Chapter 19

Mineral Identification

In my own introductory geology class, we were handed a tray of minerals and instructed to "scratch this and sniff that" to arrive at a mineral name by process of elimination. Many of the minerals that were in those trays were ones that a typical geologist would never see again, especially in the field. This proved to be very confusing for me. When you first see minerals like galena, cinnabar, and sphalerite at the beginning of your career, you somehow get the idea that they are very important. The other troubling aspect of naming minerals in an introductory class is its dependence on the use of ambiguous physical properties such as color, streak, and cleavage. I also recall wondering which mineral in a hand sample I was supposed to identify! Even in mineralogy classes, we still seem "stuck" on using trays full of minerals the size of your fist, and using macroscopic physical properties to identify them.

The sad part is that this type of lab does not come even close to describing what mineralogists do today. One of my many mentors once told me that I should teach what mineralogists actually do! The truth is that we rarely encounter fist-size hand samples at random in the field. More often, our job is to identify tiny, nondescript minerals by using combinations of analytical techniques. Unlike the situations in many other disciplines in the geological or natural sciences when identification and classification can often be impossible, a mineralogist can always identify a mineral with the right tools—though the process may require anything from a few minutes to several hours, in rare cases resulting in the discovery of a new mineral.

Between us, Darby and I have been full-time mineralogists for more than 60 years, and we have been active contributors to the fields of mineral spectroscopy, mineral optics, planetary mineralogy, and minerals and health. But if you ever encounter one of us at a conference, please don't pull out a hand sample and ask for an identification. We both find it very difficult! Darby will run for the nearest spectrometer to identify your sample and determine its chemistry, and Mickey will head for a microscope, an X-ray diffractometer, and/or an SEM with an EDS to make a positive identification. One of my standard wisecracks when someone hands me a minerals is: "Do you want me to guess what it is or tell you? If you want me to tell you, it will take a little work, but we'll know for sure." The point is, most mineralogists today work with tools that are far more sophisticated than the physical property tests described in Chapter 2, and if the mineral identification really matters, they can determine it with the proper choice of analytical equipment.

As practicing mineralogists, members of the public often bring us minerals to identify, in the hopes that they will: (a) be worth something, and (b) be something that we might want to buy from them. Most of these samples are what people hope will turn out to be meteorites or precious gemstones. As a result of study with a few analytical methods, their samples typically turn out to be melted metal "meteor-wrongs" or large pieces of calcite or quartz. The good citizen often leaves very dissatisfied, saying "We'll have to go find someone who really knows what he's doing *to identify this…"*

M.E.G.