Granites and granites

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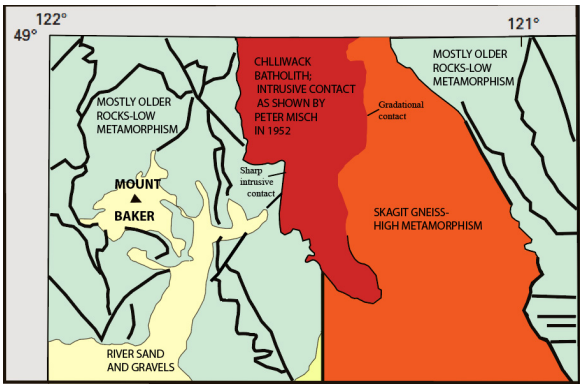
Granitization was a theory that granites could form by the slow chemical transfer of molecules into a body of metamorphic rock to make it into a granite in texture and composition. The people who came up with this idea were studying rocks that had undergone extreme metamorphism of heat and pressure at great depths in the Earth's crust, where, indeed, the difference between recrystallizing and melting is somewhat obscure. Many granite masses crystallized after the molten rock had welled up into other rocks, and they clearly showed this intrusive relationship, but some granitizers got so enthusiastic about their creed that even these clearly invasive masses were thought to have formed in place by slow chemical replacement of the older rock minerals by new ones that made up the granite.

This picture is complicated by contact metamorphism, a process of recrystallization of the invaded rock due to the heat and perhaps watery emanations from the invading magma. If the granite invades previously coarse-grained metamorphic rocks, like gneiss, the recrystallization of the minerals in the gneiss may obscure the intrusive relationship. The story is especially messy if the older gneiss is itself made up of metamorphosed sedimentary or volcanic rocks that were earlier invaded by granite sills.

When I first came to the University of Washington and started taking courses from Peter Misch, his granitization leanings were very clear. In my class notes of 1956, I copied a diagram that he drew on the blackboard showing the nature of the Chilliwack batholith in the North Cascades. Peter showed the western margin of the batholith intruding older rocks, a proper behavior for a granite crystallized from an invading magma.

But on the east side, in the mostly remote and little-known North Cascades, he showed a gradual change from the granite of the batholith into the Skagit Gneiss, described by him as a granitization front. Later Peter gave up this idea altogether, and I had much first-hand experience with the clearly intrusive contact while mapping in the North Cascades Primitive Area during the Mineral Evaluation Project.



Chilliwack batholith, as envisioned by Peter Misch in 1952

Heavy dark lines are significant faults.

I fell under the granitization spell briefly, when working in my thesis area (south of the area shown in the figure). I examined the contact between the very clearly intrusive Cascade Pass dike and the gneisses that it intruded on the east. I even collected many samples across the contact to examine in thin section with the petrographic microscope. I could clearly see how the gneisses on the east gradually became less streaky and merged into the massif granite of the dike. I had just begun my thesis work at Cascade Pass, and was seeing a lot of rock types that I had never seen before. While camped at the Pass, I was visited by a Washington State geologist, who also was interested in the large Cascade Pass dike for the mineralization associated with it. I enthusiastically told him about the "granitized" contact that I had found. Although he was polite and said something like "Oh, how interesting", I'm sure he was mentally shaking his head at this brain-washed student of granitizer Misch. Of course, when I returned to the U of W and looked at thin sections of the rocks that I collected across the contact, I quickly recognized the change from the igneous textures of the dike to the recrystallized textures of the invaded gneisses. Not even Peter Misch believed the dike was a granitized body.