PENROSE MEDAL

Presented to Eric J. Essene

Eric J. Essene
University of Michigan
(deceased 20 May 2010)

Citation by John R. Bowman

It is a great honor and pleasure to present the citation for the Society's 2010 Penrose Medalist, Eric J. Essene. Over a distinguished and highly productive career of 40 years at the University of Michigan, Eric Essene and his students made numerous insightful and seminal contributions to broad areas of mineralogy, petrology, geochemistry, tectonics and regional geology. Of particular note are his contributions to the development and critical evaluation of new geothermobarometers and his innovative and careful applications of geothermobarometry and phase equilibria to evaluate quantitatively the pressure-temperature-time-fluids history of the Grenville Province in Ontario and the Adirondacks of New York.

A series of highly cited papers by Eric and a number of his students have dealt with high-grade metamorphism in the Adirondacks (Bohlen and Essene, 1977, 1978, 1979; Valley and Essene, 1980a,b; Bohlen, Peacor, and Essene, 1980; Valley et al., 1982, 1983; Bohlen, Valley, and Essene, 1985; Edwards and Essene, 1988; Moecher, Essene, and Anovitz, 1988; Valley et al., 1990; Anovitz and Essene, 1990). The first group of these studies provided some of the first reliable data on the pressure-temperature-fluids evolution of granulite facies environments and consequently of the roles of fluids and fluid pressure in these deep crustal environments. These studies were among the first to evaluate critically suites of geothermobarometers at granulite facies conditions, reaffirming the need for careful textural interpretation of mineral assemblages before applying thermobarometers, and the need for well-calibrated thermobarometers soundly based in thermodynamics. These studies established the necessary quantitative framework within which subsequent studies by John Valley and his students could evaluate the roles of crustal H_2O versus mantle-derived CO_2 in granulite facies metamorphism. These studies were also among the first to identify issues of differential resetting of mineral solid solutions (e.g., different closure temperatures for different thermobarometers) that remain central issues of current research in metamorphic petrology. These studies have had a major impact on our understanding of the processes associated with high-grade metamorphism and tectonics in the deep continental crust.

By initiating numerous collaborations with colleagues, Eric was both a pioneer and leader in promoting the integrated application of mineral equilibria, isotope geochemistry, structural geology and geochronology to natural systems. These applications and innovative approaches have set the standard for the careful evaluation of the complex pressure-temperature, fluid flow and uplift history of ancient orogenic belts and for quantitative evaluation of the roles of fluids in a wide variety of metamorphic, hydrothermal and tectonic processes in the continental crust. Some highly cited contributions from this multidisciplinary approach include: the origin and evolution of hydrothermal fluids in contact skarn environments (Bowman, O'Neil, and Essene, 1985); a reexamination of the arsenopyrite geothermometer (Sharp, Essene and Kelly, 1985); an evaluation of the metastability of illite in diagenetic and hydrothermal environments (Jiang, Essene, and Peacor, 1990); the use of $^{40}Ar/^{39}Ar$ thermochronology to constrain cooling rates and uplift/erosion paths in the Grenville Orogen (Cosca, Sutter, and Essene, 1991); an analysis of closure temperatures of the Sm-Nd system in metamorphic garnets (Mezger, Essene, and Halliday, 1992); definition of time-temperature paths to illuminate the thermotectonic significance of high-grade shear zones in the Grenville Orogen (van der Pluijm et al., 1994); and a critical perspective on clay mineral thermometry (Essene and Peacor, 1995).

Given the extraordinary breadth and great impact of Eric Essene's research contributions, it is no surprise that Eric Essene is widely regarded as one of, if not the, most creative and influential scientists in metamorphic geology over the past 40 years. Letters of support for this nomination from several distinguished scientists note that the high level of sustained excellence that characterizes Eric Essene's research contributions likely derives from attributes that set Eric apart from most others in undertaking research: his almost superhuman focus on what is important; a keen, adventuresome intellect; his generosity with ideas; a quick, critical mind; an insistence on 'getting things right' in a technical sense; his willingness to involve other scientists to add dimension and perspective to a research project; encyclopedic knowledge; competitive attitude; curious nature; and his great enthusiasm and energy. One measure of his significant impact on our science is that Eric is named as one of the *Original Highly Cited Researchers* of ISI. Citations of Eric's 190+ publications number about 6200, with an average citation per paper of 30 and an h-index of 43, an extraordinary record for a geologist. His highly cited papers (100+ citations) include contributions to fields as diverse as thermodynamics, mineral chemistry, Adirondacks geology, lunar petrology, and economic geology.

Finally, one of Eric's important and most enduring legacies was as an inspirational mentor to 40 M.S and 34 Ph.D. graduate students. All of these former Ph.D. students are still active in geology: 8 are research scientists, 12 hold tenured or tenure track positions in University or college earth science departments, and one is President of the Joint Oceanographic Institutions. Two are among the ISI highly cited researchers. In discussions with other former students of Eric's, we believe his success as a mentor stems from several factors. He demanded the highest standards for knowledge within one's field and for critical and honest evaluation of one's data and interpretations. He was creative and full of ideas, and shared his best ideas generously with his students. His infectious enthusiasm made science fun. He supported his students fully and consistently praised their role in his professional life's work. Not surprisingly, Eric remained a life-long friend to most of us.

Eric Essene's research contributions are a record of outstanding quality, sustained excellence and broad impact. He has been perhaps the most influential leader in developing new quantitative tools for metamorphic geology in the last half-century, he has had a strong impact on our quantitative understanding of petrogenetic and tectonic processes in the Earth's crust, he has been a superlative critic and honest voice in our science for decades, and he has been an

inspirational mentor to the next generation of petrologists. Eric Essene is most highly worthy of the Penrose Medal, the Society's highest honor.

Response by Joyce M. Budai on behalf of Eric J. Essene

I am honored to accept the Penrose Medal on behalf of Eric J. Essene, my husband, my children's father, my partner in life. Though it has been five months since he passed, his presence is still very strongly felt by our family, and I am sure by his colleagues in the Department at Michigan. His youngest daughter, Ren Essene, is here to share in the acceptance of this prestigious award. His eldest daughter, Michelle Haroldson, is celebrating this special weekend with her two children and husband in Minneapolis. Eric always loved Halloween and he would expect nothing less than a full out press of trick or treating for his grandsons. I remember when our sons, Adam and Zach, were in elementary school, and Eric would gleefully lead them out through our neighborhood, urging them to go for just one or two more houses before bringing them home. Much like his approach to field work, it didn't matter if it was raining or snowing, warm or freezing, there were treats to collect and they would not be heading home until an appropriate number of stops had been successfully endured.

John Bowman and John Valley have and will share with you Eric's professional contributions far better than I could. I would like to say that I, like so many other former Michigan students, have benefitted in countless ways from long association with Eric Essene. It didn't matter that some of us were soft-rockers, we still received his critical attention. In almost all cases, his suggestions proved most valuable, and sometimes life-changing. He was a remarkable man, unusually honest, absolutely in love with life. On behalf of Eric, I want to thank the Awards Committee, the Geological Society of America, John Bowman, John Valley, and all the wonderful students who gave such joy and meaning to Eric's life. I often see the world through his eyes and I know what he would say at a time like this. Enough already Budai, let's get some beer.