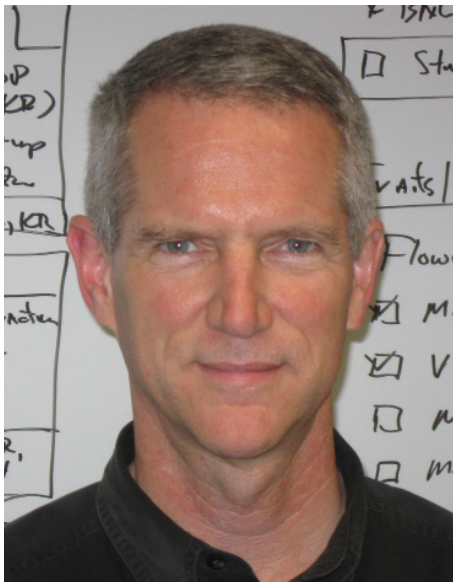
John E. Mullet

How did you spend your career?

I found the scientific career track as an undergraduate at Colgate University under the direction of Ron Hoham, when I was asked to help collect and analyze snow algae from Whiteface Mountain in upstate New York. The enjoyment of reconstructing the exotic life cycles of snow algae and early attempts to understand how algae adapt to their harsh cryogenic environment began a long-term research interest in the interaction between plants and the environment. An internship with Ray Chollet and Bob Giaquinta at DuPont led me to do graduate research at the University of Illinois at Urbana–Champaign, where I joined Charlie Arntzen's laboratory and learned about photosynthesis, chloroplasts, and hypothesis generation. I then went to Nam-Hai Chua's group at Rockefeller University, where I was fortunate to join a large cohort of postdocs and contribute to research on protein transport into plastids and chloroplast gene expression.

Subsequently, in 1983 I joined the Department of Biochemistry & Biophysics at Texas A&M University. In 1991, I was appointed director of the Institute for Plant Genomics and Biotechnology and the Borlaug Center for Southern Crop Improvement. Regular discussions with Norman Borlaug increased my awareness of the potential insecurity of world food supplies and the political dimension of the scientific enterprise. In 2004, I returned to full-time research and teaching with



a better understanding of the interrelationship among fundamental plant research, crop production, and the food and fiber supply chain, as well as a greater appreciation for those who are involved in scientific leadership and management. This key decision allowed me time to build a research team and identify collaborators dedicated to the long-term goal of developing a new bioenergy crop using sorghum as the genetic platform, a task that continues today.

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

I have had the good fortune to help guide 29 graduate students to their PhD degrees, and six graduate students are currently in various stages of obtaining degrees. I am grateful for the opportunity to advise this team of highly motivated, intellectually gifted, and collegial graduate students, who will continue making important contributions long into the future.

In terms of research, the next discovery always seems most important, because when new information is generated, it often fills some small but important gap in our knowledge that can be applied in many useful ways. For example, in one of my early research projects, I was able to isolate and reconstitute light harvesting complex II (LHCII) into lipid vesicles that would aggregate and mimic grana stacking. Similar methods enabled the isolation of photosystem II (PSII) particles that would form triplet states upon illumination and photosystem I–light harvesting complex I (PSI–LHCI) complexes that retained their in vivo fluorescence peak at 730 nm. Years later, research on chloroplast protein synthesis led to the discovery of ribosome pausing and rapid turnover of the PSI and PSII chlorophyll-binding proteins in the absence of chlorophyll. This type of discovery research is important, even if the connection to an improvement in photosynthesis, plant productivity, or solar cell design is indirect.

By 2004, I had learned enough about the constraints on crop improvement and the tools of genetics and genomics to redirect my research group to focus on the development of bioenergy sorghum using quantitative genetics and genomic approaches. I was fortunate to be able to collaborate with and learn from Bill Rooney, an expert sorghum breeder and geneticist at Texas A&M. Over the past 16 years, he has been able to create a new hybrid breeding

continued on next page

program entirely based on bioenergy sorghum. My group contributed by developing genomic tools and conducting genetic analyses, gene identification studies, and trait modeling. This research led to a molecular understanding of how photoperiod sensitivity delays sorghum flowering in long days, a key bioenergy trait leading to increased biomass yield.

Other research identified genes that regulate formation of stem aerenchyma that affect sucrose accumulation in sweet sorghums and application of dwarfing genes that have been used for over 50 years to modify stem growth in grain sorghum breeding programs. Some of these discoveries helped accelerate the establishment of breeding pools for bioenergy sorghum hybrids. It is now clear to me that bioenergy sorghum hybrids have the potential to contribute significantly to a reduction in agriculture's greenhouse gas footprint while providing for renewable and sustainable production of forage, biofuels, and specialty bioproducts.

When did you become a member of ASPP/ASPB?

I think it was during my graduate studies at the University of Illinois. I remember attending and making presentations at the annual ASPP meetings and enjoying the opportunity to learn from experts in the field about all aspects of plant biology.

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

The Society's annual meetings were especially important in my early career, and at least one member of my research group attends every year to learn about the latest advances in the field and begin building their professional network. Early in my career, I was asked to join the editorial board of *The Plant Cell* as an associate editor. I took my job so seriously that the editor called me six months into that job to let me know I was rejecting 80% of the papers assigned to me. His advice was to look for what was new and interesting about a paper instead of focusing solely on potential deficiencies. Now, when I have the occasional paper rejected for what seems to me to be pretty trivial technical reasons, I know he provided sage guidance. I was motivated to become a Founding Member of the Legacy Society by the same former editor of *The Plant Cell*.

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

In every enterprise there are many niches and approaches to success, so career paths are an expression of an individual's interests, capabilities, and autonomy, given the choices available at each stage of their career. The local environment, especially in terms of colleagues, is often overlooked as an important determinant of research interests, opportunities, and career success. One key to long-term success is to align one's interests and expertise with an emerging opportunity that has both fundamental research challenges that need to be solved and the potential to improve of the lives of people. Successful careers span many decades, so remaining flexible, ready to incorporate new technologies, and open to new collaborations is especially important.

Academic Family Tree

https://academictree.org/chemistry/tree.php?pid=351350