

Stop calling them “rare” earths, says noted earth scientist



There are all of 2,550 rare minerals around the world. And rare earths are not (repeat: not) contained within that list, and are definitely not deserving of that description, say two experts who have catalogued what they consider really to be the world’s really “rare” minerals.

As usual, Shakespeare has the apposite quote:

*“There are more things in heaven and earth, Horatio,
Than are dreamt of in your philosophy.”*

Hamlet hit the nail on the head, as we now learn, according to a new list published by two academics. For example, geologists working in Azerbaijan recently discovered Barikaite, an antimony-containing mineral.

And we learn from Museum Victoria in Melbourne, Australia, that a team of scientists (including the museum’s geoscientist Stuart Mills) has found a mineral that could be a natural solution to purifying water affected by excess nitrate, the type of water pollution caused by fertilizer run-off (a global problem as that run-off is responsible for algae blooms). The newly discovered mineral, Mössbauerite, was discovered on the French coastline near Mont Saint-Michel in Normandy. Dr Mills said the new find is mixed with other green rust minerals; green rusts are being used to remove algae in problems areas of Brittany. “This is just the beginning,” he added. Mills believes these minerals could shape the whole water treatment scene well into the future.

The lead researcher who has now catalogued the 2,550 rare minerals, earth scientist Dr Robert Hazan of the Carnegie Institution in Washington, has estimated there are still 1,500 undiscovered minerals to be found. (His co-author is Jesse Ausubel of The Rockefeller University.)

According to the authors of their new paper, *On the Nature and Significance of Rarity in Mineralogy*, the greatest value of finding these many rare minerals is that they provide tell-tale clues about what is happening (and has happened) below the Earth's surface.

The authors also tackle the name of rare earth elements. We should drop that tag, they argue. "Uses of the word 'rare' in the context of 'rare earth elements' or 'rare metals' are simply misleading as many thousands of tons of these commodities are produced annually," they wrote in their paper,

(And you can see their point: how many articles have you read in the mainstream media since rare earths became a fashionable topic five or six years ago that include, somewhere near the beginning, the important proviso that rare earths are not really rare and are found in many places?)

No, Hazen says the word should be saved for things that really are rare – like ichnusaite, a mineral created by interaction between thorium* and molybdenum. Only one specimen has ever been found, and that was located in Sardinia. The authors also point out that precious stones, such as diamonds, rubies, emeralds, are found at numerous locations and sold in commercial quantities, and so the word "rare" in relation to those is inappropriate. "If you wanted to give your fiancé a really rare ring, forget diamonds," says Hazan. "Give her Sardinian ichnusaite."

There are 5,090 known minerals on Earth, and fewer than 100 of those make up 99% of the planet's crust.

Hazen has even had one of these rare minerals named after him.

Hazenite (identified by a former student of his) is found only in Mono Lake in the California desert. Classified as $\text{KNaMg}_2(\text{PO}_4)_2 \cdot \text{H}_2\text{O}$, it is a product of the action of microbes in the highly alkaline lake. Mono was formed 750,000 years ago and its lack of an outlet causes high levels of salt.

Now that is rare – unlike cerium, of course.

** The mention of thorium reminds me to ask: why has the whole thorium discussion gone so quiet? Especially when the nuclear debate is still dominated by fears of disasters caused by using uranium.*