

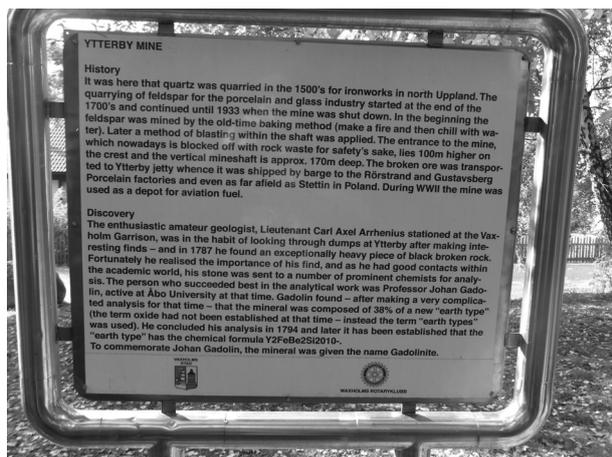
lain factories and even as far afield as Stettin in Poland. During WWII the mine was used as a depot for aviation fuel.

Discovery

The enthusiastic amateur geologist, Lieutenant Carl Axel Arrhenius stationed at the Vaxholm Garrison, was in the habit of looking through dumps at Ytterby after making interesting finds – and in 1787 he found an exceptionally heavy piece of black broken rock. Fortunately he realised the importance of his find, and as he had good contacts within the academic world, his stone was sent to a number of prominent chemists for analysis. The person who succeeded best in the analytical work was Professor Johan Gadolin, active at Åbo University at the time. Gadolin found – after making a very complicated analysis for that time – that the mineral was composed of 38% of a new “earth type” (the term oxide had not been established at that time – instead the term “earth type” was used). He concluded his analysis in 1794 and later it has been established that the “earth type” has the chemical formula $Y_2FeBe_2Si_{20}O_{10}$.

To commemorate Johan Gadolin, the mineral was given the name Gadolinite.

It is interesting to note that even on this notice there is no specific reference to new elements and that is only acknowledged on the ASM plaque at the mine entrance.



The Rotary notice at the path leading to the mine

The Wrap-up

The significance of the area is acknowledged in street names such as Yttriumvägen and Terbiumvägen.



Street name

Coincidentally Noela found an article in the September 2013 issue of *Business Life* which was in the seat pocket of one of our British Airlines flights. Title; *Rare earth element of the month: Yttrium*. It included the statement:

“When it comes to the discovery of elements on the periodic table you can divide the world into two parts – Ytterby and everywhere else”.

It doesn't quote the source but it's from Sam Kean's blog

http://www.slate.com/articles/health_and_science/elements/features/2010/blogging_the_periodic_table/ytterby_the_tiny_swedish_island_that_gave_the_periodic_table_four_different_elements.html or just google 'elements from Ytterby'.

Even more coincidentally on the final leg from Auckland to Christchurch of our epic trip I was keeping half an eye on the trivia quiz AirNZ screens. One question was “What is the rock that is composed of quartz, mica and feldspar and used in curling stones?” The answer is granite and I immediately thought of the main notice at the start of the Ytterby gruva track.

I have been intrigued by the Ytterby story for years but I am surprised at the number of teachers, even experienced ones, who look at me blankly when I mention Ytterby. Maybe it's a story that is not well known.

Letter to the Editor

With my friend and collaborator Professor Graeme Wake of Massey University, I published last year two pieces in *Chemistry Education in New Zealand (ChemEd NZ)* on carbon sequestration by trees.^{1,2} I recently sent in a third part, to discover that *ChemEd NZ* has gone into demise. Catherine Nicholson, Editor of *Chemistry in New Zealand*, has kindly agreed to consider a précis of part three as a letter.

It was previously emphasised^{1,2} that the low population of New Zealand in relation to its landmass gives it a higher trees-to-persons ratio than the international average, and that this converts into carbon sequestration potential which can be expressed in monetary terms. The third part was to have addressed the matter of oil refining in New Zealand and its carbon footprint. It is pointed out that

this is on a small scale and the carbon footprint is correspondingly low. A contrast is made with Japan, which has a landmass exceeding that of NZ only by about 50% yet has a refining carbon footprint colossally larger than that of NZ. A sufficiently interested reader is encouraged to contact me by email for full details.

References

1. Jones J.C.; Wake G.C. *ChemEd NZ*, Feb 2012, 5-6.
2. Jones J.C.; Wake G.C. *ChemEd NZ*, Feb 2012, 7.

J.C. Jones FRSC FRACI
University of Aberdeen
j.c.jones@eng.abdn.ac.uk