

CHAPTER 27

MY FIRST EXPERIENCE IN A RESEARCH LABORATORY

In the early 1940s, I spent a few months in the U.S. Department of Agriculture (USDA) Research Laboratory (now the Eastern Regional Research Center), 800 East Mermaid Lane, Wyndmoor, Pennsylvania. I don't remember how I knew a position was open – probably my mother found out about it – and the people who might remember are no longer available. I now wish I had kept a diary, but I expected to remember all the details that are now so elusive. Phyllis Davis has very kindly furnished the first name of the person who supervised me, Dr. Charles Willits. She also sent me some photos and literature from the period when I worked at the laboratory. Dr. Willits had a reputation for being an exacting scientist, but I found him to be a warm, wonderful person. I only worked for him for a few months and, since I was on the midnight to 8:00 am shift, I saw him for only a few minutes each morning. However, his appreciation for my work was evident.

As was often the case when I was young, I focused intently on the tasks assigned to me and was not aware of the other research going on in the USDA Eastern Regional Research Laboratory (ERRL), which opened August 17, 1940. In addition, not many people were available for conversation between midnight and 8:00 am. Over the years, research has varied from potatoes to vitamin C. A publication lists Publications and Patents 1940-1990 from the laboratory, now called the Eastern Regional Research Center (ERRC).

The project I worked on involved the extraction of rubber from guayule [*Parthenium argentatum* (Asteracea)] and rabbit-brush (*Chrysothamnus viscidiflorus* and *C. nauseosus*). The intent was to find natural rubber that would be useful in medical devices and for other purposes. These plants are now marketed as ornamental shrubs and can be viewed on Google and other search engines. As I recall, the sample was first hydrolyzed and then followed by an acetone extraction and a benzene extraction. The extraction was in a continuous series, and I changed flasks on schedule. In my free time, I washed laboratory glassware. Every morning I reported briefly to one of my supervisors before leaving for home.

A colleague, Professor Duncan Porter, then at Stanford University, remembered that guayule was planted outside of Patterson, California, in the Central Valley during World War II. Porter remembers that the guayule plants (between Patterson and Westley, along California Highway 33) were plowed under when the war ended. Porter's PhD advisor, Professor Reed Rollins, monographed *Parthenium* in the 1940s because of the federal government's interest in North American sources of rubber. Recently, Dr. Daniel P. Schwartz kindly sent me an article by Zack Hall from the *Reno Gazette Journal*, February 12, 2004, that describes a project led by Dr. David Shintani, which might lead to commercial rubber production in Nevada, using the abundant native rabbit-brush. One of the joys of writing an autobiography posted on the internet as a "work in progress" is connecting some of my activities as a youth to the 21st century. A Google search even disclosed that "The Emergency Rubber Project" of World War II involved 1,000 scientists and technicians.

Working on this project, on the continuous extraction, was a valuable experience for me in two important aspects. First, I learned that research involved detailed, painstaking work and meticulous recordkeeping. This learning experience was useful when I began my own research, even though it had quite different goals. Second, I used Dr. Willits as a reference when I applied for admission to Swarthmore College, not knowing that he did his undergraduate work there.

Early in my childhood, my parents had purchased a full set of the *Encyclopedia Britannica* for me – a major expense during the Great Depression. Later, they purchased a beginner's chemistry set and, still later, the advanced set. After reading the first draft of this chapter, my daughter Karen asked why my parents bought me the encyclopedia set and the two chemistry sets. At that age (probably 9 or 10), I just accepted the gifts without wondering about motivation. However, my mother took me to the library frequently, starting at a very early age. As a result, I have always been addicted to reading, and the *Britannica* was probably intended to expand the available resources. I spent a lot of time with the beginner's chemistry set, which undoubtedly resulted in the purchase of the advanced set. In the recent past and current "shop-until-you-drop" era, it is difficult to convey the sacrifice needed to purchase anything beyond the necessities of life.

However, the family did have an Atwater Kent radio. In those days, most quality radios had a short wave band, even though not many short wave stations existed. As a child, I was thrilled to listen to a broadcast from overseas. I could even find the place in a *Britannica* map and learn something about the country from which the broadcast initiated.

I also built model airplanes from kits that contained balsa wood, paper, glue, and instructions. These kits were very cheap, since practically all the work was done after the kit was purchased. These construction activities and the chemistry sets taught me to pay very careful attention to instructions or else the investment of money and time would be wasted. I worked with the chemistry sets for many hours in the basement of our house. The encyclopedia gave me an inkling that many unanswered questions existed in science and that scientists were spending their lives trying to answer them.

With this first laboratory job, I went from two chemistry sets in our basement to an entire building filled with gleaming research laboratories and mysterious equipment . . . and I was going to work there, albeit in the most junior scientific category possible. I simply was overwhelmed by my good fortune. In addition, ever the child of the Great Depression, I was to be paid for this wonderful experience!

I worked entirely in the one laboratory. A training period of a few days gave me detailed instructions on the routine tasks I had been employed to carry out – carefully written precise instructions – and some phone numbers in case I needed help. After this training period, I arrived early (about 11:30 pm) to relieve the person on the preceding shift. He was also new to the job, but he had the luxury of having full-fledged scientists present at the beginning of his shift. After he went home, I was alone in the laboratory with my notes and sheets of instructions. Of course, a guard at the front desk had let me in, but he had his own duties. Although the guard was affable, I suspected he was not a fount of information about guayule and rabbit-brush.

Suddenly, my first shift was over and the time was 8:00 am; my supervisors reported to work, as well as the next shift in my area. My supervisors were smiling, and my relief must have been abundantly clear. They went over the records, looked at the extraction system, and wished me a good morning. After that first shift, things gradually got easier, but I never got overconfident. Even today I “run scared” on all major responsibilities. I always irritated Jeannie when I locked a door and triple checked (at least) to validate that it was locked. She even stitched a sampler for me: “Being Careful Kills the Soul” (William Saroyan). Although the position of research scientist seemed incredibly distant and unattainable, I had survived and even performed adequately on the bottom rung of the ladder.

Although I did not realize it at the time, this experience was one of the defining moments of my professional career. It was my first opportunity to actually see and experience a research environment as a participant, albeit one of very low status. Even as a beginner I felt my contribution was an important part of the project, and I made every effort to do my very best. Dr. Charles (Uncle Willy) Willits was primarily responsible for the “team attitude.” (My mentor, Dr. Ruth Patrick, also favored the “team” approach many years later and solidified my faith in it.) Accurate recordkeeping, attention to detail, and precision were very important to Dr. Willits, but he was a warm, caring person as well. Although I was not in the laboratory long enough to learn the outcome of the particular project I worked on (thanks again to Ms. Phyllis Davis, I now know), the experience was extremely satisfying. I was helping generate data that might result in new knowledge and concepts, and this goal was more than enough at that time. .

Stochastic events probably occur in all research projects, but intent focus on a problem blocks all the unpleasant events common to the human condition – at least temporarily. In addition, if one is moderately successful, one gains freedom as an independent scientist and, within limits, the opportunity to move elsewhere if one’s present situation is not satisfactory. Of course, none of these possibilities were apparent to me at that time. I knew the joys of a research career that became so central to my life. I realize now that none of these events could have happened in some research laboratories, and I am grateful that fate or luck placed me in the right place at the right time for me!

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