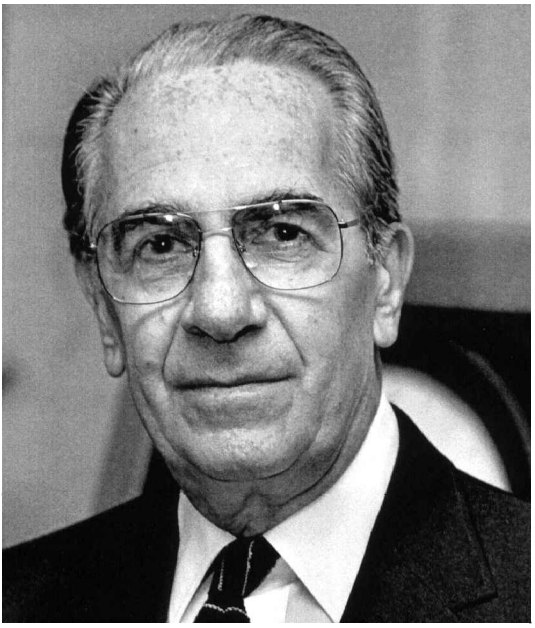
Julian Royce Goldsmith, 1918–1999



J. R. Goldsmith

Julian Goldsmith's career spanned the time during which mineralogical research moved from a largely descriptive subject to an experimental science. He was a student of the great experimental petrologist, Norman L. Bowen. Bowen came to the University of Chicago in the 1940s and set up one of the first experimental petrology laboratories in any university in the United States. Julian was one of Bowen's first thesis students.

During World War II, Julian departed from graduate work to do defence research on ceramics at the Corning Glass Company. After the war he returned, and in 1947 completed his PhD degree requirements. He was asked to stay at The University of Chicago and became a Research Associate that year. He remained at Chicago for his entire career, moving through the professorial ranks to that of Professor in 1958. In 1969 he became a Distinguished Service Professor. He retired in 1990, and became Professor Emeritus, although he continued to work in his laboratory until 1998.

Bowen departed Chicago in 1947 to go to The Geophysical Laboratory of the Carnegie Institution of Washington (DC). Julian inherited Bowen's laboratory, which consisted of open to the air high temperature ovens. By 1950 Julian obtained several externally heated hydrothermal pressure units. He also added an X-ray diffractometer. Prior to this, the examination of experimentally formed phases was done optically. He began research on one of the most complex of mineral systems, the feldspars.

Through his efforts, in 1948 he was joined at Chicago by Fritz Laves, an outstanding German crystallographer. Laves stayed at Chicago for the next six years. Together they performed a series of fundamental experiments on the alkali feldspars. They focused on the Si-Al order-disorder relations, especially the thermal disordering of natural, well ordered microcline. They developed an X-ray diffraction method to determine the degree of ordering in alkali feldspars, a method still in use today. In 1955

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Julian was presented with the Mineralogical Society of America Award for his feldspar work.

Following his feldspar years, he undertook a long series of experiments to examine cation ordering in solid solutions of the rhombohedral carbonates. This work was done with a series of post-doctoral fellows and graduate students.

In addition to his successful teaching and research, it became evident that Julian possessed a remarkably cheerful and amiable personality. He was the kind of person who could soothe frayed tempers and help settle the kinds of disagreements that arise in an academic community. This led him, in the 1960s, to accept an administrative position as Associate Dean of the Division of the Physical Sciences. During these years he also served nationally as a board member of a federal government agency, The National Science Foundation (1964–1970). But where his administrative skill came most to the fore was the period from 1963 through 1971, when he served as the Chairman of the newly reorganized Department of the Geophysical Sciences. He was, without doubt, one of the most able administrators of earth sciences Chicago had ever seen. This was an era when traditional departments of geology were broadening their scopes and reorganizing into departments of earth and planetary sciences, or earth and atmospheric science, or geology and geochemistry, etc.

Geophysical Sciences at Chicago combined geological science with atmospheric science (from the former Department of Meteorology). The new department needed unified space, and with Julian's heroic efforts at fund raising, the new Henry Hinds Geophysical Sciences Laboratory rose on the Chicago campus. But after nine years as chairman he hungered to return to full time teaching and research. He then began a productive cooperative relationship with a fellow faculty member, the experimental petrologist Robert C. Newton. They worked out the alkali feldspar solvus and the calcite-dolomite solvus. Next they combined their carbonate-silicate experience into experimental studies of the scapolites.

One alkali feldspar problem had, however, troubled Julian for years. A well ordered natural microcline could be thermally disordered, but he never succeeded in understanding order-disorder relations as a function of temperature. It was in the 1980s that he discovered the key. He found that at pressures above 10 kbar, albite could be reversibly ordered and disordered at temperatures as low as 700 to 900°C. This could be done without a mineral flux. He discovered that the sodium chloride pressure medium contained a trace of adsorbed water. The water reacted with graphite in the heater apparatus to produce atomic hydrogen which diffused through the platinum walls of the sample container. Hydrogen then acted as a catalyst for the ordering reactions within the mineral lattice. The reactivity of the hydrogen was dependent on pressure.

His explanation was, at first, disbelieved. With this knowledge, however, he and his colleagues established the first reversible order-disorder curve for albite. With potassium alkali feldspar, however, the problem was more difficult. He was able to disorder a microcline at lower temperatures than in his earlier work with Fritz Laves. However, he was only able to synthesize a partially ordered potassium feldspar – never a well-ordered microcline.

In his retirement years he ran a series of experiments to measure the equilibrium partition of the stable oxygen isotopes between several major minerals. Here he worked with his colleague, Robert N. Clayton, a world authority on the distribution of stable oxygen isotopes in nature. These results led to a practical mineral thermometer for specific systems.

Julian received many honours during his career. In 1987 the American Geophysical Union awarded him their Hess Medal. In 1988 the Mineralogical Society of America gave him their highest honour, the Roebling Medal. Julian was also active off the Chicago campus. He was the president of The Geochemical Society in 1965, of the Mineralogical Society of America in 1971, and of The Geological Society of America in 1975.

Julian was genuinely beloved by his colleagues and students. He peppered his conversations, both professional and social with entertaining asides. He just loved a good joke, and delighted in sharing it with others. It is clear that he had friends all over the world who would send him material. He also picked up quite a lot from those traditional sources, radio, television, newspapers and politicians. He always arrived early in his lab. For those of us who arrived later, it was a joy to stop by his open door and hear his latest story. His overriding sense of humor was never diminished by the knowledge he had (and none of the rest of us had) of the leukemia that finally won its battle with him.

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