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Presentation of the Roebling Medal of the Mineralogical Society of America for 1978 to James B. Thompson, Jr.

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President Wyllie, Members of the Society, Friends:

Last year at this meeting the Society honored one who gave us new tools that revolutionized the nature and range of petrologic data gathering. Today we honor one who has provided us with powerful theoretical tools needed to analyze the data. For Jim Thompson's brand of theory is nothing ethereal; it is rooted in thermodynamics and thoughtful observations, and is open for verification. Thus, although it is doubtful that Jim has squeezed many cylinders of marble or sealed many gold capsules, he has been pivotal in developing a physical framework for and critical approach to the choice of petrologic systems for fruitful experiments and their interpretation, so he is a major architect of the post-war successes in experimental petrology.

In the early fifties, simultaneously in Europe and in the United States, there was a vigorous revival of interest among petrologists to better formulate geologic problems by classical thermodynamic methods. The literature of that time is exciting to read. Several young petrologists were staking out new concepts, particularly as applied to metamorphic rocks. As a young instructor, Thompson thought about these problems, honed his ideas on students, observed and read extensively, and applied his knowledge of meteorology gained during the war. This cumulus of thought led to his paper, "The thermodynamic basis for the mineral facies concept." Here Thompson extended the Gibbsian method in what were then unconventional ways. For example, he found that if H_2O were treated as an externally-controlled variable, he could get improved agreement between theory and observations. That H_2O does enter and leave metamorphic rocks has never been questioned but its thermodynamic description has, and the Thompson-Korzhinskiy formulation for a while stimulated much controversy. In hindsight one wonders why, for the formulation is completely conformable to Gibbs' own construction of the Grand Canonical Ensemble for chemical reactions in certain classes of open systems. The theoretical validity of the Thompson-Korzhinskiy formulation is not the problem; the question is whether observations fit the theory.

Hermann Bondi, the cosmologist, once said something to the effect that a good scientific hypothesis is one that has a built-in way to check whether it is wrong. Throughout his professional work, Jim Thompson has always insisted on this test, and his papers, be they on the equation of state of the feldspars, or the mineral facies of pelitic schists, or heterogeneous reactions in complex systems, or alpine nappes in the Appalachians, are always based on solid observations, and elegantly allow themselves to be tested. In accepting the Arthur L. Day Medal, Jim said that "it would be embarrassing indeed if we were to construct an internally consistent geology, chemically and physically sound, perfect in fact but for one flaw—the lack of a planet to fit it." This insistence on physical relevance makes his work a series of milestones, and makes it possible for others to ride piggyback on his shoulders.

If a mark of good science is to clarify and unify seemingly diverse relations, to demonstrate their simplicity, and thereby to predict other phenomena that otherwise would escape observation, then Jim Thompson's study of the polysomatism of the biopyriboles is an example of good science. Jim not only made the complex crystal chemistry and symmetry relations of the amphiboles easy to grasp by considering them as a mixed-layer or polysomatic structure of pyroxene and mica, but predicted and guided the discovery of several new minerals. Jim characterized the amphiboles as "mineralogical mules derived from mating different species." Judging by the prolific progeny of his predictions, including jimthompsonite and clinojimthompsonite, however, his mineralogy would seem better than his biology.

Over the years Thompson has educated many graduate students. Whether they learn from him in formal lectures or by informal discussions, the process is always stimulating and entertaining, and sharpens their critical faculties. In addition, Jim exemplified to his students scientific integrity, modesty, and consideration for others. An example is his stead-

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fast refusal to be coauthor with his students on their thesis materials. Jim makes large contributions on the contents of each thesis, but when the work is done he steps back quietly, allowing the student the sole credit.

Years ago, I was applying for graduate admission at Harvard. Professors like Billings, Birch, Frondel, Hurlbut, and McKinstry were well known. But Esper Larsen had retired; who was in his place? I asked a professor from the area. He said, "Oh, there's a young man who just finished his degree at MIT, I think named Thompson. Said to be doing new things but we don't really know. Guess you'll be finding out." Well, some of us did find out! To become Thompson's student was a bit of serendipity for his early students, and remains today a source of intellectual challenge and dedication. We may have worried whether Jim would finish reading our thesis drafts on time to beat the deadline, but we are proud to count him as a teacher and friend, and look forward to fresh stimulations from him in the years to come.

Mr. President, it is my honor and great pleasure to present to the Society the 1978 Roebling Medalist, James Burleigh Thompson, Junior.

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Acceptance of the Roebling Medal of the Mineralogical Society of America for 1978

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Thank you E-an; *Mr. President, friends and colleagues:*

Few things could please me as much as to know, with this award, that the results of my scientific efforts have been found useful by the audience to whom most of these contributions were directed.

My interest in rocks and minerals was kindled at Dartmouth College by Harold Bannerman and Dick Stoiber, and secured later at M.I.T. by Harold Fairbairn and Martin Buerger. Much of my own life, following their lead, has been devoted to teaching others about rocks and minerals. As a teacher I have been kept on course by colleagues of like interest, in my case Connie Hurlbut, Cliff Frondel, Charlie Burnham, and others over shorter periods. Many of you know, however, that there is no better stimulus to the sharpening and honing of an idea than that provided by an able student who wishes to share it. In this I have been blessed. Thank you again, E-an, for being one of them—and I am happy to see so many of you here today. Thank you all for the freshness of mind you brought to a sometimes jaded professor.

One lesson I learned occurred when teaching an undergraduate course at M.I.T. in the late forties. I remember placing a big red X on an examination paper beside a drawing that was, in the dogma of the day, a "wrong" answer. Whose paper it was I do not know but that student's sketch somehow stuck in my mind. Two or three years later Gabrielle Donnay, then working on the structure of tourmaline, was explaining to me her results. It dawned on me as Gai spoke that her discovery of the significance of tetrahedral rotations in the adjustment of tetrahedral to octahedral complexes in silicates had been anticipated on that nearly forgotten quiz paper. I have

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