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DIVERSITY IN SCIENCE

Without inclusion, diversity initiatives may not be enough

Focus on minority experiences in STEM, not just numbers

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Diversity among scientists can foster better science (*1*, *2*), yet engaging and retaining a diversity of students and researchers in science has been difficult (*3*). Actions that promote diversity are well defined (*4*), organizations are increasingly focused on diversity (*5*), and many institutions are developing initiatives to recruit and enroll students from underrepresented minority (URM) groups (racial, ethnic, gender, sexual identity, or persons with disabilities). Yet representation of URM groups in science, technology, engineering, and math (STEM) fields lag behind demographics in society at large (*3*–*5*), and many URM students feel unwelcome in academic departments and in scientific fields. Why is progress so limited (*6, 7*)? We see a widespread and underacknowledged disconnect between initiatives aimed at increasing diversity in academic and professional institutions and the experience of URM students (including many of us authors) (*6*, *7*). We argue that failure to grasp foundations of this disconnect is the crux of why diversity initiatives fail to reach the students that they were made to recruit. We believe that addressing this will resonate with other individuals and groups and help advance discussion in the scientific community.

This disconnect is not unknown. A growing body of literature makes clear that URM students in STEM face discrimination and microaggressions within their departments (*8*, *9*) in addition to structural and systemic bias within higher education (*8*). But it is not clear whether this work is well known or engaged by well-meaning leaders of diversity initiatives. Further, research regarding these concerns has largely focused on recruitment of undergraduate students (*9*) or at the organizational/corporate level (*10*). Attention is relatively lacking on the pipeline that links them: graduate education [although, see (*11*)]. The transition from college to graduate school is a "strategic point of loss" of minority students in STEM education (*12*). Scholars argue that less tangible issues—the informal, nonacademic elements of a student's experience in which bias may further manifest—may hinder women and minorities more than other aspects of their graduate experience (*8*).

FROM DIVERSITY TO INCLUSION

Whereas diversity refers to differences within a group, inclusion speaks to how those members are treated and how they feel. Emphasizing diversity alone does not necessarily address persisting gender, racial, ethnic, disability, and other biases, which reflect widespread cultural stereotypes (*7*). Even unintentional implicit biases can be revealed through actions and macroaggressions that undermine skilled URM scientists' feelings of self-worth (*7*). If we do not focus on inclusion and changing institutional culture to address the effects of prejudice, we can increase the number of diverse scientists without creating an equitable scientific community in which all scientists feel welcomed and valued.

Transitioning from diversity to inclusion requires acknowledging that structural bias and social justice affects scientists as people, and that this has consequences for the science they do. These impacts do not vanish after recruitment into academic institutions or even diversity programs and are relevant to life within academic walls. Simply admitting an URM student is not enough if that student feels unwelcome, unheard, and unvalued—all well-established consequences of structural and systemic bias in society and in science (*13*). These feelings influence the research we pursue and produce, yet are often unrecognized and underestimated, especially if the focus is on numbers of URM students (diversity statistic) and not our experiences (inclusive institution).

Encouraging URM students to embrace their identities is also critical for inclusion. Stressors such as microaggressions and stereotype threat (*14*, *15*) often lead students to cope by "fragmenting" their identities, which can work against current diversity initiatives

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(*8*). If the goal of diversity and inclusion is to contribute to a greater understanding and diversity of thought, concurrent creative potential may be limited when URM students do not feel safe bringing parts of their culture to or being open about their identities in their academic and professional lives. While a diverse institution has individuals from different backgrounds, an inclusive institution values an individual's identity and encourages the relationship between cultural identity and work.

ENGAGEMENT AND SUPPORT

As URM scientists, we feel a strong sense of personal responsibility toward being aware of and becoming actively involved in issues related to social justice and inclusion. Research shows that many members of underrepresented groups (such as women, ethnic minorities, and first-generation college students) are dissuaded from disciplines that promote science as an isolating field focused on self-achievement rather than as helping communities (*11*, *16*). Because URM scientists are likely more acutely aware of how important social justice is for their communities, it is not surprising that many young URM scientists become alienated from choosing and staying in scientific career paths. Every scientist (regardless of URM group) has passions and pursuits that are not central to the science they do, but URM scientists often do not have the advantage of being accepted at face value or the luxury to choose which parts of ourselves to bring to work. Because many URMs may not fit the stereotypical role of a scientist and thus may, to some extent, become stigmatized and ostracized in the workplace, the challenge of deciding which parts of ourselves to expose in the workplace is magnified. For us, engagement is not left easily at the door when we enter our laboratories and offices in the morning, to be picked back up on our way out. Until URM students and researchers can bring their whole selves to their science, no amount of diversity will yield inclusion. Fostering engagement between scientists and communities can serve as a powerful tool for retaining URM scientists.

Promoting engagement among URM students has broader implications as well. Building links between our culture and our science is important to us as URM students and scientists, and we are in a position to bear witness to this need and to act on it. The value of engaging with diverse communities is well recognized (*6*), but it is challenging when these communities look very different from the racial, cultural, and economic make-up of the scientists willing to engage. Therefore, as URM students, we hold specific and essential value for institutions interested in outreach, community involvement, and social justice.

Research (*3*, *11*, *14*), as well as our own experiences, demonstrate that many URM scientists often feel a sense of urgency to address issues of social justice and inclusion and responsibility to connect with our communities. Although these may be institutional goals as well, we rarely feel supported in these endeavors and, more often, are told such work is not an appropriate use of our time. The literature reinforces these feelings: URMs may even be penalized for this work (*9*). Therefore, simply recognizing the importance of social justice and community engagement is not enough. URM students and scientists need to be actively supported if diversity is truly valued in scientific institutions and science more broadly. It must be understood that this work is more than extracurricular; it can be essential to scientists' identities and their drive to better both science and society. It may be essential to their very well-being. It must be equally important to our institutions if they hope to uphold diversity missions.

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MOVING FORWARD

Despite the challenges described here, we recognize that a growing number of URM scientists have reached higher levels in STEM. Although they demonstrate that success is possible, we argue that they are exceptions, not the rule, and that without addressing the issues presented, STEM will continue to have underrepresentation of URMs compared with their prevalence in society. The current system attracts and retains a relatively narrow range of individuals. Does it produce good scientists? Yes. Does it facilitate a diverse scientific community? Not so much. We propose three principles for institutions valuing URM scientists and students and a community of understanding and accountability: (i) Create an institutional culture of inclusion aimed at equity and social justice, (ii) respect and value diverse backgrounds, and (iii) promote opportunities for students to pursue work that addresses concerns within science and society and engages with our communities. More specific advice on achieving diversity and inclusion is already available in the literature (*13*, *17*) and exemplified by existing programs (*14*).

Creating inclusive institutions involves leadership, faculty, and staff. URM students not only need support and allies, we must be able to see ourselves in our role models and mentors (*12*). Work from the corporate sector (*6*) indicates that assigning responsibility for diversity among institutional leaders can increase diversity at other levels of organization as well. Such broad representation sends a strong message to URM students on an institution's commitment to inclusion.

Although focus on URM scientists is typically centered around race and ethnicity, there are many groups along the identity spectrum that are underrepresented in our scientific community. In each case, these groups bring valued views and beliefs that will better equip the scientific community to meet future challenges. We must all continue to demand institutional support, resources, and programs for recruiting and retaining URM students into degree programs—but also mandate that these programs be based on deeper institutional values and a commitment to cultural change. We must stop ignoring the way systemic bias infiltrates the lives and experiences of URM students and telling ourselves that these issues are unrelated to science. In the end, this is not altruistic. Committing to inclusion makes science, and scientists, better prepared to meet the ever-growing challenges facing society. ■

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