To solve scientific problems, researchers are needed with diverse fields of expertise, life experiences, and perspectives. Yet women, many ethnic and racial groups, and people with disabilities continue to be underrepresented in the STEM researcher community. Grassroots movements from local chapters of national organizations connect these aspiring scientists to those working in their field of interest—and show them that science truly welcomes all.

Even though she has never looked through a microscope, Ashleigh Gonzales will graduate this May from Arizona State University with a Bachelor's degree in molecular biology. After losing her sight when she was younger because of optic nerve atrophy, Gonzales relies on Braille textbooks and works with others to conduct laboratory exercises.

“I had to convince science professors that I am able to take a class,” says Gonzales. “I want blind students to have equal opportunity in the sciences—or at least see it as an option.”

Local chapters of several national organizations focus on doing just that. Many of these societies and associations have a mission to increase diversity in the sciences for women, ethnic groups, and people with disabilities. What follows is an overview of how some of these organizations are working to feed the pipeline—and how participating in local chapters may help one’s career.

**REVEALING NUMBERS**

The face of U.S. science is changing. Yet for too many, the image of a scientist is still a white man in a white lab coat. Although diversity in science, technology, engineering, and mathematics (STEM) is increasing, current research shows that the actual percentages of minority group representation in science still does not reflect the proportion of diversity of the U.S. population. Data from the 2013 National Science Foundation (NSF) biennial report “Women, Minorities, and Persons with Disabilities in Science and Engineering” (www.nsf.gov/statistics/
wmpd/2013) reveal that of those employed in science and engineering occupations, approximately 72% are Caucasian, 17% are Asian, 4% are African American, 5% are Hispanic, 0.4% are American Indian/Alaska Native, 27% are women, and 6.5% are persons with disabilities (Tables 9-7, 9-19 Employed Scientists and Engineers: 2008). The same report shows that about 64% of the U.S. population is Caucasian, 5% Asian, 12% African American, 16% Hispanic, and 0.7% American Indian/Alaska Native, and 51% women (Table 1-2, Resident Population of the US: 2010). In addition, 11.9% of the U.S. population is estimated to have a disability status (Table 1-3: U.S. Civilian Noninstitutionalized Population: 2010).

Parsing the numbers in terms of science and engineering Ph.D. degrees awarded in 2010 also shows disparate proportions at 69% Caucasian, 10% Asian, 4.7% African Americans, 5.7% Hispanic/Latinos, and 0.5% Native Americans/Alaska Natives (Table 7-4 and 7-7). Women fared better, at 46% (Table 7-7), whereas persons with disabilities received only 2.7% of the Ph.D. STEM degrees (Table 7-5). A similar analysis done by the Engineering Workforce Commission of the American Association of Engineering Societies in 2010 (www.ewc-online.org/data/index.asp) reported that undergraduate degrees in engineering went to 7.6% of Hispanic/Latinos, 4.6% to African Americans, 0.5% to Native Americans, and 18% to women (this project did not include persons with disabilities).

The NSF report shows that ethnic minorities intend to begin college as STEM majors at similar rates as nonminority students (Table 2-8: Intentions of Freshman to Major in S&E Fields). But by the time they graduate, minority students are more likely to have switched to a nonscience major. The attrition continues in graduate school. According to another 2009 NSF report, for example, the median time to complete a Ph.D. after entering a program is 7.7 years for white and Asian graduate students. For Hispanic students, the median is 8.3 years, and for both African Americans and Native Alaskan/American Indians, the median time to completion is 9.9 years (NSF 11-306: www.nsf.gov/statistics/doctorates/).

Exact numbers for scientists who are lesbian, gay, bisexual, or transgender (LGBT) are hard to come by, according to Rochelle Diamond, chair of the board of directors at National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP).

"About 1% of the STEM population is lesbian, gay, bisexual, or transgender. There probably are even more, but some are still reluctant to come out," says Diamond. "It’s hard enough to be in a STEM field in addition to trying to identify who you are and trying to come out."

SOMEONE LIKE ME

The reasons for the low minority representation in STEM majors and careers are numerous, but one key factor can be attributed to the lack of role models and mentors.

Local chapters of science-focused organizations aim to change this experience by connecting aspiring STEM students with successful students and scientists who are like them.

"For a lot of undergars, local chapters are the best way to get connected in terms of immediate social and academic support," says John McGill, president of the DePaul University chapter of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS). For 40 years SACNAS has been working—via internships, scholarships, job placement, and a national conference—toward increasing the number of Hispanic, Chicanos, and Native Americans in science research and leadership.

By nature, local chapters are typically small, averaging about eight to 30 individuals. DePaul University’s SACNAS chapter is no exception. Founded three years ago, the chapter grew from the two original members to a group of 35 student members with two academic advisors. The chapter meets on a monthly basis to discuss science careers. In addition, the group offers social events, community volunteering opportunities, and student study sessions.

The American Indian Science and Engineering Society (AISES) also has professional, collegiate, and affiliate high school chapters across the
nation. The chapters meet locally on a monthly basis and also participate in a variety of programs sponsored by AISES, such as the Leadership Mentor Program and various scientific research projects. By connecting undergraduate and graduate students with mentors in academia and STEM careers, the number of American Indian and Alaska Native STEM graduates continues to increase.

“For the past 35 years, AISES has provided scholarships, internships, and research opportunities as a means of increasing the Native American/Alaska Native participation in STEM,” says Sarah EchoHawk, AISES chief executive officer.

Similar activities are also seen in Women In Bio (WIB), which has 11 chapters across the United States, Canada, and India. WIB targets a broad base of over 1,300 members who work in areas such as biotech, big pharma, academia, and government. Its members range from high-ranking executives to graduate students; nearly 15% of WIB's members serve in a leadership capacity within the volunteer-run organization. WIB chapters host events revolving around professional development and educational and networking opportunities. These events include expert panel discussions which feature successful women leaders as the speakers. The panel sessions are small and welcoming in design, usually attracting audiences of 75 to 100 people, which allows people to interact directly with the speakers and with each other. Keeping the event to this size also allows attendees to emerge having made solid professional connections and makes it easier for WIB members to find jobs or resources to help them start up their own companies. Moreover, each chapter provides peer mentoring groups, in which six to 10 female members get together to informally discuss issues related to work-life balance, families, and job stresses.

“The higher you climb, the harder and lonelier it can get,” says Jamie Strachota, executive manager of WIB. She stresses the importance of the local chapter meetings for connecting women in science with role models and peers alike. “Attendees of WIB events get to see first-hand the female pioneers who inspire women to be ambitious and challenge themselves,” explains Strachota. “Our ultimate goal is to empower women to reach the highest positions of influence and responsibility within the life sciences industry.”

To provide LGBT STEM students with a community that understands their needs, NOGLSTP has caucuses, regional groups, and Internet mentoring. Within these caucuses and groups, students find mentors, peer support, and job opportunities that can be difficult to find on campus, says Diamond. External advisors can make all the difference.

**ATTRACTING YOUTH INTEREST**

Many national organizations believe that the answer to increasing diversity in the sciences is to capture students’ interest at a young age. All kids start out naturally curious about the world around them; however, in elementary school, students begin to be told about their strengths and weaknesses in certain subjects. These assessments may or may not be accurate. Middle school can be a tipping point as to whether a student will be directed away from an interest in math and science.

DePaul University’s SACNAS chapter attempts to engage youth with science through exposure to real-world projects. For instance, the chapter invites elementary students who live in neighborhoods with high levels of lead in the soil to the university’s urban garden to discuss how raised gardens can be used to avoid metal contamination. Many of the students’ families grow their own food, and this activity helps them understand the science behind the gardens’ design.

For inner city kids from grade 3 to high school, local chapters of the National Society of Black Engineers (NSBE) help organize free, three-week summer camps called Summer Engineering Experience for Kids (SEEK). Organized as a commuter-based program and held at local elementary and middle schools around the US, SEEK is the largest engineering camp in the country, according to Carl Mack, NSBE’s executive director. In addition, local NSBE chapters are strategically located near neighborhoods where a high population of African-American high school students live and attend summer science classes at a local college before enrolling in college; known as “bridge” chapters, their purpose is to help incoming college freshman make a smooth transition from high school to college.

“We lose 70% of African American freshman from the sciences. The reason? Chemistry, calculus, and physics,” says Mack, adding that African-American students do not typically study in group settings, which is the norm for science students. “We’re trying to create a culture of ‘cooperate to graduate.’”

The close collaboration that emerges between the students in these programs helps them to later
succeed in a STEM major in college.

The American Indian Science and Engineering Society (AISES) holds several national events each year which are geared toward elementary, middle, and high school students, such as the U.S. Department of Energy Intertribal Middle School Science Bowl and the National American Indian Science and Engineering Fair (NAISEF). For the science bowl, 6–8th grade students form teams of four or five and answer questions in all areas of math and science. NAISEF features over 300 science projects and holds the nation’s largest Native American science fair. Select NAISEF winners go on to compete at the Intel International Science and Engineering Fair, the world’s largest international high school science competition, which hosts more than 1,500 students from about 70 countries, regions, and territories who compete for a total of $3 million in awards.

**FINDING OPPORTUNITIES**

The biggest “sell” for local chapters, however, is the opportunity for members to participate in organizations’ national conferences. During these events, leaders from scientific organizations, like the National Aeronautics and Space Administration (NASA) and AAAS (publisher of Science and www.sciencecareers.org) and companies such as Genentech and MedImmune, organize seminars to increase the attendees’ interest in research. Local chapter members are eligible to apply for scholarships to attend these conferences.

“You come back super-charged,” says **Eric Curiel-Lares**, president of the University of California, Santa Cruz, SACNAS chapter. “Students are able to see other students who have similar backgrounds and goals.”

These national conferences also provide job fairs and access to leading scientists and engineers from Fortune 500 companies and government agencies in various science-related industries. “These professionals meet with students pursuing majors in STEM who might not otherwise have the opportunity to do so,” says EchoHawk.

At NOGLSTP’s biannual Out to Innovate conference, Diamond says that attendees can find job opportunities in industry, government agencies, nonprofit organizations, and universities that are LGBT-friendly. Participants can speak with representatives of these organizations to explore critical questions such as whether they should include information on their resume about their support for LGBT student groups, for example. With 29 states in the United States that have laws enabling discrimination against employees based on their sexual preference and 34 states without protection against gender identity discrimination, it’s important for LGBT students to be prepared for and have access to resources to help them navigate such issues.

In addition to making connections at national conferences, attending chapter meetings outside of one’s local area can also prove fruitful for networking. Gonzales’ biology professor, **Page Baluch**, also happens to be the president of Central Arizona Chapter of the Association for Women in Science (AWIS), a group which provides career training seminars, mentoring, and access to a network of STEM professionals for students, faculty, and staff at Arizona State University (ASU). While teaching her biology lab class, Baluch was troubled that because Gonzales was visually impaired, she had less access to course materials than other students.

Baluch approached Terry Hedgpeth, director of the Disability Resource Center at ASU. In collaboration with astronomy and engineering researchers, they started a project to convert 2-D printed images into 3-D tactile boards composed of high density polyethylene (a material commonly used to make cutting boards). Scientific images that are captured via telescopes and microscopes, such as stars and cells, are milled into the board’s surface to create raised tactile images, which can be felt by visually-impaired students. The project is revolutionary in that the tactile format is based on real images—most models that these students have access to are typically simplified and scaled down.

To further this research, Baluch and Hedgpeth attended an AWIS-hosted NSF ADVANCE workshop in Alexandria, Virginia, to network with educators and meet with program officers. The contacts they made at the meeting helped them identify potential funding resources to continue their accessible image project.
GAINING PROFESSIONAL SKILLS

Membership in local chapters also enables members to acquire the skills needed to prepare for STEM careers and finding job opportunities.

This year, for example, DePaul University’s SACNAS chapter arranged a pilot training program for undergraduate research assistants (RAs). These positions not only boost the participant’s resume, they also give STEM students the expertise and experience needed to pursue a research career. The SACNAS chapter’s representatives approached principle investigators in the psychology, biology, and physics departments at the university and surveyed them as to which characteristics are important in an RA. Using this information, the chapter then trained undergraduates who were interested in obtaining an RA position and matched them with professors who were looking for help.

Few of these organizations have paid-employees; most rely at least in part on volunteers. Leading or volunteering at a chapter or one of its events gives students the opportunity to acquire experience and confidence. Furthermore, many chapters hold professional development seminars, with presentations on resume polishing, acquiring letters of recommendation, networking, communication, and branding through social media.

“We want members to utilize the organization to help us and them,” says WIB’s Strachota. “It really is a win-win.”

Featured Participants

American Indian Science and Engineering Society - www.aises.org

Association for Women in Science - www.awis.org

National Organization of Gay and Lesbian Scientists and Technical Professionals - www.noglstp.org

National Society of Black Engineers - www.nsbe.org

Society for Advancement of Chicanos and Native Americans in Science - sacnas.org

Women In Bio - www.womeninbio.org

Upcoming Features

Postdocs—August 23

Faculty: Collaborative Grants—September 13

Top Employers Survey—October 25

Jacqueline Ruttimann Oberst is a freelance writer living in Chevy Chase, MD.

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