



## **The "Pierre Jaune" of Neuchâtel, Switzerland: a multidisciplinary approach of this building stone**

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Since the Roman period, and up until recently, the "Pierre Jaune" of Neuchâtel (PJN) has been used as a building stone. Today the quarries are not longer in use. Although the PJN is an ideal building stone offering good resistance to weathering, its decreasing availability has meant it has become necessary to preserve it. We therefore present a multidisciplinary study encompassing aspects of sedimentology, mineralogy, geochemistry in addition to physical and mechanical tests. This approach will be helpful in understanding the rocks durability whilst allowing us to develop ideas with regards to its conservation.

These analyses were carried on samples from natural outcrops and from small cores drilled in monuments from the 10th to the 19th century. These samples displayed different kinds of superficial alteration (black crusts, patinas, microorganisms and differing roughness due to cleaning methods).

The PJN is a limestone of Hauterivian age (Cretaceous). In the outcrops the PJN is characterised by a variable microfacies spectrum displaying bioclastic to oolitic environmental characteristics. Mineralogically the PJN is mainly composed of calcite (90-95 %) with small amounts of clay minerals, quartz and goethite which gives the yellow colour to the stone.

As a geological material, the PJN is a very heterogeneous, but in general, the stones selected to built buildings are more homogeneous and shows an [average] porosity of 14%, a slow capillary absorption of  $4 \text{ mg/cm}^2 \cdot \text{min}^{1/2}$ ,  $0.2 \text{ cm/min}^{1/2}$  and a very low capillary saturation (3%). Because of its low clay minerals content, the PJN spe-

cific surface is reduced ( $3\text{m}^2/\text{g}$ ), therefore the water vapour adsorption is negligible ( $\approx 0.005\text{ g/g}$  at a 97% relative humidity). Mechanically the PJN is very stable; low hydraulic dilatation ( $0.45\text{ mm/m}$ ), low thermal dilatation ( $9\text{K}/^\circ\text{C}$ ) and good compressive strength ( $40\text{N/mm}^2$ )

This study highlights why the PJN constitutes a very good building stone. However conservation efforts must take into account its facies heterogeneity which may require special consideration especially when it comes to cleaning and restoring the rock.