



# Inspirational and Collaborative

## Looking Back on the Life of Betty Klepper

by Denice Rackley

Last year, the Societies lost one of its giants—Betty Klepper—who passed away on 26 Oct. 2018. Despite the traditional roles deemed acceptable for women of her day, she was determined to follow her own path. She discovered her unique strengths early in life and set out to have a positive impact on the world. Along the way, she made discoveries that would propel the science of agronomy forward, but more importantly, she set an example of leadership for us all.

“Betty Klepper came into science when there weren’t many women in science in general, and even fewer in the fields of crop science and agronomy. She is one of the pillars: I stand upon her shoulders,” says ASA and CSSA member Dr. Kim Kidwell, Dean of the College of Agricultural, Consumer, and Environmental Sciences, University of Illinois at Urbana-Champaign.

“Inspirational” and “collaborative” are the words most often used to describe Betty Klepper. Her genteel southern upbringing remained evident in her gracious manners, but make no mistake: she had a plan and purpose for her life

and the resolve to stay the course. She wasn’t going to be swayed off that path, yet she always extended a helping hand to support others, valuing them and their contributions. Well known for her collaborative leadership, she developed teams that accomplished more together than any individual could achieve on his or her own.

Klepper had two unlikely influences during her childhood that shaped her into the woman and scientist she became. She credits her leadership skills to attending summer camp as a Girl Scout. Her experiences taught her to team up with others that had complementary skills so that they weren’t competing but having fun. Girl Scouts also taught her to make the work pleasant for the team. Her childhood role model was Marian Anderson, a black opera singer who overcame many preconceived ideas and prejudices on her journey to success. At 10 years old, Klepper read a book about Anderson and found her to be a “model of grace under pressure.” Anderson was skilled, successful, and a great human being, according to Klepper. Klepper decided then and there that she too wanted to be good at something and “successful as a person,” which in her eyes translated to solid, sure, and gracious.

doi:10.2134/csa2019.64.0906

**Opposite page:** Inset photos show (top, l to r) Howard Taylor, Betty Klepper, and Eric Hoare, who was Klepper's supervisor in Australia, at the Auburn University rhizotron; (middle) Klepper measuring leaf water potential with a pressure chamber, Australia, 1967; and (bottom) Klepper taking measurements of stomatal opening on corn leaves at the Auburn rhizotron in 1975. Backdrop image shows Klepper at the Umatilla River.

## Career Rooted in Curiosity

Klepper was born in Memphis, TN in 1936. Her father was a lawyer and her mother a school teacher; she had a privileged education in private girls' schools. Steeped in the southern traditions of the day, her mother expected her to follow a traditional path for women attending a finishing school. Klepper had other ideas; she attended Vanderbilt University, majoring in math and chemistry with a minor in physics.

Klepper's thirst for knowledge would lead her to a biology class in college and a botany class with an inspirational teacher, Dr. Elsie Quarterman, forever changing her trajectory. Studying living systems as a whole struck a chord with her. Receiving a Marshall Scholarship after graduation, she headed to England to study botany and chemistry for two years. Returning to Tennessee, she taught high school science briefly but found teaching to repetitive. Continuing her quest for challenges and opportunities to learn, she enrolled in graduate school at Duke University. Graduating in 1966 with her Ph.D. in Botany with minors in Biochemistry and Physical Chemistry, she set out to explore the world and begin her research career.

Klepper spent two years conducting research in Griffith, New South Wales, Australia with the Commonwealth Scientific and Industrial Research Organization (CSIRO). Upon returning to the U.S., she was hired as an assistant professor of agronomy at Auburn University.

While conducting research at Auburn in the USDA Rhizotron Laboratory with Dr. Harold Taylor, a USDA soil scientist, Klepper and her team first garnered international attention. They used time-lapse photography in this state-of-the-art laboratory to study root growth. Klepper once stated, "Dr. Taylor seduced me with offers of technical equipment and a unique role within an excellent team of soil scientists."

"Her pioneering research became widely acclaimed for investigating the interactions between root systems and soil," says ASA and CSSA member Dr. Richard Smiley, Oregon State University professor and Columbia Basin Agricultural Research Center scientist. The research at Auburn initiated her lifelong interest in how root systems grow and take minerals from the soil (see <https://youtu.be/7WID7ObQPjE>).

In 1972, Klepper moved to the Pacific Northwest to conduct rangeland ecology research. While in Washington working at Battelle Northwest Laboratories, she studied the movement of water and nutrients into and through plant tissues. She continued to explore factors that influence root growth at the USDA-ARS Columbia Plateau Conservation Research Center (CPCRC) in Pendleton, OR. As supervisory plant physiologist, she and her team studied the effects of tillage, planting machinery design, and crop residue management on cereal seedling vigor and crop water use. She worked with colleagues to develop a mathematical system to quantify and predict wheat plant development. Working



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with soil physicists and mathematicians, her team developed a model that described the interaction of wheat shoot and root growth. This model promoted a new understanding of wheat crop development and the ability to evaluate whole-plant response to environmental stresses. This understanding enabled researchers to relate observed developmental anomalies to the timing of stress and the most likely stressor, e.g., temperature extremes, soil moisture deficit/excess, pesticide injury, etc.

## Holistic Outlook

The ability to trace back a stress event to a specific time in the life of a plant was groundbreaking information that led to advances in wheat breeding. “Betty promoted the practical applications of her work, emphasizing treatment effects on the whole plant,” says Dr. Mark Westgate, Professor of Plant Physiology at Iowa State University and Past President of CSSA. “While many scientists examined the response of individual plant parts to one stress, Betty relied on a more eclectic and holistic approach. Her work showed that plants respond to the environment as whole organisms, not as a collection of individual parts.”

Klepper inspired Westgate, influencing the way he teaches students about plant physiology. Believing as Klepper did that understanding the plant as a whole is critical before investigating individual parts, Westgate begins every semester in his plant physiology class with that lesson. Westgate appreciated Klepper’s ability to retain a holistic outlook while applying basic physical-chemical principles in her collaborations with other scientists. “Betty had a special way of bringing people together, marshaling the troops for the common good. She was able to work seamlessly across disciplines. Betty knew that you did not change peoples’ minds by presenting them a bunch of data or by being domineering. She shared her point of view with respect, standing firm while being congenial and nonthreatening. I learned from Betty that science is a people business, not a data business.”

Klepper was promoted to research and location leader at CPCRC in 1984. Dr. Bill Pan, Professor and Extension Specialist at Washington State University and current President of SSSA, found Klepper to be very encouraging when their paths crossed. He went on to say Klepper was very generous with her knowledge and time. “She would attend extension events visiting with the farmers about her research and its practical applications.”

“You didn’t work for Betty, you worked with her,” says Ron Rickman, USDA soil scientist, who worked alongside Klepper for more than 15 years at CPCRC. “She was the most organized person I have ever known; Betty had her entire career planned out when she graduated. ... There was no question Betty was in charge, but she had a rare gift that made everyone—technicians, students, and colleagues—feel that it was their project and they were crucial to the project’s success. The field research required long hours of

intricate work. We dissected wheat plants leaf by leaf.” Yet, she enjoyed the work, according to Rickman. “One particular afternoon in a field with a view of Mt. Hood, Betty stopped and looked around saying, ‘Do you believe people pay us to do this?’ She loved working in the field and was very humble. I am fortunate to have worked with her. The guidance she provided me was invaluable.”

“The presence of an iconic female scientist in the West was inspirational to me,” says Dr. Kim Kidwell, who was beginning her career at Washington State University during the time Klepper was at the CPCRC. Klepper, a role model, gave her hope that she too could do meaningful work that would contribute to the success of farmers. One of the traits Kidwell most admired about Klepper is that “she did the people piece of science extraordinarily well.” It was the way she did her work that was unique. “She brought together scientists from all over the world who had complementary expertise and developed lifelong relationships with them. They accomplished amazing work because she was able to facilitate those relationships, leaving egos out of the equation. Betty played ‘team’ incredibly well—not many scientists do.” Kidwell explains that ego impedes progress, and science tends to be more competitive than collaborative. “We get caught up in thinking our theory is the right one. We all want to be the one that solves all the world’s problems. Betty’s drive to do things that mattered and her curiosity about science were more important than her need to be the one that received the credit and glory.”

Klepper’s collaborative leadership style was appreciated by everyone who crossed her path. Her ability to bring diverse people together, making each person feel that their contribution was important and encouraging everyone to give their best, propelled her career to heights that previously eluded women. In her career, she coauthored more than 200 scientific publications and became a Fellow of four science societies (SSSA, ASA, CSSA, and AAAS). She was the first woman in the U.S. to lead a major “agricultural” journal, serving three years (1992–1994) as the editor of *Crop Science*. And she became the first woman elected CSSA president in 1997. She established the Betty Klepper Endowment Lectureship to stimulate scientific discussions of cutting-edge crop science issues and to honor outstanding scientists. Her contributions garnered recognition from the society; she received the Presidential Award in 2003 and the Monsanto Distinguished Career Award in 2004. Oregon State University awarded Klepper the Diamond Pioneer Award in 2010 for her contributions to Oregon agriculture.

Early in Klepper’s career, she was dismissed by many; after all, she was a “city kid” and a woman in a man’s world. She would tell her friends in Pendleton stories of meetings in which she was one of the few, if not the only, women in the room and was often asked to take notes. Always declining gracefully, she would say she preferred to keep her mind open, allowing herself to listen intently.

## Positively Impacting Her Community

While remaining active in the Societies after her retirement in 1996, her focus shifted from contributing to science to positively impacting her community. She approached these endeavors with the same collaborative leadership style that earned her scientific success. She focused on making a lasting positive impact through education, preservation of natural resources, and supporting the arts.

Klepper began the Stewards of the Umatilla River Environment (SURE) group to promote the education, recreation, and conservation of the Umatilla River. The group organized river clean up days, planted native trees for wildlife habitat and flood prevention, and introduced nesting boxes along the river. "Betty was the driving force in not only the restoration and conservation of the river but encouraged citizens to take an active role in educating themselves and others about local natural resources," says Director of the Umatilla Watershed Council, Mike Ward. Klepper developed a "River School," bringing elementary classes to the river to teach them about it and the life that it supported. She also created several workbooks to supplement classroom science curriculum. She was instrumental in enhancing the River Parkway, the paved walk-bike path that runs along the 2.5-mile stretch of the Umatilla River through Pendleton. Artists were commissioned to paint murals on adjacent buildings, spotting scopes were added for wildlife

viewing, and educational kiosks were placed, all in an effort to educate visitors and enrich the community. She served on the boards of many community organizations, including the Umatilla Water Shed Council, Arts Council of Pendleton, and Pendleton City Library. In 2004, Klepper was awarded the City of Pendleton's Woman of the Year Award, acknowledging her dedication to enriching her community.

"She enjoyed music, played the flute, and appreciated art," recalls her good friend, Fern Oliver. "She had a strong connection to nature and appreciated all life. Betty's passion for life and learning were evident in everything she did." She was an avid birder, visited all 58 national parks in the USA, and loved going on African safaris. As a lifelong student, she enjoyed traveling widely. "An excellent cook, she would bring home cookbooks from around the world, creating fabulous dishes for her friends," Oliver says. "Betty had a vegetable garden for 35 years—she loved adding fresh garden produce to the meals she created."

Klepper's pioneering research in plant-soil interactions and root system growth contributed immensely to the understanding of crop development, yielding significant advances in agronomic knowledge. "Her ability to connect people and purpose made her extraordinarily unique, elevating her ability to be influential," Kidwell says. Those who knew Klepper echo Westgate's sentiment: "We need more Betty Kleppers in the world."



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