

## ILLINOIS YEARS—1942-1945

My arrival in Urbana-Champaign, Illinois, did not herald an auspicious beginning to my career at the University of Illinois. I came from Detroit, where I had been visiting my aunt and uncle, on the Michigan Central Railroad to Chicago and from there on the Illinois Central Railroad to Champaign. I learned later that the Wabash Railroad would have afforded more direct hypotenuse travel between the two cities. A taxi brought me from the railroad station to the “nearest hotel” (my request), which was just one block away. Imagine a New Yorker being caught in a scam like that! If I had been more observant, I could have seen the hotel sign from the exit of the Champaign railroad station. The Inman Hotel was of poor quality and was not equipped to deal with the September heat wave of 1942. It was a long walk from there to Noyes Laboratory of Chemistry. Roger Adams and the other staff members were away, attending an American Chemical Society meeting. My trunk, which had not arrived with me, needed a week of tracing work to coax it to Illinois. This litany of woes, however, was readily displaced by the pleasures of the second week. I found a place to live, described in the chapter on “Where Did We Live”; my trunk arrived; Roger Adams returned and we agreed jointly on a research plan that intrigued me; some research students included me in a picnic; and I discovered that excellent, reasonable meals were available in the cafeteria of the Illinois Union Building.

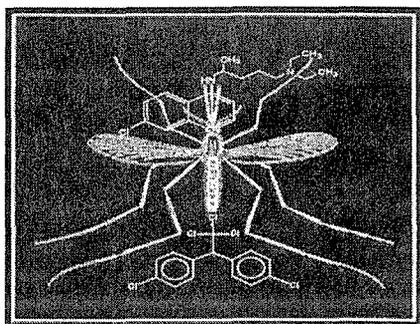
The junior staff and students in Chemistry were bright, dedicated, and friendly. John E. Mahan, who was another postdoctorate with Roger Adams, was especially helpful. Once I had done the necessary library work as background for my research problem, I began the experimental work with gusto, gradually increasing the hours at the bench until they ran from 8:30 a.m. to 10 p.m. regularly, five or six days a week. On Sundays, I wrote letters, took long walks, and listened to whatever music was available. To this routine were added bicycle rides, tennis, squash, and regular attendance at seminars and university concerts. I began to feel at home in the flat and waterless land. I found out how to get things done in the laboratory, and I introduced some of my new colleagues to fractional distillation and chromatography methodology that I had learned at

Columbia University. The biochemists were already well versed in the latter separation and purification methods, but these had not yet become routine for the organic chemists at the University of Illinois. My laboratory became a visiting place for those postdoctorates and students who liked to discuss chemistry and laboratory technique, but only when Professor Roger Adams was out of town. Dr. Adams had relinquished the headship of the Department of Chemistry to Professor William C. Rose because of commitment to war work. When Adams was in town, which was not very often, he used a desk and two chairs in the inner part of "my" laboratory. At such times, I entertained no visitors, and I also had to skip out of the laboratory when he was calling Washington on confidential matters or when he was deep in discussion with other professors. We developed a compatible routine for the pursuit of our very different activities.

In February, 1943, teaching duty was added to the postdoctoral research of John Mahan and myself because of the absence of so many of the permanent teaching staff and because of their assignment to war-related duties. I found new pleasure in the teaching of organic chemistry to non-majors, and I added "why" and "how" to the rather factual presentation in their required text. I learned to lecture without notes, aided by a single outline card. I also found out how to pace lectures and how to make up exams. None of this comes naturally. It all has to be assimilated by experience. Eventually, I determined how to give an understandable lecture by imagining myself sitting down among the students and listening to my own words. If you carry this out-of-body experience too far, you may end up as a simultaneous critic as you speak, asking, e.g., "What is he saying now?" Being two people in one body can be confusing. I also came to understand that you cannot thrill an entire class but that you can reach a few responding students in each class. In that first course of mine, I reached one student in particular who was far smarter than anyone else. He was considering becoming a missionary, but I convinced him that he could become more efficient in saving people as a chemist. He switched to being a chemistry major, went to graduate school, and eventually had an outstanding academic career, concentrating his research on biologically active natural products. We cannot run the experiment to find out how many souls he would have saved had he become a missionary. Nevertheless, he never regretted his choice.

In August of 1943, I happened to be enjoying a Sunday dinner in the Men's Faculty Club where I was joined by Roger Adams, who was not allowing himself vacation time at their "camp" in Vermont. When the conversation got around to the question of how the research was going, I could tell him that I had established the structure of retronecine by

synthesis. This had been our primary one-year goal, so he became somewhat excited, asking "What are you doing this afternoon?" I had no definite plans, but I was thinking of taking a hike. This obviously did not interest him, for he replied "Write up the experimental section of the paper describing your work this afternoon, come to my house after supper, and we will write the discussion section tonight." All of that transpired, aided in the evening by joint consumption of a bowl of popcorn. Adams was well satisfied, but I begged for another month of work in which I would be able to establish the relative stereochemistry of all the products. This he approved. I really learned about drive and focus on that busy Sunday afternoon and evening.



Chloroquine (top), etched in marble wall,  
National Academy of Sciences

There was some question as to what would happen to me after the 1942-1943 academic year, but the question was solved by an appointment as Instructor in Chemistry for 1943-1944. I was also encouraged to direct the research of senior undergraduates majoring in chemistry, which was a highly satisfactory experience because of their knowledge and practical training. I also joined the National Defense Research Council-funded Antimalarial Research Program under the direction of Professors Charles C. Price III and

Harold R. Snyder at Illinois. For background information, the Japanese invasion of Indonesia had cut off the world's quinine supply. Accordingly, when U.S. forces started regaining the islands of the Pacific, they had to battle not only the Japanese but the malaria mosquitoes, the latter without the benefit of the natural antimalarial medicine. Until that time the only synthetic substitute for quinine was atabrine, the side effects of which were almost as debilitating as the early manifestations of the disease itself. Highest confidential priority was given to research and development of improved antimalarials, and a large university-industrial team was in operation for this purpose. The most promising substitute candidate among those we made was Chloroquine, which required a new method for the synthesis of 4,7-dichloroquinoline, a necessary intermediate. Graduate student Royston Roberts with Charlie Price invented a suitable synthesis. I led a group of graduate students in development of the method, and, by means of some 72-hour stints in the laboratory, we prepared the intermediate on a grand scale. Our pilot-plant effort was sufficient for Chloroquine to be produced

in time for its use in the Pacific Theater against the assaults of the *Anopheles* mosquitoes. Alas, with the widespread later use of Chloroquine in Southeast Asia and Africa, the malaria parasites have now become resistant to this once-very-effective drug, and new methods for preventing and for treating the dread disease still have to be found.

In my participation in the Antimalarial Research Program, I shared in the direction of the excellent graduate students of Charlie Price and Harold Snyder, and I established the practice of consulting with the students each day on the progress of their antimalarial research. We explored other methodology for the synthesis of precursor 4-hydroxyquinolines and of potential antimalarials with other ring substitution and other heterocyclic rings. The research publications (17) that resulted from the Antimalarial Research Program helped me to obtain membership on the Graduate College Faculty and with it the authority to direct my own graduate students. I could also continue to direct undergraduate students who elected to do research with me in their senior year. Because of the essential nature of the antimalarial work with which I had been occupied, I continued to be deferred by my draft board. I entered into further civilian service in the summer of 1943 with the teaching of a V9 unit of the U.S. Navy that was quartered at the University of Illinois. This did not substitute for my regular teaching. It was just added on, with the benefit of an extra \$500 in pay. Then, during the academic year 1943-1944, I had another added assignment of teaching organic chemistry to premeds in a U.S. Army unit on campus. Two stories about this unit are worth telling.

The soldiers had a dog, one of the largest I have ever seen, which they trained to behave differently to men in civilian clothes. For example, I happened to meet my student unit as they marched through the campus, dog alongside. For their amusement, at an appropriate command, he bounded toward me and placed his forelegs on my shoulders. We stood face to face. Since I am somewhat of a dog person, I talked to him in a friendly manner, telling him that since we were going in opposite directions, he was really impeding our progress. He relented after a lick or two. The soldiers appreciated my reaction and the result. On another occasion, I found him standing on my lecture desk when I came in to give my regular lecture. Since his bulk prevented the Army students from seeing my writing on the blackboard, I had to "talk" him into lying down and shifting to one side of the desk. In later lectures that year, his usual place was on the floor. The dog's name was Dammit, which allowed the Army unit to vent its feelings as they marched through the campus with "Here, Dammit!", "Sic him, Dammit", and similar phrases. The other story relates to cheating. After the first exam in my course, two of the best students in the unit came to me with the question as to whether I knew

that wholesale cheating was going on in the class. I had never experienced organized cheating before, and I was almost physically sickened by the knowledge. On retrospection, I realized that I should not take it personally, but instead, that I should make it impossible for cheating to occur on the rest of the exams. As a result, half of the class flunked and returned to the infantry. Their Captain Thornberry, who was in charge of the unit and who became a friend of mine, asked whether I would teach a second course in organic chemistry to the worthy survivors so that they could continue with Army medical training in the fall. I invented a course in medicines and drugs, and all the students passed. I kept in touch with several of the men who became M.D.s and had very satisfying careers after the war.

My friends at the University of Illinois were mainly those whom I met through chemistry and music. There were others whom I met at lunches or dinners in the cafeteria of the Illinois Union Building. Three ladies in the Livesay family were good companions. First, there was Naomi Livesay, who taught in the Department of Mathematics. When she left to marry, she introduced me to her cousin Patty Livesay. And when she left to join her fiancé who was obtaining a Ph.D. degree at the University of Pennsylvania, she introduced me to her younger sister, Elizabeth Ann Livesay. Ann was a student in Geology, a pianist, and she played classical records in one of the lounges of the Union Building at set hours of the day or evening for all listeners. After graduating as the salutatorian of her class, she took a Master's degree in Geology. Then she went West, married, and has lately settled in Oregon where she and her husband write books. Among the faculty, Professor Donald Kemmerer, in the History of Economics, and his wife Mirjane treated me to Thanksgiving and occasional Sunday dinners. Don had been my teaching assistant when I took a course in Economics at Lehigh University. Professors R.C. Fuson and Sherlock Swann, Chemistry and Chemical Engineering respectively, met one night per week, 8-10 p.m., to listen to records from Sherlock's extensive record collection, and to sip beer, or Scotch, or Irish whiskey. They invited me to join them. I appreciated the music and the company, and I learned to appreciate the drink, the first alcoholic beverage of my life (at 26!). My participation on the Chemistry Bowling Team made me acquainted with members of the other teams in the Faculty Bowling League and rounded out the Midwest experience with a regular bowling night. During 1944-1945, I was an Associate in Chemistry, and this was the title to which I returned in 1946 after service in Europe. Imagine! In those days there were two ranks *below* that of Assistant Professor, namely, Instructor and Associate. Eleven of us held those ranks in Chemistry at Illinois during 1942-1946, and I was the only one to remain and advance to Assistant Professor and Associate Professor.