

I'll Take My Science Spicy, Please

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The Task by William Cowper was published in 1785. This blank verse poem in 6 books helped spark the Romantic era, commented on social issues to encourage change and influenced English authors, notably Jane Austen. *The Task* still resonates in modern times with Cowper's catchphrase "variety is the very spice of life," reminding us to embrace and diversify our perspective through new experiences and dynamic relationships.

Diversity is advantageous and preferred in nearly all aspects of life. Even in biology, heterogeneity of selected cell populations and single-cell molecular profile variations are essential for population-level function as "functional diversity facilitates collective behavior that otherwise would be inaccessible to a homogenous population."¹ Drawing from cellular biological diversity, we as scientists should incorporate diverse educational and experiential knowledge from ongoing personal and professional development.

Training and mentoring the next generation of scientists requires blended career knowledge. I admire researchers with diverse educational experience and believe that from diversifying one's knowledge and experience a broader range of working skills and professional network emerges. With having a diverse perspective, creative problem solving and a willingness to entertain and accept new or alternative viewpoints are gained. This is not to be interpreted that a scientist should not have a particular research theme rather there are experiences, skills, and training beyond STEM (science, technology, engineering, and mathematics) education to be successful in today's work place.

The cultural diversity among scientists is one of the greatest luxuries this field has to offer, and I believe those who embrace and foster these international relationships have more success. Some of my favorite principal investigators (PIs) established laboratories in both their ancestral homeland and in the United States, providing opportunities for cross-cultural collaborations through consortiums and symposia. My interest in international relationships began with an independent study grant in England during undergrad and continued as a Fulbright Scholar in South Korea before graduate school. As important as personal relationships are to succeed in any career, diverse educational training and skills is another way to position one's self competitively in today's workforce.

My education in engineering, law, and biotechnology has aided me in obtaining a variety of work experiences including Fortune 500 companies, government laboratories, law firms,



and universities. From these experiences, I reached an informed decision regarding what opportunities I am most interested in pursuing for my career and became more prepared to adapt, manage, and succeed in friendly or adverse situations. These experiences also increased my range of professional skills, which is increasingly important to succeed in scientific research.

The work of a PI encompasses many different elements including managing large budgets, overseeing and motivating personnel, mentoring young scientists, interacting with vendors, presenting research, writing persuasive grants and articles, serving as peer reviewer, recognizing intellectual property and commercializing research, organizing and starting-up a biotech company, and more. Given the depth and diversity of skills necessary to successfully serve as a PI, it is perplexing to me that I have not met a PI with an MBA. However, an advanced degree in business, as useful as it might be, may not be of interest to many academic researchers. Alternatively, more dual-doctrine students pursue medicine.

Research scientists holding dual degrees such as PhD-MD, DVM-PhD, or DDS-PhD garner insight to empower their research from clinical practice. It is a long road to obtain multiple professional degrees, but I firmly believe more is better regarding training for academia and research. Personally, I possess a JD in addition to my PhD. I graduated from law school Spring 2009, during the peak of the recession and was advised by my intellectual property (IP) attorney mentors to pursue a PhD as I

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(*Circ Res.* 2017;120:1860-1861. DOI: 10.1161/CIRCRESAHA.117.310664.)

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Circulation Research is available at <http://circres.ahajournals.org>

DOI: 10.1161/CIRCRESAHA.117.310664

waited for the recession to end. It was a happy happenstance to find satisfaction in scientific research. The freedom and creativity offered by conducting scientific research suits my personality as I enjoy the variety of work skills applied as a researcher and professor. My current postdoc mentor serves an important role to foster my success as a young investigator through creating a work environment richly filled with collaborations rather than with competitions and actively promotes each laboratory member's research and professional skills within the scientific community. Despite the challenge to work among some researchers, the majority of PIs have been intrigued and supportive of the PhD-JD combination and my opting for a professorship and research career over practicing IP law. In scientific research, there are many ways a JD can be applied.

My JD concentration in law and technology was useful during my PhD as I worked in our university's tech transfer office and gained a strong sense of IP intel from the university and PI perspective. Currently, I am more involved in biotech start-up issues and the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs through the Small Business Administration. I find these programs as an exciting means for PIs to begin commercialization of their research innovations; commercialization of research from academia is an evolved business model for industry approaches to R&D funding and has influenced government agencies oversight and involvement.

The third mission of a university, together with teaching and research, is engagement with society and industry (ie, research commercialization) and is achieved through a commitment within the Triple Helix of industry, government, and academia.² Patent applications and licensing agreements from universities have increased,³ and industry R&D is changing through practices such as closing traditional R&D sites and opening satellite branches near collaborating universities.⁴ This allows industry the luxury of shifting risk and financial burden to university researchers, whom utilize government grants to fund the work. Utilizing this nouveau research model

will spur more innovation within our research community, and I believe a broad base of skills will be essential to propel future scientists in this environment.

Considering various avenues of diversity and its importance in shaping our research community, it is from the expansion and utilization of our differences in a collective that will mold the future of scientific research and discovery. This mindset dovetails back to the Romanticism era, characterized by individualism, imagination, and intuition. Integrating the second line of the proverb "variety is the very spice of life, that gives it all its flavor," it is from pursuing diverse experiences and skills and applying it in a harmonious melody that we may fully enjoy the aroma and taste of what scientific research careers have to offer.

Acknowledgments

This article is dedicated in loving memory of my Mother, Jeanette Marie Broughton, who encouraged my educational and professional pursuits, shaped my core values, and reminded me to be thankful for life's daily blessings.

Sources of Funding

Dr Broughton was supported by National Institutes of Health grant F32HL136196.

Disclosures

None.

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