

## Rotten Granite

To those not familiar with Wisconsin geology, the term “rotten granite” is pretty startling. Who could feel so passionately about a common rock to call it this? Has a piece of it just fallen on one’s toe? Has it wrecked the back of some one trying to lift it?

No, the phrase refers to the mechanical properties of some of Wisconsin’s granite that has been so thoroughly weathered that it crumbles to sand and gravel-sized fragments in one’s hands. It is quarried extensively in the Wausau area where it is dug out by front-end loaders virtually ready-made to be spread on roads and driveways. It’s Nature’s pre-crushed stone. Dozens of quarries occur where this rock is exposed. At times these quarries provide some interesting mineral collecting. Some of the rocks are honey-combed with cavities and others are coarse pegmatites. Here smoky quartz, potassium feldspar crystals, gemmy phenakite and micro mounts of rare minerals such as bastnasite, ferro-columbite, cheralite, bavenite and bertrandite can be found.

How did this granite form and what caused its “rotten” nature? Its story began about 1.45 to 1.52 billion years ago, when the granite crystallized from a mass of magma that was intruding in many areas in what is now mid-western U.S. These granites intruded at very shallow depth, probably invading a pile of volcanic rock that came out as a precursor to the intrusions. The number of gas bubbles (technically called miarolitic cavities) form only when granite magma gets very close to the surface before cooling. In Wisconsin these rocks form intrusions called the Wausau pluton and the Wolf River Batholith. The Wisconsin state rock is red granite from one of these bodies. The red granite, where quarried, takes on a beautiful polish and is used as durable building stone throughout the mid-west. Thus, the granite is a generally a pretty hard rock. Why and when did some of it go rotten?

After cooling, these granites were subjected to a long period of erosion and weathering. In fact, the weathering and erosion could have gone on between 1,400 million and 500 million years ago. Reconstruction of Wisconsin’s geographic position through geologic time tells us that much of that time the state was near the equator, courtesy of plate tectonics. The climate for weathering was tropical. In addition, this was a time before the land was covered by vegetation, which would change the character of weathering and soil formation. This intense weathering is what caused the deterioration of the granite to its fragmental nature. This weathering most specifically attacks the feldspar, converting it to clays. As the feldspar “glue” holding the granitic rock together alters to the weak clay, the rocks crumble. Weathered granular material like this is called “grus” and can be seen in other areas (such as Colorado and Georgia) where granite and its relatives have been subjected to such weathering.

As weak as some of the granite is, one wonders how any at all survived the rigors of erosion by the seas, rivers and glaciers that have marched across Wisconsin during the last 500 million years. A lot of it was certainly eroded away, forming the basis of the sediment we now see as sandstone. But in some areas, the Cambrian seas lapped more gently onto this granite, burying it under sediment rather than eroding it. We can see this in place along the creek that runs through Irvine Park in Chippewa Falls. Here rotten granite occurs right at stream level, underneath a cliff of more resistant sandstone. The cap of Cambrian sandstone preserved the rotten granite, as later rivers and glaciers came through. Where it is mined now are places where the Cambrian sandstone have only recently been removed.

The exposures near Wausau, south of Rib Mountain, had some additional protection from glaciation. Rib Mountain itself stood as a bulwark, deflecting the worst of the glacial erosion away from where we find the rotten granite today. The thinner ice that got around this high land must have lacked the erosional force seen elsewhere in the state.

Now a more persistent erosional force, human beings, are scraping away at this resource to build part of the infrastructure of the state.

- **Bill Cordua** , U.W. - River Falls

### References:

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