Kent D. Chapman

How did you spend your career?

My entire career, which was shaped by serendipity and curiosity, was spent as an academic scientist at a large public university. My undergraduate education and training occurred at Lycoming College, a small (1,200 students), resident liberal arts college in north central Pennsylvania. I entered college as a business major, and through inspirational instructors, two summer marine biology courses, and an independent research experience in plant biology, my path took a dramatic turn to plant science research. Most of my undergraduate research experience was in physiological ecology, but I continued to be drawn to the cellular and biochemical processes of plants.

Richard N. (Dick) Trelease took an interest in my application to graduate school, and in 1986 I began PhD studies at Arizona State University in the cell biology of glyoxysomes. Dick was an encouraging mentor who always emphasized the value of combining biochemistry with cell biology. In one series of radiolabeling experiments, I obtained some unexpected results, including an unknown spot on a thin layer chromatography (TLC) plate; this unknown grew into a future project of its own. An NSF postdoctoral fellowship further enabled my curiosity and research training in plant biochemistry with Dick's colleague and friend Thomas S. (Tom) Moore, Jr., at Louisiana State University. I determined the identity of the unknown lipid and learned broader lessons from Tom about the value of a collegial research community as he introduced me to many excellent scientists within the international plant lipid community.

My initial appointment as assistant professor was in the biochemistry division of a 42-member biology department at the University of North Texas (UNT), a rather obscure place by plant biology standards, with only one other plant biologist on faculty during my early tenure track years. However, I reached out to the broader plant research community through professional networks, mostly through participation in ASPP/ASPB and lipid-focused organizations like the National Plant Lipid Cooperative. I rose through the ranks at UNT over the ensuing 27 years, and through concerted efforts to grow the plant research enterprise at UNT, I now have numerous plant biology colleagues in my department with whom to connect daily. Still, I remain connected to an international community of plant scientists largely due to my long-standing membership in ASPB.

My research career has involved both basic and applied aspects of plant lipid metabolism. The unknown spot on the TLC plate turned out to be a precursor for a class of lipid signaling molecules, the *N*-acylethanolamines, that in the 1990s was discovered to form the basis of the endocannabinoid signaling system in humans. This signaling pathway is a central regulatory pathway in humans that controls a number of physiological and behavioral processes, including pain perception, satiety, cognition, and embryo implantation. My group has explored the metabolism and function of these lipid signaling molecules in plants, most recently their role in seedling establishment.

Besides an interest in lipids as signaling molecules, I also developed and maintained an effort to engineer lipid metabolism pathways in oilseeds, which in our lab focused mainly on modifications of cottonseed oil. The interest in cotton was driven primarily by the importance of this crop to the economy of my region of the United States, and it has provided excellent connections for me to the agricultural research community.

In 2008, following a short elevator conversation with Richard (Dick) G. W. Anderson, I expanded my research program to the compartmentalization of storage lipid metabolism in plants. Dick was a cell biologist who had been working on neutral lipid storage

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diseases at the University of Texas Southwestern Medical Center in Dallas. Some of these obesity disorders involved the incorrect assembly or utilization of cellular lipid droplets. He joked that what was needed was to produce "obese plants" that stored lipids in their leaf tissues so they could be used to help reduce our dependence on fossil-based fuels. This conversation prompted a collaboration with Dick and two plant scientists, John Dyer (USDA–ARS) and Robert Mullen (University of Guelph), to examine how lipid droplets are formed and utilized in plant tissues so that storage lipids can be accumulated in the vegetative tissues of plants, where they are normally quite scarce.

This research area has taken off in recent years, and a number of groups continue to make great strides in energy densification of plant tissues beyond that found in seeds and some fruits. My latest research interest in the mechanisms of lipid droplet biogenesis represents an interesting twist, since I am now back to fundamental studies in plant lipid droplet (lipid body) biology, something that had been a central focus of my PhD research.

While I spent considerable effort developing a research program over the years, another rewarding aspect of my career has been teaching and training. For me, teaching has been at several levels, including large undergraduate lecture classes in cell biology and plant biology, small classroom-based undergraduate research experiences, graduate courses in plant biochemistry and cell biology, and mentoring of research students at the undergraduate, graduate, and postdoctoral level. As others know well, this human development effort has a positive impact on the scientific enterprise broadly, and it is personally rewarding to see the exciting paths that many of my former students have taken.

Overall, my research career has focused mostly on the study of plant lipids. It has required the adaptation of new technologies to the continued challenge of scientific exploration. Most rewarding, my research career has been enriched by many colleagues who have shared their ideas and their friendship. Because of my science, I have been to many places that I likely would not have otherwise traveled to. And I continue to agree with my first chairman who hired me that "there is no better profession than that of a professor."

What do you consider to be your most important contributions to plant science?

My most important contributions probably come from the service-oriented aspects of my career and, like all things, have often involved the help of many others. One example that comes to mind is the establishment of a Gordon Research Conference on plant lipids with the help of John Ohlrogge (Michigan State University), Jan Jaworski (Danforth Plant Science Center), and Christoph Benning (Michigan State University). This biannual meeting continues to provide a high-level focal point for the visibility of exciting new topics in plant lipid biology and a platform to attract new scientists to the field.

From a research point of view, my lab's work in lipid signaling has reinforced a theme of evolutionary conservation and divergence of fundamental signaling processes, culminating recently in the first 3D structural model for the fatty acid amide hydrolase in plants. In other work, we identified new groups of proteins involved in the cellular dynamics of lipid droplets, and this sparked renewed interest by us and others in the biogenesis and function of this organelle in plant cells. In addition, recent technological advances in the imaging of metabolites in plant embryos by mass spectrometry allowed us to document in many systems a previously unrecognized heterogeneity in lipid distribution. These patterns of metabolite distribution are prompting new thinking about how metabolic pathways interact in different seed tissues from a spatial perspective and have implications for the organization of metabolism in plants more broadly.

When did you become a member of ASPP/ASPB?

1987—my first year as a graduate student, and just before my first ASPP meeting in St. Louis, Missouri.

How did the Society impact your career, and what motivated you to become a Founding Member of the Legacy Society?

My career was intertwined with ASPP/ASPB from the beginning. All of my research mentors, undergraduate, graduate, and postdoctoral, were engaged members of ASPP, and I felt a natural allegiance to this

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Society, its journals, and its annual meeting as my career developed. ASPB is the place where I meet my valued collaborators, where I get new ideas about plant science, where I share the connections to a broader community with my students, where I gain resources for teaching, and often where I choose to publish our research results. So it seems only appropriate that I support the continued efforts of the Society to help the next generation of plant scientists enjoy the benefits that I've received over the years.

What important advice would you give to individuals at the start of their career in plant science?

Stay curious, adapt, and be generous with your colleagues.

Curiosity has driven my career, and the technology to address my questions has changed in almost unimaginable ways from my days as a graduate student. What a time to be entering the field of plant science! The advances to come will be enhanced by open sharing and collaborations, which I am certain will enrich the professional (and personal) life of any early career plant scientist. Good luck!

Academic Family Tree

https://academictree.org/chemistry/tree.php?pid=381288