R. S. H. Liu

Photograph taken by Regina Liu

We consider ourselves to be indeed fortunate to have had the opportunity to pursue our career objectives in chemistry under the tutelage of Professor R. S. H. Liu. We hope that this biographical sketch does justice to the many accomplishments of 'Bob' in the field of organic photochemistry.

Robert S. H. Liu was born in Shanghai, China, in 1938. After graduation from a Baptist-affiliated high school, Dr. Liu was awarded a scholarship to attend Howard Payne College, a small Baptist college in Brownwood, Texas. Despite the difficulties of being a foreign student in a town with no Chinese restaurants, he excelled academically. Thereafter, in 1961 he was admitted to the graduate program in chemistry at the California Institute of Technology. Under the tutelage of his research advisor and mentor, George S. Hammond, he joined a select group of exceptionally talented graduate students who were to have a considerable influence on shaping the future of modern organic photochemistry. Among his compatriots were Nick Turro, Jack Saltiel, Angelo Lamola, Bill Hardham, Bill Herkstroeter, Charles deBoer, and Don Valentine to name a few.

His thesis work focused on the photodimerization of conjugated dienes with the piece de resistance being the discovery of noninterconvertibility of isomeric triplets. Following his graduate school days at Caltech, Bob joined the research group of Howard Simmons at the Central Research Laboratories at E. I. duPont de Nemours Co. where he continued his research in photochemistry for four more years. Of these formative years he proudly cites two major accomplishments, one being the discovery of the second excited triplet state and the second being his meeting, courting, and ultimately marrying Regina Ro. Aspiring to a career in academia, he joined the chemistry department at the University of Hawaii, Honolulu, in 1968 with the rank of Associate Professor. It is said that not only did he bypass the lower rank of Assistant Professor, but he also drove the most flashy white Oldsmobile Cutlass on the Islands and sported the flattest flattop crewcut on campus! In 1972 he was awarded the rank of Full Professor of Chemistry.

His research career at UH began where he left off in industry with the study of the photochemistry of dienes and trienes. It was the photosensitized isomerization of the relatively congested dienol, β-ionol, that set the stage for more than two decades of highly productive studies. Ramamurthy and Liu discovered that the photosensitized irradiation of β-ionol quite unexpectedly afforded the 7-cis isomer exclusively. Formation of this surprisingly stable "one way" photoproduct was contrary to prevailing scientific opinion at the time. Having accomplished this remarkable feat, Bob and his co-workers at that time set their sights on the synthesis of the previously unknown 7-cis isomers of retinal, the visual chromophore.

In 1974 Professor Liu took his sabbatical leave at Harvard University in the laboratory of George Wald, the father of vision chemistry. While there, with the help of Willem deGrip of the University of Nijmegen, he succeeded in binding for the first time several of the 7-cis isomers of retinal to opsin. And thus was launched yet another phase of his career—the study of the binding site requirements of the visual protein, rhodopsin, and soon thereafter, the retinal−protein bacteriorhodopsin using as diagnostic probes a wide variety of retinal analogs including the extremely useful fluorinated derivatives. More recently his research interests have once again expanded to embrace the study of the carotenoprotein, crustacyanin (getting bigger and bigger!), using fluorinated astaxanthins.

In describing his research interests from the early studies of small conjugated molecules to much larger compounds such as retinoids, carotenoids, and their protein complexes, and azulenic polyenes as potential NLO materials, Professor Liu humbly describes the transition as quite simply a natural evolution and not a result of clever design. With all due respect, we beg to differ! He took it upon himself to learn and ultimately master diverse areas of specialization including organic synthesis, selective photoisomerization, molecular modelling, protein extraction, binding and purification, and ^{19}F NMR spectroscopy.

His major contributions include the syntheses of the remaining geometrical isomers of retinal, the "hula twist" mechanism of photoisomerization of the rhodopsin chromophore and the

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application of ^{19}F NMR to the study of protein−substrate interactions. For these projects he had received support from the NIH, NSF, Army Research, and others. He has authored over 170 papers and has extensive collaboration with several research groups.

Apart from his research accomplishments Professor Liu is most justifiably proud of his teaching at the University of Hawaii. In recognition of his excellence in both teaching and research, he was awarded the UH Regents' Medal for Excellence in Research (1986), the UH Regents' Medal for Excellence in Teaching (1988), and the Resolution of Merit by Hawaii State Legislature (1988).

As a teacher, it is the students themselves who bestow him the highest honor. His organic chemistry classes are invariably oversubscribed, and for good reason. He has rightfully earned the reputation of being a witty and well-organized lecturer with a wry sense of humor and a penchant for surprises and delighting his students when he dons his Superchemist shirt or Mandarin outfit for his polymer "noodle" or Thomas Edison Flask classroom demonstrations. To them, he is Yoda, the sage professor who compares the polarizability of atoms to the "compressibility" of Konishiki, a familiar local sumo wrestler of gargantuan proportions, or uses Peanuts comic strips to illustrate a point. To his students Professor Liu makes organic chemistry fun to learn as he makes it "shine like the sun".

For the many graduate students and postdocs who have had the good fortune to experience Dr. Liu's contagious exuberance for research and teaching, he remains a close friend, source of inspiration, and advisor to this day. George Hammond's legacy, passed on to Bob Liu, has now been extended to the next generation.

Alfred E. Asato and **Leticia U. Colmenares**
University of Hawaii