

# Inspiration: Young Scientists Reflect

Albert and Mary Lasker Foundation  
Diamonstein-Spielvogel Foundation

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# On the Shoulders of Scientific Giants

The mission of the Lasker Foundation is to advance health by accelerating support for medical research. As the Covid-19 pandemic has so devastatingly highlighted, investing in science and using research insights to guide public health is central to secure well-being for all.

A key component of scientific investment is support for young scientists who represent our hope for the future. At the Lasker Foundation, we are dedicated to nurturing rising scientific leaders.

To give voice to the next generation of scientists, the Lasker Foundation sponsors an annual essay contest that explores important questions in biology and medicine and the role of biomedical research in our society today. In 2020, we asked participants to describe how a notable scientist had inspired them—through the scientist’s personality, life experiences and/or scientific contributions. We received more than 300 contributions from trainees around the globe. An esteemed jury of Lasker directors was charged with the challenging task of selecting the winners. They ultimately chose the eleven outstanding exemplars which are contained in this book.

These essays reflect the altruism of senior scientists as they guide younger men and women in the field and the power of mentorship in helping trainees define their endeavors in science. There is no “one



*“If you think research is expensive . . .  
Try disease”*

size fits all” model to follow. These essays illustrate the diversity of paths, challenges, and successes linking one generation to the next. You will read about the myriad ways in which inspiration is given—by role modeling, by scientific accomplishment, or by personal encounters. You will learn how these young scientists truly stand on the “shoulders of giants.”

This book is dedicated to the extraordinary young scientists who have so eloquently communicated their appreciation for the wonder of science and to those who inspired them on their scientific journey.

The Lasker Foundation is honored to partner with the Diamonstein-Spielvogel Foundation to share these essays. We are grateful for their vision and support in making this book possible.

# PEN America/ Diamonstein-Spielvogel Award

PEN America stands at the intersection of literature and human rights to protect free expression in the United States and worldwide. Since 1963, the PEN America Literary Awards have honored outstanding voices in literature. With the help of our partners, the program confers over 20 distinct awards and grants each year, awarding nearly \$350,000 to writers and translators.



## **The Art of the Essay**

Close to the heart of the program is the PEN/Diamonstein-Spielvogel Award for the Art of the Essay, an annual award which honors a seasoned writer whose collection of essays is an expansion on their exceptional corpus of work. The award has been given since 1990 and the awardees include philosophers, naturalists, and cultural critics, such as Ursula K. Le Guin, James Wolcott, Ta-Nehisi Coates, Marilynne Robinson, Annie Dillard, Stanley Crouch, Martha Nussbaum, David Quammen, Adam Hochschild, Cynthia Ozick, William H. Gass, and Bernard Knox, among many other distinguished writers.

Central to the award's success are the panels of notable and charitable judges. The PEN America Literary Awards are among the most prestigious in the literary world, thanks in large part to the remarkable critical acumen and aesthetic sensibilities of the judges who generously donate their time to the process. Recent judges for the PEN/Diamonstein-Spielvogel Award for the Art of the Essay include Jelani Cobb, Daniel Menaker, Paul Reyes, Eula Biss, Kiese Laymon, Vijay Seshadri, and Luc Sante.

Each year, the judging panel takes into account the literary impact

of the submitted collections and, through serious deliberation, forms a Longlist of ten collections and a Finalist list of five collections. The winning essayist and collection are recognized with a live winner announcement and conferral at the PEN America Literary Awards Ceremony, held in New York City.

PEN America Member, former PEN America Trustee, and author, advocate and preservationist Barbaralee Diamonstein-Spielvogel founded the award along with her husband, Carl Spielvogel, a former *New York Times* columnist who continued on to a highly distinguished career in business and diplomacy. The PEN/Diamonstein-Spielvogel Award for the Art of the Essay was founded to conserve and celebrate the dignity and esteem that the essay form imparts to literature.

The Diamonstein-Spielvogel Foundation welcomes this collaboration with the Albert and Mary Lasker Foundation and honors their tradition of excellence in all they pursue.

For this collaboration with the Lasker Foundation, Barbaralee Diamonstein-Spielvogel commissioned writer Rivka Galchen to contribute an essay resonant with the spirit of these young scientists writing about those who have inspired them. Galchen received her MD from the Mount Sinai School of Medicine, is a professor at the School of the Arts at Columbia University, and writes often about science.



# Rivka Galchen

## A Little Wander

This year marks the 30th anniversary of The PEN Diamonstein-Spielvogel Award for the Art of the Essay. How marvelous to celebrate this in a collaboration with the Lasker Foundation's Essay Contest, which supports young scientists. The author and preservationist Barbaralee Diamonstein-Spielvogel has likened the form of the essay to drawing, noting how closely a drawing follows an artist's thought. The artist Paul Klee has described drawing as a line taking a walk. What kind of wander does a word take? How does this connect to the scientific method so central to the scientists we meet in these essays as both authors and subjects?



The word essay comes to us from the French term *essayer*—to try. We also find an echo of *essayer* in the modern *essay* (a term whose kinship to the scientific tradition is even more apparent.) The great 16th century humanist Michel de Montaigne developed the *essay* form to follow out his thoughts to wherever they led him, however counterintuitive or unexpected the geography of thinking might be. This created a space for heterodox insights, for felicitous discoveries, even for contradiction—a prompt for further thinking. In his essay, “Of a Monstrous Child,” Montaigne moves from describing seeing an infant with one head and two connected bodies, to observing, over four hundred years ago, that “We call contrary to nature what is contrary to custom; nothing is ever anything but according to nature, whatever it may be.” In his writing, Montaigne was thinking like the

finest scientists, and all this years before Francis Bacon had articulated the scientific method.

Many of the scientists discussed in these prize-winning essays are noted for having been willing to follow an unpopular or obscure idea, and to stand by their evidence and reason, even when encountering hostile or indifferent audiences. The PhD candidate Lisa Learman writes of geneticist Barbara McClintock's discovery of transposons, even as her "feel for the organism" approach was dismissed at the time. Learman notes how McClintock avoided "seeking to prove pre-constructed models" and instead showed what could be learned by taking outlying data seriously, and letting her experiments lead her, rather than vice-versa. Seeing a similar spirit, post-doctoral fellow Dr. Olivia Lucero writes about the cancer researcher, Dr. Mary-Claire King, who was met with skepticism when she hypothesized thirty years ago that permutations in a single gene could lead to cancer; Dr. King's work led to the identification of the BRCA1 gene mutation. Lucero quotes Dr. King: "I have come to realize that there was real freedom in being ignored, that you could ask huge questions, because nobody noticed."

Medical student Samantha Wong, in her essay on Dr. Anthony Fauci, writes that she had for a time considered a career in journalism, noting how journalism shares a goal with clinical research: seeking the truth. The Lasker essayists connect to a long tradition (including Montaigne!) of scientists and thinkers finding ways to communicate across disciplines. Research fellow Dr. Avash Das writes of physician-scientists as "Rosetta stones" in the ways they "bridge the gap between the languages of clinical medicine and biomedical research." These essays included here further that process of translation, as they bring us the stories of scientists and physicians both more and less well-known.

Each essay redirects our attention. Dr. Kwabena Kusi-Mensah writes of how the Nobel Prize winner Tu YouYou approached developing a new malaria treatment: she applied her modern pharmaceutical training to treatments she read about in a 1,600 year old text. Kusi-Mensah also describes the intellectual creativity of Dr. Harold Freeman, who wrote the seminal paper, "Cancer in the Economically

Disadvantaged,” which expanded the parameters for understanding disease.

The open-ended thinking and creativity of subjects and writers informs and develops their ethics as well—another resonance between the scientific and essayistic methods. The pediatric resident Dr. Laurel Gabler writes about her time with the physician-activist couple, Abhay and Rani Bang, whose integrated work in rural India connects the scientific method to the social good; Gabler charts how her own goals for similar work have shifted and changed through her experiences in India, Nepal and Tanzania. MD-PhD candidate Safwan Elkhatib looks at our present pandemic through the past polio pandemic. Elkhatib draws attention to how the greater good was served when Jonas Salk and Albert Bruce Sabin both decided not to patent their vaccines—they felt the patent should belong to the people. “Could you patent the sun?” Salk famously said, following out the logic of his thinking.

The line that goes for a walk: many of these young scientist writers have a personal experience from which their thinking and career-path originates. The illness of a parent, of a neighbor, of a teacher—these experiences alter us. Instead of standing still in sadness or worry, we see in these essays how these emotions are followed out: PhD Candidate Emily Ashkin writes how she became dedicated to mentoring young scientists; Dr. Das furthers the collaborative goals of his laboratory that studies lipids in metabolic diseases; MD-PhD candidate David Basta writes movingly of the mentor from down the hall; PhD candidate Hannah Mason writes of the stability and meaning found in a mentor whose work connects to her past and present; and medical trainee Dr. William Dunn finds inspiration at two different critical moments in his life, from the writings of Stephen Hawking.

Montaigne worked as a magistrate and statesman for many years before he retreated to his home in the countryside and turned to his essays, at age thirty-eight, a late age for a Frenchman of the 16th century. His best friend and intellectual companion, Étienne de la Boétie, had died. In some sense, Montaigne’s essays are conversations he was no longer able to have with his dear friend. When I read Montaigne, I feel in his work the gentle intensity of his genuinely wanting to com-

municate, to make contact, to be in touch. I suspect that feeling is why Montaigne is among the writers and thinkers who most inspire me—he's companionable, a line of thinking that invites you to come along for the walk.

The essay is a form that naturally replicates itself. One rarely speaks of an essay, but of a series of essays—the sense of trying something out again and again, under different conditions, following different premises. The thinking in essays changes over time; refinements are made; earlier outlooks get altered; even the present tense begins to look different, as the past reminds us to change perspective. Something hopeful resides in the essay, the assay, the attempt. Just as the scientific method is fundamentally optimistic, in that it allows room for being wrong, for failing, and for thinking it all through again. These essays on science remind us to remain open and curious, to invite the unexpected—and to keep thinking.

**Rivka Galchen** grew up in Norman, Oklahoma, the daughter of Israeli immigrants. Her father was a professor of meteorology at the University of Oklahoma, and her mother worked as a computer programmer at the National Severe Storms Laboratory. Galchen received her BA from Princeton University and her M.D. from the Mount Sinai School of Medicine, before going on to a career as a prize-winning fiction writer and journalist. Her work appears frequently in *The New Yorker*, *The London Review of Books* and *The New York Times*. She writes often about science and her forthcoming novel is about the witch trial of the mother of the astronomer Johannes Kepler.

# Emily Ashkin

Stanford University School of Medicine

## J. Michael Bishop: A Scientist for the Next Generation

My legs were starting to ache from standing by my research poster for nearly ten hours. I was anxiously awaiting the possibility to speak to my biggest role model, J. Michael Bishop. I heard rumors from countless other students who had previously participated in Intel International Science and Engineering Fair (ISEF) that the Nobel Laureate walks around from poster to poster to speak with students during the Public Showcase Day. However, they said he usually only goes up to posters of students who scored highest the previous day of judging. I did not believe that I had done well during the judging sessions and was disheartened at the thought that I might not have the opportunity to meet my scientific hero.



At the age of eleven, I first learned Dr. Bishop's story. This was around the same time my mom had been diagnosed with cancer, and I had made it my life goal to study her disease. However, I had no means to pursue a career in science. As a Latina, with neither of my parents as scientists, I had no one to pave a path for me to follow.

With encouragement from my mom's doctors, I started learning the basics and foundations of cancer biology. And that was where I came across Dr. Bishop's paradigm-shifting scientific discoveries.

However, very quickly, I learned that Dr. Bishop's contributions to science extended far beyond his discoveries in the lab. Every year, Dr. Bishop serves as a mentor and speaks as part of a panel at the ISEF poster session. He speaks about his childhood and how he had hardly been exposed to science. Throughout his college education, he never imagined himself as a scientist. He had even been denied entry into countless labs due to a lack of prior experience. He had an ambition to become a scientist but lacked the guidance to visualize his future career. Over time, however, he developed relationships with mentors who believed in him. More importantly, he learned how to believe in himself.

I found inspiration in Dr. Bishop's goal of becoming a scientist, along with his willingness to be open and vulnerable, often giving talks about experiencing self-doubt. Dr. Bishop is a role model for anyone—like me—who comes from an unconventional background to persevere and work through self-doubt to pursue a career in science. After learning Dr. Bishop's story, I realized that there is no exact mold that curates the development of a scientist, and I became more determined to continue studying cancer biology. I also became determined to keep sharing his message with the generations of scientists who will follow me.

All of this was weighing heavily on my mind as I looked up for a moment and realized that Dr. Bishop was inches away from the aisle of posters nearest to mine. At fifteen years old, I ran up to my hero—asking him to come to my poster even if I wasn't on his list. He was kind enough to spend almost an hour inquiring about my research and ultimately my goal to pursue a PhD. I made a point to convey to him my self-doubt given my background and how learning about his story of discovering that science was right for him gave me direction. Dr. Bishop looked me in the eyes and made it clear to me that my background was a strength, something that I hold onto to this day.

After this experience, I continue to draw inspiration from him throughout my scientific journey, especially when I face obstacles, such as difficult classes or failed experiments. Seven years after meeting Dr. Bishop, I currently have the privilege of pursuing a PhD in Cancer Biology. My path continues to mirror his, as I find guidance in how he handled the uncertainty he faced but also the value he places

on mentoring young minds. Like Dr. Bishop, I am dedicated to mentoring high school and college students.

Throughout my career, I have mentored high school students from underrepresented backgrounds through their science experiments and projects. I have found value in developing leadership workshops for younger undergraduate students to inspire introspection and career goal-setting. I have even served as a judge for some of the same science competitions I participated in during high school.

By teaching and guiding students, and openly sharing my own story just as Dr. Bishop has, I aspire to keep paving new paths and to become a role model for other young minds, inspiring them to turn to science and critical thinking to solve problems affecting themselves, their families, and their communities.

**Emily Ashkin** is a PhD candidate in the Cancer Biology program at the Stanford University School of Medicine. She was born in Charlotte, North Carolina, to an Argentine Jewish family and earned a BS in Biochemistry and Cell Biology at Rice University in Houston, Texas. Her dissertation research in Monte Winslow's lab focuses on understanding the impact of the cohesin complex on tumorigenesis and the tumor immune microenvironment in lung cancer. Emily prioritizes volunteering with programs that emphasize diversity and inclusion in STEM. Outside of science, Emily enjoys hiking and painting.

# David Basta

USC–Caltech MD-PhD Program,  
Keck School of Medicine of USC

## For the Love of Science

“So, when are you going to graduate?”

It’s the PhD student’s most dreaded question. I tended to oscillate between the classic answers: “Not sure yet,” “We’ll see,” and “Maybe in a year?” But as I neared the finish line of my PhD, I couldn’t tell whether the restless excitement I felt was due to a growing sense of personal accomplishment or because I could soon expunge that question from my conscious experience.



As I sat at my bench at 11 p.m. on a Friday night planning out my experiments, I realized that I needed technical advice to proceed. My defense was in two weeks, which meant these experiments had to start as soon as possible. Whom could I ask for advice at this hour? Fortunately, the office of the renowned biochemist Alexander Varshavsky was right down the hall. Based on years of coming into lab at all hours of the night and invariably seeing his office door open and his lights on, I figured the odds were pretty good I could find him there now.

I was first introduced to Alex through his course on *Methods in Biological Research*. There were only three students enrolled in that course, yet our lectures were held in one of the largest auditoriums on campus. Despite the incongruous setting, it was among the most enjoyable courses in my graduate career. As I sat with my two classmates in that spacious lecture hall, I quickly learned that Alex was



equal parts brilliant scientist and captivating storyteller. His ability to seamlessly weave together both the science and social politics surrounding revolutionary scientific discoveries made for a delightful educational experience.

Alex is the epitome of a man possessed by his work—a man driven by a passion for discovery. This is a man whom David Baltimore helped smuggle out of the Soviet Union so that he could fully spread his scientific wings. Despite having the means to live lavishly, Alex chooses to live in an unassuming apartment complex less than a block from the Institute. Part of me believes that he would happily live in the lab if the building codes allowed it. Truthfully, I don't know whether it's the pursuit of scientific glory that drives him or an unwavering fascination with the wonder and complexity of the natural world. My guess is that it's a combination of both. Regardless of his motivations, however, his dedication to the craft has served as a source of inspiration throughout my own scientific journey.

As I approached his office that Friday night, I was relieved to find him at his desk. “Alex, I need some advice,” I stated bluntly (with Alex, there is never a need for superfluous greetings). I explained to him my experimental challenges, and, naturally, he gave me sound advice on how to proceed. As we talked, our conversation drifted to more interesting subjects. He shared with me his developing ideas on the molecular basis for sleep. They were fascinating. Somehow I felt brazen enough to challenge him: “Alex, is it possible your hypotheses are a little far-fetched?”

“It's possible,” he replied. “I'm happy to place a standing wager on them. How about a thousand dollars?”

I immediately backed down. There was no way I was betting against Alexander Varshavsky on matters of science. Plus, a thousand dollars was Lasker Award–winning scientist money, not graduate-student money. Still, I reveled in the impromptu moment we were sharing. We chatted about my plans after graduation and about projects on which we could collaborate. I checked my phone for the time. It was 2 a.m.

“Sorry, Alex, but I need to get these experiments started. Thank you for the advice and the lovely chat.”

“No problem, David, go finish your thesis. But don’t forget that this is all just a formality. The PhD really doesn’t matter. What matters is the science.”

His words resonated with me. In a moment of introspection, I realized that while I was pleased to be on the cusp of earning my PhD, I was not doing it for fame or fortune. The prestige of having those letters behind my name never served as motivation. All the late nights working in the lab, the failed experiments, the countless hours spent thinking about my research—they were done out of passion, not obligation. I was doing science for the love of it, the way Alex did science for the love of it. What a privilege that was.

“So, when are you going to graduate?” Thanks to Alex, I finally learned that the correct answer was, “Who cares? I’m doing what I love!”

**David Basta** is a fourth-year medical student in the USC–Caltech MD-PhD Program at the Keck School of Medicine of the University of Southern California. He received his PhD in Biology and Biological Engineering at the California Institute of Technology in May 2019, where he conducted his thesis work in the lab of Dianne K. Newman, studying the genetics and physiology of bacterial growth arrest. Following medical school, David plans to pursue a residency that prioritizes his continued development as a physician-scientist.

# Avash Das

University of Texas Southwestern Medical Center

## Michael Brown and Joseph Goldstein: Tribute to My Inspiration

The strength of scientists lies in touching the lives of millions through their inventions as well as encouraging young minds to follow their lead. I was a teenager when I first came across the scientific contributions of Dr. Michael Brown and Dr. Joseph Goldstein and have always considered them as an inseparable scientific pair who heavily influenced my academic career and personal life.



Growing up in India in an era of burgeoning globalization, I have witnessed the increasing burden of cardiovascular disease in a developing nation. Just like the legend of Kisa Gotami, who was asked by Buddha to bring a mustard seed from a household that has not witnessed death in an attempt to instill the idea of death as an inevitability, it would have been equally difficult to find a family that has not witnessed cardiovascular events in its near and dear ones. On a personal note, I had also lost my high school science teacher, a man in his early 40s, to myocardial infarction. Despite his elevated blood low density lipoprotein cholesterol (LDL-c), he was noncompliant on his statin medication. I have always nurtured a desire to become a preventive cardiologist, ever since. Statins have become the cornerstone of preventive cardiology. Not surprisingly, the discovery of statins, based on the seminal scientific work of Brown and Goldstein, caught my imagination at a very tender age.

Physician-scientists play a role analogous to that of the Rosetta Stone: they help bridge the gap in understanding and communication between the two interconnected ‘languages’ of clinical medicine and biomedical research. Brown and Goldstein are epitomized as model physician-scientists. Their discoveries concerning the molecular basis of familial hypercholesterolemia, a single gene disorder of cholesterol metabolism, elucidated the basic biology of cholesterol transport, and provided a prime example of translational research, years before the term was actually coined. My enthusiasm for pursuing a career as a physician-scientist during my medical school training was largely based on curiosity that developed from their work on receptor-mediated endocytosis in our biochemistry and physiology textbooks. Taking confidence from the fact that Brown and Goldstein did not undergo a formal graduate school training to achieve their scientific goals, I accepted the position of postdoctoral research fellow in the Division of Cardiology in Massachusetts General Hospital (MGH) after the completion of my medical school training despite having minimal prior laboratory experience.

Mentorship is a key component of scientific and academic development. I believe that a strong mentor-mentee relationship helps foster a scientific ecosystem that can drive the scientific wheel forward. At MGH I investigated the role of extracellular vesicles in cardiac biology. Coincidentally, one of the pioneers in the area of vesicle biology and trafficking is Dr. Thomas Sudhof, who was a post-doctoral trainee in Brown and Goldstein’s lab. Contemporary studies demonstrating the success of PCSK9 inhibitors in reducing LDL-c and improving cardiovascular outcomes were being reported and the genetic basis of that discovery was formulated by former trainees in Brown and Goldstein’s lab, Dr. Helen Hobbs and Dr. Jonathan Cohen.

Convinced that the Department of Molecular Genetics at the University of Texas Southwestern Medical Center (UTSW) chaired by Brown and Goldstein would provide an enviable environment, I applied to the graduate program at UT Southwestern. I was fortunate enough to be accepted, and I am currently a graduate student in the Hobbs-Cohen lab. In a sense, life has come full circle. Observing Dr. Brown and Dr. Goldstein, who inspired me to follow the path that I have undertaken, from closer quarters in department seminars and

across the hallway, I feel equally humbled and privileged at the same time.

Finally, I would also highlight the profound effects of the scientific partnership of Brown and Goldstein had in my personal and professional life. Coming from a predominantly collectivist culture, I have struggled to absorb the individualistic nature of modern American society. While academic clinical training fosters collaboration and brotherhood among its trainees, few such avenues exist in training of academic science. Naturally, these dilemmas transcended the boundaries of my personal and professional life. Role models serve to allay my anxiety and mental conundrum by providing a working module. The lasting scientific partnership of Brown and Goldstein served such a purpose, which was reflected in my successful scientific pairing in UTSW, and that even included my mentors. Being a member of that collaborative ecosystem, I have been successful in identifying the importance of selective collectivism among individualism in academic science, thereby hastening my scientific cultural integration in a foreign country and alien work environment.

Brown and Goldstein, through their scientific contribution and partnership, have been instrumental in shaping my academic career, and they continue to inspire my quest for scientific proficiency.

Born and brought up in Kolkata, India, **Avash Das** graduated from one of the oldest medical schools in eastern India, before he relocated to Boston to pursue a research fellowship in cardiovascular disease at the Massachusetts General Hospital. The rich scientific environment in Boston, coupled with its confluence with humanities and arts, shaped his formative academic years in the United States. He shifted base to Dallas to pursue his graduate studies at UT Southwestern Medical Center and is currently enrolled as a PhD candidate in the laboratory of Helen Hobbs and Jonathan Cohen, studying the role of lipids in metabolic diseases. In the future, he plans to continue his research and clinical training to become a physician-scientist. Apart from adding fancy hats to the existing repertoire in his wardrobe, Avash likes to read nonfiction science books, watch documentaries and international movies, sample local restaurants, and recreate traditional South Asian dishes in the tiny corner of his kitchen in Dallas.

# William Dunn

Cambridge University Hospitals NHS Trust

## Sweet Are the Uses of Adversity

Dreich. That's how I remember that day. For those not well versed in the Scots dialect, "dreich" describes the sort of dull, miserable weather that leeches all colour from the landscape. It is, unfortunately, synonymous with the Scottish summer.

And on as dreich a day as this, I have completed my first year of medical school. A milestone such as this deserves some recognition, but being on a student budget, I forego any lavish celebrations and instead visit my favourite second-hand book shop in Glasgow's west end. An autobiography catches my eye: *Stephen Hawking. A Life in Science*. Hastily, I buy the book and catch the bus back to my hometown. As the bus judders into life, I open Hawking's autobiography to begin reading, and note a faintly scribbled Shakespearean quote, scrawled by the book's previous owner: "*Sweet are the uses of adversity.*"

Long before I started my medical career, as a schoolboy, Hawking had kindled my interest in science. Having discovered an aptitude for the natural sciences, I began reading *A Brief History of Time* during my summer holiday. Hawking's ability to distil the complex laws governing the universe into a simple anecdote that could be understood by an ordinary boy such as myself ignited my passion for science by making this esoteric world of hypothesis and observation accessible



and intriguing. First and foremost, Hawking was an extraordinary scientist, with a brilliant mind. Yet, as the bus rolled along the motorway, I read the story of his life and was reminded that it wasn't just his genius that inspired me, but rather his capacity for accomplishment in the face of immense hardship. That Hawking became the great science communicator of his time when suffering from amyotrophic lateral sclerosis (ALS), which robbed him of his ability to verbalise, is testament to that perseverance.

Adversity waylays every clinician at some point in their career. The example of Hawking's triumph has always inspired me to keep going when circumstances seemed to conspire against me. My final year at high school was a critical juncture, where I needed to attain top grades and make applications to medical schools. My mother being diagnosed with cancer and my father suffering a heart attack within days of each other threatened to derail my medical career before it had even begun, but realising that my misfortune was trivial by comparison with Hawking's, I carried on and was admitted to study medicine, and used my experience as inspiration to forge a career in oncology.

Despite being diagnosed with ALS, Hawking continued to study for his PhD at Trinity Hall, Cambridge, where he first began to articulate his theories on the expansion of the universe. He never allowed his own hardship to impede his work or his enjoyment of life. Hawking once described witnessing the death of a boy from leukaemia during his time in hospital, and remarked that "*Whenever I feel inclined to be sorry for myself, I remember that boy.*"

Fast-forward to the present day, and it is no coincidence that my own career has taken me to a clinical research post in Cambridge, where Hawking's fledgling scientific career took flight. And, perhaps subliminally influenced by Hawking's remarks about that young boy, I now find myself engaged in leukaemia research and working at the very hospital where Hawking himself was frequently treated. Stephen Hawking was a passionate advocate for the National Health Service (NHS) in the United Kingdom. Shortly before his death, he addressed the Royal Society of Medicine, where he extolled the virtues of the United Kingdom's universal health care, explaining that he "*would not be here today without the NHS.*"

Thus it is now, more than ever, that Hawking's words inspire me. I write this essay from my apartment: the normally bustling street outside is eerily empty, as we enter a period of lockdown in the face of a global coronavirus pandemic. The conferences I submitted research to have been cancelled, laboratories I had been working in have closed their doors, and clinical training and progression has been postponed indefinitely as the NHS prepares to meet the greatest challenge since its inception. This week, I have been recalled to clinical duties in the NHS from my ivory tower of academia, seemingly extinguishing any hopes I had of completing my research. Frankly, I am scared for the challenge that awaits us as the cases of COVID-19 begin to soar. But then I think of Hawking, and how he not only overcame hardship, but used it to fuel his own creativity and discovery. Time, then, to dust myself down, don my protective mask, and begin a new study, with the aim of identifying predictors of severe COVID-19 from patients' admission blood samples. After all: sweet are the uses of adversity.

**William Dunn** is an Internal Medicine Trainee at Addenbrooke's Hospital and an Academic Clinical Fellow in Haematology, based at the Jeffrey Cheah Biomedical Centre. Originally from Erskine in the West of Scotland, he graduated from the University of Glasgow with an intercalated BSc, medical degree, and MSc in Bioinformatics. After working as a junior doctor in Glasgow and Edinburgh, he has taken up an Academic Clinical Fellowship in Cambridge, where he is currently based in George Vassiliou's lab undertaking research related to age-related clonal haematopoiesis. In the longer term, William aspires to become a clinician-scientist in malignant haematology.



# Safwan Elkhatib

University of Nebraska Medical Center

## Salk, Sabin, and the Crown of Health

“Wait, what does taj (تاج) mean again?” I interrupt. “Oh. It means crown . . . so, health is a crown worn by the healthy only the ill can see,” my dad explains over the phone. As I digest this axiom lazily on my couch in self-isolation, the word *crown* bounces through my subconscious to its Latin root, *corona*, which plunges me back into a stream of fleeting, anxious thoughts about COVID-19. This perpetual anxiety is furthered by the fact that I cannot seem to scroll any social media timeline without being inundated with puzzlingly colorful 3D representations of this invisible, not-dead-yet-not-quite alive enemy, superimposed above unnerving headlines. Yet, in these hours of cheerless screen time, when the present hangs suspended in animation and the future sits uncertain, I have found much inspiration in looking to the past.



In the 1940s, public pools in America stood empty despite the late summer heat. That same eerie silence that overtook lakes, oceans, and pools is becoming deafeningly familiar in 2020. The virus responsible for the silence almost 80 years ago—poliovirus—has been known to humanity since before recorded history, leaving its young victims paralyzed and in dire need of critical care. Iron lungs for respiratory

support were often in short supply locally, another daunting parallel to our current pandemic.

It is not hard to imagine the feelings of uncertainty and fear that permeated society during the polio outbreak years ago. These same anxious feelings seep from our phones and TVs, finding their ways into every conversation, spreading from person to person, replicating in each of us quietly, only effervescing at each cough, headache, or door handle. While polio still conjures up horrifying images of children in iron lungs to some, it undoubtedly does not present the same existential threat to society as it once did, despite its frightening resurgence in places like Syria—where my dad spent his own childhood. To thank for this, we have the work of two Lasker laureates, Jonas Salk and Albert Sabin. Jonas Salk, the 1956 Lasker laureate, was the first to create and administer the vaccine globally. Soon after, Sabin created an oral version that brought our world to the current 99% vaccination rates and received the Lasker clinical research prize in 1965. Their diligent and incredibly timely work saved immeasurable human lives and forever changed the world.

Yet I have left out the most crucial detail of the story of the polio vaccine. The near complete global cure of a disease alone is of timeless brilliance, but what these two Lasker laureates did *not* do remains more noteworthy. They both chose not to patent their vaccines, allowing them to be manufactured and used freely across the world. They did not garnish a single dollar from ostensibly the most lucrative inventions of our time. They did so in a way that didn't involve proselytizing, but merely acknowledging it was morally right. To the question of who owned the patent for his vaccine, Salk famously responded, "The people I would say—there is no patent. Could you patent the sun?" It is with these simple words that Salk was able to set a precedent for how during times of crisis, scientists could not only disseminate truth and knowledge, but remind us of our shared humanity.

As we fight to mitigate the effects of this pandemic, we are all reminded how infinitely connected our world is today. The burden of COVID-19 is not one to be held by scientists and clinicians alone, but one we all must take our turn in bearing. Each person across our

communities can make a difference in stopping the spread by socially distancing and following guidelines set by public health experts. And just as this disease and its burden belong to all of us, so too should the eventual vaccines we hope to develop.

In biomedical research, the pursuit of scientific success itself often becomes the why, regardless of how noble one's original motives are. Because of the seemingly stolen time this pandemic has given me, I have been able to look back and be reminded that my research endeavors are a conduit for the ultimate goal—improving the health of those around us, just as Salk and Sabin did. They chose to not to wear the crown themselves but to give it to others, and I will be forever inspired by their story to do the same.

**Safwan Elkhatib** is a Midwest native from Bettendorf, Iowa, who completed his undergraduate degree at Iowa State University. He fell in love with research and medicine, which brought him to the MD-PhD program at the University of Nebraska Medical Center. He is currently completing his PhD under the direction of Adam Case, with his doctoral research focused on the mechanistic study of how Post-Traumatic Stress Disorder can alter the inflammatory milieu. His long-term career aspirations are to be a physician-scientist at an academic medical center, balancing atop the three-legged stool of academic medicine as a clinician, researcher, and educator. Outside of science, he is passionate about student-driven efforts to address health inequity in our communities.

# Laurel Gabler

The Children's Hospital of Philadelphia

## Putting “People’s Health in People’s Hands”: How the Bangs Inspired My Personal Journey

The husband and wife were showing us pictures of women villagers in colorful saris crowded around a wooden device learning how to count breaths. They were an old and frail couple, and they looked more like they were in need of help than capable of giving it. But that afternoon, as they talked animatedly about their two decades of community health work in rural India, they had me. And they have me still. What they taught me was how one could make a difference if all one really wanted to do was make a difference—not necessarily by great, celebrated achievements but by small, even un-noticed, ones.



You may not know Abhay and Rani Bang by name, but you might recognize the mark they have made on global health. Physicians by training, they returned to the poorest communities of Gadchiroli in their native India after receiving master’s degrees in public health at Johns Hopkins. But they returned not as self-perceived saviors for people needing health care, but rather as partners intending to help the villagers build their own health system. “People’s Health in People’s Hands,” as they called their community health work, described exactly what they hoped to achieve.

Their work began as a way to reduce neonatal and maternal mortality. It evolved into a way for the community to demand its human rights because the Bangs showed the villagers that health rights and

human rights were inextricably bound together. And what evolved into a human rights campaign became a quiet revolution. The Bangs eventually authored numerous papers and books to share what they had learned about community building. And their methods of community mobilization were adopted all over the world. But the Bangs not only helped to empower villagers and health workers across the world. They also helped change how global organizations themselves think about empowerment and community engagement: bottom-up rather than top-down.

And they changed something else: me.

I would like to say I had a revelation. I didn't. I had their inspiration. But I had to go on my own journey to appreciate the impact they had on me.

That journey began when I graduated from college, packed a copy of *Putting Women First* and headed off to work for a community-based HIV education NGO in rural Tanzania to “save the world.” I didn't save anyone, but they saved me, even from that hubris. It was in a Tanzanian cornfield, watching a girl writhing in an epileptic seizure—“possessed by the devil,” her family said—when I began to comprehend what the Bangs knew: the importance of cultural humility and sensitivity to local belief systems and illness etiologies. Like the Bangs, I realized I needed to embed myself in the community to be truly effective.

So, stripped of my savior complex, I went to rural Thailand on a year-long fellowship to learn Thai Traditional Medicine. Working alongside a group of herb farmers, I began to understand the relationship between health care and broader community development and how to partner with my new friends in their efforts to improve their health care and their lives.

My journey continued in India, where I met community health workers with no formal education or medical supplies who nonetheless were making impactful changes beyond curative care. It was there I first realized, as the Bangs had done decades earlier, the great potential of the grassroots workforce. And that inspired me to pursue a PhD in public health to investigate how people in low-resource settings navigate health decisions. The journey next took me to rural Nepal where

I spent two-and-a-half years, like the Bangs, embedded in a remote community to listen and learn from them—bottom-up—about their healthcare experiences. But I also had a personal revelation. I realized that the best way to be most useful in limited-resource settings was to possess more medical acumen.

So, I went to medical school, like the Bangs, and wound up as a pediatrician spending time in rural India and Tanzania, hoping to serve a community by being part of it—someone who would understand it and bridge Western medicine and traditional practices and health services and human rights.

These may be modest goals. So were the Bangs'. They may not be awarded a Nobel Prize. But seeing the couple's passion that afternoon, now so long ago, and their love and respect for the people with whom they served, not over whom they served, set me on my journey and directed me to my destination—to serve vulnerable children in underserved communities, and in the process, help those communities shape their own destiny.

**Laurel Gabler** is completing her third year of pediatrics residency at the Children's Hospital of Philadelphia (CHOP). Upon graduation, she worked in Tanzania as an HIV educator for an NGO and in Thailand at a government hospital as a Luce Scholar. Before earning her MD from Harvard Medical School, Laurel earned an MSc in Global Health Science and a DPhil in Public Health through the University of Oxford as a Rhodes Scholar. Her research focused on health-seeking behaviors and health service delivery in rural Nepal, where she lived for two-and-a-half years, funded through a Fulbright fellowship. Laurel continued her global health work during medical school through the Harvard South Asia Institute, where she helped community health workers in India devise community empowerment projects. During residency, Laurel had the opportunity to return to Tanzania to teach interns and help devise medical training tools for local pediatricians. After residency, Laurel will work as a pediatrician in the Emergency Department at CHOP for a year before beginning a Pediatric Emergency Medicine fellowship. She hopes to continue to work at the intersection of public health research, clinical medicine, and health education, both domestically and internationally.

# Kwabena Kusi-Mensah

University of Cambridge

## As One Single Tribe: Thinking Globally and Locally

Harold Freeman was born in 1933 in Washington, D.C., during a period of racial injustice. His journey took him from the historically black Howard University for medical training, to Harlem, the heart of African American arts and culture, where he cut his teeth in his medical career as an oncologist. Dr. Freeman's life's work focused on poverty and cancer in underserved African American communities, working to reduce disparities in access to care. It was at the Harlem Medical Center that he first came across many African Americans reporting to hospital with unusually advanced cancer. The horrors of what he saw moved him to write his seminal paper "Cancer in the Economically Disadvantaged," which exposed the disparity in life expectancy between African Americans and Caucasian men, and drew attention to the vital importance of addressing non-biological contextual factors such as social determinants of disease in poor communities. Professor Freeman won the 2000 Lasker Public Service Award.



Freeman's story struck me because of how he was not afraid to allow his unique perspective to shape his scientific inquiry to better the lives of people. As I write this, the COVID-19 pandemic is sweeping across the world with no end in sight. I am sitting behind my desk in self-isolation, with the social media newsfeed bombarding my phone with recommendations about "social distancing" and "hand

washing under running water.” Yet, I cannot help but think of an article I read a few days back asking a sobering question: what will social distancing look like for millions of ordinary people across Africa? In Ghana where I come from, the average family lives in a single room and uses a public toilet, what would self-isolation look like here? For the head porter or street-side tomato seller who relies on a daily wage, what will an Italy-style total lockdown mean? This was my big take-away from Harold Freeman: in science, pay attention to the context, it matters. My second hero, Tu Youyou, would agree. This is her remarkable story.

Also born in the 1930s but in Ningbo China, Tu trained and worked as a phyto-chemist at a time when the cultural revolution in China demonised scientists and intellectuals as being part of the “Nine Black Categories.” She graduated from the Beijing Medical University School of Pharmacy in 1955 in pharmaceutical chemistry, followed by a 2.5-year training course in Chinese traditional medicine. To solve the problem of Malaria in southern China, Tu had the idea of combing through classical Chinese texts for potential herbal candidates. She eventually found a recipe for malaria using the sweet wormwood plant (“Qinghao” in Chinese) in a 1,600-year-old text. After several failed attempts, in 1972 Tu extracted Artemisinin, a powerful compound for treating Chloroquine-resistant malaria. Thus, in spite of being a female scientist in turbulent days and having no postgraduate degree, Tu Youyou went on to win the 2011 Lasker-DeBakey Award and the 2015 Nobel Peace Prize for Physiology or Medicine.

An important lesson emerges for me. Because of her remarkable respect for both Western and ancient traditional Chinese treatments, Tu did not approach the problem with an “either/or” attitude, but with a “both/and” perspective. This is why she considered turning to ancient Chinese texts for an answer but perfected the “recipes” with modern Western phytochemical techniques. As a medical doctor in Ghana, I am well aware of the dangers posed to the health of people by charlatan prophets, witch doctors, and snake oil salesmen at lorry parks. But, while acknowledging the potential for excesses of local remedies, could it be that a better approach to scientific enquiry in my context may be the “both/and” approach



that Tu took? For example, in my research focused on executive functioning of children in Ghana, might it be useful to first undertake some qualitative (ethnographic) research to gain local conceptual insights that may unlock novel solutions in diagnosis and treatment?

The lessons that my two science heroes teach me can be summed up thus: value your unique perspective and do not be afraid to look at old problems a little differently. Our world is rapidly changing and becoming increasingly interconnected. Thus, the nature of emerging threats will increasingly be global in nature, requiring scientific talent from different regions of the world working cooperatively yet thinking uniquely. As I journey on my career as a clinician-scientist, I imagine Professor Freeman urging me to think about local context-specific determinants, and Professor Tu gently encouraging me to examine potential local solutions. They would tell me to “think globally . . . but act locally.”

“Now more than ever, the illusions of our divisions threaten our very existence. But intimes of crises . . . We must find a way to look after one another, as if we were one single tribe.”

—King T'Challa, post-credit scene in *Black Panther* (2018).

**Kwabena Kusi-Mensah** is a board-certified psychiatrist with additional training in Child and Adolescent Mental Health (CAMH) based in Kumasi, Ghana. He undertook his medical training at the Kwame Nkrumah University of Science and Technology and his residency training in Ghana and Nigeria. His passion for children’s mental health led him to establish the first multidisciplinary CAMH clinic integrated into a general hospital in Ghana in 2017, after returning from post-graduate training in CAMH in Nigeria, where he graduated at the top of his class. Currently, Kwabena is a first-year PhD candidate at the University of Cambridge, where he is working on developing culturally appropriate tools for assessing frontal lobe functioning for children and adolescents in West Africa, as well as risk factors affecting cognition and mental well-being. His career goal is to become a physician-scientist working to build local research capacity and to be an advocate for young people’s mental health in the West African sub-region.

# Lisa Learman

Johns Hopkins University School of Medicine

## With the Corn, Against the Grain

The public image of the mid-twentieth century laboratory featured dispassionate scientists working in immaculate coats as metallic instruments hummed. Among men wearing masks of objectivity, distance, and certainty, the clear visage of Barbara McClintock stood apart. McClintock did not force her data into a round hole of simplicity and elegance; rather, she allowed her biological models to reflect the messiness of nature. By doing so, she made some of the most pioneering discoveries of the century. McClintock's approach to science, and the pushback she received from her contemporaries, inspire me to embrace complexity and diverse perspectives in science to arrive at a more complete truth.



As a student, I learned little about McClintock's work. In each genetics class, professors included a single slide featuring McClintock smiling over an ear of multicolored corn. Professors taught us that her study of this unusual model organism led to the discovery of transposons, pieces of DNA that move from place to place in the genome. Mentors occasionally described McClintock as a hippie, and I imagined her having seances in the cornfields to arrive at her conclusions. I would learn that this characterization misrepresented her rigorous relationship with science.

Although critics dismissed McClintock's "feeling for the organism"

as mysticism, the intimacy Barbara had with her model organism reflected her relationship with science as a whole. In the mid-1900s, nature was seen as passive, ruled by externally imposed laws. The scientist's role was to discover these laws—to extract simple, fixed dogma from the mysteries of nature. McClintock's science was different. She embraced the idea of a nature that does not adhere to strict rules. She saw nature as “resourceful and complex,” requiring keen observation. Instead of seeking to prove preconstructed models, like many of her contemporaries, McClintock “let the experiment tell [her] what to do.”

Instead of dismissing exceptions and outliers, she worked doggedly to understand them. “If [something] does not fit, there's a reason, and you find out what it is.” Barbara saw nature not as object but as subject, an entity with its own wills and won'ts, not to be defined, but to be understood.

In the 1950s, Watson, Crick, and Franklin proposed that the structure of DNA created an immutable blueprint of the cell. McClintock's data suggested otherwise. Noticing multicolored patches in individual corn kernels, she thought “some cells had gained things that other cells had lost.” She postulated that mutations in pigment-encoding genes occurred via a purposeful process in which small DNA fragments (now known as transposons) jumped from one location in the genome to another. McClintock's findings were heretical at the time, as they suggested a nature “more flexible than had been previously thought,” and called into question the prevailing ideology of nature as defined and static. Her data contradicted a widely accepted model that appealed to many scientists due to its rigid simplicity. This made her discoveries incomprehensible to her peers. McClintock's colleagues could not grasp the empirical truths in her data, as that would have required them to acknowledge that established dogma can be insufficient to explain nature. It took decades for the community to accept McClintock's findings.

I fear that, like the colleagues who could not fathom McClintock's discoveries, I will discount ideas that challenge dogma. When scientists from different backgrounds question my models in lab meetings or at conferences, Barbara's story helps me resist the urge to react de-

fensively. These experiences reflect an inherent bias in science—that a scientist’s area of expertise and their experimental toolkit inevitably shape the models they create to describe natural phenomena. As such, scientists create different models, each reflecting a different angle. We must acknowledge the existence of these various perspectives to get closer to a complete picture.

In the classic poem by John Godfrey Saxe, blind men approach an elephant to discover its nature. One grabs the trunk and thinks elephants are like snakes; to another, the ear feels like a fan; and to a third, the leg feels very much like a tree. The poem ends:

And so these men of Indostan  
Disputed loud and long  
Each in his own opinion  
Exceeding stiff and strong  
Though each was partly in the right  
And all were in the wrong!

The story of Barbara McClintock illustrates the gravity of this lesson: we must acknowledge diverse perspectives and methodologies to arrive at a truer truth. We must view science as a human project that requires both intellectual and emotional labor. Ultimately, McClintock’s life and science taught me not to fear unexpected data that complicates the current dogma, for nature is messy and often defies our expectations.

As a PhD candidate at Johns Hopkins University School of Medicine, **Lisa Learman** studies the contribution of aberrant activity-induced splicing changes in neurological disease under the mentorship of Paul Worley. She first became interested in science at Oberlin College, when her BIO 101 professor described wind as air molecules moving down their concentration gradient. In addition to research, Lisa volunteers at the Maryland Science Center, edits for the Hopkins Biomedical Odyssey blog, plays piano in community theater pit orchestras, hikes with her partner, cuddles with her cat Dexter, and avidly consumes dystopian fiction.

# Olivia Lucero

Oregon Health & Science University

## More than Amino Acids: Genetics as a Tool for Generational Empowerment

I can still remember the geneticist's face, sweet and round like a grandmother's, as she asked how my mom was recovering from her surgery. Then she opened the envelope to read the results of my *BRCA* analysis. It was a search for the same mutation that had spurred my mom's ovarian cells to overwhelm her body like a swarm of bees, as had happened to her mother and three sisters. I was a first-year laboratory technician at the time, focused on pipetting techniques and PCR



reagents, and I hadn't yet made the connection of how the genes I studied on the bench translated into the real-life, punch-you-in-the-gut consequences that can devastate an individual. In fact, looking back now, my 23-year-old self was fairly nonchalant going into that meeting, just a little nervous—more from the anticipation of such an official meeting with a real adult than the consideration of how her report might change my life. However, that moment with the geneticist was a turning point: it was a pin drop of a moment, one I would revisit multiple times as I charted my personal journey as a physician-scientist.

In my journey, I was drawn to work on cancer prevention, but it took several years in lab and a medical degree to learn of Dr. Mary-Claire King, the person whose work changed our lives. I was drafting clinical guidelines for hereditary melanoma and knee-deep in tumor suppressors and oncogenes when I learned of Dr. King, who hypothesized more than 30 years ago that a complex disease like cancer could be explained by permutations in a single gene. I was surprised that many were very skeptical of this idea, and that she faced significant challenges, especially as a young female in the field. Yet she persisted, and has stated, “I have come to realize that there was a great freedom in being ignored, that you could go after huge questions, because nobody noticed.”

The results of going after the huge questions were deep and far-reaching. Building on the mathematical work of Morton and Elson, Dr. King utilized a multivariate, complex segregation analysis to show that the hereditary pattern of 4% of cases in their 1,579 family cohort was an autosomal dominant pattern of inheritance, then linked this risk to a gene on chromosome 17. This ultimately led to the identification and cloning of *BRCA1* and the ability for individuals to understand and act on their risk for breast and ovarian cancer.

If the Lasker Award, National Medal of Science, Shaw Prize, and membership to the National Academy of Science represent a consensus, then it is agreed that Dr. King’s scientific achievements are nothing short of a landmark. Multiple generations of women and men have been empowered by the gift of knowledge for family planning, prophylactic interventions, and enhanced screening. It is not only the ability to take action and prevent morbidity and mortality, but also the understanding of how and why this happens that can bring peace to a family, like it did to mine.

Science is often built on the backs of many, but Dr. King is testament to what one individual, with persistence, leadership, and vision can achieve with translational science. While productively filing many scientific achievements into the folds of medical literature, she elevates her discoveries to empower the individual. Another example of her Dr. King’s extraordinary bench-to-bedside work is the Abuelas de Plaza de Mayo project, in which she utilized genetics to reunite grand-

parents with their grandchildren who had been abducted from their homes and trafficked during the Argentine dictatorship. She has stated that “the most important questions come from people on the front lines,” which as a guiding doctrine enables the fruit of her discoveries to remain hand-in-hand with those she studies.

Dr. King’s work in the lab and dedication to the people on the front lines made possible the moment my mom learned that both my sister and I had a normal locus. I picture my mom clearly: she was wheelchair-bound, her head wrapped in a scarf, an initial look of startled disbelief on her face, followed by relief and tears of happiness. Her facial features were lit up with the first glint of strength I had seen in months. It was a moment of victory. Victory for her, for us, and, though she has never met me or my family, for Dr. King. She has touched my life through her BRCA1 discovery, but also in ways she may not have imagined. She inspires me to use science to empower the individual, and hitch the front lines of my clinic to the expanding scientific frontier, a value that fits hand-in-glove with my work utilizing functional genomics to bring individualized care to my patients with cancer. And, to live by the tenet that landmark progress occurs by thinking extraordinarily.

**Olivia Lucero** is a Dermatologist at Oregon Health & Science University who researches targeted therapies for cutaneous and hematological malignancies. Olivia was born in Salt Lake City and earned her MD at the University of Washington, concurrently completing a Howard Hughes Medical Research Fellowship. She is currently a post-doctoral fellow in the lab of Brian Druker, and continues her clinical work at OHSU, where she supervises a resident-run surgery clinic. She plans to complete a Cutaneous Oncology Fellowship with a goal of being an independently-funded dermatologic surgeon scientist who improves the quality of life for patients with skin cancer. In her spare time, Olivia loves to listen to music and adventure outdoors with her husband, Lars, and son, Elias.

# Hannah Mason

University of Cambridge

## My Gym Genie: Gathering Inspiration from Dr. John Schiller

I remember the first time I met Dr. John Schiller. I was interviewing for a PhD program at the National Institutes of Health (NIH). The morning's interview hadn't gone well, and I just knew I wouldn't get into the program. I had dreamed of training at the NIH, of discovering a druggable target for neurodegenerative diseases, but now I had to go back in and pretend that those dreams weren't slipping away. Sitting down for the interview lunch, I never expected to be across the table from someone who



had effectively cured a disease that plagued my childhood, someone who would one day become a mentor to me. I sat down across from Dr. John Schiller and was immediately thrown back in time.

I was back in elementary school, sitting on Mrs. Gazeley's waterbed on my tenth birthday playing *Sorry* and watching *The Ellen DeGeneres Show*. I knew she did not have much time left. I just did not know how little.

I do not remember when I first learned of HPV. Trying to pinpoint the date is like trying to figure out the first time I read a chapter book. I can ballpark a period of time, but the exact date seems inconsequential because once I learned, it just became part of everyday



life—a chapter a day. In my memory, Mrs. Gazeley, my mom’s best friend and a constant in my childhood, had always had cervical cancer. She had had it in college, and it was back. At the time, I did not understand how she got it, but I knew it was not something she wanted to have. It meant days spent getting chemotherapy at the Oregon Health and Science University. It meant losing her hair. It meant dying.

Until it did not. Two years after Mrs. Gazeley’s death, Gardasil became FDA approved as a preventative measure for HPV and therefore cervical cancer. My mom, usually someone to stay away from any medicine that is not tried and true, had my sister and me first in line at our pediatrician’s office for the vaccine. We were not going to experience what her friend had gone through, not if she could help it. I remember the three shots making my arm sore for days, but each time we went, I knew I was preventing a disease that had both broken me and made me committed to helping people suffering from incurable diseases.

So, as I returned to lunch that day, I realized that I was meeting a great. I was meeting John Schiller, the man who had helped discover and develop the vaccine that protected me from a similar fate to Mrs. Gazeley. I was meeting someone who had accomplished the purest goal in biomedical science —bringing a discovery to people and preventing disease.

Despite my earlier fears, a few months later I found myself a graduate student at the NIH. I was constantly seeing legends of science around campus, from Tony Fauci to Steven Rosenberg. No scientist, however, inspired me quite like John Schiller. Occasionally, I would see him at the tiny, windowless campus gym. He always had a smile on his face. Perhaps it was the endorphins, but I liked to think it was just his disposition. Dr. Schiller would ask me how the science was going. As a first-year PhD student, the science was going about how trudging through half-melted snow goes—difficult and sloppy. Dr. Schiller, though, would always take a minute and offer his thoughts on whatever idea or hypothesis I was toying with that day. He was my gym genie but instead of offering wishes, he was giving me ideas and advice on how to be a good scientist.

Like any PhD, mine has been fraught with obstacles—mentors lost, projects scooped. Many days I find myself thinking is it all worth it? Will my science ever help people, or is it destined to sit in PubMed for eternity, occasionally cited, but mostly forgotten? I did not start an eight-year path to become a physician-scientist for this, I think to myself. Then I remember John Schiller. I remember his gym words of wisdom on selecting problems that really matter, coming up with a solution, and knowing when to hand a discovery off to the next person in the pipeline to develop. I remember that the goal is always to help patients, not our own egos. I remember John Schiller, who is to me, everything that a scientist should be. He recognizes that science is a team sport. He is focused on improving human health. He is a mentor. I remember John Schiller, and I remember that I, too, can achieve my dreams of making a difference in people's lives through science.

**Hannah Mason** is a fourth-year NIH-Cambridge Scholar pursuing her PhD in the laboratories of Dorian McGavern at the National Institute of Neurological Disorders and Stroke, and Ole Paulsen at the University of Cambridge. She studies how the brain's immune system responds to and is shaped by repetitive head injury and degenerative processes. After Hannah completes her PhD, she will return to her home state of Georgia to attend medical school at Emory University. She hopes one day to be physician-scientist designing therapies and treating people with neurodegenerative diseases. Outside of the laboratory, Hannah enjoys rowing, baking, and writing comedy essays.

# Samantha Wong

University of California Davis School of Medicine

## Fauci: Science as a Voice of Reason

Eight months into medical school, my current skill set includes an assortment of physiology and microbiology factoids and the ability to perform a well-patient exam, skills that unfortunately leave me just as helpless as the average American who waits on edge during the third week of a stay-at-home order. COVID-19 has spun our country into unprecedented times. The dozens of news cameras positioned outside my medical school, reporters lining up to speak about the first case of community spread in the country, should have alerted me weeks ago that we were entering into uncharted territory. As industries and stock markets have slowed to a crawl, many Americans, including myself, have turned to leaders for guidance—in particular, 2007 Lasker Laureate Dr. Anthony Fauci.



As the director of the National Institute of Allergy and Infectious Diseases, Dr. Fauci has appeared at nearly all the White House briefings next to President Trump. His measured Brooklyn rasp and tell-it-to-me-straight demeanor have garnered the admiration of the country and even inspired fan merchandise (“Fauci” T-shirts in Gucci-style fonts), as well as generated vitriol from online conspiracy theorists (see: #FauciFraud).

Through the past 40 years, Dr. Fauci has led efforts against epidemics as both a scientist and public figure. In today’s pandemic, his

devotion to tempering too-rosy predictions and fearlessness in calling out testing efforts as “failing” have earned him the rarest resource of public trust. When Dr. Fauci missed one White House briefing, tweets began flying, asking, “Where is Dr. Fauci?”

Dr. Fauci represents a role of physicians and scientists that has diminished in recent years: a voice of reason, “a representative of truth and facts.” Historically, physicians were community keystones—they provided your care from birth to death, and all your family and friends, too. In this way, physicians and researchers have always been public figures. With the modernization and subsequent specialization of physicians and scientists, science began to be practiced in isolated and sterile environments, such as research done in the ivory tower or 15-minute appointments with a doctor your insurance assigned to you—a depersonalization and erosion of trust. Dr. Fauci’s appearance in media, particularly web content, brings us closer to the days of knowing your physician or knowing the faces of scientists and cultivating a relationship of respect. Moreover, Dr. Fauci highlights another crucial role of science, not just in times of pandemic: the essential need for scientists to dialogue with politicians, even when “you have to say things, one, two, three, four times.”

The argument remains that the role of a scientist is to be quiet and do the work. Dr. Fauci has certainly done the work as a leading HIV/AIDS researcher with more than 1100 publications. But he has also leveraged his expertise into a role as a public servant, advising several presidents and designing the international health program PEPFAR for HIV/AIDS treatment and prevention, among other government programs. His advocacy helped funnel funds into implementing the interventions and research he helped discover and fostering real world change.

In his 2007 Lasker Awards Ceremony acceptance remarks, Dr. Fauci said, “I realized early on that when you deal in the heady company of presidents, cabinet secretaries and members of Congress and are asked for advice, you must be prepared to disappoint people with the truth and risk never getting asked back into the inner circle. I accepted that concept. Science is truth, and as a scientist I told the truth.”

Prior to medical school, I considered careers in print journalism and clinical research, seemingly disparate fields, but to me, both centering around truth-seeking. Dr. Fauci reminds me that truth-seeking is not absent from medicine either. It is central to it. In Albert Camus's *The Plague*, the protagonist Dr. Rieux asks Tarrou, a community member, why he is so willing to risk his life and volunteer to fight the plague. Tarrou answers: "My code of morals . . . comprehension." Only by telling the truths as we know it, rooted in science and research, can we give the public and policymakers the knowledge they need to make educated decisions about their health and the health of others, and hopefully, inspire them to make the right choices.

More than ever, we need science communication education in our medical school and graduate school curriculums. It is not enough to just do the work. We need to know how to advocate for truth, how to navigate the machinations of politics, and how to build relationships with policymakers, stakeholders, and the public. In the words of Dr. Fauci, we all have to keep pushing—for policy changes that focus on preventing pandemics and chronic disease, for research advances to benefit patients in ways that are truly accessible. More than ever, our country and our patients depend on it.

**Samantha Wong** is an MD candidate at the University of California, Davis School of Medicine in the Academic Research Careers for Medical Doctors (ARC-MD) pathway. She graduated from Stanford University with an MS in Community Health and Prevention Research, where she wrote her thesis on tobacco policies on college campuses. She is passionate about cancer prevention from an interdisciplinary perspective, particularly in diverse and underserved communities. Her research interests range from tobacco cessation and public health to translational medicine and dermatology. She hopes to pursue a career in academic medicine. In her spare time, she enjoys reading newspapers and gardening.