Autobiographical Sketch of Don Setser

My parents were members of the prototypical class of Kansas citizens, the independent, hard-working, and generally poor family farmers. In fact, my mother's side, the Hewitt family, homesteaded in Stafford County, which is situated in central Kansas. My father came to Stafford county from northern Arkansas as a farm laborer. After their marriage in 1934, my mother and father began the difficult transition from tenant-farmer to owner-farmer status. I was among the last group of students in Kansas to attend a one-room rural school for grades 1−8. My education was salvaged in the eighth grade by a stern, elderly woman, Miss Wendt, a truly dedicated teacher who demanded the best from her students. The most notable event of my experience at Hudson High School was a broken leg, which occurred during the first day of practice of my junior year in an inept attempt to play six-man football. Complications with the broken leg limited my attendance to only one-half of the school term. A few years after my graduation from Hudson High School in a class of 12 students, the grade and high schools of Stafford county were merged into larger regional units. Following high school, I enrolled in a pre-engineering program in Hutchinson Junior College, and I returned to the farm each weekend.

I was fortunate to receive excellent instruction in chemistry (Mr. Elliot) and mathematics (Mr. Cambell) at the junior college. The classes were small, 20−25 students, and the instructors were always available. The chemistry laboratory was conducted in an informal style, and students could spend as much time as they wished refining their experimental results. Mechanical drawing, a requirement of the pre-engineering curriculum, was a nightmare. For me, it was impossible to create a neat drawing in pencil, let alone subsequently to trace the drawing in ink without smudges or mistakes. The instructor was most kind, and I attended both sections of his class trying, with little success, to make decent drawings. The exit paths for engineering majors were either to the University of Kansas or to Kansas State University (KSU). In addition to the chemical engineering departments, I also visited the chemistry departments of these universities. The Chairman of the Chemistry Department at Kansas State University subsequently phoned me with an offer of a small scholarship plus employment in the stockroom. I accepted immediately. The job in the stockroom quickly evolved into research in a nuclear-chemical laboratory, and the transition from a pre-engineering curriculum to becoming a student and a laboratory assistant in the Chemistry Department, although totally fortuitous, was accomplished without regret.

The two years required to complete the B.S. degree passed quickly. I was in a comfortable environment, and I decided to remain at KSU for a M.S. degree. Because I continued in the nuclear-chemical group for the thesis research, the M.S. degree could be completed in three semesters. At that time, the M.S. program required graduate level courses in all four traditional areas of chemistry, which added depth and breadth to my chemical background. Although doing a M.S. degree at the same institution from which the B.S. degree was obtained is strongly discouraged today, it was the correct decision for me. In addition to improving my chemical background, I gained some personal confidence and social maturity. Furthermore, the department had just hired a new assistant professor in Physical Chemistry from the University of Washington, and he suggested that I should consider doing my Ph.D. work with Professor B.S. Rabinovitch at the University of Washington.

In 1958, Manhattan, KS was still an isolated and insular community. The geography of western Washington, the city of Seattle, the large urban university, and the intellectual intensity within the Chemistry Department that I found at the University of Washington were intimidating, but stimulating. Fortunately Professor Rabinovitch did accept me into his group, and I left radiation chemistry for total immersion in the study of unimolecular reactions. I was (and still am) in total awe of Professor Rabinovitch. He is an eminent scientist, a highly educated intellectual, and a classical gentleman. This was a productive period in which Rabinovitch's group developed chemical activation systems of small organic radicals and molecules to test and prove the utility of the Rice−Ramsperger−Kassel−Marcus (RRKM) formulation of unimolecular reactions, including nonequilibrium kinetic-isotope effects. The recent development of digital computers permitted the sums and densities of vibrational states to be evaluated for different molecular and transition-state models; thus, calculated RRKM rate constants could be compared to the experimental results. The close interaction within members of the research group and with Professor Rabinovitch provided an ideal environment for learning; the research experience and the urban university were a perfect match for me, and I even found time to climb Mt. Ranier. Professor Rabinovitch was the ideal mentor, and I am very grateful to have had the privilege of an association with him throughout my professional life.

The Sputnik era began as I was doing my Ph.D. work. The National Science Foundation programs provided a doctoral fellowship for my terminal year at Washington and a postdoctoral fellowship to Cambridge University, England. I selected Professor Brian Thrush in the Department of Physical Chemistry as my postdoctoral supervisor. Brian, who was a young member of the faculty, introduced me to emission spectroscopy, to the advantages of flow reactors, and to the puzzle of CN radical chemiluminescence. Michael Clyne, who had just completed his PhD with Brian and had received a research fellowship at Churchill College, also was in the group. The inorganic free-radical systems under investigation introduced me to a completely new kind of chemistry. Professor Norrish sternly governed his Department of Physical Chemistry, which occupied an entire wing of the magnificent chemistry building. For reasons of safety, Professor Norrish did not permit any experimental work on weekends, a very big change from the work schedule at the University of Washington. This was a blessing for me because I spent many weekends in the elegant library located on the top floor of the chemistry building, which overlooked the gardens of Cambridge. Cambridge was, of course, a stimulating place with an international atmosphere that retained just a hint of the imperial attitude. I was tempted to stay for a second year. However, Kansas State University insisted that I either accept or decline their offer of employment. Also, Rab wanted me in Seattle for 2−3 months in order to complete an article for *Advances in Photochemistry* and to write other papers. Thus, I returned to Seattle in the early summer of 1963 to begin a long period of very intensive work. My association with Professor Thrush and with Michael Clyne, who subsequently moved to Queen Mary College, University of

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London, had an immense impact on my views about physical chemistry. The one year at Cambridge was an outstanding postdoctoral experience.

Although the social activism of the 60's hardly affected university life in Manhattan, Kansas, this period was a time of intensive growth and change at KSU. The undergraduate student population rapidly increased, new programs were started, and new buildings were constructed. The size of the faculty in the chemistry department nearly doubled, and a revised graduate program was the focus of many heated discussions. The number of students choosing to study for advanced degrees in chemistry increased dramatically, because of the national interest in science and engineering as a consequence of the U.S. space program. Federal fellowships to graduate students were available to qualified students graduating from midwestern liberal arts colleges. Although the scene was chaotic, starting a research group in experimental physical chemistry was relatively easy; research students were plentiful, and the expense for small scale research projects was modest. Reaction dynamics was the area of choice, and research projects were started in unimolecular reactions, using the chemical activation technique, and bimolecular reactions, using infrared, visible, and ultraviolet chemiluminescence to monitor the chemical changes. My first postdoctoral assistant, Don Stedman, was instrumental in developing techniques for generating metastable rare gas atoms and metastable N_2 and CO molecules in flow reactors. Metastable rare gas atoms provided a stable base for a research program that eventually led to the rare gas halide laser systems. During the early years, the KSU program benefitted from collaborative interactions with Michael Clyne's group, including Dr. John Coxon, who moved to Dalhousie University. A guiding principle, learned mainly from Rabinovitch, was that physical chemistry measurements should be done on chemically interesting systems, whenever possible.

The stimulus to the science and engineering programs by the U.S. government in the 60's created an oversupply of scientists with Ph.D. degrees in chemistry and physics, relative to the positions available in the industrial market. The disillusionment with the available employment opportunities caused a marked drop in the number of American students choosing graduate study in chemistry, and especially physical chemistry, at universities such as Kansas State University. Further expansion of the physical chemistry program at KSU was not feasible. It became necessary to place a greater emphasis on recruiting graduate students from other countries and on hiring postdoctoral assistants in order to have a productive research group. Recruiting graduate students was more difficult than obtaining funding for research, because the interests of government agencies in gas laser systems in the 70's and 80's matched the emphasis in our research program. Fortunately, the department and the university did encourage collaboration, including a liberal leave-of-absence policy. Especially noteworthy were joint research efforts with Dr. Wayne Danen and Dr. Richard McDonald at KSU. In addition to advice on spectroscopy from John Coxon, Joel Tellinghuisen, and Don Ramsay plus advice on theory from Bill Hase and Ken Kay, research projects were organized with Dr. Chris Öttinger at Göttingen, Dr. Horst Heydtmann at Frankfurt, Drs. Juan-Carlos and Sylvia Ferrero at Cordoba, Dr. Zamik Rosenwaks (and his students I. Nadler and J. Bachar) at Beer Sheva, Dr. Nader Sadeghi at Grenoble, Dr. C. P. Liu at Jinan, and Dr. Nadya Butovskaya at Moscow. The collaborative efforts with Nader Sadeghi, which have continued for 20 years, were especially valuable because Nader introduced me to new techniques of spectroscopy, including the utilization of lasers for various types of measurements. The exposure of our family to French culture has been an enriching experience. The collaboration with Nadya Butovskaya continues, as we strive to summarize the vibrational energy disposal by water-forming unimolecular and bimolecular reactions.

In 1969 Carole Schulze and I were married. The Schulze family, which immigrated to Missouri from northern Germany about 1850, has a long tradition as successful family farmers in eastern Missouri. In addition to organizing our excellent family life, Carole created her own highly successful career as a Professor of Food Science with a specialty in sensory analysis at KSU. We have three children Brad, Kirk, and Brett. Brad, who has a D.Phil. degree from Oxford University in International Economics, currently works in Washington, D.C. Kirk is pursuing a Ph.D. degree in Ecology, and Brett is an undergraduate in the fourth year of a Wildlife Biology program. I have become the diminutive male of the family in physical stature and in mental agility.

Many talented students and postdoctoral assistants have worked in my group during the 37 years of teaching at KSU. I learned much from them. The rapid change in technology has totally altered the nature of research in experimental reaction dynamics. It was only because of the continuous infusion of young talent and the cheerful assistance from the KSU support staff that the research program survived for 37 years. I have always been fascinated by chemical reactions. The opportunity to actually earn a good living by studying reaction dynamics in the midst of a group of perpetually young and optimistic coworkers has been a privilege. Teaching for a semester at Boğaziçi University in Istanbul after retirement from KSU provided a tantalizing glimpse into another world. I cannot imagine a profession that would have suited me better. The fortuitous events that shape our lives, from having the right teacher in the eighth grade, excellent mentors for Ph.D. and postdoctoral studies, the choice of spouse, and interactions with colleagues seem always to have been favorable in my case.

Education

B.S. in Chemistry, 1956, Kansas State University
M.S. in Chemistry, 1958, Kansas State University
Ph.D. in Chemistry, 1961, University of Washington
Postdoctoral Fellow − University of Washington, 1961−62
National Science Foundation Postdoctoral Fellow, Cambridge University, 1962−63

Experience

Assistant and Associate Professor − Kansas State University, 1963−69
Senior British Fellow − Queen Mary College, University of London, 1968
Professor of Chemistry − Kansas State University, 1970−1985
NSF Senior Postdoctoral Fellow − (Freiburg, Ottawa, London) − 1972
Max Planck Visiting Fellow (Göttingen-Germany) − Summer 1977
Associate Editor, *J. Phys. Chem.* 1982−1985
Visiting Professor (Grenoble-France) 1981, 1984, 1987, and 1991−1993
Distinguished Professor of Chemistry, Kansas State University,-1986−2000
Visiting Professor (Boğaziçi University−Istanbul, Turkey), Sep, 2000−Feb, 2001

Honors and Awards

Ramsay Memorial Fellow (England) 1962−63
Alfred P. Sloan Fellow, 1967−68
KSU Distinguished Faculty Award, 1980
American Chemical Society Midwest Award, 1981
Petefish Award, University of Kansas, 1984
Fellow of American Physical Society
Frontiers in Chemical Research Lectures at Texas A&M, 1988
Professorship at Joseph Fourier University sponsored by City of Grenoble (1992/93)
Rank Foundation Prize (1992) for Electrooptics (discovery of excimer lasers)
Segebrecht Teaching Award, Kansas State University, 1995
H. H. King Lecture, Kansas State University, 1999

Research Interests

Dynamics of unimolecular and bimolecular elementary reactions, mechanisms of chemical reactions giving chemiluminescence, laser-induced reactions, vibrational and electronic energy transfer, spectroscopy of small molecules.