ILLUSTRATION: KATTY HUERTAS

THE NEW NORMAL

Science lost and lessons learned: A lab plots its comeback

A microbiology team regroups, with a more virtual lab and a bigger focus on mental health

By **David Grimm**, *in Philadelphia*

The main door of Sunny Shin's lab is plastered with pictures of happier times: Shin photoshopped onto the cover of a Wheaties box, grad students chomping on corn cobs, a group photo on the lawn of a beach house. "We used to do a yearly retreat to the Jersey Shore," says Shin, a midcareer microbial immunologist here at the University of Pennsylvania (UPenn). "Hopefully we can go back in 2022."

When the COVID-19 pandemic hit, Shin oversaw 12 people: seven Ph.D. students, three postdocs, an undergrad, and a lab manager. She was thinking about each of them when the memo came down from an administrator in mid-March 2020: All non–COVID-19 work must stop, and most rodents must be culled because few people would be around to care for them. "It was heartbreaking," Shin said at the time, as her lab manager began the agonizing task of euthanizing 200 mice, some with unique genomes that had taken years to breed.

Shin was concerned for the future of her research on Legionnaires' disease—and, more importantly, for the future of her people. "I worry that the pandemic will affect the career trajectories of junior scientists for years to come," she says.

Some of those fears have come true, as universities across the country assess the damage of a lost year—research programs derailed, job opportunities vanished, and promising researchers lost to alternate careers. At the same time, "It's incumbent upon us to learn something valuable from this experience, and to use it to improve the lives of our students," says Daniel Kessler, chair of UPenn's cell and molecular biology graduate group. Among the legacies of the pandemic, UPenn and other schools are finding new ways to support trainees, with both their careers and their mental health.

When UPenn closed its labs and Shin's team faced 3 months of near-isolation, her immediate priority was their well-being. She dedicated the first 20 minutes of every (now virtual) lab meeting to how people were feeling. "Sunny tried to set everyone's mind at ease," says Tzvi Pollock, a fifth-year graduate student at the time. "She said everyone experiences setbacks, whether it be from a pandemic or Hurricane Sandy. That really reassured me."

Pollock says he needed the reassurance. During the pandemic, the depression and anxiety he had battled for years returned. He couldn't work or sleep. He had frequent panic attacks. "It absolutely wrecked me," he says.

He and his lab mates tried to write papers or plan experiments from home. But there was only so much they could do without access to mice and cell lines. Things didn't get much easier when UPenn reopened at half capacity last summer. Core resources such as tissue culture rooms and animal facilities filled up fast. Young graduate students like Víctor Vázquez Marrero had trouble shadowing older ones because they weren't always allowed in the same room. And Nawar Naseer, then a fourth-year grad student, chose to cram in a week of labwork between Friday and Sunday, when she had access to the facilities she needed. "Even though I was back in lab 50% of the time," Pollock says, "I was only about 30% productive."

The challenges continued at home. Shin's daughter was 6 years old when the pandemic struck. For months, Shin and her husband worked in shifts. About half of those who responded to a U.S. National Institutes of Health (NIH) survey in October 2020 said caretaking responsibilities made it "substantially more difficult to be productive," with women reporting more issues than men.

Meanwhile, nearly 70% of the postdocs surveyed said the pandemic would negatively impact their careers, with those caring for young children expressing the most anxiety. One of Shin's postdocs left academia, taking a job in industry that didn't involve bench research. "The COVID-19 pandemic is dismantling the pipeline of investigators who are essential to the future of biomedical science," fretted a recent article in *The New England Journal of Medicine*.

Worried about supporting her postdocs if she couldn't renew her grants, Shin took a 6-month sabbatical during which the university, rather than grants, covered most of her salary. But instead of taking that time off from her duties, she kept working and funneled the saved money to her postdocs. "My top priority was to keep the lab funded to buy them enough time to bounce back."

Her efforts joined a broader response. Universities like UPenn have allowed postdocs to apply for extensions, and young faculty to add a year to their tenure clocks. Meanwhile, in February NIH announced it

would extend many of the grants given to grad students, postdocs, and young faculty.

Still, Michael Lauer, NIH's deputy director for extramural research, acknowledges the agency won't be able to help everyone. "We're still in a hypercompetitive environment," for grants, a situation that predates the pandemic, he says. "If we give money to one person, that's less money for someone else."

In all, Shin estimates her lab was set back as much as 9 months. But things are slowly returning to normal. She brought in five undergrads, for a total of 15 people—more than before the pandemic. She was able to rebreed or reorder most of her mice. And her team is back to working full days in the lab.

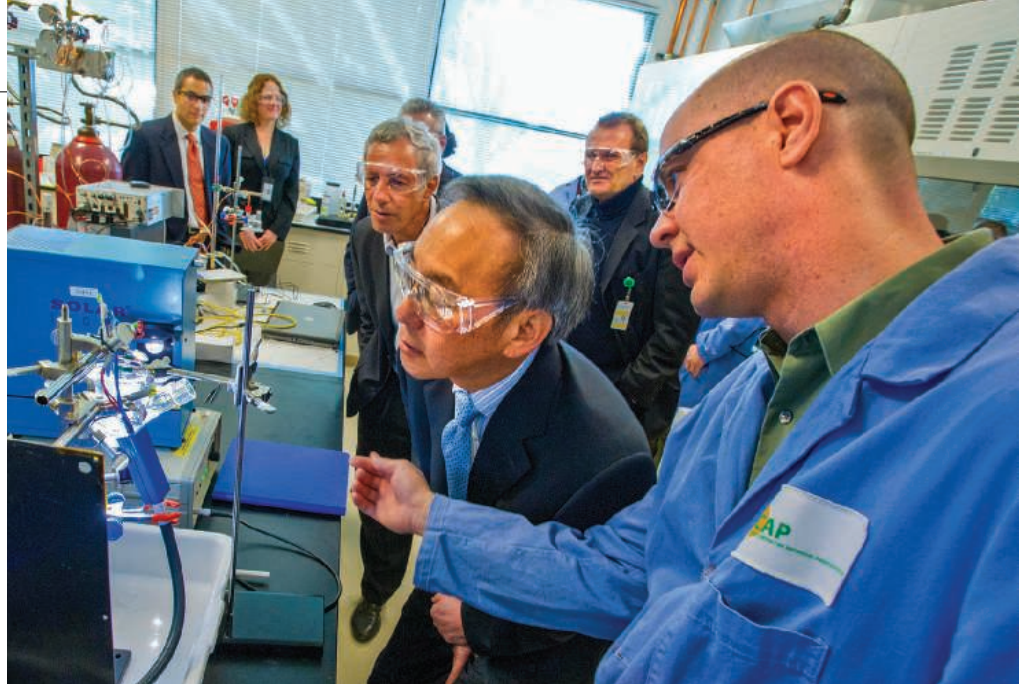
Some pandemic retrofits will stick around. Lab meetings are in person again, but Shin still starts them by asking how everyone is doing. Lab members also now have the option of attending remotely, and about one-third do. "Some people just focus better in a virtual setting," Shin says. "Others feel more comfortable asking questions."

The lab has also embraced the instant messaging platform Slack as a way to keep in touch and check in on each other when they're not together. That situation is more typical now, as trainees have realized that they can analyze data and write papers from home. "The peer pressure to put in face time has abated," Shin says.

For its part, the university has put more emphasis on mental well-being. Pollock says that during the pandemic, "Penn had posters everywhere for all of the places you could call," but because of what he argues is still a large stigma around mental health, "people weren't availing themselves of those resources."

In response, the university has created a peer support network that allows students to reach out to friends and colleagues instead of going straight to a therapist. UPenn is also building a trainee advocacy alliance, which will partner students with peers and faculty trained in active listening and mentoring, who can help students navigate the university's mental health resources. "We want to normalize that if you need help, it's OK to ask," Kessler says. "When a student enters our school, they will now have access to multiple support systems from Day One."

Pollock is getting back to normal himself, feeling productive again and mentoring two undergrads this summer. He plans to stay in academic science, and when he gets a lab of his own he knows, now more than ever, whom he wants to emulate. "Over the past year, it's been so clear that Sunny cares more about me as a person than as a producer of data," he says. "I want to be the kind of mentor she was to me." ■



Steven Chu, who was then U.S. secretary of energy, visits the Joint Center for Artificial Photosynthesis in 2012.

PHOTO: U.S. DEPARTMENT OF ENERGY/FLICKR

ENERGY RESEARCH

'Mini–Manhattan Projects' for energy innovation wind down

But hub model for bridging basic and applied research lives on

By **Adrian Cho**

The Department of Energy (DOE) will soon wipe away a legacy of Steven Chu, the Nobel Prize–winning physicist who served as secretary of energy from 2009 to 2013 under former President Barack Obama. According to the department's budget request for next year, DOE intends to wind down most of its Energy Innovation Hubs, multidisciplinary, multi-institutional centers that Chu devised to solve crucial energy-related problems and invigorate the sclerotic department.

Chu compared the hubs to the Manhattan Project, the World War II scramble to make an atomic bomb, and like the bomb project, they were meant to be ad hoc, temporary efforts. Some DOE bureaucrats disliked the way the hubs crossed organizational boundaries, but observers say they succeeded in making DOE's research more responsive and relevant. "The vision for the hub was, and still is, a great one," says Eric Isaacs, president of the Carnegie Institution for Science and former director of DOE's Argonne National Laboratory. In fact, DOE appears to have embraced the once-controversial model and has started several new projects that hew to it. "They look like a hub, and they walk like a hub, but they don't have this unfortunate malodorous name," says Alex King, a materials scientist retired from DOE's Ames Laboratory.

Chu, a former president of AAAS, which publishes *Science*, borrowed the basic parameters for the hubs from three bioenergy research centers started by DOE under former President George W. Bush. Each hub would receive $25 million a year for 5 years, with the possibility of a renewal. Instead of focusing on a research topic, each would strive to develop a practical solution for a single big problem, Chu said, uniting "under one roof" everybody from scientists doing basic research to engineers developing a prototype. By 2013, DOE had initiated five hubs focused on challenges ranging from converting sunlight to fuel to modeling nuclear reactors to improve their performance.

The whole point of the hubs was to breach a long-standing boundary within DOE, says Cherry Murray, a physicist at the University of Arizona and director of DOE's Office of Science from 2013 to 2015. DOE's basic and applied research are disconnected because they're funded out of different congressional budget lines. The two rub elbows at DOE's 17 national laboratories, but "the interface isn't perfect," Murray says. "So the hubs are just trying to bring that [connection] into a funding mechanism" to drive the innovation of new technologies.