

EDITORIAL

**The American Mineralogist at 100 years, and a mineralogy renaissance**

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The meaning of the word mineralogy affects the way scientists view our field, and obviously enough, the journal as well. The use of the word has changed dramatically since the 17th and 18th centuries, when geological investigations were as much in the service of mineralogy as vice versa (Laudan 1987). At that time, “mineralogy” was the all-encompassing term for the study of Earth materials. “Geology” was coined not to subjugate mineralogy, but rather to replace terms like “geognosy” and “cosmogony”, so as to better describe the goal behind the study of minerals, i.e., to understand Earth and its history (Laudan 1987). Forgetting our heritage, and perhaps because “Geology” was later identified with petrology and field studies, we now use “Earth Sciences” in place of Geology (see Heaney 2007). Similarly, the once all-encompassing “Mineralogy” is now often viewed quite narrowly—to some, barely relevant to understanding Earth and planetary systems

Such views would make no sense to Werner, Hutton, Lyell, Darwin, or Dana. They still thought in terms of a world divided into three kingdoms: animal, vegetable, and mineral (see Laudan 1987). “Minerals”, then, were effectively the universe of all non-living things. Biologists still retain the Becher and Linnaean kingdoms (as “Animalia” and “Plantae”) and have since added a few more. Mineralogists, in contrast, at least in a formal sense, divested themselves from a large fraction of the single kingdom assigned to them. This dissociation did not happen rapidly. James Dwight Dana (1813–1895), whose textbook and classification of crystalline minerals we still use (his *Manual of Mineralogy* and *System of Mineralogy*), retained the broader, 17–18th century view throughout his lifetime. In the 1871 edition of his *Manual*, for example, Dana makes a compelling case that water, and “all gases occurring in nature” should be considered minerals, while in his *System* he describes “Minerals of Organic Origin” and fluid inclusions. His argument for including such is that they are important parts of the Earth system. And as to non-crystalline substances, he argues that it would be too arbitrary to include only those natural materials that preserve a quenched crystalline structure at the *P-T* conditions that obtain at Earth’s surface.

By the mid-20th century, however, most textbooks would restrict the universe of “minerals” to substances that are inorganic and crystalline, and that have fixed compositions, a change that happened—perhaps not coincidentally—at about the same time that the International Mineralogical Association (IMA) was established, to oversee new mineral species and nomenclature (Pabst 1957). In parallel, though, Dana’s broader view of the mineral kingdom was never completely abandoned. The earliest papers in *American Mineralogist* (Am Min) covered amorphous

materials [e.g., Greenland 1917; Merrill 1919, fluid inclusions (Buerger 1934), and biogenic substances (e.g., Palache 1923)], later followed by seminal papers on glass structure (Mysen et al. 1980; McMillan 1984), fluid and melt inclusions (Roedder 1976; Bacon et al. 1992; Anderson 1993), and fission tracks (Ketchum et al. 1999), and papers on biogenic materials too numerous to list. And more recently, Am Min publications have inaugurated whole new areas of research, such as “mineral evolution” (Hazen et al. 2008). Curiously, however, while mineral evolution has attracted great and remarkable interest globally, that interest is mostly evident on the pages of other journals, and has yet to capture the imagination of the mineralogical community that publishes in Am Min.

The mid-20th century restrictions on “mineralogy” have created a grand irony: many, perhaps even most Earth scientists study minerals; few if any identify themselves as mineralogists. It is evident that mineralogy is in the midst of a renaissance, driven by advances in fine-scale analytical techniques. The study of minerals now plays the leading role in understanding everything from the carving of the Grand Canyon to the birth of the Solar System; from the origin of life on Earth to the existence of life on Mars. Meanwhile, in academic departments, course offerings in Mineralogy have diminished over the past few decades, and crystallographers are no longer in high demand. Had we retained Dana’s view of “mineral”, “Mineralogy” would effectively describe all of what we now call “geochemistry”—and most Earth scientists would likely describe themselves, and view department curricula, quite differently. The issue is not irrelevant to the Journal. As biological publications are to the journal *Cell* (Journal Impact Factor = 31.9), so should publications in the Earth sciences be to *American Mineralogist* (JIF = 2.0). A publication dedicated to the fundamental unit of Earth science investigations should draw upon the widest range of critical Earth and Planetary studies and be heavily and widely cited.

Might the current view of Mineralogy be reversed? Possibly: membership in MSA is recovering from a decades-long decline, and the *American Mineralogist* is more widely distributed than ever. Submissions to the journal increased sharply last year, and we saw order of magnitude increases in the rate at which *American Mineralogist* articles are accessed from various electronic venues.

Perhaps more importantly, though, we affect how mineralogy is viewed by what we publish. The science will be as broad as our topical coverage, and will be respected in proportion to the quality of papers that appear in this journal. Happily, student subscriptions to the journal are at an all-time high—thus current authors, consciously or not, are sending a message to a new generation of scientists. That message could be quite inspiring, if the content demonstrates what many of us already know: that no other

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scientific discipline is more interesting, relevant, or compelling.

*American Mineralogist* in the next century should continue to lead in new areas of mineralogy. The pages of our journal should reveal the crucial role of our science in the understanding of the deep Earth and the surfaces and interiors of other planetary bodies; the global cycle of volatile elements and climate change; the evolution of life here on Earth (or possibly Mars or elsewhere); our health and as a means to improve our environment and provide sources of energy; how and why volcanoes erupt or why earthquakes occur; how living organisms interact with a seemingly inorganic environment, and how nano-technology can impact any or all of the topics just listed. And, of course, mineralogy will impact many other new areas of research yet to be realized. To begin the new century of *American Mineralogist*, we have invited authors from a wide range of allied fields to contribute “Invited Centennial Articles”. These articles will cover Mineralogy in the sense of James Dwight Dana, so as to fulfill the promise of our subtitle: “A Journal of Earth and Planetary Materials”, as instituted by former Editors Robert F. Dymek and Anne M. Hofmeister in 1998. Perhaps in the next century of *American Mineralogist* publication, Earth scientists will again, unashamedly, self-identify as Mineralogists. To get there, we need Earth scientists to send their best works to the *American Mineralogist*.

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