

In Memoriam Clifford L. Schrader (1937–2001), Chemical Educator *Par Excellence*

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Abstract: The life and career of veteran science teacher, educator, consultant, and articulate spokesman for science Clifford L. Schrader are recounted.

“A teacher affects eternity; he can never tell where his influence stops.” Henry Brooks Adams, *The Education of Henry Adams* (1907), Chapter 20.

In my Acceptance Address for the 1993 American Chemical Society George C. Pimentel Award in Chemical Education I related the following anecdote:

In the Spring of 1960, believing that every writer should know how to type, I enrolled in a typing course at California State University, Fresno. When I started, I was typing 20 words per minute, and when, in disgust, I walked out of the typing classroom never to return, I was typing only 16 words per minute. Because I assumed that the professor wouldn't flunk a fellow faculty member, I didn't bother to withdraw officially. I received an "F" grade in the course, but I wasn't put on probation because this failing grade was balanced by an "A" that I received in an Elementary Voice course that I was taking simultaneously. I always relate this anecdote to my students when I caution them to be sure to withdraw *officially* if they intend to drop the course [1].

Thus I convinced myself that I could never learn how to type. Consequently, when the typing of letters and manuscripts suddenly became unavailable in our department, it appeared that my entire research and writing program would have to come to a grinding halt. Fortunately, at the time Cliff Schrader, with whom I had corresponded for decades but whom I had never met, was an American Chemical Society Tour Speaker. At the dinner following his lecture to our San Joaquin Valley Section, I told Cliff of my problem. He assured me that he had taught himself to type and that I could do the same.

I marked the keys on my computer with different colors to designate the correct fingers and with Cliff's advice ringing in my ears, I laboriously taught myself the skill that had eluded me all my life. If it were not for his assurance and encouragement, I would not be typing this tribute to him today.

On January 29, 2001 Cliff died suddenly and prematurely from congestive heart failure at his home in New Philadelphia, Ohio at the age of 63 [2, 3]. At the time of his death he was Assistant Professor of Chemistry at the University of Akron, where he taught honors chemistry and was writing a course for nonchemistry majors titled “Chemistry for Everyone.” He is survived by his wife of almost 41 years, Martha Schrader (née Solon); two daughters, Pam Reising of Seattle, Washington, and Emily of New Philadelphia; a son, Paul of New Haven,

Connecticut; one granddaughter; one sister; and three brothers. He was preceded in death by a daughter, Valerie.

Following Cliff's death I soon found that many other persons—students, colleagues, and friends—had similarly benefited from his counsel and, like me, were indebted to him for changing their lives. Two examples that give some insight into his personality will have to suffice here.

According to Lee Marek, Cliff's award-winning friend of more than 20 years who collaborated with him on the videocassette, “Sodium: A Spectacular Element,” reviewed in this issue [4],

I know of few people who have reflected on chemical education more than Cliff. I remember our many conversations over the years and the really long ones we had on both European trips he was on with us [5]. I miss the discussions on the many books he read. He was a prodigious reader, devouring sometimes a book a day! I spent two summers with him and others at Berkeley, where we were charged with explaining why labs are important for learning chemistry [6]. He stayed at my house a number of times with interesting discussions long into the night. We were in many programs together—ACS, NSTA, APAST, Woodrow Wilson, his safety program, Chem Ed, BCCE, and Flinn workshops. When my car was totaled, he gave me his, although it did have 275,000 miles on it! I consider him to be a true friend both for chemistry and life. I still am in denial about his being gone. I expect to see him at the next NSTA meeting waiting to start a discussion [7].

A former student, Carl Obermiller, now Professor of Marketing at Seattle University, wrote:

Cliff's chemistry class changed me. In the language of the time, he turned me on, not merely to chemistry, but to science and learning. He imbued in me, first, a sense of curiosity and, second, a confidence in my abilities to find answers. And those gifts have shaped my life. It's hard to overstate the extent of Cliff's influence on my early years. I set out to pattern my life after his, went to Purdue to major in chemical engineering with the vague notion that, as he, I would eventually end up a high school chemistry teacher....Cliff was the embodiment of nearly all that I like about myself and much that I have aspired to be. Being a scientist, having compassion for others, his love of sports, the pleasure he took in analysis and understanding, his general competence—he could do seemingly anything, from building a car to writing a book. His love of literature, music, and theater—he introduced me, along with dozens of others, to Shakespeare with his annual summer trips to Cleveland for Shakespearean theater. Most of the best parts of my life began either as suggestions from Cliff or as

* Series Editor Contribution



Figure 1. Clifford L. Schrader, taken June 1999 during Yvonne Twomey and Lee Marek's European scientific history tour of England and Scotland. (Courtesy of Paul Schrader.)

explorations we took together....I marveled at the richness of his life. He routinely had days that included playing tennis, watching a football game, reading a book, umpiring a tennis tournament, one or two meetings, family, and a full day of work. Even now, when I have the occasional full slate, I think of it as a "Cliff day."...Head, heart, and hand—he was a man complete [8].

Clifford Leroy Schrader, the son of Errett Schrader and Ethel Schrader (née Haessig), was born on April 16, 1937 in Batesville, Indiana. He was employed as a chemical technician at the Atomic Energy Plant at Fernald, Ohio during 1955–56 and the summers of 1957–59. A certified high school science and mathematics teacher, he taught mathematics at Crawfordsville (Indiana) High School (1960–61), physics, chemistry, biology, general science, and mathematics at East Tipp (Ohio) High School (1961–63), and chemistry, advanced chemistry, science, and mathematics at Dover High School in east central Ohio (1963–69, 1970–90).

Cliff received his B.S. in chemistry and mathematics (1960), his M.S. in physics and mathematics (1965), and his Ph.D. (1971) from Purdue University, where he was a graduate teaching assistant (1969–70). His doctoral dissertation, carried out under the supervision of prominent chemical educator J. Dudley Herron, was titled "The Effect of the Timing of the Presentation of Two Subordinate Informational Concepts on the Cognitive Process of Synthesis." He was a research and product development chemist at RHOCO in Cleveland, Ohio during the summers of 1978–79. He served as Adjunct Professor of Chemistry at Kent (Ohio) State University (1965–90), Ashland (Ohio) University (1990–98), and the University of Akron (1995–96). From 1990 to 1998 he was Science Consultant/Supervisor for the Summit County Educational Service Center in Akron, Ohio.

Cliff was an active member and officer of numerous organizations, including the National Science Teachers Association, Sigma Pi Sigma, Phi Delta Kappa, the American

Chemical Society (Chairman, Wooster, Ohio Section 1983–90; Chairman-Elect, Chairman, and Past-Chairman, Akron Section 1991–94, 1995–98), the State Education Council of Ohio (President 1987–88), and the Ohio Academy of Science (President, Science Education Division 1966–68). He served on numerous committees for local, state, and national organizations, including the United States Department of Education, Ohio Department of Education, American Chemical Society, and National Science Foundation.

Cliff was the Principal Investigator of 16 grants from agencies and organizations such as the American Chemical Society, National Science Foundation, National Science Teachers Association, and Ohio Board of Regents. Much in demand as an educational consultant, he served on more than 20 committees of various state, national, and international organizations. An articulate spokesman for science education, he gave invited presentations at no fewer than 29 national meetings of the National Science Teachers Association and five Chemical Education Conferences. He presented more than 60 lectures, seminars, and talks as an American Chemical Society Tour Speaker, and he spoke at five ACS Biennial Conferences on Chemical Education. He spoke at 60 science teachers' meetings in 11 different states, delivered more than 150 invited presentations before county and local school districts, and lectured at International Conferences on Chemical Education in São Paulo, Brazil; Waterloo, Canada; and Moscow, Russia.

Cliff's 23 publications included two widely used textbooks, *Heath Chemistry* [9], and *Heath Chemistry Laboratory Experiments* [10]. The titles of many of his articles bear witness to his wide interests and erudition, for example, "Teaching Science and Shakespeare," "Sex and Quantum Theory," "Using Algorithms to Teach Problem Solving," and "Shopping for Science." He wrote the narrative and ancillary materials including exercises, background, laboratory experiments, and viewer guide for the high school version of "The World of Chemistry" videotapes (supported by grants from the Annenberg Foundation and NSF and published by Wings for Learning, 1988–90), and he authored "Shopping for Science," an educational videotape program for the Public Broadcasting System series, "Blow the Roof Off!" (1985–86).

Cliff's awards and honors include a Fulbright Scholarship (1965); Jaycee Outstanding Young Educator (1967); Shell Merit Fellow (1968); Acker Outstanding Young Teacher (1979); Fellow of the Ohio Academy of Science (1980); Dreyfus Master Teacher (1982); Chemical Manufacturers Association Regional Catalyst Award (1984); Kiwanis Outstanding Teacher, Dover Education Association Excellence in Teaching Award, and Ohio representative for Teachers in Space (1985); John Vaughn Award for Excellence in Education Award, North Central Association (1987); American Chemical Society's Regional Award (1987) and James Bryant Conant Award in High School Chemistry Teaching (1989); and the Ashland Golden Apple Award for Excellence in Teaching (1988).

Early in his four-decades career as a science teacher, Schrader assumed the responsibility for removing dangerous chemicals from a storeroom that he "inherited." He encountered a quart bottle of picric acid, not realizing that it was explosive trinitrophenol. His quest for rational, safe methods of resolving this problem led him to help initiate and coordinate the \$2.9 million Hazardous Waste Removal Program (HWRP) of the Ohio Department of Education, for

which he served as Program Manager from 1998 until his death. The goal of the program was to remove all hazardous wastes from science laboratories in all public and private K-12 schools in the State of Ohio and to provide safety training for science teachers [11–13].

At first Cliff thought that only a few schools would possess explosive materials. He eventually learned that 153 schools—almost a quarter of the school districts—had highly hazardous substances that required special handling, for example, picric acid, dimethyl and diethyl ether, and sodium azide. Although the program was voluntary, by September 1, 1999 85 percent of Ohio's school districts had decided to participate, and by the end of that Fall the participation had increased to 98 percent. Cliff traveled some 8,000 to 10,000 miles around the state overseeing the cleanup and presenting safety seminars. His work in this area led him to serve as Chairman (1999–2000) of the Safety Committee of the ACS Division of Chemical Education, resulting in his being invited to lecture on classroom safety all around the country.

Through regional and statewide meetings other high school teachers throughout the country have shared their concerns and knowledge about safety matters as a direct result of Cliff's leadership in this field. The HWRP soon became a model for other states. Cliff's heritage in this area lives on in the "Friends of Science" Award given by the Science Education Council to science educators or noneducators who have positively influenced science education in the State of Ohio or the nation through specific or sustained activities.

In 1984 Cliff received the Presidential Award for Excellence in Science Teaching, and he served as President of the Association of Presidential Awardees in Science Teaching (1986–99). Beginning in 2001, APAST established an annual Cliff Schrader Future Science Teacher's Award of \$1000 for "a junior, senior, or fifth-year student enrolled in an accredited university teaching program who has demonstrated outstanding achievement in science and is majoring in science education at the secondary level or elementary education with a science emphasis." In this, in the hearts of his students and colleagues, and in many other ways Cliff's legacy endures. We shall not forget him.

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