Kenneth Sauer: A Short Personal and Scientific Biography

Gerald T. Babcock

Department of Chemistry, Michigan State University, East Lansing, Michigan 48824

An academic vagabond in his early days, Ken Sauer was born in Cleveland, OH, in 1931, matriculated at Oberlin College, did his Ph.D. work at Harvard with George Kistiakowsky (where he was reported to be the best glassblower in his class), and took his first academic position at the American University of Beirut in 1957. Along the way, he met, courted, and married his wife, Margie. She has some of the vagabond spirit herself, and the newly married couple spent much of their free time in Lebanon by slipping away for long motorbike tours of the surrounding countryside and points beyond.

By 1960, Ken and Margie decided to return to the United States and he took a position with Melvin Calvin, at the University of California, Berkeley. At the same time, he switched the emphasis of his research. With Kistiakowsky and at AUB, he had focused on small-molecule gas-phase photochemistry (1−3). In moving to the Biodynamics group at Cal, he maintained his basic photochemical interests but now applied these to the fundamental photoprocesses that involve the conversion of light energy, CO_2, and water into O_2 and biomolecules in photosynthesis. In the early stages of this work, his physical chemical training was clearly evident, as he labeled the photosynthetically active complexes he isolated as "quantasomes" (5−7,9) These early papers are prescient in terms of Ken's emphasis on the necessity for an underlying molecular structure of the photosynthetic unit. Although this seems obvious today, the level of knowledge of biological membranes in the early 1960s was rudimentary and the idea of well-organized membrane-bound proteins with specifically bound chromophores and cofactors would not fully emerge until the next decade.

With his appointment to the Chemistry faculty at Berkeley in 1963, Ken built his research group quickly. One of the hallmarks of Ken's long career in science is his ability to identify and apply useful new physical methods to challenging biological problems, and he quickly demonstrated this as a junior faculty member. His use of, first, optical rotatory dispersion (11) and, second, circular dichroism (20) to study the organization of chlorophyll in photosynthesis was pioneering and led, eventually, to the realization of the chlorophyll dimeric structure in higher-plant reaction centers (35).

During this time, Ken and Margie had settled into their open and charming house in the north Berkeley hills. The house was big enough to accommodate their four boys—Bob, Terry, Rodney, and Peter—and also his graduate students and postdocs on the frequent occasions when he invited us over for an evening of ping-pong and conversation. The food was always good and the atmosphere always one of warm friendliness and intelligence. The Sauer group rapidly grew to reflect Ken's outdoor interests, and group softball games, picnics, bike rides, and, most of all, canoe trips were common. Unfortunately for these trips, but fortunately for our scientific development, Ken was always better at picking projects than rivers!

The mid 1970s was an unusually productive time for Ken, scientifically. He and his group identified the immediate electron donor to Photosystem II, the O_2-evolving reaction center in photosynthesis (47,55,56), elucidating the fundamental principles of using magnetic circular dichroism to study metalloproteins (48,53,54), showed how to use resonance Raman to exploit charge-transfer transitions in metalloporphyrins (58,66), discovered the spin-polarized EPR signal in Photosystem I (52,69), and developed the use of single-photon-counting fluorescence methods (59,60,65,68,101) that he continues to use today with effectiveness (215). During a sabbatical with Paul Mathis, in Saclay, Ken made the initial time-resolved observations on forward and reverse electron transfer in the Photosystem I reaction center (71,73,76) that have sparked considerable activity in a number of labs. Shortly thereafter, he also initiated theoretical considerations of partially oriented systems that continue to be of fundamental importance (87,92).

In the early 1980s, Ken joined forces with his long-time colleague Mel Klein and began an X-ray absorption investigation of the manganese complex at the heart of the photosynthetic water-splitting complex (127). This work reached a watershed in 1993 with the publication of the "dimer of dimers" model for the organization of this complex (191). This structure continues to serve as the working model for the manganese cluster (217). Also in this period, he began detailed EPR work on the manganese cluster (e.g., 109) and continued the spin-polarized time-resolved work (99,110). As with the fluorescence and X-ray absorption work, the work on magnetic resonance in Photosystem II continues to this day with important, new discoveries (221). Along the way, he has continued to develop and apply new techniques (143,146,175,181,200,219)—always new techniques—and new insights (118,120,148,151,161,169, 195,206,214).

In addition to the fundamental, new knowledge that Ken has generated through the work in his lab over the past 40 years, he has trained a host of graduate students and postdocs and extended hospitality and intellectual stimulation to a variety of sabbatical visitors. All of us take this opportunity to salute, congratulate, and thank you. We wish you and Margie all the best!

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