



John D. (Jack) Roberts
1918 – 2016

John D. Roberts, the Institute Professor of Chemistry, Emeritus, and one of the most influential chemists of the 20th century, passed away on October 29, 2016 at the age of 98 following a stroke.

John Dombrowski “Jack” Roberts was born on June 8, 1918 in Los Angeles, California. He spent most of his 98 years in Southern California and witnessed first hand its transformation from a reasonably underpopulated region into one of the world’s busiest metropolitan areas. In fact, Jack (or “JDR” as he was oft referred in the labs at Caltech) was born essentially right underneath what is now the famous four level interchange connecting the 101 and 110 freeways in modern day downtown LA. JDR also witnessed the growth and explosion of science and in particular chemistry over that century span. As summarized in his *J. Org. Chem.* **2009**, *74*, 4897-4917 article and numerous talks over the later part of his life, the explosion of instrumentation capabilities available to the organic chemist progressed in the course of his scientific career from no less than the melting point apparatus to some of the most advanced instruments on the planet. Without doubt, the advances most influential to JDR’s monumental career in chemistry were the advent of nuclear magnetic resonance (NMR)

spectroscopy and the accompanying explosion in computing. Combined, these tools greatly facilitated the insightfully designed experimentation and careful analyses that became the hallmark of JDR's career. It is clear that Jack's thoroughgoing nature combined with his deep understanding of instrumentation and fundamental chemistry served as an inspiration to nearly four generations of scientists. Roberts was oft credited by those far senior to the author as having "taught organic chemists" the power of NMR spectroscopy. Indeed, even Jack's license plate bestowed a love for NMR that only a limited number of SoCal residents could appreciate ("N15NMR"). JDR was a stalwart organic chemist and a scientist who would never shy away from discussion (or argument) in pursuit of the truth. He was a giant of a man.

JDR attended local elementary and secondary schools in SoCal before heading to UCLA as an undergraduate in 1936, where he worked with Bill McMillan and later with William R. Crowell, Don M. Yost, and Charles Coryell (with whom he published his first two research papers). JDR earned his B. A. degree in chemistry from UCLA in 1941. Jack held a lifelong fondness for his Alma matter, once recalling to the author the scene at the UCLA football stadium where his undergraduate contemporaries Jackie Robinson and Kenny Washington connected on touchdown passes. Both of these African American men would go on to play critical roles in breaking professional sports color barriers, for which JDR was proud to have had an association through UCLA. JDR moved from UCLA to attend Penn State University for graduate school in chemistry to work with Frank Whitmore, but returned to UCLA after only one year in the midst of WWII after the bombing of Pearl Harbor, in order to be closer to family. Back in SoCal JDR performed wartime research at UCLA with William Young.

In 1942 JDR married Edith Mary Johnson, who would play a central role in his life, his family's life, and the lives of many "adopted" families in the Pasadena area. Edith and Jack would have four children, Anne, Donald, John Paul, and Allen, who have remained a strong part of the Caltech family through the decades. Jack and especially Edith played a major role in local activities wherever they were, and in their later years were particularly strong supporters of the Pasadena Symphony. In addition to chemistry, Jack was an avid photographer. In his early years, he amassed one of the largest collections of photographs of 20th Century Chemists, many of which can be found in the supplementary materials to his 2009 *J. Org. Chem.* article mentioned above.

In 1944 JDR completed his Ph. D. from UCLA and began an appointment there as an instructor. After a brief time in this position, JDR received a National Research Council Fellowship and began a position at Harvard working with Paul D. Bartlett. In 1947 JDR was offered an instructorship at MIT by Arthur C. Cope and was rapidly promoted first to Assistant Professor in 1947 and then to Associate Professor in 1950. In 1950 Roberts also initiated a consulting and advisory relationship with DuPont that would last more than five decades. In 1952, while in Los Angeles on a Guggenheim Fellowship, JDR was offered a position at the California Institute of Technology and moved in 1953 as Professor of Organic Chemistry. Jack served on the Faculty at Caltech for the remainder of his life holding many

positions including Division Chair of Chemistry and Chemical Engineering (1963-1968), Institute Provost (1980-1983), Institute Professor of Chemistry (1972-1988), and Institute Professor of Chemistry Emeritus (1988-2016).

In his illustrious career, JDR received countless awards, professorships, honorary degrees and numerous other notable accolades. He was the recipient of American Chemical Society Award in Pure Chemistry (1954), the Harrison Howe Award (1957), the Roger Adams Award in Organic Chemistry from the American Chemical Society (1967), the UCLA Alumni Achievement Award (1967), the William H. Nichols Medal (1972), the Richard C. Tolman Medal (1975), the Michaelson-Morley Award (1976), the James Flack Norris Award in Physical Organic Chemistry (1979), the Linus Pauling Award (1980), the Theodore William Richards Medal (1982), the Willard Gibbs Gold Medalist (1983), the American Academy of Achievement Golden Plate Award (1984), the Priestley Medal from the American Chemical Society (1987), the Madison Marshall Award (1989), the Robert A. Welch Award in Chemistry shared with W. von E. Doering (1990), the National Medal of Science (1990), the Glenn T. Seaborg Medal (1991), Award for Achievements in Magnetic Resonance (1991), the Service to Chemistry Award (1991), the SURF 92 Dedicatee (1992), the Arthur C. Cope Award from the American Chemical Society (1994), a Chemical Pioneer Award (1994), the History Maker Award of Pasadena Historical Society (1994), a *Chemical and Engineering News* citation as one of the 75 Most Influential Chemists of the Last 75 Years (1998), the National Academy of Sciences Award in Chemical Sciences (1999), the Nakanishi Prize from the American Chemical Society (2001), the Auburn-G. M. Kosolapdoff Award (2003), the Linus Pauling Legacy Award (2006), the Reaction Mechanisms Conference - Special Session Honoree (2006), the NAS Award for Chemistry in Service to Society, and the American Institute of Chemists Gold Medal Award (2013).

Roberts was a proud member of the American Chemical Society and became an ACS Fellow in 2009. JDR was also elected a Fellow of the Royal Society of Chemistry in 2008. He had a long association with *Organic Syntheses* (1955-2016) including as a long-time member of the Board of Directors. Notably, he served as Editor-in-chief of Volume 41 of *Organic Syntheses* (1961) where his laboratory checked no less than 25% of the published procedures! Roberts was an elected member of the American Academy of Arts and Sciences (1952), American Philosophical Society (1974), and the National Academy of Sciences (1956).

JDR was a prolific author and produced over five hundred published articles in addition to twelve books including his autobiography "The Right Place at the Right Time". Worthy of particular mention is *Basic Principles of Organic Chemistry* (W.A. Benjamin, Inc., New York, 1964), which was co-authored with Marjorie C. Caserio. This book, known in all circles simply as "Roberts and Caserio", was a highly influential work that introduced a modern approach to the teaching of organic chemistry. The work, now freely available for download as an open access e-book, has been downloaded nearly a million times as of this writing. Additionally, Roberts' small book of notes on *Molecular Orbital Calculations* (W.A. Benjamin, Inc., New York, 1961) was influential in that it introduced many organic chemists to the relatively straightforward Linear Combination of Atomic Orbitals

(LCAO) methods for calculating molecular orbitals and fostered the future intimate pairing of experiment and computation in physical organic chemistry.

Roberts' contributions to the primary research literature span an amazing eight decades (1940-2014). Although there are far too many published works to be perused by the casual reader, Roberts himself provided personal perspective on his career, when late in his life he listed what he believed to be his five most significant publications, which is reproduced below. This small sampling of published works provides a glimpse of both the breadth and depth that defined Roberts' scientific style.

1. Small-Ring Compounds. IV. Interconversion Reactions of Cyclobutyl, Cyclopropylcarbinyl and Allylcarbinyl Derivatives, *J. Am. Chem. Soc.*, **73**, 2509 (1951). With R. H. Mazur.

2. Rearrangement in the Reaction of Chlorobenzene-1-C¹⁴ with Potassium Amide, *J. Am. Chem. Soc.*, **75**, 3290 (1953). With H. E. Simmons, Jr., L. A. Carlsmith, and C. W. Vaughan.

3. Nuclear Magnetic Resonance Spectroscopy. Carbon-13 Spectra of Steroids, *J. Am. Chem. Soc.*, **91**, 7445 (1969). With H. J. Reich, M. Jautelat, M. T. Messe and F. J. Weigert.

4. Applications of Natural-Abundance Nitrogen-15 Nuclear Magnetic Resonance to Large Biochemically Important Molecules, *Proc. Nat. Acad. Sci. USA*, **72**, 4696 (1975). With D. Gust and R. B. Moon.

5. Nitrogen-15 Nuclear Magnetic Resonance Spectroscopy. The State of Histidine in the Catalytic Triad of α -Lytic Protease. Implications for the Charge-Relay Mechanism of Peptide-Bond Cleavage by Serine Proteases, *J. Am. Chem. Soc.*, **100**, 8041 (1978). With W. W. Bachovchin.

Jack and his family were quintessential Caltech. His booming voice, strong opinions, and oft thunderous laugh were all characteristic of his style. JDR was no shrinking violet and indeed was a legend. His staunch support of students across all disciplines at Caltech and through the decades are equally legendary and cemented his stature at the institute. One of his earliest actions at Caltech was to assert that a Ph.D. student working with him at MIT, Dorothy Semenow, be admitted to Caltech in order to complete her degree. At the time, the institute was male only, yet with this action, and the intervention and assistance of Linus Pauling, Caltech instantly became co-ed at the graduate ranks. Although the road toward full and equal opportunity was still years away, Roberts helped pave that path. Much later in his career, JDR with Edith by his side welcomed legions of undergraduate "SURFers" (Caltech Undergraduate Research Fellowship awardees) to his group and introduced countless students to chemical research. The Roberts' collegiality extended to all who walked Caltech's campus. In the summer of 2000, when a cadre of new organic chemists joined the Caltech faculty (including the author) it was Jack and Edith who extended an invitation to

all of us and our spouses to their home in beautiful Altadena to enjoy a memorable welcome dinner and celebration lauding our division chair. It was a pleasure and an honor to know Jack over the final 16 years of his life. It was clear that JDR worried about his legacy and his life's works. Shortly after our esteemed colleague and dear friend Nelson J. Leonard had passed away, JDR lamented to me that everyone who had known him as a young man had now all died and he could only barely recall what he himself was like in his younger days. I suppose that is a challenge of longevity, but it is clear that at every stage of JDRs life, he touched people in ways that will outlive him.

John D. Roberts is survived by his four children, nine grandchildren and one great grandchild.

Brian M. Stoltz
California Institute of Technology
Pasadena, California