1867

Alum Extraction around the North Yorkshire Moors

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Mineral extraction around the North Yorkshire Moors may seem always to have been an important part of life in this part of Britain, but it did have a starting point.

If we go back to 16th century Britain, one of the country's major industries was producing woollen clothing – yet there was a major problem in the industry, which was fixing colours in these woollen goods. In the past various substances had been used as a mordant – including urine – but by then it had been discovered that the most effective means was using alum. Alum is a mix of the crystalline salts of Potassium aluminium sulphate and Ammonium aluminium sulphate. However, at that time the alum which was so essential had to be imported from Italy, which had a monopoly on European production. Italy was then effectively governed by the Roman Catholic Church, but these were Elizabethan times, when Protestant Britain was seen as an important enemy of the Catholic Church, and so the release or withholding of alum could be used as a financial and political weapon.

It was clear that it was important to find a source of alum in Britain to overcome this problem. In the late 16th century Sir Thomas Chaloner the Younger (1559-1615) was on a tour of Europe when he visited the alum extraction plants in Italy. He appreciated that the local plant life was similar to that on his Guisborough estate, and thought it worth trying to extract alum from the shale deposits found in the Guisborough area. He called in the support of his cousin Thomas Chaloner of Lambay (a small island near Dublin) who in 1595 managed - with the help of alum workers from Germany or Italy - to develop a process that brilliantly overcame the difficulty of extraction. The process involved roasting the shale for between 6 and 9 months to convert the sulphides and oxides into sulphates.

The level of heating and length of roasting was critical and a considerable achievement to get correct at a time when the science of chemistry and therefore the understanding of these processes did not yet exist.

Thomas Chaloner of Lambay was awarded a Government pension (40 marks per year) for the achievement, but when he was 70 years old he had to walk over 250 miles to London from Guisborough in order to persuade the government of Charles 1st to continue to pay the pension: the Chaloner family had trouble getting money from the King after he had forced them to lease the workings to him.

Essential elements of the alum production process had to be imported from elsewhere in Britain, especially the coal needed as fuel, urea (from urine) as a source of ammonium to precipitate formation of the alum crystals,

and dried seaweed as a source of potassium. The coal was generally brought in from Newcastle and the urine from London, since production of this fluid from local cities such as Newcastle and Hull proved insufficient. In a useful way of helping to alleviate the challenge of sewage disposal in the increasingly populated capital city, Londoners were paid for their urine, which was transported north in wooden tubs – with the empty tubs sent back to London containing Yorkshire butter! As these resources were mostly transported by sea, the larger scale extraction works tended to move closer to the coast over the years. In fact, the alum industry was a significant factor in stimulating the rapid expansion of Whitby's shipping industry during the 17th century.

Eventually there were at least 17 alum works. In the heyday of the industry workings took place along the North Yorkshire coast at Loftus, Sandsend and Ravenscar. The last working mine was at Sandsend, where extraction of alum came to an end in 1871. By this time simpler methods of manufacture had been developed and the woollen industry was no longer so important, so there was less demand for the mineral. However, the chemically related Potassium sulphate is still extracted from under the northeastern edge of the North Yorkshire Moors, at Boulby. Meanwhile, the Chaloner family moved on to ironstone extraction from their Guisborough lands to support the Teesside steel plants, with the Chaloner pit operating until 1939.

Many places along the Yorkshire coast still show evidence of the alum industry, including huge piles of shale discarded after the extraction process. Former workings can be seen at the Loftus Alum Quarries and the Peak Alum works at Ravenscar, near Robin Hood's Bay, which can be visited on foot from the National Trust's Coastal Centre at Ravenscar.

Find out more

The Cleveland Way footpath offers a beautiful route for visiting ten sites of the old workings
http://www.teeswildlife.org/what-we-do/past-projects/alum-alchemy-and-ammonites/places-to-visit/cleveland-way-alum-sites-guide/

'Thomas Challoner and his Astonishing Alum Industry' by Adam Hart-Davis (1995),
at http://www.exnet.com/1995/12/18/science/science.html

Headland quarried for alum shale, Sandsend