



Previously Published in *Prophetic Voices from Our Past*, CD, 2007

A Century of Women in Agronomy: Lessons from Diverse Life Stories

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ABSTRACT

The experiences, achievements, wisdom, and philosophies of eight exemplary women agronomic scientists are told to provide insights into the history, diversity, and evolution of the agronomic sciences. The stories of these women, whose lives and careers span the last century (born 1889 to 1973), integrate their personal and professional lives to create a multidimensional understanding of the past to help us see a clearer vision for the future. Each woman's story contributes a unique and significant perspective on the roles of individuals in the agronomic sciences. The compilation of these life stories reveals important similarities shared among women. Their lives and words are meant to inspire others as they reflect on their own personal and professional goals and approaches to attaining them. This paper can be a resource for teachers seeking to stimulate student discussion about the role of gender within the agronomic profession, as well as about professional ethics and cultural diversity. While intending to be thought-provoking, the authors sought to reveal the importance of women in the continuing evolution of agronomy and to affirm the value of human diversity in a constantly changing world.

*"This is not the age of monks and hermits.
Truth is revealed by association with our fellow work-
ers as well as diligent individual study and research.
A scientist should belong, if he wishes to keep alive to
the ever advancing truth of science in his line."
—Ten Eyck (1911)*

The founding fathers of ASA in 1907 envisioned an organization that would "increase and disseminate knowledge regarding crops and soils and all conditions affecting them" (Carleton, 1910). Because of the vast expansion of our knowledge base, the myriad of new ways to disseminate information, and the increasing need for international communication among scientists, this vision and purpose for ASA have become even more relevant and important today. During the last hundred years, changes in both the science and the technology of agronomy have been profound, as have the changes in society in general.

In 1907, the charter members of ASA authorized a committee to "invite other men to serve with them on a final committee which shall call a meeting of all persons interested in agronomy" (Lyon, 1933). Notable but not surprising, the

invitation to serve on the final committee charged with organizing ASA was not extended to women, since it would be another 13 yr for women in the USA to gain the basic right to vote in national elections. Until the 1970s, most of the few women pursuing college and graduate education in the sciences were hired as support scientists or technicians and they were expected or required to resign their positions upon marriage (Mason, 1992). In the 1920s, the number of women receiving college degrees in sciences were at a peak, but ASA remained exclusively male until 1937, the year when Dr. Ester Parsons Perry became the first female to join. One can only wonder how she was perceived by her colleagues and, conversely, how she perceived herself as the sole woman in the Society. In the context of the prevailing attitudes among and towards women at the time, it is difficult to know how Perry might have reacted to the prevailing perspectives regarding roles in the Society. For example, the ASA Presidential address of 1939 began with examples of how scientists from different disciplines would view an agronomist. The president described how a cytologist would study an agronomist in relation to his chromosomes and would have drawn attention to the "peculiar significance" of the sex chromosomes. He stated that, "If our paternal ancestor had given us an *x* chromosome, instead of a *y* chromosome, we would have been more likely to become an agronomist's helpmate than an agronomist" (Garber, 1939).

In the 1940s, two more women joined ASA. All three women were soil scientists employed within the University of California system. Ester Perry and Edith Tibbetts were located at the Berkeley campus and Harriet Joseph was at Riverside and are since deceased. In the 1950s, three women crop scientists joined ASA. These women, Anna Storgaard (Professor of Plant Science, University of Manitoba), Elpida Skorda (Emeritus Research Leader, Cereal Institute, Athens, Greece), and Te May Zou Ching (Professor Emeritus at Oregon State University) have since retired and maintain emeritus status at their home institutions. Membership of women increased very slowly, resembling the lag phase of a growth curve, until

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Published in *Agron. J.* 100:S-53–S-69 (2008).
doi:10.2134/agronj2007.0081s

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the mid 1970s when the growth curve entered an exponential phase (Fig. 1).

This exponential growth coincided with the Women's Rights Movement, which captured the attention of the U.S. public and lawmakers. In the 1970s, women were entering the scientific workforce in larger numbers and the accompanying sense of empowerment was energizing women to break into traditionally male-dominated fields. The number of women with Ph.D.'s in agronomic sciences varies by subdiscipline (Table 1). Membership numbers and the percentage of women in ASA, CSSA, and SSSA in 2005 are given in Table 2. As ASA approaches its benchmark centennial, its membership reflects the past and remains at only 13%.

Quantifying and analyzing membership trends over time are important for any organization. These numbers allow evaluation and assessment of the past and present in order to

“Organizations often seem immovable. They are not. With the right kind of story at the right time, they are stunningly vulnerable to a new idea.”
—Denning (2005)

Table 1. Number and percentage of doctorates awarded to women in agronomy and related fields of study: 1996–2005.†

Field	1996	2000	2005	1996–2005	
				1996	2005
				%	
Agricultural sciences	304	317	376	27	36
Agronomy/crop science	17	14	14	16	18
Conservation/renewable natural resources	3	5	25	23	39
Environmental science	23	43	52	28	40
Plant breeding/genetics	13	23	7	21	20
Plant pathology	27	12	33	30	47
Plant sciences	3	10	16	14	52
Soil chemistry/microbiology	9	8	13	31	54
Soil sciences	14	15	16	18	31
Biological sciences	2415	2622	3105	42	49
Biometrics/biostatistics	34	41	63	43	49
Botany, other	44	53	42	42	48
Cell biology	107	155	151	46	48
Ecology	84	116	193	34	47
Molecular biology	291	320	362	45	50
Plant genetics	16	17	23	39	46
Plant pathology	13	8	13	34	42
Plant physiology	29	15	19	40	50
Earth sciences	88	108	127	20	30
Hydrology/water resources	5	16	7	16	17

† Source: National Science Foundation, Division of Science Resources Statistics, Survey of Earned Doctorates.

Table 2. ASA, CSSA, and SSSA membership in 2005 by gender and member status.†

Status	ASA				CSSA				SSSA			
	F	M	Total	%F	F	M	Total	%F	F	M	Total	%F
<i>U.S. members</i>												
Active	500	4334	4858	10	302	2155	2480	12	537	2634	3191	17
Emeritus	2	929	934	0	1	348	352	0	1	460	462	0
Graduate	273	513	808	34	239	482	740	32	392	590	1012	39
Sustaining	1	35	38	3	1	35	38	3	1	35	38	3
Undergraduate	167	348	520	32	101	192	295	34	105	170	278	38
Total U.S.	943	6159	7158	13	644	3212	3905	16	1036	3889	4981	21
<i>International members</i>												
Active	101	831	947	11	58	522	597	10	121	808	946	13
Emeritus	3	118	121	2	1	40	41	2	2	84	86	2
Graduate	26	59	87	30	23	60	85	27	44	85	132	33
Sustaining	5	9	14	36	5	9	14	36	5	9	14	36
Undergraduate	0	4	4	0	0	4	4	0	0	2	2	0
Total international	135	1021	1173	12	87	635	741	12	172	988	1180	15
<i>Total members</i>												
All	1078	7180	8331	13	731	3847	4646	16	1208	4877	6161	20

† F = female; M = male.

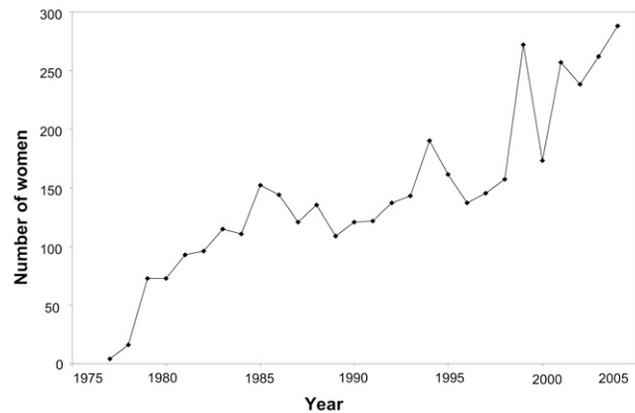


Fig. 1. Number of women joining ASA in the last quarter century.

set goals for the future. Numbers also inform us of progress and change as well as bottlenecks and leaks. Contrary to the popular idiom that “the numbers speak for themselves,” they do not; people do. Thus, the data presented here provide female membership trends and reflect the professional participation of women agronomic scientists, but they only offer circumstantial evidence regarding the factors causing the trends.

The main objective of this article is to use personal accounts of selected women agronomic scientists to add a human dimension to these data. We relate the life stories of these women, born in different decades, in order to provide a better understanding of the forces that have motivated and influenced women and men in their choice of profession.

The experiences of all ASA members, albeit to varying degrees, have shaped and are part of the history of ASA. Assembling accounts of agronomists can provide valuable insights into the history, diversity, and evolution of the agronomic sciences. Just as the yield of a corn plant depends on its genes and environment, each person's professional place depends on his or her inherent traits, life history, and surrounding environment. The narratives included in this paper do not represent women in general but relate experiences shared by both women and men, especially of that respective generation. However, the life stories contain experiences, traits, emotions, and appearances that are either unique or more common among women. Thus, these stories are not meant to define, but rather, to transcend gender. They offer selected glimpses into the history of agronomy by portraying women as diverse as the sciences they practice.

The following presents life stories of eight women agronomic scientists whose lives and careers have spanned the past century. They are based on personal interviews with seven of these women and the records of Dr. Anna Sommer (deceased). Some of the women interviewed have held important leadership positions within ASA, CSSA, and SSSA, and are well-known to the Societies' membership; others less so. Each woman's story contributes a different dimension to the mosaic of woman ASA members. Collectively, their professional and personal journeys

reveal impressive similarities, as well as significant differences. Integrating the personal with the professional creates a multi-dimensional and richer picture of the past and permits us to see a clearer vision for the future. Quotations of the women interviewed serve to depict and enrich history in ways that statistics or an historical account alone can not. To make meaning from the things that really matter in our lives, we must delve beyond the factual and listen to what our lives have to tell us (Hampl 1999). We wish to pay our respect and appreciation to these women in agronomy who have shared their life stories, and in doing so, others can gain a deeper understanding of themselves and of the agronomic sciences over the past century.

LIFE STORIES

Anna L. Sommer (1889–1973)

“For more than a century, plant physiologists contented themselves with the assumption that only ten of the eighty odd chemical elements known are essential and indispensable to the life and growth of the chlorophyllous plants. We submit that in view of the foregoing evidence and discussion, that position is untenable.”

—Sommer and Lipman, 1926



Before the turn of the 20th century, farms were largely family-oriented; farm and household were inseparable. Wives were customarily considered to be integral to farm operations and worked with their husbands in the fields and barns. In the early 1900s, state agricultural colleges, experiment stations, cooperative extension, and other professional agriculturalists advocated agriculture as a scientific enterprise and industrial in nature, leading to an increasing gender-based division of farm labor (Handy-Marchello 2005). In 1916, new legislation began to require land-grant colleges to

include “industries for women” in their instruction of agriculture, which superficially made college educations more accessible to women. However, this legislation also codified the expectation that women study scientific housekeeping, while men studied scientific agriculture, including agronomy.

At the turn of the 20th century, there may have been only one woman in the USA who had earned a graduate degree in plant or soil sciences from a land grant agricultural college. Anna L. Sommer, born in Cucamonga, CA, in 1889, earned her Ph.D. in plant nutrition and chemistry from the University of California at Berkeley in 1924. After completing a research fellowship at the University of Minnesota, she was hired in 1929 as a tenure-track associate soil chemist by the Department of Agronomy and Soils at Alabama Polytechnic Institute (now Auburn University). Dr. Sommer was an extraordinary scientist who published groundbreaking papers proving that Zn, B, and Cu were essential trace elements for

plant growth (Sommer and Lipman, 1926; Sommer, 1927; Sommer, 1928; Sommer and Sorokin, 1928; Sommer, 1931). Using meticulous techniques and eliminating previously undetected contamination from the rooting media, she established that extremely small amounts of these elements were necessary for plant growth.

As shown by the excerpt quoted from one of her groundbreaking papers, she challenged her colleagues for not having previously conducted the rigorous experimentation necessary for determining the essential roles of Zn, B, and Cu for plant growth. Despite the significance of her discoveries and her abilities as a scientist, Dr. Sommer was not promoted to the rank of professor until she retired in 1949 (Weaver, 2002).

Even though Dr. Sommer was a faculty member in Auburn’s Agronomy Department for more than 20 years, she published her research in journals including *Science*, *Plant Physiology*, and *Soil Science Society of America Proceedings*, but not in *Agronomy Journal*. Dr. Sommer died in 1973 in her home state of California, leaving a rich scientific legacy through her significant journal publications but little record of her personal life. Thus, we can only guess what her life was like as the only woman tenured in an Agronomy Department.

Rosalind Morris (b. 1920)

“I enjoyed growing up on my parents’ fruit farm, but in my early years I considered becoming a journalist. As a child I wrote poems to send to my grandfather in Wales, and in high school my favorite subject was literature.”



In 1918, soon after World War I ended, a great flu epidemic spread around the world, which would fortuitously point Rosalind Morris towards a career in agronomy. Morris was born in Wales, where her parents were both schoolteachers. Her father had survived the flu, but his illness left him in poor health. Responding to his doctor’s counsel to “seek an outdoor life,” the family immigrated to Canada and bought a fruit farm in southwestern Ontario. Morris’ father’s health

improved and he quickly adapted to a more rustic lifestyle. Her mother initially had more difficulty adjusting to the rural location and circumstances, but with great determination she soon learned the ways of a Canadian housewife.

Morris' childhood was happy and characteristic of rural Ontario in the 1920s. She and her brother walked to a one-room country schoolhouse for their elementary education. When not studying, she helped to harvest asparagus and raspberries, cleaned the chicken pens and gathered eggs, and fed several dogs. In her teens, she became increasingly involved in farm operations. In the spring, she drove a Fordson tractor while her father sprayed apple trees, and in the fall she helped to pick and sort apples.

“Following the depression years, my family could not afford a prestigious university, so we chose the Ontario Agricultural College in the city of Guelph, about 130 miles from home.”

In 1938, Morris graduated from the local high school with the highest marks in the county and enrolled at the Ontario Agricultural College, later part of the University of Guelph. With her parents' academic backgrounds, there was no question about whether she would attend college, but her mother would have liked her to study home economics while her father encouraged her to pursue agriculture. On the basis of her interest and background, she decided to major in horticulture with the intent of becoming a fruit-tree breeder.

In 1942, Morris obtained her B.S. in Agriculture and was accepted into the graduate program in the Plant Breeding Department at Cornell University. With most college-age males involved in World War II, women had a window of opportunity to enter the academic pipeline in agricultural sciences. However, Cornell was founded on a commitment to an education for “any person in any study” and had a history of attracting women undergraduates. In 1923, the year that Nobel Laureate Dr. Barbara McClintock earned her B.S. degree from Cornell's College of Agriculture, 25% of that college's graduates were women. McClintock had wanted to pursue graduate studies in genetics, but the Plant Breeding Department, which offered the genetics major, was not accepting women graduate students in those years. Instead, she received her graduate degrees from the Botany Department, majoring in cytology. Twenty years later, in 1947, Dr. Rosalind Morris and Dr. Leona O. Schnell became the first women to receive Ph.D.'s from Cornell's Department of Plant Breeding. Despite a legacy to “provide and forever maintain facilities for the education of women as broadly as for men”, during Morris' years of graduate study, there were no female tenure-track faculty outside the College of Home Economics. Although McClintock was hired by Cornell as an instructor, she left Cornell believing that she would not receive tenure (Keller, 1983). It was 1978 before another woman, Dr. Martha Mutschler, was hired as a faculty member in that department (Royce Murphy, 2007, personal communication).

As a graduate student, Morris spent the academic year taking courses, assisting in the genetics classroom and lab, and working on her dissertation. During the summers, she worked

in the Plant Breeding Garden, located in a hollow on the edge of the campus, assisting her advisor with small-grains research and conducting her own research on buckwheat. But her education gained new meaning when she first saw chromosomes under a microscope in a cytology course, and they never ceased to captivate her interest.

“Little steps lead you one way or another. But my mentors helped to guide me in the direction my career was going to take.”

It often takes more than credentials to find a desirable position and in Morris's case, her career began with the support of the professor she had assisted in teaching at Cornell. He was impressed by her skills and intelligence as well as her research and teaching abilities. When he learned that his *alma mater*, the University of Nebraska at Lincoln (UNL), was searching for an assistant professor in the Agronomy Department, he enthusiastically recommended Morris. She was not yet an American citizen and would have preferred to return to her Canadian homeland. But in 1947, she was not able to find a suitable position in Canada. Thus, she ventured to Nebraska, and she fondly states, “That is where I stayed thereafter.”

“I guess I was destined to be in this profession.”

Rosalind Morris began her teaching and research career in plant cytogenetics at UNL in 1947, several years before the structure of DNA had been discovered. She was the first woman faculty member hired in the Agronomy Department at UNL and surmises that her department chair probably wondered whether she would stick to it or leave to get married and raise a family. There was no need to be concerned because Morris remained for more than 40 years on the faculty at UNL, where she was appreciated for filling an important niche in the department's teaching and research efforts. Over a period of 10 yr, she advanced through the ranks to full professor. During her career, Morris taught graduate courses in plant genetics and cytogenetics and continues to enjoy the close contacts that she formed with her former graduate students and lab assistants. As a faculty member of a land-grant university, she appreciated the balance between research and teaching. Morris notes that she was active in departmental matters but did not have a competitive attitude with respect to her male colleagues. Her approach as the only woman faculty member in the department was to “demonstrate that I was qualified, based on my professional accomplishments, to be a faculty member in agronomy.” Since she was the only woman faculty member in the Agronomy Department, she made contacts with other women scientists across the campus through the local chapter of the national organization, Graduate Women in Science (Sigma Delta Epsilon).

For the first 10 yr at UNL, Morris was a junior partner in experiments to test the effects of X-rays and thermal neutrons on crop plants. These studies grew out of concern over the effects of the atomic bombs during World War II. In 1949 Morris spent a year at the California Institute of Technology

“It was a joy for me to sit at the microscope and look for those beautiful chromosome spreads. My research was based on the misbehavior of chromosomes and took a lot of patience and persistence. Those studies were a forerunner for molecular research on wheat chromosomes and genes.”



learning to identify radiation-induced chromosome abnormalities in maize. In 1956–1957 she continued irradiation studies in Sweden and England on a Guggenheim fellowship. Upon her return to Nebraska she decided to join the wheat team as a cytogeneticist. From then until her retirement in 1990, she and her assistants developed unique sets of cytogenetic lines in wheat. Each line differed by only one chromosome pair, which allowed her and other scientists to locate genes for numerous important traits. Seeds of these lines were sent to many parts of the world for use in wheat research. Morris' wheat cytogenetics research that began over half a century ago now provides a premier resource base for the emerging field of functional genomics. Her career is a testimony to the importance of long-term research.

In 1963 Rosalind Morris joined ASA. In 1979 she became the first woman honored as an ASA Fellow, and in 1985 she became a CSSA Fellow. She was an Associate Editor of *Crop Science* from 1977 to 1979 and she contributed to two ASA Monographs on wheat.

Following a long, productive, and fulfilling career, Dr. Morris has retired. Occasionally she feels “homesick” for her work, but she has found close friends and other avenues to round out her life. She has contributed to educational bro-

chures about the value of a local forest. She also has a daily mission to pick up litter in parks while walking her dog and cleans items for recycling. “When so many people in this world have so little, it’s terrible that we waste recyclable material.” Hobbies have included travel, photography, and bird observations. She served as president of the Nebraska Ornithologists’ Union and editor of the *Nebraska Bird Review*. In recent years, she has been active in the local Osher Lifelong Learning Institute, one of many across the USA funded by the Osher Foundation in San Francisco. Dr. Morris has attended numerous courses and has coordinated several on topics as diverse as archaeology and foods. “It’s an opportunity to meet people who have a common interest in keeping their brains active.”

“We do have global warming and the glaciers are melting. Young people need to learn about environmental issues so that they can take leadership roles in deciding on solutions.”



Te May Zou Ching (b. 1923)

“We struggled just to have enough to eat. Friends would shelter us in their houses. We must have food, we must have shelter, and now my goal is to get that for everyone in the world.”

In that same decade as the birth of Rosalind Morris, but on the other side of the world, China was experiencing its last peaceful years before a long period of civil war and foreign invasion. In 1923, Te May Zou Ching was born into an aristocratic Chinese family. Until she was 7 yr old, she lived in an imperial compound with five generations of her extended family, including her great-grand uncle who was the Minister of Foreign Affairs in the Ch'ing Dynasty. Her life as a young child was privileged and peaceful. Ching, her siblings, and her cousins had private tutors from the age of two who instructed them in reading, writing, and arithmetic. Their afternoons were spent playing in the different gardens in the compound

and, with the help of servants, uncles, and “aunties,” they happily engaged in all kinds of projects, including harvesting fruit.



Abruptly, at the age of seven, Ching’s carefree childhood ended when the Chinese civil war erupted and forced her immediate family to flee to the international settlement in Shanghai. Ching recalls that “no terror of war occurred in the settlement, but the sound of guns, explosion of bombs and destruction were forever in the air.” Her early memories are dominated by recollections of struggling to

obtain food, water, and shelter. Her family lived as fugitives and she was often unable to attend school. When the Japanese invaded Shanghai in 1937, her family again fled, this time to the Chinese interior where Ching and her family spent the next 15 yr surviving on odd jobs and government support.

During World War II, Ching attended high school and then National Central Chinese University with the financial assistance from scholarships and the Chinese government. The devastating events of her childhood became positive influences and set the direction of Ching’s goals to work in agriculture and forestry to provide the basic needs of food and shelter for all people.

“During the war, I had nothing else to do but study and hope.”

In the 1940s, Ching studied forestry, which was unusual for women of that era. There were no women faculty in the department nor other women forestry students. On the other hand, she does remember one significant male teaching assistant whom she met in her forestry classes as an undergraduate. He was a “great mentor” but more than that—he was later to become her husband. Following her graduation, the newly married couple left China to begin their graduate degree programs on scholarships at Michigan State University in the USA.

“Career and family are not mutually exclusive!”

As is the case for most graduate students, Ching studied diligently, worked as a graduate assistant, and conducted her thesis research. However, she was different from most other graduate students in that she also had two babies while pursuing her graduate degrees. Ching’s life as a graduate student and mother was not only “foreign” from most American women of that time, but also unique among the exceptional women who were also pursuing graduate degrees in agriculture. She was an exception to the predominant philosophy of the time that women should choose a family or a career but not both. She and her husband believed that they could succeed together by devoting themselves to family and school. They shared all responsibilities for the children and

also traded doing domestic chores for friends in exchange for day care for their pre-school children. Ching received her M.S. in Wood Technology (Forestry) in 1950 and Ph.D. in Cytogenetics (Botany) in 1955. Also, she wisely took advantage of every opportunity to broaden her knowledge and skills. Thus, she completed graduate school with a large and diverse set of laboratory skills, supportive recommendations from professors, and teaching experience in plant physiology. Ching worried that it would be impossible for two Ph.D.’s in closely allied fields (Kim Ching obtained his Ph.D. in Tree Genetics) to secure jobs in the same locale.

Serendipitously, two faculty positions became available in the Agronomy and Forestry departments at Oregon State University. Ching applied for an Agronomy position as a seed physiologist even though her Ph.D. was in cytogenetics. She was more than happy to reorient her career so that both she and her husband could obtain faculty positions at the same university. Against long odds, the couple both secured tenure-track appointments and the family moved to Oregon.

“I could plan a research project to solve a problem or answer a question that I had in my head. Many projects failed and I would try again and again but without an answer. The successful ones, however, made a positive total score.”



Ching began her career as a seed physiologist at Oregon State in 1956 and successfully maintained continuous and long-term support for her research in tree seed physiology through a combination of grants from the National Science Foundation, the USDA, and the Oregon Agriculture and Forestry Experiment Stations. With stable grant support and a well-equipped laboratory, she conducted basic seed physiology research on agronomic crops and trees, while developing improved techniques for seed testing, storage, and other appli-

cations. She feels particularly fortunate that her faculty position allowed her the academic freedom to pose and answer questions of her own choice. As she states, "I didn't think about being a woman. I just did what needed to be done."

"Make a little bit at a time and it will make something better."

Another important aspect of her satisfaction with her academic position was her student interactions because she truly loved teaching, advising, and mentoring students. She reminisces with obvious satisfaction that her former graduate students would visit and tell her that "they had it good in graduate school" and she was glad to be appreciated for her part in their education. Similar to many faculty mentors, her graduate students became her extended family. At the same time, her children often became her lab assistants and her research became her family's "hobby," which occasionally resulted in joint publications with her husband. As her children became older, their assistance progressed from measuring seedling height, to counting cells in different stages of mitosis under a high-powered microscope, and to plotting data on her computer.

"I just wanted to answer questions and find the truth."

During her career, Ching worked to improve the production and quality of grain and tree seeds. During the 1970s, she recognized that biological energy (ATP) was the common denominator for all living activity and pioneered studies on the role of ATP as the key to seed viability and forming the basis of plant growth, vigor, and production. Her outstand-



ing contributions to agronomy and crop science led to her becoming the second woman to be elected as a Fellow of both ASA and CSSA in 1985.

"My proudest accomplishments as personal and tangible assets are my children and grandchildren and my publications as professional contributions."

Ching found her career stimulating and rewarding, but in 1988, she followed her husband in retirement to allow more time to spend with her family. Although officially retired, Ching and her husband manage a tree farm in Oregon and use its profits to help others. Ching's early desires to work towards a world where everyone has food and shelter are sustained through the couple's financial support for four college scholarships to assist students who study agriculture and forestry. As her 60th wedding anniversary approaches, she is planning a family trip to China. For their first time, her children and grandchildren will visit her homeland and meet their Chinese relatives. At 84, Ching and her husband continue to play tennis every morning. According to her, "He has volunteered to lose because I am the only cook in the house!"

Betty Klepper (b. 1936)

"I was a city kid and that was rare in the Agronomy Society."



A decade later and worlds apart, Betty Klepper was born in 1936 into a traditional upper-middle-class family in Memphis, TN. Her father was a lawyer, and her mother was a school teacher and housewife. Klepper grew up immersed in the societal norms of the antebellum South and her mother tried to mold her in these traditions by choosing the schools and social activities she deemed best for her daughter. And so Klepper attended an elite private girl's school even though she would have preferred to attend the local public school with her friends. Her high school emphasized a classical education that excelled in English, history, and Latin, but was only average in math and science. Klepper acquiesced to her mother's choices of schools until college. By then, Klepper felt old enough and confident enough to set her own course. Her mother urged her to apply to a Virginia all-girls school but

she declared that if she were going to attend a girl's school, it would be Vassar or Wellesley, not a "finishing school." Her mother considered these schools "too radical" and it was agreed that Klepper would attend Vanderbilt, which had been Klepper's school of choice from the start.

Quantitative and analytical subjects came naturally to Klepper and she chose to major in chemistry and math with a physics minor. Her father was pleased with her choice, while her mother was not as enthusiastic. Klepper once overheard her mother telling her friends that "Betty is a science and math major and she didn't get it from me!"

"I went to College because I am curious about the world around me. The possession of knowledge is the possession of a lot of power."

Klepper entered Vanderbilt in 1954 where she ably pursued her interests in learning about "the big sweep of things." In an effort to appease her mother, she joined a sorority and paid her meeting dues even though she never bothered to attend the meetings. Her mother remained unaware that Klepper was independently scheduling her own social activities. During her undergraduate years, Klepper found math too abstract and gravitated towards chemistry and physics because they were more concrete. But during her junior year, Klepper discovered biology and began her lifelong love of learning about living systems.

"The reason I ended up in plant science rather than any other type of science had to do with people."

Like so many college seniors, Klepper was unsure about her future after graduation even though she had decided that it would include biology. After graduation, she was awarded a Marshall Scholarship to study botany and chemistry for two years in England. She then returned to Tennessee to teach high school science. Although she had always wanted to teach, she quickly realized that she needed more variety than teaching high school science provided. She decided, "When I'm 45 years old, I don't want to be teaching this for the twentieth time." She continued her education at Duke University, where she earned her M.A. (1963) and Ph.D. (1966) degrees in Botany with minors in Biochemistry and Physical Chemistry, respectively. Even though her dissertation research investigated the effects of salinity on water uptake in corn, she studied corn as a model plant, not as a crop. Thus, she regarded herself as a plant scientist but not yet an agronomist.

Klepper again went overseas for a postdoctoral position in Australia and had become confident of her choices and direction in a science career. She recalls, "By then my mother was proud of me, my father was pleased, and I was very pleased." While most young women of her generation planned for marriage and family, Klepper was single and focused on her career path to become a successful researcher.

"Research is king and that won't change. That is unfortunate and I'm afraid that is the way it is."

In 1968, Klepper obtained a tenure-track position as an assistant professor at Auburn University in the same department where Dr. Anna Sommer had been hired 40 yr before. Klepper considered herself a "career woman" and wanted to be financially independent, so salary and rank were important to her. As a young faculty member, she observed that promotions and higher salary were associated with research and were more difficult to obtain than teaching appointments. Although she liked teaching at the college level and was promoted "on track," she decided it was in her best interest to leave academia for a full-time research position.

"I'm not a great scientist but I work with great scientists and make them better."

While at Auburn, Klepper collaborated with Dr. Howard Taylor, a USDA soil scientist. From him, she learned to research plants as agronomic crops, while Taylor came to realize the importance of including a plant scientist to "interpret what the soil was doing to the plants." He recruited her to



work at the USDA Rhizotron Laboratory, an underground root observation laboratory at Auburn. According to Klepper, "Dr. Taylor seduced me with offers of technical equipment and a unique role within an excellent team of soil scientists." Working with these USDA scientists, Klepper conducted innovative multidisciplinary research on soil-root interactions and found the career path that fit her goals and aspirations. For 30 yr, she was "learning new stuff all the time" while making a significant, positive impact on agronomy and people. In 1976, she relocated to the USDA Columbia Plateau Conservation Research Center in Pendleton, OR, where she and her team of research scientists developed MODWHT, a widely used wheat growth model. This model was based on Klepper's early root growth studies that led her to understand crop growth in a new way and use her discoveries to improve wheat production and growth.

"Women that were in the tip of the wedge were basically in the cadre of men. I have always considered myself to be the point of the wedge."

In 1968, when Klepper joined ASA, women members could be counted on the fingers of two hands. In the following years, she has accomplished more firsts in ASA, CSSA, and SSSA than any other woman member. In 1985, she became the first woman SSSA Fellow. That year (along with

Te May Zou Ching), she was also elected as an ASA Fellow. In 1989, she was elected a CSSA Fellow and is one of the few ASA–CSSA–SSSA members to be elected as a Fellow of each of the Societies. She also was one of the first journal editors for the Societies who was not a graduate of a land-grant university. She was not only the first woman but also the first “city kid” to become a Society President when she was elected CSSA President in 1996. Although Klepper has retired from USDA, she continues to actively participate and contribute to ASA–CSSA–SSSA activities. In 2004, she received the Monsanto Crop Science Distinguished Career Award, and in 2006 the CSSA Presidential Award.

“You only live each day. I’m 71 and I’ve done everything that I set out to do. I gave away all of my books and reprints. I don’t go back to the lab. I don’t hold onto that part of my life. I’ve lived a very full life. I had a plan and I was going to do what it took. I can now look back, see what I have accomplished, and plan to live for a long time.”



Since retirement, Klepper has been actively involved with environmental education and stewardship and her interests are surprisingly similar to Morris’. Since 2000, Klepper has used her leadership skills to coordinate the Stewards of the Umatilla River Environment (S.U.R.E.), a citizens group working to enhance the habitat along the river in Pendleton, OR. The group’s activities include planting native riparian trees for wildlife habitat and flood prevention. Nesting boxes have been provided for wood ducks and song birds, which are helpful for Klepper’s hobby of bird watching. During the first 3 yr, volunteers removed more than three tons of trash from the river. Klepper has also coordinated the educational activities ranging from a workshop for local farmers on managing riparian habitats to developing a “River School” for fifth grade science enrichment.

Like Morris and Ching, Klepper no longer conducts research, although she has remained professionally active in the Societies and created the Betty Klepper Endowment that supports the plenary lecture for CSSA at the annual meetings. She is honored at many Society functions at the annual meetings but seems more comfortable in the role of learner. Her

satisfaction is evident when she sits among the large audience of agronomic scientists attentively listening to the plenary talks that she supports and approves through the endowment. At 71, her philosophy is to live each day approaching her own ideals and values. And, that is what she is doing, one day at a time.

Vivien Gore Allen (b. 1940)

“I was a tomboy and my father’s shadow on the farm, while my mother tried to make me a lady.”

Four years later and only two hundred miles away, Vivien Allen was born in 1940 in Nashville, TN. Her father was a professor of Industrial Arts. Her mother had briefly been a school teacher but chose to stay home to care for their three daughters. Allen benefited from an excellent public education, attending high school at the George Peabody College for Teacher’s Demonstration School, a laboratory school for a premier teacher’s college that has become a part of Vanderbilt University. Although Allen grew up in Nashville, she did not consider herself to be a “city girl.” While growing up, she looked forward to working and playing at her grandparent’s nearby farm on weekends. Allen’s family heritage and farm roots have been and continue to be a huge influence on her life, and she still proudly talks of her great-grandparents’ farm sharing a border with the farm of Davy Crockett, the popular Tennessee frontier hero.



By the time Allen graduated from high school, she wanted to farm. She admits that “I might not have ever gone to college if my father had not laid down the law.” Prudently, Allen continued her education and attended college. She narrowed her college choices down to the University of Tennessee at Martin because it offered the coursework and curriculum in a general agriculture degree that would provide her with the background she needed to be a successful farmer. Similar to Betty Klepper’s parents, Allen’s father was pleased with her decision, while it was more difficult for her mother, also a Southern Tennessee lady, to accept her daughter’s choice of study. But this choice became the foundation of Allen’s future career.

“We did everything from milking cows to building barn roof rafters. I was on the livestock judging team, the dairy judging team, the square dance team, and was barn-warming queen. I also made every grade they gave that first year.”

Allen left home to attend Martin from 1958 to 1962 and, not surprisingly, she was the first and only girl there in agriculture at the time and she loved it. She always felt accepted and thoroughly appreciated the hands-on curriculum. She “learned it all” and had a lot of fun doing it. It was the right choice for her and a wonderful four years.



“I needed to further my education and by then attitudes had changed.”

Although Vivien Allen went to college to prepare her to operate a farm, immediately after graduating, she married and accompanied her husband to Louisiana to start a family. While a young mother, she began a graduate program in Animal Science at Louisiana State University, but the department chair and some faculty informed her that it was inappropriate for her to do research “out

at the farm.” They advised her instead to use the extra data from a male student’s research to write her masters thesis. She responded, “thank you, but no thank you” and left the graduate program.

The 1970s brought changes in expectations of women at home and the workplace, which set the stage for Allen’s second effort towards a graduate degree. She had come to consider a graduate degree essential for her to enter the workforce. In a new era known for women demanding equality in the workforce along with adequate childcare, she managed to juggle motherhood and graduate education and obtained her M.S. and Ph.D. degrees in Agronomy with Animal Science minors. With two young sons and a third son on the way, she missed the social life that she had reveled in as an undergraduate, but her long-term goals had shifted toward raising her family. Her decision to pursue graduate education was as much for her children’s sake as for herself.

“I tell my students that they have to be interdisciplinary and I have seen a shift in the way we approach agriculture.”

Allen had the right background, the right qualifications, and was at the right place at the right time when she got her first job offer. She was presenting a poster about her Ph.D. research at a symposium when she encountered the dean of the college at Virginia Polytechnic Institute, who had been one of her instructors at Martin. As they talked and discussed her research, it occurred to him that she was exactly the type of person he was seeking to fill a job opening.

From 1980 until 1995, Allen was on the faculty at Virginia Tech. Because of the state’s economy, it was a time of serious university cutbacks. Although her department underwent significant downsizing, she succeeded in obtaining tenure and

rising up the ranks to become a full professor. She was able to obtain steady support to conduct research that integrated plants, animals, and the environment. Among her proudest accomplishments was creating and leading a multidisciplinary course that travels to different U.S. locations to learn about forage systems. This course began in 1983 and is now a truly multiuniversity course that enrolls students from across the USA to experience integrated agricultural operations in diverse geographical regions. She passionately advocates the benefits of an integrated systems approach to agriculture that involves interdisciplinary teams and nontraditional partnerships. “Solutions will require bold action. A focused, visionary, and aggressive research, educational, and training program is essential to generate and translate appropriate knowledge into economically and environmentally viable practices” (Allen et al., 2007).

“Don’t ever be afraid to try. That is the only way of knowing what you can accomplish. Understand that one person can make a difference.”

Allen has played a significant role in professional societies. In the early 1990s, she chaired the Multisociety/Agency Terminology Committee that standardized terms and definitions so that scientists would bring clarity and a common understanding of terms frequently misused and misunderstood in forage research and teaching. An active ASA member for more than 30 yr, Allen has been an ASA Fellow since 1996 and a CSSA Fellow since 1999. In 2002, she served as the second woman to be elected president of CSSA. She was also the first woman president of the American Forage and Grassland Council, the first woman to chair the International Grassland Council Continuing Committee, and is a Fellow in the American Association for the Advancement of Science.

While Allen managed to balance motherhood and graduate school, she never lost her desire to farm and has since purchased her family farm in Tennessee. For now, she farms from a distance and credits it as a “wonderful learning experience and in many ways, a reality check for me and my family.” The farm has reinforced her commitment to interdisciplinary efforts which has always been her approach to research, teaching, and mentoring. As an academic and a farmer, she is keenly aware that we need to adjust our way of thinking about agriculture because “land and some other natural resources are running out and we have to find alternatives and use well what we have.”



Joyce Scheyer (b. 1956)

“As long as I was in the forest, I was happy.”



The 1950s, the decade following World War II, the returning troops coming home resulted in a spike in the number of new families and a return to the traditional American family unit in which the father's role was to provide income and the mother's role was to care for the family. Born in 1956, Joyce Scheyer is a member of the Baby Boom Generation. Scheyer's father was a career Army officer and her mother held a degree in social work, but did not work outside the home until her children were in high school. Scheyer's family moved every 1 to 3 yr depending on her father's assignments and she attended schools on military bases where “you quickly make friends with whoever shows up on the first day of school.” During the mid 1960s, Scheyer's father was stationed in Germany where she attended the American school for officers' children. Scheyer was comfortable with her nomadic, military-oriented lifestyle but there was one particular place she considered “home.” Scheyer spent 10 summers at a nature camp in Massachusetts and in some ways she felt like she grew up in the forest.

In 1970, her father retired from the Army, and Scheyer began attending public schools for the first time. She excelled in her studies and was accepted by the boys when she was the only girl in her advanced placement chemistry class. Although she confesses that the boys may have appreciated her because without her there were too few students to offer the class. After graduating from high school, Scheyer considered attending various Ivy League schools and chose to attend Radcliffe



College, an all-girls school sometimes referred to as the “Harvard Annex.” This seems like an unlikely path towards a career in agronomy but all paths are not straight.

“I was not an activist type or one to break down the doors. I had the best women's support network and coed classes.”

Scheyer began college in 1974, during a time of rapid and important changes for women and girls. Access for women and minorities was changing in response to demands for equality and civil rights, and Scheyer joined Radcliffe's soccer team that benefited from the passage of Title IX, by receiving second-hand equipment from Harvard's men's soccer team.

Scheyer started as a biochemistry major but quickly tired of spending her days in a laboratory. Although students around the country were joining a “back to the land movement” and enrollments in agricultural and environmental programs were rapidly increasing, these programs were not prominent at Radcliffe. Thus, Scheyer opted to study the humanities and became a folklore and mythology major, which surprisingly led to her first exposure to the wonders of soil science. Needing an upper-level biology elective, she enrolled in “Soil Ecology and Biology” during her senior year. Her early love of the forest reemerged when the small class was “crammed into a van” and headed for laboratories in the Harvard forest. At the same time, she also grew to love the soils in the forest.

“I guess that was agronomy but it didn't seem like American agronomy.”

Graduating in 1978, Scheyer volunteered to serve in the Peace Corp and accompanied six women and 20 men to plant rice in the “swamps of Africa.” Among the 26 volunteers in her group, Scheyer was one of three who were African-American. From 1979 to 1981, the volunteers worked with the local people to construct an irrigation system. According to Scheyer, “the critical work and the real fun was in controlling the water. Once that was complete, planting the rice seemed like an afterthought.” Thus, it was not until the end of her Peace Corp assignment that Scheyer finally connected crops with soils.

“I knew she was a woman, met her, and used her work. That was cool!”

Her Peace Corp experience led her to Oregon State University to study soil fertility. In graduate school, she was a “wheat lady” and was encouraged and pleased to use the wheat growth stage model developed by Betty Klepper, a prominent “wheat lady” located at the nearby USDA station at Pendleton, OR.

While a graduate student, she married a fellow Peace Corp volunteer and had a son. The Agronomy department at OSU was very supportive and allowed her to work on her research at night or bring her baby into the laboratory. When she was pregnant and nursing, her department arranged for another student to fumigate her wheat plants so she could avoid chemical exposure. On the other hand, field work was not an

obstacle since she had become used to “hard labor” overseas. Although she was encouraged by her professors to continue her graduate education and obtain a Ph.D., it did not seem to be the right time in her life. She needed a job to support her husband and children.

In 1985, Scheyer, husband, and infant son moved to eastern Washington where she began her career with the Natural Resource Conservation Service (formerly, Soil Conservation Service). With a master’s degree, she was pleased to work in the field on conservation programs and conduct soil surveys and interpretations.

“He stayed home but could not be pregnant or nurse.”

By the mid 1980s, the federal government was changing in response to societal needs and began offering flexible hours for full-time employees. This was a boon for working mothers and Scheyer worked overtime while pregnant to earn two weeks of pay to stay home after her second and third sons were born.

Scheyer’s life took a new direction in 1991, when she separated from her husband and transferred to Nebraska. With the encouragement of her supervisor, a flexible work schedule, and tuition paid by the federal government, she was able to enter a Ph.D. program in soil physics at nearby University of Nebraska. As a single working mother, pursuing a Ph.D. was stressful but a good day care provider helped her get through each day and eventually complete her degree. She needed to maximize her time at home, and her dissertation research, a statistical study of soil particles, could be worked on at her home computer while her children were sleeping. Scheyer persisted and completed her Ph.D. in 1998 but remained in the same professional position as prior to her degree.

“I have been on a treadmill too long.

After the kids are out of the house, I would really like a chance to refocus.”

Somehow and somewhere, Scheyer feels like her career has turned away from its intended direction. Much of her specialized training as a scientist currently goes unused and she confides that, “I’m desperate now to use the science that I invested in. I wanted to work out in the country, in the forest. But I was suddenly assigned to do urban design. I’m expected to be a person that I never was.” Despite this, Scheyer insists that she “does not regret a second of her previous training.” She also admits that her role as the primary financial and care provider for her children overshadowed her career goals.

Scheyer joined ASA in 1984, when women were joining ASA in record numbers. Since joining, she has been active on ASA and SSSA committees and has been an early participant and supporter of the Committee on Women in Agronomy. Presently, she is the Chair of the Urban Soils Committee.

When asked to comment on her career in agronomy, she reflects on the significance of cycles. “I went overseas and started out by growing improved rice to feed the world. Thirty years later, we again want to feed the world. I have been around for two green revolution cycles and, whether it’s



varieties, fertilizers, or something else, it’s about making that kind of a difference and holding it up as a goal. The little steps will add up so you just have to hold on. And with each cycle, learn some new things and shift your focus a little. Then all the stuff from before will eventually fit right in. That’s the way agronomic research goes.”

Scheyer also views her career in cycles. She considers her career to be at midstream and with characteristic persistence, she states, “I’m young and can change directions again.” Her youngest son will be starting college soon and an empty nest could provide her the time she needs to concentrate on revitalizing and reorienting her career. Regardless, “Hopefully, somewhere down the line, what I am doing will make a difference for someone.

Daria Schmidt (b. 1963)

“In high school genetics, three-quarters of the class gets lost. The rest think it’s pretty cool. Then, there are the silly ones that go on and pursue a career in it.”



A beach community on Long Island, NY, during the 1960s seems more likely to be the home to a “beach bunny” than an agronomist, but that is where Daria Schmidt grew up. By the mid 1960s, particularly in metropolitan regions, it was increasingly common for women with children to work outside the home. Schmidt grew up in a working-class suburban neighborhood on the North Shore of Long Island outside of New York City. Her mother worked as a bookkeeper and father as a surveyor. Neither of her parents went to college or had agricultural roots. About half of Schmidt’s classmates did not go on to college, but she was a self-proclaimed “nerd” and took every course she could in math and science. Her high school genetics class convinced her that she wanted to go to college to study genetics.

Schmidt learned the value of making a plan, executing it, and then taking responsibility for it from her mother, and the value of making lists from her grandmother. So, true to this counsel, Schmidt went to the local library, researched

colleges that offered programs in genetics and decided on the University of Wisconsin–Madison for her future education. Schmidt had to refer to a map to locate Madison but she wasn't concerned about where the university was located or what it looked like. She had never been to the campus when her parents drove her 800 miles from Long Island, NY, to Madison, WI, to begin her freshman year. Her father predicted that "You'll be on the Greyhound bus for home in two weeks." But in the spirit of her mother and grandmother, Schmidt had made her plan and she was prepared to prove her father wrong.

"My daughter went to school to become a farmer?"



In the early 1980s, Schmidt's plan was to study applied biology and genetics in a highly rated program. She had not yet decided whether to concentrate on animals or plants, so she checked out the associated departments and quickly chose plant biology. She credits her choice to the welcoming atmosphere of the department, her developing interest in plant physiology, and her "thoroughly enjoyable student job washing glassware" amidst the milieu of an active plant science laboratory.

Schmidt's plan had included graduate school, and she continued her education in the University of Wisconsin interdepartmental plant breeding program. She was attracted to this program because it offered frequent seminars, classes, and activities that fostered a strong connection between the basic and applied sciences and involved students from different disciplines. While her research focused on endosperm mutants and inbred background interactions affecting seed physiology, her advisor impressed upon her that it was partially funded by the Sweet Corn Producers Association and that her research needed to be of benefit to commercial sweet corn production. To extend her applied experience, and to escape the cold Wisconsin winter, Schmidt volunteered for a brief one-month internship with a private seed company to make pollinations at their winter nursery in Hawaii. While in Hawaii, she coordinated attendance at the National Sweet Corn Breeders Association which just so happened to be meeting at the same time she was making pollinations. Her Hawaiian experience hooked her on working in the private sector, and demonstrated her ability to weave opportunities together when possible. It also confirmed her professional interest and, to gain additional commercial experience, she completed another 3-

mo internship with a seed company before starting her Ph.D. studies at Iowa State University.

"He thought it was the neatest thing that I was studying plant breeding."

At Iowa State University, Schmidt's life revolved around corn breeding and genetics with a minor in entomology. She even dressed as an ear of corn for a Halloween party. Wearing green sweat pants and a yellow tee-shirt with brown yarn stitches outlining kernels, her brown hair sprayed silver to look like corn silk, she drove fellow graduate students to the various events of the evening. She is a firm believer in creativity and shopping at thrift stores, another key lesson learned from her grandmother.

"It was a setback and I hate setbacks, but I couldn't manage very well until I got my brain together again."

Although it had not been in her original plan, Schmidt married a year later and within another month had a self-described "meltdown." She did not expect it would be such a shock to get married, but it was. Upon marriage, she realized that her plan had changed in scope and was no longer just about her. She knew that she needed a break. Having completed her dissertation field work, she approached her advisor about taking a leave. Confident that she would return and complete her degree, her advisor supported her leave and advised her to "come back when you are ready."

For the first time in her life, Schmidt stepped back and took care of herself. She took time to exercise her body, relax her brain, raise a Labrador puppy, and take it easy while writing her dissertation. After a 2-mo leave of absence, she returned to graduate school and finished her program. During her Ph.D. program, Schmidt learned a lot about plant breeding, genetics, entomology, and agronomy. She also learned about her human side and the need for balance in her life.

"Careers are great—you will wake up in the morning and you will do your job and you will close your eyes at night and in the morning you will wake up and be a part of that job again. My advice to anyone—be sure that you love that job, or you will be miserable."

After earning her Ph.D., Schmidt worked and gained research experience in the private seed industry. Her third work experience in the private sector began in 1995 as a research scientist at Pioneer Hi-Bred International, Inc. With time she progressed into research management. Times were changing for women and, in 1998, Schmidt interviewed for a research coordinator position. She was offered the position and took on the additional responsibilities, along with the increasingly obvious upcoming responsibility of a child. Schmidt was due to deliver soon after starting in her new role. She remembers co-leading a field plot tour with a fellow research coordinator, who, like Schmidt, was 7 mo pregnant. The two had to chuckle at the nervousness of the research

Vice President on the tour that warm July day. Somehow, Schmidt doubts that this field tour would have occurred in an earlier generation.

“It is great that our children know that we work, we love our careers, and we can support our families.”

By the time Schmidt turned 40 yr, she had become the youngest research director in the company. Currently, she supervises a group of about 45 employees and leads several integrated research efforts that span nearly all areas of Crop Genetics Research and Development at Pioneer, now a subsidiary of DuPont. She continues to work long days and often travels, but always enjoys her work. She is thankful for the support system of friends and family that step up and help out when she travels. Her son is always in good hands, although getting used to being away from him for extended periods of time is never easy. Schmidt is a research director and would be content to retire as a research director. She has found satisfaction in her research, particularly in being able to integrate molecular technologies with conventional plant breeding. Her laboratory and field teams work in an integrated manner, aware that their interdependence is needed to bring products to their customers and profits to their company. She finds that her staff will not waste company time competing for a limited pool of resources if she keeps them informed about management strategies and the priorities behind decisions that are made.

“Projects like Workforce Development, Mentoring, and Networks are part of the overall Research and Product Development Plan—they are no longer “those Human Resource” projects.”

As Schmidt has become more established and confident with her career, she has become more involved with public service activities with the company and with outside organizations, including ASA, CSSA, and SSSA. With the support and sanction of Pioneer’s higher management, Schmidt has been an active participant in the research organization’s Workforce Development Team and in the early years of the Pioneer Women’s Network. To some scientists, this type of an effort within a research organization may seem a bit out of place. However, addressing workforce projects within the research framework has been successful. Thus, Schmidt’s plans

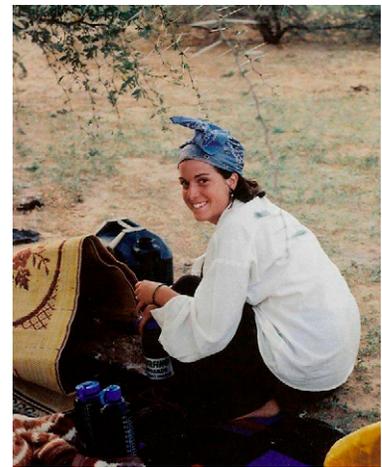


for the future have evolved with her career and personal life. Now that she is in a management position, she is concerned that the private sector is experiencing difficulty filling the workforce pipeline needed to be globally competitive. As she states, “The need for agriculture is not going away. We need to feed people. We must find ways to be creative to recruit and retain an excellent workforce”. And she has come to understand that if a workforce is to be successful and sustainable; it must also be diverse and attentive to all employees, connecting science and personal growth to address customer needs.

Laura R. Lewis (b. 1973)

“My life changed when I accompanied my grandmother to France. We toured farms that produced plants for perfumes. This became an obsession and I wanted to be a plant scientist in search of plants with volatiles for perfume.”

In 1973, the year Laura Lewis was born, America was divided over both the war in Vietnam and the debate over Women’s Rights. Although television brought scenes of protests to the American public, Lewis’s upbringing in a small suburban neighborhood near Seattle was sheltered from direct involvement with such issues. Her extended family



had lived in the same neighborhood for many years and she attended the same elementary school as her parents. Her father had a degree in urban planning but chose a career related to water and the coast. Her mother, a college graduate, yearned to become a lawyer but chose to stay at home with her children when they were young.

Lewis loved academics and sports. Being very athletic, she played on the boy’s hardball team. She was allowed to play on the team possibly due to Title IX legislation or possibly because her father was the coach. She is not sure.

Lewis discovered agriculture during high school when she accompanied her grandmother to France. Her grandmother had undertaken the trip to visit various vineyards but they also toured farms that grew plants for perfumes and she became fascinated with every aspect of the perfume industry. In her senior year of high school, she landed a job on a nearby herb farm, which was her first direct experience as an agriculturalist. Sadly, Lewis’s father also died during her senior year. Because she was the eldest child, she decided to stay at home following high school to help her mother with the household.

Following high school, Lewis and many of her friends continued to live and work in their hometown. Lewis continued to work at the herb farm but enrolled part time as a journalism major at a community college. However, a co-worker

at the farm, who was a very knowledgeable woman without a college degree, motivated Lewis to study plant sciences at a university. Lewis left home in 1993 for Washington State University to major in general agriculture with a crops and soils concentration. She made up for lost time by taking 18 credits a semester and graduated in 3 yr.

“I felt out of place in my agriculture classes since most students had farm backgrounds. They questioned my choice of major by asking, ‘What have you grown before? Cement?’”

Although Lewis did not feel particularly uncomfortable being one of the few women in the general agriculture program, she admits to feeling intimidated because she was one of the few general agriculture students with an urban background. In an attempt to compensate for her insecurity and to earn money, she worked as a student in the field and laboratory at the USDA Western Regional Plant Introduction Station. Her supervisor recognized her research potential when he asked her if she wanted to take ownership of a project to classify the USDA pea collection. She enthusiastically and naively agreed to assume responsibility for assessing field and seed characteristics of 5,400 pea accessions. Thus, her winters were spent investigating seed characteristics and her summers were spent growing 1800 to 2000 pea accessions and collecting data that is now part of the Germplasm Resource Information Network (GRIN) database. For Lewis, the study of crop evolution, conservation, and diversity became even more fascinating than perfume.

By day, Lewis attended classes or worked at USDA. By night, she studied or tended bar. Unexpectedly, her night job influenced her life choices even more than her day job. One typical Friday evening, she served beer at a table where an entomology graduate student was animatedly discussing insects and she was drawn into the conversation. Their conversation continued after her work, which developed into a relationship and eventually led to their marriage.

“I had a lust for life but didn’t have the discipline needed for graduate school.”

After graduating, Lewis was not ready for graduate school and turned down an offer for a fulltime USDA position. Instead, she was inspired to join the Peace Corp. At the USDA, she had earned the respect of the field technicians and the farm crew by working hard and long hours in the field, but she felt that she needed to work with an agricultural society that depended on the land to earn her credentials as a real agriculturalist. Also, due to her interest in crop evolution, she longed to travel to sub-Saharan Africa. The Peace Corp gave her the opportunity to do both.

When she returned from the Peace Corp, she worked as a technician at USDA in Washington, where her supervisor finally convinced her that she was ready for graduate school to fulfill her dream of becoming a researcher/crop explorer.

In 2001, Lewis was accepted into a Ph.D. program at University of California at Davis without a M.S. degree. Although her education and work experiences were rooted

to her desire to become an agriculturalist, she enrolled in the Geography program at UC-Davis. She made this decision because she wanted a degree grounded in both physical and social sciences. The Geography program was multidisciplinary and allowed her the latitude she needed to explore her interests in crops, people, and society. With fellowship support from the National Science Foundation and a thesis advisor that trusted her judgment, she had a broad sweep of research goals for her dissertation. Her graduate committee advised her to focus more on the genetic diversity aspects of her proposal. In hindsight, that was sound advice but Lewis had to learn that through experience. But when she became pregnant a week before her qualifying exam, she saw the wisdom of focusing her research as had been suggested. She was surprised that when she told her committee that she was pregnant, they thought that graduate school was a great time to have a baby. And with enormous help from her husband, Lewis found that to be true. Her son was born in August 2004 and 2 wk later, she was back in the field. She proudly states, “I brought my baby to harvest pearl millet research plots and I’m happy that I did.”



“I am thrilled to be part of a small, young department that has a faculty community. The faculty are from different disciplines but have bonded as they set future department directions.”

In 2006, Laura Lewis became an assistant professor in the Geography and Environmental Systems Department at the University of Maryland at Baltimore County. She teaches in a social science department at a non-land-grant university, but her department is interdisciplinary and she continues her research in biogeography of crop species, particularly those of African origin. She is still amazed that she obtained a full-time tenure track position although it is sometimes daunting. Her husband, an entomologist, left his job to join her on the East Coast. While he continues to look for a suitable job, the couple is pleased with their current situation, which allows him to care for their son while she is at work. Lewis’ mother, born in the 1950s, put aside her desire to become a lawyer until her children were grown. As a reaction to this, Lewis finds it important to have a family and not put her career on hold. She and her husband want their son to see her as a “working mom who is happy.”

Lewis represents a new wave of careers in multidisciplinary

departments that require graduate education and training in agronomy, but are not directly associated with an Agronomy Department, a College of Agriculture, or a Land-Grant University. Regardless of her job title, her research and teaching revolve around crops and the conditions that affect them. Since she works outside a traditional crops department, it is particularly important for her to belong to ASA in order to keep current and share information with colleagues professionally involved in agronomy. Because Lewis has a young son, she limits her travel but she intends to attend the ASA Centennial celebration in New Orleans, which will be a time for her to expand her national and international network of colleagues as she begins her professional career.

Epilogue: Wilder's little brother, Rider, decided it was time to join the family

While this paper was being written, Laura Lewis was experiencing a difficult pregnancy and was confined to bed except to teach class. Following this paper's acceptance, her second son was born under highly unusual circumstances. Her students had voted to drive as a group to her house for the last class of the semester. Before their arrival, she made one last trip to the bathroom and just as they knocked on her door, she began to hemorrhage. Twenty college students stood in her entry way while she called to her husband to take her to the hospital. A family friend stayed to watch their son and host the students, while Lewis and her husband raced to the hospital where she wasn't even admitted—just rushed off to the operating room for a cesarean section. Rider Lewis was born at 35 weeks. Mother and son are healthy, happy, and home together until the fall semester begins.



APPLICATIONS AND USE

This paper is obviously not intended to be a comprehensive history of every woman in agronomy. Such an undertaking would be well beyond the scope of a paper of this length. To parody a familiar expression, there is just as much danger of paying too much attention to the forest and losing sight of the trees in the process. With our story-based approach, the significance of individual “trees” within our agronomic profession will not be “lost.”

This paper is intended to stimulate—and even to inspire.

But it is wise to take heed of these words from Dr. H. J. Wheeler's 1911 ASA presidential address.

“To him who would be a strong, full man, capable of imparting inspiration to his students or of attacking problems of research with the true enthusiasm which is essential to success, time must not only be allowed for renewal of physical strength and for abundant reading, but also for undisturbed and consecutive thought.”—Wheeler (1911).

Wheeler's address was a plea to institutions and implored them to repay their debts to college professors, grown old in the treadmill of exacting service, and to not cast them aside like “exhausted sponges.” This paper's first author, Dr. Marla S. McIntosh, has personally experienced the wisdom of Wheeler's ideals. After 27 yr at the University of Maryland, starting as an assistant professor, attaining the rank of full professor, and serving as an Associate Dean for the College of Agriculture and Natural Resources, she is renewing herself on a sabbatical leave by focusing on scholarship and research about women in agricultural sciences. Her sabbatical leave has given her the opportunity to write this paper and, through the process has renewed her sense of commitment to the agronomy profession. We trust that the stories of the groundbreaking women profiled in this paper will inspire others to envision or revise their personal and professional goals and to pursue a variety of approaches to attain them.

This paper can also be used in the classroom as a resource for students and a stimulus for constructive discussion about the roles of gender and opportunity in one's professional path, as well as about professional ethics and cultural diversity. Teachers might use these life stories as “case studies” from which students can gain new insights regarding their own lives and professional aspirations. A wealth of contrasts and similarities are found by comparing the life stories in this paper and can be used to discuss aspects of intellectual and professional growth. Discussion questions can be developed at a multitude of levels; a few examples of thought-provoking questions that might be addressed within the context of the life stories presented in this paper are: Why is there a need for women in agronomy? What can you (as a student) learn from these women that would assist you in gaining more from your education? What can you learn from these women that would assist you in better balancing your personal and professional life? What prerequisites for professional success seem to be evident from these women's stories? Why does work matter?

One notable factor in each of these women's lives was the influence of “mentors” or “sponsors.” These stories offer opportunities for prospective mentors and mentees to gain additional understandings about this crucial professional activity.

Because female role models were practically nonexistent when most of the women interviewed began their careers, role models do not play a prominent role in the life stories of these women. However, several papers published in the 1980s about women in agronomy suggest that the lack of female role models in agronomy presents a serious obstacle to recruit-

ment and retention of women in agronomy (Collins and Pesek, 1983; McIntosh and Strand, 1983; Logan, 1989). In 2000, ASA published presentations from a special Symposium held at the 1998 Annual ASA meetings (Rosenzweig, 2000) to provide positive female role models and highlight their significant research accomplishments. Our paper includes interviews with four of the same role models and adds four others to once again highlight the accomplishments of these women but also focuses on examples of women successfully balancing their personal and professional lives. Both publications can be used to study and identify individuals who are role models and also traits that have earned them this status.

CONCLUDING THOUGHTS

The life stories portrayed within this paper contain insight, inspiration, and wisdom from exemplary women in agronomy. It is more descriptive than prescriptive. Unique and intentionally somewhat provocative, this paper symbolizes the importance of women in the continuing evolution of agronomy and to affirm the value of human diversity as we anticipate a new vision adapted to the changing world.

ACKNOWLEDGMENTS

The authors gratefully acknowledge documents and a photograph of Anna Sommer provided by Dr. R.E. Stevenson. Sabbatical support for M.S. McIntosh to research women in agriculture was provided by the Beltsville Agricultural Research Center, ARS-USDA.

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