Community science groups have an inclusive, open-door ethos that makes them a natural place to learn informally about scientific careers. Members explore, create, and problem-solve as they work together on do-it-yourself projects in conservation, synthetic biology, and more. If you join a community science lab, don’t expect a straightforward path to a job. But do expect to meet potential mentors and advisors, make local connections, and gain skills to support your professional development.

By Chris Tachibana

Michael Galdzicki started doing community science nearly 10 years ago, while getting a Ph.D. in bioinformatics and bioengineering from the University of Washington (UW). The community science movement is still evolving, he says, so even members don’t know if they should call it citizen science, DIY for “do it yourself,” or something else. Participants may identify as artisans, hackers, or makers, but all celebrate hands-on, open, accessible science. Projects can be about engineering, environmental conservation, art, food, and more—often covering multiple topics at once. For example, Galdzicki originated a DIY-genotyping project for tracking the origin of salmon from markets and restaurants.

Galdzicki now has the title “Data Czar,” in charge of integrating information at the Seattle protein-design company Arzeda. He says he constantly applies expertise from his community science work. Especially in a startup company, resourcefulness, low-cost creativity, and on-the-spot problem-solving are essential. Community science projects can develop those capabilities. For him, he says, “DIY actually means ‘figure it out yourself.’”

Kevin Chen also benefited from cofounding the community science group Bricobio in 2013 in Montreal. In 2014, he launched the company Hyasynth, which uses engineered microbes to generate cannabis-derived medicines. Bricobio helped with connections, he says, bringing the right people with the right interests together to start the company.

Chen, Galdzicki, and others emphasize that community science is not about career advancement. Its primary goals, Chen says, are around democratization, “breaking down walls to increase access to science and get the public engaged with its tools.” Still, being part of the community science world can provide professionally useful skills and connections.

A global mission—with networking opportunities

Community science projects cover a broad spectrum, ranging from collecting weather data with home sensors to culturing microbes to produce milk proteins. Synthetic biology is a common theme, Chen explains, because the history of community science includes sharing BioBricks, which are units of DNA sequences for engineering microbes. Teams for the International Genetically Engineered Machine (iGEM) Foundation Jamboree, held annually since 2003 at the Massachusetts Institute of Technology (MIT) in Cambridge, develop projects for the event using a standard BioBrick kit. Companies including Hyasynth, Ginko Bioworks, and SynBioBeta count “iGEMers” among their founders and employees.

The diversity of people and interests in community science is highlighted by the hundreds of participants at the Global Community Bio Summit at the MIT Media Lab. Activities, Chen says, include productive discussions, useful breakout sections, and global collaborations.

David Kong directs the MIT Community Biotechnology Initiative and founded the Global Community Bio Summit. He describes his work as “helping crystallize global networks around community science.” The goal of the Bio Summit, he says, is to move science from individual labs to a collective intelligence that advances it in a coordinated, decentralized fashion.

Upcoming features

Faculty: Moving Your Lab to Another Country—September 13
Neuroscience: Alzheimer’s—October 4
Top Employers Survey—October 25

PHOTO: ASGER NØRREGÅRD RASMUSSEN

cont.>
Bio Summit attendees meet people who share this broader scientific objective. They can also connect with people in decision-making positions. In 2018, Bio Summit donors and sponsors included the global corporations Scientist.com, MilliporeSigma, and Takeda. Akiko Otani, Takeda's director of public-private partnerships, was one of several participants from the pharmaceutical company.

Otani stresses that Takeda's primary goal in sending representatives to the Bio Summit was not recruiting or scouting for employees. Instead, she says, "It was an opportunity to connect with and support people around the world who are doing science in their own communities."

Projects such as teaching science to children in India using paper microscopes showed "young scientists doing impressive, innovative things with limited resources." Otani was impressed at the innovation and practical skills demonstrated by attendees that went beyond their academic achievements. She noted that the Bio Summit highlighted a diversity of thoughts, ideas, and people—a perspective that she brought back to Takeda by having Kong present to her team about the community bioscience philosophy.

The spaces where it happens

Global summits are energizing, but the real work of DIY scientists happens in community labs. At first glance, these spaces can resemble traditional academic, government, and for-profit facilities. Seattle's SoundBio Lab, for instance, has incubators, centrifuges, and a pipetting robot. Lab members, however, range from high school students to retirees. Members may be artists incorporating science in their work, programmers contributing computer skills, parents introducing their kids to technology, or entrepreneurs piloting startup ideas.

Like most community labs, SoundBio is governed by a volunteer board. It’s funded by donors and a low-cost membership fee. The SoundBio mission is educational, but some community labs are more like incubator spaces for startups, says cofounder Zach Mueller. SoundBio literally started “with people sitting around on lawn chairs in Zach’s garage,” cofounder Galdzicki says. Moving to lab space near UW meant that he, Mueller, cofounder Regina Wu, and early SoundBio members did all the work of creating their nonprofit organization, including paperwork, fundraising, and building lab benches.

Other learning experiences that can result from community science include mentoring, teaching, and collaborating with people with diverse backgrounds and interests. Networking is not a goal of SoundBio but can happen automatically. Many of those working at the lab have local connections: Wu works at Fred Hutchinson Cancer Research Center and Mueller at Amazon, while Yoshi Goto, director of operations and lab manager, has interned at Arzeda.

When Galdzicki started doing community science, his graduate school advisors were John Gennari, in UW's Biomedical Informatics and Medical Education department, and Herbert Sauro, in UW’s Department of Bioengineering. Both supported this outside activity, even for an early-career researcher who had a thesis to complete. Gennari says that his department is interdisciplinary, with projects that include studying patient communications via social media and presenting science to laypeople. Community science aligns with that work and is a way to acquire and practice science communication skills. For that reason, some students and postdocs find that community science complements their research and grounds it in the real world. In addition, Gennari says, “research is intense” and any external activities help “clear your mind.”

Community science is also a public-outreach opportunity. Sauro notes that some funding agencies, such as the U.S. National Science Foundation, require outreach activities. By working with the public on projects, scientists learn to explain and justify their research to laypeople. The activity also educates the general population about science, Sauro says. Many science outreach and communication programs are geared toward kids, so he appreciates that community labs include adults. “They vote and pay taxes that pay our salaries,” he says, “so they should also be part of science outreach.”

Chen says that currently, about half the participants in Montreal’s Bricobio are academic scientists. For them, Bricobio is an inspiring, friendly space to build their skills and share their knowledge, he explains. As someone who now hires for his company, Chen observes that community science experience on a CV is noteworthy and demonstrates an ability to think beyond academic science. Others in hiring positions at universities and companies also say they notice citizen science or maker projects, or participation in community science or iGEM, but do not prioritize applications with these activities.

Nonetheless, to some, community science experience demonstrates creativity, genuine interest in the field, and job-related competence, especially for participants who initiate projects or develop them from scratch. Gennari and Sauro said they would look favorably at community science membership that was mentioned in an application from a graduate student, postdoc, or even faculty member. Gennari said he would consider it an indication of organizational and communication skills. Both he and Sauro emphasize, however, that not everyone would agree.

Making and marketing

Somewhat related to community science are maker organizations. These groups often focus on creating tangible items, such as furniture or musical instruments, but the community science and maker movements aren’t separated by a clear line. Take Laura Penman’s work with Copenhagen Maker in Denmark. As part of completing her Master’s degree in digital manufacturing at London Metropolitan University, Penman self-built a 3D printer based on open-source designs from ceramicist Jonathan Keep. The printer creates items using organic material, such as coffee grounds, inoculated with fungal spores. The fungi grow into a networked mycelium that can be treated to create a solid, biodegradable material.

When Penman moved to Denmark, she got involved in the maker community—not to find a job, but to meet people. “As a byproduct,” she says, “I found people who helped my professional development by pushing me to try out ideas.” For example, through the community, Penman met a professor at...
the IT University of Copenhagen Digital Design Department who provided her with informal advice and mentoring for her maker project and her career.

Penman now works for 3Shape, which makes 3D scanners and software. Getting the job did not involve maker connections, though. One day, Penman bicycled past the company's building, noticed the name, and then checked the company's employment page. Penman says the 3D printing project was an asset that helped her CV stand out, though. Reflecting on these experiences, she says the career benefits of community science or maker participation are “hard to predict, but can be huge as long as you’re not expecting a direct link to a job.”

Even now, as an engineer for a 3D company, Penman still participates in Copenhagen Maker. Her motivations align with those of Galdzicki and Chen, whose day jobs and community lab work use related competencies. The difference, the three say, is that community science allows for more creativity. The work is driven by member and community interests rather than company directives and has few constraints beyond the usual need for time and funding.

Copenhagen Maker has a professionalization side, though, says Stine Broen Christensen, leader of the Copenhagen Maker Festival. A goal of the nonprofit organization is making technology accessible to the public through education, urban development, and democracy initiatives. Another is showcasing small businesses that originated as community science or maker projects. As an example of a science-based small business that uses the Copenhagen Maker Festival to interact with the public and promote its product, Broen Christensen names PlatoScience. Started by a neuroscientist and a product designer, the company makes personal neurostimulation headsets to increase focus and productivity.

Copenhagen Maker also runs Underbroen, a space for startups and small- and medium-sized enterprises “to go from maker to market,” Christensen says. The space brings entrepreneurs together and encourages them to share knowledge, resources such as 3D printing and milling equipment, and skills such as programming and graphic design.

Occasionally life- and career-changing

Participants in community science, maker spaces, and events like the Global Bio Summit or iGEM emphasize that these activities do not lead directly to a job. Sometimes, though, joining the community can be career changing. Japheth Kelly was a computer science student at Ashesi University in Accra, Ghana, when he saw a poster in the library about iGEM.

The iGEM Jamboree brings thousands of participants to MIT, including teams from community labs such as SoundBio, which sends a group of high school students. Kelly’s team members were from his university. Not only were they the first iGEM team from the West African region, he says, “we were all engineers with no biology background.” Recruited and led by faculty member Elena Rosca, the team quickly got trained in synthetic biology methods and developed their project to use engineered bacteria to reduce the toxicity of gold mining in Ghana. The team won a silver medal for their work and the Chairman’s Award for iGEM spirit and values.

For Kelly, the project led to a job growing the scientific and synthetic biology community in his region. He is now an iGEM Ambassador and travels around Africa, raising awareness about iGEM with young scientists and industry and academic leaders who could support them. The job requires researching a country’s education policies, pitching to funders, and aligning university and company interests with solutions that a synthetic biology team can provide.

Kelly’s career plans are to work in industry, get more education, and return to Ghana to teach. He says his iGEM work, which was reported extensively in the media, has been recognized by employers. He adds that the challenges of the experience were actually opportunities. Lack of funding seemed like a disadvantage, “but I learned skills from presenting and giving pitches to investors,” he says. “I learned to tell a story that can get us help with our projects.” His team dealt with equipment that had to go abroad to get repaired and customs agencies that didn’t understand materials sent to them for synthetic biology. Overcoming these barriers gave his team problem-solving experience that they now present to employers as a valuable skill.

Now, when Kelly talks to students about getting involved with science at a grassroots level, he tells them, “You need heart and determination to get through the hard, long nights in the lab when you often get results you weren’t expecting, but you’ll get help from a network that will bring other opportunities to your door. If I, Japheth Kelly, a nonbiologist, can do it, I say you definitely can, too.”

Chris Tachibana is a freelance writer who specializes in life sciences.

"[Community science is about] ... breaking down walls to increase access to science and get the public engaged with its tools."
– Kevin Chen (lower left corner)