

ICOMOS

国际古迹遗址理事会

International Scientific Committee for Stone (ISCS).

国际石质科学委员会

ILLUSTRATED GLOSSARY ON STONE DETERIORATION PATTERNS

石质文物劣化模式图解术语表



English - Chinese Version / 英语 - 汉语 对照版



MONUMENTS AND SITES
古迹和遗址（丛书）

XV
第 15 卷



ICOMOS-ISCS:

国际古迹遗址理事会 - 国际石质科学委员会：

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ICOMOS-ISCS Web site

The ISCS Website includes among other things, the terms and definitions of the seven background glossaries on which the ISCS glossary has been set up. Terms and definitions can be found in English, Spanish, German, Portuguese and French. A cumulated alphabetical list, including all the terms that can be found in each specific language, has been set up. Available definitions of each term can be visualised simultaneously in any selected language.

Address : <http://lrmh-ext.fr/icomos/consult/index.htm>

国际古迹遗址委员会 - 国际石质科学委员会网址

ISCS 网站除其它外，还包括了 ISCS 术语表编写所依据的七个参考术语表的术语和定义。可以查找这些术语和定义的英语、西班牙语、德语、葡萄牙语和法语表述。经过长期积累，已经建成了一个按字母顺序排列的表格，包含了在每种特定语言中可以找到的所有术语。每个术语的适用定义都可以同时在选定语言中找到可视化的介绍。

网址：<http://lrmh-ext.fr/icomos/consult/index.htm>



陕西省文物保护研究院译著系列—02

INTERNATIONAL COMMISSION ON MONUMENTS AND SITES

国际古迹遗址理事会

ICOMOS - ISCS

国际石质科学委员会

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ENGLISH-CHINESE VERSION

英语 - 汉语 对照版

Translated from the English-French edition

根据英语 - 法语版翻译

陕西省文物保护研究院
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MONUMENTS AND SITES

古迹和遗址 (丛书)

XV

第 15 卷

图书在版编目 (CIP) 数据

石质文物劣化模式图解术语表 : 陕西省文物保护研究院 / 砖石质文物保护国家文物局重点科研基地译. — 西安 : 陕西科学技术出版社, 2019.9

ISBN 978-7-5369-

I. ①石… II. ①陕西… III. ①砖石-文物保护 IV. ①Q948.524-13

中国版本图书馆 CIP 数据核字 (2019) 第 183143 号

ICOMOS Publications: SERIES / COLLECTION "MONUMENTS & SITES",
Vol.XV: ICOMOS-ISCS: Illustrated glossary on stone deterioration patterns

ICOMOS International Secretariat

49-51, rue de la Fédération

75015 Paris, France

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石质文物劣化模式图解术语表

责任编辑 李 珑

出版者 陕西新华出版传媒集团 陕西科学技术出版社
西安市雁塔区登高路1388号陕西新华出版传媒产业大厦B座

地 址 陕西新华出版传媒集团 陕西科学技术出版社

印 刷 西安奇良海德印刷有限公司

规 格 635mm × 965mm 1/8

印 张 11

字 数 120千字

版 次 2019年 月第 版

2019年 月第 次印刷

书 号 ISBN 978-7-5369-

定 价 128.00元

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《石质文物劣化模式图解术语表》

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序 言

我国的石刻艺术源远流长，悠久的历史遗存了大量精美的陵墓石刻、碑刻、石造像，高挺的石阙、石碑坊、石塔，恢弘的摩崖和石窟造像等，种类繁多、数量庞大、具有很高的历史、艺术和科学价值。

因石质材质相对较为稳定、有一定耐风化能力，大多数石质文物千百年来都处于户外环境。因长期遭受自然风化和人为破坏的影响，加上近代工业化以来的环境变化和环境污染影响，已使得石质文物出现了普遍风化、甚至严重风化的问题。从上世纪 60 年代以来，我国的文物保护工作者即针对石质文物的风化，开展了大量的石质文物保护研究和保护修复实施，取得了很大的成绩。

石质文物、石造建筑也是欧美国家最主要的文物类型之一。欧美国家的同行们在石质文物劣化机理、保护技术和材料，乃至保护规范等方面，更是积累了大量的研究成果和经验，可以为我国的石质文物保护研究提供有益的参考和借鉴，《石质文物劣化模式图解术语表》就是一个很好的例子：自上世纪 80 年代起，英国、法国、德国、意大利等国家的石质文物保护工作者，先后就石质文物的劣化模式和相关专业术语编制了多份不同语言、具有很高水准的术语表文件，2001 年更由国际石质科学委员会（ISCS）的 40 多位知名专家、学者合作编译、对比、整理，最终编辑成了本术语表。这本术语表内容丰富、劣化模式和劣化特征定义准确、图解示例清楚，为在石质文物劣化调查研究中准确的识别、与相似的劣化样式进行比较等提供了规范的方法，不仅为石质文物劣化模式和特点的科学讨论提供了一套通用的、规范的术语，同时也为了解石质文物劣化现象与过程提供了一个基础教程，书中还提供了内容广泛的石质文物保护建议和实施意见，非常实用。

陕西是文物大省，也是文物保护、石质文物保护大省。尤其改革开放以来，通过广泛的国内外合作，陕西的同行们先后开展了大佛寺石窟保护、瞿塘峡摩崖题刻搬迁保护、唐陵石刻保护等重要石质文物的保护研究和保护工程实施，取得了显著的成就。2009 年陕西省文物保护研究院、陕西省考古研究院和西北大学文博学院联合申报了“砖石质文物保护国家文物局重点科研基地”。自挂牌以来，“基地”以砖石质文物保护基础研究、应用技术研究和预防性保护研究和保护修复示范为重点，来满足陕西乃至全国砖石质文物保护的技术需求。除此之外，还注重砖石质文物保护修复规范化工作，先后主持完成了砖石质文物保护 3 项国家标准、6 项行业标准的编制，为我国的石质文物保护技术进步做出了贡献。这次《石质文物劣化模式图解术语表》的翻译，是基地结合石质文物保护基础研究工作、跟踪当今世界石质文物保护方法和经验的又一项具体成果，希望本书的出版能对我国石质文物保护研究、保护修复实施、相关保护技术标准、规范的制定，以及开展国内外石质文物保护交流等工作起到参考和借鉴作用。

黄克忠
2020 年 5 月

ICOMOS-ISCS

国际古迹遗址理事会—国际石质科学委员会

Illustrated glossary on stone deterioration patterns

石质文物劣化模式图解术语表



MONUMENTS AND SITES
古迹和遗址

XV 第15卷

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The ICOMOS International Scientific Committee for Stone (ISCS) is providing a forum for the interchange of experience, ideas, and knowledge in the field of stone conservation. ISCS aims at facilitating the publication, dissemination and presentation of state of the art reviews on pre-identified issues. Simplification and demystification of scientific information for practitioners are also part of the main goals of the group.

In studies on stone deterioration and conservation, terminological confusions lead to major communication problems between scientists, conservators and practitioners. In this context, it is of primary importance to set up a common language; if degradation patterns can be shown, named and described, then they can be recognised and compared with similar ones in a more accurate way in further investigations.

The ISCS glossary constitutes an important tool for scientific discussions on decay phenomena and processes. It is also an excellent basis for tutorials on stone deterioration. It is based on the careful examination of pre-existing glossaries of English terms. It does not aim at replacing these glossaries, often set up originally in a language other than English, and for most of them done to a high standard.

As President of ICOMOS I would like to congratulate the International Scientific Committee for Stone and its President Véronique Vergès-Belmin for the results of years of research presented in this publication. Stone conservation is a crucial topic in monument conservation and many of our National Committees all over the world hope for advice and help from the specialists familiar with traditional and modern methods of conservation. The Illustrated Glossary on Stone Deterioration Patterns offers a wide range of suggestions and practical advice. Probably, after the English-French version becomes available the Glossary will also be translated into other languages. In view of the accelerating decay of our stone monuments worldwide this is an exemplary contribution which will promote the international cooperation so important in this field.

Prof. Dr. Michael Petzet, President of ICOMOS

国际古迹遗址理事会 (ICOMOS) 石质科学委员会 (ISCS) 一直致力于提供一个交流石质文物保护领域经验、思想和知识的论坛。ISCS 旨在促进对已知问题研究论述最新成果的出版、传播和介绍。给从业者提供浅显易懂的科学知识也是这个团体主要目标之一。

在石质文物劣化和保护研究中，术语的混淆常常导致了科学家、文物保护师和从业人员之间交流的困难。在这种情况下，建立一套通用术语是头等要务，如果石质劣化模式可以用图片呈现、命名和描述，那么在今后的调查研究中这些劣化模式就可以以一种更准确的方式被识别、并与相似的劣化样式进行比较。

ISCS 编写的这个术语表为石质的劣化现象和过程的科学讨论提供了一个重要的工具。它同时也是一个极好的关于石质劣化的基础教程。它改编自经过仔细验证的已有英文术语表。本术语表不是要去取代那些已经建立的、具有很高水准的非英语语种术语表。

作为国际古迹遗址理事会主席，我要祝贺国际石质科学委员会和 Véronique Vergès-Belmin 主席，本书的出版展现了他们多年的研究成果。石质保护在文物古迹保护领域是一个至关重要的话题，全世界大多数国家的古迹遗址协会都希望得到熟悉传统和现代保护方法的专家们的建议和帮助。《石质文物劣化模式图解术语表》给我们提供了内容广泛的建议和实用意见。很有可能随着英语 - 法语版的出版面世，这个术语表还将被翻译成其它的语言出版。考虑到全世界范围内石质古迹的加速破坏现状，这本术语汇编是一个模范性的贡献，它将极大促进在这个重要领域的国际合作。

米歇尔·佩策特博士、教授，ICOMOS (时任) 主席



SUMMARY . 目录

BACKGROUND GLOSSARIES . 术语表的编写背景	page 4	GLOSSARY OVERVIEW . 术语表概述	page 6
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GENERAL TERMS 一般术语

ALTERATION . 变化	DAMAGE . 微劣化 (损伤)	DECAY . 弱劣化 (损蚀)
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CRACK & DEFORMATION 裂隙与变形

CRACK . 裂隙	page 10	DEFORMATION . 变形	page 12
FRACTURE . 破裂、断裂缝			
Star crack . 星状裂纹			
Hair crack . 发丝状裂纹			
Craquele . 网状裂纹			
Splitting . 劈裂缝			

DETACHMENT 剥离、脱落

BLISTERING . 鼓包胀裂	page 14	BURSTING . 凹状破裂	page 16	DELAMINATION . 层状剥落	page 18
				Exfoliation . 页状 (多层) 剥落	

FEATURES INDUCED BY MATERIAL LOSS 材质损失形貌

ALVEOLIZATION . 表层凹窝	page 28	EROSION . 侵蚀	page 30	MECHANICAL DAMAGE . 机械损伤	page 32
Coving . 局部凹窝		Differential erosion . 差异侵蚀		Impact damage . 撞击、冲撞	
		Loss . 损失		Cut . 切、割、削	
		■ of components . 成分损失		Scratch . 刮擦	
		■ of matrix . 基质损失		Abrasion . 磨损、磨擦	
		Rounding . 磨圆		Keying . 刮、刺、凿	
		Roughening . 粗糙化			

DISCOLOURATION & DEPOSIT 变色与堆积物

CRUST . 覆盖层	page 42	DEPOSIT . 堆积物	page 44	DISCOLOURATION . 变色	page 46	EFFLORESCENCE . 盐霜、盐华	page 48	ENCRUSTATION . 矿化沉淀层	page 50
Black crust . 黑色覆盖层				Colouration . 染色				Concretion . 凝固物、凝结物	
Salt crust . 盐覆盖层				Bleaching . 褪色					
				Moist area . 潮湿区域					
				Staining . 染污					

BIOLOGICAL COLONIZATION 生物侵蚀

BIOLOGICAL COLONIZATION . 生物侵蚀	page 64	ALGA . 藻类	page 66
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INDEX . 索引	page 76	REFERENCES . 参考文献	page 78
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DEGRADATION . 强劣化 (损坏)		DETERIORATION . 劣化		WEATHERING . 风化		page 8
DISINTEGRATION . 颗粒状剥落		FRAGMENTATION . 片状剥落		PEELING . 表面层剥落		page 20
Crumbling. 碎屑状剥落		Splintering. 尖细片状剥落		SCALING . 鳞片状剥落		page 26
Granular disintegration. 粒状剥落		Chipping. 削片状剥落				Flaking. 薄片状剥落
<ul style="list-style-type: none"> ■ Powdering, Chalking. 粉化 ■ Sanding. 沙化 ■ Sugaring. 砂糖化 						Contour scaling. 轮廓线状剥落
				<ul style="list-style-type: none"> ■ Spalling. 层裂 		
MICROKARST . 微溶蚀		MISSING PART . 残缺部分		PERFORATION . 穿孔		page 34
		Gap. 间隙、豁口				page 36
				PITTING . 点蚀		page 40
FILM . 薄膜层		GLOSSY ASPECT . 镜面光泽		GRAFFITI . 涂鸦		page 52
				PATINA . 氧化膜、皮壳		page 56
				Iron rich patina. 富铁氧化膜 (皮壳)		
				Oxalate patina. 草酸盐氧化膜 (皮壳)		
				SOILING . 表面脏污		page 58
				SUBFLORESCENCE . 次表层盐霜		page 60
LICHEN . 地衣		MOSS . 苔藓		MOULD . 霉菌		page 68
				PLANT . 植物		page 70
						page 72
						page 74



英语 / 汉语

In 2001, when the group began its compiling task, seven documents, comprising various numbers of entries were identified as a basis for collecting and combining useful terms into a generalised glossary. The oldest one is an unpublished list of 21 terms written by A. Arnold, D. Jeannette and K. Zehnder (1980), who performed that task within the framework of the ISCS petrography group activities. This glossary includes an alphabetical list of terms in English, French and German, with related definitions in the three languages.

The second document is a compilation of 24 English terms with related definitions, published by Grimmer (1984) of the U.S. National Park Service.

The third document is the Italian Standard Normal 1/88 published in 1990 and called "Alterazioni macroscopiche dei materiali lapidei : lessico". Each one of the 27 terms in this glossary is illustrated by photographs, usually in two different scales and by a graphic chart to be used if mapping of deterioration patterns is needed. This glossary, and related definitions have been translated into English by Apy Elena Charola. This author has also translated the terms, without their definitions, into Spanish and Portuguese.

The fourth set of documents is a proposal for a terminology of stone decay forms on monuments, written by Jose Delgado Rodrigues from LNEC (Lisbon, Portugal). It comprises 26 terms, and was largely inspired in internal documents produced in the framework of the Petrography Group of the ICOMOS Stone Committee and published in its newsletter in 1991.

This proposal was used as a basis for the publication by LNEC, in 2004, of a glossary with short definitions in Portuguese language, including terms related to stone, masonry and render deterioration (Henriques et al., 2004). Each term is translated into French, Italian and Spanish, and is associated with a graphic chart.

The sixth document is a detailed contribution by B. Fitzner, K. Heinrichs & R. Kownatzki (1995), on classification and mapping of weathering forms, which was updated in 2002 by Fitzner & Heinrichs. This document presents as well definitions of terms which are found in a slightly altered form in the present glossary, as an introduction into the mapping of stone damages. The thoroughly illustrated document classifies decay patterns on the basis of type and intensity. A colour and graphic chart is proposed, in the same way as the one which can be found in the Italian Standard Normal 1/88.

2001年,当编写小组开始编制工作时,确定了七种由不同数量条目组成的术语表文件作为基础,收集有用术语并将其合并成一个综合术语表。

最早的一份术语表文件(未发表)撰写于1980年,有21个术语,作者是A.Arnold,D.Jeannette和K.Zehnder。他们是在国际石质科学委员会岩石学小组活动的框架内完成的。这个文件包括了一套按字母顺序排列的英语、法语和德语术语,以及相关定义。

第二份文件是一个由24个英语术语及其相关定义构成的,由美国国家公园管理局的Ann Grimmer(1984)出版。

第三份文件是1990年出版的意大利标准1/88,“术语表:石质材料的宏观变化”。在这个术语表中包含27个术语,通常每个术语都配有两种不同尺寸说明图片,必要时还配有绘制的图表。这个术语表及其相关定义由Apy Elena Charola翻译成英文。该作者还将术语表中除定义之外的部分翻译成了西班牙文和葡萄牙文。

第四份文件是一个关于石质文物古迹劣化类型术语表的建议,由国家土木工程实验室(里斯本,葡萄牙)的Jose Delgado Rodrigues编写。它由26个术语组成,很大程度上受到ICOMOS石质委员会岩石学小组内部文件的影响,1991年发表在其内部通讯简报上。

第五份文件是2004年国家土木工程实验室以第四份文件为基础出版的带有简短定义的葡萄牙术语表,包含石质、石造建筑和灰泥风化(Henriques等,2004)。每条术语及相关图表都被翻译成了法语、意大利语和西班牙语。

第六份文件由B. Fitzner, K. Heinrichs和R. Kownatzki(1995年)三人编写,详细介绍了关于风化形态分类和图示,2002年Fitzner和Heinrichs修订了该文件。文件对应石质病害图示,定义了相应术语(与本土语表中的略有不同)。以类型和强度为分类依据,对各种风化模式进行了图文并茂的展示。文件中提出使用彩色图例的方法,这与意大利标准Normal 1/88非常类似。

英语 / 汉语

The seventh document (Franke et al.1998) is a multi- authored book published as a deliverable of a FP5 European Commission research program. The document is an Atlas and a classification of brick masonry deterioration. It deals both with deterioration of the material (bricks, joint and pointing mortars), and with degradation of the whole masonry. It was developed together with an expert system, of which the acronym is MDDS, which stands for "Masonry Damage Diagnostic System". In fact all damage types contained in the document are to be found in the expert system (Van Hees et al 1995), aiming at helping decision makers to diagnose the origin of deterioration and select appropriate methods and materials for brick masonry restoration.

The most recent document has been set up by a Group of experts from Germany (VDI 3798. 1998) VDI stands for "Verein Deutscher Ingenieure, i.e. Association of German Engineers". This document is quite close to a standard, and it is composed of a list of 14 terms in German, with a translation into English, accompanied by a definition and illustrations. A proposal for graphic representation of the decay patterns is also provided, as in the Italian Standard and in the Fitzner system.

Although we did our best to gather all the available information, we have obviously missed a number of documents. One of them is an illustrated glossary of 30 terms edited by the "Queen's University of Belfast" (U.K.). On its website (<http://www.qub.ac.uk>) one can find a comprehensive weathering features tutorial, which includes both degradation patterns of monuments and natural outcrops, and also refers to anthropogenic damage.

第七份文件是 Franke 等多人的 FP5 欧洲委员会研究课题成果，出版于 1998 年。文件包含一份砖砌建筑分类与劣化图集。涉及材料的劣化（砖、勾缝灰浆）和整个砖砌结构的劣化。还开发了一个名为“砌体病害诊断系统”的专家系统，缩写为 MDDS。专家系统（Van Hees 等，1995）旨在帮助决策者诊断病害起因，选择合适方法和材料来修复砖砌建筑。事实上该文件文本中的病害类型都可以在专家系统中看到。

最近的文件是由一组德国专家（VDI3798）在 1998 年编写的。VDI 是“德国工程师协会”的德文缩写。这份文件非常接近一份标准，包含了十四个德文术语和对应的英文翻译。文件建议使用图示来展示风化类型，就像意大利标准以及 Fitzner 系统中的那样。

我们已尽了最大努力去收集所有可用信息和资料，但显然还是遗漏了一部分文件。其中之一是贝尔法斯特女王大学（英国）编写的包含有 30 个术语的图示术语表。在其官方网站（<http://www.qub.ac.uk>）上可以检索到一个详尽的风化特征教程，不仅包括文物古迹的劣化模式，也有出露地表自然岩层的劣化模式，以及相关的人为破坏。

The glossary is arranged into 6 families composed of 2 to 11 terms :

- General terms,
- Crack and deformation,
- Detachment,
- Features induced by material loss,
- Discoloration and deposit,
- Biological colonization

As far as possible, the authors have kept within strict limits, describing deterioration patterns observable by the naked eye. Only a few families deviate from this general rule, for instance “mechanical damage” which includes terms such as “impact damage”, “cut”, “scratch”, “abrasion”, and which is clearly process and not feature oriented.

We have chosen to create a specific family including terms related to surface morphologies, called “Features induced by material loss”. This family is important because it contains terms allowing a deterioration pattern to be described even if there is no active material loss at the time the object is described. For instance a surface showing alveolization may be subjected to active granular disintegration or scaling. If there is no more stone loss from the surface, it will still have an alveolar relief, but with no further loss of material, and the surface will have a tendency to soil. The same is applicable to “erosion” and “biological colonization”, because a surface may have eroded first and then be colonized by algae, lichen or mosses.

The ISCS glossary only contains terms related to stone material as an individual element within a built object or sculpture. As a consequence, the terms do not relate to the description of the deterioration of a stone masonry structure as a whole.

本术语表分为 6 个系列，每个系列包括 2 到 11 个术语。

- 一般术语，
- 裂隙与变形，
- 剥离、脱落，
- 材质损失形貌，
- 变色和堆积，
- 生物侵蚀

作者尽可能严格谨慎地描述肉眼可以观察到的劣化模式。只有个别系列的描述偏离了这个总的规则，例如“机械损坏”类型中，包括了“撞击损坏”、“切割”、“划痕”、“磨损”等术语，而这些术语显然是过程而不是特征导向的。

我们选择建立一个包括与表面形貌有关的术语系列，命名为“材质损失形貌”。这个系列很重要，因为即便被观察对象当下没有发生物质损失的情况，但是仍可以通过系列中的术语来描述其劣化的模式和特点。例如，石材表面出现了凹窝，可能是石材活跃的颗粒状剥落和鳞片状脱落的结果。如果不再有石材表面的损失，它将继续呈现为一个齿槽状的凹窝（浅浮雕状），但不再有进一步的材质损失，表面将有土壤化的趋势。同样的例子还有“侵蚀”和“生物侵蚀”，因为表面可能先被侵蚀，然后才有藻类、地衣和苔藓的生物侵蚀。

ISCS 术语表只包含与一个建筑或雕刻中的单个石质元素相关的石材术语。因此，这些术语表不涉及对整个石砌建筑结构的劣化描述。

How to find a particular term in the glossary?

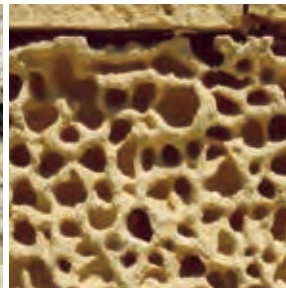
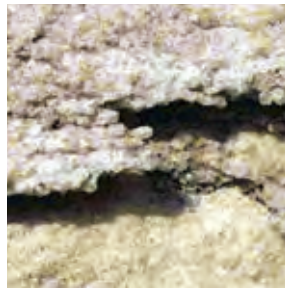
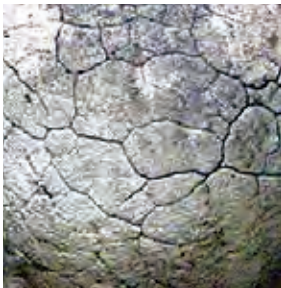
To find a term, one can search from the table of contents on page 2, or go to the index page 76.

如何在术语表中查找到特定的术语?

要找到一个术语，可以从第二页的表格内容中查找，或到第 76 页的索引中去检索。

GENERAL TERMS. 一般术语 *

ALTERATION.	变化
DAMAGE.	微劣化 (损伤)
DECAY.	弱劣化 (侵蚀)
DEGRADATION.	强劣化 (损坏)
DETERIORATION.	劣化
WEATHERING.	风化



CRACK & DEFORMATION 裂隙和变形	DETACHMENT 剥离、脱落	FEATURES INDUCED BY MATERIAL LOSS 材质损失形貌	DISCOLORATION & DEPOSIT 变色与堆积	BIOLOGICAL COLONIZATION 生物侵蚀
CRACK. 裂隙 Fracture. 破裂、断裂缝 Star crack. 星状裂纹 Hair crack. 发丝状裂纹 Craquele. 网状裂纹 Splitting. 劈裂缝 DEFORMATION. 变形	BLISTERING. 鼓包胀裂 BURSTING. 凹状破裂 DELAMINATION. 层状剥落 Exfoliation. 页状 (多层) 剥落 DISINTEGRATION. 颗粒状剥落 Crumbling. 碎屑状剥落 Granular disintegration. 粒状剥落 ■ Powdering, Chalking 粉化 ■ Sanding. 沙化 ■ Sugaring. 砂糖化 FRAGMENTATION. 片状剥落 Splintering. 尖细片状剥落 Chipping. 削片状剥落 PEELING. 表面层剥落 SCALING. 鳞片状剥落 Flaking. 薄片状剥落 Contour scaling. 轮廓线状剥落	ALVEOLIZATION. 表面凹窝 Coving. 局部凹窝 EROSION. 侵蚀 Differential erosion. 差异侵蚀 Loss. 损失 ■ of components. 成分损失 ■ of matrix. 基质损失 Rounding. 磨圆 Roughening. 粗糙化 MECHANICAL DAMAGE. 机械损伤 Impact damage. 撞击、冲击 Cut. 切、割、削 Scratch. 刮擦 Abrasion. 磨损、摩擦 Keying. 割、刺、凿 MICROKARST. 微溶蚀 MISSING PART. 残缺部分 Gap. 间隙、豁口 PERFORATION. 穿孔 PITTING. 点蚀	CRUST. 覆盖层 Black crust. 黑色覆盖层 Salt crust. 盐覆盖层 DEPOSIT. 堆积物 DISCOLOURATION. 变色 Colouration. 染色 Bleaching. 褪色 Moist area. 潮湿区域 Staining. 染污 EFFLORESCENCE. 盐霜、盐华 ENCRUSTATION. 矿化沉淀层 Concretion. 凝固物、凝结物 FILM. 薄膜层 GLOSSY ASPECT. 镜面光泽 GRAFFITI. 涂鸦 PATINA. 氧化膜、皮壳 Iron rich patina. 富铁氧化膜 (皮壳) Oxalate patina. 草酸盐氧化膜 (皮壳) SOILING. 表面脏污 SUBFLORESCENCE. 次表层盐霜	BIOLOGICAL COLONIZATION. 生物侵蚀 ALGA. 藻类 LICHEN. 地衣 MOSS. 苔藓 MOULD. 霉菌 PLANT. 植物

* 一般术语按法语版译成变化、劣化和风化 3 类，其中劣化按程度分为微劣化、弱劣化、强劣化和劣化 4 级，括号中的译文与英语对应。

ALTERATION

Modification of the material that does not necessarily imply a worsening of its characteristics from the point of view of conservation. For instance, a reversible coating applied on a stone may be considered as an alteration.

变化

从保护的角度看，材质的改变不一定意味着文物性能的劣化。例如，对石质文物实施一次可逆性的涂层处理，可以被视作一种变化。

DAMAGE

Human perception of the loss of value due to decay.

微劣化 (损伤)

指因石材材质遭受侵蚀造成的、可被人们感知的价值损失。

DECAY

Any chemical or physical modification of the intrinsic stone properties leading to a loss of value or to the impairment of use.

弱劣化 (侵蚀)

石质内在特性的任何化学或物理改性而导致的价值损失或使用功能的损失。

DEGRADATION

Decline in condition, quality, or functional capacity.

强劣化 (损坏)

石质文物状态、质量或者功能能力性的下降。

DETERIORATION

Process of making or becoming worse or lower in quality, value, character, etc.; depreciation.

劣化

使得石质文物品质、价值、特性等变得更差、更低的过程；价值降低。

WEATHERING

Any chemical or mechanical process by which stones exposed to the weather undergo changes in character and deteriorate.

风化

露天石质文物在性质上发生变化和劣化的化学或机械过程。

ALTERATION . 变化



Common **alteration** of architectural mouldings by algae.
藻类造成的建筑造型构件表面的常见变化。

Scotland, Edinburgh, Meadows Pillars, 1992. Height of vertical face approx.300mm.Pers. Archive (ref.KP 22) / I. Maxwell
[苏格兰] 爱丁堡, 牧场石柱, 1992年。每个立面高约300毫米。个人档案(编号.KP22) / I.Maxwell

DEGRADATION . 强劣化 (损坏)



Degradation of red sandstone masonry due to defective rainwater gutter behind parapet. 挡墙后雨水排水槽失效导致的红砂岩砌体强劣化(损坏)。

Scotland, Edinburgh, Caledonian Hotel, 1991. Individual block heights approx.300mm.Pers. Archive (ref.KD 30) / I. Maxwell
[苏格兰] 爱丁堡, 卡东尼酒店, 1991年。单块石材高度约300毫米。个人档案(编号.KD30) / I.Maxwell

DAMAGE . 微劣化 (损伤)



Damage to the lower part of a sandstone grave slab resulting in loss of value. 红砂岩墓碑下部材质受损导致的墓碑价值损失。

Scotland, Edinburgh, Old Calton Cemetery, 2002. British Geological Survey E. Hyslop
[苏格兰] 爱丁堡老卡尔顿公墓, 2002年, 英国地质调查局 / E.Hyslop

DETERIORATION . 劣化



Deterioration of a Carboniferous sandstone masonry. 石炭纪砂岩砌体的劣化。

Scotland, Edinburgh, North Castle Street, 1993. Individual block heights approx.30cm, Pers.Archive (ref.OU 13) / I. Maxwell
[苏格兰] 爱丁堡, 北城堡大街, 1993年, 单块石材高度约30厘米, 个人档案(档案号.OU 13) / I. Maxwell

DECAY . 弱劣化 (损蚀)



Limestone relief showing advanced **decay**. 石灰岩浮雕展示的一定程度的劣化和损蚀。

France, Caen, Eglise Saint- Pierre, 2006. head ca. 10 cm LRMH / V. Vergèc-Belmin

[法国] 卡昂, 伊利赛圣彼艾尔, 2006年。头像尺寸约10厘米。法国历史建筑实验室 / V. Vergèc-Belmin

WEATHERING . 风化



Weathering of a Lewisian Gneiss monolith resulting from long term exposure to the elements. 长期暴露于自然环境中刘易斯片麻岩巨石形成的风化。

Scotland, Isle of Lewis, Turs-achan Stone Circle, Callanish, 1990. Width of stone approx. 1.2m . Pers. Archive (ref. GH 9) / I. Maxwell
[苏格兰] 刘易斯岛, 图尔斯卡拉尼什阿坎石圈, 卡拉尼什, 1990年。岩石宽约1.2米。个人档案(编号.GH9) / I. Maxwell

CRACK

裂隙

Definition :

Individual fissure, clearly visible by the naked eye, resulting from separation of one part from another.

定义：

由于一部分与另一部分分离而产生的、肉眼清晰可见的单个裂缝、裂隙。

Equivalent terms to be found in other glossaries :

Fissure, fault, joint.

其它术语表中可以看到的相似术语：

裂缝、断层、节理。

Sub-type(s) :

- **Fracture** : Crack that crosses completely the stone piece

- **Star crack** : Crack having the form of a star.

Rusting iron or mechanical impact are possible causes of this type of damage.

- **Hair crack** : Minor crack with width dimension < 0.1 mm

- **Craquele** : Network of minor cracks also called crack network. The term crazing is not appropriate for stone, as this term should be used for describing the development of a crack network on glazed terracotta.

- **Splitting** : Fracturing of a stone along planes of weakness such as microcracks or clay/silt layers, in cases where the structural elements are orientated vertically. For instance, a column may split into several parts along bedding planes if the load above it is too high.

子类型：

- 破裂、断裂缝：完全贯通石质本体的裂缝。

- 星状裂纹：像星星形状的裂纹。生锈的铁件或者机械碰撞可能是本类病害的形成原因。

- 发丝状裂纹：宽度小于 0.1 毫米的小裂纹。

- 网状裂纹：呈网状的细小裂纹，也叫裂隙网络。龟裂一词不适合用于石质文物，因为它是用于描述釉陶（瓷）器表面网状裂隙发展的。

- 劈裂缝：在建筑构件呈垂向时，沿微裂隙或粘土 / 淤积层等软弱面的开裂。例如，如果负重过高，石柱可能沿着其岩石层理面劈裂或断裂成几部分。

Not to be confused with :

- **Delamination**, which consists of detachment along bedding or schistosity planes, not necessarily orientated vertically. In delamination, mechanical overload is not noticeable. Delamination is transitional to splitting.

易混淆术语：

- 层状剥落，包括石材沿着层理面或片理面的剥离，不一定是垂直向的。在层状剥落中，机械负荷过重不明显。层状剥落是向劈裂发展的过渡阶段。

Other remarks :

Cracking may be due to weathering, flaws in the stone, static problems, rusting dowels, too hard repointing mortar. Vibrations caused by earth tremors, fire, frost may also induce *cracking*.

Cracks and *fractures* occurring on rock carved surfaces are usually named after the geological terminology : *joint* if there is no displacement of one side with respect to the other, *fault* if there is a displacement.

其他备注：

石材裂隙发生的原因可能是户外环境的侵蚀、岩石构造缺陷、静态受力问题、锈蚀的铁销，过硬的重砌灰泥等因素。地震引起的震动、火灾、霜冻等也可能形成裂缝。

雕刻岩石（岩画等）表面出现的裂缝和裂隙常以地质学术语命名：如裂隙两部分未见相对位移称之为节理，有相对位移的则称之为断层（线）。

CRAQUELE . 网状裂纹



Marble sculpture showing a network of thin cracks (**craquele**). 大理石雕像表面呈现的网状细裂隙（网状裂纹）。

France, Versailles, Castle Park, 2002. Large side : 0.8m. LRMH / V.Vergès-Belmin
[法国] 凡尔赛城堡花园, 2002年。大图侧边尺寸: 0.8米长。
法国历史建筑实验室 / V.Vergès-Belmin。

FRACTURE . 断裂缝



Horizontal **fracture** due to a rusted iron clamp. 铁夹件锈蚀导致的水平断裂缝。

France, Angoulême, Saint-Pierre cathedral : Western façade, central tympanum, 1974. DIA00001685 LRMH / J.P.Bozellec
[法国] 安格雷姆, 圣皮埃尔大教堂西立面, 门楣中部, 1974年。DIA00001685 法国历史建筑实验室 / J.P.Bozellec。

STAR CRACK . 星状裂纹



Star crack on sandstone resulting from corrosion and expansion of an iron fixing at the base of a grave slab. 固定底座用铁销的锈蚀和膨胀导致砂岩星状裂纹。

Scotland, Edinburgh (Old Calton Cemetery), 2002. British Geological Survey / E.Hyslop
[苏格兰] 爱丁堡 (老卡尔顿公墓), 2002年, 英国地质调查局 / E.Hyslop

HAIR CRACK . 发丝状裂纹



Vertical **Hair cracks** have developed on protruding parts located between the flutes of this column. 沿着石柱凹槽之间的边楞发育的垂直向发丝状裂纹。

Greece, Athens, 2004. KDC Olching / S.Simon
[希腊] 雅典, 2004年。(德国奥尔兴) 文物保护咨询实验室 / S.Simon。

SPLITTING . 劈裂缝



Splitting of a limestone column 石灰岩石柱的劈裂缝。

France, Vienne, Saint-André-le-Bas church, cloister, 1981. Column diameter c.15 cm. LRMH DIA00006991 / J.P.Bozellec
[法国] 韦恩, 圣安德莱-巴斯教堂, 回廊, 1981年, 石柱直径约15厘米。法国历史建筑实验室 / J.P.Bozellec

DEFORMATION
变形

Definition :

Change in shape without losing integrity, leading to bending, buckling or twisting of a stone block.

定义:

只是形状改变、导致石材发生弯曲、拱曲或者翘曲等，但没有失去其完整性。

Equivalent terms to be found in other glossaries :

Plastic deformation, bowing.

其它术语表中可以看到的相似术语:

塑性形变，弯曲。

Other remarks :

This degradation pattern mainly affects crystalline marble slabs (tombstones, marble cladding).

其他备注:

这种劣化模式主要发生于结晶大理石（墓碑，大理石片包砌层）中。

DEFORMATION . 变形



This white marble plate shows a convex **deformation**.
这块白色大理石板呈现的向外凸的弯曲变形。

France, Queyras, Ville-Vieille, 1990. Plate size 0.7 x 2 m. LRMH / V. Vergès-Belmin
[法国] 凯拉, 老城区, 1990年。石板尺寸, 0.7×2米。法国历史建筑实验室 / V. Vergès-Belmin。

DEFORMATION . 变形



The white marble plate of this XIXth century stele shows a concave **deformation**.
这块 19 世纪的白色大理石板呈现的是向外凹的弯曲变形。

France, Sélestat (Haut-Rhin), Cemetary, 1995. Plate size 0.4 x 1m. LRMH / V. Vergès-Belmin
[法国] 塞莱斯塔 (上莱茵省) 墓地, 1995 年。墓碑尺寸: 0.4×1 米。法国历史建筑实验室 / V. Vergès-Belmin。

DEFORMATION . 变形



Marble panel out of line. The convex **deformation** is visible due to oblique light.
两块大理石面板不在一个面上。这种凸起变形侧光下肉眼可见。

USA, Albany, New York, Agency Building, New York State Capitol, 2001. Approx Panel Dimensions : 90 x 90 cm. Wiss, Janney, Elstner Associates Inc. / K. Normandin, M. Petermann
[美国] 奥尔巴尼, 纽约, 州议会大厦机构大楼, 2001 年。石板大致尺寸约: 90×90 厘米。Wiss, Janney, Elstner 联营公司 / K. Normandin, M. Petermann

BLISTERING
鼓包胀裂

Definition :

Separated, air-filled, raised hemispherical elevations on the face of stone resulting from the detachment of an outer stone layer. This detachment is not related to the stone structure.

定义：

在石材表面呈现的分离的、充满空气的、半球形的凸起，往往是石材外层的剥离造成的。这种分离和脱落与石材的结构没有关系。

Other remarks :

Blistering, in some circumstances, is caused by soluble salts action.

其他备注：

某些情况下，鼓包、表皮胀破可能是可溶盐活动引发的。

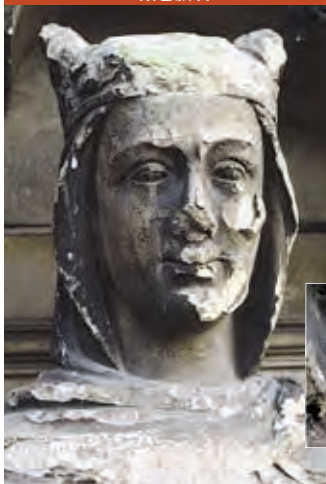
BLISTERING . 鼓包胀裂



Blistering on surface of molasse sandstone.
磨拉石（软砂岩沉积）砂岩表层的鼓包胀裂情况。

Switzerland, Lausanne, Cathedral, 2002. Field of view : ~2 cm. Princeton University / G.W. Scherer
[瑞士]洛桑, 大教堂, 2002年, 图片视域: 约2厘米。普林斯顿大学 / G.W.Scherer

BLISTERING . 鼓包胀裂



The left cheek of the limestone figure shows **blistering**.

石灰岩雕像左颊所示为鼓包胀裂病害。

France, Laon (Aisne), Notre-Dame Cathedral, western façade, 1983. DIA00010119 LRMH / C. Jaton
[法国]拉翁(埃纳省), 圣母大教堂, 西立面, 1983年. DIA00010119 法国历史建筑实验室 / C. Jaton

BLISTERING . 鼓包胀裂



Blistering of sandstone masonry caused by expansion of the weathered surface layer leading to loss of the stone surface.

由于风化表层的膨胀导致的砂岩砌体建筑表层鼓包胀裂, 导致石材表面的损失。

Scotland, Glasgow, Wellington United Free Church, 2005. British Geological Survey / E. Hyslop
[苏格兰]格拉斯哥, 惠灵顿联合独立教会, 2005年。英国地质调查局 / E. Hyslop

BURSTING
凹状破裂**Definition :**

Local loss of the stone surface from internal pressure usually manifesting in the form of an irregularly- sided crater.

定义：

由于内部压力导致的石质表层的局部损失，通常表现为边缘不规则的凹坑。

Equivalent term to be found in other glossaries :

Break out.

其他术语表中类似术语：

破裂

Not to be confused with :

- *Impact damage* : loss of material due to a mechanical impact, which may have crater shape if the object hitting the stone surface is hard and small (a bullet for instance).

易混淆术语：

- 撞击损害：机械撞击导致材质损失，如果撞击石材表面的物体又小又坚硬（例如子弹）的话，有可能形成上述凹坑。

Other remarks :

Bursting is sometimes preceded by star-shaped face-fracturing. This deterioration pattern is due to the increase of volume of mineral inclusions (clays, iron minerals, etc.) naturally contained in the stone and situated near its surface. The corrosion of metallic reinforcing elements may also induce bursting.

其他备注：

凹状破裂有时是从星状表面破裂发展而来。这种类型的病害是由于石质表层下天然所含的矿物包裹体（如粘土、铁矿物等）体积的增加引起。加固用金属构件的锈蚀也可能导致凹状破裂的发生。

BURSTING . 凹状破裂



Bursting of this limestone element was most probably due to volume expansion linked to the corrosion of the iron clamp.
这块石灰岩构件的凹状破裂，极可能是由铁夹件锈蚀后体积膨胀引起。

Portugal, Lisbon, Jeronimo Cloister, 2005. Length of stone, 50 cm.
IDK Dresden / C.Franzen
[葡萄牙] 里斯本, 杰罗尼莫修道院, 2005 年。石材长度: 50 厘米。
(德国德累斯顿) 文物诊断与保护研究所 / C.Franzen

BURSTING . 凹状破裂



Typical **bursting** at flat wall marble panel.
大理石平板墙面上典型的凹状破裂情况。

USA, Albany, New York, Agency building, New York State Capitol, 2001. Approx Panel Dimensions: 90 cm x 90 cm. Wiss, Janney, Elstner Associates Inc. / K.Normandin, M. Petermann
[美国] 奥尔巴尼, 纽约, 纽约州议会大厦, 机构大楼, 2001 年。石板尺寸约为: 90×90 厘米。Wiss, Janney, Elstner 联合有限公司 / K.Normandin, M.Petermann

BURSTING . 凹状破裂



Bursting due to corrosion and expansion of a metal fixing at the base of a sandstone grave slab.
砂岩墓碑底部金属固定件锈蚀和膨胀导致的凹状破裂。

Scotland, Edinburgh, Old Calton Cemetery, 2002. British Geological Survey / E.Hyslop
[苏格兰] 爱丁堡, 老卡尔顿公墓, 2002 年, 英国地质调查局 / E.Hyslop

DELAMINATION

层状剥落

Definition :

Detachment process affecting laminated stones (most of sedimentary rocks, some metamorphic rocks). It corresponds to a physical separation into one or several layers following the stone laminae. The thickness and the shape of the layers are variable. The layers may be oriented in any direction with regards to the stone surface.

定义：

这种分离、层离脱落过程影响着薄层结构岩石（绝大多数为沉积岩，以及部分变质岩）。它对应于沿着薄层结构岩石的一层或多层形成的物理分离。这些分层或层离的厚度和形状是可变的。与石材表面有关，这些分层的走向可以朝向任何方向。

Equivalent term to be found in other glossaries :

Layering.

其他术语表中类似术语：

分层。

Sub-type(s) :

- **Exfoliation** : detachment of multiple thin stone layers (cmscale) that are sub-parallel to the stone surface. The layers may bend or twist in a similar way as book pages.

子类型：

- 页状（多层）剥落：与石材表面平行的多层重薄层状岩石（厘米级别）的分离、剥落。这些分离的岩层可能像书页一样的弯曲或扭曲。

Not to be confused with :

- *Scaling*: kind of detachment totally independent of the stone structure.

易混淆术语：

- 鳞片状剥落：一种完全与石材结构无关、独立的表面剥落。

Other remarks :

Efflorescences and *biological colonization* can be detected in-between the laminae.

其他备注：

在薄层状岩石中，可能会检测到盐霜和生物侵蚀。

DELAMINATION . 层状剥落



Delamination of a sandstone gravestone possibly resulting from frost action.
一块砂岩墓碑的层状剥落，很可能是由霜冻造成的。

Scotland, Brechin, Angus,
Brechin Cathedral Graveyard,
1991. C.1 meter wide slab.
Personal archive Ref IW 31 / I.
Maxwell
[苏格兰] 布里金，安格斯，
布里金教堂墓地，1991 年。
墓碑宽度约 1 米，个人档案号
RefIW31/ I.Maxwell

DELAMINATION . 层状剥落



Delamination of a sandstone element
一处砂岩构件的层状剥落。

India, Fathepur Sikri, 2003. Stone width
: c.50 cm.LRMH / V. Vergès-Belmin
[印度] 法特普尔·西克里，2003 年。
石构件宽度：约 50 厘米。法国历史建
筑实验室 / V. Vergès-Belmin

EXFOLIATION . 页状（多层）剥落



Sandstone **exfoliation**. This subtype of delamination is characterised by a detachment of multiple thin stone layers sub-parallel to the stone surface.
砂岩的页状（多层）剥落。这种分层脱落的子类型特征是多重薄层石材的分离、剥落，与岩石表面近似平行。

Germany, Zeitz, Cathedral, 1992. Stone width : c. 40 cm. Geol.Inst.Aachen
Univ/B.Fitzner
[德国] 塞特兹，大教堂，1992 年。石材宽度：约 40 厘米，亚琛大学地质研究所 / B.
Fitzner

DISINTEGRATION

颗粒状剥落

Definition :

Detachment of single grains or aggregates of grains.

Relationship with the substrate :

It affects only the surface of the stone or can occur in depth. Damage generally starts from the surface of the material. On crystalline marble, *granular disintegration* may reach several centimeters in depth, sometimes more.

Equivalent terms to be found in other glossaries :

Loss of cohesion, incoherence, decohesion, friability, disaggregation, intergranular incoherence, pulverization.

Sub-type(s) :

- **Crumbling** : Detachment of aggregates of grains from the substrate. These aggregates are generally limited in size (less than 2 cm). This size depends on the nature of the stone and its environment.

- **Granular disintegration** : Occurs in granular sedimentary (e.g. sandstone) and granular crystalline (e.g. granite) stones. *Granular disintegration* produces debris referred to as rock meal and can often be seen accumulating at the foot of a wall actively deteriorating. If the stone surface forms a cavity (*coving*), the detached material may accumulate through gravity on the lower part of the cavity. The grain size of the stone determines the size of the resulting detached material. The following specific terms, all related to *granular disintegration*, refer either to the size, or to the aspect of corresponding grains :

. **Powdering, Chalking** : terms sometimes employed for describing granular disintegration of finely grained stones.

. **Sugaring** : employed mainly for white crystalline marble,

. **Sanding** : used to describe granular disintegration of sandstones and granites.

Other remarks :

In the case of crystalline marbles, thermal stresses are known to be among the main causes of *granular disintegration*, thus leading occasionally to deformation patterns.

Stones may display deterioration patterns intermediate between *granular disintegration* and *crumbling, scaling* or *delamination*.

Partial or selective *granular disintegration* often leads to surface features such as *alveolization* or *rounding*. When occurring inside crystalline marble, *granular disintegration* may lead to *deformation* patterns.

定义：

石材的单个颗粒或颗粒团聚体的剥离、脱落。

与基底层的关系：

一般只影响石材表面，也可能发生在石材深处。破坏作用一般开始于材料的表面。对结晶大理石，粒状剥落可能会有几个厘米的深度，甚至更深。

术语表中类似词汇：

黏结力缺失，无黏结力，结合破坏、松散、崩解、颗粒间松散、粉化。

子类型：

- 碎屑状剥落：颗粒团聚体从石材基底上剥落。这些颗粒团聚体一般粒径都有限（小于2厘米）。其大小主要取决于石材的性能和保存环境。

- 粒状剥落：发生在粒状沉积岩（如砂岩）和粒状结晶岩（如花岗岩）上。粒状剥落会产生被称为石粉的残渣，经常可以在劣化作用活跃墙体的墙根看到它们的堆积。如果石质表面已形成了孔洞或空腔，脱落的石粉在重力的作用下会慢慢堆积在这些孔洞或凹窝的低部。石材粒度决定着这些脱落物质的大小。下面的几个具体术语，都与粒状剥落有关，不仅与颗粒的大小，还与颗粒的特性有关：

. 粉化：这个术语有时用来描述细粒岩石的粒状剥落。

. 砂糖化：主要用于描述白色结晶大理石的粒状剥落。

. 沙化：用于描述砂岩和花岗岩的粒状剥落。

其他备注：

对于结晶大理石而言，热应力被认为是造成粒状剥落的主要原因之一，有时候也会导致变形劣化。

石材可能会表现出介于粒状剥落和碎屑状剥落之间、鳞片状剥落和层状剥落之间的劣化模式。

部分或有选择性的粒状剥落会在石材表层引发表面形貌劣化现象，例如表面凹窝状侵蚀或磨圆。当发生在结晶大理岩内部时，粒状剥落可能也会引起变形的劣化模式。

POWDERING . 粉化



This limestone element shows **powdering**, appearing as whiter zones with an irregular surface aspect.
这件石灰岩构件呈现的粉化，表现为白色的、表面不规则的特征。

France, Poitiers, Notre-Dame-la-Grande church, 1993.
Head size: c. 20 cm. LRMH/D.Bouchardon
[法国] 普瓦捷, 圣母大教堂, 1993, 头部尺寸: 20cm。
法国历史建筑实验室 / D.Bouchardon

SUGARING . 砂糖化



Sugaring developing on the head of a marble sculpture. 大理石雕像头部出现的砂糖化。

Germany, Munich, ropyläen, P Königsplatz, Tympanon. KDC Olching / S. Simon
[德国] 慕尼黑, 国王广场。(德国奥尔兴) 文物保护咨询实验室 / S.Simon

SANDING . 沙化



Sanding of a coarse grained granite. 粗粒花岗岩的沙化剥落。

Portugal, Évora, Cathedral, 2005. LNEC/J.Delgado Rodrigues.
[葡萄牙] 埃武拉, 大教堂, 2005年。国家土木工程实验室 / J.Delgado Rod-rigues

CRUMBLING . 碎屑状剥落



Crumbling of a crystalline marble. 结晶大理石表面的屑状剥落。

Czech Republic, Nedvedice, South Moravia, Pernstejn Castle, 2005. Area about 150cm². National Heritage of the Czech Rep./ D. Michoinova
[捷克共和国] 内德维迪采, 南摩拉维亚, 佩恩什特因古堡, 2005年。照片区域约150cm²。捷克共和国国家文化遗产 / D.Michoinova

SUGARING . 砂糖化



Typical **sugaring** or loosening of the calcite crystals at the surface of the marble. 大理石表面典型的砂糖化或方解石晶体的松动。

USA, Albany, New York, Agency Building, New York State Capitol, 2001. Photo size: 10 cm width / Wiss, Janney, Elstner Associated Inc. / K.Normandin, M.Petermann
[美国] 奥尔巴尼, 纽约州, 机构大楼, 纽约州政府, 2001年。图片尺寸: 宽度10cm。Wiss, Janney, Elstner 联合有限公司 / K.Normandin, M.Petermann

FRAGMENTATION

片状剥落

Definition :

The complete or partial breaking up of a stone, into portions of variable dimensions that are irregular in form, thickness and volume.

定义：

石材整个或部分破裂成形状不规则、厚度和体积大小不同的部分。

Equivalent term to be found in other glossaries :

The substrate remains apparently sound on both sides of the detachment plane. *Fragmentation* may occasionally affect the entire stone block, and may follow discontinuity planes.

其他术语表中相关术语：

从已脱落部分的两个面看，石材基层明显保持完好。片状剥落偶尔可能会影响整块石材，也可能由此产生不连续的层面。

Sub-type(s) :

- **Splintering** : Detachment of sharp, slender pieces of stone, split or broken off from the main body.
- **Chipping** : Breaking off of pieces, called chips, from the edges of a block.

子类型：

- 尖细片状：是石材基体开裂或折断而脱落下来的尖锐、细长的石块碎片。
- 削片状：从石材边缘断裂的碎片，称为削片。

Other remarks :

Fragmentation may be found when stone blocks are subjected to an overload. Upper parts as well as lower parts of monolithic columns are particularly prone to chipping and splintering (large weight supported by a small area).

其他备注：

当石材承重过大时可能会出现片状剥落的情况。单体石柱的上部和下部特别容易发生削片状和尖细断片剥落的劣化模式（小的面积支撑大的重量）。

SPLINTERING . 尖细片状



The **splintering** of this limestone block has resulted in a succession of cupule-like depressions on the stone surface.
这块石灰岩石料的尖细片状剥落导致在石材表面形成了一连串的丘疹状凹陷。

Egypt, Karnak temple, block fields, KDC Olching / S.Simon
[埃及] 卡纳克神庙, 石料场。德国奥尔兴文物保护咨询实验室 / S.Simon

FRAGMENTATION . 片状剥落



Fragmentation of the upper part of a monolithic limestone column.
石灰岩单体石柱上部的片状剥落。

France, Saint-Benoît-sur-Loire, 1996. Fracture length :30cm. CICRP/P.Bromblet
[法国] 圣博努瓦卢瓦尔大教堂, 1996年。断裂长度: 30cm。(法国马赛)文化遗产保护与修复跨学科研究中心 / P.Bromblet

CHIPPING . 削片状



Limestone, **chipping** (final state). Chipping occurred under high compression, after the replacement of the lower block of the column.
石灰石, 削片状(最终状态)。石柱下部石块更换后, 在高压下产生的削片状脱落。

Belgium, Leuven (Louvain), 2005. Height of the stone blocks : 40 to 50 cm. TNO / R.Van Hees.
[比利时] 鲁汶, 2005年。石块高度: 40~50厘米。荷兰应用科学研究组织 / R.Van Hees

FRAGMENTATION . 片状剥落



Fragmentation of a dense limestone slab exposed on the church exterior wall.
暴露在教堂外墙上的致密石灰岩石板的片状剥落。

Germany, Munich, 1998. Picture 60 cm width approximately. LNEC /J. Delgado Rodrigues
[德国] 慕尼黑, 1998。照片视域宽约60厘米。葡萄牙国家土木工程实验室 / J. Delgado Rodrigues

CHIPPING . 削片状



Soft limestone, **chipping** due to overload on the structure supporting a balcony.
软石灰岩, 由于支撑阳台的石材构件承重过大, 形成的削片、削块状脱落现象。

Malta, Valletta, 2006. Small side of the photo: c. 2m. V.Vergès-Belmin
[马耳他] 瓦莱塔, 2006年, 小幅照片视域约2m。法国历史建筑实验室 / V.Vergès-Belmin



PEELING

表层剥落

Definition :

Shedding, coming off, or partial detachment of a superficial layer (thickness : submillimetric to millimetric) having the aspect of a film or coating which has been applied on the stone surface.

定义：

在石材表面实施过薄膜或涂层处理，表面层（厚度：亚毫米级到毫米级）发生的剥落、脱落，或者局部剥落的现象。

Equivalent term to be found in other glossaries :

Peeling off.

其他术语表中类似术语：

起翘脱落。

Not to be confused with :

- *Blistering*, which is associated with a dome-like morphology.
- *Scaling*, which is related to the detachment of stone layers (thickness : millimetric to centimetric).

易混淆术语：

- 鼓包胀裂：一般与半球形的形貌特征相关联。
- 鳞片状剥落：一般与石材的层状剥离（厚度：毫米到厘米级）相关联。

PEELING . 表面层剥落



Peeling of a surface layer on a limestone element.
石灰岩构件表面层的表面层剥落。

France, Chartres, Cathedral, northern portal, 2005. Size of the figure : c. 15 cm. LRMH / V. Vergès-Belmin
[法国] 沙特尔, 大教堂, 北入口, 2005年。雕像尺寸: 约15厘米。
法国历史建筑实验室 / V. Vergès-Belmin



PEELING . 表面层剥落



Peeling linked to salt crystallization at the surface of a magnesian limestone.
与含镁石灰岩表层盐结晶有关的表面层剥落。

Portugal, Coimbra, Largo de Santa Clara, 2004. LRMH / Véronique Vergès-Belmin
[葡萄牙] 科英布拉, 圣克拉拉湖, 2004年。法国历史建筑实验室 / V. Vergès-Belmin



SCALING
鳞片状剥落**Definition :**

Detachment of stone as a scale or a stack of scales, not following any stone structure and detaching like fish scales or parallel to the stone surface. The thickness of a scale is generally of millimetric to centimetric scale not following any stone structure and detaching like fish scales or parallel to the stone surface. The thickness of a scale is generally of millimetric to centimetric scale, and is negligible compared to its surface dimension.

定义：

像鳞片或一堆鳞片状的剥离，完全与石材结构无关，像鱼鳞一样或者平行石质表面剥落。鳞片状剥落的厚度一般在毫米级到厘米级，与表面尺寸相比可以忽略不计。

Relationship with the substrate :

The plane of detachment of the scales is located near the stone surface (a fraction of millimeters to several centimeters).

与基底层的关系：

鳞片状剥落的脱落面位置靠近石材表面（一小部分为毫米到几个厘米）。

Equivalent term to be found in other glossaries :

Desquamation, Scale, plaque or plaquette describe exclusively the features, and not the process.

其他术语表中类似术语：

类似的脱落、鳞片脱落、斑块状或小斑块状脱落等，是专门描述形貌而非过程的术语。

Sub-type(s) :

- **Flaking** : scaling in thin flat or curved scales of submillimetric to millimetric thickness, organized as fish scales.
- **Contour scaling** : scaling in which the interface with the sound part of the stone is parallel to the stone surface. In the case of flat surfaces, contour scaling may be called **spalling**. *Case hardening* is a synonym of *contour scaling*.

子类型：

- 薄片状剥落：薄而扁平或略带弧度的鳞片状剥落，薄片厚度为亚毫米到毫米级，组织结构像鱼鳞一样。
- 轮廓线剥落：剥落层和石材完好部分的交界面与石材表面平行。在石材表面呈平坦状时，可以称为层裂。表层硬化也可看做是等轮廓线剥落的同义词。

Not to be confused with :

- **Delamination** : corresponds to a detachment following the bedding or shistosity planes of a stone.

易混淆术语：

- 层状剥落：对应于沿石材本身沉积层理面或片理面的剥离、脱落情况。

SCALING . 鳞片状剥落



Detached contour **scaling** 4 mm thick on sandstone block base course.
在砂岩基底上形成的 4 毫米厚的沿轮廓线状的剥落。
Scotland, Stirling Castle Esplanade, Stirling, Robert Bruce Monument, 1993. Incised letters c.35mm high. Pers. Archive Ref OW 5/I.Maxwell
[苏格兰]斯特灵城堡大道, 斯特灵, 罗伯特布鲁斯纪念碑, 1993 年。碑上凿刻字母约 35 毫米高。个人档案号 OW 5/I.Maxwell

SCALING . 鳞片状剥落



Contour scaling, developing on a magmatic stone element (Kersanton).
发育在一个岩浆岩(云斜煌岩)构件表面的沿轮廓线状的剥落。

France, Brittany, La Martyre, Saint-Salomon church, 1984. Scale thickness : 1-2 cm . LRMH DIA00011326 / J.-P. Bozellec
[法国]布列塔尼, 殉难者, 圣所罗门教堂, 1984 年。剥落层厚度: 1-2 厘米。法国历史建筑实验室, DIA00011326/J.-P. Bozellec

CONTOUR SCALING . 轮廓线状剥落



Contour scaling developed as thin detachments on the face of the figure.
在雕像脸部、像薄层一样的沿轮廓线状的剥落。

Austria, Vienna, Saint-Stephen Cathedral, calcareous sandstone (Breitenbrunner). Bundesdenkmalamt, Vienna / Atelier E. Pummer, Wachau & J. Nimmrichter
[奥地利]维也纳, 圣史蒂芬大教堂, 钙质砂岩(布雷滕布伦纳)。国家古迹遗址办公室, 维也纳 / Atelier, E. Pummer, Wachau & J. Nimmrichter

SPALLING . 层裂



Some of the flat dimension stones show complete or partial **contour scaling**, which may be called here **spalling**.
有些维度上平坦的石材呈现出的全部或部分轮廓线状剥落, 这里也可以称作层裂。

France, Bouzonville (Moselle), abbatial church, 2004. LRMH / J.-D. Mertz
[法国]布宗维尔(摩泽尔省), 修道院教堂, 2004 年。法国历史建筑实验室 / J.-D. Mertz

FLAKING . 薄片状剥落



Sandstone block contaminated with sodium chloride. Salt crystallization induces granular disintegration and scaling of the stone. As scales are very thin, the degradation pattern is also called **flaking**.
砂岩石材表面受氯化钠的污染。盐分的结晶引起了石材的粒状剥落和鳞片状剥落。由于这种鳞片层非常薄, 这种劣化模式也被称作薄片状剥落。

France, Dieuze (Moselle) Salines Royales, bâtiment de la délivrance, 2002. Large side : 0.4 m. LRMH / V. Vergès-Belmin
[法国]迪约兹(摩泽尔省)皇家盐库, 食盐储运站, 2002 年。大边尺寸: 0.4 米。法国历史建筑实验室 / V.Vergès-Belmin

ALVEOLIZATION 表层凹窝

Definition :

Formation, on the stone surface, of cavities (alveolus) which may be interconnected and may have variable shapes and sizes (generally centimetric, sometimes metric).

定义：

在石材表面、由形状和大小不等（一般为厘米级，有时公尺级）、可能相互连接的腔、洞（肺泡状、蜂窝状）组成。

Equivalent terms to be found in other glossaries :

Alveolar erosion, alveolar weathering, honeycomb.

其他术语中的相近词：

肺泡状侵蚀，肺泡状风化，蜂巢状风化。

Other spelling :

Alveolisation

其他拼写：

Sub-type(s) :

- **Coving** : erosion feature consisting in a single alveole developing from the edge of the stone block.

子类型：

- 局部凹窝：由从石材边缘发育的单个肺泡状凹窝组成的侵蚀形貌。

Not to be confused with :

- *Microkarst* : refers to a network of millimetric to centimetric interconnected depressions, clearly linked to a dissolution process.

易混淆词汇：

- 微溶蚀：为毫米级至厘米级相互连接的网状坑窝，明显地和溶解过程有关。

- *Pitting* : corresponds to the formation of point-like millimetric to submillimetric pits, generally not connected, on a stone surface.

- 点蚀坑：石材表面对应于形成点状、毫米级至亚毫米级的小凹坑，一般这些点状小凹坑相互不连通。

Other remarks :

Alveolization is a kind of differential weathering possibly due to inhomogeneities in physical or chemical properties of the stone. *Alveolization* may occur with other degradation patterns such as *granular disintegration* and/or *scaling*. In those particular cases in which *alveolization* develops mainly in depth in a diverticular manner, it can be referred to as *vermicular alveolization*. In arid climates large size alveolus of meter size are frequently formed (e.g. Petra, Jordan).

其他备注：

表层凹窝是差别风化的一种，可能归因于石材物理和化学性质的不均一。表面凹窝可能会伴随其他劣化模式一起发生，比如粒状剥落和 / 或鳞片状剥落。在那些表层凹窝以支囊的方式主要向纵深的发展特殊例子中，可以称之为蠕虫状表层凹窝。在气候干燥地区，经常会形成以米计量的大尺寸表层凹窝（例如约旦佩特拉遗址）。

COVING . 局部凹窝

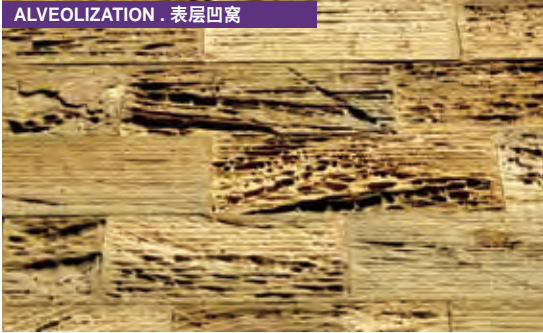


Disaggregation of individual geologically weaker sandstone blocks due to the consequential effect of repointing the joints and beds with a too hard and durable cementitious mortar. As a result, a single alveole (**coving**) has developed from the sides of the block.

由于石块间、石块和基底层间重新用过硬和耐久水泥砂浆接缝、固定，随之而来的影响使得个别地质学上的弱砂岩石材发生瓦解，结果使得从石块侧面开始发育成单体凹窝。

Scotland, Arbroath, Angus, Arbroath Abbey, 1992. Individual stone bed heights. 20 cm. Pers. Archive Ref MQ 14 / I. Maxwell
[苏格兰] 阿布罗斯, 安布斯, 阿尔布罗德修道院, 1992 年。单块石材基层厚约 20 厘米。个人档案号 Ref MQ 14 / I. Maxwell

ALVEOLIZATION . 表层凹窝

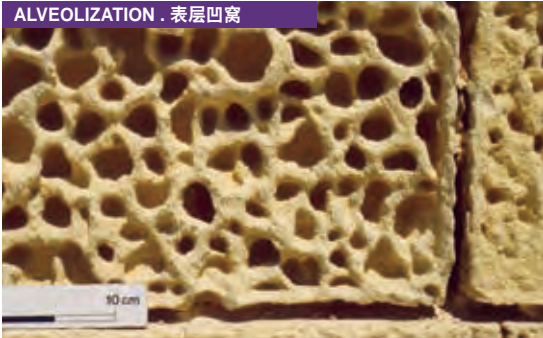


Alveolization develops here as cavities illustrating a combination of honeycombs and alignments following the natural bedding planes of the sandstone.

这里是以腔、洞的形式发育的表层凹窝，呈现了蜂巢状凹槽和沿砂岩的自然层理面排列的组合。

Scotland, Culzean, Ayrshire, Culzean Castle entrance gates, 1993. Individual stone bed heights Ca 200-250mm. Pers. archive Ref PB 35 / I. Maxwell
[苏格兰] 卡尔津城堡, 埃尔郡, 卡尔津城堡入口, 1993 年。单体石材基层高度约 20-25 厘米。个人档案号 Ref PB 35 / I. Maxwell

ALVEOLIZATION . 表层凹窝



Alveolization of a porous limestone.
多孔性石灰岩上的表层凹窝。

Malta, Rabat-Gozo, Citadel, 1994. Geol. Inst. Aachen University / B. Fitzner
[马耳他] 拉巴特戈佐, 城堡, 1994 年。亚琛大学地质学院 / B. Fitzner

ALVEOLIZATION . 表层凹窝



Deep **alveolization** of a sandstone block.
砂岩石材深度发育的表层凹窝。

Italy, South Tyrol, Terlano/Terlan, Maria Himmelfahrt/Maria Assunta, Sandstone, 2000. Length of stone, 80 cm. IMP Uni Innsbruck / C. Franzen
[意大利] 南蒂罗尔、特兰诺 / 特兰, 玛丽亚希梅尔法 / 玛丽亚亚松塔, 砂岩, 2000 年。石材长度 80 厘米。因斯布鲁克 IMP 大学 / C. Franzen

EROSION 侵蚀

Definition :

Loss of original surface, leading to smoothed shapes.

Equivalent terms to be found in other glossaries :

Loss of material is a very general expression that refers to any loss of original surface, which can be due to a variety of reasons such as *granular disintegration*, *scaling* etc. This term is too vague and should not be used.

Sub-type(s) :

- Differential erosion : to be preferred to *differential deterioration* : occurs when erosion does not proceed at the same rate from one area of the stone to the other. As a result, the stone deteriorates irregularly. This feature is found on heterogeneous stones containing harder and/or less porous zones. It may also occur as a result of selective lichen attack on calcitic stones. Differential erosion is generally found on sedimentary and volcanic stones. Differential erosion is synonymous with *relief formation*, i.e. the formation of irregularities on the stone surface.

Differential erosion may result *in loss of components or loss of matrix of the stone* :

- **Loss of components** : Partial or selective elimination of soft (clay lenticles, nodes of limonite, etc) or compact stone components (pebbles, fossil fragments, geological concretions, lava fragments).

- **Loss of matrix** : Partial or selective elimination of the stone matrix, resulting in protruding compact stone components.

- **Rounding** : Preferential erosion of originally angular stone edges leading to a distinctly rounded profile. Rounding can especially be observed on stones which preferably deteriorate through granular disintegration, or when environmental conditions favor granular disintegration.

- **Roughening** : Selective loss of small particles from an originally smooth stone surface. The substrate is still sound. Roughening can appear either progressively in case of long term deterioration process (for instance in case of granular disintegration), or instantaneously in case of inappropriate actions, such as aggressive cleaning.

Other remarks :

Erosion may have natural and /or anthropogenic causes. It can be due to chemical, physical or/and biological processes.

定义：

石材原始表面损失、导致石刻造型或纹饰等被磨平。

其他术语中的相近词：

物质损失是有关原始表面损失非常普遍的表述方式，它可能是由许多原因引起的，比如粒状剥落、鳞片状剥落脱落等。因这一术语太模糊了，故而不应再使用。

子类型：

- 差异侵蚀：用差异劣化表述更合适：发生在石材某一区域和其他区域的侵蚀速度不同时。结果导致了石材的不规则劣化。这一形貌特征经常可以在含坚硬和 / 或孔隙较小区域的非均质石材上观察到。这也可能是有选择力的地衣侵蚀钙化性结石时造成的结果。差异侵蚀一般发生在沉积岩和火山岩石材上。差异侵蚀是浮雕形貌的同义词，例如石材表面不规则形貌的形成。

差异侵蚀可能导致石材成分或石材基质的损失。

- 成分损失：软石（黏土透镜体、褐铁矿节点等）或致密石成分（鹅卵石、化石碎片、地质凝固石、熔岩碎片）的部分或选择性损失。

- 基质损失：石材基质的部分或选择性损失，导致致密石材成分的凸出。

- 磨圆：原有棱角石材边缘的选择性侵蚀导致其明显的变圆。石材本身有粒状剥落倾向、或环境条件有利于粒状剥落时更易于观察到磨圆。

- 粗糙化：石材原始光滑表面选择性的小颗粒损失，其基底还仍然完好。粗糙化既可能形成于长期侵蚀过程的积累（比如在粒状剥落情况下），也可能因不恰当的行为短时间形成，比如侵蚀性的清洗。

其他备注：

侵蚀可能有自然和 / 或人为的原因。这可能是由于化学、物理或 / 和生物过程造成的。

LOSS OF MATRIX . 基质损失



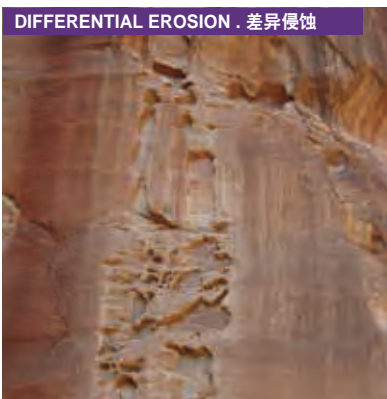
Differential erosion of a fossil bearing limestone block due to **loss of matrix**.

含化石石灰岩石材因基质损失而发生的差异侵蚀。

Malta, Valletta, old town, 2003. LRMH / V. Vergès-Belmin

[马耳他] 瓦莱塔, 古镇, 2003年。法国历史建筑实验室 / V.Vergès-Belmin

DIFFERENTIAL EROSION . 差异侵蚀

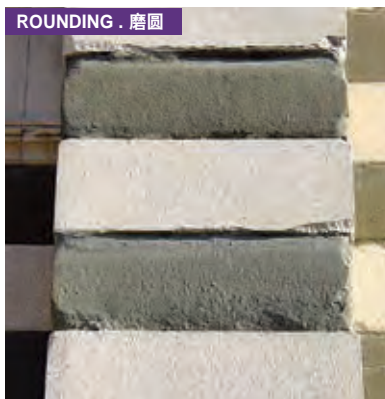


Differential erosion in the sandstone Petra cliffs.

佩特拉岩壁砂岩的差别侵蚀。

Jordan, Petra, 2004. Photo 4–5m in height. LNEC / J. Delgado Rodrigues
[约旦] 佩特拉, 2004年。照片位置高度4-5米。葡萄牙国家土木工程实验室 / J. Delgado Rodrigues

ROUNDING . 磨圆

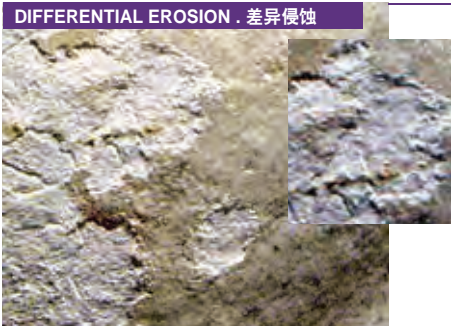


Rounding of Serena sandstone due to preferential deterioration of edges close to the joints.

塞雷纳砂岩沿接缝部位边缘优先劣化而形成的磨圆。

France, Marseille, Cathédrale Nouvelle Major, 2006. Size of each block : 40x80cm. LRMH/V. Vergès-Belmin
[法国] 马赛, 新主教座堂, 2006年。石材尺寸 40x80厘米。法国历史建筑实验室 / V.Vergès-Belmin

DIFFERENTIAL EROSION . 差异侵蚀



Differential erosion on a marble sculpture visible after treatment with a biocide and gentle brushing. 在大理石雕塑上温和涂刷杀虫剂后可见的差异侵蚀。

Portugal, Queluz Palace, 2003. Width of the sculpture : ca. 60cm. LNEC / J. Delgado Rodrigues
[葡萄牙] 奎鲁兹宫, 2003年。雕塑宽度约60厘米。葡萄牙国家土木工程实验室 / J. Delgado Rodrigues

EROSION . 侵蚀



The **erosion** of this limestone sculpture results in loss of carved details, and smoothed shapes. 侵蚀导致的这尊石灰岩雕刻细节的损失和表面的平滑。

France, Rouen, cathedral. LRMH / P. Bromblet
[法国] 鲁昂, 大教堂。法国历史建筑实验室 / V.Vergès-Belmin

LOSS OF COMPONENT . 成分损失



Loss of iron-rich component in a sandstone block. 富铁砂岩石材上的成分损失。

Scotland, Edinburgh, Carlton Hill Observatory, 2007. LRMH / V. Vergès-Belmin
[苏格兰] 爱丁堡, 卡尔顿山天文台, 2007年。法国历史建筑实验室 / V.Vergès-Belmin

MECHANICAL DAMAGE
机械损伤

Definition :

Loss of stone material clearly due to a mechanical action.

定义：

明显地由机械作用引起的石质材料的损失。

Sub-type(s) :

- **Impact damage** : Mechanical damage due to the impact of a projectile (bullet, shrapnel) or of a hard tool.
- **Cut** : Loss of material due to the action of an edge tool. It can have the appearance of an excavated cavity, an incision, a missing edge, etc...Tool marks can be considered as special kinds of cuts but should not be considered as damage features.
- **Scratch** : Manually induced superficial and line-like loss of material due to the action of some pointed object. It can be accidental or intentional. Usually it appears as a more or less long groove. Tool marks can have the appearance of scratches, but should not be taken as damage features.
- **Abrasion** : Erosion due to wearing down or rubbing away by means of friction, or to the impact of particles.
- **Keying** : Impact damage resulting from hitting a surface with a pointed tool, in order to get an irregular surface which will assist the adhesion of an added material, a mortar for instance.

子类型：

- 撞击损伤：弹丸（炮弹、子弹等）或坚硬工具撞击形成的机械损伤。
- 切、割、削：使用有刃的利器导致的物质损失。它可能以挖凿的空腔、切口，残缺的边缘等形貌出现。石质表面的凿刻痕迹可以看做是一种特殊的切削类型，但是不能被认定为形貌特征的破坏。
- 刮擦：人工使用尖锐物体造成的石质浅表层、线状的物质损失。刮擦可以是偶然的或故意的。通常呈现出或多或少的长形凹槽。石质表面的凿刻痕迹感官上很像刮擦，但是不能被认定为形貌特征的破坏。
- 磨损、擦伤：由于磨损或磨擦磨掉，或颗粒物冲击造成的侵蚀现象。
- 刮、凿、刺：如为了获得有助于增大例如砂浆等添加材料粘结力的不规则表面，使用尖头工具撞击石材表面形成的冲击损伤。

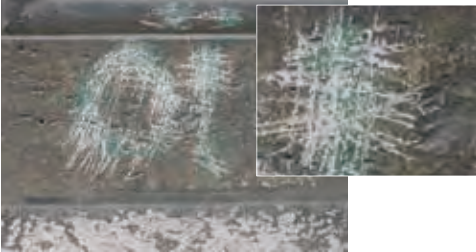
Other remarks :

In most cases *mechanical damage* has an anthropogenic origin.

其他备注：

在大多数情形下，机械损伤是人为引起的。

SCRATCH . 刮擦



Mechanical damage due to series of scratches on a limestone element.
一系列划痕在石灰岩构件上造成的机械损伤。

France, Chartres, Cathédrale, 2005. LRMH / V.Vergès-Belmin
[法国]沙特尔, 大教堂, 2005年。法国历史建筑实验室 / V.Vergès-Belmin

IMPACT DAMAGE . 撞击



Impact damage on a limestone ashlar, due to a bullet.
一颗子弹在石灰岩琢石砌面上的撞击损伤。

Lebanon, Baalbek quarry, small building, 2000. LRMH / V. Vergès-Belmin
[黎巴嫩]巴尔拜克采石场, 小型建筑, 2000年。法国历史建筑实验室 / V.Vergès-Belmin

KEYING . 刮、刺



Soft limestone showing **impact damage**. These **keying** marks were made to facilitate the adhesion of a render, which was later removed or has fallen off.
软石灰岩出现撞击损伤, 这些凿刻痕迹是为了便于粉灰泥层的附着, 原来的粉灰泥层已经被铲除或自然掉落了。

Malta, Valletta, 2006. LRMH / V. Vergès-Belmin
[马耳他]瓦莱塔, 2006年。法国历史建筑实验室 / V.Vergès-Belmin

CUTS . 切削



Cuts in a sandstone wall, most probably due to knife whetting.
砂岩砌筑墙面的切削特征, 很可能是(人为)磨刀造成的。

Scotland, Stirling Castle, 2007. LRMH / V. Vergès-Belmin
[苏格兰]斯特灵城堡, 2007年。法国历史建筑实验室 / V.Vergès-Belmin

ABRASION . 摩擦



The repeated **abrasion** effect of feet has led to the formation of a depression on this stone pavement element.

步行脚踏、重复摩擦造成的铺石路面的磨损和坑洼。

Italy, Tschars, South Tyrol, Pfarrkirche, 2001. IMP Uni., Innsbruck / C. Franzen
[意大利]特查斯, 南蒂罗尔, 普法尔基什, 2001年。因斯布鲁克 IMP 大学 / C. Franzen

MICROKARST

微溶蚀

Definition :

Network of small interconnected depressions of millimetric to centrimetric scale, sometimes looking like hydrographic network. Microkarst patterns are due to a partial and/or selective dissolution of calcareous stone surfaces exposed to water run-off.

定义：

毫米级至厘米级的细小、相互连通的网状凹坑，有时看起来像水文网络。微溶蚀模式是由于钙质石材表面在有水流动时其部分溶解和 / 或选择性溶解造成的。

Equivalent terms to be found in other glossaries :

Karst, dissolution, cratering. This last term refers to bricks, not to stone.

其他术语中的相近词：

岩溶、溶解、坑穴，最后这个术语常用于砖材而不是石材。

Not to be confused with :

- *Alveolization*, the depressions of which are similar in shape but bigger in size (centimetric scale) and are not systematically interconnected. Alveolization may be due to selective degradation by salts, whereas microkarst is exclusively linked to an obvious dissolution process.

- *Pitting* : point like, usually not interconnected, millimetric or submillimetric cavities.

易混淆词汇：

- 表面凹窝：在表面凹陷的形貌上相似，但在尺度上更大一些（厘米尺度），这些凹陷部位没有相互联通。表面凹窝可能是由于盐的选择性侵蚀，而微岩溶则是完全的与明显的溶解过程有关。

- 点蚀：点状、一般相互不连通的毫米级或次毫米级的腔、洞。

Other remarks :

There is no trace of any *granular disintegration* or *scaling* on the stone surface.

其他备注：

石材表面没有任何粒状剥落或鳞片状剥落的痕迹。

MICROKARST . 微溶蚀



Microkarst developed on a limestone sculpture.
发育在石灰岩雕塑上的微溶蚀。

Turkey, Nemrud Dag 2002. Head of a statue (Apollo), Height of the image : c. 60 cm. Geol. Inst., Aachen University / B. Fitzner [土耳其] 纳姆鲁德达哥, 2002 年。(阿波罗) 雕像头部, 头像高度约 60 厘米。亚琛大学地质学院 / B.Fitzner

MICROKARST . 微溶蚀



Microkarst developed on the base of a chalk column particularly exposed to weather.
暴露在户外环境的白垩岩质圆柱底部产生的微溶蚀。

France, Amiens, Cathedral, western façade, 1992. LRMH / V. Vergès-Belmin [法国] 亚眠, 大教堂, 西立面, 1992 年。法国历史建筑实验室 / V.Vergès-Belmin

MISSING PART

残缺部分

Definition :

Empty space, obviously located in the place of some formerly existing stone part. Protruding and particularly exposed parts of sculptures (nose, fingers) are typical locations for material loss resulting in missing parts.

定义：

在以前明显有石材部位存在的缺失。雕像的凸出部位，尤其是外露部位（鼻子、手指）是典型的易发生物质损失的位置，从而形成局部残缺。

Equivalent terms to be found in other glossaries :

Lacuna.

其他术语中的相近词：

局部残缺、空白。

Subtype(s) :

- **Gap** : hollow place in the stone surface, hole.

子类型：

- 间隙、豁口、离缝：石材表面的中空处、孔洞。

HOLE . 孔洞



Chimney structure showing **hole** and loss of sandstone masonry.
 烟囱结构上出现的孔洞和砂岩砌体的损失。

Scotland, Edinburgh, Carlton Terrace, 2002. British Geological Survey / E. Hyslop
 [苏格兰] 爱丁堡, 卡尔顿露台, 2002年。英国地质调查局 / E. Hyslop

MISSING PART . 残缺部分



The nose of this marble figure shows a **missing part**.
 大理石雕像鼻子上的局部缺失。

France, Versailles, Castle Park, Sculpted group "Le bain d'Apollon", 2004.
 LRMH / V. Vergès-Belmin
 [法国] 凡尔赛宫, 城堡花园, "阿波罗的浴缸" 群雕, 2004年。法国历史建筑实验室 / V.Vergès-Belmin

PERFORATION

穿孔

Definition :

A single or series of surface punctures, holes or gaps, made by a sharp tool or created by an animal. The size is generally of millimetric to centrimetric scale. Perforations are deeper than wide, and penetrate into the body of the stone.

定义：

一种由锋利的工具或动物活动造成的、单一的或系列的表面穿孔、孔洞或缝隙。尺寸大小一般为毫米至厘米级。穿孔的深度大于宽度，并深入到石材本体内部。

Equivalent terms to be found in other glossaries : 其他术语中的相近词：

Drill hole.

钻孔。

Not to be confused with :

- *Pitting* : formation of millimetric to submillimetric pits, usually much smaller than perforations.
- *Gap* : hole not obviously created through a perforation process.

易混淆词汇：

- 点蚀：由毫米级至亚毫米级的凹坑形成，一般比穿孔小的多。
- 豁口、缺口：不是明显的穿孔发育过程形成的孔洞。

Other remarks :

A *perforation* is normally induced by a sharp instrument (e.g. by drilling). In specific circumstances, animals may produce *perforations* :

- *wasps* on very soft stones (diameter : Ca. 5 mm)
- *marine molluscs* (e.g. : *lithophagus sp.*) on stones which have stayed under water for some time (diameter : Ca. 1 cm).

其他备注：

穿孔一般是由锋利的工具（例如打钻）形成的。特殊情况下，动物活动也会造成穿孔：

- 黄蜂在非常软弱的石材上（直径约 5 毫米）
- 海洋软体动物（例如石斑鱼）对可能在水底停留过一段时间的石材造成的穿孔（直径约 1 厘米）。

PERFORATION . 穿孔



Perforation by marine lithophagous organisms on a limestone sphinx found during undersea excavations after an immersion of several centuries.

几个世纪后在海底发掘出的石灰岩狮身人面像上呈现的海生噬石生物造成的穿孔。
Egypt, Alexandria, Kom el Dikka open air museum, 2006.
CICRP / P. Bromblet
[埃及] 亚历山大, 科梅尔迪卡露天博物馆, 2006年。(法国马赛) 文化遗产保护与修复跨学科研究中心 / P. Bromblet

PERFORATION . 穿孔



Perforation of sandstone due to masonry bees which have entered the mortar joints and burrowed into the soft sandstone beneath the surface layer.

由于钻入结合砂浆、打洞到软砂岩表层下的巧工蜂造成的砂岩穿孔。

Scotland, Irvine, Town House, 2004. Image is approx. 20 cm across.
British Geological Survey / E. Hyslop
[苏格兰] 欧文, 市内住宅, 2004年。照片中的区域宽大约20厘米。英国地质调查局 / E. Hyslop

PERFORATION . 穿孔



Perforation due to wasp activity.
黄蜂活动引起的穿孔。

France, Avenay-Val-d'Or, Church St-Thérain, sandstone, 2006.
Reims University / G. Fronteau
[法国] 阿韦奈瓦多尔圣泰兰教堂, 砂岩, 2006年。兰斯大学 / G. Fronteau

PERFORATION . 穿孔



Geometrically organised **perforations**, forming letters of the word "farmacia".
穿孔形成的几何图案, 由一组字母组成“药店”的单词。

Italy, Venice, Istria stone, 2007. Diameter of the holes : 2mm.
LRMH / V. Vergès-Belmin
[意大利] 威尼斯, 伊斯特拉石, 2007年。孔洞直径: 2毫米。法国历史建筑实验室 / V. Vergès-Belmin

PITTING

点蚀

Definition :

Point-like millimetric or submillimetric shallow cavities. The pits generally have a cylindrical or conical shape and are not interconnected, although transition patterns to interconnected pits can also be observed.

定义：

点状毫米级或次毫米级的浅腔、洞。点蚀孔一般具有圆柱或圆锥形状，并且不相互连接，虽然可以观察到相互连接点蚀孔的过渡模式。

Not to be confused with :

- *Microkarst*, which creates a network of small interconnected depressions of millimetric to centimetric scale.
- *Perforation* which is, in general, induced by a sharp instrument or an animal, and usually induces much bigger and deeper holes than pitting.

易混淆词汇：

- 微溶蚀，产生毫米级至厘米级微小的相互连接的网络。
- 穿孔，一般是由锋利的工具或动物活动引起的，通常形成比点蚀更大更深的孔洞。

Other remarks :

Pitting is due to partial or selective deterioration. Pitting can be biogenically or chemically induced, especially on carbonate stones.

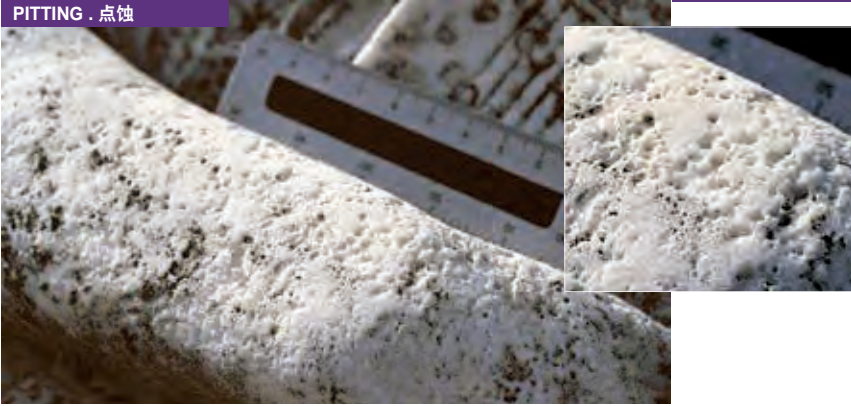
Pitting may also result from a harsh or inadapted abrasive cleaning method.

其他备注：

点蚀起因于局部或选择性劣化。点蚀的原因可以是生物或化学作用导致的，特别是在碳酸盐石头上。

点蚀也可能起因于苛刻的、或不适宜的磨料清洗方法。

PITTING . 点蚀



Pitting developing on a marble sculpture. Microbiological origin is probable.
大理石雕塑上发生的点蚀。可能是微生物引起的。

Germany, Munich, Old Southern cemetery, 1992. KDC Olching / S.Simon
[德国] 慕尼黑, 老南方公墓, 1992年。(德国奥尔兴) 文物保护咨询实验室 / S.Simon

PITTING . 点蚀



Pitting, developing on the upper part of a broken limestone column. Microbiological origin is probable.
断裂石灰岩立柱上部发生的点蚀。可能是微生物引起的。

Morocco, Volubilis archaeological site, 2006. Diameter of the column, c. 45 cm. CICRP / J.-M. Vallet
[摩洛哥] 沃鲁比里斯考古遗址, 2006年。立柱直径约45厘米。(法国马赛) 文物保护及修复跨学科中心 / J.-M. Vallet

PITTING . 点蚀



Pitting on an Istria limestone column. The black color of the stone is due to the presence of a black crust tracing its surface.
伊斯特里亚石灰岩立柱上的点蚀。这块石材表面有一层沿其表面发育的黑色外壳。

Italy, Venice, Doge's Palace, 1998, LMRH / V. Vergès-Belmin
[意大利] 威尼斯, 总督府, 1998年, 法国历史建筑实验室 / V. Vergès-Belmin

PITTING . 点蚀



Pitting due to lichen colonization on a limestone block.
石灰岩石料上生物侵蚀引起的点蚀。

Lebanon, Baalbek temple, 2000. LRMH / V. Vergès-Belmin
[黎巴嫩] 巴尔贝克神庙, 2000年。法国历史建筑实验室 / V. Vergès-Belmin

CRUST 覆盖层

Definition :

Generally coherent accumulation of materials on the surface. A crust may include exogenic deposits in combination with materials derived from the stone. A crust is frequently dark coloured (black crust) but light colours can also be found. Crusts may have an homogeneous thickness, and thus replicate the stone surface, or have irregular thickness and disturb the reading of the stone surface details.

定义：

一般指在石材表面的连贯的物质积累。外壳的成分可能是来自外来的沉积物与源自石材自身物质的结合。覆盖层通常是暗色（黑色覆盖层）的，但也可能是浅色的。外壳可能有着相同的厚度，因而看起来好像是“复制”了石材的表面，或者有着参差不齐的厚度，从而妨碍了对石材表面细节的辨识。

Relationship with the substrate :

A crust may be weakly or strongly bonded to the substrate. Often, crusts detached from the substrate include stone material.

与基底的关系：

覆盖层和基底的粘附力可能较弱或较强。通常，从基底上脱落的外壳包含有石材成分。

Sub-type(s) :

- **Black crust** : Kind of crust developing generally on areas protected against direct rainfall or water runoff in urban environment. Black crusts usually adhere firmly to the substrate. They are composed mainly of particles from the atmosphere, trapped into a gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) matrix.

子类型：

- 黑色覆盖层：在城市环境中，不受直接降雨或径流影响的遮护设施区域，形成的一种覆盖层。黑色覆盖层通常和基底粘附紧密。它们主要来自大气中的颗粒物组成，被包裹到石膏 ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) 的基质结构中。

- **Salt crust** : Crust composed of soluble salts, which develop in the presence of high salt levels, and form from wetting and drying cycles.

- 可溶盐覆盖层：由可溶盐形成的覆盖层，它是在有高盐含量时、由干湿循环过程形成的。

Not to be confused with :

- *Encrustation*, which is also a coherent layer, but is always adherent to the substrate. The term *encrustation* is preferred to crust when the accumulation clearly results from water infiltration followed by precipitation.

易混淆的术语：

- 矿化沉淀层：也是一种粘附层，但总是粘附在基底上。如果这层物质的积累确定是来自降雨后的渗流，则使用矿化沉淀层比覆盖层更恰当。

- *Alga* : Algae often have a dark colour during the dry season and may be confused with black crusts. Oppositely to black crusts, algae do not adhere to the substrate, and are usually located in outdoor situations, in areas exposed to direct rain impact, or on water pathways. These two characteristics differentiate algae from black crusts.

- 藻类：在干旱季节藻类一般为黑色，可能会和黑色覆盖层混淆。和黑色覆盖层相反的是，藻类不是粘附在石材基底上，一般位于户外环境，暴露在直接受雨水或者径流水影响的位置。这两个特点可以区分藻类和黑色覆盖层的不同。

- *Patina* : Black iron rich patinas, which develop usually as a thin layer enriched in iron/clay minerals on iron containing sandstones, and are located on all exposed parts of the building/sculpture, not only on parts sheltered from the rain impact.

- 氧化膜 / 皮壳：黑色富铁氧化膜，通常在富铁砂岩表面发育成一个富铁 / 黏土矿物的薄层，分布在建筑和雕塑的所有外露部位，而不仅仅是在有遮雨防护棚的部位。

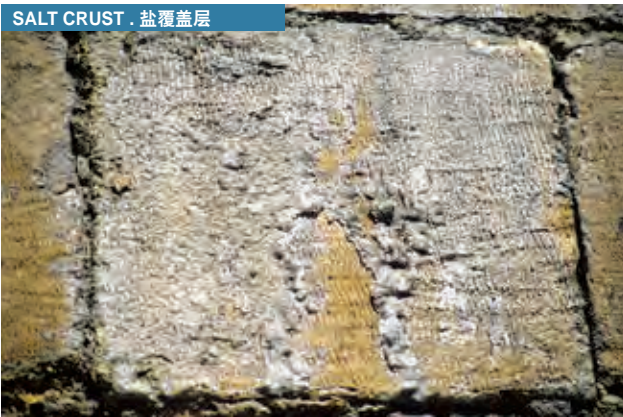
BLACK CRUST . 黑色覆盖物



Black crust tracing the surface of a limestone sculpture.
沿着石灰岩雕塑表面发育的黑色覆盖物。

France, Saint-Denis, Basilique, 2006. Photo height : c.30 cm. LRMH / V. Vergès-Belmin
[法国] 圣丹尼斯, 大教堂, 2006年。照片高度: 约30厘米。法国历史建筑实验室 / V. Vergès-Belmin

SALT CRUST . 盐覆盖层



Porous limestone, **salt crust** (halite).
多孔石灰岩表面的盐覆盖层。

Egypt, Cairo, Mosque, 2000. Stone width : c. 30 cm. Geol. Inst. / Aachen Univ. / B. Fitzner
[埃及] 开罗, 清真寺, 2000年。石材宽度: 约30厘米。亚琛大学地质学院 / B. Fitzner

BLACK CRUST . 黑色覆盖物



Limestone sculpture, **black crust**.
石灰岩雕塑, 黑色覆盖物。

Germany, Naumburg, Cathedral, 1990. Head height : c. 30 cm. Geol. Inst. / Aachen Univ. / B. Fitzner
[德国] 瑙姆堡, 大教堂, 1990年。雕像头部高度: 约30厘米。亚琛大学地质学院 / B. Fitzner

DEPOSIT 堆积物

Definition :

Accumulation of exogenic material of variable thickness. Some examples of deposits : splashes of paint or mortar, sea salt aerosols, atmospheric particles such as soot or dust, remains of conservation materials such as cellulose poultices, blast materials, etc...

定义：

不同厚度外来物质的积累。一些堆积物的例子：飞溅的油漆或灰浆，海盐气溶胶，大气中的颗粒物如煤烟灰和灰尘，保护材料例如纤维素敷剂、喷砂材料的残留等。

Relationship with the substrate :

A *deposit* generally lacks adhesion to the stone surface.

与基底的关系：

堆积物一般与石材表面的粘附力不强。

Equivalent terms to be found in other glossaries :

Surface deposit.

其他术语中的相近词：

表面堆积物。

Not to be confused with :

Bird and bat droppings are considered as *deposits*, whereas bird nests, spider webs are to be considered as *biological colonization*.

易混淆的术语：

鸟类和蝙蝠的粪便可以看成堆积物，而鸟巢、蜘蛛网则属于生物侵蚀。

Other remarks :

A *deposit* can be described for colour, morphology, size and if possible nature and/or origin.

其他备注：

堆积物可用颜色、形貌、大小，如果可能还有性质和来源来表征。

DEPOSIT . 堆积物



Deposit of pigeon droppings on granite sculpture.
花岗岩雕塑上鸽子粪形成的堆积物。

Portugal, Porto , Cathedral, 2002. Sculpture slightly above natural size. LNEC / J. Delgado Rodrigues
[葡萄牙]波尔图,大教堂,2002年。雕像略高于自然尺寸。葡萄牙国家土木工程实验室 / J.Delgado Rodrigues

DEPOSIT . 堆积物



The material detached from the sandstone block forms a **deposit**.
从砂岩石材上剥落下来的物质形成的堆积物。

USA, Santa Barbara, Mission, 2008. Block height : 30 cm. Véronique Vergès-Belmin / LRMH
[美国]圣芭芭拉,布道所,2008年。石材高度:30厘米。法国历史建筑实验室 / Véronique Vergès-Belmin

DISCOLOURATION 变色

Definition :

Change of the stone colour in one to three of the colour parameters : hue, value and chroma.

- hue corresponds to the most prominent characteristic of a colour (blue, red, yellow, orange etc..).
- value corresponds to the darkness (low hues) or lightness (high hues) of a colour.
- chroma corresponds to the purity of a colour. High chroma colours look rich and full. Low chroma colours look dull and grayish. Sometimes chroma is called saturation.

Relationship with the substrate :

It may affect the surface and/or be present in depth of the stone.

Equivalent terms to be found in other glossaries :

Chromatic alteration.

Other spelling :

Discoloration (US).

Sub-type(s) :

- **Colouration** (to be preferred to *colouring*) : change in hue, value and/or a gain in chroma
- **Bleaching** (or *fading*) : gain in value due to chemical weathering of minerals (e.g. reduction of iron and manganese compounds) or extraction of colouring matter (leaching, washing out), or loss of polish, generally very superficial. Dark and bright colour marbles often show bleaching as a result of exposure to weather.
- **Moist area** : corresponds to the darkening (lower hue) of a surface due to dampness. The denomination *moist area* is preferred to *moist spot*, *moist zone* or *visible damp area*.
- **Staining** : kind of discolouration of limited extent and generally of unattractive appearance.

Not to be confused with :

- *Patina* : superficial modification of the material perceivable as a discolouration, in often having a favourable connotation.
- *Soiling* : refers to a tangible deposit and has a negative connotation
- *Deposit* : refers to the accumulation of material of variable thickness, possibly having a colour different from that of the stone.

Other remarks :

Discolouration is frequently produced by salts, by the corrosion of metals (e.g. iron, lead, copper), by micro-organisms, or by exposure to fire.

Some typical yellow, orange, brown and black *discolouration* patterns are due to the presence of carotenoids and melanins produced by fungi and cyanobacteria.

Darkened areas due to moistening may have different shapes and extension according to their origin : pipe leakage, rising damp, hygroscopic behaviour due to the presence of salts, condensation.

定义：

石材颜色在色调、明度和色度(门赛尔颜色系统)中的1-3种参数的变化。

- 色调对应于颜色的最突出特点(蓝色、红色、黄色、橘色等)。
- 明度对应于颜色的暗(低色调)或亮度(高色调)。
- 色度对应于颜色的纯度。高色度颜色看起来丰富饱满。低色度颜色看起来沉闷灰暗。有时色度也被称为饱和度。

与基底的关系：

它可能会影响石质的表面和/或存在于石材的内部。

其他术语中的相近词：

色度变化。

其他拼写：

变色、褪色(美国)。

子类型：

- 染色(使染色更恰当)：色调、明度发生变化，和/或色度有增加。
- 褪色：一般在岩石浅表层由于矿物的化学风化(例如铁和镁化合物的还原)、或者染色物质的淋失(沥滤、淋溶)、或者抛光面的损失而使得明度值增大的现象。长期暴露在户外环境的深色、明亮的彩色大理石常常会出现褪色现象。
- 潮湿区域：对应着岩石表面由于湿气形成的暗色(低色调)部位。“潮湿区域”这一术语比“湿润点”、“湿润带”或“可见潮湿区”更正式。
- 染污：一种有限程度的变色，通常外观不好看。

易混淆的术语：

- 氧化膜(皮壳)：可被感知的石材表面变色，通常有利于文物的感观和保护。
- 表面脏污：指的是一种有形的堆积，不利于文物的感观和保护。
- 堆积物：指的是不同厚度的物质积累，很可能和石材原本的颜色有差别。

其他备注：

变色大多情况下是由盐、金属(例如铁、铅、铜)的腐蚀、微生物作用或暴露在火中等原因形成的。

一些典型的黄色、橘色、褐色和黑色的变色模式是由于真菌和蓝藻生成了类胡萝卜素和黑色素。

由于潮湿造成的暗色部位，根据其水分来源是管道渗漏、上升的水汽、有盐时的吸湿行为，以及冷凝水等，而呈现出不同的形状和分布范围。

COLOURATION . 染色



Red **colouration** on a marble bas-relief.
大理石浅浮雕上的红色染色。

Italy, Certosa di Pavia, 1992.
height : c. 0.5m, KDC.
Olching / S. Simon
[意大利] 切尔托萨迪帕维亚, 1992年。浅浮雕高约0.5米, (德国奥尔兴) 文物保护咨询实验室 / S. Simon.

STAINING . 染污



Iron oxides are driven by water from the rusting railing, and induce the development of a brown **staining** on the underlying stones.
由水驱动的来自生锈栏杆的铁氧化物, 诱发了栏杆下方石材的褐色染污。

France, Chartres, Cathedral, 2004. LRMH / V. Vergès-Belmin
[法国] 沙特大教堂, 2004年。法国历史建筑实验室 / V.Vergès-Belmin

BLEACH . 褪色



This purple-red nodular limestone has a natural tendency to **bleach** (fade) from exposure to rainfall as can be seen on most vertical parts and balusters of this monument. The faded surface layer has not been allowed to form in areas of constant rubbing action.

由于暴露在雨水中, 在这个历史建筑大部分的水平部位和栏杆部位都可观察到紫红色石灰岩的自然褪色趋势。
Italy, Venice, Piazza San Marco, Rosso Di Verona marble, 2007. LRMH / V. Vergès-Belmin
[意大利] 威尼斯, 圣马可广场, 维罗纳红色大理石, 2007年。法国历史建筑实验室 / V.Vergès-Belmin

STAINING . 染污



Stains on a limestone pediment underneath a bronze sculpture.
青铜雕塑下方石灰岩三角形楣饰上的染污。

Hungary, Budapest, 2001. Sculpture c. 3m height. LNEC/J. Delgado- Rodriguez
[匈牙利] 布达佩斯, 2001年。雕像高度约3米。葡萄牙国家土木工程实验室 / J. Delgado-Rodrigues

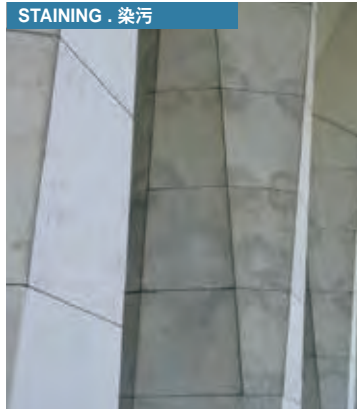
MOIST AREA . 潮湿区域



Moist area on a sandstone rubble built wall as a result of a concentrated discharge of rain water from a broken downpipe.
雨水从破裂落水管集中排放形成的砂岩毛石墙面上的潮湿区域。

Scotland, New Lanark, South Lanarkshire, Long Row residential block, 1996. Rainwater downpipe 100mm in diameter. Pers. archive Ref XM 12 / Ingval Maxwell
[苏格兰] 新拉纳克, 南拉纳克郡, 长排住宅小区, 1996年。落水管直径 100 毫米。个人档案 XM 12 / Ingval Maxwell

STAINING . 染污



Staining from water absorption or vapor condensation occurring on marble cladding.
大理石面板上由于吸水或者水汽冷凝形成的变色。

United States, Albany, New York, Cultural Education Center, New York state Capitol, 2001. Wiss, Janney, Elstner Associates Inc./ K. Normandin, M. Petermann
[美国] 奥尔巴尼, 纽约州, 文化教育中心, 州议会大厦, 2001年。Wiss, Janney, Elstner 联合有限公司 / K. Normandin, M. Petermann

EFFLORESCENCE

盐霜、盐华

Definition :

Generally whitish, powdery or whisker-like crystals on the surface. Efflorescences are generally poorly cohesive and commonly made of soluble salt crystals.

定义：

通常在石材表面形成的白色粉状或晶须状结晶，盐霜一般由与可溶盐结晶组成，与表面黏聚力差。

Relationship with the substrate :

Efflorescences are generally poorly bonded to the stone surface.

与基底的关系：

盐霜和石头表面结合力通常较弱。

Equivalent terms to be found in other glossaries :

Efflorescence is preferred to the expression *loose salt deposits*.

其他术语中的相近词：

盐霜更适宜于表述松散的盐沉积。

Not to be confused with :

- *Subflorescence* : Term employed in the case where crystallization occurs inside the material.
- *Deposit* : To the naked eye, efflorescences often look like deposits. However, their constituents come from the stone itself whereas deposits come from outside.

易混淆的术语：

- 次表层盐霜：这个术语主要用于盐结晶发生在石材内部的情况。
- 堆积物：对于人眼而言，盐霜一般看起来像堆积物。但是，它们的物质成分来自石材本身，而堆积物则来自外界。

Other remarks :

Efflorescence is commonly the result of evaporation of saline water present in the porous structure of the stone. Efflorescences are often constituted of soluble salts such as sodium chloride (*halite* : NaCl) or sulphate (*thenardite* : Na₂SO₄), magnesium sulphate (*epsomite* : MgSO₄ · 7H₂O), but they may also be made of less soluble minerals such as calcite (CaCO₃), *barium sulphate* (BaSO₄) and *amorphous silica* (SiO₂ · nH₂O).

其他备注：

盐霜一般是由存在于多孔隙石材结构中的含盐水分蒸发而成的。盐霜通常是由可溶盐组成，例如氯化钠（岩盐：NaCl）或硫酸盐（无水芒硝：Na₂SO₄）、硫酸镁（泻利盐：MgSO₄ · 7H₂O）等，但他们也可能由较难溶的矿物例如方解石（CaCO₃）、硫酸钡（BaSO₄）和无定形二氧化硅（SiO₂ · nH₂O）组成。

EFFLORESCENCE . 盐霜



Efflorescence on dolomitic limestone related to historic air pollution.

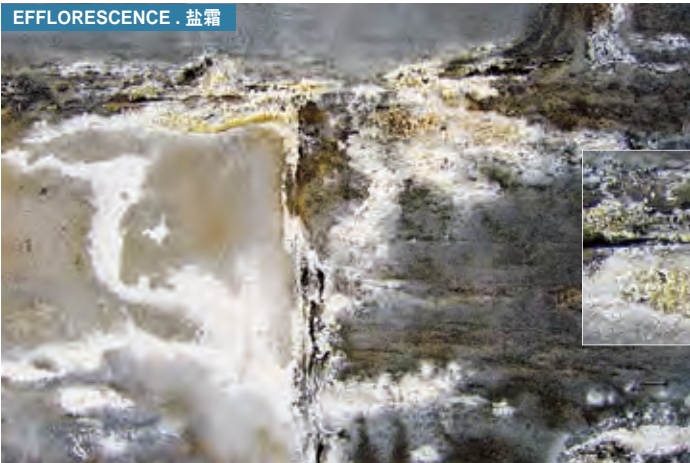
白云质石灰岩上与长期空气污染有关的盐霜。

United Kingdom, York, Monk's Bar, historic city gate, 14th century, 2005. Width of the stone blocks :appr. 40 cm. The Getty Conservation Institute, E. Doehne

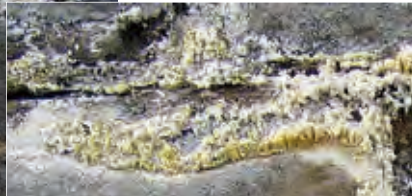
[英国] 约克古城教士门, 14 世纪古城的城门口, 2005 年。石料的宽度约 40 厘米。盖蒂文物保护研究所 E. Doehne



EFFLORESCENCE . 盐霜



Formation of salts forming **efflorescence** on the surface of sandstone masonry, focused at joints between masonry blocks.
在砂岩建筑表面形成的盐霜, 集中于砌墙石材的接缝处。



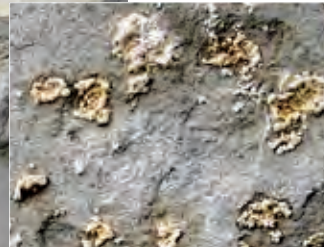
Scotland, Glasgow, McLennan Arch, 2005, image is approx. 25cm across. British Geological Survey / E. Hyslop

[苏格兰] 格拉斯哥, 麦克伦南拱门, 2005 年, 照片中的图像实际宽度约 25 厘米。英国地质调查局 / E.Hyslop

EFFLORESCENCE . 盐霜



Limestone block showing salt **efflorescences**.
石灰岩石材块料表面的盐霜。



USA, Santa Barbara, Mission, 2008. Block size : 30cm. Véronique VergèsBelmin / LRMH

[美国] 圣芭芭拉, 布道所, 2008 年。石块尺寸: 30 厘米。
法国历史建筑实验室 / Véronique Vergès-Belmin

ENCRUSTATION 矿化沉淀层

Definition :

Compact, hard, mineral outer layer adhering to the stone. Surface morphology and colour are usually different from those of the stone.

定义：

黏附在石材上的致密、坚硬的矿物外层。外观形貌和颜色通常和石材本体不一样。

Relationship with the substrate :

Encrustations generally adhere firmly to the stone surface. When an encrustation is removed, adhering stone materials may be taken away with it.

与基底的关系：

矿化沉淀层通常与石材表面的黏附比较紧密。当剔除结壳时，黏附的石材材质也可能被一同除掉。

Location :

Encrustations are generally found below areas of the building where water is percolating or has percolated in the past.

位置：

矿化沉淀层通常出现在建筑物有水渗透或者已经渗透区域的下部。

Equivalent terms to be found in other glossaries :

Incrustation.

其他术语中的相近词：

结壳、结硬壳。

Sub-type(s) :

- *Concretion* : Kind of encrustation having a specific shape : nodular, botryoidal (grape-like) or framboidal (raspberry like). Concretions may even have conic shapes of form drapery-like vertical sheets. Stalagmites and stalactites are types of concretions. In general, concretions do not outline, contour the surface of the stone, and are of limited extent.

子类型：

- 凝固物：具有特殊形状的一种硬壳：结节状、葡萄状或覆盆子状。凝固物甚至呈现垂直带褶窗帘状的圆锥形。凝固物的类型还有石笋和钟乳石。总体上，凝固物不能呈现出石材表面的轮廓线，且分布范围有限。

Not to be confused with :

- *Crust* : The term encrustation is used when the feature is clearly due to a precipitation process, following any kind of leaching. If there is no evidence of leaching and precipitation, the term crust will be employed.

- *Lichen* : Some lichens (the so-called crustose ones) can look like encrustations. Lichens are not usually hard. When scratched, one can see blackish or green traces resulting from algae or cyanobacteria hosted by the lichen.

易混淆的术语：

- 覆盖层：矿化沉淀层这一术语指明明显的伴随任何形式淋溶后的沉淀过程造成的形貌特征。如果没有淋溶和沉淀的证据，一般使用覆盖层这一术语。

- 地衣，某些地衣（所谓的壳状类的）的外观看可能和矿化沉淀层一样。地衣一般不坚硬。当被刮擦时，可以看到带黑色或绿色的痕迹，这是由藻类或寄宿到地衣中的蓝藻细菌造成的。

Other remarks :

Encrustations on monuments are frequently deposits of materials mobilized by water percolation and thus coming from the building itself : Carbonates, sulphates, metallic oxides and silica are frequently found.

其他备注：

古迹上的矿化沉淀层通常是由渗水带来的物质沉淀形成的，因此矿化沉淀层的物质来自建筑物本身：通常可以看到碳酸盐、硫酸盐、金属氧化物和二氧化硅等。

ENCrustATION . 矿化沉淀层



Calcite encrustation covering a limestone masonry under an arch.
拱门下覆盖在石灰岩砌体表面的方解石矿化沉淀层。



France, Vaison-la-Romaine, ancient cathedral Notre-Dame de Nazareth, cloister, 2005. CICRP/ P. Bromblet
[法国] 韦松拉罗迈讷, 拿撒勒的圣母大教堂回廊, 2005年。(法国马赛) 文物保护及修复跨学科中心 / P. Bromblet

ENCrustATION . 矿化沉淀层



Concretions with the form of **stalactites** under the arch of the aqueduct built of limestone.
高架引水渠拱券下具有钟乳石形状的凝固物。



Portugal, Lisbon, Águas Livres Aqueduct 2002. Blocks are c. 1m wide. LNEC / J. Delgado Rodrigues
[葡萄牙] 里斯本, 古代高架水渠, 2002年。石材宽度约1米。葡萄牙国家土木工程实验室 / J. Delgado Rodrigues

ENCrustATION . 矿化沉淀层



Calcite encrustation linked to water leached from joints, on a granite, sandstone and schist ashlar.
与花岗岩、砂岩和片岩方琢石接缝处的渗水、淋溶有关的方解石矿化沉淀层。



Scotland, Isle of Iona, ancient convent (detail), 2006. Length of a stone, c. 25 cm. CICRP / J.M. Vallet
[苏格兰] 艾奥纳岛, 古代修道院 (细部), 2006年。石材长度约25厘米。(法国马赛) 文物保护及修复跨学科中心 / J.M.Vallet

CRUST . 覆盖层	DEPOSIT . 堆积物	DISCOLOURATION . 变色	EFFLORESCENCE . 盐霜、盐华	ENCRUSTATION . 矿化沉淀层
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FILM 薄膜层

Definition :

Thin covering or coating layer generally of organic nature, generally homogeneous, follows the stone surface. A film may be opaque or translucent.

定义：

一般指有机质的覆盖层或涂层，通常沿着石材表面均匀分布。薄膜层可能是不透明或透明的。

Relationship with the substrate :

A film generally adheres to but does not penetrate into the substrate, possibly changing surface properties (aspect, colour, permeability) of the stone.

与基底的关系：

薄膜层通常是黏附在而不是渗透进石材基底，可能会改变石材的表面特性（外貌、颜色、渗透性）。

Equivalent terms to be found in other glossaries :

Pellicle, skin.

其他术语中的相近词：

薄皮、表皮。

Not to be confused with :

- *Patina*, which, to the naked eye, has no perceivable thickness.
- *Encrustation*, which refers to a strongly adhering mineral deposit, and may not follow the surface of the stone as a film would.

易混淆的术语：

- 氧化膜、皮壳，用肉眼观察感知不出它的厚度。
- 矿化沉淀层，指的是有强的粘附力的矿物质沉淀，不能像膜一样沿着石材的表面发育。

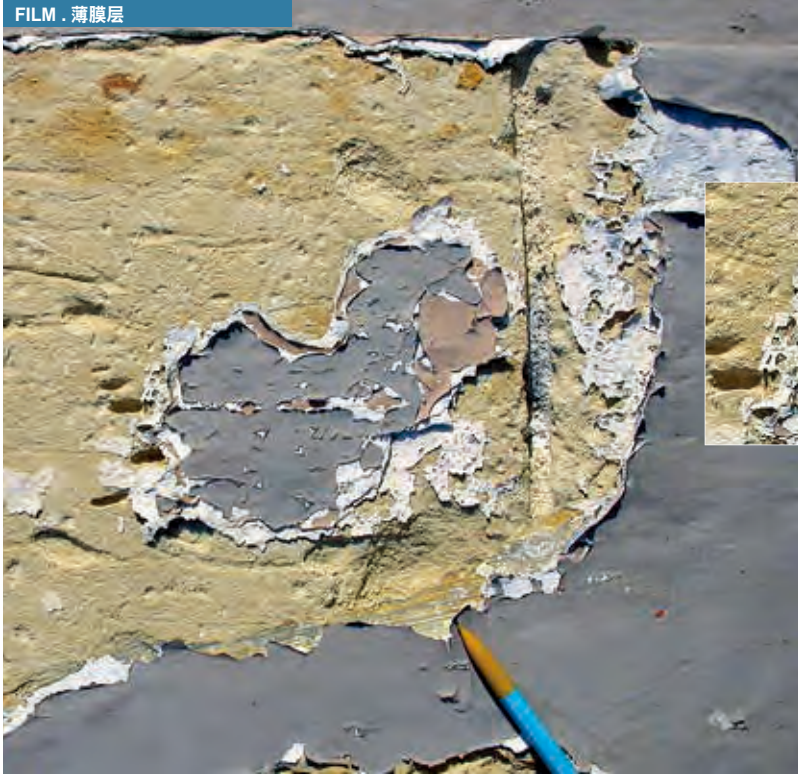
Other remarks :

Paint layers, certain categories of water repellents or protective agents (antigraffiti), sealants, are considered films. A *biofilm* is a kind of *biological colonization* (see this term). Through ageing, a film may lose its translucency or detach from the substrate.

其他备注：

油漆层，某些类型的防水剂或保护剂（防涂鸦）、密封剂都被视为是薄膜层。生物膜是一种生物侵蚀现象（见该术语）。历经时间的老化，薄膜层可能会失去透明度或从石质基材上脱落。

FILM . 薄膜层



Porous limestone ashlar partially covered with multilayer paint **film**.
局部被多层油漆膜覆盖的多孔石灰岩方琢石。



Malta, Valletta, old town, 2003. LRMH / V.
Vergès-Belmin
[马耳他] 瓦莱塔, 老城区, 2003年。法国历史建筑实验室 / V.Vergès-Belmin

>	CRUST . 覆盖层	DEPOSIT . 堆积物	DISCOLOURATION . 变色	EFFLORESCENCE . 盐霜、盐华	ENCRUSTATION . 矿化沉淀层
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GLOSSY ASPECT
镜面光泽

Definition :

Aspect of a surface that reflects totally or partially the light. The surface has a mirror-like appearance.

定义：

石材表面完全或部分反射光的特征。呈镜面状外表。

Equivalent terms to be found in other glossaries :

Polished surface.

其他术语中的相近词：

抛光面。

Other remarks :

A glossy aspect may be due to previous polishing (intentional or not), or to the presence of a transparent film which reflects light.

其他备注：

镜面光泽可能是由于先前的抛光（故意或者无意的），也可能是存在着一层透明薄膜导致的光线反射。

GLOSSY ASPECT . 镜面光泽



Marble column, covered with a superficial film of polyvinyl acetate. This product was applied during a restoration campaign, to give back the marble its original **glossy aspect**.
大理石圆柱，表面涂覆了一层聚醋酸乙烯酯。该材料是在一次修复工程中使用的，使大理石恢复了原始的镜面光泽。

France, Paris, Opéra Garnier, 1999.
Diameter of the column : c. 0.7 M.
LRMH / V. Vergès-Belmin
[法国] 巴黎，加尼叶歌剧院，1999年。
石柱直径约 0.7 米。法国历史建筑实验室 / V.Vergès-Belmin

GLOSSY ASPECT . 镜面光泽



The **glossy aspect** of this parapet is due to the repeated rubbing action of people leaning over the bridge.
由于人们重复地在桥上倚靠磨擦，造成了护栏镜面光泽。

Italy, Venice, Rialto Bridge, 1994.
LRMH / V. Vergès-Belmin
[意大利] 威尼斯，里亚托桥，1994年。法国历史建筑实验室 / V.Vergès-Belmin

GLOSSY ASPECT . 镜面光泽



Glossy aspect on pavement stones.
人行道铺路石上的镜面光泽。

Malta, Valletta, 2004. LRMH / V. Vergès-Belmin
[马耳他] 瓦莱塔，2004年。法国历史建筑实验室 / V.Vergès-Belmin

>	CRUST . 覆盖层	DEPOSIT . 堆积物	DISCOLOURATION . 变色	EFFLORESCENCE . 盐霜、盐华	ENCRUSTATION . 矿化沉淀层
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GRAFFITI

涂鸦

Definition :

Engraving, scratching, cutting or application of paint, ink or similar matter on the stone surface.

定义：

在石材表面凿刻、刮擦、切削或使用油漆、墨水或相似物质。

Other spelling :

Plural : *Graffiti*.

其他拼写：

复数：涂鸦。

Other remarks :

Graffiti are generally the result of an act of vandalism. However, some graffiti may have historical, aesthetic or cultural values and should be conserved.

其他备注：

涂鸦总体来说是破坏文物的愚蠢行为。但是，少数涂鸦可能具有历史、美学和文化价值，也应该加以保护。

GRAFFITI . 涂鸦



Marble sculpture of the Potsdam Sanssouci park coloured by graffiti.
波茨坦无忧宫花园大理石雕像的彩绘涂鸦。



Germany, Potsdam castle, LRMH / V. Vergès-Belmin
[德国] 波茨坦城堡。法国历史建筑实验室 / V.Vergès-Belmin

GRAFFITI . 涂鸦



Graffiti in the west abutment of the Aqueduct built in limestone.
石灰岩质输水管道西侧桥墩上的涂鸦。

Portugal, Lisbon, Águas Livres Aqueduct, 2005.
“Alex” spreads on c. 1m. LNEC / J. Delgado Rodrigues
[葡萄牙] 里斯本，古代高架渠，2005年。涂鸦“Alex”的字体长约1米。葡萄牙国家土木工程实验室 / J.Delgado Rodrigues

GRAFFITI . 涂鸦



Graffiti obtained through scratching.
通过刮擦形成的涂鸦。



Malta, Valletta, 2006.
Porous limestone, LRMH / V. Vergès-Belmin
[马耳他] 瓦莱塔，2006年。多孔隙灰岩。法国历史建筑实验室 / V.Vergès-Belmin

CRUST . 覆盖层	DEPOSIT . 堆积物	DISCOLOURATION . 变色	EFFLORESCENCE . 盐霜、盐华	ENCRUSTATION . 矿化沉淀层
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PATINA 氧化膜、皮壳

Definition :

Chromatic modification of the material, generally resulting from natural or artificial ageing and not involving in most cases visible surface deterioration.

定义：

通常是由于自然或人工老化引起的材料色彩改变，在绝大多数情况下不涉及可辨识的表面劣化。

Sub-type(s) :

- **Iron rich patina** : Natural black to brown thin layer enriched in iron/clay minerals, which can be found on iron containing sandstones. This kind of patina is generally observed in outdoor environments, and develops quite uniformly on the stone surface.
- **Oxalate patina** : Orange to brown thin layer enriched in calcium oxalates. This kind of patina may be found in outdoor environments, often on marble and limestone substrates.

子类型：

- 富铁氧化膜：富含铁 / 黏土矿物的、天然黑色至褐色的薄层，可以在含铁的砂岩上找到。这类氧化膜通常在户外环境中可见，在石材表面发育得相当一致。
- 草酸盐氧化膜：富含草酸钙的橘色至褐色薄层。这类氧化膜常见于户外大理石和石灰岩基底上。

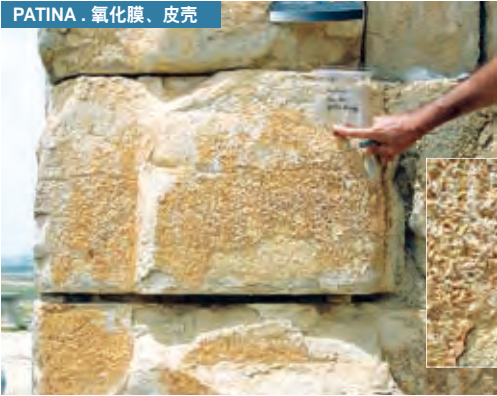
Not to be confused with :

- *Film*, which is a thin visible homogeneous covering or coating layer generally of organic nature.
- *Black crust*, which is a generally coherent accumulation of materials on the surface. Black crusts are black to grey and have a perceivable thickness.
- *Discolouration*, which is a change of colour perceived as unattractive.

易混淆的术语：

- 薄膜层，一般为微薄、可见、均匀的有机性质的覆盖层或涂层。
- 黑色覆盖层，一般是粘附在表层的物质积累。黑色外壳呈黑色至灰色，具有可觉察的厚度。
- 变色，一种被认为有碍观赏性的颜色变化。

PATINA . 氧化膜、皮壳



Oxalate **patina** developing on limestone.
石灰岩石材表面形成的草酸氧化膜。

Morocco, Volubilis archaeological site, Basilica, 2006. Width of a stone : c. 45 cm.
CICRP/ J.-M. Vallet

[摩洛哥] 沃吕比利斯 考古遗址, 长方形大教堂, 2006年, 石材宽度约45厘米。(法国马赛) 文物保护及修复跨学科中心 / J.-M. Vallet

PATINA . 氧化膜、皮壳



The sandstone elements of these buttresses show a variety of colours. Creamy to orange colours correspond to stones more recently set into the masonry. Brown colours are due to the development of an **iron-rich patina**, as a result of a longer exposure in the open air.

这些扶壁的砂岩石材出现了不同的颜色。奶油色到橘色的石材对应着砖石砌体近期翻修更换的石材。褐色是由于在户外环境长时间暴露, 形成了富铁氧化膜(皮壳)的原因。

Czech Republic, Prague, Cathedral, 2002. Stone size : c. 30 x 50 cm. LRMH / V. Vergès-Belmin

[捷克共和国] 布拉格, 大教堂, 2002年。石材尺寸: 约30 x 50厘米。法国历史建筑实验室 / V.Vergès-Belmin

PATINA . 氧化膜、皮壳



This sandstone sculpture, originally of light colour, has developed an **iron rich patina** over time.

这个砂岩雕塑原本是浅色的, 随着岁月流逝, 表面形成了富铁氧化膜(皮壳)而成深色。

Czech Republic, Prague, one of the sculptures of the Charles Bridge, 2002. LRMH / V. Vergès-Belmin

[捷克共和国] 布拉格, 查尔斯大桥上的一尊雕塑, 2002年。法国历史建筑实验室 / V.Vergès-Belmin

>	CRUST . 覆盖层	DEPOSIT . 堆积物	DISCOLOURATION . 变色	EFFLORESCENCE . 盐霜、盐华	ENCRUSTATION . 矿化沉淀层
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SOILING 表面脏污

Definition :

Deposit of a very thin layer of exogenous particles (eg. soot) giving a dirty appearance to the stone surface.

定义：

外源粒子（例如煤烟灰）沉积形成的一个极薄层，使得石材表面呈现脏污的外观。

Relationship with the substrate :

With soiling, the substrate structure is not considered as affected. Soiling may have different degrees of adhesion to the substrate.

与基底的关系：

一般认为表面脏污不影响石材基底的材质结构。表面脏污可能与基底层有不同程度的黏附力。

Not to be confused with :

- *Crust*, which has a visible thickness.
- *Deposit*, which has a visible thickness, and not systematically a dirty appearance.

易混淆的术语：

- 覆盖层，具有可见的厚度。
- 堆积物，具有可见的厚度，不是系统性地外观脏污。

Other remarks :

With increasing adhesion and cohesion, soiling can transform into a crust. Soiling may originate from atmospheric pollutants (industrial, domestic or car exhaust products) or from particles transported by running water or heating convection.

其他备注：

随着粘附力和结合力的增加，表面脏污可以转变成覆盖层。表面脏污可能源自大气污染物（工业、畜牧业或汽车排放物）或来自径流水也或者是热对流输送来的颗粒物。

SOILING . 表面脏污



This very particular type of **soiling** is specific of stone surfaces treated with water repellents. Water pathways are limited to narrow stripes, where algae may develop preferentially.

这一特殊类型的表面脏污是防水剂处理过石头表面所特有的。石材表面水流的路径被限制成狭窄条带状，这些位置非常适于藻类生长。

France, Versailles, Castle Park, marble sculpture, 2002. Large side : c. 0.6 m. LRMH / V. Vergès-Belmin

[法国] 凡尔赛，城堡公园，花岗岩雕塑，2002年。大幅照片表示的实际长度大约0.6米。法国历史建筑实验室 / V.Vergès-Belmin

SOILING . 表面脏污



Thin, veil-like **soiling** by atmospheric dust on horizontal and subhorizontal parts of the sculptures.

在雕塑的水平 and 近水平部位因大气粉尘形成的薄层面纱状表面脏污。

France, Marseille, La Nouvelle Major cathedral, Grey Serena sandstone and white limestone, 2006. c. 2.5 m. CICRP / J.-M. Vallet

[法国] 马赛，拉努维尔大教堂，灰瑟琳娜砂岩和白色石灰岩，2006年。约2.5米。(法国马赛) 文化遗产保护与修复跨学科研究中心 / J.-M. Vallet

SOILING . 表面脏污



Soiling on the surface of a limestone sculpture protected against rainfall.

有防雨设施的石灰岩雕塑表面呈现的表面脏污。

France, Reims, Cathédrale Notre-Dame. Façade occidentale, portail central, 1989. Head size : c. 40cm. LRMH DIA00015622 / J.P. Bozellec

[法国] 兰斯，圣母大教堂。西立面，中间雕像，1989年。头部尺寸：约40厘米。法国历史建筑实验室 / DIA00015622 / J.P. Bozellec

CRUST . 覆盖层	DEPOSIT . 堆积物	DISCOLOURATION . 变色	EFFLORESCENCE . 盐霜、盐华	ENCRUSTATION . 矿化沉淀层
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SUBFLORESCENCE

次表层盐霜

Definition :

Poorly adhesive soluble salts, commonly white, located under the stone surface.

定义：

附着性很差的可溶盐，一般为白色，位于石材表层的下部。

Relationship with the substrate :

Subfloreescences are hidden, unless the stone layer over them detaches. In that case, salt crystals become visible on the newly exposed surface.

与基底的关系：

盐霜是隐蔽的，除非盐霜上面的岩石层剥落。这种情况下，盐的结晶物在新暴露的表面变得可见。

Equivalent terms to be found in other glossaries :

Cryptoflorescence.

其他术语中的相近词：

隐形盐霜。

Not to be confused with :

- *Efflorescence*, which corresponds to salt crystallization on the surface of the stone instead of under it.

易混淆的术语：

- 盐霜，和石材表面而不是次表层的盐结晶有关。

Other remarks :

Subflorescence is commonly the result of evaporation of saline water present in the porous structure of the stone. As subfloreescences develop inside the porous structure, they often result in scaling of the surface.

其他备注：

次表层盐霜是石材孔隙结构中存在的盐水蒸发的结果。当在多孔结构内部形成盐霜时，往往会在表面造成鳞片状剥落。

SUBFLORESCENCE . 次表层盐霜



Formation of white **subflorescence**, i.e. salt deposits within porous sandstone leading to loss of the stone surface, resulting from the use of de-icing salts at the entrance to the building.

白色次表层层盐霜的形成，例如由于在建筑入口处使用除冰盐，盐在多孔砂岩中的沉积，导致了石材表面的脱落。

Scotland, Glasgow, Newark Drive, 2005.
British Geological Survey / E. Hyslop
[苏格兰] 格拉斯哥，纽瓦克德利夫，2005年。
英国地质调查局 / E. Hyslop

**BIOLOGICAL
COLONIZATION**
生物侵蚀

Definition :

Colonization of the stone by plants and microorganisms such as bacteria, cyanobacteria, algae, fungi and lichen (symbioses of the latter three). Biological colonization also includes influences by other organisms such as animals nesting on and in stone.

定义:

植物和微生物，例如细菌、蓝藻、藻类、真菌和地衣（后三者的共生体）可以在石材上定居。生物侵蚀也包括其他一些生物体带来的影响，比如动物在石材表面和内部筑巢。

Relationship with the substrate :

Direct growth on and in Stone Cavities; also indirect influences by nearby trees and other organisms.

与基底的关系:

直接生长在石材上或石材空腔孔洞中；也会受到邻近树木和其他生物体的间接影响。

Equivalent terms to be found in other glossaries :

Biological growth, biological overgrowth, living exogenous material.

其他术语中的相近词:

生物生长，生物过度生长，活性外源性物质。

Other spelling :

Biological colonisation.

其他拼写:

生物定居。

Not to be confused with :

- *Deposit* : consists of an accumulation of exogenic material, such as dust, droppings, on the stone surface. For instance, a bird's nest, a spider web are part of biological colonization, but bird or bat droppings are deposits.

易混淆的术语:

- 堆积物：由灰尘、鸟类粪便等外源性物质在石材表面积累而成。例如，一个鸟巢、一片蜘蛛网都是生物定居的一部分，但是鸟和蝙蝠的粪便属于堆积物。

Other remarks :

Biological colonization may be used when a mixture of different types of organisms are present on a stone, and are not distinguishable from each other.

Biofilm : Mono- to multilayered microbial colony attached to surfaces with varying thickness of up to 2mm. Often a biofilm consists of very few cells of different microorganisms embedded in large amounts of extracellular slime. These cohesive often sticky layers may shrink and expand according to the supply of water. Biofilms often create multicoloured biopatina by production of colouring agents.

Higher plants grow sometimes to a considerable size at unexpected locations.

其他备注:

生物定居常用于石材上出现了不同类型生物体的混合，且彼此间很难区分的情况下。

生物膜：指贴在石材表面单层或多层的微生物菌落，它们厚度不同、最大达到2mm。通常，生物膜是由包埋在大量细胞外粘液中的少量不同种类的微生物组成。这些有附着力的黏液层，常常伴随着供水量的变化可发生收缩和膨胀。生物膜经常通过产生染色剂而形成多彩的生物质膜。

高等植物经常在意想不到的位置生长得相当大。

BIOLOGICAL COLONIZATION . 生物侵蚀



This mason wasp nest on a sandstone carved element constitutes a type of **biological colonization**.
砂岩雕刻构件上的梅森黄蜂巢构成的一种生物侵蚀。

India, Fatehpur Sikri, 2003. LRMH / V. Vergès-Belmin
[印度] 费瑟布尔西克里, 2003 年。法国历史建筑实验室 / V.Vergès-Belmin

BIOLOGICAL COLONIZATION . 生物侵蚀



Biological colonization constituted of an association of algae (dark grey), lichen (light grey and orange) and mosses (green cushions, 2cm large).

由藻类 (深灰色)、地衣 (浅灰和橙色)、苔藓 (绿色垫层, 2cm 大) 共同造成的生物侵蚀。

France, Bourges, Cathedral, limestone bank, 2007. LRMH / V. Vergès-Belmin
[法国] 布尔日, 大教堂, 石灰岩护坡。法国历史建筑实验室 / V.Vergès-Belmin

BIOLOGICAL COLONIZATION . 生物侵蚀



Biological colonization (essentially plants and algae) on a limestone masonry.

在石灰岩砖石建筑上的生物侵蚀 (基本上是植物和藻类)。

Malta, Mdina, gate of the old fortified capital, 2005. IMCR / J. Cassar
[马耳他] 姆迪纳, 古老的都城之门, 2005 年。(马耳他姆西达) 砖石和建筑研究所 / J. Cassar

BIOLOGICAL COLONIZATION . 生物侵蚀



Dark grey diffuse **biological colonization** in dolostone and limestone.
在白云岩和石灰岩石材上散布的深灰色生物侵蚀。

Portugal, Tomar, Christ Convent, 2001. Photo of 10m width approximately. LNEC / J. Delgado Rodrigues
[葡萄牙] 托玛, 基督修道院, 2001 年。照片所拍摄的宽度约为 10 米。葡萄牙国家土木工程实验室 / J. Delgado Rodrigues

ALGA 藻类

Definition :

Algae are microscopic vegetal organisms without stem or leaves which can be seen outdoors and indoors, as powdery or viscous deposits (thickness : tenth of mm to several mm). Algae form green, red, brown, or black veil like zones and can be found mainly in situations where the substrate remains moistened for long periods of time. Depending on the environmental conditions and substrate type, algae may form solid layers or smooth films. On monuments, algae are constituted of unicellular to pluricellular clusters, and they never form macroorganisms.

定义：

藻类是一类微小的生物体，没有茎叶的分化，可在室内和室外生长，形成粉状或粘性的沉积物（厚度：十到几个毫米）。藻类形成绿色、红色、棕色或黑色面纱状区域，主要可见于石材基底长期处于潮湿状态的情况下。受环境条件和石材基底类型影响，藻类可能形成固体层壳或平滑薄膜。在古迹遗址上，藻类可形成单细胞至多细胞群落，它们从不形成大型生物体。

Relationship with the substrate :

Algae generally constitute superficial films. They may be found also deeper into the substrate (under scales, in cracks).

与基底的关系：

藻类通常构成表面膜。它们也可能在石材基底更深处找到（在鳞片状剥落层下面、裂缝中）。

Other spelling :

Plural form : *algae*.

其他拼写：

藻类之复数形式。

Not to be confused with :

Algae may be confused with *epilithic* lichen, with fungus and sometimes with soot or mineral deposits soiling the stone surface. If algae are present, wetting and brushing the surface will turn it to green due to the presence of chlorophyll.

易混淆的术语：

藻类容易与石生地衣、真菌混淆，有时也与石质表面的煤烟灰或矿物质堆积的表面脏污混淆。如果存在藻类，由于叶绿素的存在，湿润或刷洗石材表面会使藻类部位变成绿色。

Other remarks :

Several groups of algae may grow on and in stone depending on climate and stone type. Green algae (sometimes red, e.g. trentepohlia) diatoms (usually yellow to brown), and in rare cases red algae may occur. Cyanobacteria (formerly called blue-green algae) are very frequent stone dwellers and can cause black, bluish or even violet stains.

其他备注：

受气候和石材类型的影响，某些类型的藻类可以在石材上甚至其内部生长。绿藻（有时为红色，如橘色藻）、硅藻（通常为黄色至褐色），极少数情况下可能还有红藻。蓝藻（以前称为蓝绿藻）是非常普遍的石材居住者，会在石材上造成黑色、黛青色或紫色的色斑块。

In some cases the stone serves as a source of nutrients. However usually the stone surface is only a solid host for growth.

在某些情况下，石材充当藻类的营养源。但是通常情况下，石材表面仅是其生长的固体宿主。

ALGA . 藻类



Green algae growing on a limestone buttress.
生长在石灰岩拱壁上的绿藻。

France, Thouars, Eglise SaintMédard, 1994. Dimension stones 30 cm thick. LRMH / G. Oriol
[法国], 图阿尔, 埃格利斯圣赫勒拿, 1994年。石料尺寸: 30厘米厚。法国历史建筑实验室 / G.Oriol

ALGA . 藻类



Red algae on a bas-relief sandstone sculpture.
生长在砂岩浅浮雕上的红藻。

Cambodia, Angkor, Chao Sey, 2003. LRMH / V. Vergès-Belmin
[柬埔寨] 吴哥, 周萨神庙, 2003年。法国历史建筑实验室 / V.Vergès-Belmin

ALGA . 藻类



Green algae developing on a lime render on stone masonry.
生长在砖石结构建筑石灰粉刷层上的绿藻。

Czech Republic, Nedvedice, South Moravia, Pernstejn Castle, 2004. National Heritage of the Czech Rep. / D. Michoinova
[捷克共和国] 内德维迪采, 南摩拉维亚, 佩恩什特因古堡, 2004年。捷克共和国国家文化遗产。/D.Michoinova

LICHEN
地衣

Definition :

Vegetal organism forming rounded millimetric to centimetric crusty or bushy patches, often having a leathery appearance, growing generally on outside parts of a building. Lichen are most commonly grey, yellow, orange, green or black and show no differentiation into stem, root and leaf.

定义：

植物有机体形成毫米至厘米级的圆形硬壳或浓密的斑块。通常具有皮质的外观，一般生长在建筑物外部。地衣一般为灰色、黄色、橙色、绿色或黑色，茎、根和叶没有分化。

Relationship with the substrate :

A lichen is composed of a thallus, eventually bearing fruiting bodies, generally developed on the stone surface, and rhizines that may penetrate deep into the stone (tens to several millimeters).

与基底的关系：

地衣由叶状体组成，最终形成子实体。通常在石材表面，其假根会穿入石材内（几十到几毫米）。

Sub-type(s) :

Lichen usually are divided into crustose, folioid and epilithic types. When their thallus is mainly inside the stone, they are called endolithic lichen.

子类型：

地衣 通常分为壳状地衣、叶状地衣和石生地衣。当它们的叶状体主要在石材内部生长时称为石内生地衣。

Not to be confused with :

Moss, alga, mould : see those terms.

易混淆的术语：

苔藓，藻类，霉菌：见这些术语。

Other remarks :

All lichen represent symbiotic growth of a fungus and green alga or a cyanobacterium. Lichen is a common feature on outdoor stone and is generally best developed under clean air conditions, but growth may be facilitated by certain pollutants such as nitrogen oxides derived primarily from vehicle pollution or agriculture. Former lichen growth may be detected by typical pitting structures (see this term) or lobate or mosaic patterns and even depressions.

其他备注：

地衣是真菌与绿藻或蓝细菌的共生体。地衣是户外石材的一个普遍特征，通常在洁净空气下生长的最好，但是某些污染物，如主要来源于车辆排放或农业排放的氮氧化物也会促进其生长。以前的地衣生长可以通过典型的点蚀结构（见该术语）、叶状侵蚀或是镶嵌侵蚀，甚至是凹陷侵蚀来检测。

LICHEN . 地衣



Lichens on a marble figure.
大理石雕像上的地衣。
Switzerland, Pontresina, Cemetery,
1993. KDC Olching/S. Simon
[瑞士] 蓬特雷西纳, 公墓, 1993 年。
(德国奥尔兴) 文物保护咨询实验室
/ S.Simon

LICHEN . 地衣



Lichens on a marble figure.
大理石雕塑上的地衣。
Portugal, Évora, Cathedral, 2001.
Pieces of 1.5m height approximately.
LNEC / J. Delgado Rodrigues
[葡萄牙] 伊奥拉大教堂, 2001 年。
每件大约 1.5 米高。葡萄牙国家土木
工程实验室 / J. Delgado Rodrigues

LICHEN . 地衣



Lichen on a coarse grained granite monolith.
粗粒花岗岩独块巨石上的地衣
Portugal, Évora, Almendres Cromlech,
2004. Monolith 2m high approximately.
LNEC / J. Delgado Rodrigues
[葡萄牙] 埃武拉, 巨石阵, 2004 年。
独块巨石高约 2 米。葡萄牙国家土木
工程实验室 / J. Delgado Rodrigues

LICHEN . 地衣



Folious lichen (Ramalina sp.)
growing on a granite dimension
stone.
生长在花岗岩块石上的叶状地衣

France, Penmarc'h, Saint-Nonna
church, 1991. Picture small side :
15cm. LRMH DIA00091617 / J.P.
Bozellec
[法国] 庞马尔, 圣诺纳大教堂,
1991 年。照片小侧面: 15 厘米。法
国历史建筑实验室 DIA00091617 /
J.P. Bozellec

LICHEN . 地衣



White folious lichen on a basaltic Tiki.
玄武岩上的白色叶状地衣。
French Polynesia, Marqueses Islands, Atuona, 2006. LRMH / G. Oriol
[法属波利尼西亚] 马奎塞斯群岛, 阿托奥纳, 2006 年。法国历史建筑实验
室 / G. Oriol



MOSS
苔藓

Definition :

Vegetal organism forming small, soft and green cushions of centimetric size. Mosses look generally like dense micro-leaves (sub- to millimetric size) tightly packed together. Mosses often grow on stone surface open cavities, cracks, and in any place permanently or frequently wet (masonry joints), and usually shady.

定义:

植物有机体形成厘米级别的小且柔软的绿色垫层。苔藓一般看起来像浓密的挤在一起的微形树叶(亚毫米至毫米级)。苔藓经常长在石材表面孔隙、裂隙,以及任何永久或频繁潮湿(砖石砌体接点)的、通常阴凉的地方。

Relationship with the substrate :

Mosses develop brown rhizines and may create a micro-soil zone between the stone surface and the green part.

与基底的关系:

苔藓长出的褐色假根,会在石材表面和绿色部分之间的区域形成微型土壤。

Not to be confused with :

- *Lichen*, which are composed of a thallus and do not have the typical organisation of micro-leaves tightly packed together.
- *Algae* : Algae are green during the humid season, but look different from mosses (viscous consistency, absence of micro-leaves).

易混淆的术语:

- 地衣,是由叶状体组成,其微型树叶紧紧地挤在一起,不具备典型的“叶”的结构。
- 藻类. 藻类在湿润季节为绿色,但是看起来和苔藓不一样(粘稠,没有叶的结构)。

Other remarks :

Mosses often change morphology and colour under lack or excess of water. During dry periods of the year, the cushions shrink, become harder and brittle, and their colour turns to brown.

其他备注:

苔藓通常在缺水或饱水条件下有形貌和颜色的变化。每年的干旱期间,绿色垫层收缩,变得越来越硬和脆弱,它们的颜色也变为褐色。

MOSS . 苔藓



Different kinds of **mosses** developed on sandstone.
砂岩上生长的不同种类的苔藓。

Sweden, Stockholm. Skanska / M. Klingspor-Rotstein
[瑞典] 斯德哥尔摩, (瑞典斯德哥尔摩) 斯堪斯卡建筑承包公司 / M. Klingspor-Rotstein

MOSS . 苔藓



Chalk sculpture, showing **mosses**, which appear brownish (typical aspect during the dry season), and are developed on the upper part of the figure.

生长在白垩岩雕塑上部的苔藓, 彼时呈现为褐色 (干旱季节中的典型特征)。

France, Amiens (Somme, 60). Notre-Dame cathedral, 1991. Head size : 20 cm. LRMH / V. Vergès-Belmin

[法国] 亚眠 (索姆, 60), 圣母大教堂, 1991 年。头部尺寸: 20 厘米。法国历史建筑实验室 / V. Vergès-Belmin

MOSS . 苔藓



Moss on the joints of a granite ashlar.
生长在花岗岩琢石接缝处的苔藓。

Scotland, Aberdeen, St Nicholas Kirk. Pers. Archive Réf. N°30 / I. Maxwell
[苏格兰] 阿伯丁, 圣尼古拉斯柯克。个人档案 Réf. N° 30 / I. Maxwell

MOULD

霉菌

Definition :

Microscopic fungus which colonies, to the naked eye, look like a downy film or a network or star-like millimetric patches of filaments of diverse colours (white, grey, black).

定义：

真菌菌落，肉眼看起来像一个毛绒绒的膜或者一个网格又或者像毫米级别的五颜六色的星形丝状斑块（白色，灰色，黑色）。

Relationship with the substrate :

Moulds, by their filamentous and/or chain-like growth may penetrate several centimeters into the stone substrate.

与基底的关系：

霉菌，通过它们的丝状和 / 或链状生长穿透到石材基底几厘米深处。

Equivalent term to be found in other glossaries :

Fungi.

其他术语中的相近词：

真菌

Other spelling :

Mold (US)

其他拼写：

Not to be confused with :

- *Algae*, which form powdery or viscous layers and are only found in areas which remain humid for long periods of time.
- *Lichen*, which form generally crusty to bushy patches. Lichen coverings are thicker than mould coverings.
- Salt *efflorescences*, and initial stages of calcite encrustations, which are both mineral features.

易混淆的术语：

- 藻类，形成粉状或黏性层，只能在长期保持湿润的区域发现。
- 地衣，一般形成有硬壳的浓密的斑块。地衣覆盖物比霉菌覆盖物厚。
- 盐霜，以及方解石矿化沉淀层的初始阶段，这二者都是矿物特征。

Other remarks :

Mould often creates serious damage by chemical and mechanical action and heavy discolouration. As the metabolism of mould necessitates organic substrates mould often develops on algal metabolic products found on stone. Organic pollution of the atmosphere also favours mould growth.

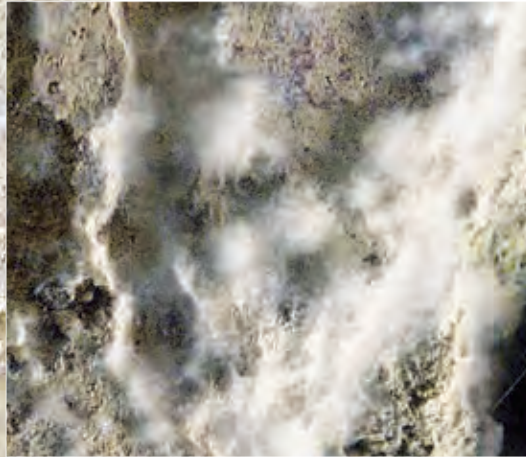
其他备注：

霉菌经常通过化学和机械作用造成严重的破坏，以及褪色和变色。由于霉菌的新陈代谢需要有机基质，所以霉菌常在石材上发现的藻类代谢产物上生长。大气的有机污染物也有利于霉菌的生长。

MOULD . 霉菌



Down-like white **mould** on a limestone block.
灰岩石块上的绒毛状白色霉菌。



France, les salles Lavauguyon, Sainte- Eutrope church, 2008. Photo large side : 40cm. / V. Legoux
[法国] 圣尤特鲁普教堂盥洗室, 2008年。照片的长边: 40厘米。/ V.Legoux

PLANT
植物

Definition :

Vegetal living being, having, when complete, root, stem, and leaves, though consisting sometimes only of a single leafy expansion (e.g. tree, fern, herb).

定义:

高等植物，有完整的根、茎和叶分化，尽管有时只由一片树叶单叶扩张而成（例如 树、蕨类、草本植物）。

Equivalent term to be found in other glossaries :

Higher plant, vegetation.

其他术语中的相近词:

高等植物，植被

Other remarks :

If buildings are not maintained, *plants* will eventually colonize places where water is accessible, extending roots into joints and fractures. As the roots grow they can widen these joints and cracks and break the stone. They may also contribute to keep areas damp. This in turn, exacerbates other processes such as salt deterioration.

其他备注:

如果不对建筑物进行维护，植物最终会定植到建筑物所有有水的地方，并将根系延伸到接缝和裂缝中。随着根系的长大，它们可以扩大这些接缝和裂缝而使石材破裂。植物也可能有助于保持区域潮湿。这反过来又加剧了其他过程，如盐的劣化作用。

PLANT . 植物



Higher **plant** (*Tetrameles nudiflora*) growing on a temple.
在一座寺庙建筑上生长的高等植物 (四数木).

Cambodia, Angkor, Chao Sey, 2003. ICBM / W. Krumbein
[柬埔寨] 吴哥, 塔布隆寺, 2003, (德国奥尔登堡) 海洋环境化学与生物研究所 / W. Krumbein

PLANT . 植物



Plants growing on sandstone basalt masonry.
在砂岩、玄武岩砖石砌筑体上生长的植物。

Czech Republic, Central Bohemia, Bezdez Castle, 2003. Plant
0,1 - 0,2 m. Nat. Heritage of the Czech Rep. / D. Michoinova.
[捷克共和国] 波西米亚中部, 贝兹杰兹城堡, 2003年。植物
约 10~20 厘米高。捷克共和国国家文化遗产 / D. Michoinova

PLANT . 植物



Higher **plant** (Fig tree) growing on a roof.
在屋顶生长的高等植物 (无花果树).

France, Capestang (Aude), Castle (roof), 2005. Length of a
stone, c. 35 cm. CICRP/ J.M. Vallet
[法国] 卡佩斯唐 (奥德河), 城堡 (屋顶), 2005年。石材
长度约 35 厘米。(法国马赛) 文物保护及修复跨学科中心 / J.M.
Vallet

ENGLISH / CHINESE
英语 / 中文

		页码			页码
Abrasion	磨损、擦伤	32	Gap	间隙、豁口、离缝	36
Alga	藻类	66	Glossy aspect	镜面光泽	54
Alteration	变化	8	Graffiti	涂鸦	56
Alveolization	表面凹窝	28	Granular disintegration	粒状剥落	20
Biofilm	生物质膜	52	Hair crack	发丝状裂纹	10
Bio.Colonization	生物侵蚀	64	Impact damage	撞击损伤	32
Black Crust	黑色覆盖物	42	Keying	刮、刺、凿	32
Bleaching	褪色	46	Lichen	地衣	68
Blistering	鼓包胀裂	14	Loss of components	成分损失	30
Bursting	凹状破裂	16	Loss of matrix	基质损失	30
Chalking	粉化	20	Mechanical Damage	机械损伤	32
Chipping	削片状	22	Microkarst	微溶蚀	34
Colouration	染色	46	Missing part	残缺部分	36
Concretion	凝固物、凝结物	50	Moist area	潮湿区域	46
Contour Scaling	轮廓线剥落	26	Moss	苔藓	70
Coving	局部凹窝	28	Mould	霉菌	72
Crack	裂隙	10	Patina	氧化膜、皮壳	58
Craquele	网状裂纹	10	Peeling	表面层剥落	24
Crumbling	碎屑状剥落	20	Perforation	穿孔	38
Crust	覆盖层	42	Pitting	点蚀	40
Cut	切、割、削	32	Plant	植物	74
Damage	微劣化(损伤)	8	Powdering	粉末化	20
Decay	弱劣化(侵蚀)	8	Roughening	粗糙化	30
Deformation	变形	12	Rounding	磨圆	30
Degradation	强劣化(损坏)	8	Sanding	沙化	20
Delamination	层状剥落	18	Scaling	鳞片状剥落	26
Deposit	堆积物	44	Scratch	刮擦	32
Deterioration	劣化	8	Soiling	表层脏污	60
Dif.Erosion	差异侵蚀	30	Spalling	层裂	26
Discolouration	变色	46	Splintering	尖细片状	22
Disintegration	颗粒状剥落	20	Splitting	劈裂缝	10
Efflorescence	盐霜、盐华	48	Staining	染污	46
Encrustation	矿化沉淀层	50	Star Crack	星状裂纹	10
Erosion	侵蚀	30	Subflorescence	次表层盐霜	62
Exfoliation	页状(多层)剥落	18	Sugaring	砂糖化	20
Film	薄膜层	52	Weathering	风化	8
Flaking	鳞片状剥落	26			
Fracture	破裂、断裂缝	10			
Fragmentation	片状剥落	22			



凹状破裂	Bursting	16	粒状剥落	Granular disintegration	20
薄膜层	Film	52	裂隙	Crack	10
变化	Alteration	8	鳞片状剥落	Scaling	26
变色	Discolouration	46	轮廓线剥落	Contour Scaling	26
变形	Deformation	12	霉菌	Mould	72
表面凹窝	Alveolization	28	磨损, 磨蚀	Abrasion	32
表面层剥落	Peeling	24	磨圆	Rounding	30
表面脏污	Soiling	60	凝固物、凝结物	Concretion	50
薄片状剥落	Flaking	26	片状剥落	Fragmentation	22
残缺部分	Missing part	36	劈裂纹	Splitting	10
层裂	Spalling	26	破裂、断裂缝	Fracture	10
层状剥落	Delamination	18	强劣化(损坏)	Degradation	8
成分损失	Loss of components		切、割、削	Cut	32
差异侵蚀	Differential Erosion	30	侵蚀	Erosion	30
潮湿区域	Moist area	46	染色	Colouration	46
穿孔	Perforation	38	染污	Staining	46
次表层盐霜	Subflorescence	62	弱劣化(损伤)	Decay	8
粗糙化	Roughening	30	沙化	Sanding	20
点蚀	Pitting	40	砂糖化	Sugaring	20
地衣	Lichen	68	生物侵蚀	Biological Colonization	64
堆积物	Deposit	44	生物质膜	Biofilm	52
发丝状裂纹	Hair crack	10	碎屑状剥落	Crumbling	20
粉化	Chalking	20	苔藓	Moss	70
粉末化	Powdering	20	褪色	Bleaching	46
风化	Weathering	8	涂鸦	Graffiti	56
覆盖层	Crust	42	网状裂纹	Craquele	10
鼓包胀裂	Blistering	14	微劣化(伤损)	Damage	72
刮、刺、凿	Keying	32	微溶蚀	Microkarst	34
刮擦	Scratch	32	削片状	Chipping	22
黑色覆盖层	Black Crust	42	星状裂纹	Star Crack	10
间隙、豁口、离缝	Gap	36	盐霜、盐华	Efflorescence	48
尖细片状	Splintering	22	氧化膜、皮壳	Patina	58
镜面光泽	Glossy aspect	54	页状(多层)剥落	Exfoliation	18
机械损伤	Mechanical Damage	32	藻类	Alga	66
基质损失	Loss of matrix	30	植物	Plant	74
局部凹窝	Coving	28	撞击损伤	Impact damage	32
颗粒状剥落	Disintegration	20			
矿化沉淀层	Encrustation	50			
劣化	Deterioration	8			

- Anonyme, 1999 : Commission européenne, DGX, projet Raphaël 99/II.2.a.54/F, file S12.81329, CRISTAL, Sculpture, Définitions en français, C2RMF, 6 rue des pyramides 75041 Paris Cedex 01.
- Arnold A., Jeannette D. & Zehnder K. 1980 : ICOMOS GP 80 Proposal for a terminology of weathering phenomena on building stones.
- De Henau P., Tourneur F. & J. Barlet 1998/1999 : Terminologie descriptive et iconographie des altérations de surface chez les matériaux pierreux. Bull. Com. Royale des monuments, sites et fouilles, T16-2, p. 45-96
- De Vigan J. et al., 1990 : Dicobat : Dictionnaire général du bâtiment/Ris-Orangis : Ed. Arcature, cop., 957 p.
- Fitzner B., Heinrichs K. & Kownatzki R., 1995 : Weathering forms-classification and mapping, Verwitterungsformen Klassifizierung und Kartierung. Denkmalpflege und Naturwissenschaft, Natursteinkonservierung 1. Ernst & Sohn, Berlin, p.41-88.
- Fitzner B., Heinrichs K., 2002 : Damage diagnosis on stone monuments - weathering forms, damage categories and damage indices.- In Prikryl, R. & Viles, H. (ed.): Understanding and managing stone decay, Proceeding of the International Conference "Stone weathering and atmospheric pollution network (SWAPNET)", Charles University, Prague, The Karolinum Press p.11-56.
- Franke L., Schumann I., Van Hees R., Van der Klugt L., Naldini S., Binda L., Baronio G., Van Balen K., Mateus J., 1998 : Damage Atlas, Classification of Damage Patterns Found in Brick Masonry. Protection and Conservation of European Cultural Heritage, Research Report European Commission, N° 8, vol.2. Stuttgart: Frauenhofer IRB Verlag.
- Henriques M.A., Delgado-Rodrigues J., Aires-Barros L., Proença N., 2004 : Materiais Pétreos e similares : terminologia das formas de alteração e degradação. In : ICT Informação técnica, Patologia e reabilitação das construções, ITPRC 2, 39p.
- Grimmer, Ann E., ed. 1984 : A Glossary of Historic Masonry Deterioration Problems and Preservation Treatments. National Park Service Preservation Assistance Division : Washington, DC.
- ICOMOS Stone Committee newsletter, 1991 : Unpublished document.
- Normal 1/88, 1990 : "Alterazioni macroscopiche dei materiali lapidei: lessico" "Macroscopic alteration of stone materials : glossary" Comas Graphica, Rome, 36p.
- RILEM Commission 25-PEM, 1980 : S.I. : Essais recommandés pour mesurer l'altération des pierres et évaluer l'efficacité des méthodes de traitement/Recommandations provisoires. Matériaux et constructions, Bordas-Dunod, ISSN 0025-5432, vol. 13, No 75, p. 175-253.
- Van Hees R.P.J., Naldini S., 1995 : Masonry Damage Diagnostic System, International Journal for Restoration of Buildings and Monuments, Vol. 1, No.6, November 1995, p.461-473.
- VDI 3798, 1998 : Untersuchung und Behandlung von immissionsschädigenden Werkstoffen, insbesondere bei kulturhistorischen Objekten. Die graphische Dokumentation. VDIRichtlinien, p.1-27.
- 作者不详, 1999年 : 欧盟委员会, DGX, 拉斐尔计划 99/II.2.a.54/F, 文档编号 S 12.81329, CRISTAL, 雕塑, 法语的术语定义, 法国博物馆研究与修复中心, 巴黎金字塔街 75041 号 Cedex 01。
- 阿诺德 A., 简尼特 D. 和 泽恩德尔 K. 1980 : ICOMOS GP 80 关于建筑石材风化现象术语表的建议。
- De Henau P., Tourneur F. & J. Barlet 1998/1999年 : 石质材料表面的形貌描述与风化术语, 皇家委员会的建筑、遗址与发掘简报社, 第 16 集第 2 册, 45-96 页。
- De Vigan J. et al., 1990 年, Dicobat: 土木工程大辞典 / 里桑 : Arcature 出版社, 957 页。
- Fitzner B., Heinrichs K. 和 Kownatzki R., 1995 年: 风化形式分类和制图, 《天然石材保护》第一卷之文物保护和自然科学, 第 41-88 页, 柏林恩斯特和索恩出版社。
- Fitzner B., Heinrichs K., 2002 年 : 石造古迹遗址的损伤诊断 - 风化形式、损伤类别和损伤指数。Prikryl, R. & Viles, H. : 《石材风化的认知和管理》国际会议论文集, “石材风化与大气污染网络”, 布拉格查尔斯大学, 卡罗琳出版社, 第 11-56 页。
- Franke L., Schumann I., Van Hees R., Van der Klugt L., Naldini S., Binda L., Baronio G., Van Balen K., Mateus J., 1998 年 : 砖砌建筑病害图谱、病害模式分类。欧洲文化遗产保护, 欧洲委员会研究报告, 第 8 集, 第 2 卷, 斯图加特, 弗劳恩霍夫 IRB 出版社。
- Henriques M.A., Delgado-Rodrigues J., Aires-Barros L., Proença N., 2004 年 : 岩石和类似材料的变化、劣化术语。发表在《信息技术》 : 信息和通信技术在建筑病害和保护中的应用, ITPRC 2, 39p。
- Grimmer, Ann E., 1984 主编 : 历史砖石建筑的劣化问题和保护处理词汇表。国家公园管理局保护技术部, 华盛顿特区。
- ICOMOS 石质委员会通讯, 1991 年, 未发表的文件。
- 标准 1/88, 1990 年 : “石质材料宏观变化 : 术语表”, Comas Graphica, 罗马, 36 页。
- 国际建筑材料与结构实验室暨专家联盟, 1980 年 : 石质材料的风化和保护处理效果评估的推荐测试方法 / 临时推荐。材料与建筑, 博尔达 - 迪诺出版社, ISSN 0025-5432, 第 13 卷, 第 75 辑, 第 175-253 页。
- Van Hees R.P.J., Naldini S., 1995 年 : 砖石建筑病害诊断系统, 国际古迹遗址修复期刊, 第 1 卷, 第 6 期, 1995 年, 第 461-473 页。
- VDI 规范 3798, 1998 年 : 空气污染物对材质, 特别是文物古迹本体影响的调查和处理。图示化文档。德国工程师协会规范, 第 1-27 页。



About ICOMOS

The International Council on Monuments and Sites (ICOMOS) was founded in 1965 at Warsaw (Poland), one year after the signature of the International Charter on the Conservation and Restoration of Monuments and Sites, known as the "Venice Charter".

ICOMOS is an association of over 9000 cultural heritage professionals present in over 120 countries throughout the world, working for the conservation and protection of monuments and sites - the only global non-governmental organization of its kind.

It benefits from the cross-disciplinary exchange of its members - architects, archaeologists, geologists, art historians, engineers, historians, planners, who foster improved heritage conservation standards and techniques for all forms of cultural properties: buildings, historic towns, cultural landscapes, archaeological sites, etc.

ICOMOS is officially recognized as an advisory body to UNESCO, actively contributing to the World Heritage Committee and taking part in the implementation of the World Heritage Convention. It also runs 28 specialised International Scientific Committees on a variety of subjects.

The ICOMOS International Secretariat and its specialized Documentation Centre are located in Paris (France)-for further information consult our web site.

有关 ICOMOS（国际古迹遗址理事会）的情况 / 信息

在国际古迹遗址保护修复宪章即著名的“威尼斯宪章”签署一年后，1965年国际古迹遗址理事会在波兰华沙成立。

ICOMOS 是由分布在全球 120 多个国家的超过 9000 多名从事文化遗产保护的专业人员成立的协会，是该领域唯一——一个世界性的非政府组织。

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ICOMOS 国际秘书处和文献中心设在法国巴黎，详细信息请查询我们的网址。

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后记

《石质文物劣化模式图解术语表（英语 - 汉语版）》在陕西省文物局的大力支持下、在陕西省文物保护研究院和砖石质文物保护国家文物局重点科研基地同事们的共同努力下，历经近三年的翻译，即将出版。在此，对本术语表的全体翻译、校审人员，以及对本术语表的翻译进行过指导、帮助的各位专家、老师和同事表示最诚挚的感谢！

本书是一本具有世界影响的关于石质文物劣化模式、过程和特点的、规范的术语表，并配有内容丰富的石质文物劣化模式照片。自其英语 - 法语版出版面世以来，先后被翻译成 50 多种语言，已逐步成为全世界从事石质文物保护工作人员之间交流的通用术语。

在“砖石质文物保护国家文物局重点科研基地”马涛主任的组织下，《石质文物劣化模式图解术语表》的翻译团队，在忠实原著的术语、定义和架构体系的基础上，综合参考了本术语表的英语 - 法语版、英语 - 德语版、英语 - 日语版相关术语、定义和内涵的解释和表述，同时结合我国在石质文物保护修复研究和实施中已积累的相关知识和常用说法，兼顾中文习惯，字斟句酌、七易其稿，最终完成了汉语版的翻译。译者冀盼这部《石质文物劣化模式图解术语表（英语 - 汉语版）》，能以专业的语言尽可能准确地将原著的内容传递给我国的石质保护工作者和广大读者，让石质文物保护研究跨语言、跨国界的沟通交流更加准确、规范。

在本书的翻译过程中，得到了“砖石质文物保护国家文物局重点科研基地”学术委员会各位专家的悉心指导，得到了 ISCS 前任主席 Stefan Simon 博士、Jean-Marc Vallet 秘书长，以及 ISCS 现任秘书长 Ann Bourges 博士的热情帮助。同时，“中法合作茂陵石刻保护合作研究项目”、“陕西省文物局 2018 年度科研课题：陕西砂石质文物防风化保护研究”、以及“国家重点研发计划：石窟文物本体风化病害评估系统及保护技术研究项目（项目编号：2019YFC1520500）”等科研工作的实施，也对本术语表的翻译、出版提供了促进和支持，在此一并致谢！

译者

2020 年 5 月