Valerie Sponsel

How did you spend your career?

From a young age I knew I would work with plants. I grew up in the large industrial city of Liverpool in the north of England, as it was recovering from the ravages of World War II. Our neighborhood had been extensively bombed, and I was enthralled to see that opportunistic plants could gain a toe-hold almost anywhere in the piles of masonry and rubble and convert them into lush green playgrounds for my older brothers and me. By the age of five I was certain I wanted to do something with plants when I grew up. As I moved through the stages of my formal education I never wavered, except to contemplate briefly that I might study agriculture instead of botany.

When I left high school to take up a place at university, I chose the University College of Wales in the tiny town of Aberystwyth, as it had an outstanding Botany Department as well as very well-respected departments of Agricultural Botany and Rural Science. I loved my undergraduate course work, combining specialized courses in botany and agricultural botany. I had several opportunities for PhD research and opted to stay in Aber and work with Philip Wareing, whose lectures during my undergraduate days had intrigued and fascinated me. Wareing had just recently been a co-discover of abscisic acid (ABA) (or "dormin" as the Aberystwyth group had called it). The department was an epicenter of plant hormone work at that time, with PhD students, postdocs and visiting scientists

working on auxins, gibberellins, and cytokinins in addition to ABA, as well as processes such as dormancy, flowering, tuberization and more. I chose to work on phase change in English ivy (*Hedera helix*), much to Wareing's delight. (I should have been cautioned when he grinned and said it had been many years since he'd been able to persuade anyone to work on that topic). It was a tough nut to crack in the late 1960's, and indeed it was several decades before real progress was made in understanding the regulation of juvenile to mature phase change in plants. I picked up on the documented ability of gibberellins (GAs) to reverse the adult phase, and the bulk of my thesis was on the identification of "gibberellin-like substances" in both phases.

After completing my PhD in 1972, I knew I needed to learn more chemistry and, in particular, gas chromatographic-mass spectrometric (GC-MS) analysis of plant extracts. I was thrilled to be awarded an Imperial Chemical Industry (ICI) Fellowship to spend two years in the School of Chemistry at Bristol University in the natural products research group of Jake MacMillan. Once there I realized I had found my niche and stayed in his laboratory for a further twelve years. The MacMillan lab was populated by a large number of organic chemistry PhD students, some of whom (notably John Bearder) were working with Bernie Phinney (UCLA) on GA biosynthesis in the B141a mutant of *Gibberella* (now *Fusarium*) *fujikuroi*. Phinney was a frequent visitor to Bristol. In the MacMillan lab I began to work on GA biosynthesis in pea, bolstered by an amazingly wonderful group of lab mates who made isotopically labeled GAs for me (for example Mike Beale, John Bearder, and Paul Kirkwood), and where Paul Gaskin's GC-MS expertise was legendary.

In 1974 I took my first trip to the US, a six-week marathon Greyhound trip with a friend, mostly camping in National Parks, but stopping off with various friends of Phinney's (Bob Cleland, Russ Jones, and Larry Rappaport) at his "invitation." The late afternoon that Bob Cleland picked us up from the Greyhound Station in Seattle was memorable: we rushed back to his neighborhood block party to listen to and share in the excitement of Richard Nixon's resignation speech!

Many other international plant scientists visited the MacMillan lab, including Frank Dennis from Michigan State University, who brought Rick Sponsel with him. I married Rick in 1975 and changed my name from Frydman to Sponsel. I know when I still hear someone calling out to me by my maiden name it must be a very old friend indeed (yes, Russ Jones and others)! Other scientists who collaborated with the MacMillan group included Jan Graebe, from Göttingen. In 1975 and 1976 I spent some time in Germany at the Graebe lab working on cell-free systems and making lasting friendships with Willi and Elfriede Rademacher.

While working in the MacMillan lab I visited Long Ashton Research Station (LARS) in the neighboring village of Long Ashton almost daily, as that is where all my plant material was grown and where I conducted many of my experiments. At the time my close colleague there was Gordon Hoad, who would be joined by several other scientists after the closure or reorganization of other Agricultural Research Stations in the UK. I was delighted that Peter Hedden, an alumnus of the MacMillan, Phinney and Graebe labs, and John Lenton, who along with his wife Jane had been PhD students in Aberystwyth when I was an undergraduate, moved to Long Ashton in the late 1970s. That plant hormone group at LARS later swelled to take in several core members of the MacMillan group when Jake retired from the School of Chemistry in 1987. On the closure of LARS in 2003, several members of that group moved to Rothamsted Research, where I have been happy to visit with Mike Beale and Peter Hedden as recently as 2023.

In 1986 my husband and I and our two children, who were born in 1978 and 1981, moved to the US, going first to Madison, then Indianapolis (1991), and then San Antonio (1994) as my husband, who had attended medical school in Bristol, pursued his academic career as an ophthalmic surgeon. It was not easy being a "trailing spouse." In each of the three locations I was extremely fortunate to obtain National Science Foundation funding to equip a lab with HPLC and GC-MS and pursue my gibberellin research. I had decided when moving to Indiana to take my research funding to IU Bloomington, where I attached myself to Mark Estelle's lab and began to work on Arabidopsis in addition to pea. This turned out to be fortuitous, as on moving to the University of Texas at San Antonio (UTSA), which had no plant growth facilities, I was able to grow Arabidopsis, but not pea plants, on my office floor.

It's hard to imagine I have been at UTSA for almost 30 years. I came initially on soft money, supported by my NSF funding, and eventually transitioned to a tenured faculty position. During these 30 years UTSA has changed from a predominantly undergraduate institution to an R1 university, one of the few R1 Hispanic Serving Institutions in the US. During my time here, along with a lot of teaching and some research (I continued to receive funding as a PI, and as a co-PI with colleagues in Computer Science, Chemistry, and Civil Engineering), I have been involved with programmatic building or further development. These programs have included a cell and molecular biology PhD program and Masters' degrees in Biology and Biotechnology. In 2015, I received a Regents' Outstanding Teaching Award from the University of Texas System, and was inducted into the UTSA Academy of Distinguished Teaching Scholars. I have been very active in the Academy, including three years in leadership, and together with my colleagues have effected some lasting changes to the institution.

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

Undoubtedly the most exciting part of my scientific career has been the 14 years I spent in the MacMillan lab in the Organic Chemistry Department at Bristol University. When I joined the lab in 1972, I was Jake's first post doc, the first woman in his lab, and the first permanent member of his lab who was a plant scientist. I was immediately welcomed into his lab, though others in the School of Chemistry voiced their bewilderment as to how I could possibly have been awarded an ICI Fellowship!

Jake was a natural product chemist, with a very significant body of past work in fungal products including gibberellins, as well as seminal work on the discovery of GAs in higher plants. His wife, Anne, is a plant scientist and was an avid gardener, and she probably provided Jake with a strong botanical influence at home. Jake was already collaborating with Bernie Phinney on GA metabolism in the fungus *Gibberella* when I joined his lab. My project, which was to work on GA metabolism in plants, would have been impossible without the support of every member of his lab and the GC-MS facility run by Paul Gaskin. Jake had an amazing capacity to devise PhD projects for his organic chemistry graduate students in which the deliverables were radioactive- or stable-isotope labeled GAs, or GA analogs, for me to use in my research. I chose to work on developing pea seeds (developing seeds in general have much higher GA levels than vegetative tissue) and began by identifying the endogenous GAs and quantifying them through seed maturation using GC-MS in the selected ion current monitoring (SICM or SIM) mode. Our 1974 paper was the first use of this method to quantify GAs in plant tissues, and probably the first for any plant hormone.

We went on to study GA biosynthesis in pea seeds and described the

method of using stable-isotopes and MS to definitively identify metabolic products in the presence of the same endogenous GAs. We determined that the major pathway in pea was a new early 13-hydroxylation GA pathway different from the GA metabolic pathways in *Gibberella*. We characterized several new GAs, notably GA_{44} and GA_{53}, as key intermediates. At the International Plant Growth Substances Association (IPGSA) meeting in Madison in 1979, my husband and I were in an elevator with Bob Bandurski who, noticing "Sponsel" on my husband's name badge, congratulated him on his excellent work. My husband set the record straight pointing to me, with our one-year-old son in my arms, and told him "it was her work." The early 13-hydroxylation GA pathway was later shown to be the major GA pathway in many important plants including corn. The position and stereochemistry of hydroxylation of the GA molecule is crucial for determining GA bioactivity.

Over the remaining years I was in the MacMillan lab it became much more diverse, in every way. Graduate students, post docs, and visiting scientists from around the world with backgrounds in chemistry, biochemistry, and plant biology worked on fungal and plant systems, notably legumes, cereals, and cucurbits, to advance our knowledge of GA chemistry, metabolism, and action. The work was frequently collaborative and, always, it was definitive, underscored by the combination of chemistry and biology, and the power of GC-MS. As that technology advanced it became possible to identify trace amounts of GAs in vegetative tissue. When Tim Ingram came to the MacMillan lab, working with mutants from Jim Reid's group in Tasmania, he was able to determine that GA_1 is the bioactive GA in pea stems, and that Mendel's short peas (having the *le* mutation) were defective in 3ß-hydroxylation of GA_{20} to GA_1. Simultaneously, Phinney, working with the MacMillan lab and using his own single gene mutants of corn, showed that GA_1 was the bioactive GA in corn too. Many years on, and now with 136 named GAs, it is clear that the majority of them are precursors or inactive metabolites of just a handful of GAs that have intrinsic biological activity. For my work in the MacMillan lab, I received a Doctor of Science degree (DSc, a higher doctorate) from the University of Bristol in 1984. (Phinney received an Honorary DSc from Bristol in 1989, which he accepted in the red silk gown and black velvet cap shown in his Pioneer Member photo on the ASPB website. Knowing that I had never bought DSc regalia for myself, he showed his characteristic generosity by mailing it to me whenever I had to participate in my own students' graduation ceremonies).

Throughout my time at UTSA, my contributions to science have been predominantly through teaching of subjects ranging from Introductory Biology to Advanced Biochemistry. Although I could not consistently attract enough students into Plant Development and Plant Physiology courses, I developed two courses that have more appealing names to our students, namely Plants and Society, and Medicinal Plants. The multi-disciplinary nature of the Medicinal Plants course with botany, chemistry, biochemistry, human physiology, and pharmacology makes it fun to teach, and popular with students who are hoping for a career in the health professions. In my lab I predominantly mentor undergraduates in research, mostly women, and often first-generation college students. Many of them do indeed end up in a health profession, although they always attest to a lasting love of plants, even years after they have left my lab. After the cell and molecular biology PhD program became a reality at UTSA, Isabel Desgagné-Penix did her PhD in my lab and is now a Professor of Biochemistry at Univeristé du Québec à Trois Rivières. Isabel holds a Canada Research Chair in Plant Specialized Metabolism.

When did you become a member of ASPP/ASPB?

I became a member of ASPP in the mid-1970s. Although I was still living and working in the UK, I had already met several luminaries of the Society at Greyhound Stations across the US and decided it would be fun to become part of it.

How did the Society impact your career and what was your motivation for becoming a founding member of the Legacy Society?

I attended my first ASPP meeting in Madison in 1977, though I did not begin to attend the annual conference regularly until I had moved to the US in the mid-1980s. The meetings have provided me with a way to interact with colleagues and friends, and to keep abreast of current research in plant biology for which I am very grateful. Becoming a Founding Member of the Legacy Society as ASPB approached its centenary seemed like a good way to pay it forward.

What important advice would you

give to individuals at the start of their career in plant science?

My advice to my students is always to do what you love. Your career may take some twists and turns, and you may need to "reinvent" yourself to take advantage of particular opportunities. Over the years you will get to know many colleagues who, like you, love plants and enjoy the challenges and rewards of discovery. Take any opportunity you can to travel and get to know the global community of plant scientists. Some of these people may become your life-long friends.