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Moonshine Whiskey and Japanese Shoestrings: The Making of a Textile Chemist

Sidney M. Edelstein, Chairman, Dexter Chemical Corporation.

Willing to try any venture that would provide additional income in the midst of the Great Depression, a young chemist at the Dixie Mercerizing Company convinced the University of Chattanooga to offer adult education courses in textile microscopy and textile fibers and then signed on as the instructor. Since he was given a fee for each student attending, Sidney M. Edelstein looked forward to the first night of class in this large textile town, only to find an unusual Tennessee snowstorm reduced the attendance to one—his wife Mildred, who had come along to keep him company.

Edelstein's entrepreneurial spirit was not dampened by that snowstorm, as he vividly described in two recent interviews for the Beckman Center Oral History program. With Prohibition in effect, the local mountaineers were conducting a brisk business in selling moonshine whiskey. Dr. Edelstein developed a "quick-aging" process using little packets of potassium permanganate and sodium bisulfite. Addition of one packet of permanganate to a five-gallon crock of freshly distilled raw whiskey would remove a number of undesirable ingredients, the precipitated manganese dioxide would be filtered off, and the whiskey neutralized with the second packet of bisulfite. Other packages of coloring and flavoring allowed the moonshiner to be creative in marketing his product. As Edelstein remarked, "If you know chemistry, you might as well make use of it. What good is it if you just know it and you don't do something with it?"

The pages of the Sidney M. Edelstein transcript, part of the rapidly growing collection of oral recollections now being assembled by the Beckman Center, are filled with lively and colorful accounts of the people, places, and events that form part of Dr. Edelstein's distinguished career. Edelstein was given his first chemistry set when he was eight years old. At the Baylor prep school in Chattanooga he became a prize student in chemistry and was trusted with the keys to the laboratory. To celebrate the spring holidays he enlisted the aid of some friends in preparing fireworks, only to have the mixture explode, knocking out windows and sending all of them to the hospital with cuts and burns.

That love for chemistry, coupled with an innate curiosity, insatiable internal drive, and a broad range of interests, has become the Edelstein trademark. Whether he was making home brew in the attic of the fraternity house at MIT or investigating the behavior of cellulose in strong alkali as a senior research project, he was setting the stage for future contributions to textile chemistry, marked by solid chemistry and a keen sense for business.

As an undergraduate at MIT, Sidney Edelstein had an intense interest in cellulose. In answering a question about cellulose on an exam, he cited the latest research results obtained from reading the current journal literature, only to be marked wrong. When he tried to substantiate his point, the instructor simply said the "correct answer" was the one given in the lecture. Attempting to do research in cellulose chemistry, he was turned down by the organic chemistry group, who said that his proposed study would be physical chemistry. The physical chemistry group refused to participate, stating that they did not work with substances that were not "definite compounds." Instead, he was told, "The only place that does this kind of foolishness is chemical engineering." There Edelstein was given a laboratory and office, and during his final year at MIT he studied viscosity changes in cellulose solutions treated with alkali, publishing his results in *The American Dyestuff Reporter* in 1933.

No longer able to afford graduate studies, in 1932 Sidney Edelstein returned to his home town of Chattanooga, the cellulose center of the United States. He finally convinced the president of the Dixie Mercerizing Company to hire him, and for $9 a week began trying to solve their problem of uneven dyeing. He subsequently turned to other research areas, but every time he worked out a new process, the president would say, "We don't want to change."

Edelstein in 1948, already hooked on chemical history, explains a blowpipe that was used in the nineteenth century by James Curtis Booth at the Philadelphia Mint. Chemical and Engineering News, *26 (1948), 1357.*

Undaunted by this apparent lack of interest in his results, Edelstein used his three-year stint to gain a deep knowledge of yarn dyeing, keeping a demanding schedule. He was in charge of the mercerizing department, and from 6:30 A.M. until 5:00 P.M. he worked as a chemist, using his laboratory to develop tests for better control of the baths. From 5:00 P.M. to midnight he was a dye worker, learning color-matching techniques and the process machinery. On Saturdays he worked only in the morning, spending the afternoon in his father's store to "make a little extra money."

In 1936 "people in the Chattanooga area decided to apply for a grant to study mercerizing," the treatment of cotton with alkali to improve its strength, luster, and affinity for dyeing. Funds were supplied by the American Association of Textile Chemists and Colorists (AATCC). Sidney Edelstein was selected to direct the study, and he approached the former head of the Baylor school who was now at the University of Chattanooga. The University supplied a laboratory and "put up additional money for equipment." For the next two years Edelstein became a research associate of the AATCC, establishing the scientific basis for many trade traditions and superstitions.

Recognizing that there was no established test for determining if cotton had been mercerized, Sidney Edelstein developed a method based on the absorption of barium, which is still used today as the official test for mercerizing. Its immediate application in the 1930s, was to Japanese shoestrings! The import tariff was based on the amount of mercerizing, and the existing test was an examination of a fiber cross-section to determine the amount of swelling. But the black-dyed fibers were difficult to assess, until Sidney's test "settled it once and for all. That method made the Japanese pay a lot of duty."

Seeking the scientific basis for operational procedures, Edelstein destroyed an industry myth in the process. Most plants used large cooling machines to cool the caustic used in mercerizing and thus supposedly to increase shrinkage, as John Mercer recommended in his 1850 patent. Dr. Edelstein showed that "shrinkage had no relationship to this effect and that with the strengths they were using, the temperature was only slowing down the reaction." Slowly the word made its way around the industry, and the expensive cooling machines were discarded.

Undergraduate chemistry majors at MIT were required to take a course in the history of chemistry to meet their degree requirements. As Dr. Edelstein recalls, "I was already married, and the idea of going in on Saturday morning just to listen to the history of chemistry seemed awful to me. But I was afraid I might not get a degree if I didn't take it. So I went in and was almost ready to sleep through the class, because we were often out on Friday night." Tenney L. Davis, the instructor, would bring in old books that Dr. Edelstein examined carefully. "The very idea that these things existed got me completely interested in the field," Edelstein explains, "and that has remained with me until today. It came through taking this course. It wasn't what he said, but because of what he showed me. If I can feel and smell something, then I'm hooked." Dr. Edelstein has never been off that hook, and his support of the history of chemistry has now reached legendary proportions, as explained elsewhere in this issue.

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