

The Wrong Stone

the english houses of parliament - a lesson from history

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Stone buildings have always taken pride of place in the architectural heritage of Britain, none more so than the Palace of Westminster, built between 1840 and 1860, when the British Empire was at the height of its wealth and power.

The elaborately carved facades of the Houses of Parliament, as this building is better known, can hardly fail to impress a visitor to London but, behind this expression of grandeur which is presented to the world, there is another story to be told; one that is relevant to architects, stonemasons and geologists concerned with the selection and use of building stone today.

After the destruction of the old parliamentary buildings by fire in 1834, a national competition was held to design a new set of buildings, with the only proviso being that these should be in the Elizabethan or Gothic style. The eminent architect Sir Charles Barry emerged as the winner from 97 entries and one of his first tasks was to locate a suitable building stone which would satisfy the combined criteria of durability and relative ease of working.

For these reasons, Portland stone, a hard oolitic limestone from Dorset on the south coast, had already acquired a reputation in the capital, where it had been widely used in churches and other buildings over a hundred years old and the London Guild of Stonemasons advocated that Portland stone be used for the new Houses of Parliament. However, in response to new scientific evidence suggesting that limestones might not be resistant to the increasingly sulphurous London atmosphere, it was considered appropriate to investigate a full range of alternatives, together with an assessment of their relative costs.

A Select Committee comprising the architect, Sir Charles Barry, a leading mason/sculptor and two eminent geologists of the day, was duly appointed and a tour of 102 quarries together with an inspection of associated reference buildings followed, complemented by a series of laboratory tests. The final shortlist comprised Portland stone, the renowned Darley Dale stone (a hard, medium grained Carboniferous sandstone) and three dolomitic limestones of uncertain pedigree.

One of the primary considerations appeared to be the selection of a material that was crystalline and possessed a chemical composition near to that of the mineral dolomite, a calcium-magnesium carbonate. Scientific analyses had shown that dolomite was very resistant to the effects of dilute acid and a dense crystalline structure provided minimal surface area upon which chemical agents could act.

Although the scientific or, strictly speaking, chemical reasoning applied at the time still holds true, it seems that the commissioners, despite their professional standing, did not apply their field observation and surveying skills to good effect when finally selecting the dolomitic Bolsover Moor stone.

It was not long after the laying of the foundation stone that it became clear that Bolsover Moor quarry was unable to provide the volume of stone nor blocks of a sufficient size to satisfy the design. Persisting with their faith in modern analytical science, the commissioners turned to the nearby Mansfield Woodhouse quarry, again with the same results and then to Anston in South Yorkshire, from which all the stone was eventually supplied.

All seemed well until, a few years later, the stonework began to crumble at an alarming rate, especially the intricately carved details, and in 1860 Charles Dickens, the astute social observer, felt compelled to describe the material as being “the worst ever used in the capital”, having seen the need for constant, expensive repair.

Whilst in hindsight it is easy to criticise, the commissioners themselves pronounced that “buildings which are highly decorated afford a more severe test of durability of any given stone”, a consequence of the increased surface area presented to the elements and, heeding their own advice, a much closer investigation of the in situ physical characteristics of the dolomitic limestones would have revealed the following.

Sections through many of the quarried and natural exposures of the dolomitic limestones in Derbyshire and South Yorkshire display sequences of massive, horizontal and laterally persistent beds up to 900mm or more thick. It is

[Back to Table of Contents](#)
[Stone Foundation Home Page](#)

undoubtedly these that provide the best building stone. However, this is the exception and not the rule. Overall, the impression is one of rock faces that are disrupted, often at oblique angles, by joints and fissures and with extreme brecciation of the thinner beds.

Apart from these obvious faults which limit the block size available, a close examination with the naked eye or hand lens reveals that much of the stone contains small crystal lined cavities, is often minutely cellular and on weathered surfaces, randomly orientated calcite veins stand proud. To the architect, quarryman or mason, these details may, understandably, be overlooked but to the geologist these provide clues which indicate that an apparently sound block of stone contains minute cracks and voids which will open up and fail when fully exposed to the weather.

Walking around the pristine exterior of the building today, there is little evidence to suggest that approximately 50% of the visible masonry has been replaced during the last 130 years but, hidden from public view and cameras, the stonework of the inner courtyards is still severely blackened. Here, despite a sheltered position, many of the plain ashlar blocks, simple mouldings and string courses, that have failed without obvious reason, are preserved in an advanced state of decay.

Numerous ancient buildings constructed from similar dolomitic limestone survive in good condition today but, almost without exception, their masonry is very plain and functional. Selection of poor quality material at the quarry face was largely blamed for the decay at the Houses of Parliament. With the sheer volume of material supplied, the apparent lack of professional supervision at the quarry and the quirks of human nature, where price work and profit is concerned, there is no doubt an element of truth to this argument. It is, however, very difficult to escape the notion that the commissioners chose not to rely on much of the evidence presented before their own eyes, from both buildings and the quarries themselves.

The Anston quarry ceased production in 1913 but one can still see the occasional face, complete with evidence of inherent structural defects, where stone was once extracted using the traditional method of plug and feathers.

As for the Houses of Parliament itself, Clipsham stone has been used for repairs since the second world war and, given that it is an oolitic and shelly limestone with a totally different composition, it blends in remarkably well. For building purposes, dolomitic limestone has been virtually consigned to history, with only a handful of quarries supplying small amounts of material for restoration and for vernacular walling stone.

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[Back to Table of Contents](#)
[Stone Foundation Home Page](#)