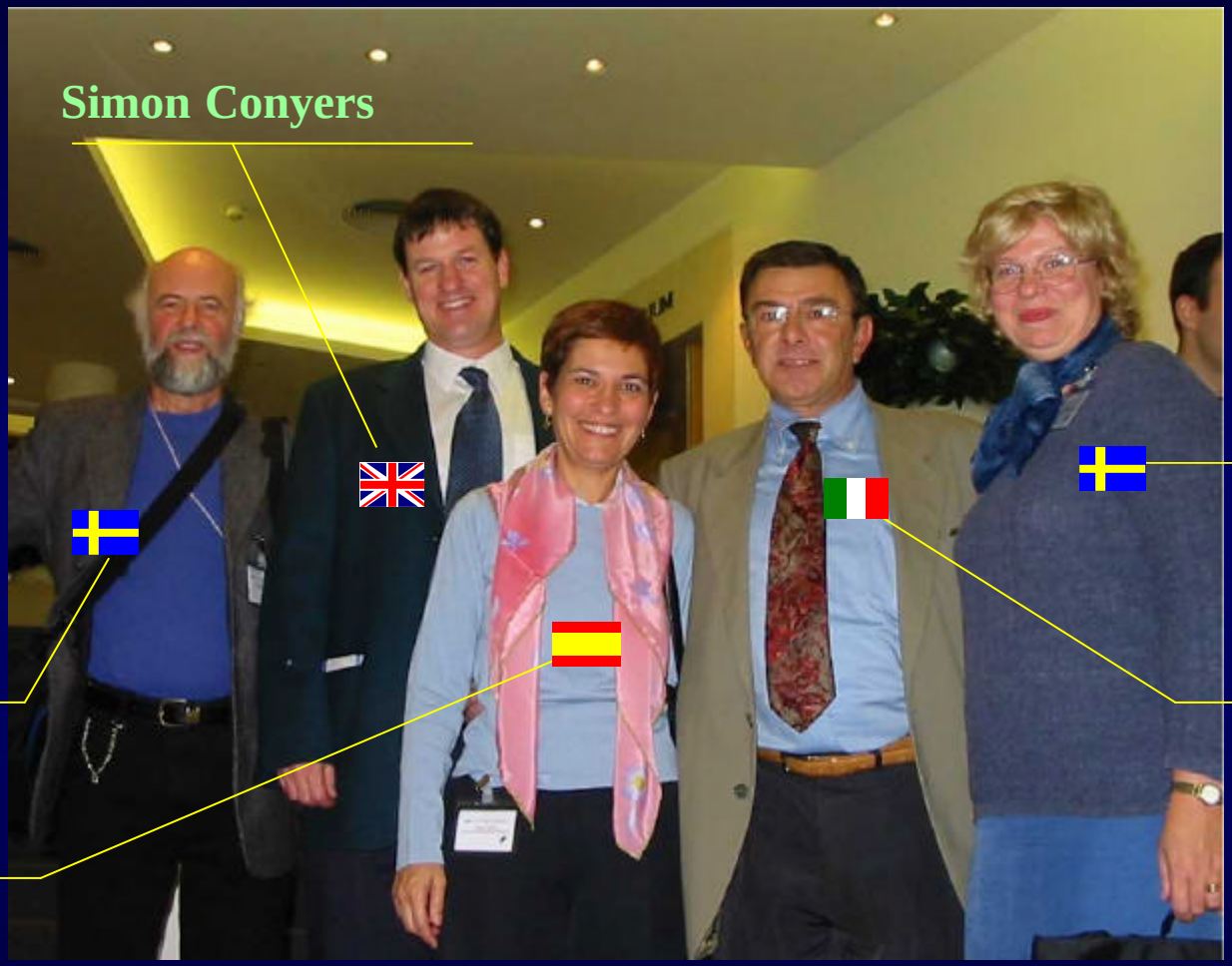
Central Science Laboratory
Dr. Chris Bell

SPAIN

Instituo del Patrimonio Cultural d España
Dr. Nieves Valentin

SWEDEN

Naturhidtoriska Riksmuseet
Dr. Monika Akerlund



Some researchers of
SAVE ART project

EQUIPMENT

- Using a novel equipment, VELOXY® that creates a low oxygen environment inside plastic enclosures where the infested objects are located
- It produces an inert gas: NITROGEN

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Biodeterioro Mat. Orgánicos IPCE

OBJECTIVES

- To offer an alternative treatment to toxic insecticides
- To develop a portable an effective equipme for large scale de-infestation in museum an archive collections
- To protect health of users and environment

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METHOD

Identify the insect

Construct an hermetic bubble using high barrier plasti
containing the infested objects

Replace atmospheric air in the bubble by nitrogen unt
reduce the oxygen concentration at the adequate flow
temperature and relative humidity

Disconnect the nitrogen flow and maintain a low oxygen environment. The exposure time depends on the size of the object, material structure and type of insect

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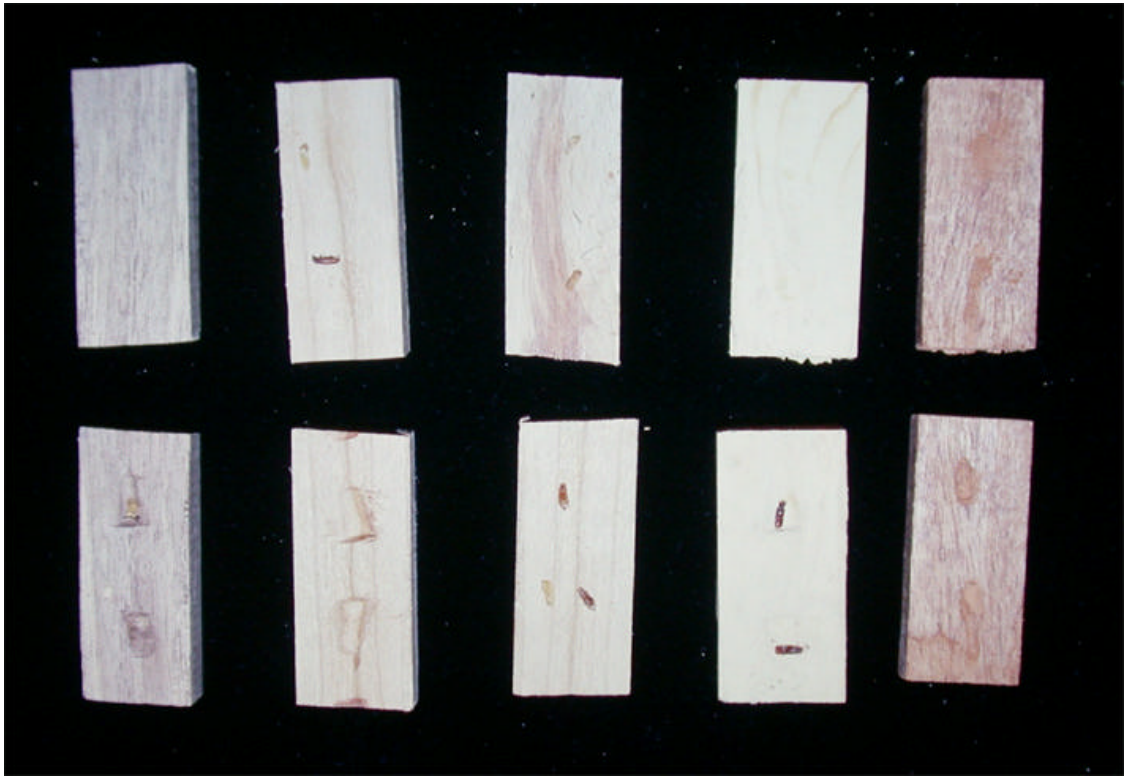

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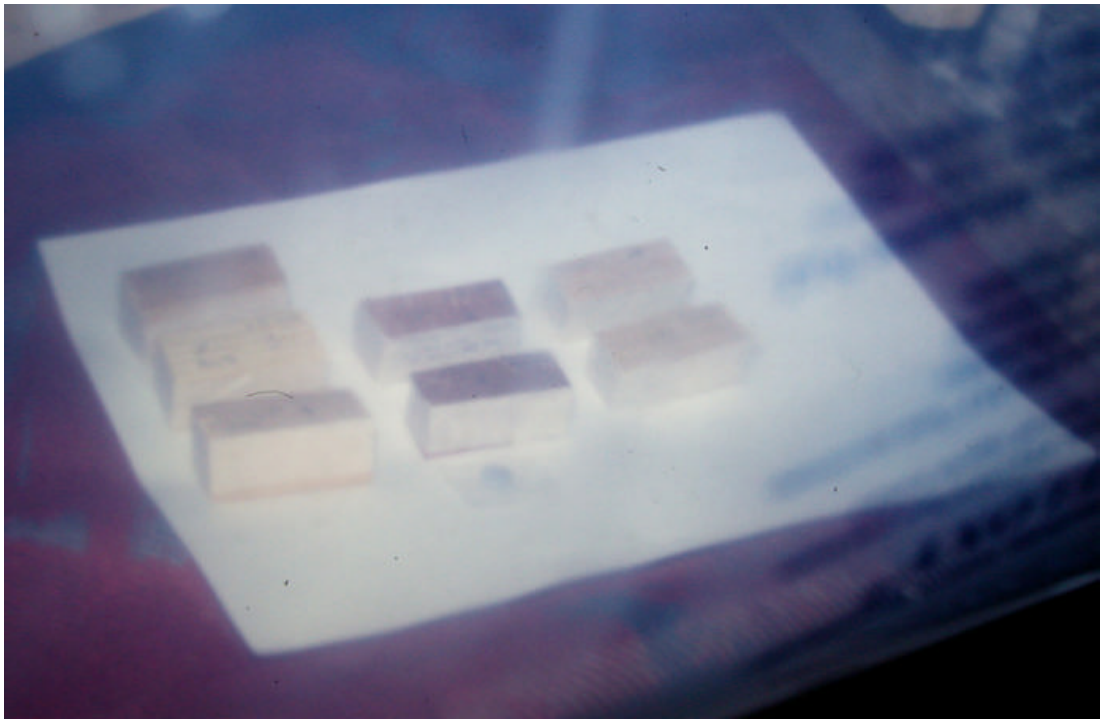

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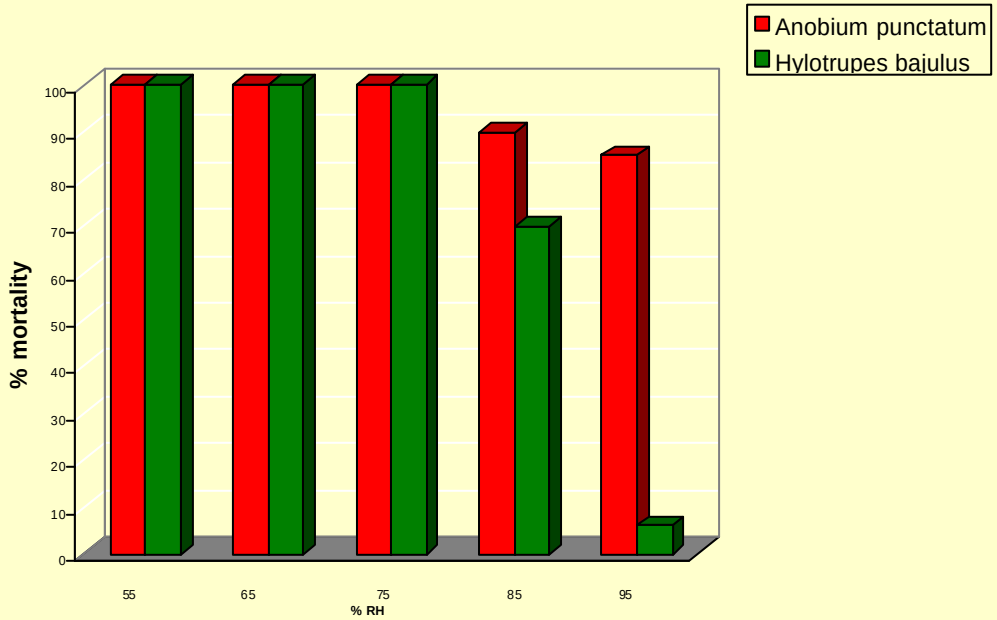
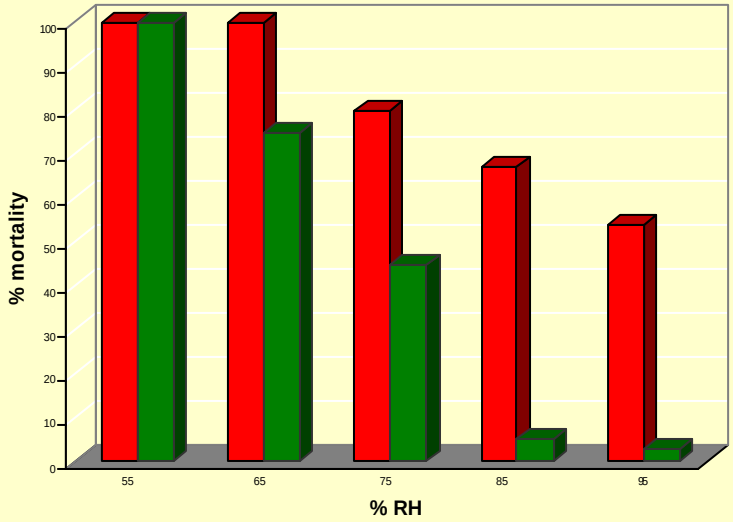
Larvae tolerance to 0.01% oxygen at 25ºC



Larvae tolerance to low oxygen at 20ºC



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Insect mortality 20 days exposure

Genus	(ºC)	%	%	(days)
Hylotrupes	20	35-60	0.005	24
	25	35-60		14
	20	60-80		40
	25	60-80		30
Anobium *Lasioderma* *Lyctus* *Nicobium* *Oligomerus* *Stegobium* *Xestobium*	20	35-60	0.03	20
	25	35-60		15
Anthenus	20	60-80		30
Attagenus	25	60-80		15
Blattela *Periplaneta*	20	35-60	0.2	14
	25	35-60		5
	20	60-80		25
	25	60-80		10
Mezium	20	35-60	0.2	15
	25	35-60		10
	20	60-80		25
	25	60-80		18
Triboleum	20	35-60	0,1	28
	25			14
	20	60-80		30
	25	60-80		20
Dermestes *Trogoderma*	20	35-60	0.1	30
	25	35-60		18
	20	60-80		40
	25	60-80		25
Tinedoa	20	35-60	0.2	14
	25	35-60		16
	20	60-80		25
	25	60-80		15
Liposcelis	20	35-60	0.3	15
	25	35-60		8
	20	60-80		20
	25	60-80		28

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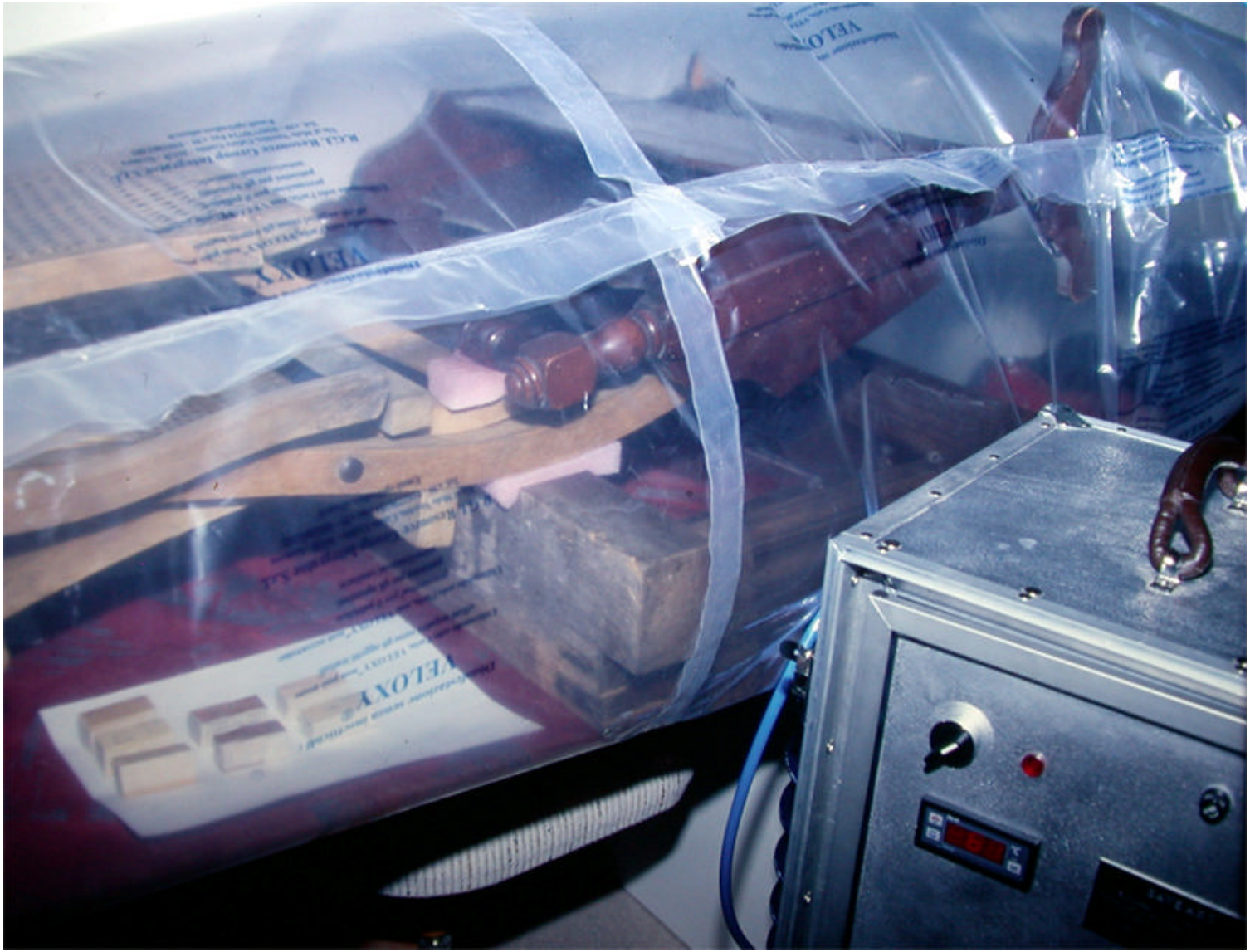

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CONTROL DEL BIODETERIORO POR ANOXIA

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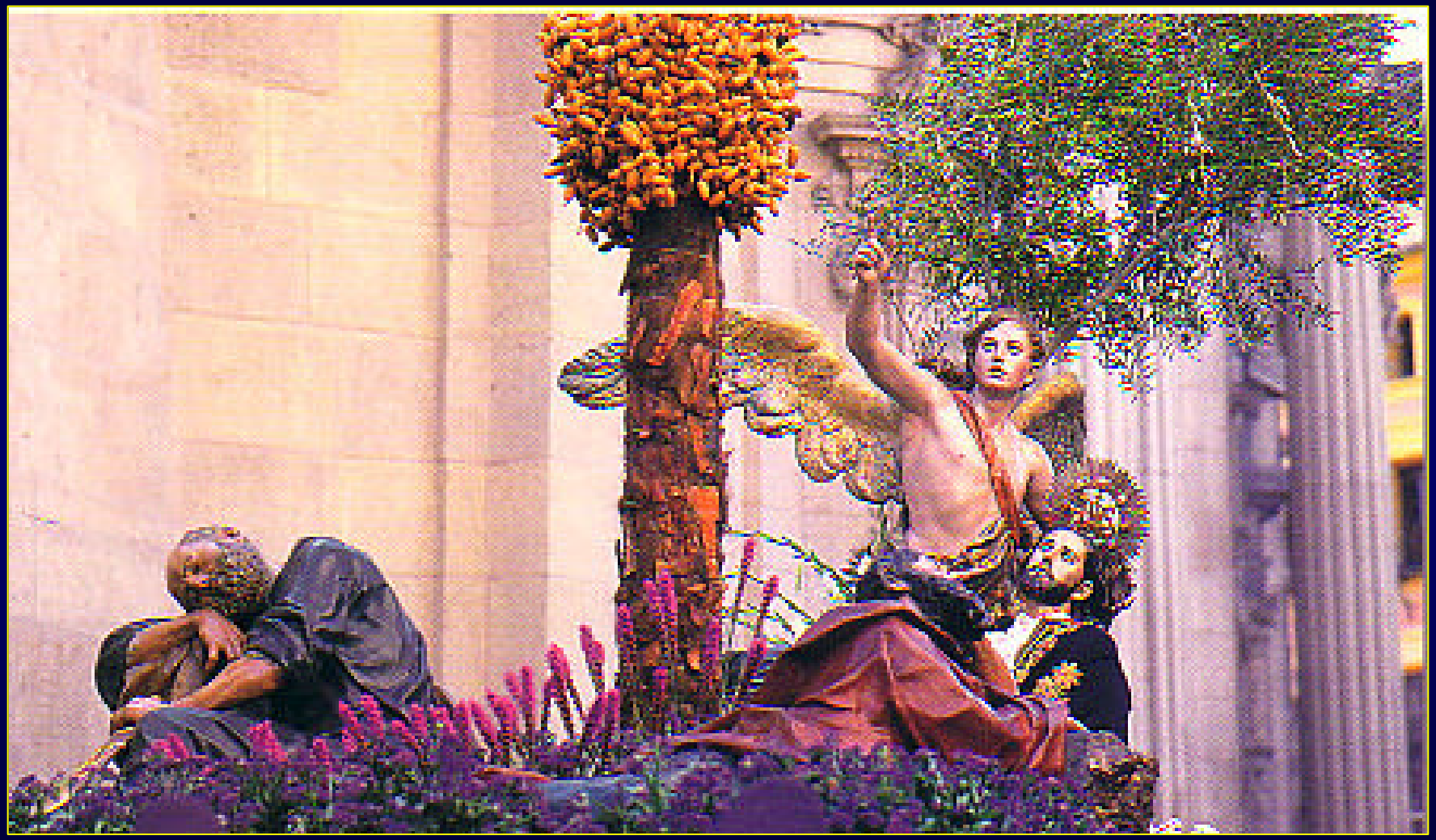
LARGE SCALE TREATMENTS
Murcia. Spain. 2.000



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LARGE SCALE TREATMENT

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GENERAL GUIDELINE FOR DE-INFESTATION

DELICATED MUSEUM OBJECTS

Painting, textiles, books, furniture, wood, leather

ENVIRONMENTAL CONDITIONS

- Temperature > 18ºC, in a range of 21-23ºC.
- Relative humidity: identical as room conditions
- Oxygen concentration: < 0.1%
- Exposure time: 3 - 7 weeks depending on RH, insect and object

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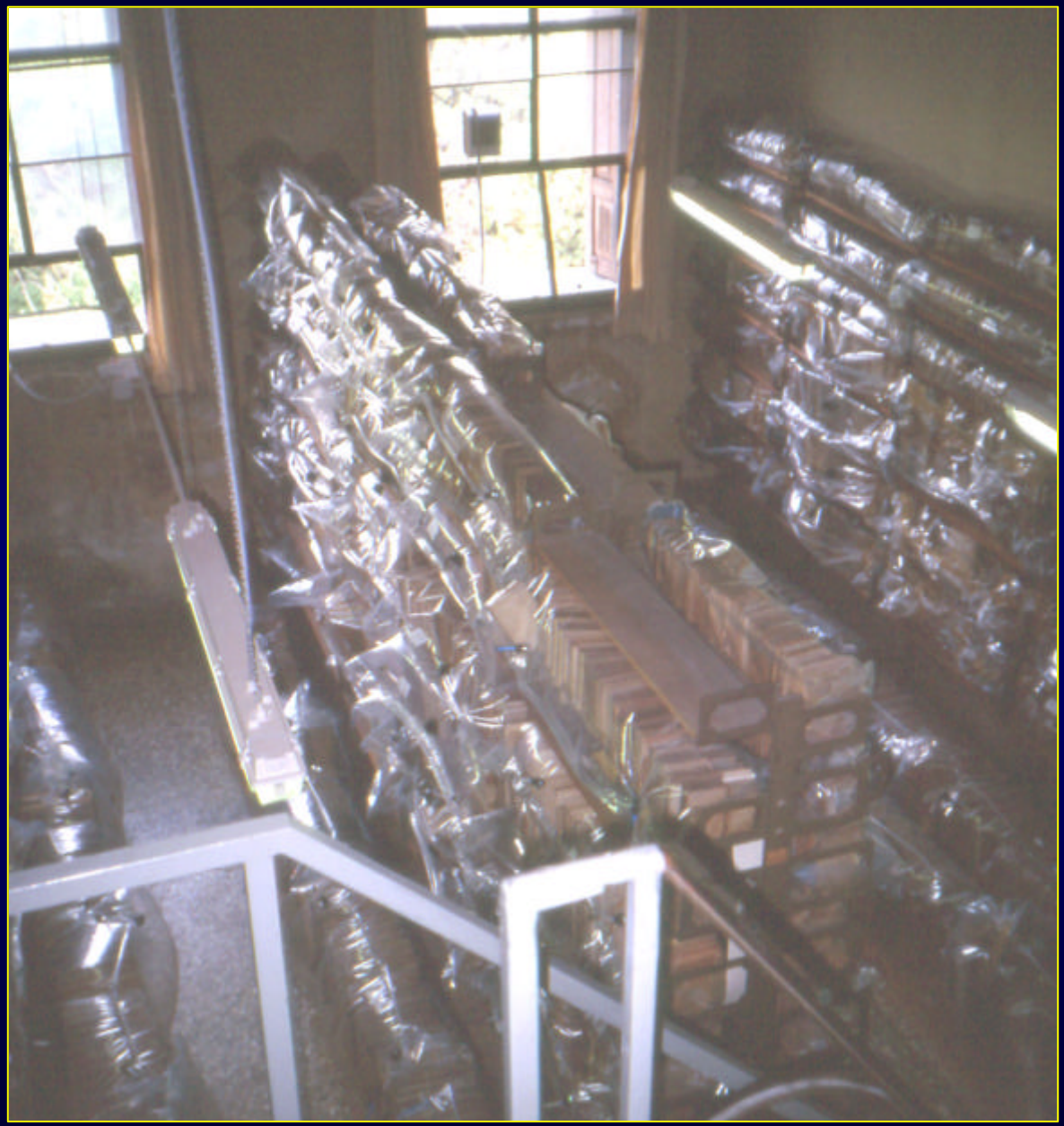
MARCIANA NATIONAL LIBRARY
Low oxygen treatments using VELOXY

TIZIANA PLEBANI
HEAD OF PRESERVATION AND RESTORATION.
BIBLIOTECA NATZIONALE MARCIANA -VENEZIA . ITALY

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SAVE ART PROJECT

FINDINGS AND CONCLUSIONS

ACHIEVED

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FINDINGS

- Production of a portable equipment to treat *in situ* infested art objects
- Instrumentation to mesure parameters during the process.
- Production of specific plastic to preserve historic objects for long-term storage, available for archives, libraries, museums and private collections.

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ADVENTAGES

- **It is easy to use**
- **Professionals will not need to handle toxic and dangerous products**
- **It is safe for public in Museums and Archives**
- **It is safe for the environment**
- **The cost/treatment is reduced**
- **It works in a dynamic system *in situ* without transporting art pieces avoiding risk of damage**

CONCLUSSION

- **Veloxy® was found to be a useful tool for the de-infestation of historic objects, including large size**
- **The plastic used was easy to handle and showed acceptable aging.**
- **The moister content of the material should be controlled to guarantee the efficacy for de-infestation and avoid desiccation of art objects**
- **To decrease oxygen level in large scale treatments is difficult and requires higher personal cost.**

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TO BE IMPRUBED

- The compresor can be noisy
- Nitrogen flow produced (1.5 l/min) was low for large scale treatments
- Nitrogen flow decreases when it is humidified
- In most of the equipments N_2 flow is inversely proportional to its purity
- To solve these problems increases the cost of the equipment significantly.

IN ADDITION:

IN THE BUILDING

- Pest control managment is required to prevent re-infestation
- Environmental parameters should be controlled and correcte
- A specific preventive conservation program is essential to avoid further risks

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THANK YOU VERY MUCH

FOR YOUR ATTENTION

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