

# TECH



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*Caltech  
Alumni  
Magazine  
2022*



## THE CRUCIBLE OF COVID

David Ho on the pandemic's lessons for science and society

## TECHNOLOGY FOR ALL

Google's Eve Andersson and the importance of accessible design

## FUNDING FEMALE FOUNDERS

Alumnae insight on the obstacles and opportunities for women in tech

## IT'S IN THE DNA

Jennifer Low leads 23andMe's efforts to expand from heritage to health care



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Photo: [Eve Andersson] Mitch Tobias





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# TECHER

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Editor: MARK A. DAVIS, BS, CALTECH ALUMNI ASSOCIATION,  
WITH DOG EAR CONSULTANTS

Contributing Writers: BIANCA BLASQUEZ, MARISA DEMERS, STACY HONG,  
DALE KEIGER, ZACH KELCH, WAYNE LEWIS, DAN MORRELL, GEORGE SPENCER

Copy Editor: JEREMY ARNOLD

Photography: STEPHANIE DIANI, LEAH LEE, DANIEL LEKA, MITCH TOBIAS

Illustration: MONICA HELLSTRÖM, MICHELLE THOMPSON

Art Director: SUSAN LANDESMANN, LANDESMANN DESIGN

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## CONTACT CAA

CALTECH ALUMNI ASSOCIATION  
MC 1-97  
1200 E CALIFORNIA BOULEVARD  
PASADENA, CA 91125  
INFO@ALUMNI.CALTECH.EDU

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# TRANSMISSION

*From the Board Chair of the Caltech Alumni Association*



SATOSHI OHTAKE, PhD (BS '00)  
*Board Chair,  
Caltech Alumni Association*

When the world is changing fast and inflection points seem to come with less and less lag time between, it's important to remember who we are and where we come from.

Where? We come from a unique and special place where we prepared to meet the challenges and opportunities of an evolving world. Our experiences at Caltech have placed us at the forefront of humanity's most important work — in science, medicine, research, technology, engineering, and education — vital work which continues to lead us all into the future.

Who? We are members of a powerful and committed community. A family.

We all recall that Caltech can be an intense environment. We worked hard to get accepted, and we worked even harder to graduate. As a result, our degrees carry significant value, and we give fellow Techers the utmost respect. In the world, the diligence and creativity that became our signature as Techers are tested even further. Caltech prepared us for productive careers, but how are we navigating those careers? How well are we balancing our work with quality time with our friends, family and new relationships?

The Caltech Alumni Association (CAA) asks us to remember that we aren't alone in the important work we do. Look back to where we come from and we will find connection and commonality with fellow Techers, people who have a lot to offer each other, and who will benefit from mutual support.

Always focused on the human concerns of the Techer community, Caltech Alumni is growing toward a bright future:

There are 25,026 alumni, including the newest 456 who earned degrees in 2021. Welcome!

Surveys of alumni indicate that Techers as a group are evolving. The Techers of 2021 are not the same as the Techers of 1961. For example, more alumni are pursuing careers in industry, along with the traditional paths of academics and research.

Techers are increasingly global citizens, with 20% of us residing and working outside the U.S., creating positive change for communities all over the world.

Techers express a desire and an inclination to be of service to each other, the world and Caltech. CAA is focused on creating opportunities to make new connections. We offered many of our programs digitally over the past two years and the result has been increased attendance and engagement. Recognizing the importance of personal connection, we will continue to assess the appropriate balance for future events to be held in-person and offered digitally, so that our community can be as global as its membership.

Recent graduates and established professionals are looking for opportunities to help each other and students. The CAA is seeking and creating new and better ways — like the Alumni Portal — for Techers to engage, to enhance their professional and personal lives.

Change in the world continues to come quickly and Caltech graduates are at the forefront, meeting new challenges and finding new solutions. The CAA is committed to keeping us connected so that, at every age and everywhere around the globe, we will continue to learn, to teach, and to support each other.

**Stay connected and stay strong. I hope to see you soon,**

A stylized, handwritten signature in black ink, consisting of several loops and a long horizontal stroke.

SATOSHI OHTAKE, PhD (BS '00)  
*Chair, Caltech Alumni Association*





# TRANSFORMING

## Timely Partnership

In 2021, the northeast corner of the Caltech campus received a new addition. Inside an unassuming building sits technology that is transforming the future of computing. The AWS Center for Quantum Computing is the result of a collaboration between Caltech and Amazon Web Services, the cloud-computing branch of Amazon. The collaboration helps bridge the fundamental, breakthrough research happening at Caltech with commercial quantum computing. The AWS Center creates quantum computing and related technologies that have the potential to revolutionize data security, machine learning, medicine development, sustainability practices, and more.

IMAGE: SHUTTERSTOCK



[ *Transforming* ]

# SORTING IT OUT

HOW MATANYA HOROWITZ'S REVOLUTIONARY  
RECYCLING SYSTEM COULD KICK-START  
A GLOBAL RENAISSANCE

BY DAN MORRELL • ILLUSTRATION BY MICHELLE THOMPSON











**In 2013**, Matanya Horowitz, PhD (PhD '14), realized that he had a solution in search of a problem.

Horowitz was in the midst of his postdoc work at Caltech at that point, studying robotic control theory and path planning. In his spare time, he was researching artificial intelligence tools and building a deep learning “vision system” whose ability to identify specific objects actually improved with every new object it observed. Taken together, his pursuits could create a powerful robotic sorting system.

But where would such a system have the most impact? This kind of technology, he figured, could have applications in manufacturing, e-commerce, and even sports.

Eventually, though, he landed on recycling. It wasn't a new idea—robotic sorting had been predicted as a solution since recycling was first popularized by the environmental movement of the 1970s. But even 50 years later, the recycling industry was still employing humans to separate out its aluminums, papers, and plastics, and staffing challenges were holding the industry back.

It made for a perfect fit: His vision system could detect recyclable materials by accurately identifying bits of brand logos and elements of shape—no matter how crushed the cans or cartons—and robotic picking arms could sort the materials. This process would not only improve the accuracy of the sorting process, creating more pure, higher-value materials, but it could also help solve the labor crunch. Recycling needed to be a better business, and his system, he figured, could make that a reality.

Eight years later, the initial promise that Horowitz saw is bearing fruit. His company, AMP Robotics, has 200 employees, 200 robots deployed, and \$78 million in venture funding. AMP has been a finalist for Fast Company's 2021 World Changing Ideas list and made the Forbes AI 50 list for the past two years; Horowitz was also named a 2021 Ernst & Young LLP Entrepreneur of the Year.

He not only found the right problem, but he found it at the right time. “As modern society has become more aware of its negative impacts, consumers are pushing for more sustainable approaches to business,” says Horowitz. “This groundswell in consumer interest is having a huge impact in the recycling industry, and when coupled with technology, gives me confidence that the world is going in the right direction.”

## RISE OF THE MACHINES

**M**atanya grew up fascinated by robots, enchanted early on by Voltron and Transformers cartoons. But the reality of a career in the field didn't cross his mind until high school, when he came across the DARPA Grand Challenge, a global competition that tasked teams with building and racing autonomous vehicles. Ultimately, none of the cars even finished the race, and Horowitz remembers being unimpressed with their construction. “They were clearly clunky,” he says. “It looked like they were held together by duct tape or something—and lots of wires everywhere.” But it wasn't the tech that moved him, it was the young, scrawny grad-student types who built it. He had this idea that advanced technology was the dominion of secret, government labs. The reality, he saw, was that the future was being designed by people not much older than him. “And, I don't know, are they any smarter than me?” he thought. “I should be able to do this.”

After earning four undergrad degrees and a master's in just four years at the University of Colorado Boulder, Horowitz headed to Caltech for graduate school, impressed by the research and reputation of the faculty. Among them was famed robotics professor Joel Burdick, PhD, with whom Horowitz would ultimately work during his PhD studies. And while Horowitz's work in robotics and control theory would play a major role in the sorting mechanisms that AMP's robots employ today, it was a chance encounter that would round out the foundation of the company. As a hungry grad student attracted by the promise of a free meal, Horowitz decided to attend a campus lecture on deep learning, a type of machine learning that solves problems by breaking them down into a hierarchy of easier

problems. He was floored. “I became convinced that this was going to be a revolution in computer vision,” he says. “And I wanted to be part of that.”

AMP officially launched in 2014, but the first few years were rough. After a long stretch of tinkering and development, AMP put its first robot in place in the beginning of 2016 at a facility focused on sorting out food and beverage cartons from the rest of the recycling stream. “It was a nightmare,” says Horowitz. “The thing didn’t work at all, it just immediately broke. It was very embarrassing.” He spent the next year waking up every day to new problems to solve—gummed-up suction systems, conveyor belt cleats ripping up his robots. “There was certainly a lot of self-doubt,” says Horowitz. “I think the question was, ‘Oh gosh, am I the guy who can figure this out?’”

Things started to take off in 2017. AMP sold five robots that year, started providing its AI to a Canadian recycling company, and raised its first venture capital money. Not only had Horowitz worked out some of the bugs in the system by then, but he had honed the economic pitch.

Recycling, he explains, is a tough business. In many cases, he notes, the costs of running a facility can exceed the price of the recycled commodities it produces. “But if you can bring the cost of sorting down, that can really make an impact. And that’s what robots do.”

Helping recycling plants sort more accurately not only creates higher-quality materials, he notes, but it can also help separate out more types of recycled goods—creating even more commodities to sell. “And if you do both, recycling starts to become this phenomenal business.”

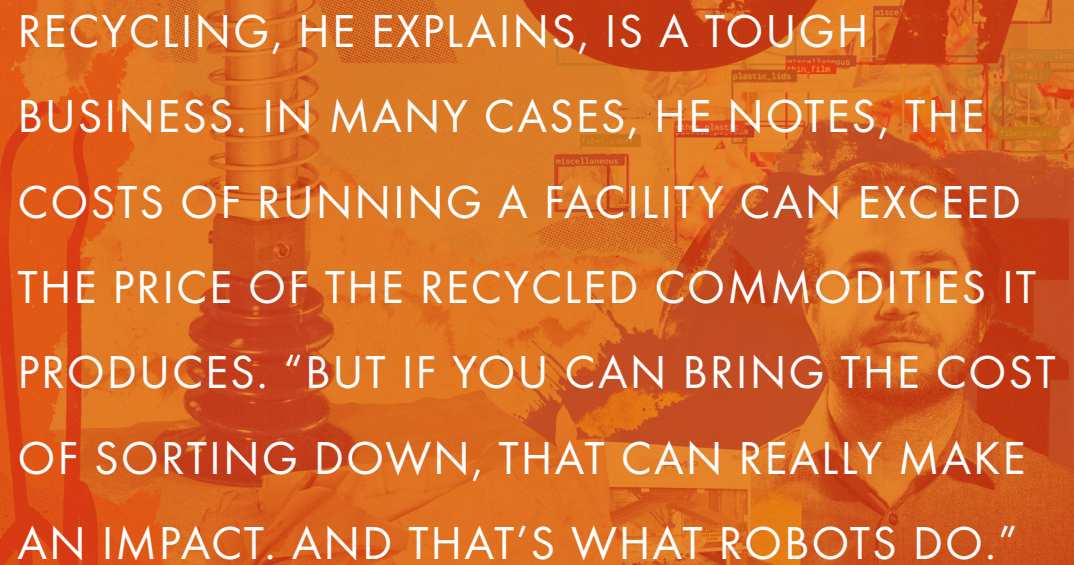
## SCALING CHANGE

**I**f recycling becomes a better business, Horowitz says, it will create more incentive to collect recycling. That, in turn, will create more recycling operations in areas of the country or even the world that haven’t had those options before. “In the developing world, where they don’t have waste management infrastructure, a lot of material is basically thrown in rivers and dumped,” says Horowitz.

But if these advanced systems like AMP’s start making it both simpler and cheaper to sort recycling, then “I think you can start to make inroads in this global problem.”

He hopes to watch this scenario play out over the next decade, with recycling becoming a growth industry and new entrepreneurs sprouting up around the globe, finding more ways to recycle a broader range of materials.

“I’m very much a techno-optimist,” says Horowitz. “What I see is that technology not only has the ability to make ‘doing the right thing’ easier, but can also make it the lucrative thing to do.”



RECYCLING, HE EXPLAINS, IS A TOUGH BUSINESS. IN MANY CASES, HE NOTES, THE COSTS OF RUNNING A FACILITY CAN EXCEED THE PRICE OF THE RECYCLED COMMODITIES IT PRODUCES. “BUT IF YOU CAN BRING THE COST OF SORTING DOWN, THAT CAN REALLY MAKE AN IMPACT. AND THAT’S WHAT ROBOTS DO.”





## Distinguished Alumni Panel Ponders the New Normal

Pondering the pandemic with 2021 Distinguished Alumni Award recipients

*By Wayne Lewis*

*Photography by Daniel Leka*

**A**mid the return of in-person interactions at Caltech's 2021 Reunion Weekend, one event brought together three of the four 2021 winners of the Distinguished Alumni Award: NASA astronaut Bob Behnken, PhD (MS '93, PhD '97); Barbara Burger, PhD (PhD '87), president of technology ventures and vice president of innovation at Chevron; and Laurie Leshin, PhD (MS '89, PhD '95), president of Worcester Polytechnic Institute. (DAA winner Charles Elachi, PhD [MS '69, PhD '71], Caltech professor emeritus of electrical engineering and planetary science and former director of the Jet Propulsion Laboratory, was unable to attend.)

The Techers engaged in a panel discussion moderated by Satoshi Ohtake, PhD (BS '00), chair of the Caltech Alumni Association Board

of Directors and senior director of pharmaceutical research and development at Pfizer. The distinguished group contemplated the COVID-19 outbreak and today's sometimes-uneasy "new normal."

One subject of focus was "The Third Option"—the newly trod middle ground between safer-at-home measures and a return to life as it was before COVID-19. The panel members, speaking to a crowd of about 100 alumni and friends, offered personal perspectives on the effects of the pandemic and discussed how society can plot a way forward.

Focusing on the need to communicate with, and sometimes persuade, people who may have fallen victim to misinformation about vaccines, for instance, the panelists agreed that it's vital to reach out to others in a way that's understanding and respectful. "What I learned ... after a very long career at a big company where standard-

2021DAA recipients Bob Behnken, Laurie Leshin, and Barbara Burger share how they manage life and business through the pandemic with CAA Chair Satoshi Ohtake.

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**“IT’S A WONDERFUL THING TO GO OFF AND DISCOVER SOMETHING, AND WE SHOULD HONOR PEOPLE WHO DO THAT...BUT IF THEY DON’T SHARE IT WITH SOMEBODY ELSE, THEN, IN SOME SENSE, THE DISCOVERY IS LOST.”**

**— BOB BEHNKEN, PHD (MS ’93, PHD ’97)**

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ization is one of the defining principles of being able to manage at scale, is you’ve got to meet everybody where they’re at,” Burger said of her time at Chevron. “And you first have to find out where they are. It’s almost like personalization at a very large scale.”

When the topic turned to the increasing doubt and distortion of science that undermines public health efforts, Leshin suggested that it is part of a broader trend. “When we have spent so much time as a society undermining [authority in general]—government, probably most spectacularly—it’s actually not that surprising that we end up with a mistrust of science, because it feels institutional,” she said. “There’s something about those things being linked, and do I know the answer to it? I do not. ... It’s a huge challenge to overcome.”

The panelists were also unanimous that scientists and engineers should redouble efforts to communicate with the public about their work. “It’s a wonderful thing to go off and discover something, and we should honor people who do that,” said Behnken, who had delivered Caltech’s commencement speech at an in-person ceremony earlier that day. “But if they don’t share it with somebody else, then, in some sense, the discovery is lost.”

All of the panelists called upon their fellow alumni to take part in such outreach any way they can. After all, what they learned at the Institute puts them in a special position to contribute. “This place,

to me, was all about building an incredibly strong foundation in critical thinking, problem-solving, questioning, and appropriate levels of skepticism ... and [bringing] that to the world,” Leshin said.

*To see recordings of the 2021 Distinguished Alumni Award recipients in conversation with 2001 DAA Sandra Tsing Loh, MA (BS ’83), and Caltech President Thomas Rosenbaum, PhD, visit [www.alumni.caltech.edu/DAA](http://www.alumni.caltech.edu/DAA).*

**LAURIE LESHIN**



**BARBARA BURGER**



**BOB BEHNKEN**





[ *Transforming* ]

# MAKING A FEDERAL CASE FOR CLIMATE ACTION

How John Dabiri, PhD (MS '03, PhD '05), is helping shape the  
Biden administration's plans for addressing climate change

By George Spencer • Photography by Leah Lee





After being appointed in fall 2021 to the 29-member President's Council of Advisors on Science and Technology (PCAST), **John O. Dabiri, PhD (MS '03, PhD '05)**, has explored a range of topics including wildfire response—a seemingly odd fit for someone whose research focuses on ocean science. “While my day job is thinking about topics related to the ocean, I do a lot more related to fluid dynamics—the physics of air and water flow, whose underlying math and science are connected,” says Dabiri, Centennial Professor of Aeronautics and Mechanical Engineering, who, at 42, is the youngest member of PCAST. “So, this is not too much of a departure.” Indeed, the Dabiri Lab focuses on the interactions of fluid mechanics, energy, and biology in the world's oceans. His work on how schools of fish move has impacted wind farm design, and his study of jellyfish could revolutionize underwater vehicle propulsion.

At PCAST, he is focused on how the wind moves—an important variable in wildfires. “We're looking at ways in which the best of science and technology can help to reduce the stress Americans feel from these events,” says Dabiri. “Because of the urgency of these challenges, we hope to move rapidly.”

In this conversation with *Techer*, Dabiri notes the need for both urgency and innovation to confront climate change.

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**President Biden charged the council with addressing climate change. What's the most urgent issue in that arena?**

We need to develop either longer-term or lower-cost storage options for wind and solar or develop other clean technologies that could provide on-demand power.

I'm keen to see further development of nuclear fusion. It provides the benefits of on-demand power you get from nuclear fission but without long-lived radioactive waste. It also can be derived from fuel sources that aren't mined the same way. In terms of an environmentally friendly energy source, you can't do better.

Because of remarkable recent advances in material science relating to high-temperature superconductors and superconducting

magnets, which are important for confinement fusion, I think we're at an inflection point where the possibility of nuclear fusion is real. The question is: Can we provide the investment needed to bring it to fruition fast enough to impact the climate problem? Additional funding could get us to commercial fusion faster.

**China is challenging America's role as the world's science and technology leader. Are we at risk of losing our top spot?**

It's important the U.S. not become complacent. Sustained investment in science, technology, and children's education and a healthy immigration policy enabled us to become preeminent. Many Chinese scientists played a big role in our advancement. For example, former Caltech faculty member Qian Xuesen was forced

*“I think we're at an inflection point where the possibility of nuclear fusion is real.”*





*“The next big ideas will come from people free to explore science without any immediate application in mind.”*

to leave the U.S. He became the father of the Chinese space program. Short-sighted immigration decisions like that led to growing competition we see abroad.

Going forward, I believe a rising tide lifts all boats. It’s great for China to lift its own standard of living as the U.S. did, but it’s important we not cede leadership to any other country, which will happen if we don’t continue to aggressively support science funding in education and have a healthy immigration program.

**Generally speaking, do you think the U.S. needs to accelerate how it brings technologies to market?**

We have a huge scientific enterprise where the incentive system—the goal—is to write a paper, publish it, and move to the next thing. We need to redouble our efforts to take the best of existing science and technology and with a sense of urgency pursue a new set of technologies to help people withstand the climate change that’s going to come.

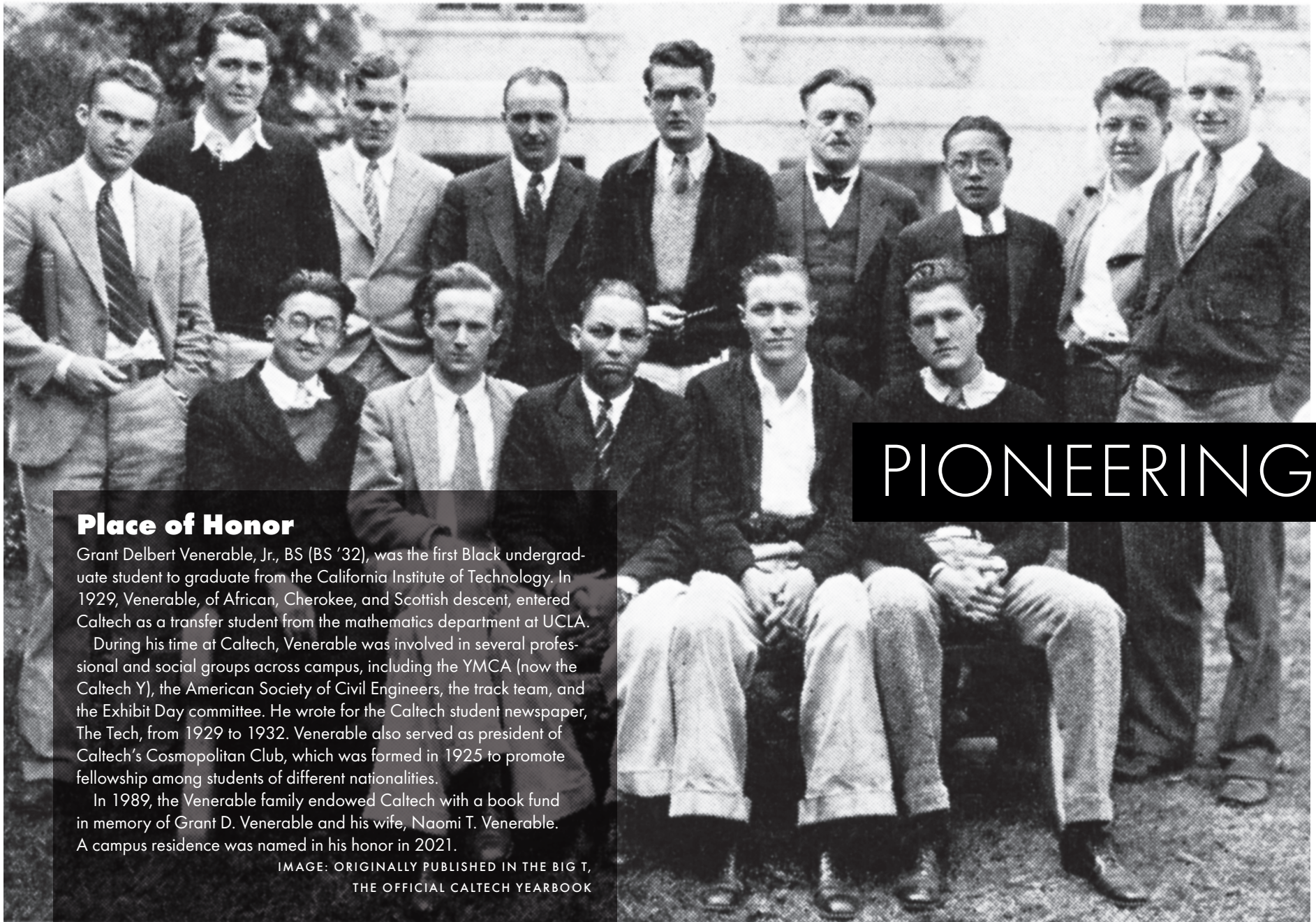
Even if we turned off the spigot on carbon tomorrow, temperatures are going to go up, and the worst of climate change might still be ahead in any case. We need to figure out how to use science and technology to deal with those issues on a much faster time scale than decarbonization writ large.

**You told *The Atlantic* magazine your Caltech education instilled in you the importance of questioning your assumptions. What assumptions do U.S. scientists need to question?**

I worry there’s been an increasing focus on translation of basic science into technology. That focus is needed, but it may be out of balance with the need to develop new fundamental science ideas. Often the impact of a line of research is hard to predict at the beginning. We started working on jellyfish largely out of my own personal interest. It would be hard to imagine anybody writing a proposal to study jellyfish to understand cardiac function or fish schooling to better understand wind energy.

Those proposals would be met with strong criticism, because we tend to be too utilitarian in how we measure the value of a particular area of research. In PCAST I hope those examples can serve as a counterpoint—examples of research done out of scientific curiosity. The next big ideas will come from people free to explore science without any immediate application in mind. I worry that if too much funding is intentionally focused we will become too utilitarian in our research and run out of the seed corn for innovation—the fundamental science. We need to provide more freedom for scientists at all levels to do more exploration.





# PIONEERING

## Place of Honor

Grant Delbert Venerable, Jr., BS (BS '32), was the first Black undergraduate student to graduate from the California Institute of Technology. In 1929, Venerable, of African, Cherokee, and Scottish descent, entered Caltech as a transfer student from the mathematics department at UCLA.

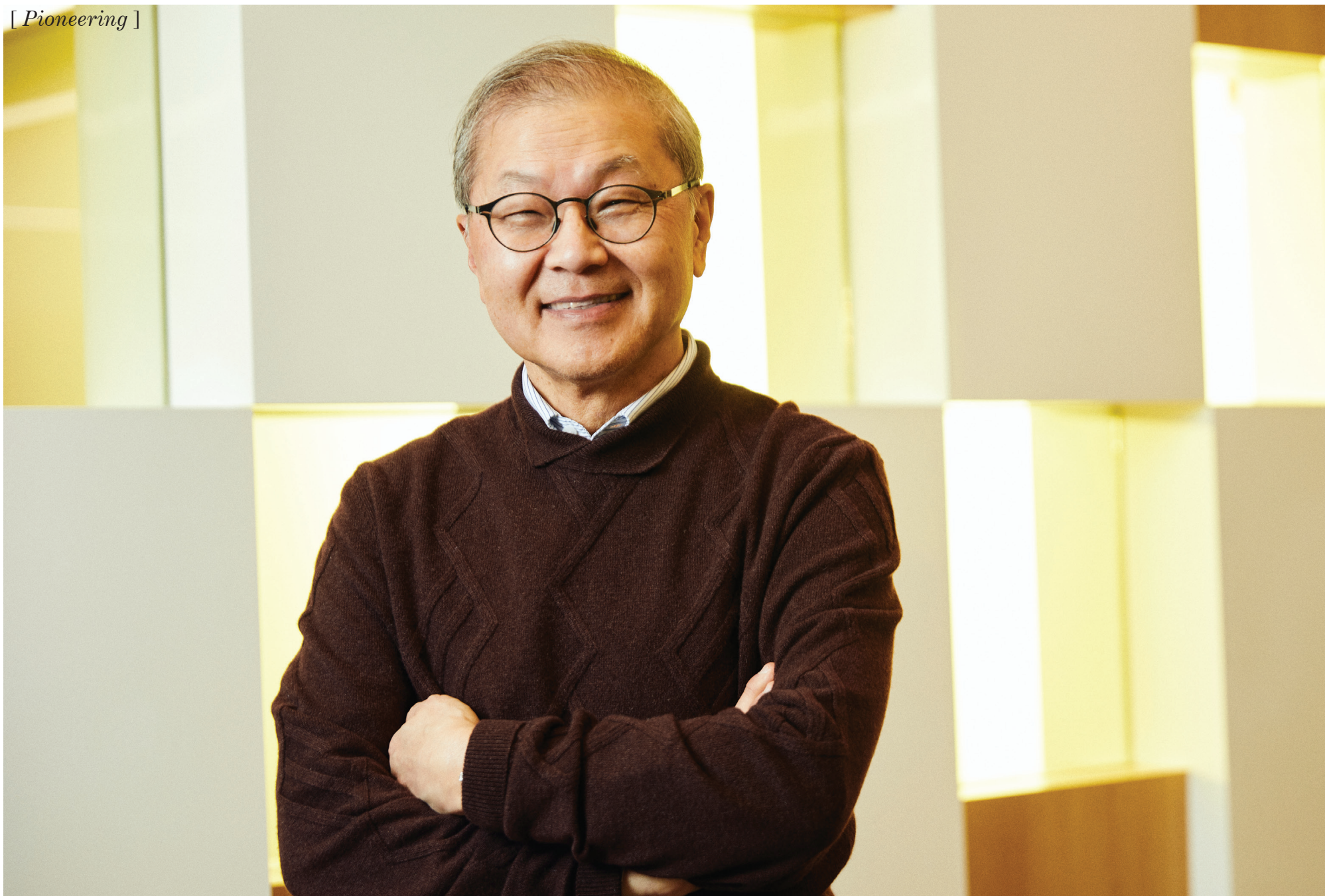
During his time at Caltech, Venerable was involved in several professional and social groups across campus, including the YMCA (now the Caltech Y), the American Society of Civil Engineers, the track team, and the Exhibit Day committee. He wrote for the Caltech student newspaper, *The Tech*, from 1929 to 1932. Venerable also served as president of Caltech's Cosmopolitan Club, which was formed in 1925 to promote fellowship among students of different nationalities.

In 1989, the Venerable family endowed Caltech with a book fund in memory of Grant D. Venerable and his wife, Naomi T. Venerable. A campus residence was named in his honor in 2021.

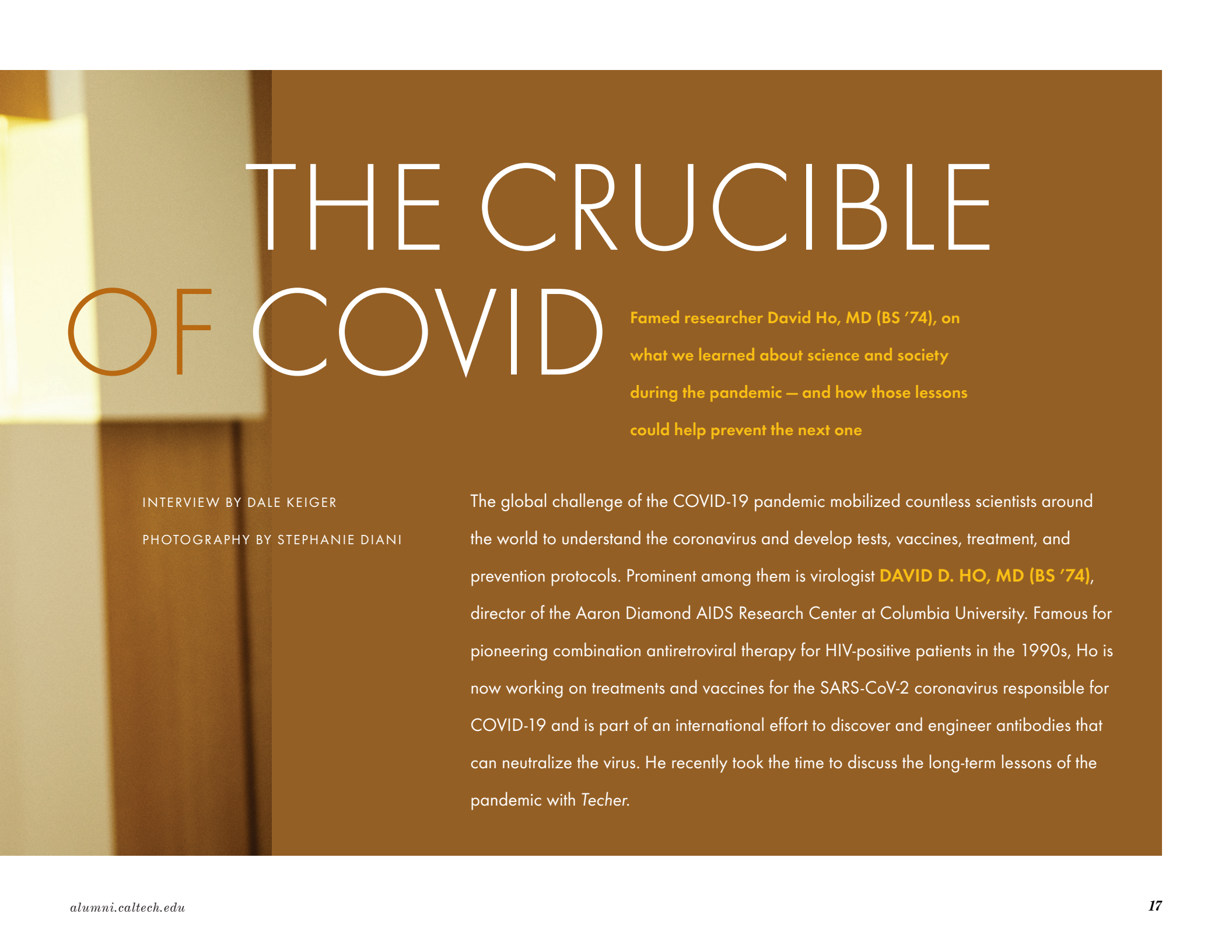
IMAGE: ORIGINALLY PUBLISHED IN THE BIG T,  
THE OFFICIAL CALTECH YEARBOOK



[ *Pioneering* ]







# THE CRUCIBLE OF COVID

Famed researcher David Ho, MD (BS '74), on  
what we learned about science and society  
during the pandemic — and how those lessons  
could help prevent the next one

INTERVIEW BY DALE KEIGER

PHOTOGRAPHY BY STEPHANIE DIANI

The global challenge of the COVID-19 pandemic mobilized countless scientists around the world to understand the coronavirus and develop tests, vaccines, treatment, and prevention protocols. Prominent among them is virologist **DAVID D. HO, MD (BS '74)**, director of the Aaron Diamond AIDS Research Center at Columbia University. Famous for pioneering combination antiretroviral therapy for HIV-positive patients in the 1990s, Ho is now working on treatments and vaccines for the SARS-CoV-2 coronavirus responsible for COVID-19 and is part of an international effort to discover and engineer antibodies that can neutralize the virus. He recently took the time to discuss the long-term lessons of the pandemic with *Techer*.



*“We’re going to have even better drugs, antibodies, and vaccines to come, and some of them could be even broader in their protective effect and extend beyond just the COVID-19 virus and cover other related viruses. That gives me hope that better tools are going to come along.”*

**We are more than two years on from the Wuhan outbreak. Did the COVID-19 pandemic play out as you anticipated?**

On the academic side, it’s probably bigger than any of us had imagined, with wave after wave and, of course, over a quarter-billion people infected and five million dead. I think the other thing is [that] we knew there was enormous scientific investment in solving this problem, but the solutions came faster than we anticipated, exemplified by the very rapid development of highly efficacious vaccines and antibody therapies and more recently, the emergence of treatment drugs. I think that’s beginning to change the equation. We now have more tools at our disposal to combat this virus.

**The global health system did a pretty good job of containing SARS and MERS. What was so different about COVID-19?**

Both MERS and SARs were actually more deadly. But there’s one very fundamental difference with COVID-19, and that is people who are infected can have no symptoms at first and so go about their business and spread the virus. That’s a particular feature that allows it to spread so rampantly.

**In August 2020, on a podcast, you said the country was doing very poorly confronting the pandemic. More than a year from that statement, what’s your assessment? Did we get better?**

I think we did get better but we could always improve. Witness the period following the summer of 2020—the situation got a lot better until the winter months arrived. That’s because I think much of the country was hit hard and was devastated and everybody learned the lesson the hard way. Then the winter months and the holidays and the increased indoor contact caused another peak. Once the situation was better, everyone let their guard down. Now, you could say nearly two-thirds the country is vaccinated, so the pool of susceptible individuals has decreased substantially, so the expectation was that we may not hit the same type of peaks that we have seen in the past. But the omicron variant has proven that wrong because its infectiousness is several fold greater than previous variants. I think we need to sustain our efforts much longer than what we have done with each previous wave of the pandemic.

**What made such a difference this time in the extraordinarily rapid development of multiple vaccines and now-promising treatments?**

After China shut down in January 2020 and we pretty much shut down here in March, everyone appreciated the enormity of the situation. There was a massive infusion of talent to address this problem from a diagnostic, treatment, and prevention perspective. And the FDA should get credit for responding very quickly to fast-track the development of antibody drugs and vaccines. But these developments don’t come out of nowhere. There was a lot of scientific progress made on various vaccine platforms, most notably the mRNA vaccines administered by Pfizer and Moderna. Some of that technology had been worked on for over a decade. In terms of antibodies and drugs, the massive effort spent on HIV and hepatitis C really formed the foundation for rapid development. Take the Pfizer drug: It is a protease inhibitor that was first developed in the 1990s for HIV and then applied to hepatitis C and now effectively applied to COVID-19.

**Does this give you some hope going forward? This is not going to be our last pandemic.**

That’s absolutely right. Some of these drugs are likely to hit related coronaviruses that have been found in animal species, particularly in bats. Some of the antibodies that scientists are coming up with will also hit related viruses. Just as one example: We have developed an antibody that will hit not only COVID-19 but SARS and all the related viruses that we have examined that are normally found in bats. We are already developing useful interventions that might block a subsequent emergence of a related coronavirus.

We’re going to have even better drugs, antibodies, and vaccines to come, and some of them could be even broader in their protective effect and extend beyond just the COVID-19 virus and cover other related viruses. That gives me hope that better tools are going to come along.

**Some of the more optimistic thinking has been that we will approach a point with COVID-19 where it just becomes part of our public health landscape, like influenza. When might we reach that point?**

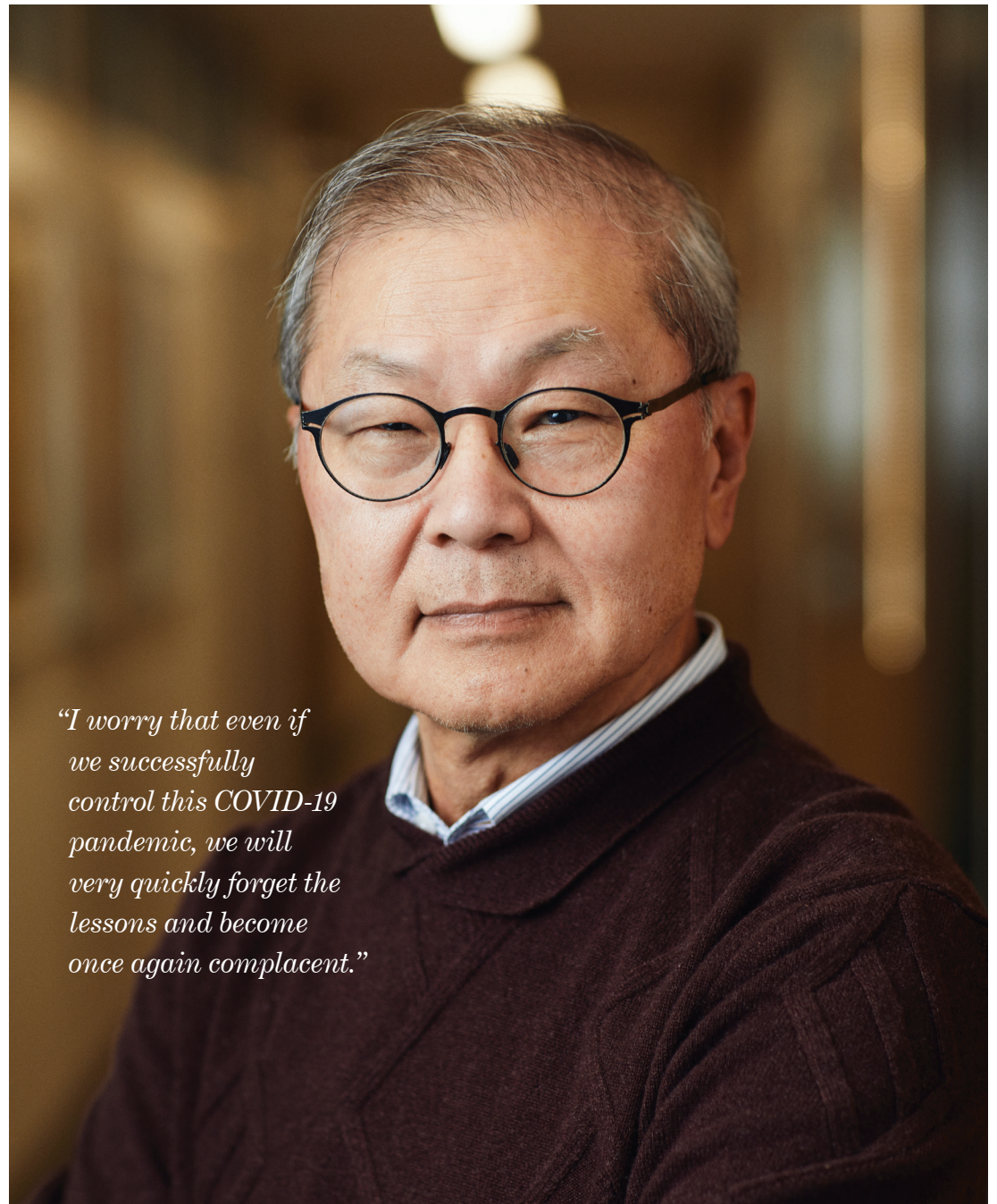
I've been espousing such a point of view, but I don't know when we might get there. The omicron variant being more infectious yet less pathogenic may, oddly enough, rip through the population and raise herd immunity in a way that helps to end the pandemic and turn it into an endemic situation. I'm hoping that 2022 is the last year we have to deal with the severe devastation caused by the virus. I think with multiple effect drugs and antibodies available now, and, in this country, three vaccines available, we should be able to eliminate the severe consequences of COVID-19 and turn it into something that is not as fearsome and more manageable, more treatable.

**What are the most significant things that we have learned from this experience?**

I think it's pretty clear that these types of pandemic threats are as important as climate change. I think that's been the case for a long time but it's never been fully appreciated until this pandemic hit us. This is the third coronavirus in the last 20 years. Surely there's going to be more, because we know these viruses are prevalent in various animal populations and we're going to have more cross-species transmission from animals to humans. If we don't do a good job at the outset of each transmission to contain it, we're going to endure yet another epidemic and possibly a pandemic. I worry that even if we successfully control this COVID-19 pandemic, we will very quickly forget the lessons and become once again complacent. This is a major security threat, not just to our country but to the world.

I also fear for our inability to sort out facts. Science has given us the vaccines and drugs that allow us to begin to rein in this pandemic, but if people believe in their own set of facts and that these things don't work, then all the work would be for naught. That would be a huge tragedy. I think scientists need to continue to help put out the truth and explain the facts in ways that are much more understandable to a layperson. We need to wipe out the spread of misinformation in the same way we do for the spread of pathogens.

*Dale Keiger is the former editor of Johns Hopkins Magazine.*



*"I worry that even if we successfully control this COVID-19 pandemic, we will very quickly forget the lessons and become once again complacent."*



[ *Pioneering* ]





# TECHNOLOGY FOR ALL

} Google's Eve Andersson, MS (BS '96),  
on how accessible design can foster both  
inclusion and innovation

M

**ORE THAN ONE BILLION PEOPLE WORLDWIDE** live with a disability, and anyone reading this story is likely to experience a lasting, temporary, or situational impairment at some point. Yet, the technologies people rely on—mobile phones, tablets, smartwatches, laptops—are generally designed for only one type of user. **EVE ANDERSSON, MS (BS '96)**, senior director of accessibility at Google, is leading efforts to make today's and tomorrow's innovations work for everyone.



“Having access to technology can absolutely be life-changing,” Andersson says. “Achieving that high-level impact guides the work that my team and I do.”

Andersson oversees a team of software engineers, user experience designers, and experts in physical and cognitive disabilities. Together with the disability community and product teams across the company, they brainstorm new ways to use and benefit from technology. One of Google’s flagship apps, the Android Accessibility Suite, has been downloaded five billion times and enables users to control their phones using voice commands, eye movements, and even customizable facial gestures. As voice-activated home assistants grow in popularity, Andersson collaborated with Google’s machine learning scientists to refine its algorithms to better understand users with impaired speech.

Inclusive design and accessible technology are not confined to one domain or audience, which is why Andersson’s team offers input on nearly every Google product. This type of integration allows features that are designed for the disability community, such as voice typing, auto-complete, and dark mode, to trickle down to mainstream users. “The accessibility problems of today can lead to the technology breakthroughs of tomorrow,” Andersson wrote in a blog post for Google.

### {A DRUMBEAT FOR CHANGE}

WHEN ANDERSSON JOINED the central accessibility team in 2013, it consisted of Andersson and just five staff members. At the time, they were assigned to fix issues within existing Google products. But Andersson had a more ambitious vision.

She invited members of the disabled community, both inside and outside of Google, to share their user experiences. She also met with other Google groups, linking their goals with hers. Want to score a lucrative government contract? Want to create an app

that has mass appeal? Want to avoid bad public relations? Inclusive design and accessible technology can help.

“You cannot just talk to somebody and then assume that they will forever prioritize accessibility,” Andersson says. “You have to keep the drumbeat going.”

She has been keeping a steady beat for inclusive artificial intelligence (AI). She is an advocate of data collection that spans countries, gender, race, and physical abilities. Anything that ignores large swaths of the user population will produce biased results, she says. She has helped incubate some principles and approaches to inclusive AI at Google and remains peripherally involved in the initiative.

### {LATE NIGHTS IN THE LAB}

ANDERSSON GREW UP in the Seattle area, one of the country’s first tech hubs and home to Microsoft and Amazon. Early on, Andersson was influenced by her engineer father’s hobbies and learned BASIC (Beginners’ All-purpose Symbolic Instruction Code), an early programming language, before she was a teenager. Andersson and her younger sister visited their grandparents’ house in Nebraska every summer and enjoyed talking with their aunt who used a wheelchair, and playing with their deaf cousins.

When the time came to apply for colleges, Andersson took a tour of Caltech. The campus and its atmosphere were a natural fit for her. “Being at Caltech, it just felt creative,” Andersson says. “And I saw other people who were kind of nerdy like me. I felt right at home immediately.”

Andersson pursued engineering and applied science and, in her free time, competed on the swim team. She also served as president of the Caltech chapter of the Society for Women Engineers and grew the club from five members to 50.

But Andersson’s main passion, and the source of her sleepless nights, was the Undergraduate Computer Science (UGCS) Lab at Earle M. Jorgensen Laboratory. The 1990s were the early years of Web 1.0, and student-run UGCS capitalized on the moment by keeping the lab open 24 hours a day and offering web hosting services. Thrilled by the prospect that the Internet could be used as a tool for communication, Andersson spent hours developing websites and learned HTML, JavaScript, and Perl in the process.

“I was obsessed,” Andersson says. “I would eat microwave popcorn and drink coffee from a vending machine just so I could stay up all night and make random web pages.” In 1994, before LiveJournal or blogging became popular, Andersson coded web pages where she published her creative writing and thoughts as well as puzzles and poetry about pi, her favorite irrational number.

Her work caught the attention of others. After all, less than 3,000 websites existed when she built her first page. Without trying, Andersson had a web development side hustle.

“There were a lot of steps between my time at Caltech and now,” Andersson says. “UGCS helped me recognize my love for software development. Without it, I probably would have gone on to a career in mechanical engineering.”

### {A NEW CAREER PATH}

TODAY, ANDERSSON HAS A DREAM JOB that she never designed or planned. Before joining the accessibility team, Andersson cofounded an open-source software company, helped launch a technology-focused university, and worked abroad in Guatemala City, Buenos Aires, and London.

Then, a chance encounter with a West Coast colleague at Google’s New York City cafeteria changed her career

path. He mentioned the company was establishing a central accessibility team and was looking for someone with product management experience to fill the role. She did not meet some of the requirements for the job but leaned into her startup experience and passion for the group's mission.

"As soon as I learned about the position, I just knew I had to be a part of it," she says. "Leveling the playing field is one of my fundamental beliefs and this was an opportunity to do that in a really meaningful way."

### {NAVIGATING THE PHYSICAL WORLD}

ANDERSSON IS ENCOURAGED by the progress made in computer vision, robotics, and the Internet of Things, a network of devices that "talk" to each other. These developments make possible a new frontier in accessible technology—helping people with disabilities better navigate the physical world.

Andersson's team and colleagues across the company have begun to make strides in this realm. Google Maps now lists wheelchair-accessible streets and public transit stops. Another app helps people with low vision or blindness identify objects in a room. And while Andersson cannot disclose projects in Google's pipeline, other researchers outside Google have been working on robotic wheelchairs and wearable devices that can communicate with smart cities.

"So much can be done with real-world accessibility and I get to be part of it," Andersson says. "I used to think that having a tech job meant I would be staring at the computer all day by myself. Instead, I get to help change the world."

**"Having access to technology  
can absolutely be life-changing.**

**Achieving that high-level  
impact guides the work that  
my team and I do."**





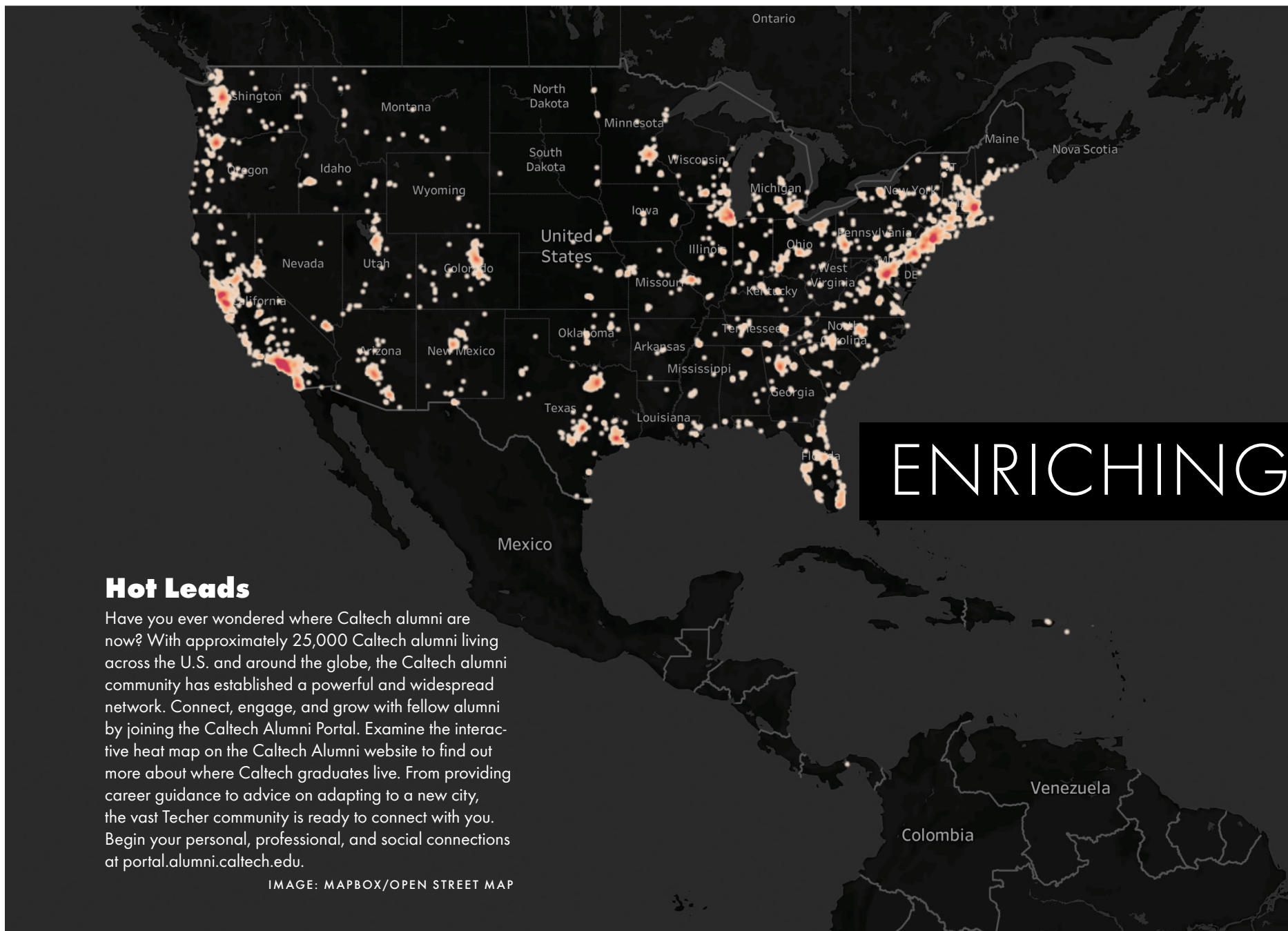
[Pioneering]

## Krystal Vasquez

When I became disabled in grad school, I knew only one other disabled student. Wait, aren't we more than 25% of the U.S. population? Where are the disabled scientists? I soon found out, however, that STEM and academia create unique challenges for disabled scientists and engineers, often pushing us out altogether. So, I created this piece in the hope that one day all these barriers are finally torn down and the disabled scientists that come after me can feel proud of their identities.







## Hot Leads

Have you ever wondered where Caltech alumni are now? With approximately 25,000 Caltech alumni living across the U.S. and around the globe, the Caltech alumni community has established a powerful and widespread network. Connect, engage, and grow with fellow alumni by joining the Caltech Alumni Portal. Examine the interactive heat map on the Caltech Alumni website to find out more about where Caltech graduates live. From providing career guidance to advice on adapting to a new city, the vast Techer community is ready to connect with you. Begin your personal, professional, and social connections at [portal.alumni.caltech.edu](http://portal.alumni.caltech.edu).

IMAGE: MAPBOX/OPEN STREET MAP



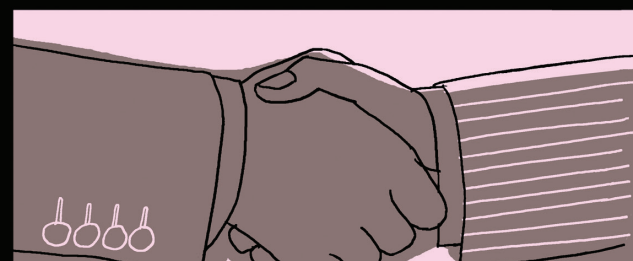
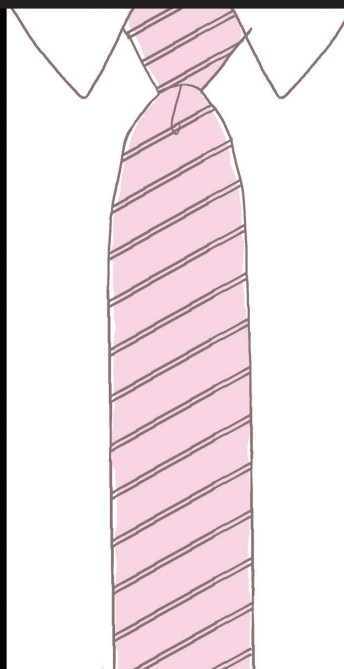
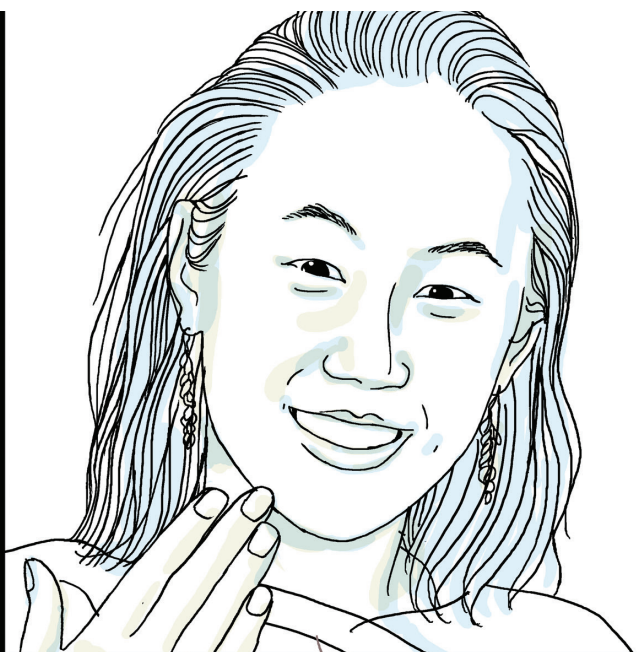
# FUNDING FEMALE FOUNDERS

CALTECH ALUMNAE SHARE INSIGHTS  
ON REPRESENTATION AND THE FUNDING  
CRISIS FOR WOMEN IN TECH

BY MARISA DEMERS  
ILLUSTRATION BY  
MONICA HELLSTRÖM

**N**ancy Hong, PhD (BS '92), Ann Johnson, MS (BS '99, MS '00), and JJ Kang, PhD (PhD '15), faced a moment when they knew working in startup and venture capital (VC) spaces would be different for them. Kang, a venture partner at The Column Group and chief executive officer (CEO) of Appia Bio, was often the only woman at meetings. As the cofounder and founding CEO of Interana, Johnson had to pitch to potential funders who were more interested in talking to her husband and cofounder Robert Johnson, BS (BS '98), than to her. Hong, who is managing director at RiverVest Venture Partners, heard for 20 years how equity was within reach. Yet, year after year, she saw talented and ambitious women leave their life science VC careers.

Their experiences are part of a larger gender imbalance in entrepreneurship and venture capital. Although female founders had a breakout year in 2021, discrepancies persist on who gets funded and who writes the checks, according to a report from Pitchbook, a company that provides private market data. Despite these odds, Hong, Johnson, and Kang have thrived in their careers. In this edited discussion, they offer their thoughts on the current state of their industry and why both women and men should be optimistic about the future.







"The bigger New York VC firms wanted to go get cigars and talk about the deal with me. I mean, seriously. The established software industry still closes multimillion-dollar sales through a round of golf. What are ways you would increase access?"

— Ann Johnson, MS (BS '99, MS '00)



**Techer:** Studies show women-founded startups generate more revenue and provide a higher rate of return for investors. Why is it still so hard to get funding?

NH: Probably on average, women CEOs are overqualified, have more hustle, and have more soft skills because they have to meet a higher bar to be venture-backed. That could explain why they generate better returns.

From the VC perspective, there needs to be more women in the funding seats as well. I am super thrilled to have backed three female CEOs, and it's probably not an accident, right? I think female CEOs should target female VCs.

AJ: I certainly would have gone to a female VC if that had been an option in our field. The funding process we went through in 2014 turned my husband into a huge feminist because we would go into meetings and VCs would ignore me, the CEO, and talk directly to him, the chief technology officer, even about sales numbers and hiring practices.

JK: There is a mentorship-apprenticeship model that also needs to be considered. You have to go through a lot of challenges and failures when you are starting out and you need a support network to help you bounce back and keep pushing. Pretty much all of my mentors, and I have had great ones, have been men. I think it is about providing those networks to women and a new generation of founders.

**Techer:** What do you wish more women founders knew about the pitching process?

NH: There is a softer, more emotional component to getting a deal done. Male *and* female founders do not appreciate the human side. Yes, it is a financial transaction, but it is really a relationship-building exercise. The majority of CEOs that I take pitches from tend to go

on autopilot and it becomes a data presentation. It should be about building a conversation, making sure the audience is engaged, and eliciting questions so that there's some back and forth. These needed skills play into women's strengths.

AJ: When I was starting, there was this idea that the VC is a super-smart person who has this infinite amount of money and that they are going to decide whether you are worthy enough to get funded. In reality, they have made promises to their backers that they would fund a very particular type of company. Those companies must fit a very particular profile, and it can feel like rejection even if it is only a fit problem. Also, as a new technology, there is always the hope that they will truly understand the intricacies of your technology. However, as the Theranos [a defunct startup whose founder, Elizabeth Holmes, was convicted of fraud] debacle highlights, what funders really want to do is leave the intricacies to you. They often determine how much to trust your technical instincts by how much confidence you project, which is the opposite of how it works at Caltech.

JK: If you are engaging with VCs, you need to clean up the narrative of your value proposition. Understand the critical parameters of the problem you are trying to solve and clearly articulate how your efforts will directly address it.

**Techer:** The #MeToo movement has been one of the most catalyzing moments of our times. It also brought to light the lack of leadership and representation for women across a variety of fields. What progress have you noticed?

JK: There are more deals done now that include women, especially those from a younger generation. Over the next decade or so, these folks will make it to the partner

level and push more ideas of equality and opportunity forward. The current lack of representation reflects the tail end of a leaky pipeline, but I think there is positive evolution underway for the future.

**Techer:** Have there been any missed opportunities?

**NH:** There has been a well-intentioned but a little bit misguided focus on training women to be CEOs and board members. The focus should be much more on access and less on thinking women need this special finishing class. Access versus training is a subtle distinction but it is an important one.

**AJ:** The bigger New York VC firms wanted to go get cigars and talk about the deal with me. I mean, seriously. The established software industry still closes multimillion-dollar sales through a round of golf. What are ways you would increase access?

**NH:** It is having more limited partners [who are part owners of their VC firms] saying, “Hey, we want your investment team and your portfolio to reflect a healthy diversity.” There are a lot of modern guys and gals who don’t want to discriminate based on gender, they just want the best minds working on these really hard problems. It is actually a double win—people who are doing the right thing are also doing well.

**JK:** I do not think it is just the younger generation being better at it. There are more established folks who are becoming more aware of it, and it is tremendously helpful when they take action. I think VCs are well-positioned to create access and opportunity by identifying some great rising stars at some of their portfolio companies and nominating them for board positions or making sure they are considered in searches for executive positions. As Nancy said, access to an opportunity is more meaningful than taking another class.

**Techer:** Is there anything we are not doing now that needs to be done?

**JK:** As leaders in our respective fields, it is our role to help other folks work through that. Our company really makes it a point to encourage paternity leave. You just have to believe that doing it will help change expectations.

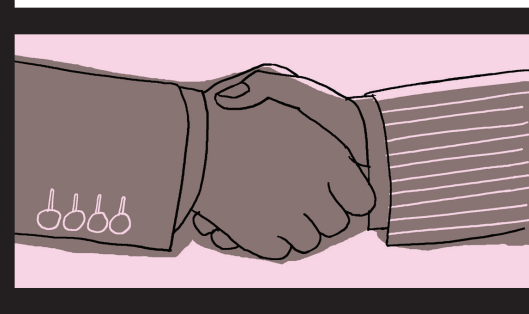
Each of us, as individuals, is doing what we can but I also think policy changes can help. California is requiring that boards of public companies have more diversity and everyone is having to react to that. And that moves the needle. Everything is on the table for getting to change.

**NH:** That is a good point, JJ. Scientists do not really like to think about politics. Maybe this is an opportunity for the technical space to build a bridge to policymakers. Maybe we should expand our mandate even more by talking to politicians.

**AJ:** Here’s another idea: My kids are in high school and gender fluidity is really strong in their generation. And I love it. Maybe let’s just make it not so binary. Let’s all mush it up and start over.

“There has been a well-intentioned but a little bit misguided focus on training women to be CEOs and board members. The focus should be much more on access and less on thinking women need this special finishing class.”

— Nancy Hong, PhD (BS ‘92)



“California is requiring that boards of public companies have more diversity and everyone is having to react to that. And that moves the needle.” —JJ Kang, PhD (PhD ‘15)



[ *Enriching* ]

# *It's in the* **DNA**

**At 23andMe, Jennifer Low MD, PhD (BS '90),  
helps put the precision into precision medicine**

**By Wayne Lewis • Photograph by Mitch Tobias**

# A

fter successfully working in cancer drug development since the turn of the millennium, **Jennifer Low, MD, PhD (BS '90)**, made what was a rare career move in 2015: She stepped away.

Low refocused on time with family and considered what she could do next to continue making a difference. Answers emerged in 2018 when she heard from Richard Scheller, PhD (PhD '80), with whom she'd worked at biotechnology company Genentech. He had launched a drug development arm for 23andMe, up until then known as a consumer genetic testing business, and he thought Low might be interested in joining.

The potential to improve human health by drawing insights from a massive trove of genomic data was irresistible. "It was incredibly inspiring," Low says. "The possibilities were so exciting, I wanted to be part of it."

Today, Low is the head of therapeutics development at 23andMe, where her team contributes to a pipeline of drug candidates targeting genetic markers associated with disease. More than 11.9 million customers have agreed to participate in research, powering the endeavor with the world's largest database of its kind, 20-plus times bigger than the largest public DNA database (the UK Biobank, with 500,000 participants). "If we were a telescope looking into the biological universe, we can see 20 times farther," she says.

As overall momentum grows to personalize health care, millions of genetic profiles let 23andMe view connections between genes and disease with unprecedented resolution. Low notes—important for privacy concerns—that neither her team nor 23andMe's pharmaceutical industry collaborators can access individual customer records. Rather, they work from reports containing complex DNA analyses pointing the way to potential drug targets. The data imparts speed. Just a little more than six years after the therapeutics division's

start, one 23andMe program has already begun a phase 1 clinical trial in partnership with GlaxoSmithKline, and another program was licensed to Almirall. A third, wholly owned by 23andMe, should begin trials in early 2022.

Low first pursued biomedical research during her days at the Institute, with mentorship from a researcher at the comprehensive cancer center City of Hope. Her Caltech experiences fueled self-belief. "On the one hand, you find your community at Caltech, but on the other hand, everybody seems so intimidatingly smart," Low says. "It's invigorating but also scary and humbling. Making it through gave me the confidence and optimism to believe that so much more is possible, and I don't have to be limited by what others say if I see a different way forward, whether it's designing a clinical trial or obtaining drug approval."

After graduating, she earned her MD and PhD at Georgetown University and completed a medical residency at UC Davis. Her drug development career took her to the National Cancer Institute, Genentech, and then to Loxo Oncology, where she was chief medical officer. By her break in 2015, she had shepherded several cancer drugs through clinical trials leading to approval of lifesaving medications at record speed.

That background prepared Low to head up 23andMe's sophisticated, one-of-a-kind clinical development enterprise—a challenge she relishes.

"I look at clinical trials as suites of individual experiments to answer broader questions about things like a drug's efficacy, dosing regimen, and side effects," she says. "It's important that we move quickly and efficiently, because every day counts, and we want to bring relief to suffering. And pulling all of it together is so incredibly exciting and interesting to me."

*"It's important that we move quickly and efficiently, because every day counts, and we want to bring relief to suffering. And pulling all of it together is so incredibly exciting and interesting to me."*





## New Departures: Techer Alumni Tours Reboot

Incredible sights await Techer travelers, such as ancient Nuremberg (Cruise the Heart of Europe) and the full solar eclipse (Totality Over Texas).

AS ANTHONY BOURDAIN once said, “Travel isn’t always pretty. It isn’t always comfortable... The journey changes you; it should change you. It leaves marks on your memory, on your consciousness, on your heart, and on your body. You take something with you. Hopefully, you leave something good behind.”

The Caltech Alumni Association is proud to announce the return of Techer Alumni Tours, group travel opportunities designed with world-class travel partners to spark the curiosity and imagination of Techers. Departures scheduled over the next few years will take Techers to see the engineering marvels that created Europe’s longest waterway, and a full solar eclipse with internationally recognized astronomer Douglas Duncan, PhD (BS ’73). Future tours include an exploration of how African Americans inspired the Parisian jazz scene, and a wildlife safari in southern Africa.

“After the last two years, it feels like the ideal time to relaunch Techer Alumni Tours,” said Ralph E. Amos, President and CEO of the Caltech Alumni Association. Creating trips that feed our desire to learn and explore, while keeping safety and well-being in mind,

were our biggest priorities.”

CAA has partnered with Duncan and Alumni Holidays International (AHI) to provide unique, intimate, group travel experiences that cater to Caltech alumni, curious to understand and explore. Travel partners take care of all the details so guests can spend more time learning about the world.

### **Cruise the Heart of Europe (October 13-26, 2022):**

Connecting waterways across Europe’s Great Divide was a dream of engineers for centuries. Engineers accomplished the feat when an uninterrupted waterway spanning the continent opened in the 1990s. Experience the heart of Europe along the great rivers that shaped its borders and traditions. Unpack just once and enjoy an intimate look at four countries, three storied rivers, and 12 cities on one exclusively chartered, first-class ship. Tour medieval Germany; explore Bratislava and Budapest; and marvel at the incredible beauty of the Rhine Gorge and Wachau Valley.

**Totality Over Texas (April 6-9, 2024):** Head to Austin, Texas, to experience a total solar eclipse, led by University of Colorado astronomer Douglas Duncan, PhD (BS '73). Duncan, a well-known popularizer of astronomy, has spent decades modernizing planetariums. During Duncan's tenure as director of Fiske Planetarium at the University of Colorado Boulder from 2002 to 2018, the facility became the most technically advanced planetarium in the US. Duncan has worked with Cain Travel to create a highly rated experience that includes a fun and accessible itinerary and exclusive guest speakers. Don't miss this opportunity—the next US total eclipse isn't until 2045.

**The African-American Experience in Paris (TBD 2023):** Enjoy a first-class stay at the Les Jardins du Marais as you tour Paris with AHI, discovering how the African-American expatriate community influenced Paris. Explore where jazz musicians created their own Harlem in the 1920s, followed by an evening at a jazz club. Taste the local delicacies on a gastronomic walking tour. Enjoy the most beautiful Parisian landmarks from a cruise on the Seine.

**Journey to Southern Africa (TBD):** Experience the thrill of the African safari and marvel at incredible wildlife in South Africa, Botswana, and Zimbabwe, all while enjoying luxury and tailor-made accommodations. From the cascades of Victoria Falls, to the wonder of Rovos Rail, this journey will show you it all. Immerse yourself in nature and the beauty of southern Africa's majestic landscape.

**For more information and to reserve your spot on a Techer Alumni Tour, visit [alumni.caltech.edu/travel](https://alumni.caltech.edu/travel).**

## A Retrofuturistic Approach to Quantum Physics with Nicole Yunger Halpern

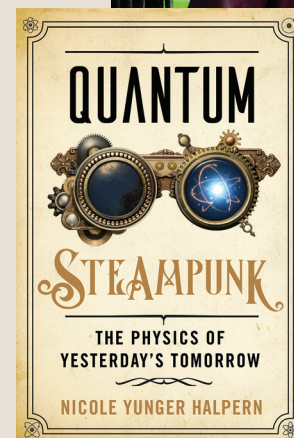
In the revolutionary new book *Quantum Steampunk: The Physics of Yesterday's Tomorrow*, which will be available on March 22, Nicole Yunger Halpern, PhD (PhD '18), delivers a “steampunk adventure guide to how mind-blowing quantum physics is transforming our understanding of information and energy.”

Yunger Halpern is currently employed as a theoretical physicist at the National Institute of Science and Technology and a QuICS Fellow at the Joint Center for Quantum Information and Computer Science at the University of Maryland (QuICS). Her doctoral dissertation in physics at Caltech won the Ilya Prigogine Prize for Thermodynamics.

“Caltech, especially my PhD advisor, John Preskill, offered me the freedom and support to develop my quantum-steampunk research program,” says Yunger Halpern. During this time, Yunger Halpern adopted the habit of interweaving science with literature, art, and history as she began writing for *Quantum Frontiers*, a blog by the Institute of Quantum Information and Matter at Caltech, posting once a month and unintentionally writing what would become the beginnings of her book. “Without Caltech, I might not have a story to tell. The research program that I expanded during my postdoctoral years forms much of the material in the book,” says Yunger Halpern.

So, in 2020, when Johns Hopkins University Press invited Yunger Halpern to write a book for the general public after reading her existing discussions on quantum steampunk, she already had a foundation to work from. “I mulled over the book possibility on many a pandemic-exercise walk, and I discovered that I did have a substantial story to tell about quantum steampunk.”

In the book, readers follow the adventures of a rag-tag steampunk crew on trains, dirigibles, and automobiles. They explore questions such as, “Can quantum physics revolutionize engines?” and “What deeper secrets can quantum information reveal about the trajectory of time?”



Pre-order *Quantum Steampunk: The Physics of Yesterday's Tomorrow*  
<https://jhupbooks.press.jhu.edu/title/quantum-steampunk>



# SCHEMA

*From the Executive Director of the Caltech Alumni Association*



RALPH E. AMOS  
*Executive Director,  
Caltech Alumni Association*

One year ago in this space, I asked you kind of a personal question. How does your Caltech degree translate into living your best life? Not just a job, but the right job. Not just an idea but the relationships to help bring it to life. Not just relationships, but family.

And as you pondered, I shared that while more than 25,000 Caltech graduates continue to produce at the leading edge of the most important work in the world—protecting the planet, curing disease, forwarding science for the benefit of all—CAA’s leadership is focusing on you. How are you doing? Are you satisfied in your work? Do you want to change what you do? Or maybe find people who can help you do it better? How about friends? Relationships? Family? Are you balanced? I know Techers, so I know you work hard. But are you happy in your profession and your life?

It’s one year later now, and despite all the challenges present in the world today, CAA is persistently working to provide a space for the human element, a space for alumni around the world to come together to foster personal and professional relationships based on the unique experiences, skills, and needs Techers share. Caltech Alumni continues to progress and succeed. Through all the challenges and rapid, global societal shifts, CAA is growing and thriving. Here are just a few accomplishments Caltech and CAA have made for Techers over the past year:

- *Techer* Magazine redesigned
- Caltech Alumni website relaunched
- Alumni Portal launched ([portal.alumni.caltech.edu](http://portal.alumni.caltech.edu))
- Oral History Book, more than 1,900 Techers contributed stories
- Black Alumni Council launched
- Increased communications, via web, email and social media
- Strategic Plan adopted, based on input from alumni
- CAA staff vacancies filled (while doing all the above during the pandemic... proud of the staff, too)

And while we are committed to creating as many in-person experiences, virtual events have created new accessibility:

- Seminar Day 2021 saw 2,115 people participate over four sessions (You will join us on May 14, won’t you?)

- Online events and lectures, including the Match Madness chess tourney, Diversity-Equity-Inclusion lecture on Challenges facing Math & Physics, and more.
- Distinguished Alumni Conversations were expanded and accessible from anywhere in the world. In-depth interviews allowed you to get to know the 2021 Distinguished Alumni.
- Board and Annual meetings adapted to online environments, and the Board is working to provide for more virtual participation. Finally, alumni played an invaluable role in supporting Caltech’s Break Through Campaign, which closed this fall, raising a record-shattering \$3.4 billion, laying the foundation for Caltech’s future successes. Alumni contributed \$778 million, and significant funding has been designated for Financial Aid for Future Techers (\$416 million), and for Faculty and Staff (\$32 million). As Caltech sets its sights on the next goals, we are grateful to know alumni continue to support the mission.

We all benefit in many ways from the power of community. Caltech Alumni works for you, the humans behind the important and challenging work of science, technology, and engineering. We are here to help you to work, play, and live well.

**I hope you will join in,**

A handwritten signature in black ink that reads "Ralph Amos". The signature is fluid and cursive.

RALPH E. AMOS  
*Executive Director, Caltech Alumni Association*

# ENDOWED SUPPORT ZONE:

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[ *The Stack* ]

Endowed positions are the highest academic honors universities bestow on faculty. Signifying Caltech's commitment to championing professors' most inspired ideas, *Break Through: The Caltech Campaign* raised \$482 million for 24 leadership chairs, 46 professorships, and 29 early-career professorships.

Unscramble letters to reveal the names of the 12 extraordinary scientists and engineers who hold the titles below.

EARTHY RAW ART

Otis Booth Leadership Chair,  
Division of Engineering and Applied Science

MAJOR BEAM PLANK

David Baltimore Professor  
of Biology and Bioengineering

SHEEP INDICATOR

Theodore Y. Wu Professor of  
Environmental Science and Engineering

HONORARIA FINS

Kent and Joyce Kresa Leadership Chair,  
Division of Physics, Mathematics and Astronomy

MEOW BRINK

Terence D. Barr Leadership Chair, Center for  
Comparative Planetary Evolution

ADORED JEANS

Cecil and Sally Drinkward Leadership Chair,  
Department of Mechanical and Civil Engineering

EARLIER JUG

Fletcher Jones Foundation Director  
of the Kavli Nanoscience Institute

ABANDON ROAD FERN

Bren Professor of Theoretical Physics

CERAMIC LONER

T & C Chen Center for Social  
and Decision Neuroscience Leadership Chair

SOLARIUM AIR PUP

Shang-Yi Ch'en Professor of Physics

ANGER CHANT

Bren Professor of Chemistry

ACAI ROAD HAIR

G. Bradford Jones Professor of  
Mechanical Engineering and Applied Physics



Jose Andrade



Harry Atwater



Pamela Bjorkman



Fernando Brandao



Mike Brown



Colin Camerer



Garnet Chan



Chiara Daraio



Julia Greer



Fiona Harrison



Tapio Schneider



Maria Spiropulu

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# IN MEMORIAM

*We mourn the loss of the following members of our Caltech alumni community*

## 1942

**Arnold Grossberg** (BS '42)

## 1944

**Phillip Adams** (BS '44)  
**P.H. Leiderman** (CERT '44, MS '49)  
**John McQuate** (MS '44)  
**Raymond Palmer** (BS '44,  
ENG '48)  
**John Sorenson** (CERT '44, MS '52)

## 1946

**Robert Frohman** (BS '46)  
**Howard Jessen** (BS '46)

## 1947

**Eric Woodbury** (BS '47, PhD '51)

## 1948

**Kenneth Tang** (BS '48)

## 1949

**Francis Foster** (ENG '49)  
**Stanley Pace** (MS '49),  
1987 Distinguished Alumni Award

## 1950

**Ralph Stone** (BS '50)

## 1951

**Michael Basin** (BS '51, MS '52,  
PhD '54)  
**Fred Eisen** (BS '51)  
**John Fee** (BS '51)  
**Francis Haskins** (PhD '51)  
**Peter Mason** (BS '51, MS '52,  
PhD '62)  
**San-Chiun Shen, DAA** (PhD '51)  
1996 Distinguished Alumni Award  
**John Walter** (BS '51)

## 1952

**Boyd Israelsen** (BS '52, MS '53)  
**William Wise** (BS '52)

## 1953

**Robert Smith** (BS '53)  
**Edwin Stofel** (BS '53, MS '54,  
PhD '62)  
**George Stranahan** (BS '53)

## 1954

**John Abbott** (BS '54)  
**John Billings** (BS '54)  
**George Corporales** (BS '54)  
**James Heppner** (MS '50, PhD '54)  
**John Lloyd** (BS '54, MS '55)  
**Hugh Taylor** (BS '54, PhD '59)

## 1955

**Edwin Furshpan** (PhD '55),  
2001 Distinguished Alumni Award  
**George Gleghorn** (MS '48,  
PhD '55)  
**Joseph Mandell** (PhD '55)  
**Ralph Miles** (BS '55, MS '60,  
PhD '63)

## 1956

**Mark Carrigan** (MS '56)  
**Kenneth Laws** (BS '56)

## 1957

**Gerard Grau** (PhD '57)  
**C. Allen Wortley** (MS '57)

## 1958

**Richard Neville** (BS '58, MS '59,  
PhD '71)  
**Donald Stern** (BS '58)  
**George Wallerstein** (MS '54,  
PhD '58)

## 1959

**Gordon Baird** (BS '59, MS '60)  
**Ritchie Coryell** (MS '59)  
**Mert Cramer** (BS '59, MS '60)  
**Thomas Gordon** (MS '56, PhD '59)  
**Noboru Sueoka** (PhD '59)  
**Terry Teigen** (BS '59, MS '60)

## 1960

**Melvin Neville** (BS '60)  
**Stephen Sawochka** (MS '60)

## 1961

**Ernest Janzen** (BS '61)

## 1962

**Reginald Clemens** (BS '62)  
**Harold Kurtz** (BS '62, MS '65)  
**Kaye Lathrop** (MS '59, PhD '62)  
**George Root** (BS '62, MS '63)  
**Edward Seppi** (PhD '62)  
**William Straka** (BS '62)

## 1963

**John Hosack** (BS '63)  
**J. Richard Wrobel** (ENG '63)

## 1964

**Mason Williams** (BS '64)  
**Alvin Young** (BS '64)

## 1965

**Philip Austin** (MS '65)  
**Charles Michener** (BS '65, MS '66)  
**Ben Saltzer** (BS '65)

## 1966

**Ron Constable** (BS '66)

## 1967

**Gary Christoph** (BS '67)  
**Janet Jones** (PhD '67)  
**James Strauss** (PhD '67)

## 1968

**William Bauer** (BS '61, PhD '68)  
**Richard Bild** (BS '68)

## 1969

**Peter Lyons** (PhD '69)  
**Alfred Potter** (BS '69)

## 1970

**Narendra Gupta** (MS '70),  
2004 Distinguished Alumni Award

## 1971

**Asher Sigal** (PhD '71)  
**Charles Willus** (PhD '71)

## 1972

**Mary Baker** (MS '67, PhD '72),  
2014 Distinguished Alumni Award  
**Hong Lim** (PhD '72)

## 1973

**David Goff** (MS '73)

## 1974

**James Kaufeld** (MS '74)  
**Darrell Peterson** (BS '74)

## 1975

**Claude Anderson** (BS '75)

## 1976

**Tullis Onstott** (BS '76)

## 1977

**Franklin Ho** (MS '77)

## 1979

**Judith Allison** (PhD '79)

## 1981

**Luis Bernal** (PhD '81)

## 1983

**John Dodge** (PhD '83)

## 1985

**Charles Barrett** (BS '85)

## 1986

**David Hough** (MS '84, PhD '86)

## 1993

**Richard Tsuyuki** (MS '91,  
ENG '93)

## 1995

**Jeffrey Goldsmith** (MS '95)

## 1999

**Kurt Schenk** (MS '94, PhD '99)

## 2008

**Min Chen** (MS '06, PhD '08)

## 2010

**Jim Swan** (MS '07, PhD '10)

## 2011

**John Phillips** (PhD '11)

**TO READ OR SUBMIT OBITUARIES:** [WWW.ALUMNI.CALTECH.EDU/IN-MEMORIAM](http://WWW.ALUMNI.CALTECH.EDU/IN-MEMORIAM)



[ *From the Archives* ]

## Delta Wing Test Model

William C. House, BS (BS '40), invented this Delta Wing test model with a wooden case. The model was donated by House's daughters, Binnie Grant and Wendy Bennett. It was repaired and refurbished in 1992. The model would have been used in Caltech's wind tunnel, a historic 10-foot wind tunnel that was used to test many of the warplanes that helped the Allies win World War II.

House was active with Caltech and served on the Caltech Alumni Association Board of Directors. He retired as Vice President and General Manager of the Surface Effects Division of Aerojet-General Corporation. His career included positions at Northrup Aircraft Company, U.S. Naval Engineering Experimental Station, Project SQUID at Princeton University, and General Tire and Rubber of California. He also served as Director of the Nuclear Engine for Rocket Vehicle Application, NASA.

**ID #:** ST-EN-02

**DONORS:** BINNIE GRANT  
AND WENDY BENNETT,  
DAUGHTERS OF WILLIAM C. HOUSE

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