John D. Corbett (1926–2013)

John Dudley Corbett, born March 23, 1926, in Yakima, Washington, was a 1944 graduate of Yakima High School, and did his undergraduate studies, subject to wartime conditions, at three institutions, namely North Dakota Teachers College and at the University of Wisconsin at Madison, where he learnt general and chemical engineering. Finally, in 1948, he received a bachelor's degree from the University of Washington in Seattle. In that same year he married Irene Lienkaemper.

John Corbett earned a PhD in physical chemistry from the University of Washington at Seattle with a dissertation entitled "Anhydrous Aluminum Halides and Mixed Halide Intermediates". In 1952, the young couple moved to Ames where John became assistant professor at the Department of Chemistry of Iowa State University and associate chemist at Ames Laboratory. With the background of a molten-salt chemist, John knew the field of thermodynamics, he knew how to determine phase diagrams and, thus, his first independent publication (after two with his thesis supervisor Professor Gregory) was on "The Solubility of Some Metals in Their Molten Halides". In other words, he became interested in metal halides with metals in lower oxidation states ("reduced metal halides"). The theme was set, and for many years, John investigated lower halides of cadmium, mercury, gallium, bismuth, niobium, zirconium, and many others. For example, this early work led to the discovery of the five-atom cluster Bi_5^{3+} and the nine-atom cluster Bi_9^{5+}. In the Corbett style that blends experiment and theory, he later extended his work to anionic species, and was the first to isolate and characterize stable homopolyatomic anions such as Pb_5^{2-} and Sn_9^{4-}. These naked metal clusters, all forming metal–metal bonds, are of theoretical and practical importance in catalysis because they illustrate the possible classical geometries of small metal particles.

In 1959, John Corbett published a paper on neodymium(II) halides, the first in a series on "Rare-Earth Metal–Metal Halide Systems". Thus, he had now really arrived at the Ames Laboratory where the purest rare-earth metals and their compounds were readily available. Paper seven in the series reported not only on gadolinium diiodide, but on a mysterious compound, namely a gadolinium chloride with a Gd:Cl ratio of roughly 2:3. This was in 1965, when X-ray structure analysis was not yet a routine method, and it took another five years until the structure was published in *J. Am. Chem. Soc.* under the title "Gadolinium Sesquichloride, an Unusual Example of Metal–Metal Bonding". For John this was the "eighth wonder of the rare-earth world". Indeed, Gd_2Cl_3 had an unprecedented structure containing chains of gadolinium metal octahedra sharing common *trans* edges that had never been seen before, and opened a completely new chemistry that is still surprising and profitable. This compound is still a mystery because the metal octahedra are empty, in contrast to almost all other compounds in this area that have been discovered since then. The centers of the octahedra are usually occupied by a large variety of nonmetal as well as both main-group and transition metal atoms that John named interstitials.

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Many of John's graduate students and postdoctoral associates have explored this new chemistry, and with time, and with work of others, the picture of what was possible emerged ever more clearly. John was always ahead of us, he already knew what a new compound really meant "that one stumbled upon during experiments designed with plausible but incorrect or naïve ideas regarding possible compounds or structural targets", to say it in his own words. Thus, while we still admired the beautiful structure, he, in his mind, was already heading in a new direction.

John was so excited about not only metal-rich halides, but intermetallics themselves. In recent years, gold became *the* element for John, his eyes sparkled with joy when he started talking about the beauty of the gold partial structures in many intermetallic phases, and he tried to convince many of us that this was the chemistry one should pursue. Quasicrystals and approximants were another important theme John went into with a boyish joy to explore and to discover the unimaginable. For many decades, he stood at the forefront of the fields of Zintl phases, Zintl ions in solution, noncarbon fullerenes, metal-rich tellurides, always looking for new possibilities to discover what cannot be imagined. "It is the wonder and excitement of finding the unprecedented and unimaginable that makes research enjoyable, even exhilarating, and worthwhile."

John Corbett has through his gentle and gracious, although sometimes impatient, personality contributed immensely to modern solid-state chemistry. Not only directly as a teacher and supervisor, but also indirectly in that he influenced colleagues and their thinking, in passing on knowledge (and a certain way of thinking) from generation to generation. John Corbett was elected as a member of the National Academy of Sciences in 1992 and received ACS awards in Inorganic Chemistry (1986), for Distinguished Service in the Advancement of Inorganic Chemistry (2000), and the F. Albert Cotton Award in Synthetic Inorganic Chemistry (2008); he was the 11th recipient of the Frank H. Spedding Award (2005). John Corbett, a Distinguished Professor in the College of Sciences and Humanities since 1983, got all the recognition

he can possibly get from his own university and of course from Ames Lab, and was internationally highly recognized. Among many others, he won the Humboldt US Senior Scientists Award in 1985, which gave him the freedom to work for a period of up to one year at German institutions.

This was all fine, but there was "no time to rest". Vacations were rare occasions although the country boy, that he also was, used the time for outdoor activities (e.g., fishing). After traveling, however, John was glad to return to the lab and write original research papers (almost 500 in total), which was a good opportunity to understand what he was doing during the process of writing. And this was no nine-to-five job: he went home, had dinner and a nap, and then he went on thinking and writing. He was convinced that there is so much out there to discover, and discovery was an important foundation of his life.

John D. Corbett passed away on September 2, 2013. He will have time to rest now, but he would not want us to rest. He would want us to go on, do whatever we are skilled of doing best. It will be hard to go on without having him around, but we will certainly try.

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