JPEDAV (2005) 26:306-307
DOI: 10.1361/154770305X57132
1547-7037/$19.00 ©ASM International

Editorial

It is with regret that I note the demise of two men, W.B. (Bill) Pearson and Leo Brewer, within a day of each other in February of this year. Both of these gentlemen made important contributions to our field. I was privileged to have known both of them as friends over a number of years. Both were warm, considerate, and friendly human beings. Another trait they shared in common was a devotion to their work.

Bill's thesis work was done under the tutelage of Hume-Rothery, who pioneered alloy theory. Bill extended Hume-Rothery's ideas with studies of the relationships between electronic distributions and crystallographic geometries. His many publications cover various aspects of that interest and emphasize cogent relationships between electronic factors and crystal structure. He was an interesting lecturer and an outstanding teacher. He is very well known for his compilation of metal crystal structures, though he himself would have rated compilation as a secondary activity. His compilations are valuable because they are done critically.

Leo's interests and efforts were more diverse, with his major activity being concerned with high-temperature chemistry and materials. Indeed, with a fresh doctorate from Berkeley in 1943, he was brought into the Manhattan Project (atomic bomb project) and was assigned the task of predicting the high-temperature properties of plutonium, which at that stage of the project was available in only minute amounts. His efforts during this period and throughout his career have been characterized by ingenious use of both theory and experiment to elicit the knowledge that he sought. Though at one time or another he contributed to a number of different endeavors, he has focused primarily on high-temperature chemistry and materials science. His ideas concerning the bonding in transition metal phases were incorporated in the Brewer-Engel theory of atomic bonding.

In reminiscing about these two individuals, it strikes me that they are units in the long chain of development that sets man apart from the other creatures on this planet. That factor is the communication that allows us to include and build on the contributions of our predecessors during the progression of man's attempts to understand the physical universe. Pearson will now have added another layer to our understanding of solid materials that began when Steno around 1610 enunciated the law that states *the angles between equivalent faces of crystals of the same substance at the same temperature are the same.* By the late 19th century, point group symmetries had been defined and Roentgen had discovered x-rays. Von Laue irradiated a crystal with x-rays in 1912 and found a diffraction pattern. This was soon followed by the Bragg father-and-son team that developed the mathematical relationship between diffraction maxima and crystal spacings. This evolved into the capability of unraveling the atomic arrays in crystals, in some cases with crystals containing as many as 1000 or more atoms per unit cell. Now Bill Pearson has added his piece to sequential progression by contributing to improved understanding of bonding and structure.

Similarly, Leo Brewer has now added his contribution to thermodynamic developments. Boyle in the 17th and Charles in the 18th centuries began the development with experiments that led to delineation of the ideal gas law, and development continued through the work of many people to the point where Gibbs formulated a comprehensive picture of thermodynamic equilibrium. Bakhuis Roozeboom applied the Gibbs formalism to the Roberts Austen iron-carbon temperature-composition diagram to develop the first equilibrium phase diagram. With inclusion of the electronic computer, we can currently calculate very complex equilibria that are applicable to modifying and improving materials for applications. The importance of Brewer's work on high-temperature alloys derives from the work of Sidi Carnot, who found the cycle that produces the maximum amount of work that can be extracted from a heat engine. This maximum work increases with increasing maximum temperature of operation. Brewer's investigations are thus practically relevant. However, they are also relevant to the overall view of materials science and constitute a useful part of the flow of information into the future.

In making an analogy between life and the theater, Shakespeare said it well, "Each man in his time plays many parts." The major role of the scientist is to generate new knowledge to be added to the bank from which future generations may make withdrawals. The two gentlemen of whom we speak have certainly fulfilled that role.

J.F. Smith
Editor
Journal of Phase Equilibria and Diffusion