A MEMORIAL

to

DR. JOSEPH S. CANTRELL

July 31, 1932 – January 6, 2009

Professor Emeritus of Chemistry and Biochemistry

Dr. Joseph Sires Cantrell, born July 31, 1932 in Parker, Kansas, died January 6, 2009 at his home in Pearl River, Louisiana. He is survived by his wife, Margaret, whom he married in 1958, and three sons: Mark, Ken, and Keith. Joe received his A.B. from Emporia State University and his M.S. from Kansas State University. He continued on at Kansas State for his Ph.D. in Physical Chemistry. Joe served in the American Occupational Forces in Germany in the 1950s, after the Second World War.

Joe was a research scientist from 1961-1965 for Procter and Gamble, where he worked on dioxin and the chicken edema factor. He taught at Miami University from 1965 until his retirement in 2002 and became Professor Emeritus of Chemistry and Biochemistry. During his tenure at Miami, he traveled around the world, speaking on his research in crystallography, metal hydrides, and frozen lakes in Antarctica.

Joe Cantrell's Ph.D. research in chemistry involved x-ray molecular structure characterization, and this topic continued as a major theme throughout his research career. His ground breaking x-ray crystallography work as a research scientist at Procter and Gamble from 1961-1966 identified a chlorinated dibenzo-p-dioxin as the contaminant in a feed product and pointed to this class of compounds for the first time as a major toxicological hazard in the food chain. Dioxin was later a substance of significance as a human health hazard because it was contained in significant quantities in Agent Orange, an herbicide used extensively in the Vietnam War.

His research at Miami University not only encompassed x-ray diffraction structure studies and characterization of other chlorinated dioxins for use as gas chromatography and powder x-ray diffraction standards, but also reflected a long collaboration with R.C. Bowman at Mound Laboratories in Dayton, Ohio, on the thermal stability and crystal structure of metal hydrides.

He was considered to be "the" expert in x-ray crystallography structural analysis of flavanoids, a group of compounds now known to possess very important medicinal properties. He co-authored numerous papers with Anastas Karipides of the Miami University Chemistry and Biochemistry Department and John Hughes, Professor of Geology. He and Hughes, in particular, were responsible for obtaining funding for a powder x-ray diffractometer from the National Science Foundation. Approximately 200 x-ray diffraction patterns of both inorganic and organic compounds were submitted to and published by the International Centre for Diffraction Data. Joe was a consultant to the Mound Laboratory in Miamisburg from 1982-1993 and to the Lawrence Livermore National Laboratory from 1994-2009. Professionally, he was a member of the American Chemical Society, serving as Chair of the Cincinnati Section in 1985. He was also a member of the American Crystallographic Association, the American Physical Society, the International Solar Energy Society, and Sigma Xi. As part of his work on using solar energy, he was a member of a team at Miami University that developed a solar dehumidification process using desiccants; he did the necessary chemistry on desiccants.

Throughout his career, Joe taught both first year general chemistry and a third year physical chemistry course and occasionally a graduate course in x-ray crystallography. Physical chemistry can be a particularly intimidating subject, but Joe taught this course in a straightforward and clear style to which students could relate. One of us (Danielson) also co-taught a physical-analytical chemistry laboratory course with Joe. Our requirement for detailed, well-thought out laboratory reports, was quite a shock to some students, but was a blessing to them later in their careers. Joe was major professor for two Ph.D. candidates and one M.S. candidate in chemistry.

Joe was heavily involved in, and relished, interdisciplinary activity, collaborating with other faculty members on research issues across a wide spectrum of chemistry. He served on the Executive Committee of the Institute of Environmental Sciences (IES) and on numerous oral comprehensive examinations. He was major professor for one M.En. degree candidate in IES and served on the research committee for two others.

Joe participated in an NSF research program in Antarctica, where he helped unravel the chemistry responsible for maintaining the pristine quality of the deep lakes. He and his wife, Margaret, co-authored and published a book on his Antarctica experience, The Land of Ice, in 2000.

After his retirement from Miami, Joe worked on NASA programs under contract to Lockheed Martin from January 2005 to May 2006. After the Space Shuttle Columbia disaster, Joe researched environmentally friendly corrosion control procedures capable of providing good adhesion characteristics under cryogenic conditions for the foam and ablators needed on the Space Shuttle External Tank to support return to flight.

Joe had many interests and concerns. Some were known to many, while others were not so well-known, even to people who thought they were quite close to him. One of the better examples was his service as faculty adviser to Alpha Phi Alpha, a fraternity of African-American students. Miami's chapter of Alpha Phi Alpha was founded a half-century after the fraternity was founded at Cornell University in 1906 as a study and support group for minority students who faced educational and social racial prejudice. Joe was the second faculty adviser of the fraternity at Miami, and he took his responsibilities so seriously that he became a life member of the fraternity. His desire to become a life member stemmed from his belief that if he were to be as helpful as possible, he had to understand the experience of being an active, participating member of the fraternity, as well as to emphasize to fraternity brothers that he was dead serious about doing a good job as an adviser. Joe carried out these functions both during and after his period of service as faculty adviser for the fraternity, organizing study groups, enlisting faculty members to provide tutoring in chemistry for minority students, and encouraging students to persevere. In the words of many graduates, he made the difference between graduating from Miami U and going on to successful careers or leaving the University because of their pre-college experiences in high schools without science laboratories and even science classes.

Joe volunteered in the community as a Boy Scout leader, member of the Oxford Methodist Church, where he was especially active in social action ministry, and the church of the Nazarene in Pearl River, Louisiana. He was a member of the Masonic Lodge, Kiwanis, and the Izaac Walton League.

Joe's service in the Boy Scouts of America was well known and extensive. He served as Cubmaster of Pack 937, Committee Chairman of Troop 956, Scoutmaster of Troop 930, District Commissioner of the Dan Beard Council, and District Chairman of the Dan Beard Council. He was known as a person who was interested in every boy and helped them achieve the highest level of attainment possible. Many Eagle Scouts coming from Troop 930 selected important service projects and did a good job of leadership in assembling the resources needed to successfully complete their Eagle projects. Those who did not become Eagle Scouts did not receive short shrift. Joe worked hard to ensure that every Scout had a great experience.

Several of Joe's students sent messages to his family and the University. Two examples stand out. A former M.S. student, Pat Slonecker, reflected, "I was sad to learn of Joe's passing. He was a chemistry professor, mentor, colleague and friend for thirty-four years. He was a founding father in the structural analysis of flavanoids as well as metal hydrides and chlorinated dibenzo-p-dioxins. Few know that he solved the first crystal structure of histamine, by hand, early in his career. He dedicated his life to scientific discovery, teaching, Boy Scouts, his family and friends. He was an eclectic individual with interests in painting, pottery, and many other endeavors. He was a life-long mentor giving new meaning to the word. He was a friend. I will miss him."

Tammi (Thomas) Howard said, "I knew since fourth grade that I wanted to be a physician. After arriving at Miami and finishing my first year pre-med courses, I encountered Organic Chemistry. I was discouraged, and my dreams of becoming a physician were becoming farther and farther out of my reach. I was introduced to Dr. Cantrell by my mentor, Joseph Cox, soon after expressing my concerns regarding chemistry. Dr. Cantrell mentored me and reviewed difficult topics with me outside of classes. I became more and more encouraged because of his time and patience. He helped me overcome this challenge early on in my career, and I am now happy to say that I graduated from The Ohio State University College of Medicine in May 2008, and I am a practicing resident physician at University Hospital Cincinnati. I am very thankful for professors like Dr. Cantrell who took the time to help students like me achieve the goals we set for ourselves. He made me believe that no task was too big, and that I could do whatever I wanted to do as long as I studied hard and continued to be driven."

In summary, Joe was known as a down-to-earth and caring professor.

Joe's wife, Margaret, told us that Joe thought the purpose of life was thinking. Joe did a lot of thinking, and the results of that thinking became part of his life of service to family, community, students, University, and the world.

Respectfully submitted by Gene E. Willeke, Ph.D., P. E., Director Emeritus, Institute of Environmental Sciences and Professor Emeritus of Geography, Chair of the Memorial Committee, Joseph L. Cox, III, Professor of Art and Associate Provost (Administrator Emeritus), Neil D. Danielson, Ph.D., Professor of Chemistry and Biochemistry and Gilbert Gordon, Ph.D., Professor Emeritus of Chemistry and Biochemistry.