

Presentation of the Roebling Medal of the Mineralogical Society of America for 1991 to E-an Zen

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I was honored and pleased that E-an Zen asked me to be his citationist for the Roebling Medal because it gave me an opportunity to review his work and some of the correspondence that we have had. In fact, it gives me great pleasure to reveal that I have kept our massive correspondence for a decade, and so had ample material to peruse for background for this citation. Those who have been around E-an or have been the honored recipients of his correspondence will know that he doesn't write essays with answers—I have a stack nearly 3 in. high of questions! Today I'd like to pay tribute to that inquisitive, questioning nature of our Roebling medalist.

Some of the questions that have concerned E-an throughout his career do draw on his magnificent knowledge of mineralogy, including thermodynamics and physical chemistry. When E-an was awarded the Arthur L. Day Medal of the Geological Society of America in 1986, Brian Skinner cited his work spanning 25 years on topics ranging from the properties of salts in aqueous solutions, to the thermodynamic properties of mixed-layer minerals, to topologic relationships in complex multisystems. Many of the other questions that have concerned him in the past decade have extended beyond the mineralogy, chemistry, and physics for which he was given the Day Medal and revolve around field problems and physical processes. For a mineralogist with an unusually broad range of scientific and philosophic interests, this man is also a wonderful field geologist who physically covers a lot of ground in his quest to understand things like granites, sapolites, and, most recently, potholes. In fact, I have to confess that my favorite Zen reprints are his most recent ones, like "Plumbing the Depths of Batholiths," in which he integrates properties on the plate-tectonic scale with properties on the mineralogic scale. E-an is finally hitting his stride, and we expect nothing but more and better from his mind and farther and faster from his feet in future years!

I pride myself on being fit, but when I'm in the field with E-an, I'm always so out of breath that I can't talk, and thus I'm subjected to questions. For example, I was recently subjected to 3–4 days of questions about granites, migmatites, structural geology, epidote, and eucalyptus while working with E-an at the Cooma Granite in Australia. Even the sudden, rather startling, appearance of a 4-foot-long poisonous black snake under his foot distracted him only long enough to mutter "Oh, my," and he was back to questions. I was so out of breath and confused by the rocks we were in that I wasn't provid-

ing him any feedback (other than, at one point, possibly a declaration that if he, with his experience in New England and with granites all over the world, couldn't differentiate among a granite, a migmatite, and a granulite, how did he expect a fluid dynamicist like me to be of any help at all?). E-an could sense my frustration and, with the sensitivity so characteristic of the man, politely changed the questions: to ones about scientific ethics, education, literacy, policy, religion, or philosophy—subjects about which he is deeply concerned. These are all integral parts of the man, and, I am sure, are as much what we are honoring here today as are his contributions to mineralogy.

I did some research on Colonel Washington A. Roebling and on the origin of the Roebling medal. I found that a relationship existed between Colonel Roebling and Professor Charles Palache (the first recipient of the Roebling Medal) much like that between E-an and me. Professor Palache's acceptance speech had a number of sentences about Roebling that could apply equally well to E-an: "My mind reverts to the delightful hours—all too few for my satisfaction—spent in his company. He always had a number of 'tough nuts' for me to crack. . . . His intense pleasure when I was able to confirm, at the time or through later tests, his own keen-eyed detection of some obscure specimen, was a rare delight."

For example, I once proposed a hypothesis to E-an that if one understood how to cook a bag of Brussels sprouts of assorted sizes so that they all ended up done at the same time, one could understand the origin of granite magmas. I'd do the theory on Brussels sprouts, if he'd find a green magma to work on. E-an's reply included such profundities as: "the black body theory suggests that green magma is an impossibility." He proposed that a pure model might be as good as a Brussels sprout model for granites, and that the thermal structure of magma chambers was probably more complex than that of the interior of Brussels sprouts. He also showed his incredible ability at collaboration and consensus building, as he then quoted two supporting opinions solicited from Jane Hammerstrom and Pete Toulmin, two of his many colleagues at the U.S. Geological Survey. I'll probably never know if his concluding speculation on the origin of the name Brussels, as applied to sprouts, included some opinions of those other mavericks from the Experimental Geochemistry and Mineralogy Branch with whom he was hanging out—Dave Stewart, Paul Barton, or Phil Bethke.

In 1929, the MSA was 10 years old. At the annual

meeting, the proposal was made that the Society establish awards to be given to outstanding investigators in America and abroad. Specifically, the statement was made that "to be the recipient of a medal or prize of the Mineralogical Society of America would soon be recognized as a signal honor, one that would be greatly coveted." I think

that all of us who know E-an feel that he deserves this signal honor, but that covetousness is a trait remarkably lacking in this man. He is a humble mineralogist, a friend, a mentor, and an inspiration to so many of us in science, education, philosophy, and life.