Mark Jacobs

How did you spend your career?

I grew up the son of a very well known plant biologist and longtime member of what was then ASPP, William P. Jacobs, a biology professor at Princeton University. This is pertinent to my academic career, because it means that (a) I saw firsthand what a nice life and career academia could offer and (b) I was exposed to many of the main issues in plant biology as a youth, and I met many of the world's plant biologists visiting my father's lab—at the dinner table, so to speak.

I went to Harvard, majored in biology, and—in the one course I decided I owed it to my father to take, even though he never pressured me—I fell in love with plants. It was taught by Winslow Briggs and called "Plants as Organisms"; the two teaching assistants for the course were Elaine Tobin and Gary Gardner. It was one of the best courses I had ever taken, and it made me immediately sign up to be an undergraduate researcher in Briggs's lab, where I did an undergraduate thesis on control of auxin transport in petiolar tissue.

When I decided to go to graduate school after obtaining my AB in 1971, Win Briggs encouraged me to go to the place he had started his career as a professor, Stanford, and there I found a wonderful group of plant biologists—Peter Ray, Paul Green, and Peter Hepler—who had happy, committed graduate students, were very supportive of young plant people, and were all doing brilliant work in their fields of plant biology. When, after my first year in graduate school, Win himself joined Stanford at the Carnegie Institution, Stanford had assembled a truly great group of mentors in plant science.

I got my PhD in 1975, working on the acid secretion theory of auxin action. It was the middle of the Arab oil embargo, when there were only three jobs in plant biology of any sort in the country. One, which I got, was at Swarthmore College, a small but very good liberal arts college in the suburbs of Philadelphia, Pennsylvania. I had applied to be a NATO postdoctoral fellow in Freiburg, West Germany, with Rainer Hertel, and I found out that NATO would let me put off the start of that postdoc for a year so that I could go to Swarthmore and then take a leave without pay to go to Freiburg. I had reservations about going to a college with no graduate students, when all that I had known up to that point were top research universities, but Peter Ray pointed out to me that it was a good job at the time and that Swarthmore produced an inordinate number of the nation's PhDs, so I could perhaps do research there with good *future* graduate students! I went to Germany to do research on membrane binding sites for auxin with Hertel and then returned for a 28-year career as a professor of biology at Swarthmore.

While at Swarthmore, I had a fulfilling career doing what Paul Green would call "cottage industry" work, with brilliant undergrads. With the help of federal grants supporting technicians and postdocs at Swarthmore and sabbaticals every fourth year to go to other people's labs, I got quite a bit published during that time. I was able to publish in *Science* and *PNAS,* and I won a Guggenheim Fellowship to go to Cambridge University on one of my sabbaticals and work with Philip Rubery. The research in this period was generally on auxin's mode of action: induction of stem cell elongation, auxin signal transduction, auxin transport, natural factors that regulate auxin transport, and—in collaborations with Andy Binns's lab at the University of Pennsylvania nearer the end of my time at Swarthmore—investigations of the signal transduction chain allowing *Agrobacterium tumefaciens* to sense wounded plant cells and initiate the transfer of T-DNA into the plant.

In 2003, having served as associate provost of Swarthmore, I made a switch to academic administration by becoming dean of Barrett Honors College at Arizona

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State University. I had discussed this kind of switch in the past with Larry Vanderhoef, whom I had originally met when he was at the University of Illinois, and who went from being a successful plant biologist into positions that involved more and more administration for the rest of his career. I have now been at ASU for 16 years, teaching plant biology–related seminars to very good honors students, but admittedly working without a lab and having research papers come out only when a graduate student at another institution uses one of my molecular constructs to do a project and puts my name on the paper or when I publish on a subject related to honors education. Over the years, we have established Barrett on each of ASU's four campuses in the Phoenix Valley and have opened the nation's first all-honors, seven-building, nine-acre, $140 million campus in Tempe.

We have built Barrett Honors College into the best honors college in the nation, as recognized by the *New York Times,* and I love the team of people with whom I have worked for these years, all dedicated to the education of bright undergraduates in the best way possible. I am very proud of the good plant biologists who have been my students, but at this point in my career I am dedicated to the care and nurturing of an even wider range of equally bright students at the prototype of an innovative, future-oriented public university.

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

I was interested from my PhD work in how auxin brings about the acidification of cell walls that results in the elongation growth of plant stems. My work in Lincoln Taiz's lab with a specific ATPase inhibitor, vanadate, helped show that a proton-pumping ATPase was likely involved in cell wall acidification. I was also interested in how auxin moves through plant tissue and its so-called polar transport in a basal direction down plant stems. Scott Gilbert and I at Swarthmore were the first to use monoclonal antibodies to label plant cell proteins and to use this labeling technique to visualize NPA-binding proteins thought to be involved in polar auxin transport toward the basal ends of transporting stem cells. Phil Rubery and I discovered that naturally occurring flavonoid compounds could regulate auxin movement in plant stems and thus offered a model that would work in vivo to affect the movement of this important plant hormone in plant tissue.

When did you become a member of ASPP/ASPB?

I became a member in 1973, in the middle of my four years in graduate school. I remember that a mark of a serious scientist at that time was to have your own personal subscriptions to the important journals in your field, and more than anything else, I wanted to have the journal issues on the shelf of my tiny grad student office. So I joined, both to go to the national meetings at a reduced rate and to begin my lifelong subscription to *Plant Physiology*.

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

For me, ASPP/ASPB has been just the same as a lifelong friend: supportive of my development when I was a young researcher, full of collegiality and good ideas during my middle career, and still the source of fascinating and high-quality information about intriguing subjects all along. While serving as treasurer of ASPB from 1991 to 1997, I got to know the staff behind our organization quite well, and it gave me great respect for the group that keeps us going as a society. I give only to certain charities, and I spend a large amount of time thinking about what the organization means to me before I actually commit. When I was asked to be a Legacy Society member, it just came over me in a flash: I am defined by others and by myself as a plant biologist, I enjoy that association, and there is no better organization to support than the one that, so to speak, brought me into the plant world.

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

When I was a graduate student, Paul Green told us that you should always be sure you are working as a scientist on something that is (a) important and (b) not understood. If your project meets only one of those two qualifications, it still is not good enough. I have found that really great projects meeting

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both of these criteria are abundant in plant biology. Plant science is a great way to explore biology. Most of the cellular and genetic mechanisms are similar to or closely related to animal biology, yet entering a greenhouse to see your plants is literally a buoyant high, because of a higher level of oxygen from all the photosynthesis going on therein, whereas entering an animal facility can be a depressing, and smelly, experience. Why not have an NIH grant to study membrane signal transduction in plant cells (where your results can still directly help humans), rather than studying the same subject and having to sacrifice animals to start each day (and get the same results)? Also, plant people are friendly, positive, collaborative, and approachable the world over, with much less cutthroat competition between labs.

All in all, plant science is a great career!