

HUMAN BIOLOGY

STANFORD UNIVERSITY

HONORABLE WORK

Chris Le Boa won the 2019 Lloyd W. Dinkelspiel Award for Distinctive Contributions to Undergraduate Education for his commitment to the Stanford community. He is honored for his leadership in shaping the service experience of his peers and for catalyzing students to be involved in Stanford Food Recovery.

Chris worked with [Professor Giulio De Leo](#) as part of the lab's 5-year project to study environmental control mechanisms that will eliminate schistosomiasis. Each year over 200 million people are infected

with schistosomiasis, and the World Health Organization [estimated](#) that over 24,000 died from the disease in 2016. The Centers for Disease Control and Prevention [report](#) that next to malaria, schistosomiasis is the second most devastating parasitic disease.

At a summer lab meeting, Chris talked with Dr. De Leo about trying out a relatively new method, called environmental DNA (eDNA) testing, to look for DNA from two different schistosomes. Continued on the next page.



Early in the morning we rode in trucks to one of the rivers nearby. We sorted vegetation for snails and took boats to collect more vegetation and take water measurements. In the evenings, we shed the snails and looked at them under microscopes to see parasites. Afterward, we would have dinner, sit on the porch with Samba, the security guard, using Google Translate to have conversations between English and Portuguese.

The streets in Saint-Louis were always bustling. In the morning it was people going to mosque, then around 7am the baguette shops opened. Throughout the day shepherds pushed their flocks down the streets. In the afternoon soccer games started on every block. Once it was dark, people sat on their porches or on mats in the street and drank tea.

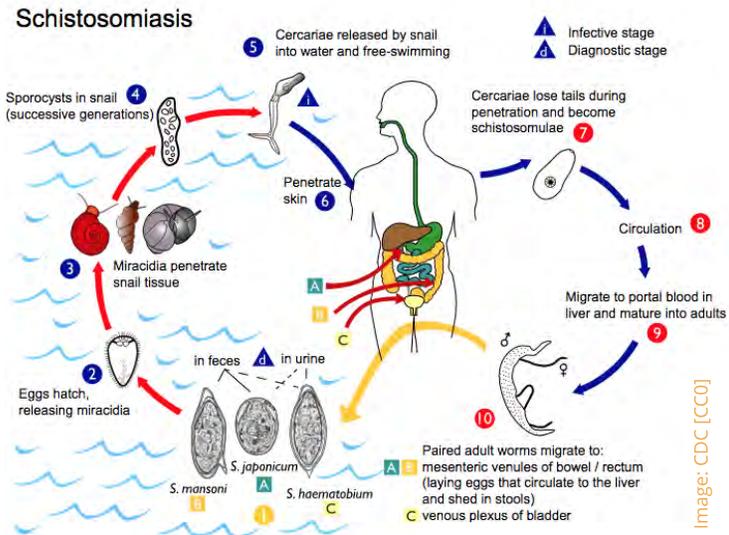
-Chris

This description of a day in Senegal was recorded as part of an [interview](#) with Stanford's Center on Global Poverty & Development.



Photo: Stanford Center for Global Poverty and Development

TESTING E-DNA TECHNIQUES FOR DETECTING SCHISTOSOMES IN THE SENEGAL RIVER BASIN



Continued from page 1.

parasite species in water samples. Chris learned eDNA testing skills on board the SSV Robert C. Seamans as part of the [Stanford at Sea Spring Quarter, 2017](#). If successful, this method will shave months of lag time off of the testing process, and help reduce the spread of the disease. The current method of detection involves collecting thousands of tiny snails, the schistosome worm's intermediate host, then shipping these to the Imperial College London lab and waiting for their molecular analysis.

Testing for schistosoma using eDNA became Chris's honors research project. He spent the summer of 2017 and the following academic year designing primers to bind with these specific species, then testing them to make sure they worked. In late July of 2018, he set out to collect samples from 32 established collection sites along the Senegal River. Chris pumped his samples through a series of filters to catch DNA on filter paper. Thinking of saving money, and based on the recommendation from the United States Geological Survey (USGS), he decided to use a hand-pump. Unfortunately, the murky river water strained the pump and caused the handle to break frequently. Chris made many field repairs over the summer, including swapping in a bicycle pump that he altered. Pump struggles for Chris

meant leaving Senegal at the end of the summer with many fewer samples than he had planned. He packed what vials he had into his suitcase and headed back to campus, hoping there would be a large enough sample size to allow him to detect the presence of schistosome DNA.

In the lab, Chris tested his samples against the schistosome DNA primer that he created. After running as many tests as he could, only the controls turned out to be positive. This was disappointing, but not surprising given the shortage of water samples. Chris laments the choice of hand pump when there were better, albeit more expensive, options. If things had turned out differently and one of his samples had tested positive, his honors work would have been a real boon for schistosome detection methods.

Nevertheless, his work has moved this effort forward in two ways, actually. Chris identified primers that were specific enough to these two species that false positives due to less dangerous species are unlikely. His lab, as well as other research teams, can use these primers in their own work. By showing that the USGS-recommended hand pump cannot be used with turbid water, he demonstrated its shortcomings in realistic field situations. As part of his epidemiology co-terminal master's program, he is

The logistics and the messiness of data collection are some of the biggest challenges of doing field work anywhere. There are so many variables to any disease ecology work and it is hard to separate them all out to get scientifically rigorous and meaningful results. It is also hard to work through language barriers. However, doing research on the ground is the only way to truly understand a situation and its complexities.

-Chris

now using similar techniques to detect *Salmonella typhi* in drinking water samples. In this case, a lot more work has been done previously by other groups, so Chris is able to work with a better primer and clearer water.

Chris's experience has given him a greater perspective and appreciation for lab work. It has also affirmed his desire to pursue a career as a physician-researcher who is committed to holistically understanding health and treating disease. He will apply his intellectual grit and resourcefulness to future problems, which he now knows may take many trials before discovering a solution.

HONORABLE WORK

Francesca Lupia was awarded a Fulbright Grant IIE to study the academic and social experiences of youth of Chinese descent in Prato, Italy. She will identify strategies for multicultural inclusivity in Italian schools.

Francesca took on an honors research project about the parenting beliefs and attitudes of formerly incarcerated mothers because she wanted to understand the persistence of intergenerational incarceration. The idea of this project came to Francesca during her work as a [Stanford in Government \(SIG\) fellow](#)

at the Santa Clara County Office of Reentry Services (ORS). This agency coordinates resources for the formerly incarcerated. While convening parent-support workgroups, she observed the high demand for child care and parenting resources. Francesca's project is also informed by her high school experience as a writer and editor for a local [street newspaper](#) called the [Groundcovernews](#).

Here, she saw her housing-insecure newspaper coworkers cycle in and out of hospitals, prison and street-living. "This is clearly not a one-system problem," Francesca said, "The Core taught us about the effect of multiple systems on problems, as well as the role of parenting in shaping children's psychological and emotional development. That is exactly what this project is about."

Given her participants' tender histories, Francesca worked closely with the ORS behavioral professional staff (some of whom were incarcerated parents now serving as peer mentors) to develop a trauma-informed interview environment. She began her interviews by acknowledging her limits as a Stanford student, and by emphasizing to each mother that *they were the experts of their own experience*, and that *she must rely on their expertise* to help her fill in the academic

knowledge gaps. Francesca told them, "It is my hope that what you share with me today will help other people in your shoes in the future." The mothers she interviewed seemed to feel encouraged and purposeful that they could help with a solution. Francesca asked strength-based questions such as, "What parenting experiences are you proud of?" or "What do you envision for your child's future and what can you do to help them accomplish this?" Mothers could skip any question, take a break or stop the interview at any time.

PARENTING EXPERIENCES & STRATEGIES OF FORMERLY INCARCERATED WOMEN



Francesca grappled with the meaning of her own well-parented life in the context of these women's experiences, and is resolved to work for positive change.

This can be solved. We can teach parenting skills. People are not born to be bad parents. Parenting is an actionable skill that can be learned.

-Francesca

When asked about the opportunities and obstacles of working with the county government, Francesca said, "One can make a big tangible difference by working in local government. The biggest challenge I see is the lack of coordination and communication among different governmental agencies. Though

given the data-security policies within agencies, this is not an easy problem to solve." Francesca wants to work, for at least part of her career, in one of the Santa Clara County Board of Supervisors' offices. She wants to help tie together education, housing and peer mentorship for the formerly incarcerated by integrating and streamlining the agendas of different county services. She said, "The Board of Supervisors is responsible for interfacing with many county organizations. I really want to see these components come together to support

women, youth and families in the criminal justice system."

Francesca has already helped to increase the reach of a Santa Clara County parenting program called [First 5](#), by advocating for face-to-face meetings. As a SIG fellow, she noticed that the First 5 office was physically located in a small cubicle in the rear of ORS. Knowing that

parenting resources were in high demand, she urged (pestered!) her supervisor to include the First 5 staff member in their regular meetings. Her recommendation resulted in the First 5 office being moved next to the lobby, making it highly visible to and more fully utilized by the formerly incarcerated parents who visit ORS. Francesca said, "I am a strong proponent of getting people who represent different agencies or institutions into the same physical space."

Francesca will work toward making her findings available to service providers so they can more effectively counsel for strong parent-child bonds. Her eventual goal is to earn her law degree with an emphasis on policy making.

STEM CELL BIOLOGY EXPLORER



Fuller spent time this spring exploring Greenland with the Inuit by dog-sledding on sea ice. Photo credit: Matthew Scott

Professor Margaret (Minx) Fuller is propelled into her workweek by the prospect of the biological surprises yet to be discovered. She likens her research on the mechanisms that regulate stem cell behavior to being a lioness on the prowl. Human Biology Core students are the beneficiaries of her scientific prowess and the thrill of the hunt for biological surprises each winter in her *HumBio 3A: Cell and Developmental Biology* course. Fuller is the Reed-Hodgson Professor in Human Biology and Professor of Developmental Biology, Genetics and Obstetrics/Gynecology (Reproductive and Stem Cell Biology). She is a member of the American Academy of Arts and Sciences, the National Academy of Sciences, and the Institute of Medicine.

Fuller and her Developmental Biology colleagues have created a top notch undergraduate introductory biology course for the HumBio Core by distilling content from the world of biology into 10 weeks of fundamentals. Each lecture is designed to perform triple duty. Fuller said, "Students think they are only learning about the cell-cycle, but they are also learning how to use a genetic screen to identify the molecular actors in a process, how proteolysis makes regulatory pathways irreversible, and how phosphorylation is a way to regulate protein function..."

In addition to content, the Core

emphasizes ideas such as *history matters*. As Fuller explained, "What a cell experienced *before* in development affects how that cell and its progeny respond to incoming signals at later stages. We now know and teach in the Core some of the molecular mechanisms of how the memories of those prior experiences are passed on from cell generation to cell generation - known as epigenetics." Beyond memorizing terms in biochemistry, and cell and developmental biology for exams, it is important that Core students come away with a lifetime scientific understanding of *cause and effect*. This concept is critical, not only for understanding biology, but also for evaluating aspects of modern life from economics, to medicine, to deciding what to eat. Fuller repeatedly asks sophomores in the Core throughout the quarter: How do you know how something works? How do you discover? How do you do the test for cause and effect?

Fuller's start as a budding biology researcher came the summer following her own sophomore year, when she experienced her first biological "a ha" moment. Working in a research lab over the summer, Fuller discovered that adding a solution to a test tube containing a single-celled, smooth-tailed swimmer caused it to morph into an amoeba-shaped crawler, in 90 seconds. This instance of life "doing its thing" before her eyes

hooked Fuller and launched her life-long passion for biological research. She was intrigued with what caused this change, and spent that summer and time in the following academic year trying to discover what triggered the swift change in cell morphology. When Fuller, who was majoring in physics at the time, learned that a modest biology lab microscope could reveal this type of wonderment, and that a researcher could pose and answer questions with "her mind, some test tubes and a water-bath," she asked her adviser if she could fulfill some of her physics academic requirements with biology classes and labs. His support allowed her to follow her growing interest in biology. When Fuller returned to her university years later as a seminar speaker for its 50th anniversary, she began her talk by thanking her undergraduate physics faculty adviser. She said, "My adviser came up to me later and said that he had actually gotten into a lot of hot water for letting me design my own program."

Continued on the back page.

What is jaw-dropping to me is how these biological regulatory mechanisms we study and teach in the Core have evolved - they have been selected for because they work. It is beautiful.
-Fuller



Would you rather: Stanford edition

Stanford is the type of place that forces you to prioritize in real-time.

I'm forced to make decisions that I wish I could ignore. Even ignoring everything is a decision.

Here's what it's like moving through a day at Stanford faced with endless rounds of "Would you rather."

9:00 a.m.: Would you rather stay in bed an extra hour or complete the readings for your class?

I really convince myself that an extra hour of sleep is going to make my day better, even after my alarm has gone off and I know the extra hour will be rife with interruptions; I'll jump awake thinking that I missed my alarm or check how many more minutes of snooze time I have. Suddenly, the school work that I convinced myself I had to finish in the morning isn't so important anymore. There is something about getting out of bed that makes everything else pale in importance. Maybe if I weren't so sleep-deprived all the time I wouldn't be fighting myself for an extra hour of sleep.

Final choice: Stay in bed.

9:45 a.m.: Would you rather go to class and not participate or skip class and write a make-up essay?

So at this point it's too late to wake up, do the readings, take a shower, eat breakfast and get to my 10:30 a.m. class on time.

Time to make some choices.

Final choice: Go to class.

12:25 p.m.: Would you rather go to a talk that your professor is giving or go home and get lunch?

Even though I made it to class, I feel bad that I haven't participated as much as I could have. This just adds to the feeling that I'm not doing as well as I should in all my commitments. Since I'm living in a constant state of feeling like I'm disappointing everyone, I'm always trying to overcompensate. So when my professor told me about an event they were talking at, I really wanted to attend. But now that the time has come, I'm hungry, already late for the event and wondering if it makes sense to stop by. They even promised food, but what if it's gone? What if my professor was expecting me to be there? What if not many people attend and my presence actually made a difference? Will my professor be upset if I don't go? How much longer can I go without a meal?

Final choice: Stop by the event for 10 minutes, then get food.

1:00 p.m.: Would you rather draft and send an email that's been on the back of your mind forever or complete a class assignment?

Final choice: [read the article to find out.](#)

6:00 p.m.: Would you rather have dinner with that friend you've been meaning to catch up with forever or eat at your house where you can bond with housemates?

As an RA, I want to spend time with my residents, and mealtimes are a great time to do that. But between classes that overlap with meals, scheduling meals with friends and those days when I'm too tired to eat with everyone and choose a nap over dinner, there are only a couple of mealtimes left. So if someone asks me to grab a meal spontaneously, I seriously consider whether it's more important to catch up with them or be present in my house community. The answer changes depending on the week, but it's a dilemma I've had to face too many times.

Final choice: [read the article to find out.](#)

11:00 p.m.: Would you rather get a full night's rest or spend time planning for life after graduation?

Final choice: [read the article to find out.](#)

That's it for today's round of, Would you rather: Stanford edition.

Thanks for sticking with me. For every choice that I make one day, I try to balance it and make the opposite choice next time. Because everything can't be at the top of my to-do list all the time. Even though I have a big picture of what is important to me in life, in reality the day-to-day decisions I make must reflect what's important in the moment.

STANFORD DAILY
ARTICLE EXCERPTS OF
ASTRID CASIMIRE, HB '19

"Would you rather: Stanford edition" and "Time to delete the email app from my phone" are excerpts of just two of Astrid's 15 [Stanford Daily articles](#). Honest and insightful, her wise reflections help melt away stress and build perspective.

Time to delete the email app from my phone

Last year, I turned off the email notifications from my phone in an attempt to declutter my life. But now I compulsively open the app to see what I missed, and I think I've gone too far. When I feel awkward at a social event, I open the Gmail app and pull down to refresh, while thinking how sad is it that I'm checking my email right now.

Yet, I can't help myself.

I'm wondering how many friendly interactions I've missed out on because I was checking my email.

I'm eyeing my phone right now and the thought of getting rid of the email app discomferts me...

A DAY IN THE LIFE OF A STANFORD STUDENT



DAVID A. HAMBURG, M.D., FOUNDER

Hamburg is memorialized as a campaigner for international peace, a champion of educational excellence and leader in conflict resolution in the [New York Times](#), the [Washington Post](#) and the [Carnegie Corporation of New York](#). In 1996, he was awarded the Presidential Medal of Freedom, the highest honor given to a civilian by the U.S. Government.

Hamburg and seven other eminent Stanford faculty members [founded](#) the Program in Human Biology in the late 60's and early 70's to train and empower future leaders. Hamburg had already established and chaired Stanford's psychiatry and behavioral sciences department before founding the program in Human Biology. He developed and taught the

As the Director of Human Biology, I came to know David's keen intellect, sage advice and passion for humanity. I appreciated too his honesty and wit.

I was most fortunate many years earlier as an undergraduate to benefit from his prescient wisdom via the legacy of the Human Biology program that he created with others. I took my Human Biology degree in 1984, and that experience forever changed my life. Today I am a clinician caring for children with brain tumors at Stanford's School of Medicine, a researcher in the epidemiology of childhood cancer, and an educator in neuroscience and epidemiology—a very interdisciplinary child of Human Biology. I am thankful to David Hamburg and the other founders for the gift of Human Biology taking me where I am today.

On behalf of Human Biology, our extended faculty, staff, and family, and close to 8,000 Human Biology alumni, I share our sympathy and immense thanks for what David Hamburg gave to us. He was an amazing man.

*Paul Fisher, M.D.,
Bing Director of Human Biology*

undergraduate course, *Man as Organism* with co-founder Joshua Lederberg, then developed and taught Human Biology B-side Core courses, *Behavior As Adaptation* and *The Transformation of Human Society* with Herant Katchadourian, Sandy Dornbusch and Alberta Siegel and *Evolution of Human Behavior* with Jane Goodall.

These innovative courses began a legacy of Stanford's top faculty giving students in the Core the kind of first-class instruction they need to take on society's multifaceted and complex problems.

Hamburg headed the Institute of Medicine, the health policy branch of the National Academy of Sciences, the American Association for the Advancement of Science, and the Carnegie Corporation of New York. He taught health policy and served as director of the Division of Health Policy Research and education at Harvard University, applying a

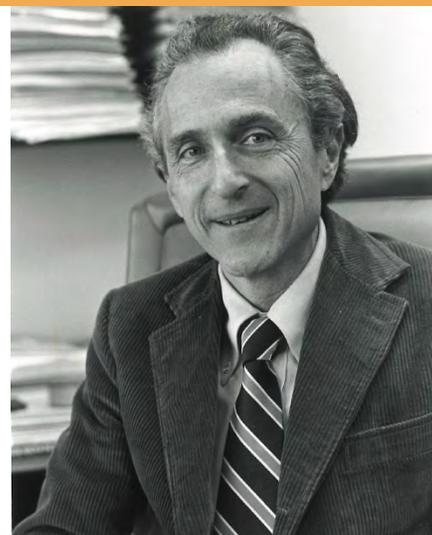


Photo: Stanford News Service

David A. Hamburg, M.D., Human Biology founder, died on April 21, 2019, at the age of 93.

cross-disciplinary approach to health-policy issues. At Carnegie, he expanded their work in education and healthy development of children (part of which was HumBio's Middle Grades Life Science Curriculum Project). He served on committees such as the U.S.-Soviet Joint Study Group on Crisis Prevention, the Defense Policy Board of the Department of Defense, and the Carnegie Commission on Preventing Deadly Conflict. He also chaired several groups in science policy, such as the advisory boards of the National Institute of Mental Health and the National Science Foundation. From 1988 to 1995, Hamburg was a member of Stanford's board of trustees. He served as an adviser and distinguished fellow at the Nuclear Threat Initiative. And chaired two parallel committees at the United Nations and the European Union on the prevention of genocide.

Hamburg was the author of a number of [books](#) including, *Preventing Genocide: practical steps toward early detection and effective action*.

Learn more about Hamburg's involvement in Human Biology in these [video](#) and [audio](#) interviews made in honor of HumBio's Biology's 40th.

From [The Program in Human Biology: The First 30 Years](#)

David Hamburg did pioneering research on stress and anxiety, as well as the relationship between physiological and behavioral factors in mental illness. He was very interested in studying the behavior of primates, in the 1970s helping Dr. Jane Goodall set up a center at Stanford to study primates called Gombe West. After HumBio was started, he taught in and continued to guide the program, as its first Reed- Hodgson Professor. He also served as as a key negotiator in the 1975 Gombe kidnapping, spending ten weeks negotiating in Africa for the students' release.



PAUL FISHER'S CONTRIBUTIONS 2012-2019

BACHELORS
OF SCIENCE
OPTION

DATA
ANALYSIS

CAPSTONE

ONLINE
DECLARATION

SCIENTIFIC
LITERACY

COMMUNICATION
SKILLS

DIRECTOR PAUL FISHER'S FAREWELL

Hello, I Must Be Going

That title dates back, as best I can tell, to a Groucho Marx sketch from *Animal Crackers* in which his character appears and then departs rapidly. Well, my stay as Human Biology Director seems that way. I feel as though I started just yesterday, but my term ends this summer after seven years. Professor Lianne Kurina will take over this September as Human Biology's 11th Director.



The last seven years have witnessed a number of changes in Human Biology, including a new B.S. option; an overhauled Curriculum Committee with a rigorous course proposal and review system; new minors in Global Health, Epidemiology, and Health Policy; many new faculty faces; emphasis on student curricular capacities in communication, data analysis, and scientific literacy; implementation of Capstones to replace our Internship; and an online declaration system with yet another Stanford acronym, "SFACT." No doubt, Human Biology will continue to evolve more.

What lies ahead for me? As I addressed our 48th graduating class in Human Biology at a sunny Commencement in the Quad on June 16, I will continue to let serendipity and opportunity be my guide ([full commencement address here](#)). As I shared with our students, Human Biology has prepared me (Class of '84) to be happy and to have a good life, to serve and help others more than myself, be they patients or students or human knowledge, valuing always the community around me more than myself and leaving the world a little better each day. For certain, I will continue to teach neuroscience in Human Biology 4A of the Core, as well as my upper division Cancer Epidemiology course, while reconnecting with my epidemiologic research on childhood cancer. And yes, I have a few patients waiting for me in clinic.

My deepest gratitude goes to everyone who continues to give Human Biology such great purpose and energy to advance the human condition. As always, I want to thank our supporters, alumni, staff, faculty, and most of all, our students for making Human Biology the great major it is. You are our future.

You are in great hands with the next Bing Director in Human Biology, Lianne Kurina, Ph.D. She too is an epidemiologist, who came to us in 2013 from the University of Chicago. She teaches Human Biology 88, Introduction to Statistics for the Health Sciences, and an upper division Principles of Epidemiology class. As one student remarked a couple years ago on a class evaluation, "Professor Kurina is the bomb. She articulates everything very clearly, answers all questions, and is funny and friendly." She will be a force as Human Biology cruises past age 50.

Fifty? Yes, Human Biology's 50th anniversary jubilee celebration is approaching, slated to take place in autumn 2021 during Stanford Reunion Weekend. Stay tuned for details. In preparation for our 50th, please feel free to send us your HumBio artifacts or recollections in consideration for inclusion in our celebration materials.

For now, enjoy this edition of our Human Biology newsletter. Our unique major continues to be robust and diverse, and our students and alumni continue to impress and inspire with their broad range of achievements. Do peruse the articles that capture just a few of the many HumBio community members in action making the world a better place: <https://humanbiology.stanford.edu/newsletters>. Stay connected with Human Biology! Lead a career workshop for our students. Join over 1,200 alumni in HumBio's [LinkedIn group](#). Share your thoughts, news, and stories.

You will continue to find me all over the Farm, so please feel free to reach out any time at pfisher@stanford.edu Best wishes ahead, and remember, it's all right now.

Paul

Paul Graham Fisher, MD | Professor, Neurology and Pediatrics, and by courtesy, Neurosurgery, Health Research and Policy (Epidemiology), and Human Biology | The Beirne Family Professor of Pediatric Neuro-Oncology | The Bing Director of Human Biology | The Dunlevie Family University Fellow in Undergraduate Education | Chief, Division of Child Neurology, and Vice Chair, Department of Neurology | Stanford University and Lucile Packard Children's Hospital

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While Fuller enjoys working at the bench, as a principal investigator she must dedicate her time instead to supporting her lab team. She misses bench work, but said, "Thinking about all of the data being generated by different team members in the lab and seeing the connections is a wonderful job. Even the stress of applying for high-stakes grants can be worthwhile because I have to stop and think about our data, work from others in the field, and frame the next questions. The resulting grant proposal is a blueprint for making the next steps in discovery happen."

Fuller is adventurous and artistic. A can do person who thinks outside-of-the-box, her advice for living is, "If you love something, do it. It will make you happy." Also, "Always keep learning - once you stop learning, go do something else." As a college senior she enjoyed painting, and considered it as a possible career. As a scientist, her artistic traits are expressed in her passion and drive to work hard, in her search for original ways of doing things, and her ability to take creative leaps of mind in theorizing.

Human Biology history is repeating itself in providing generations of Core students with the highest quality of science teaching. Fuller is a powerhouse professor who delivers the fundamentals of biology with drive and passion. She is fueled by optimism and excitement about scientific discoveries. One of the long-standing and classic pieces of advice in scientific research is to cherish your exceptions. Fuller says, "We are in the business of discovery-research, not to prove our preconceived notions of how things work, but to be surprised." When one of her research mentees came to her with a disappointing experimental outcome that did not fit the expected model, Fuller said, "Hooray! It does not fit our model - that means there is more to explore!"



Photo: Carlos Seligo



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2019 REUNION
SAVE THE DATE!
FRIDAY OCTOBER 25
REGISTRATION IS FREE!

HumBio turns 50 in 2021!

*Send your memorabilia for our
jubilee celebration materials.*

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Student Services Assistant: Matt Kramer
Writing Specialist: Shay Brawn

PROGRAM IN HUMAN BIOLOGY
450 SERRA MALL, BLDG 20
STANFORD UNIVERSITY, CA 94305