



## INTRODUCTION:

The collection of the Museu de Ciències Naturals (MCN) housed at the Museu de Geologia de Barcelona (MGB) will soon be moved. To facilitate and to improve this process, it's necessary to be sensible about the deterioration patterns that affect its items. A compendium of the deterioration patterns observed in the MGB-MCN paleobotanical collections is presented hereby. It will also help to preserve the items from damage due to manipulation and weathering and to prevent them from degradation and decay. The MGB-MCN paleobotanical collection is composed of 6.000 items.

## METHODOLOGY:

The International Council on Monuments and Sites-International Scientific Committee for Stone (ICOMOS-ISCs)<sup>1</sup> published a glossary, based on six family models, that describes naked-eye deterioration patterns on stone, furthermore it includes a compilation of other documents on the same matter. As most of the paleobotanical items of the MGB-MCN collection are preserved on stone, this glossary has been used to classify the deterioration patterns that affects this part of the collection. In consequence, no analyses have been needed (chemical, petrographic, biologic...).

From these premises ten deterioration patterns have been recognized as the most important affecting such items. A compendium of them is herein shown, classified by its family type.

## RESULTS AND DISCUSSION:

Ten deterioration patterns have been observed and ordered following the ICOMOS-ISCs criteria and ordered in five families as listed below:

### Detachment:

- Powdering: disintegration in thin grains (figures a, b).
- Splintering: fragmentation into irregular pieces (figures c, i).
- Spalling: detachment into pieces parallel to the surface of the stone (figures g, h).

### Discolouration and deposit:

- Deposit: accumulation of exogenic material (dust) (figure b).
- Staining: change of the colour of the stone (figures d, e).
- Efflorescence: salt precipitated on the stone surface (figure e).
- Subflorescence: salt precipitated under the stone surface (in porosities) (figure i).

### Crack and deformation:

- Craquele: network of minor cracks (figures g, h).

### Biological colonization:

- Lichen: colonization of the stone by biological organisms on the surface of the rock or inside its pores or fissures (figure f).

### Features induced by material loss:

- Rounding: loss of original shape due to erosion into a rounded profile (figure a).

The deterioration patterns of the MGB-MCN paleobotanical collection reported herein do not imply a loss of value (degradation) because a big part of the patterns can be reverted (splintering, spalling, deposits, craquele, efflorescence). On the other hand, there are some that don't have an easy solution: subflorescence observed in the figure 'i' is causing item detachment by splintering. There are some other patterns that are somewhat neutral to the preservation of the item itself, as the staining of figures 'd' and 'e'. Furthermore, the lichen colonization on the item of the figure 'f' was stopped long time ago by natural process; and the rounding observed in figure 'a' can be stopped applying adapted packages or controlling the environmental conditions in the storage room. The powdering observed in the figures 'a' and 'b' are probably a heritage from the fossil site<sup>2</sup>, as is the case of deterioration patterns observed in the items showed in the figures 'i', 'h' and 'f'.

In order to preserve the paleobotanical collections on stone, it is useful to have documented the deterioration patterns. This will prove a useful tool in order to prevent a further degradation of the paleobotanical collections which were yielded from the same site and are stored in different museums, as well as to solve the origin of these patterns.

## CONCLUSIONS

The paleobotanical collections of the MGB-MCN have been documented and its preservation state naked-eye observed under the ICOMOS-ISCs criteria, due to its imminent move.

The deterioration patterns observed do not imply loss of value of the paleobotanical collection housed at the MGB, as most part of it could be reverted.

This kind of documentation would be a useful tool to prevent degradation of paleobotanical collections (and other), as well as an appropriate storage strategy

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## BIBLIOGRAPHY

<sup>1</sup>Diverse authors (2008) *ICOMOS-ISCs: Illustrated glossary on stone deterioration patterns. Monuments and sites*, XV. Ed: Vergès-Belmin, V. 77 pp.

<sup>2</sup>ROS, Xavier & PALOMAR, Jordi (2003) *Contexto geográfico y geológico de los yacimientos plioleptocenos de Incarcal (Girona, NE de la Península Ibérica)*. Paleontología i Evolució t. 34, p. 13-22.

