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Fostering inclusion and diversity through research, teaching, mentoring, and outreach

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ABSTRACT **I am deeply humbled and honored to receive the American Society for Cell Biology (ASCB) Prize for Excellence in Inclusivity. Thank you to the ASCB for recognizing the contributions of faculty to inclusion and diversity in STEM and the importance of this for the advancement of science. Thank you to the Howard Hughes Medical Institute (HHMI) for your generous support of inclusivity. The prize money will be used to fund outreach activities aimed at increasing inclusion in science and to create research opportunities for students from underrepresented groups in the sciences. In this essay, I share bits of my life's story that I hope will resonate with a broad audience, especially students from underrepresented groups in STEM, and that drive my passion for inclusion and diversity. I provide points of consideration for students to enhance their preparation for science careers and for faculty to improve the current landscape of inclusion and diversity in STEM.**

HUMBLE BEGINNINGS

I was born in McAllen, Texas, to Mexican immigrants. The family, composed of my parents and two siblings, had been in the United States for only a few years, and it was rough. My father earned a living taking care of a farm in exchange for living in a farm building, and he unloaded freight trucks in exchange for food and money. I was introduced to earning my keep early in life. From about the age of 8 to 13, I worked alongside my family as a migrant farm worker and traveled the United States living in the back of a truck, working in the fields harvesting vegetables (onions, tomatoes, squash, etc.) and fruits (strawberries, grapes, wine grapes, apricots, oranges, etc.). So if you were enjoying these delicious products in the 1980's, they may have been picked by my hands! Needless to say, this was backbreaking work from dusk till dawn in harsh conditions. This would go through the summer and often into the school year and spanned numerous states across the country, making it difficult to get a good footing on my early education. We settled in southern California, and I am thankful for the California Job Training Partnership Act (JTPA) program that provided job opportunities to at-risk youth and gave me my first non–farm worker job at the age of 14. I would continue to work during the summer and/or during the academic year in various jobs throughout high school. I first learned about college in my sophomore year, when I was sponsored to attend the Migrant Education Youth Leadership Conference at Sacramento State University, which introduced me to college life. I would go on to enroll at the University of California, Santa Barbara (UCSB), for my undergraduate career and became the first in my family to attend a 4-year university. At UCSB, I worked various jobs to help support myself through college. I am grateful for undergraduate diversity in science programs like the California Alliance for Minority Participation (CAMP, NSF-Louis Stokes Alliances for Minority Participation [LSAMP]) and the University of California, San Francisco (UCSF), Summer Research Training Program (SRTP) that gave me an opportunity to conduct paid undergraduate research instead of taking on multiple jobs. For the next 11 years, in graduate school at Princeton University and as a postdoc at

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Stanford University and Genentech, I focused on improving my skills for the professoriate and leading my own laboratory. Thus, my road to the professoriate has been unique and at the same time common. We all have unique life experiences that shape our motivation, thought process, and interests in science, and at the same time we share commonalities in our stories of struggle, perseverance, and success. As a society we need to value the uniqueness in everyone and consider it an asset for the advancement of science. We need to provide opportunities to students from all walks of life. I am grateful that I was given opportunities to succeed; without them I certainly would not be in my current position.

PAY IT FORWARD

None of us has gotten to the positions that we hold without the generosity of others be it through their time, mentoring, support, influence, etc. We have all experienced how good it felt to be supported, encouraged, and taken into account. Paying it forward is woven into the scientific fabric, and it is something that we should all continue to do in perpetuity. I am deeply indebted to all my mentors who have aided me along my life and my career path. I choose to honor my mentors by paying it forward and contributing to inclusion and true diversity in science. My passion for inclusion and diversity in science comes from both negative and positive experiences. I have experienced hunger, homelessness, and poverty, which never really bothered me. I have also experienced racism and marginalization be it because of my ancestry, the color of my skin, or my socioeconomic status, and that *has* bothered me. However, I have also experienced and benefited from inclusion (in educational programs, in research training, in career development activities, etc.), and that made me feel great! Collectively, these experiences have influenced the approaches that I take to teach, mentor, train, and prepare diverse students for careers in science.

As a professor and current director of a National Institutes of Health T32 graduate student training grant in Cellular and Molecular Biology, I am fortunate to have the opportunity to foster inclusion and diversity through a multipronged approach that leverages my research program, teaching, mentoring, and outreach activities. All of these activities are great opportunities to lead by example, to interact with diverse students, to encourage students, and to invest in the next generation of great discoverers. To students, especially those from underrepresented groups in the sciences, I would like to say that this is your home, you belong here, we value you, and we look forward to your future leadership in science! I hope that you will be encouraged by my story and come away with a sense that you can achieve anything that you set your mind to.

TIPS FOR STUDENTS (CAN ALSO APPLY TO POSTDOCS AND FACULTY)

The road to a science career is often a difficult one with ups and downs at all levels. Students, here are some tips to consider that can aid your scientific training experience and better prepare you for careers in science:

1. Find a good support network outside the science world. Whether it's your family, a faith-based community, an LGBTQ+ support group, a Chicano art group, or a group of foodie friends, we all need an outlet for connecting with the outside world, for decompressing, for laughter, and for invigorating our focus. Most importantly a strong support network can provide the empathy and support that you need to get through difficult experiences.
2. Find a good support network inside the science world. Ideally you are being mentored by someone who cares about you and is invested in your success as a scientist. Nonetheless, seek out a network of mentors (teachers, research advisors, faculty, and staff) who will know you well and whom you can rely on for advice and mentorship on all aspects of your career (educational, research, career development, etc.). These folks are your allies who will advocate on your behalf and look out for your best interests.
3. Join the American Society for Cell Biology (ASCB) and diversity in science communities like the Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), the National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP), and the Annual Biomedical Research Conference for Minority Students (ABRCMS). These societies do wonders to build a sense of scientific community, and they provide networking, mentoring, career development, and job placement opportunities.
4. Apply! Opportunities that can advance your career are sometimes limited. So be proactive and take advantage of any potential opportunities that you can apply to, including awards, fellowships, and training programs. For example, seek opportunities to do summer research at other institutions and/or in industry, which can expose you to new science and lead to future employment.
5. Advocate for yourself. Your voice matters! Be heard!
6. Give back. There is no greater joy than to share your excitement for science with others. Think about diversity outreach to K–12 students in underserved communities, mentoring younger underrepresented students, etc. These activities can change your perspective on how much positive influence you can have on the next generation of scientists, make you think about science communication to a broad audience, and help to invigorate a diverse STEM pipeline.

TIPS FOR FACULTY MENTORS

There is a great need for increasing representation of underrepresented groups in STEM at all levels (undergrads, grads, postdocs, and faculty). As a community of scientists, we have a moral obligation to increase diversity in science to more accurately represent and serve our society. We need to engage students from all walks of life (minorities, LGTBQ+, students with disabilities, Veterans, etc.) and to provide them with opportunities to succeed in STEM and value their unique potential to make important contributions to the advancement of science. So what can faculty do promote inclusion and diversity in science?

1. Get involved. Yes, faculty are overworked, and many institutions do not put a premium on mentoring activities, but what better reward than to make a difference in the life and career of a budding scientist?
2. Get trained. We may not be mentoring experts, but organizations like the Center for the Improvement of Mentored Experiences in Research (CIMER) provide "evidence-based and culturally aware mentorship" training.
3. Make institutional changes. Evaluate your undergraduate/graduate program, department, and university policies and mindsets with regard to student recruitment, admission, training, retention, and graduation. Define institutional barriers to inclusion and diversity and make institutional changes to address them.

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