



International Course on Stone Conservation SC13

SESSION: Overview of deterioration mechanism

INSTRUCTOR: John Fidler

TIME: Wednesday, 8th May/ 10:00-11:00 (1 hour) & 11:30-13:00 (1.5 hours)

SESSION OUTLINE

ABSTRACT

The session will introduce cause and effect in the weathering and deterioration of building stones at both macro- and micro- levels. The presentation and walking tour will create a general awareness of the issues involved and their inter-relationships so that subsequent presentations will elucidate the issues in more detail.

OBJECTIVES

- to be introduced to, and made aware of, the physical symptoms and causes of stone decay and deterioration;
- to gain a general understanding of the structural and architectural causes of damage to stone, stone sculpture, and stone masonry walls and floors;
- to gain a general understanding of the inter-relationship between the inherent physical, chemical and mineralogical sensibilities of stone types and the external physical, chemical and biological agents of deterioration and
- to discuss and exchange views on the terminology associated with deterioration mechanisms

CONTENT OUTLINE

Terminology: structural, architectural and material deterioration systems and their inter-relationships to one another, and to the susceptibilities or vulnerabilities of the stones themselves and their mineralogy. Establishment of symptom and cause:

Structural deformation:

- subsidence and settlement
- eccentric loading, thrusts and failure of support
- failure of cohesion
- thermal movement
- seismic motion

Architectural deterioration:

- moisture ingress
- rising damp
- corroding iron/steel anchors
- inappropriate bedding of stone (eg face bedding of sedimentary stones)
- introduction and entrapment of salts by cementitious mortars
- incompatible adjacent stones
- side-flash lightning impacts
- inappropriate cleaning



SESSION OUTLINE CONT'D


Material deterioration:


- acid rainfall & other pollution effects
- Salt crystallization
- Frost
- Biological deterioration
 - bacteriological impacts
 - algae, lichens and mosses
 - ivy and other creeping plants and higher woody species
 - insects: masonry bees etc
 - bird/bat guano impacts
 - human impacts – graffiti, traffic wear, vandalism and theft
 - animals


READINGS

 = Essential reading material

 = Available online



 Ashurst, John, and Nicola Ashurst. 1988. Chapter 1. *In Practical Building Conservation: Volume 1: Stone Masonry*, English Heritage Technical Handbook. Halsted Press, New York,

 Feilden, Bernard M. 2003. Climatic causes of decay. In *Conservation of historic buildings*. 3rd ed, 92-118. Oxford: Architectural

 Honeyborne D.B. 1998. Weathering and decay of masonry. In *Conservation of building and decorative stone*. Paperback ed. edited by John Ashurst and Francis G. Dimes, 153-84. Oxford ; Woburn, Mass.: Butterworth-Heinemann

Ashurst, John. 2007. *Conservation of Ruins*. 1st ed. Butterworth-Heinemann Series in Conservation and Museology. London and Burlington, Mass.: Butterworth-Heinemann..

Henry, Alison. 2006. *Stone Conservation: Principles and Practice*. Shaftesbury: Donhead.

  Vergès-Belmin, Véronique, ed. 2008. *Illustrated Glossary on Stone Deterioration Patterns = Glossaire illustré sur les formes d'altération de la pierre*. English-French ed, Monuments & Sites no. 15. Paris: ICOMOS and (ISCS) International Scientific Committee for Stone.
http://www.icomos.org/publications/monuments_and_sites/15/pdf/Monuments_and_Sites_15_ISC_S_Glossary_Stone.pdf

Schaffer, Robert John. [1932] 2004. *The Weathering of Natural Building Stones*. Shaftesbury: Donhead.

Smith, Bernard J., and Alice V. Turkington, ed. 2004. *Stone Decay: Its Causes and Controls*. Shaftesbury: Donhead.

Weaver, Martin E., and F. G. Matero. 1997. *Conserving Buildings: Guide to Techniques and Materials*. Rev. ed. New York: John Wiley & Sons.

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