

Greenstones, greenstones and green stones

Geological terminology is difficult for beginners. It does not help when the same term is used for different things. During a recent club meeting, the term greenstone came up. Ely, Minnesota is the site of a famous formation called the Ely Greenstone. Greenstone is also a term used for something different - the official gemstone of Michigan. When a club member asked "Is jade a greenstone?" I knew we were in for trouble. Jade is indeed often a green stone. So are malachite and emerald. But these aren't greenstones. See what I mean by confusing?

Let's start with the Ely Greenstone. Call it greenstone 1. This greenstone term is used by geologist for rocks that have been metamorphosed so that green minerals such as chlorite, epidote, actinolite, prehnite and pumpellyite grow. Many of these rocks start out as basalt lava flows, but were deeply buried in a volcanic pile or suffered mountain building forces. Due to these metamorphic minerals, the rocks take on a distinct, but usually drab, green color. The metamorphic mineral grains themselves are often quite small. In the Ely, Minnesota area there are outcrops of lava flows which were extruded under water about 2.7 billion years ago. They are metamorphosed, and mapped as the "Ely greenstone".

The greenstone gems of Michigan - which we'll call greenstone 2, are nodules of the mineral pumpellyite. Usually pumpellyite is in tiny fibers scattered through a rock. In the basaltic volcanic rocks of Michigan's Keweenaw Peninsula, however, pumpellyite can form rather solid nodules of coarsely fibrous material filling in old volcanic gas bubbles (which geologist call amygdulites). This dark green mineral has a Mohs hardness of 6, and takes on a good polish, showing interesting mottled patterns and chatoyancy. It weathers out of the volcanic rock and may be stream or wave polished, showing up on nearby shores or stream beds. The variety name of this material is chlorastrolite, meaning "green star stone". Since this is hard to spell, and not all that easy to pronounce, folks began to call this stuff simply greenstone. Or, for the purposes of this article, greenstone 2.

So, to recap, greenstone 1 is rock that may (or may not) have pumpellyite in it, and doesn't usually have much lapidary value. Greenstone 2 refers to a particular type of pumpellyite found in Michigan that does have lapidary value.

At the risk of confounding the issue still more, the volcanic rock in which the chlorastrolite - greenstone 2 - is found has been metamorphosed by being buried deep in a volcanic pile. In addition to pumpellyite, the green minerals chlorite, epidote and prehnite have formed. That means the rock is now

greenstone 1. So we have greenstone (2) nodules in greenstone (1) rock. Let's just stick to pumpellyite or chlorastrolite for the mineral. O.K.?

As a closing story, I was on an old mine dump on the Keweenaw one Sunday afternoon. A group of obvious novices drove in and stated walking around the dump in sandals. One guy brought over a sample for me to look at. "Look at this green stuff. Is this copper?" he asked. The rock was full of beautiful pumpellyite nodules. "No", I said, eyes bugging out a bit, "they're greenstones!" "Oh" he said, and tossed the rock on the ground before I could explain that it was a good find. "Let's go," he shouted and they all left. That specimen is now in my collection, labeled, clearly, "pumpellyite in metamorphosed basalt".

- Dr. Bill Cordua, University of Wisconsin-River Falls