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BRYCE L. CRAWFORD, JR.



COURTESY OF SHERRY CRAWFORD

27 NOVEMBER 1914 · 16 SEPTEMBER 2011

**B**RYCE L. CRAWFORD, JR., one of the nation's prominent chemists, passed away due to congestive heart failure on 16 September 2011 at Presbyterian Homes in Arden Hills, St. Paul. He was 96. In 1982, the American Chemical Society chose to honor Dr. Crawford with the Priestley Medal, its most prestigious award, for his outstanding lifetime contributions to the science.

Bryce was born in New Orleans on 27 November 1914 to Bryce Low Crawford and Clara Hall Crawford. In 1940, he married Ruth Raney in Chicago. They had three children, Bryce L. Crawford III (Davenport, Iowa), Craig Crawford (Richmond, Virginia), and Sherry Crawford (Vinton, Iowa), and eight grandchildren.

Bryce grew up mostly in the San Francisco Bay Area and also in El Paso. His youth was remarkable as well. He skipped several grades, quickly advancing his education. He was the youngest student at 15 to graduate from El Paso High School. In 1931, representing the state of Texas, he won first place and obtained \$500 in the National Edison chemistry essay contest. He was flown to Menlo Park, New Jersey, for his award, and there he met Henry Ford and Thomas Edison. As a teenager, Bryce spent summers working as a ranch hand on Jimmy Mayhill's ranch in the hills of Alamogordo, New Mexico.

He enrolled at Stanford University and received his A.B. degree in 1934, an A.M. degree in 1935, and a Ph.D. degree in chemistry in 1937, with the supervision of Professor Paul C. Cross. He then spent 2 years at Harvard University as a National Research Fellow, working in the laboratories of Professor E. Bright Wilson, Jr. This seems to have strongly influenced the direction of his future progress in science. He also spent a year at Yale University as a chemistry instructor. In 1940, he joined the chemistry department of the University of Minnesota, and in the same year, his bride, Ruth, arrived by train in St. Paul in the middle of the Armistice Day blizzard.

At the University of Minnesota, Bryce started as an assistant professor of physical chemistry, but rose swiftly and became a full professor in 1946, chairing the chemistry department from 1955–60 and serving as dean of the graduate school from 1960–72. During this period, he organized, with Professor John Overend, the Minnesota Summer Course in infrared spectroscopy, with co-sponsorship of Perkin-Elmer. This short course greatly helped to give industrial spectroscopists an opportunity to update their understanding of molecular vibrations and the interpretation of infrared spectra. At that time, the infrared instruments were placed in the basement area of the chemistry department; Bryce had a nicely lettered sign over the narrow entrance lane designating the area as “Bryce Canyon.”

In 1950–51, Bryce spent time at the California Institute of Technology as a Guggenheim Fellow and at Oxford University as a Fulbright Fellow in the field of molecular spectroscopy. He was selected to be a Fulbright Professor in Japan in 1966 and collaborated with Professor Takehiko Shimanouchi, who practically contributed to calculations of molecular vibrations using force constants. Bryce, on the other hand, developed the first principle method of calculating force constants from molecular orbitals.

During World War II, Bryce worked on rocket propellants, carrying out research in his own laboratories at Minnesota and also at the Allegany Ballistics Laboratory in Cumberland, Maryland. His work was a significant contribution to World War II rocketry and the development of solid propellants for the much larger rockets that evolved after the war. But his first love was always chemistry. His focus and interest centered on molecular spectroscopy and molecular structure.

Among Bryce's many accomplishments and involvements, those that meant the most to him included his years as home secretary for the National Academy of Sciences (NAS) and his chairmanship of the NAS report review committee. The committee's work was to see that the scientific findings and reports it released were thorough, objective, and complete. He was also a member of the American Chemical Society (ACS), on whose board he served from 1969–72. Working with chemical abstracts, he found a labor of love in chairing an ACS committee on such abstracts. In addition, he edited *The Journal of Physical Chemistry* from 1969–80 and also served as a member of *Chemical & Engineering News's* advisory board.

His memberships in work-related associations are too numerous to list, but they included serving as chairman of the President's Committee on the National Medal of Science and as a member of the Science Development Advisory Panel of the National Science Foundation. He held the distinction of membership in all three honorary science academies: the National Academy of Sciences, the American Philosophical Society, and the American Academy of Arts and Letters.

Honors he was most proud of included being named in 2004 as a fellow of the Society for Applied Spectroscopy for his contributions to the advancement of spectroscopy and its applications. He loved studying molecular vibrations and force constants and collaborated with professors Shimanouchi from Japan, Mills from England, and Califano and Zerbi from Italy. He was interested not only in vibrational frequencies but also in intensities. To get reliable integrated intensities of a given band, he demonstrated that addition of infrared-transparent

inert gas broadens the lines in the vibration-rotation absorption spectrum and allows it to determine integrated intensities of gas molecules. From the studies, Bryce established such relationships as the isotopic sum rule for infrared intensities. His last project in his science was elucidation of molecular dynamics of liquid through infrared spectroscopy—that is, the precise determination of a shape of absorption coefficient by using attenuated total reflection.

Bryce loved model trains and was a marvelous cook. He and Ruth enjoyed cooking together, especially Japanese food. One of his most treasured gadgets was a Cuisinart. He was also an avid and knowledgeable fan of Sherlock Holmes. At the University of Minnesota, Bryce was one of the five foremost Sherlockian professors, and in 1947, he formed a local society to discuss Sherlock Holmes, together with librarian E. W. McDiarmid and professors Theodore C. Blegen, E. W. Ziebarth, and Wallace Armstrong. The Norwegian Explorers of Minnesota, a scion society, still meets regularly, and Bryce was its last surviving founder. A few years ago, he told members at a dinner that the key to keeping it going was to find “people as ornery and committed as you are.” In the 1960s, Bryce was famous for wearing two wristwatches. When pressed, his explanation was that no single watch had all the functions he required.

Bryce’s sense of humor never flagged. One of his favorite pastimes was to burst into song at gatherings, entertaining his family and friends with his remarkable high school song, “Old El Paso High.” He was partial to smooth, single-malt Glenlivet.

In addition to being a renowned scientist, Bryce loved literature and the beauty of the English language. He and Ruth were avid supporters of the Twin Cities’ cultural arts. Bryce’s daughter, Sherry, said (and we completely agreed) that Bryce was just so intelligent and always driven to learn more, but he was also a lot of fun. He had a great sense of humor and was kind and generous. Bryce was more than just a great scientist.

We would like to thank Ms. Chris Lundby for sharing her archive with us, Ms. Eileen Harvala for responding so quickly to our plea for help, and Ms. Sherry Crawford for providing the picture of Bryce and reviewing this article. Any errors are the responsibility of the authors. Professor Kitagawa was a postdoctoral student and Professor Goplen was a doctoral student under Professor Crawford.

Elected 1971

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