An archive photograph of East Midlands geology from the British Geological Survey collection.

The Hemlock Stone

One of the East Midlands' most well-known geological landmarks, the Hemlock Stone is of course very familiar to Mercian Geologist readers, having adorned the cover of each individual part of Volumes 13 and 14. The Hemlock Stone now sits proudly in the centre of the Society's new logo, so it seems fitting to choose the Stone as the subject of this issue's 'From the Archives'.

Previous archive features have used images from the British Geological Survey's own collection of survey photographs. BGS is also the custodian of the British Association for the Advancement of Science archive of geological photos, which numbers over 9000 images dating from 1861 to 1945. This photo of the Hemlock Stone, taken in 1890, is from that collection. Like almost all photos or drawings of the Stone, it shows the pillar from the south, its narrowest and most spectacular perspective. The pillar is in fact several metres broad along its north-south axis, but it is an imposing feature from any viewpoint.

The Hemlock Stone (BAAS photo #1488, British Geological Survey Library). We have no information on the people in the photograph, nor on the event they were attending. Can any readers help? If so, we will publish a note in the next issue.

The Society logo

Unusually for a society or organisation, the EMGS has thrived since its formation in 1964 without a logo. But the Society's imminent guidebook on the geology of the East Midlands has required a logo to go on the cover alongside that of our co-publishers, the Geologists' Association. Accordingly, members were asked for ideas, which were then considered by Council. Hammers were rejected on conservation grounds, mammoths are used elsewhere and the choice appeared to be which fossil was most identified with the East Midlands. Charnia was the front runner, but a draft appeared to be too botanical, the palaeontologists lost to the sedimentologists and the Hemlock Stone was chosen. Various modern forms of lettering were tried but eventually a traditional form of letters encircling the stone were chosen in a similar arrangement as used by the Geologists' Association.

Looking back in the Mercian Geologist, the secretary was surprised to find only a single reference to the Hemlock Stone - in Volume 1 part 1, of 1964, in a report by Dr Frank Taylor (still an active member of the Society) of an excursion he led to localities in the area west of Nottingham. The Stone gets just six lines in the report. Happily, Frank Taylor's views expressed in 1964 are still supported by geologists currently working in the area.

The Hemlock Stone lies on the eastern side of Stapleford Hill (at NGR SK499386), to the west of Nottingham. The hill is underlain by Permo-Triassic sandstones of the Sherwood Sandstone Group. The Lenton Sandstone Formation (formerly Lower Mottled Sandstone) forms much of the slopes, with the basal beds of the Nottingham Castle Sandstone Formation (formerly Bunter Pebble Beds) forming a thin capping on the Hill. Almost all descriptions mention that the Hemlock Stone is composed of 'Bunter Pebble Beds', but the reality is rather different. The sandstone platform on which the pillar stands, plus the lowermost 2 m part of the pillar itself (up to the heads of the tallest figures in the photograph) is in fact in the Lenton Sandstone Formation, a deep red-brown, very fine-grained cross-stratified sandstone. The rest of the pillar (abou 7 m) is in the overlying Nottingham Castle Sandstone. This is a yellowish grey, medium to coarse-grained, cross-stratified sandstone with common large mudstone clasts. Extraformational quartzite pebbles, typical of this sandstone, become common towards the top of the pillar. The Nottingham Castle Sandstone part of the pillar is strongly cemented by the mineral baryte (barium sulphate), but the underlying Lenton Sandstone Formation is not, and retains the characteristic, very friable texture seen elsewhere in this formation in the Nottingham area.

Theories abound about the origin of the Hemlock Stone, ranging from the supernatural to the scientific. Many have been documented in a well-researched booklet on the Hemlock Stone by R W Morrell, a former Secretary of the EMGS. Familiar old chestnuts such as druids, ley lines and demonic activity have all appeared in various interpretations. The views of medieval scholars are the most entertaining. They maintained that the Devil hurled the Stone into place from Castleton in Derbyshire, in irritation at the chiming of local church bells. Most readers will no doubt discount this theory on intuition alone, but sticklers for a scientific refutation should note that there is no Triassic sandstone at Castleton.

The Nottingham Castle Sandstone was originally deposited as a pebbly, fluvial sand by a major, possibly seasonal, river in a semi-arid continental drainage basin, perhaps like the Murray-Darling Basin of present day Australia. Baryte is an authigenic cement that was precipitated in localised zones within the formation during burial diagenesis, partly by corroding and replacing detrital feldspar sand grains. Pore-filling carbonate cements, principally ferroan calcite and dolomite, were formed at about the same time and probably pervaded the entire formation. Most of these carbonate cements were subsequently removed by reducing, meteoric groundwaters when the Nottingham Castle Sandstone was exhumed from its overlying cover rocks by erosion during the Tertiary and Quaternary periods. This has left the familiar, weakly cemented, friable pebbly sandstone seen at most exposures today. The baryte cement, due to its lower solubility, resisted this solution process, leaving patches of more strongly cemented sandstone within an otherwise friable rock.

Though geologists agree that the strong baryte cement accounts for the preservation of the pillar, debate continues about the agency responsible for removing the surrounding, weaker sandstone. Was natural erosion responsible, or was the pillar left behind after ancient quarrying activities? According to Morrell, the earliest scientific attempts to explain the origin of the Stone were by William Stukeley in the late 18th century, who was the first to put forward the quarry remnant theory. James Shipman, the foremost amateur geologist in the East Midlands in the late 19th century, favoured natural erosion, especially glacial action, as the cause, an explanation later followed by the Geological Survey in 1908. The current, 'official' BGS view, expounded in the Derby Sheet memoir and also favoured by Frank Taylor in an early Mercian Geologist article, is that the Hemlock Stone is a quarrying artefact.

Those favouring the natural erosion theory mainly allude to the lack of any documented quarrying activity in the vicinity. However, even a casual stroll around Stapleford Hill reveals copious evidence of former quarrying on all sides of the Hill and around the Hemlock Stone itself. This includes several old quarry faces and spoil heaps in various states of degradation, indicating a long history of quarrying. Extraction seems to have favoured the Lenton Sandstone Formation, possibly for use as a moulding sand, but the Nottingham Castle Sandstone was probably also won in lesser quantities. It is easy to visualise how, once quarrying had exhumed the baryte-rich sandstone from its softer rock surroundings, it would have been impossible to work the Stone pillar further for fear of toppling it, with possibly catastrophic results. Interestingly, the baryte-cemented upper part of the pillar still bears a coating of industrial grime that probably pre-dates modem air pollution controls, indicating negligible erosion. The lower part, in the friable Lenton Sandstone, has no grime coating and is actively eroding at present. This will eventually undercut the pillar and cause the entire upper part to fall en masse - but visitors are safe at present!

Andy Howard, British Geological Survey

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