

Donald Ort

How did you spend your career?

In thinking about how I have spent my career, I thought about the path that led me to doing the science I do today, in 2022. Actually, my path to where I am today has been pretty straightforward. From a young age I have always liked to watch plants grow. By high school I already knew that I wanted to study plant biology and learn how plants did it...how they stood in one place and did so many amazing things. In graduate school at Michigan State, I became fascinated with photosynthesis. At that time, it wasn't known how the full photosynthetic process worked. I spent my early career doing basic mechanistic research, taking a very reductionist approach. Probably because of my desire to understand how plants grow and do what they do, to me the goal of the reductionist approach was to eventually understand enough to put the bits back together and understand critical processes at higher levels of organization, which is what I try to do today.

I completed my PhD at Michigan State in 1974 in Norman Good's laboratory. My dissertation work focused on the coupling of ATP formation to photosynthetic electron and proton transport, demonstrating that proton release associated with water oxidation to the thylakoid lumen represented a second coupling site to the already known site associated with intersystem plastoquinol oxidation. At the time, our tools were those of biochemistry, and molecular meant



working with proteins, not nucleic acids. Specific inhibitors and artificial electron acceptors and donors were used to dissect the photosynthetic electron transport chain into discrete segments to define what happened where. While today directed mutations might replace some of the non-native compounds we used then, a lot was learned quite efficiently with the tools of the day. In subsequent postdocs, at Purdue I continued with biochemical approaches investigating photosynthetic ATP formation and then at the University of Washington I branched into more biophysical approaches investigating proton release by bacteriorhodopsin containing purple membranes of *Halobacterium*.

On arriving at the University of Illinois in 1978 as plant physiologist with the USDA/ARS Photosynthesis Research Unit and Assistant Professor in Plant Biology, I made the deliberate decision to begin to assemble what had been learned, taking a reductionist biochemical approach into understanding

photosynthetic physiology at higher levels of organization. For me, that meant graduating from isolated chloroplasts to intact leaves. My transition to leaf physiology was launched by interacting with John Boyer, who taught me the theory and practice of photosynthetic gas exchange and leaf energy balance. In the middle 1980s, I spent a sabbatical year with Neil Baker at the University of Essex to learn about the power of emergent new methods in chlorophyll fluorescence as powerful tool to investigate photosynthetic physiology of intact leaves. It was also during that year at Essex that my longtime relationship and collaboration with Steve Long began. I contributed to recruiting Steve to the University of Illinois in 2000. The establishment of the SoyFACE global change research facility that Steve led enabled the next step in my own research from the leaf to plants in the field. My research took on transgenic approaches to pursue the aspiration of adapting photosynthesis to current and future climate change, with my primary focus on optimizing the benefits and minimizing hazards of increasing atmospheric [CO₂] and temperature. This research aimed at adapting crops to global change in turn launched the work we are doing now to engineer improved photosynthetic efficiency as a strategy to improve crop carbon gain and yield.

While with the USDA/ARS and the University of Illinois, I have had the opportunity to take on numerous research leadership roles. From

continued on next page

ASPB Legacy Society Founding Member

DON ORT, *continued*

1997 until my retirement from USDA/ARS, I served as the Research Leader of the Photosynthesis and Global Change Research Unit (in 2018 I transitioned to a fulltime University of Illinois faculty position). During the past 14 years I have been a Theme Leader in the Carl R. Woese Institute for Genomic Biology and have been serving the past four years as CSO in the DOE Bioenergy Research Center that is led from Illinois.

And, I still love to watch plants grow. Many have sampled strange and wonderful apples from the >200 varieties that I grow and enjoyed my 100+ member dahlia collection.

What do you consider your most important contribution to plant science research?

I see my contributions to plant science to be in the areas of research, service to our research community and mentoring of students and postdocs who will become the next generation of plant scientists.

To me, my most important and impactful research must be what I am doing right now...why else would I be doing it? My entire research career has been focused on photosynthesis, and up until the last decade the field has been seen in largely an academic context with little potential to translate to address pressing societal challenges. It is gratifying to see the perceived relevance of photosynthesis research transformed and to be seen today as a potential contributor to meeting the chal-

lenges of feeding 11 billion people, decarbonizing the atmosphere, and rescuing the planet from anthropogenic disasters. To fulfill its potential, photosynthesis research must deliver crops that can use solar energy more efficiently, while using less water and nutrients to grow crops that are higher yielding and sequester more carbon on the same land area. These are the aspirational goals of the work that we are doing on engineering photosynthesis to be more efficient and more resilient to global climate change.

I feel that a professional plant scientist has an obligation to provide service to our community. Service to our professional community can be in many different forms and impactful in many different ways. For me, service has been highlighted by editorial activities, including serving as Editor-in-Chief of Plant Physiology for seven years and currently serving as Associate Editor of Annual Reviews of Plant Biology, Journal of Experimental Botany, Plant Cell and Environment and on the editorial boards of PNAS and BioEnergy Research. I have served on research panels for USDA, NSF, DOE, BARD and others, as well as numerous departmental and program review committees. I have enjoyed being on the Scientific Advisory Boards of the Danforth Plant Science Center, MSU Plant Resilience Institute and the ARC Centre of Excellence for Translational Photosynthesis. I have found service to the plant science community to be personally rewarding and contribute in important ways to my scientific

development. I encourage my early career colleagues to view service as a professional opportunity rather than as a task.

For plant researchers in an academic setting, we also have the opportunity to make a contribution that will outlast the impact of even our most important publications, and that is to mentor and help develop the next generation of plant scientist. Most of my mentoring was of students and postdocs working in my lab because being a USDA/ARS scientist much of my career I did less classroom teaching than my university peers. With more than 60 graduate students and postdocs and equal number of undergraduates training and learning with me, I consider this to be my most important and lasting contribution to plant science.

When did you join ASPP/ASPB and how did it affect your career?

I became a member of ASPP/ASPB in 1972, while a graduate student at Michigan State, and I have been a member ever since. While I did not attend the annual meeting every year, there is no meeting that I attended more often. As a student and postdoc, it was a real training ground for me in preparing and giving presentations, as it has been for postdoc and students that have trained with me. ASPB has been central to my career as a plant biologist. ASPB is the basis for my connection to colleagues, many of whom have become valued friends, and if the sponsor and guardian of two of the top journals in plant biology.

continued on next page



ASPB Legacy Society Founding Member

DON ORT, *continued*

ASPP/ASPB is also where I gained my first experience in professional society leadership, serving as President Elect, President and Past President 1995-1998 and Board of Trustees Chair 1999-2000. In these roles I came to understand the complexity and breadth of the Society. In particular I saw the far-reaching impact that ASPB has on advocating for plant science funding legislation as well as on plant science education and training. Later when I became Editor-in-Chief of Plant Physiology (2005-2013), my understanding of the Society, its finances and its operations were invaluable to me. Understanding how journal revenue integrated with the financial wellbeing of the society gave me insight to what journal initiatives might make leadership nervous and how to present them in a context that anticipated that nervousness.

I am also grateful to ASPB for two awards that I cherish. In 2006, I received the Charles F. Kettering Award “to recognize excellence in the field of photosynthesis”, which was foundational to subsequent recognition that I have been fortunate to receive. In 2020, I was honored to be a corecipient of the Charles Reid Barnes Life Membership Award for “meritorious work in plant biology”.

What advice would you offer to young people contemplating a career in plant biology?

I am well aware that a great deal has changed in plant science since I was contemplating career choices. In addition, a lesson that I have learned over my decades interacting with students and postdocs is that no two are alike and none are like me. These two realizations make me somewhat circumspect

about giving advice, as I don't believe that I have any “one size fits all”; wisdom that spans private sector, government, and academic careers in plant science. What I can do is point to a few things that were important to me in my career development and that I see frequently in early career people who are in the process of building a successful career. Rely on your own hands working at the bench to establish your career. Establish a network of people that know things that you don't and learn from them. Collaborate and worry as little as possible about credit ... it will come. Relax, you will be fine.

Academic Family Tree

<https://academictree.org/plantbio/peoplelist.php?searchname=Donald+Ort&searchalltrees=1&allfields=1>