Graphic granite

Last summer I had the pleasure of going to the Poland Mining Camp and spending three days pounding on pegmatites in Maine, not far from the city of Auburn. The Poland Mining Camp is fun place, geared to mineral collector vacations. For a nominal fee you get all your meals, a pleasant, if somewhat rustic, cabin and guided tours to granite pegmatite quarries to collect - places that are generally off-limits to collectors. The camp has an outside high-pressure hose and screen for washing your samples. The dining area is lined with cabinets filled with Maine minerals, has boxes of give-aways, and a good microscope for looking at your finds. Collectors gather outside the dining hall before and after dinner to trade stories. What a great place! During my stay I got to visit the Bennett Quarry, Emmons Quarry and the array of pits on Mt. Apatite. I brought back a nice suite of tourmaline, apatite, beryl and other goodies.

At Mt. Apatite, I was happily at work, screening rock tailings in a small pool in the floor of one of the pits, looking for bits of gemmy tourmaline. Taking a break (it was a ferociously hot day when I was there) I saw in the pit walls a wide variety of graphic granite. Graphic granite is a type of granite made of angular intergrowths of quartz in host feldspar (both potassium feldspar and albite are possible). The quartz crystals form incompletely, and show up as skeletal hexagonal outlines. These odd shapes, contrasting in color from the surrounding feldspar, resemble cuneiform writing or maybe odd runes, hence the name. Turn these rocks ninety degrees and the rest of the quartz crystals show up as elongated rods. In some the quartz crystals are quite large, in others small and pencil-like. The "runes"may go different ways in adjacent feldspar grains. In some places the quartz crystals get larger as they go from one end of the feldspar grain to the other. The pattern is distinctive and very attractive, particularly when the feldspar is a pleasant pink against the slightly smoky or gray quartz. Lapidarists have cut attractive cabochons and spheres from graphic granite.

How could such a thing form? First, such intergrowths are not unique to granite. They are often seen at the microscopic scale in gabbros, for example. Quartz and feldspar intergrowths are, however, the most common and easily seen manifestation of this phenomenon.

Experimental and field observations show that the texture results from the simultaneous growth of the two minerals, with the feldspar starting first. Feldspar is a discourteous host, as it allows the quartz to only partly develop its crystal faces. The outline of the angular partial quartz crystals forms the rune-like pattern. Recently Japanese scientist made 3-D models of the quartz crystals in graphic granite by using a medical X-Ray CT scanner. The quartz contrasted enough to show that what looked like separate crystals were really interconnected in 3 dimensions. Such technology will help geologists understand many structures by seeing through solid rock in ways never before possible. The exact conditions for making graphic granite require a particular composition of magma supersaturated in both minerals, and crystallizing at a particular speed. That is why not all granite will show this structure. Where they do, though, it is striking and a "graphic" example of how certain magmas behave.

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Reference: Ikeda, S., Nakano, T. and Nakasima, Y, 2000, "Three-dimensional study of the interconnection and shape of crystals in a graphic granite by X-ray CT image analysis", Mineralogical Magazine, vol. 64, p. 945-959.