ASPB Pioneer Member

Barbara Mazur

I grew up in Los Angeles, California, the oldest daughter of a polymer chemist/mountain climber and a chemist/artist. I intended to become a history major in college, but while taking history and humanities courses at UCLA during my senior year of high school I realized that I preferred science courses. I concentrated in bacteriology and chemistry, happily meeting my husband as a result. I was captivated by the logic of molecular biology, and upon graduating college spent a year as a PhD student in the UCLA Molecular Biology Institute. We then moved to New York City where I became a student at the Rockefeller University, working in the laboratory of Norton Zinder and Peter Model on the molecular genetics of phage f1 DNA replication. The Rockefeller University was a superb place to study. There were only 20 entering students each year across all fields, and the high ratio of professors to students meant that attention was available as needed. Independence in project design was expected, interdisciplinary science was strong, and the culture supported the development of the self-confidence needed for a successful career.

My husband left New York after two years for a faculty position at the University of Chicago. We started weekend-commuting, which reinforced our subsequent intention to find two jobs in the same city. I won a National Science Foundation postdoctoral fellowship and took it to the University of Chicago to work with Bob Haselkorn, starting a project on nitrogen fixation in the cyanobacterium Anabaena. The project resulted in the first identification of a nitrogen fixation gene locus, and later a first nitrogenase gene sequence. After completing my postdoctoral work, I was appointed a Research Assistant Professor in the Department of Biophysics and Theoretical Biology. I stayed in that position for only one year. My husband and I were recruited by the Vice President for Research at DuPont, who took the audacious step of starting a biotechnology program in a chemistry company. After completing previously arranged short sabbaticals in Basel, Switzerland, we moved to Wilmington, Delaware, where we still live. We were the second couple that DuPont had hired; I was the first biotechnology employee and the first hire to arrive eight months pregnant.

I had a lead role in subsequent biotechnology hiring, and by persuading Carl Falco, an outstanding yeast geneticist, to join me, the intellectual caliber and culture of the group was established. In the early 1980s people like Carl and I, who could have stayed in academics but chose company positions, were atypical. We used our genetic backgrounds to assemble a strong research group that succeeded in identifying the targets of the sulfonylurea herbicides, a new class of over 20,000 molecules that were safely metabolized by specific crops but not by their weeds. We developed critical intellectual property, but did not commercialize our genetically herbicide tolerant crops to protect the company's chemically selective herbicide businesses. Maintaining a healthy business is vital to the ongoing funding of commercial research.

I was asked to lead the research group that we had built, a hard decision because I enjoyed working in the lab and speaking about our work. I accepted the offer but remained engaged in our research rather than following a more typical management career track. We were asked by the newly formed agricultural biotechnology business to modify the oil, protein and carbohydrate compositions of corn, soy, canola and wheat, at that time novel research challenges. We successfully identified, cloned and modified key genes in row crop seed metabolism. We co-developed high oleic canola oil, which was sold to Cargill and is still commercially produced, and we developed high oleic soybeans, which are planted on over a million acres annually. Throughout this work we encountered the important differences between the row crops foundational to our business and popular model plants, with their simpler genetics and sometimes divergent metabolic pathways. We stuck with the row crops, learning in time to identify their trait genes and transform them with efficiencies that exceeded those for model plants.

We developed genetic mapping, marker-assisted breeding and cDNA sequencing programs, and created the first physical map of maize. DuPont leadership changed, and the previous mantra of 'we will never buy a seed company' was dropped and DuPont bought Pioneer Hi-Bred Seeds. The successes that our group was having, and our ability to communicate those successes to company leadership,

supported their decision. Prior to the Pioneer acquisition we had grown to a group of close to 300 that spanned seed biotechnology to chemistry discovery. Once we joined Pioneer we focused on crop plant biotechnology, including insect and disease resistance traits and on underlying enabling technologies, including transformation, genetics, genomics, bioinformatics, analytics, and transcriptomics, proteomics and metabolomics.

After we developed commercial Bacillus thuringiensis [Bt]-based corn rootworm resistant lines, my focus turned to trait leverage opportunities in sugarcane, rice and wheat. We formed alliances, including a joint venture on rice in China that used gene tagging and overexpression strategies to clone desired traits. Genetic identification schemes were launched within a new internal group in Hyderabad, India and trait leveraging programs for sugarcane were developed in Brazil and Australia. We formed a multi-year collaboration with a group in Adelaide on hybrid wheat. We worked with the Gates Foundation and CIMMYT on projects to improve maize yields in Africa.

My final area of concentration was on technology gaps that could be bridged through collaborations with startup companies and universities. A first example was our support of ScreenSys in Germany, which had developed unique concepts for breeding technologies. My focus on emerging technologies led to the immediate recognition that we needed to embrace gene editing, and to the quick formation of a research and intellectual property alliance between DuPont Pioneer, UC Berkeley and Vilnius University. We founded several companies that applied editing technologies for agricultural needs. Sanatech Seeds, in Tokyo, successfully edited and commercialized health-beneficial tomatoes. CasZyme was founded in Vilnius and focused on discovering and employing the next generation of editing nucleases. We helped launch Verinomics, a Yale University spinout which built genetic deconstruction strategies to identify editing targets. All these startups remain successful, many years later.

I served on numerous advisory boards and panels during my career, including for the National Science Foundation Biology Directorate, the National Research Council Board on Biology, the American Society of Plant Biology, and institutes and universities globally. I retired from DuPont Pioneer, now Corteva, in 2019, close to 40 years after I was hired at DuPont. Thinking about the transformation that the company made during this period brings pride and gratitude for the remarkable colleagues that I worked with. Their scientific creativity and leading-edge thinking were outstanding, and my esteem was often echoed by that of consultants, collaborators and competitors, and importantly, supported the foundation and growth of our business.

I have continued working in retirement, as a strategic advisor for Aliment Capital, a growth venture firm, and for Tropic Biosciences, a UK-based company working on tropical crops, including bananas and rice. I have served as a board observer to Aliment portfolio companies, improving my understanding of how venture investments are evaluated and supported, and how startups succeed and fail. The work has immersed me in the remarkable technologies that often underlie startups.

My advice to young scientists is to believe in yourself and to make your own informed decisions, particularly since conventional wisdom and standards continually change. Decisions that may seem difficult or bewildering can lead to new fields and skills. When I started graduate school it was not common for women to become scientists, and I was actively discouraged from doing so by one professor. I did not have female role models, but I did have excellent graduate school professors who believed in me and helped form me as a scientist. I tried not to be distracted by the harassment commonly faced by women. I learned from my many assignments in DuPont but actively chose to remain in research roles in agriculture, as they brought me continuing intellectual satisfaction. I learned from both good and bad bosses how to be a better leader, and I have continually mentored others. A last recommendation is that an unexpected short duration project can seem distracting or even unappealing, but can also lead to new skills and insights, and to important relationships and lasting friendships.

I am the proud mother of two grown children and take delight in their children, and I thank my husband of 55 years for his continuing love, encouragement and confidence. I am gratified by my accomplishments and happy with the choices that I have made.