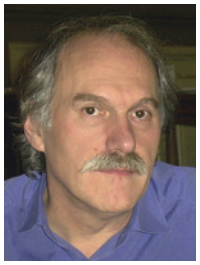
LINKS AND LINKS



Georges Calas

On the way back from our *Elements* editorial meeting, held just prior to the Geological Society of America's 125th-anniversary meeting in Denver, I realized that we lived wonderful moments at this special meeting. At the MSA awards ceremony, the Distinguished Public Service Medal was awarded to Pierrette Tremblay for making a dream a reality. This ceremony was a unique occasion to gather friends of *Elements*. The magazine is made by you—the authors and guest editors—in close cooperation with our supporting societies. Yes, Rod, you had the foresight to recognize the potential usefulness of a magazine without borders—a magazine linking members of the many societies in our scientific fields! I remember our discussions while walking around Notre Dame de Paris over 10 years ago, when you were explaining to me your vision of this challenge. But all our communities were not ready at that time. Now, 17 societies support *Elements*, and the link keeps growing.

Diogenes in his barrel at Corinth (early-19th-century engraving)

This issue presents another kind of link, one that we all cherish as Earth scientists: understanding the past and present of planet Earth using the links offered by the observables that we can understand and quantify. Here is garnet, surely among the major witnesses that allow us to travel back in space and time with the help of the record of detailed events it preserves in its deep memory. But we need adequate tools to open these "cans" and decrypt the messages they contain. Garnet is one of the most frequently observed and visible minerals, and it is common to find specimens with unrivaled colors and well-preserved crystal shapes. But garnet deserves deeper attention, beyond the admiring surprise of children and teenagers who discover garnet crystals for the first time during vacation trips—I was one of these—and who start asking questions about these intriguing natural objects, often the first mineral they pay attention to.

Recent innovations and developments have allowed a progressive convergence of mineralogy, petrology, and geochemistry, to the point that it is sometimes not easy to tell in which field a research topic falls. We, the editors, experience such a feeling while discussing the many proposals we receive for future *Elements* issues. This convergence among our fields has been facilitated by the increasing use of tools that allow micro- and nanoscale approaches. At the scale of the crystal, and below, everyone speaks about the same object, though based on different approaches. And by observing and measuring this crystal, we learn what happened hundreds of millions of years ago. Diogenes (ca 400–325 BC) in his barrel was observing humankind and reflecting on how to link man to Nature, despite the limited space he had. We do not hesitate to spend much time on a tiny crystal to gain a deeper knowledge about complex geological processes. Indeed, this approach represents a positive and attractive evolution of our scientific domains.

Making links between ideas from various scientific fields is an important responsibility that we all share. And this issue on garnet is a nice illustration of that. Garnet is a ubiquitous mineral occurring in a broad range of rock types. Witnesses to complex geological processes, garnet crystals may record details on Earth's evolving crust and lithosphere, allowing us to decipher metamorphic conditions and histories. And they contain important information on tectonometamorphic events, as shown by the compositional zoning preserved by slow diffusional resetting. Acting like "tree rings," this zonation provides a detailed chronology spanning millions of years. Garnet is a witness, but more than that, it is an actor: it gives peculiar seismic and other properties to the mantle, influences the budget of volatiles, affects the dynamics of subducting slabs, and provides distinctive geochemical signatures to deep magmas.

This issue of *Elements* also illustrates the link between garnet and societal questions—a strong component of most *Elements* issues—by highlighting high-tech applications of oxide materials with the garnet structure and by recalling the historical and artistic influence played by this multifaceted mineral. In the former case, the unique crystal structure of garnet imposes its law, and the original applications of nonsilicate materials based on the garnet structure arise from the peculiar crystal chemistry of this structure, including cation site geometries and the structural relationships among the three types of cation sites. In the latter case, the scenic trip through the garnet kaleidoscope perfectly illustrates the links to geochemistry, an evocative illustration of the importance of structure–property links. And these links relate to a frequently asked question by undergrads when they observe garnet crystals: why are these crystals usually red, rather than the shades of green and brown displayed by most ferromagnesian minerals?

Despite the fact that major progress has recently been made in our understanding of Earth's crust and mantle using the information contained in this multicolored mineral, we are far from being able to write a book "On Nature," as Diogenes did in his barrel home. But we learn that important knowledge can be gained by observing Earth from the perspective of a garnet crystal.

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