A perspective on developing scientific independence and belonging through the lens of identity

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Early in my graduate school training, my advisor asked me to describe what kind of scientist I wanted to be. At the time, I was studying sources of variation in lake sediment methanogenesis, specifically aiming to quantify the relative influences of environmental conditions, microbial community composition, and their interaction. There were many words and titles I could use to describe myself. *Aquatic ecologist*. *Limnologist*. *Biogeochemist*. *Ecosystem ecologist. Microbial ecologist*. *Environmental microbiologist*. Each had some level of overlap and could be used to describe some component of my work.

Choosing between these different titles was difficult for me: it felt self-solidifying, as if the acceptance of one hindered me from other ways of thinking and doing science. It was also very scary—to define myself as a member of a community and to decide so early on what my career might look like. I also remember thinking that I didn't deserve to claim any expertise—because I was only a graduate student, only a trainee, didn't have some particular skillset.

I quickly learned that these feelings were at least partly driven by imposter syndrome, an internal anxiety about the mismatch between my actual capabilities and my accomplishments. There are many articles written about imposter syndrome, so I won't belabor the point here other than to note that imposter syndrome disproportionately affects women and People of Color, and

is fueled by structural inequality in the promotion and recognition of accomplishments (Mullangi & Jagsi 2019). And, that it is specifically intertwined with developing independence and belonging in academia (Bothello & Roulet 2019).

So, fueled by imposter syndrome, I avoided the question during "elevator pitch" workshops, when meeting new professors at conferences, and when writing any sort of application. I remember, specifically, a lab meeting with a visiting professor in which I completely fumbled when asked to introduce myself. My advisor poked their head into my office at the end of the day. "Hey", they said, "remind me tomorrow that we should talk about elevator pitches again".

I am now in the first year of a postdoctoral position, and the problem of cultivating a scientific identity remains ever present. Particularly so because I chose to pursue research in a new study system. I am currently investigating the consequences of microbial trait variation in leaf litter decomposition in grassland ecosystems—a system that seems a world away from lake sediment methanogenesis. There are components of my work that build off the expertise I developed during my Ph.D., but other parts that are completely new and forcing me to stretch my thinking towards even newer descriptors. Now, *theoretical ecologist*, *global change ecologist*, and *modeler* have worked their way into the mix.

If asked today, I would probably call myself an *ecosystem and microbial ecologist*. These words are comfortable, and purposefully broad. But still, they sometimes also feel limiting to the type of scientist I would like to be. And, as I begin looking towards leading my own research program, there are other aspects of my identity that I would like to bring more fully to the workplace.

I am a woman, an Asian-American woman, and the eldest daughter of a single mother who immigrated to the United States. I was raised in a low-income household. I am a survivor of workplace sexual harassment. I am a partner and hopefully, one day, I will be a mother.

These are also parts of my identity, and ones that I am trying to celebrate more fully as I establish myself as an independent scientist. Because identity is not only about marking divisions about your expertise and who you are. It is also about signaling to others your value systems and establishing commonality and community in spite of those differences (Barvosa-Carter 2001). Identity is the pipe through which we acknowledge our differences and form alliances anyway, forged by distinct and agreed upon commonalities that allow for a collective voice.

So, as we work towards building a more inclusive community in which all scientists can develop independence and a sense of belonging, it is important that we cultivate identities that encompass both scientific expertise and personal lived experiences. The recently-launched ASLO webinar series, "Amplifying Voices: Early Career Researchers Making Waves in Aquatic Sciences", highlights this principle well by selecting scientists based on a combination of scientific and personal identities, and showcasing the diversity of scientists in the aquatic sciences. I was excited to take part in the first year of this series, and I am hopeful for more opportunities to bridge scientific expertise with an understanding of our broader roles as educators and leaders of our communities.

In the meantime, while I continue working on developing my own independence, belonging, and identity, I offer five tips that have helped me thus far:

1. **Write often about who you would like to be.** Application statements are excellent opportunities to think hard about what you want out of a career, but also try writing about your identity in smaller activities that you do more often. For example, in annual reports,

goal setting, and independent development plans (IDPs). These exercises have helped me to envision future progress while also providing the motivation and inspiration to face current obstacles.

2. **Join societies and communities you identify with.** Scientific and professional societies have long been hubs for community, but other avenues also exist for finding community. Look to Twitter for other grassroots communities, such as Black in Marine Science (#BIMS), Asian Americans & Pacific Islanders in Geosciences (@aapigeosci), #QueerInSTEM, amongst many others. The Women of Color in Ecology and Evolutionary Biology (WoC in EEB) Slack (https://wocineeb.wordpress.com/) is also an excellent resource for professional development and mentoring.
3. **Ask questions of your mentors and colleagues.** Science is a collaborative endeavor, so use your networks to learn about your shared identities. Ask about their paths through graduate school and their careers. What other priorities did they factor into their decision-making? Find both commonalities and differences.
4. **Share your experiences with others.** For every question you ask, there is someone who would also appreciate your perspective. And often when giving advice, you'll find new insight into your own experience. So, give back to your communities through formal and informal mentoring and be authentic and transparent with those more junior than you.
5. **Call yourself a scientist.** If you ask questions and collect evidence, you are a scientist.

I'll end with the recognition that establishing and fostering a scientific identity is a deeply personal endeavor that will look differently for everyone. It is also ever changing. As we pursue different opportunities and career directions, each new experience influences how we approach science and understand the world. It is still often difficult for me to describe myself and my

science in a way that feels authentic and representative of my core motivations. And it is especially hard being an early career researcher, with temporary contracts and an unstable job market forcing us to continuously reassess our interests and priorities. But as we face a changing academic landscape, I do believe that cultivating a scientific identity could serve as a buoy in the storm: one that synthesizes our understanding, communicates with others, and remains a steadfast post in which to retreat. More importantly, it is an opportunity to redefine who and what a scientist can be.

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