A recent issue of *Elements*, edited by Craig Lundstrom and Allen Glazner (2016), is titled “Enigmatic relationship between silicic volcanic and plutonic rocks.” This title, and the articles in the issue, reflect the remarkable fact that the origins of silicic magmas and the relationship between their erupted and intruded products—rhyolite and granite sensu lato—remain a topic of great interest, uncertainty, and heated debate. This, despite the fact that these rocks comprise a large part of Earth’s crust, include products of arguably the largest and most impactful eruptions on Earth and have been puzzled over by investigators for centuries, since before the dawn of geology as a science. A paper in this issue of *American Mineralogist* by Tang et al. (2017) provides new perspectives and insights on these problems that arise from a detailed study of a particularly opportune natural example.

**A Brief History.** To gain a perspective on views and debates about granite and rhyolite today, it is worth a glance back to where they stood 70 years ago. Both rock types were well known, as were the facts that their chemical and mineralogical compositions were generally similar and that rhyolite was indeed formed from magma. Granite, however—despite its enormous abundance (at least as defined s.i.) and importance in the exposed crust—was at the center of bitter dispute that at the time overshadowed disagreements about continental drift (plate tectonics was yet to be proposed). Hutton had suggested in the late 18th century that granite, or at least some granite, was the product of intruding and cooling molten magma, but in the mid-20th century that was far from universally accepted. A memorable day-long session of the 1947 GSA meeting in Ottawa was entitled “The Origin of Granites.” The symposium was devoted to debate about whether granite was formed by crystallization of magma, by replacement of pre-existing rock with or without participation of watery or magmatic fluids (“granitization”), or by both of these processes. GSA Memoir 28 (Gilluly 1948) records this fiery debate, including addresses and discussion by such luminaries as Read, Buddington, Grout, Bowen, and Shand. Interestingly, the word “rhyolite” is not mentioned once (assuming reliability of my recollection from grad school reading of the text and a recent search). Ten years later, Tuttle and Bowen (1958) published what was essentially a follow-up that very much took rhyolites into consideration: GSA Memoir 74, “The Origin of Granite in Light of Experimental Studies.” They noted that the compositions of silicate melts in equilibrium with quartz and feldspar, granites (sensu stricto in this case), and rhyolites coincided. This coincidence—of melts produced in the lab, melt-rich rhyolites, and the controversial granites—and the power of the application of phase equilibria effectively ended the debate about whether granites were magmatic. Left open was the question of whether felsic magmas—granites and rhyolites—represented products of partial melting of quartz- and feldspar-bearing rocks (crustal anatexis), fractional crystallization of more mafic magma (potentially mantle-derived), or both, since phase equilibria simply required a melt that was saturated, or nearly saturated, in both feldspar and quartz. And it also left open the question of whether rhyolites and granites have common origins.

**Questions Linger and Arise.** Sixty years after publication of Tuttle and Bowen’s pivotal study, questions linger, and in fact new questions continue to arise, about silicic magmatism, and the relationship—or lack of relationship—between granites and rhyolites remains central. Currently active debate is not as acrimonious as it was 70 years ago, but it sometimes comes close. It includes, but is not limited to, the following questions.

1. Are silicic magmas mostly generated by partial melting of preexisting crust or fractional crystallization of mafic magma (e.g., Martin and Sigmarsson 2007; Sawyer et al. 2011; Brown 2013; Annen et al. 2015; Lipman and Bachmann 2015)? Or by a combination of the two processes [cf. assimilation-fractional crystallization (AFC; DePaolo 1981), melting-assimilation-storage-homogenization (MASH; Hildreth and Moorbaugh 1988)]? And do the processes by which erupted silicic magmas are generated differ systematically from those by which compositionally similar intrusive magmas are formed?

2. How commonly—and how—are intrusive silicic magmas physically linked to volcanic counterparts—the “volcanic-plutonic connection”? (e.g., Bachmann et al. 2007; Mills and Coleman 2013; Bachmann and Huber 2016; Lundstrom and Glazner 2016). Do large batholiths contain the residue of super-scale eruptions? Or are batholith construction and supereruptions for the most part mutually exclusive?

3. What is the nature of the silicic magma bodies that erupt, and those that form batholiths—and are they the same? How much of their volume is eruptible (sufficiently mobile to be capable of eruption: melt-rich magma and crystal-rich, more sluggish mush) and how much is locked up within melt-poor, uneruptible “rigid sponge” or fully solidified magma (Marsh 1981; Hildreth 2004)? Do they contain cumulate zones in which crystals have been concentrated and from which melt was extracted, and are rocks that represent these crystal-rich and complementary melt-rich materials compositionally and texturally distinct within plutons, and in erupted products (e.g., Lipman and Bachmann 2015; Keller et al. 2015)?

4. How does the distribution of the rheologically distinct zones within these subsurface bodies vary in four dimensions: what is their geometry and scale, and how do they vary through time? These questions have received particular attention recently because they are critical for understanding how batholiths—the dominant volume of Earth’s continental crust—are constructed, how eruptions work, and the threats posed by potentially hazard-