

THE Physiologist MAGAZINE

JANUARY 2020



GENE SCREEN

A serendipitous crowdsourcing project changed the trajectory of Andrea Meredith's research.



Read the comparative physiology blog

Life Lines

by

Dr. Dolittle

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lifelinesblog.com



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CALL FOR NOMINATIONS

EDITOR-IN-CHIEF

American Journal of Physiology—Heart and Circulatory Physiology[®]

Nominations are invited for the position of editor-in-chief of the *American Journal of Physiology—Heart and Circulatory Physiology* (ajpheart.org) to succeed Irving H. Zucker, PhD, who will complete his term as editor on December 31, 2020. The American Physiological Society (APS) Publications Committee plans to interview candidates in the spring of 2020.

Applications due: January 10, 2020



How to Nominate

Nominations, accompanied by a curriculum vitae, should be sent to the chair of the APS Publications Committee via email, care of APS Publications Department Administrative Assistant Charmon Kight (ckight@the-aps.org).

Meet the Team

physiology.org/ajpheart/edboard

Submit Your Best Work

ajpheart.msubmit.com

Thank You, Staff

BY SCOTT STEEN, CAE, FASAE



Happy New Year! I hope you had a wonderful holiday season filled with family and friends.

The Physiologist Magazine was created to celebrate our members and spotlight their work. Certainly, there is a lot to celebrate. I am constantly impressed by our members' brilliance, passion and commitment to furthering scientific discovery. And I am deeply gratified by your dedication to the Society and willingness to offer your talents for the common good.

As I reflect on the new year, I want to celebrate another group of people who contribute their passion, time and talent to make APS a truly special organization. When I arrived at APS about 18 months ago, I was concerned about the long tenures of so many of our staff members. I was hired specifically to bring change to the Society, and change is difficult, especially for those with a strong connection to the past. I was very aware that I might receive a frosty reception and that it might take years to change the culture.

What I found instead was a team of professionals with a deep devotion to our members and mission. Not only was the staff warm and welcoming to me, they were also much more open to change than I could possibly have imagined, eager to share their ideas and find ways to better serve our members.

BREAKING DOWN SILOES

Right away, the staff expressed the desire to break down siloes and work more effectively across department lines. One of the greatest examples of this was the development of our new website, led by Christine Zhou from our IT Department and Coleen Kitaguchi from our Communications Department.

During the past year, several APS team members have assumed new positions, while others have added new responsibilities. Stacy Brooks moved from manager to director of communications, leading the creation of the new *Physiologist Magazine*. Brooke Bruthers

stepped into the role of director of education and member communities at a time of tremendous change for the department, after serving as the long-time senior manager of diversity programs. Kevin Chian became director of finance, leading both the accounting team and the budgeting process. And Christina Bennett, PhD, assumed interim leadership of the Publications Division and managed the process of finding an editor-in-chief and publishing partner for our new premier journal, *Function*. Veronica Purvis, director of marketing, managed all the moving parts of our rebranding effort, while Rebecca Osthus, PhD, associate director for government relations and science policy, along with Bruthers, shepherded the development of our new code of conduct and diversity policy.

CHANGING COURSE

As we worked to implement our strategic plan, staff were asked to make significant changes and stretch in new directions. For example, Linda Allen, director of scientific meetings and section communities, and team were asked to envision an APS annual meeting outside of our partnership with Experimental Biology. Chief Engagement and Partnerships Officer Meg De Cagna and Associate Publisher for Digital Karie Kirkpatrick are leading an effort to consolidate the Society's websites under the physiology.org banner. And the Education Department—now the Education and Member Communities Department—is reimagining many of their activities. Senior Program Manager Margaret Stieben has moved from managing K–12 activities to applying her expertise to oversee program design. Esther Samuel has moved from the Executive Office to provide administrative coordination for the new Engagement and Science divisions. Change is happening everywhere, and our staff is not only adapting, but leading the way.

I have been impressed with the APS staff across the board. Our staff love our members and the physiology community, care deeply about the discipline, and are striving to build a future-ready organization capable of serving our members for generations to come. That's something to celebrate.

Scott Steen, CAE, FASAE, is executive director of the American Physiological Society.

“Not only was the staff warm and welcoming to me, they were also much more open to change than I could possibly have imagined.”



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animals function and stay healthy in
this public-facing, translational blog.
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#APSBenefitsMe



“The
[EB]
meeting
stimulates new
scientific ideas and
collaborations in a
fun, collegial
way.”

—Audrey Vasauskas, APS Member
Alabama College of Osteopathic
Medicine

WITH MEMBERSHIP COMES COLLABORATION

Comprised of more than 14,000 attendees, the American Physiological Society's (APS) annual meeting at Experimental Biology (EB) is a hub of cutting-edge interdisciplinary research impacting life sciences. APS members enjoy discounted registration rates. Take advantage of your benefits and register at the-aps.org/benefits and learn about the meeting at apsebmeeting.org.



We had a busy fall at APS headquarters as we welcomed several of our hard-working committees for in-person meetings. Here, members of our Diversity and Inclusion, Trainee Advisory and Women in Physiology committees get down to business discussing ways to make APS and the physiology community more equitable, supportive and inclusive.



International researchers studying the kidney, high blood pressure and related medical conditions convened at the APS Aldosterone and ENaC in Health and Disease: The Kidney and Beyond conference last October. Find conference proceedings and research news at www.the-aps.org/enac.



LABNOTES

MENTORING Q&A YOUR QUESTIONS ANSWERED
POLICY IQ PHYSIOLOGY ON THE HILL AND IN THE HALLS
RESEARCH FIZZ 2019'S TOP TRENDING RESEARCH
STATS & FACTS PHYSIOLOGY BY THE NUMBERS
UNDER THE MICROSCOPE OUR MEMBERS, UP CLOSE
PUBLISH WITH POLISH RESEARCH TRENDS

STATS & FACTS

1:59:40

Eliud Kipchoge's recorded marathon time for the INEOS 1:59 Challenge in Vienna, Austria, on October 12, 2019

World Athletics

RESEARCH FIZZ



Potato ingestion is as effective as carbohydrate gels to support prolonged cycling performance

This study suggests that eating potato puree during endurance exercise provides as much fuel—and results in similar performance—as carbohydrate gels in trained athletes.

Journal of Applied Physiology, October 2019
<https://doi.org/10.1152/jappphysiol.00567.2019>

STATS & FACTS

9.58 seconds

The current world record for the men's 100-meter dash, set by Usain Bolt in 2009

World Athletics



MENTORING Q&A | PRIORITIZING EXERCISE

Work. It. Out.

Build a healthy fitness routine into your busy career and life

Each issue, we'll ask a trainee member to pose their career questions to an established investigator and mentor. Here, Laura Coats, a doctoral candidate at the University of Mississippi Medical Center, asks for strategies to make space for exercise in the midst of a demanding and stressful work schedule. Sue Marsh, PhD, clinical associate professor of pharmaceutical sciences at Washington State University, shares advice on the importance of prioritizing health, carving out moments for movement and “no excuses” strategies for squeezing exercise into a busy schedule.

Q: How do you maintain an exercise routine while balancing the pressures of producing, publishing and grant writing?

A: The key is to build exercise into your daily routine, the same as you would (or should) eating and sleeping. Making your health a priority will actually help you be more productive at work and will also improve relationships

outside of work with friends and family.

Q: What's the best time of day to fit in and maintain a workout routine?

A: This is largely down to personal preference, the type of exercise you do and what works best for your schedule. When I was younger, I used to participate in competitive sports that were scheduled in the evenings. I invariably had trouble falling asleep afterward, which then led to me not being at my best the next morning. Some people find that exercising

“Demonstrating to your PI that you are more alert and productive when you are able to incorporate exercise into your daily routine should help to win them over.”

at lunchtime works best for them, but this can be difficult if you're in a workplace that doesn't have the facilities for you to clean up afterward. When I first became a faculty member, I found that early-morning workouts were best for me, as I was then heading into work feeling refreshed and ready to go. In recent years though, I've gotten lazier and I now run to and from work most days so that I can't talk myself out of exercising. It's how I get to work!

Q: Do you think senior researchers see it as a negative when young scientists prioritize exercise, mental health and

physical health? If so, any tips for addressing these issues with superiors who may prioritize productivity over self-care?

A: This can be a tricky issue, especially for junior scientists. For me, I simply cannot be a productive scientist if I am not looking after my mental and physical health. Regular exercise is how I maintain my overall health, and I always encourage my own students to do the same. My first suggestion is to ask about expectations when you are interviewing with a potential adviser or principal investigator (PI); if they are solely focused on trainee productivity and are dismissive about the health

and well-being of the people in their lab, I would be concerned about joining their lab. If you're already working in this kind of environment, look at your daily schedule and see if there is period of time or a couple of smaller chunks of time that you could exercise. This could be something as simple as going for a walk while your immunoblot is incubating, taking the stairs instead of the elevator or walking while you call in to a conference call or webinar. Over time, demonstrating to your PI that you are more alert and productive when you are able to incorporate exercise into

your daily routine should help to win them over.

Q: I find that when I get very busy and stressed at work that my workouts become much less productive and sometimes do not happen at all. Do you have any suggestions on how to maintain an exercise and active mindset in times of stress?

A: The key is not to be too hard on yourself when times are tough. If you don't feel like going to the gym, even something as simple as heading out to walk around the block can make you feel better. Walking your dog (or cat) can force you to leave the house, even if just for a few minutes. If you are too tired to exercise after a long day in the lab, don't feel bad about taking it easy and heading to bed early. Certain kinds of exercise, such as lifting weights, boxing, yoga and running, can also help you shrug off the stress and tension when things don't work in the lab. Arranging to meet and exercise with friends can help keep you on track with your schedule. Running or walking while listening to podcasts or audiobooks is also an effective way of helping the brain let go of the problems or frustrations of your day. ☺

Got a career question you'd like to submit? Email it to education@the-aps.org and we'll consider it for an upcoming Mentoring Q&A.

STATS & FACTS

\$54 Billion

The estimated direct health care cost of physical inactivity worldwide

World Health Organization

RESEARCH FIZZ



Exercise training impacts skeletal muscle gene expression related to the kynurenine pathway

Research suggests that exercise-induced muscle changes could help boost mood in older adults.

American Journal of Physiology—Cell Physiology, March 2019

<https://doi.org/10.1152/ajpcell.00448.2018>

STATS & FACTS

1 in 5

The number of adults worldwide who don't get enough physical activity

World Health Organization



POLICY IQ | LOBBYING 101

How to Advocate for Research

YOUR REPRESENTATIVES NEED TO HEAR FROM YOU. YOU DECIDE THE WHERE AND HOW.

If you work in a lab that depends on federal research grants, Congress needs to hear from you about why it is important to support the budgets of agencies such as the National Institutes of Health (NIH) and the National Science Foundation (NSF).

While peer reviewers and agency officials determine which grant applications receive funding, Congress plays a central role in this process by setting annual budgets for each agency. Congressional support is essential to continued federal funding of biomedical research and training.

APS members working on our Science Policy and Animal Care committees conduct several visits to Capitol Hill each year to advocate for biomedical research funding, but you don't have to be in Washington to have an impact. Check out these tips for contacting Congress both locally and virtually:

Do your research:

The first step in any congressional outreach is identifying the appropriate congressperson to contact. Contact information for senators and representatives is available on the House and Senate websites. The House website at www.house.gov will identify your representative from your nine-digit home ZIP code. The Senate website at www.senate.gov lists senators by state. Both have links to the members' websites, which have the addresses and telephone numbers of local offices. Members' websites have biographical information

and may say whether the member belongs to any disease advocacy caucuses that might be related to your work.

Forms to send an online message can usually be found on the contact information page. It's also the place to find links to social media accounts and phone numbers for the members' local and D.C. offices.

Next, decide how you want to interact: face-to-face (in your district) or virtually (from your couch).



FACE-TO-FACE

Request an appointment:

Call your member's office and say you would like to meet with the legislator (or someone on the staff) to discuss federal support for biomedical research. Mention your institutional affiliation, but make clear you will be speaking for yourself.

Prep for your meeting:

Before the meeting, visit the Federation of American Societies for Experimental Biology (FASEB) website for fact sheets showing how much money your state or district received last year from NIH, NSF and other federal agencies.

Find them at www.bit.ly/FedResearchFundingMap.

The fact sheets show that while these agencies are headquartered in Washington, they fund research and training at institutions in your state. Bring copies of these fact sheets to the meetings.

Stay cool: If this is your first meeting with a legislator, you may feel nervous, but these meetings are usually low-key and friendly. No one will expect you to be an expert on every topic. They only want to know your opinion.

Follow these steps for a great visit:

1. Start by thanking the legislator or staffer for meeting with you.
2. Explain that you are there as an individual constituent.
3. State that the purpose of your visit is to ask the legislator to support federal funding for biomedical research and training.
4. Give a brief explanation of your work in non-technical terms—something along the lines of what you would say to family members or at a social occasion.
5. Tell them what federal support you have received for your own research and training and the names of the agencies that have supported your work. You might also mention how many students you have trained and/or how many people are employed in your lab.

6. Show them the FASEB funding fact sheets for your district and/or state.
7. Ask if they have any questions. (If they have a question you can't answer, tell them you will find out and get back to them.)
8. Thank them for their time.



VIRTUAL ADVOCACY

Before you reach out to your representative(s) online, remember to do these activities on your own time and send any messages from your home computer so that federal or state resources are not used to lobby Congress.

Be social: Social media is an easy way to share your views and send brief messages to Congress. Members of Congress use social media as a way to exchange information and find out what's on their constituents' minds. Bearing in mind that all online communications are public, it's best to stick to messages that are positive in tone.

Send a message: Email is still a primary way to communicate with congressional offices. If there isn't an email address on the website for your senator or representative, look for an

online message submission form. Each member of Congress has a staff that is responsible for monitoring communications and responding to constituent inquiries. Anything arriving through the U.S. postal service will be delayed by security measures, so electronic methods of communication are preferred.

Is it urgent? Make a call: If you have a time sensitive message to share, call your senator or representative's D.C. office. When the receptionist answers, tell them briefly why you are calling and they will either connect you to a staff member or take a message so that they can pass on your views.

Get help honing your message: Politics change fast, and it can be hard to know what messages will be effective at any given time. For help in crafting your messages, check out the resources available online from APS at www.the-aps.org/advocacy and FASEB at www.bit.ly/FASEBAdvocacyToolKit. While you are there, click to connect on social media and sign up to receive email communications that will let you know when key opportunities for advocacy arise. 📧

PUBLISH WITH POLISH | METRICS

Research Trends

How can you tell if the research you're publishing is making a splash? Nontraditional metrics such as Altmetric and Dimensions badges can track where content is being shared in real time—badges appear only after research is shared—helping you measure your sphere of influence. APS simplifies your data gathering by including Altmetric and Dimensions badges with every published article.

THE ALTMETRIC BADGE—also known as “the donut”—illustrates the buzz created when readers share and discuss an article online. The weighted score is compiled from online mentions, such as by news outlets, blogs, social media and citation networks. Clicking on the badge displays the breakdown of the channels promoting an article. You can also learn who's talking about your research, which could help you identify future collaborators. Learn more at www.altmetric.com/products/altmetric-badges.



THE DIMENSIONS BADGE links research information from grants, publications, citations, clinical trials, patents and policy documents in one place. The Dimensions badge allows authors to measure the scientific influence of their article via total citation count, recent citation count, field citation ratio and relative citation ratio. A text summary places these values in perspective by comparing them with other articles in the same field. Specifics are at www.altmetric.com/blog/dimensions-badges-a-new-way-to-see-citations.



Still have questions? More information about APS journal metrics can be found at www.physiology.org/metrics.

APS' experienced publishing staff share their tips and know-how to help you improve the polish of your scientific manuscripts. Got a scientific publishing or style question that you want us to weigh in on? Email it to tphysmag@the-aps.org.

STATS & FACTS

20–30%

The increased risk of all-cause mortality from being insufficiently active

World Health Organization

UNDER THE MICROSCOPE

Rapid Fire Q&A

Ana Estevez, PhD, discusses the people and experiences who've influenced her career in science, the importance of basic science to medical breakthroughs and why "The Big Bang Theory" is her favorite science-related TV show even when they didn't get the details quite right.

Q: What inspired you to become a scientist?

A: As an undergraduate, I got the chance to do a small-group independent project in my developmental biology class. It surprised me how much I enjoyed the entire experience, and this opened my mind to science as a career option.

Q: Favorite time of the day/week to work in the lab and why?

A: On days that I don't teach, I like to come in early in the mornings to run my experiments. There are fewer

interruptions, and there are no meetings scheduled then.

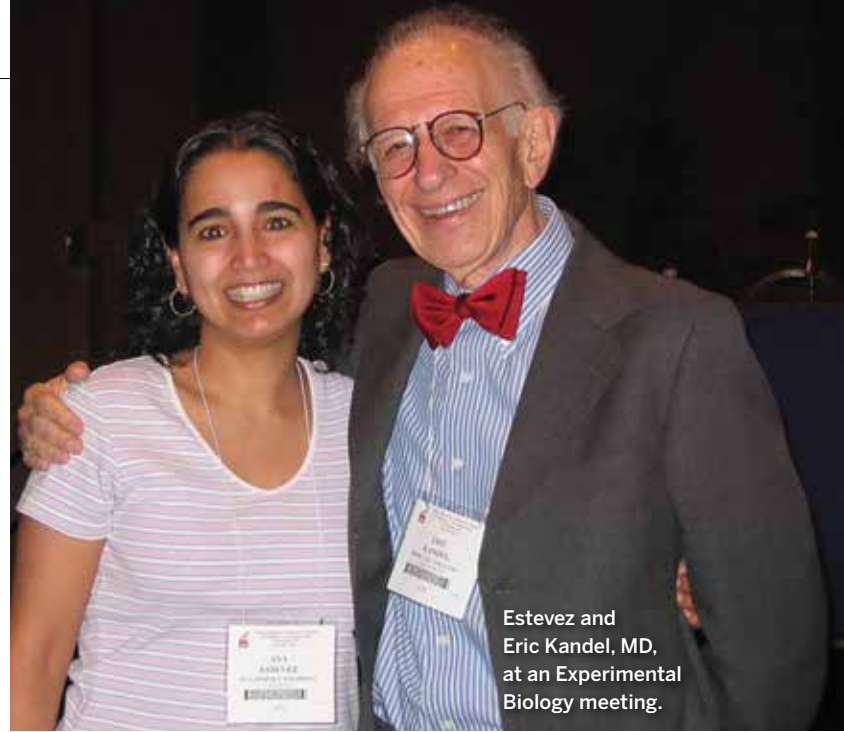
Q: "Old school" technique you're most proud of mastering?

A: Patch clamp electrophysiology.

Q: Items on your lab bench that you are/were most possessive of?

A: My micropipettes and my worm pick.

Q: If you could meet any scientist (living or dead) who would it be and why?



Estevez and Eric Kandel, MD, at an Experimental Biology meeting.

A: Eric Kandel because he is a cellular neuroscientist who uses model organisms to understand the cellular basis of memory. I actually got a chance to meet him at an Experimental Biology meeting several years ago (see above), but that was a brief interaction. I would love to have more time to chat with him.

Q: If you could do a sabbatical with any scientist (living or dead) who would it be and why?

A: Santiago Ramón y Cajal. He was able to infer so much about brain function through the microscopic study of its structure. I would love to witness his thought process and his amazing technical abilities in person.

Q: If you were a model organism, which model organism would you be?

A: *C. elegans*, of course.

Q: What do you wish the general public understood about science or research?

A: That basic science is a long and arduous process, with

many failures interspersed with some successes. Eventually, all of this work can contribute to great discoveries, but it takes time. A great example of this is the new combination drug recently approved by the FDA to treat cystic fibrosis. This new treatment was decades in the making and couldn't have happened without all of the basic science research that went into studying cystic fibrosis. (See APS' I Spy Physiology blog: bit.ly/CFTreatmentTestamentToBasicResearch.)

Q: Favorite book about science (fiction or non-fiction)?

A: "My Stroke of Insight: A Brain Scientist's Personal Journey" by Jill Bolte Taylor.

Q: No. 1 guilty pleasure?

A: Chocolate cake with a scoop of vanilla ice cream.

Q: Most influential scientist on your career?

A: My PhD mentor, Dr. John W. Phillis (deceased). As a first-generation college graduate, pursuing a PhD was definitely



Estevez and her husband, Tim, in Paris, France.

Q: What do you wish the general public understood about science or research?

A: That basic science is a long and arduous process, with many failures interspersed with some successes. Eventually, all of this work can contribute to great discoveries, but it takes time.

unchartered territory for me. Dr. Phillis took me into his lab and taught me the ways of science at the bench but also beyond the bench. Most importantly, he always treated me like I belonged there just like everyone else.

Q: Favorite science-related TV show (fictional or factual)?

A: "The Big Bang Theory," especially after they cast a real-life neurobiologist (Mayim Bialik) on the show to play ... a neurobiologist. Unfortunately,

they don't always get the neuroscience right. For example, on one episode there was rat brain atlas picture hanging upside down!

Q: The scientific discovery or invention (made by someone else) that you wish you had made?

A: Long-term potentiation.

Q: Biggest misconception about physiology ... in five words?

A: It is an outdated discipline.

Q: Most valuable quality in a colleague?

A: Kindness.

Q: Tell us a surprising fact about you.

A: I was in an Academic Olympics team in middle school that made several local TV appearances.

Q: How would you describe your job to a child?

A: I teach college students how the brain works, and in the lab I try to discover new medicines to treat brain conditions.

Q: Favorite charities you support?

A: Doctors Without Borders and North Country Public Radio (arguably the best National Public Radio station in the country!).

Q: Favorite musician/musical artist/band?

A: Bon Jovi and Boyz II Men.

Q: All-time favorite city in the world?

A: Paris, France.

Q: City, suburb, country? (Favorite place to live)

A: I grew up in New York City, but I have now embraced rural living. 🏡

Ana Estevez, PhD, is associate professor of biology and psychology at St. Lawrence University in New York where she teaches courses that serve the neuroscience majors. She is a cellular neuroscientist with research interests in ion channel physiology and neurodegeneration.



Estevez and her dog, Miko.

RESEARCH FIZZ



Intrinsic foot muscles contribute to elastic energy storage and return in the human foot

This study finds that the plantar muscles in the arch of the foot contribute to elastic energy storage in humans.

Journal of Applied Physiology, January 2019
<https://doi.org/10.1152/jappphysiol.00736.2018>

STATS & FACTS

150 minutes

The recommended amount of weekly moderate-intensity aerobic activity for adults ages 18–64

World Health Organization

RESEARCH FIZZ



The Microbiota-Gut-Brain Axis

This comprehensive review explores the influence of the gut microbiome on both body and mind.

Physiological Reviews, October 2019
<https://doi.org/10.1152/physrev.00018.2018>



Gene Screen

A serendipitous crowdsourcing project changed the trajectory of Andrea Meredith's research, connecting her directly with patients of a mysterious disease.

BY MELANIE PADGETT POWERS

One night just before bed in August 2018, Andrea Meredith, PhD, was reading the *New York Times Magazine* on her iPad when she came across an article about a six-year-old girl in South Dakota named Kamiyah who had a mysterious disorder.

Over 300 times a day, the little girl would fall or slump forward, with large portions of her body paralyzed. An episode would last anywhere from three to 20 seconds. Then, suddenly, she would pop back up and resume whatever she was doing. The article mentioned that Kamiyah had paroxysmal dyskinesia, a type of movement disorder. But the cause was unknown.

The symptoms began to sound eerily familiar to Meredith: She realized the article could be describing the gene and ion channel her lab was focused on every day. “I turned to my husband and sort of said it for the record: ‘Hey, Jim. This looks like a BK channel mutation, but they don’t name the gene. It’s torturous.’”

Kamiyah’s genome had been sequenced at the National Institutes of Health (NIH) two years earlier, but her parents had not been contacted with any results. Then, in the middle of the *New York Times* reporting, Kamiyah’s mom heard from the NIH. The results showed a gene mutation. That first article Meredith was reading, however, did not name the gene.

The symptoms began to sound eerily familiar to Meredith, an associate professor in physiology at the University of Maryland School of Medicine. She realized the article could be describing the gene and ion channel her lab was focused on every day. “I turned to my husband and sort of said it for the record: ‘Hey, Jim. This looks like a BK channel mutation, but they don’t name the gene. It’s torturous.’”

The story that Meredith had stumbled upon was part of a collaboration by the *Times* and Netflix to crowdsource potential answers to undiagnosed mysterious disorders in individuals. In Kamiyah’s case, the cause of her paroxysmal dyskinesia was found during the article’s reporting, but the underlying disease didn’t have a name, and her parents had not heard of anyone else who had the same gene mutation.

Two and a half weeks later, a follow-up article about Kamiyah named the gene mutation. “They said the gene is *KCNMA1*,” Meredith says. “I read the follow-up article right before I got into the car [for work]. I have this super-long commute. Then I was trapped in the car for almost two hours, thinking, ‘Oh my gosh, that’s my ion channel.’”

Meredith emailed the *Times* the next day. That exchange would change the trajectory of her research. She would appear in a Netflix documentary, connect with families linked to her research and launch a foundation.

A LIFE’S WORK

Meredith did her postdoc at Stanford University in California, where she began studying the physiology of ion channels. That’s where she made the first genetic deletion of the *KCNMA1* gene.

For the past 13 years, she has been running her own lab at the University of Maryland, immersed in the science of *KCNMA1*, which encodes the BK ion channel (BK stands for “big potassium”). The channel regulates how much potassium exits a cell, a process that controls numerous neurological processes.

Before the *Times* article, Meredith’s team was studying how the BK

channel was used for information coding using the circadian clock as the exemplar. “For example, some people are morning people; some people are evening people,” she says. “And there is a variety of genetic bases for that. We were interested in understanding whether changing BK channel properties as a result of natural occurring genetic variation between individuals would influence how the brain’s clock tells time.”

When Meredith came across Kamiyah’s story, she wasn’t surprised that people were affected by a *KCNMA1* gene mutation. A 2005 research study in *Nature Genetics* was the first to report on a family affected by a different *KCNMA1* mutation. But that family in China wasn’t identified. “It would never have occurred to us that we could have a personal interaction with the patients. It was just a pedigree in the literature,” Meredith says.

The *Times* replied to Meredith’s email, requesting a Skype interview, which is when she learned about the Netflix show. She actually ended up doing three Skype interviews, and Netflix even sent a film crew to film her in her lab and at her house. “It was a bit nerve-racking,” Meredith says. “They didn’t have a scientist in the crew, so it felt like a free-for-all in

terms of what they might want. I was so much more prepared to present the science, obviously, but it was very clear they wanted the emotional side of things.”

They did take after take, as they encouraged Meredith to use simpler language for a lay audience. “They wouldn’t let me use big words like ‘ionic currents’ or ‘action potentials.’ They asked more questions about how I ‘felt’ about Kamiyah and other kids with *KCNMA1* mutations.”

However, she was intrigued by the process. “It was the most interesting to see the end product because after all the takes and retakes ... it wasn’t clear to me that any of it (especially scientifically) was even remotely going to make sense. I think they did a great job piecing together the story, both in the whole episode and how our little piece of the science fit into it.”

Through the reporting team, Meredith was connected to Kamiyah’s family, who sent her the little girl’s genetics report. As Meredith’s research team examined the findings, the researchers realized they had already studied Kamiyah’s mutation. They had found the sequenced gene in a public database curated by the NIH, but it was anonymous. Because it wasn’t linked to Kamiyah or to a disease, Meredith’s team considered it an orphan mutation. “We knew exactly what her mutation did, and we knew that it was stronger than any other mutation that we had seen before,” she says.

A NETFLIX DEBUT

In August 2019, Netflix released a seven-part documentary called “Diagnosis.” Each episode outlines the crowdsourcing efforts to diagnose someone’s mysterious symptoms.

Meredith appears in episode four, “Looking for a Village.” In a Skype

interview on the show, she describes her reaction to reading the initial article: “All of a sudden, everything I’d gotten into science for and started studying this particular channel for could potentially be linked to a human patient that I could help.”

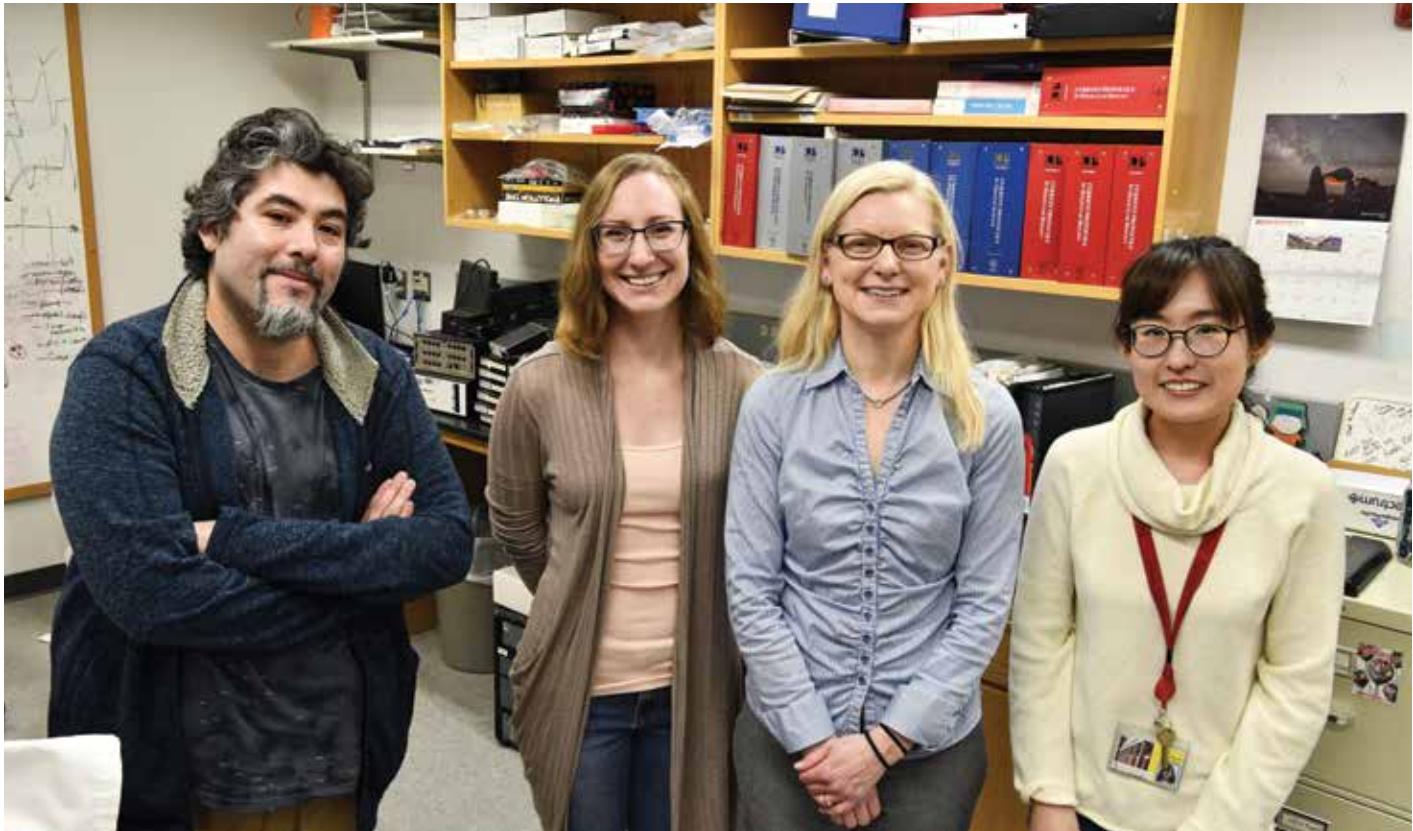
In an especially poignant moment in the documentary, Meredith makes another connection—this time, a maternal one. During a Skype call with Kamiyah’s mom, Breteni, Meredith gets choked up as she describes her dedication to this research. She told *The Physiologist Magazine*, “At first I was a little bit ashamed because scientists are supposed to have a stiff upper lip, but my daughter is just about the same age as Kamiyah. I realized the gift of having a healthy child and the agony of watching your child have these baffling attacks that you can’t control.”

AN URGENT MISSION

Meredith says she had trouble sleeping after hearing about Kamiyah: “I was really haunted.” Through Facebook, other families with kids like Kamiyah started popping up. So far, fewer than 50 people in the world have been identified with the disorder.

“I felt a sense of urgency that we really needed to kick everything

“I’ve always been very focused, and very mechanistic, but I would certainly say that what we feel now is a sense of pressure and a sense of urgency—that it’s not just intellectual anymore.”



Left: courtesy Tom Jemski, University of Maryland School of Medicine

Meredith, second from right, with her lab team: postdoc Hans Moldenhauer, PhD; grad student Amber Plante; and postdoc Su Mi Park, PhD.

in the lab into overdrive and start figuring out how to understand what their mutations were doing and how they were producing symptoms,” Meredith says.

First, she gave the disorder a name: *KCNMA1*-linked channelopathy. “The only thing that defines this disorder—because we don’t really know anything about it mechanistically—is the fact that people that present with these symptoms have mutations in *KCNMA1*,” she explains.

Meredith also co-founded the *KCNMA1* Channelopathy International Advocacy Foundation with Sotirios Keros, MD, PhD, a pediatric neurologist and epilepsy specialist at the University of South Dakota. The Foundation serves as the home base, educating and connecting

families with each other and the research community. The team is also developing a patient registry. In the future, the Foundation plans to develop patient education resources, raise money for research and sponsor meetings and conferences.

CROWDSOURCING CAUTIONS

While crowdsourcing in this case connected families who had felt all alone, Meredith urges caution with using crowdsourcing in health care.

“I actually think that there’s a potential danger in this, and the danger is not that the answer will be wrong because I think it could be relatively straightforward to sort out the evidence of whether a diagnosis is right or wrong,” she says, “but the danger, in my opinion—and I’ve seen this in the patient population that

we’re now interacting with—is that as soon as you come up with a gene mutation or a candidate diagnosis, the patients think there’s a cure.

“They hope that because a gene mutation has been discovered that that means that my lab or somebody else’s lab tomorrow, the next day, fairly soon, is going to wave a magic wand and have a precision medicine answer for their child, and it doesn’t work like that.”

In fact, knowing these kids have a specific gene mutation hasn’t changed the treatment plan or led to new therapies yet. Their day-to-day lives remain the same. Meredith says parents with children who have *KCNMA1*-linked channelopathy should be trying the standard anti-seizure and dyskinesia medications for their kids.

What has changed is that Meredith's lab is actively making mutations in transgenic mouse models with CRISPR using these kids' specific mutations. "We basically switched all of our resources over to understanding how these patient mutations ... change the channel properties and then how they might produce symptoms in an animal model," she says. "We really put every single resource that I have in my lab into this, and our next goal is to get a grant funded on it. NIH support is so critical to projects like these."

Her research team is trying to figure out how the mutation produces symptoms—and how and why some of those symptoms differ from patient to patient. While nearly all of these patients have some sort of movement disorder and a seizure disorder, the types of seizures vary widely. In addition, it's unclear whether a host of secondary symptoms are linked to the mutation.

"The most important thing to discover is not necessarily how the mutations change the channel properties but how those mutant channels produce the symptoms of the disease," Meredith says. "The forefront of understanding *KCNMA1*-linked channelopathy is really understanding the brain and neuromuscular mechanisms of the seizure and the movement disorder that these mutations produce."

While the disorder is found mostly in children, Meredith thinks that's circumstantial. Adults with the disorder have probably gone undiagnosed because whole genomic sequencing wasn't available when they were kids and *KCNMA1* wasn't yet a part of any genetic testing panel. Instead, the adults were likely diagnosed with an unnamed seizure disorder and

put on seizure medication. And that's fine for now, Meredith says, because without a cure for *KCNMA1*, treating the symptoms is the recommended course.

Meanwhile, Meredith and her lab press on to learn more about *KCNMA1*-linked channelopathy,

"If this is the contribution that I make until the end of my career, I would be completely satisfied. It feels like everything that I did up until now prepared me for meeting these patients and being ready to help them."

with the hope that better treatment or a cure may one day be found. "I've always been very focused, and very mechanistic, but I would certainly say that what we feel now is a sense of pressure and a sense of urgency—that it's not just intellectual anymore," Meredith says. "There are real kids whose daily lives could be changed if we understood more about the mechanisms of this disorder."

"I feel really committed—and I don't want to be overstating it—but it came to the right person. I've always worked on this channel, and if this is the contribution that I make until the end of my career, I would be completely satisfied. It feels like everything that I did up until now prepared me for meeting these patients and being ready to help them." 🐦



Share Share

Researchers grapple with the value—and risk—of sharing unpublished data at conferences.

BY HEATHER BOERNER

S Spencer Cushen's data was generating the kind of interest that a PhD candidate might hope for at Experimental Biology (EB). It should have been a highlight of his career. Indeed, it was a defining moment, but not in the way you might expect.

"I felt like I was prey almost," says Cushen, who is getting his PhD at the University of North Texas Graduate School of Biomedical Sciences.

That's because as the 2019 conference wore on, researchers more senior—faculty members and junior scientists who had already received their PhDs—started taking photos of his poster, with still unpublished data. Sometimes they talked to him about his findings. Some grad students snapped photos and walked away.

All he could think was, "It's my dissertation. I have to publish it to graduate."

As social media changes the way people share data, Cushen isn't alone in grappling with the impact of smartphones and the easy dissemination of unpublished data online. At this year's APS Annual Meeting at EB, new rules around data sharing will be implemented, allowing presenters to state at the beginning of their presentations or note on their posters whether they will permit photos to be taken of unpublished work.

“One of my mentors used to say that when people are hungry, they lose their manners around the dinner table. Right now, science is underfunded. People may be close to losing their manners.”

Then, it's up to attendees to honor the presenters' wishes. Whether the precaution is necessary—whether anyone's data really has been scooped from photos taken at conferences—is unclear. But it's time to start having the conversation, says Robert Hester, PhD, APS' outgoing Joint Program Committee chair.

“This year,” he says, “the idea is to have a discussion.”

STIFF COMPETITION

The world in which Cushen is presenting data is different than it was when Hester began in the field years ago. “Twenty years ago, no one thought data had economic value,” says Hester, professor of physiology and interim chair of data science at the University of Mississippi Medical Center.

“Nowadays, data is everything”—the key to grants, publications and, in some cases, patents.

That's in part because the competition is so stiff today, he says. Over the past decade or longer, the annual budgets of the National Institutes of Health (NIH) and the National Science Foundation (NSF) have failed to keep pace with the rate of inflation, meaning that both agencies have lost purchasing power. At the same time, the size of the scientific workforce has grown faster than federal research budgets, with the end result being more competition for grants. The chance of getting a research project grant funded by the NIH fell from 32 percent in fiscal year (FY) 2000 to 20 percent in FY 2018, meaning that only 1 out of every 5 grant applications submitted receives funding.

“One of my mentors used to say that when people are hungry, they lose their manners around the dinner table,” says Stella Goulopoulou, PhD, assistant professor of physiology and anatomy at the University of North Texas Graduate School of Biomedical Sciences. “Right now, science is underfunded. People may be close to losing their manners.”

Meanwhile, with the increased sharing of data, universities and researchers are more protective of their intellectual property (IP), says Hester, who chairs the IP committee at the University of Mississippi. In the 1990s, the U.S. Patent and Trademark Office created the provisional patent to protect IP as researchers develop their findings. Once you file a provisional patent, the clock starts ticking. You have one year to file the full patent.

When your provisional patent is on file, “it's a whole lot easier to submit an idea” to a conference, Hester says.

And then there's publication. “Published work is pretty much our

currency—how we're evaluated for everything," Cushen says.

If a journal withdraws its interest in publishing because a competitor publishes similar data elsewhere—or because a more experienced researcher can duplicate the work faster than a trainee—it can bring a very sudden end to years of research.

For Cushen, who is relying on this data to earn his degree, when people were taking photos of his work, the fear of losing all of that control of the data “felt 100 percent real to me.”

A few months after Cushen's presentation, Goulopoulou, Cushen's mentor, emailed with what she thought was good news. Another lab was submitting data for another conference that was “very in line with what we do,” Goulopoulou says.

“This is great,” she told Cushen. “Maybe we can talk to them.”

But Cushen wasn't cheerful. “Oh,” he said. “These are the people who were taking pictures of my poster.”

He had never felt comfortable with strangers taking pictures of his findings. “I was naive,” he says. “I don't think I'll let anyone take photos of my work again.”

AN N OF 1

There's no way to know what role Cushen's research had in the work of the other lab, of course—if it played any at all. Cushen and Goulopoulou say that researchers work along similar tracks all the time.

Certainly not every picture taken at a conference ends up on social media or in another lab's published work. And there may be good reasons for people to take photos at conferences, says Christina Bennett, PhD, APS publication director, policy.

For instance, attendees who are not native English speakers may need more time to read the information on a slide. Others may take a picture to review the

results at a later time or share it with lab-mates who were unable to attend the meeting. The intent is not the same as attempting to replicate the findings quickly and publish them as their own work. It may also be a generational thing: Younger researchers may take notes by taking photos instead of writing, Hester says.

If you look at the Twitter account of W. David Merryman, PhD, Walters Family Chair of Engineering and professor of biomedical engineering, pharmacology, medicine and pediatrics at Vanderbilt University in Nashville, Tenn., it's full of photos of the researchers from his lab.

He's also one of those conference attendees you see with his phone in the air taking photos of slides. But a review of his Twitter account for more

than a year shows that he doesn't post those photos online—though he has retweeted photos of findings from his own lab. From his perspective, “this is widely known,” he says. “Everyone takes pictures.”

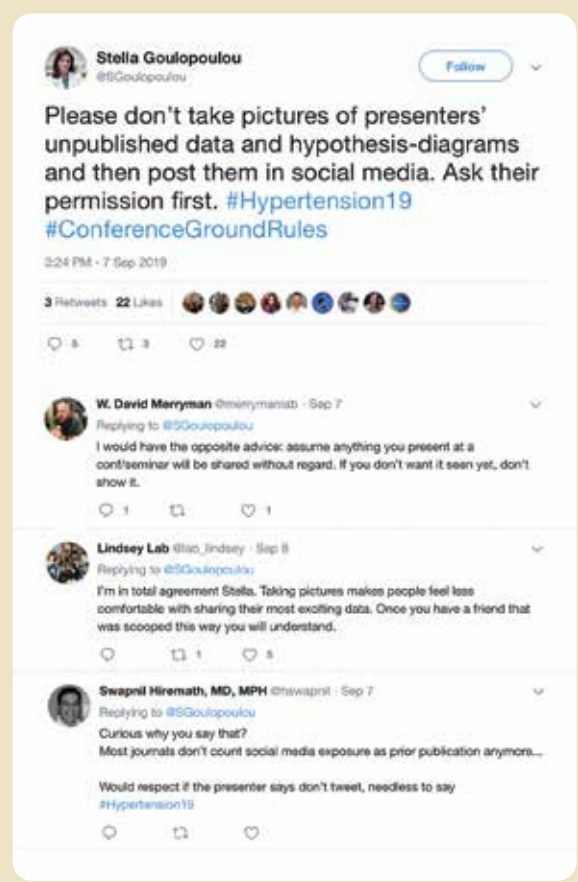
So when Goulopoulou, a member of the APS Science Policy Committee, tweeted at a September conference, “Please don't take pictures of presenters' unpublished data and hypothesis-diagrams and then post them in social media. Ask their permission first,” with the hashtag #ConferenceGroundRules, Merryman's response was decisive.

“I would have the opposite advice: assume anything you present at a conf/ seminar will be shared without regard. If you don't want it seen yet, don't show it,” he tweeted back.

Where do you stand?

We'd like to hear from you on scooping in science and your interpretation of the “scientific honor code.”

Do you share science on social media? Have you been scooped? Is there a scientific honor code and, if so, what does it entail? Email us your thoughts at tphysmag@the-aps.org. Your input will help APS guide future policies and better understand the true landscape of how research is and should be shared at scientific conferences.



He was surprised by Goulopoulou's tweet, he says. For one thing, pre-print databases and bioarchives make it so people can lay claim to their work even before it's officially published. For another, publications such as *eLife* now offer "scoop protection"—they won't pull publication of a paper that's in review if someone else publishes similar data. Plus, provisional patents give scientists an opportunity to protect their work and share it with the field.

Many projects his trainees are working on can take up to five years to complete. Prohibiting them from presenting out of fear of being scooped is a "complete disservice" to them, he says.

He says there are lots of benefits of presenting data, even data that may be new: You might connect with other researchers, get tips on methods or ideas for how to proceed, or discover opportunities to collaborate.

"If scientific leaders see your presentation, they can learn who you are, learn your work," he says. "Those are the people who are reviewing your fellowship idea. There's a human element here. If you keep your PhD students locked up, they never get that chance."

Still, he says, if data is particularly sensitive or pivotal, you may want to hold off on presenting until you're closer to publication. And he acknowledges that his take on this now as an endowed chair is probably different than it would have been when he was a trainee.

"For the junior people, it may seem much more risky than for people further in their careers," Merryman says. "When you're a junior researcher, you're an n of 1 and you only have yourself to consider. When you're the leader of a large lab, you can see the benefit of sharing data more widely and see the data from trainees move the field forward."

Rather than starting a session with your phone out, instead start it with a conversation: Approach someone and explain why you're interested in their work. Ask for their presentation. That both spreads the research and makes connections that could be important later.

A SCIENTIFIC HONOR SYSTEM

Following Goulopoulou's tweet, others, such as Swapnil Hiremath, MD, MPH, associate professor of medicine at the University of Ottawa, pushed back on Goulopoulou's tweet but ended the tweet with, "Would respect if the presenter says don't tweet, needless to say."

This is the cost-benefit analysis that both early-career and established researchers must navigate, Bennett says. "It's a balance. You attend meetings and share data to learn and move the field forward," she says. "If no one shared their unpublished findings, conferences may hold less value for attendees who are looking to gain new scientific insights."

That's the environment in which the new APS conference data-sharing policy is being suggested. It may be that the new policy is a solution in search of a problem, Hester says. But we won't know until we talk about it.

"Some may say we're blowing this up out of proportion," he says. "We have no evidence as far as I know." To him, the point is not the photos in particular; it's the lack of conversation.

"The biggest thing at EB is networking," he says. "You get to talk

about their science, your science, potentially do projects together. Say you have this mouse strain I'd like to use. Well, that's fine. I can help with that and send some mice to you to breed. But with EB, my concern is that taking pictures isn't that. It's not the true definition of collaboration."

Hester suggests that, rather than starting a session with your phone out, instead start it with a conversation: Approach someone and explain why you're interested in their work. Ask for their presentation. That both spreads the research and makes connections that could be important later.

In the end, though, Hester says that both his recommendations and the APS policy are just suggestions. "There's no way to enforce this."

And that's where, Goulopoulou says, the scientific honor system comes in. "Most people don't mean anything bad" in taking photos at conferences, she says. "My response is just to bring this up: How do you participate in this honor system? Any society has rules—what are the rules? The goal is to keep the honor system and still trust each other." 🐾

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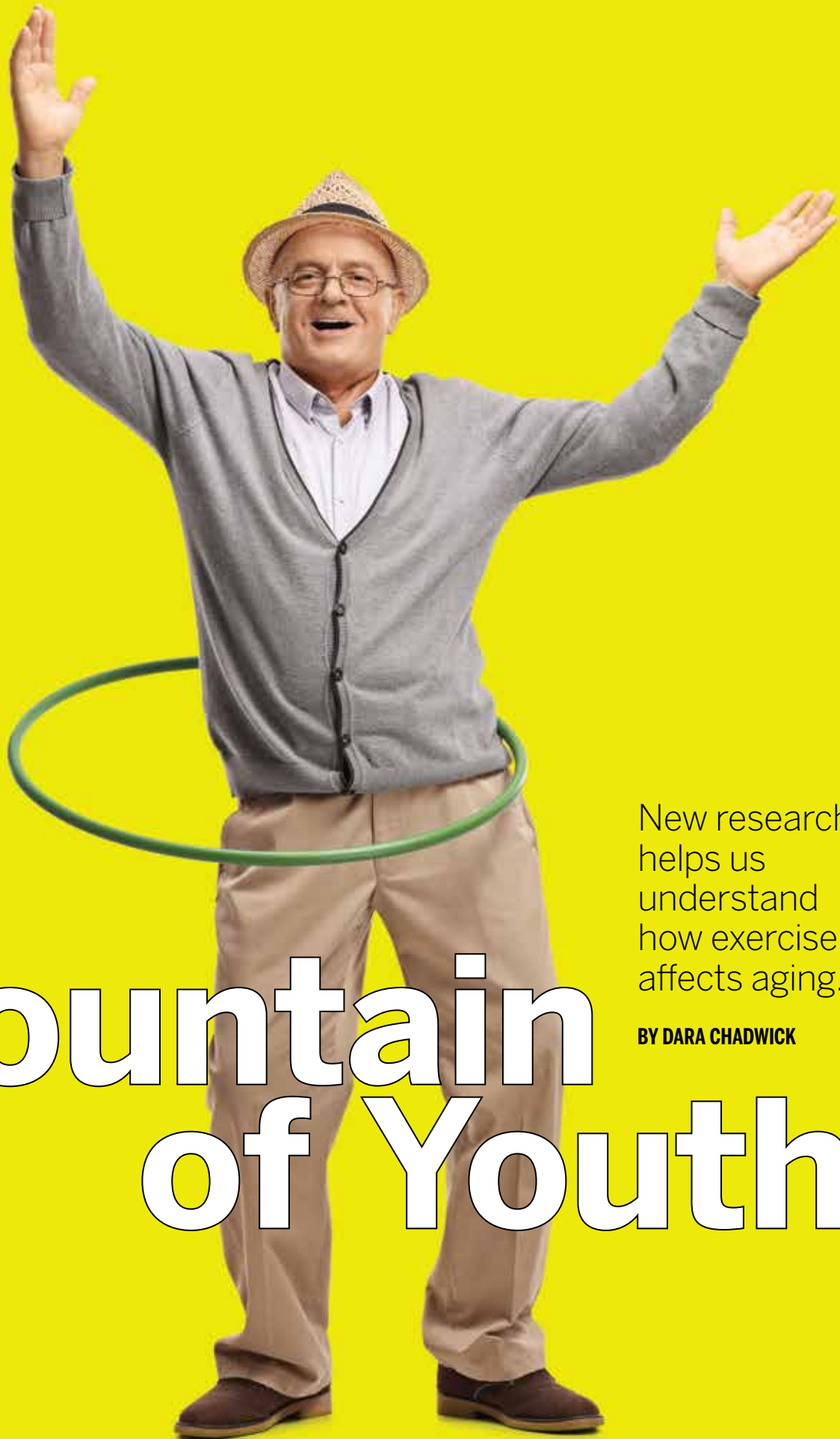
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New research helps us understand how exercise affects aging.

BY DARA CHADWICK

Fountain of Youth?



Browse the magazine rack at your local supermarket and you'll likely see headlines like "Sexy Abs in 7 Days" and "Ripped Right Now." It seems the lay media would have readers believe that visibly changing your body is as simple as hitting the gym a few times.

It's enough to make an exercise physiologist laugh out loud.

In this new year, as droves head to the gym determined to meet their fitness goals, physiologists who study exercise remain focused on what we know—and sometimes more importantly, what we don't know—about exercise's effects on the body. While people often say they want to "get in shape," beneath this generality is a series of complex physiological processes.

“We know from research that during exercise, hormones and chemicals are made in the muscles, liver, brain, etc.,” says Scott Trappe, PhD, director of the Human Performance Lab at Ball State University in Muncie, Ind. “It’s all connected at some level. We’re learning more about it.”

Trappe and his brother, Todd Trappe, PhD, professor of exercise science in the Human Performance Lab, have focused on exercise’s impact on aging for more than two decades. Their study “Cardiovascular and Skeletal Muscle Health with Lifelong Exercise,” which was published in the Nov. 1, 2018, issue of the *Journal of Applied Physiology*, compared the maximum oxygen consumption (VO₂ max) and skeletal muscle metabolic fitness of women and men in their 70s who were lifelong exercisers with healthy non-exercisers in their 70s and with exercisers in their 20s. Additionally, male lifelong exercisers were separated into two groups: those who trained moderately for fitness and

a “performance” group who trained more vigorously for competitive events.

Over the course of six weeks, study participants were evaluated on body composition using fasting blood draws, resting and exercise electrocardiograms, MRI to measure muscle mass, and resting and strategically timed post-exercise muscle biopsies, among other measures. “What we saw was that the benefits of exercise were outstanding,” says Scott Trappe.

Among the performance group, researchers saw participants whose cardiovascular systems looked 30 years younger than their age, while among the fitness group, they saw participants whose cardiovascular systems looked 15 to 20 years younger. Aerobic quality of the muscle was the same in both groups, he says.

“We know that muscle mass loss is a big problem in aging and that we do have a decline in physiologic function as we age,” Scott Trappe says. “But we know that exercise slows the decay.”

A WHOLE-BODY APPROACH

If you’re planning to use exercise to induce a change in your body—such as losing weight, improving cardiovascular health, boosting metabolism, controlling glucose levels, or maintaining mobility and muscle mass as you age—you need to know that not all exercise is the same.

“Exercise has an effect on not only active muscles, but almost every tissue in the body, such as brain, heart, liver, kidney, etc. But one type of exercise doesn’t fit all needs,” says Sue Bodine, PhD, professor of medicine at the University of Iowa Carver College of Medicine in Iowa City and editor-in-chief of the *Journal of Applied Physiology*. Her research has focused primarily on understanding the mechanisms that regulate skeletal muscle mass, using animal models to study how hypertrophy increases muscle mass and how inactivity and disuse produce muscle atrophy.

Resistance exercise—where you’re working against an external load—

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Integrative Physiology of Exercise Conference

Exercise physiologists: Plan to attend the Integrative Physiology of Exercise conference in Austin, Texas, this November. The conference—organized by Scott and Todd Trappe and other leading experts—is geared toward all scientists working in the field of exercise physiology and those interested in learning more about the field. The conference theme is “Distinguished Past, Bright Future.” We are excited to present a program that will include many opportunities for researchers to present their research, network and hear presentations on a variety of topics in exercise research. Visit www.the-aps.org/ipe2020 for updates on the conference program, deadlines and awards.

Conference highlights will include:

- New science in areas not routinely covered at this conference such as exercise and organ cross-talk, connective tissue and exercise, astronaut health for a mission to Mars and performance-enhancing agents for health and athletic competition.
- Preclinical and clinical updates from the \$200 million National Institutes of Health Molecular Transducers of Physical Activity Consortium initiative.
- Recognition of key historical milestones in exercise physiology, including the 100-year anniversary of August Krogh’s 1920 Nobel Prize for capillary diffusion, a century of progress since A.V. Hill’s seminal foundation of VO₂max, and the many scientific contributions of John Holloszy.
- A focus on trainees and early investigators with oral presentation opportunities, quiz bowl competition, a chaperone program, numerous awards and much more.

causes hypertrophy, which increases muscle strength, she says. “In a 12-week program, muscle strength progressively increases due to neural adaptation and increases in muscle size,” Bodine says. “Significant hypertrophy caused by an increase in muscle fiber size results in increases in strength.”

Resistance training is highly effective for people of any age, including those in their 70s, 80s and even 90s, according to Todd Trappe. “When you increase the amount of muscle you have, it helps with other metabolic processes,” he says. “We promote a ‘bread-and-butter’ approach.” He says they’ve seen huge gains in people doing resistance exercises for three sets of 10 repetitions per muscle group three days a week. This approach—in which an individual lifts an amount of weight that fatigues their muscle at about 10 repetitions (meaning they can’t lift another repetition)—would be useful for most muscle groups in the body, Trappe adds.

Maintaining muscle mass is important as we age, says Melissa Markofski, PhD, assistant professor in the Department of Health and Human Performance at the University of Houston in Texas, who studies both the role of skeletal muscle and the immune system in healthy aging. “If we maintain muscle mass, we’re more likely to maintain muscle function,” she says, adding that regular exercise also helps prevent systemic low-grade inflammation. “When a monocyte infiltrates muscle tissue, it transforms into a macrophage. The macrophage then produces inflammatory cytokines. While we don’t want macrophages to leave muscle tissue completely because they do have a ‘good’ role, exercise seems to keep the macrophages on these ‘good’ tasks and not the pro-inflammatory role. People who exercise have a lower percentage of cells with pro-inflammatory signals.”

“We know that muscle mass loss is a big problem in aging and that we do have a decline in physiologic function as we age. But we know that exercise slows the decay.”

HOW MUCH IS ENOUGH?

Those who indulged a bit over the holidays may be wondering if exercise is the key to a quick recovery. Yes ... and no. “There’s a saying that you can’t outrun a bad diet,” Markofski says. “But exercise helps us maintain healthy blood glucose and maintain weight.”

Losing weight requires a heavier exercise effort—about 300 minutes a week compared to the weekly 150 minutes of moderate exercise or 75 minutes of vigorous exercise (plus resistance training twice a week) in standard guidelines, she says, adding that dietary changes may be needed to see results.

Endurance (aerobic) exercise improves metabolic factors, Markofski says. “Evidence supports that aerobic exercise increases HDL cholesterol, helps keep fat mass low, helps control blood pressure and improves glucose control,” she says.

Aerobic exercise also boosts stamina, increasing mitochondria content and the ability to metabolize fat, Bodine says. It can be especially beneficial for people with chronic conditions such as diabetes. “When a person does aerobic exercise, muscle contraction increases glucose uptake,” she says. “This is especially helpful for someone with diabetes where insulin-regulated glucose uptake is impaired.”

With 2,000 participants being recruited, MoTrPAC is one of the largest human exercise studies and will expand what we know about how exercise impacts the body. “The initial goal is discovery. It’s a big data project looking at what molecular pathways are activated in response to exercise. People respond differently to exercise. One end goal is to be able to prescribe exercise and to have a scientific basis for it.”

Building or preserving muscle is also important for maintaining basal metabolism, according to Bodine.

So if you’re exercising, when can you expect to see results? Generally, Markofski says, with moderate to vigorous exercise, cardiorespiratory fitness improvements are measurable at four to six weeks, while fitness improvements are seen at four to eight weeks. The bad news? Stop exercising and you’ll see your gains disappear fairly quickly.

A NEW ERA IN EXERCISE RESEARCH

While the general benefits of exercise are widely known among physiologists, many questions remain as to how exercise affects people at an individual level. “With exercise, there’s a lot of interesting biology going on under the hood,” Scott Trappe says. “When you start to peel back the layers, we don’t know the molecules underneath.”

Both Trappes and Bodine are participating in the Molecular Transducers of Physical Activity Consortium (MoTrPAC), a national research consortium “designed to discover and perform preliminary

characterization of the range of molecular transducers (the molecular map) that underlie the effects of physical activity in humans.” The six-year effort, supported by the National Institutes of Health Common Fund, has nearly completed its planned animal studies, and clinical sites are now recruiting for the adult study.


With 2,000 participants being recruited, MoTrPAC is one of the largest human exercise studies and will expand what we know about how exercise impacts the body, Bodine says. “The initial goal is discovery. It’s a big data project looking at what molecular pathways are activated in response to exercise,” she says. “People respond differently to exercise. One end goal is to be able to prescribe exercise and to have a scientific basis for it.”

Scott Trappe says the MoTrPAC project marks a new era in exercise research. “We don’t yet have a handle on heterogeneity in exercise,” he says. “There’s an argument in the lay media that some people don’t respond to exercise. MoTrPAC will allow us to look at genetic variations in a larger population.”

Todd Trappe says the inclusion of “omics” experts in the study will make MoTrPAC different. “We are expecting to collect petabytes of data on the participants, and the expertise across the consortium will be necessary to stitch this magnitude of information together into a meaningful story,” he says.

But while understanding the molecular map of how exercise affects the body may yield critical data to inform exercise recommendations for individuals, it may not tell researchers something critical: how to get people to stick to an exercise program.

“It could be partially genetic,” Bodine says of why people don’t exercise. “But we also need to be thinking about exercise when designing communities. Our daily amount of activity has been decreasing because of technology.”

Still, even those who are well aware of exercise’s benefits may have trouble getting to the gym. “That’s when you call a psychologist, not a physiologist,” Todd Trappe says. 

SUBMIT YOUR LAST-CHANCE ABSTRACT

Join the community that brings together scientists of all career levels to share cutting-edge research, networking and career advancement. It all starts with submitting an abstract on your latest research and joining us at the American Physiological Society annual meeting at Experimental Biology.

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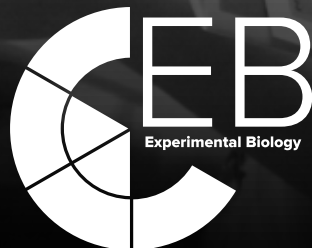
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San Diego

Tang Prize Award — Tony Hunter, PhD

Tony Hunter, from the Salk Institute for Biological Studies, is the British American scientist who discovered tyrosine phosphorylation and that the oncogene Src is a tyrosine kinase. With this discovery, Hunter gave birth to the field of tyrosine kinase inhibitors, which are prototypes of targeted cancer therapies. Its emergence made a milestone of cancer therapy.

APS Nobel Prize Award Lecture — Randy W. Schekman, PhD

During the 1970s, Randy Schekman studied yeast cells with malfunctions in the vesicles transportation system. He demonstrated that the malfunctions were due to genetic defects and explained how different genes regulate different aspects of the transports.

APS/ASPET Joint Presidential Symposium Series on Inflammation and Oxidative Stress

Topics include:

Workshop on CRISPR-Cas and miRNAs in the Study of Drug Metabolism, Cancer and Other Diseases

Cardiovascular and Renal Inflammation in Health and Disease

Inflammation and Drug Disposition

Central Nervous System Inflammation: Pain and Cognition

View more speaker announcements at apsebmeeting.org.

APS TASK FORCE ON SEXUAL HARASSMENT

APS Focuses on Diversity and Inclusion Recommendations

BY TANYA GWATHMEY, PHD; ANNELYN TORRES-REVERON, PHD; AND ALICIA SCHILLER, PHD

The APS Task Force on Sexual Harassment was established in the fall of 2018 to help solidify a culture of safety and mutual respect in the Society and create a deliberate set of principles to guide decisions on urgent matters such as harassment, diversity and inclusion, and the prevention of all types of discrimination. The Task Force was charged with developing recommendations for the APS Council to shape future Society policies on sexual harassment with respect to membership, conferences and awards. It was also charged with suggesting ways to improve diversity and inclusion, support civility and combat bullying within a scientific context.

Over the past year, we've been busy with activities that included the creation of the following policies, which have been approved by Council:

- Member Code of Conduct
- Diversity Statement
- Core Values
- Policy on Honors and Awards

Details about each policy, including information on how to make a report and how reports are investigated, can be found on the APS website at www.the-aps.org/values.

The Task Force was comprised of a diverse group of members from various committees and sections, backgrounds, geographical locations and career stages. Members were co-chairs TanYa Gwathmey, PhD, and Victor Convertino, PhD; Katherine Blackmore; Elisa Gonzalez-Rothi, PhD; Matthew Parmenter, PhD; Jennifer Pluznick, PhD; Maura Porta, PhD; Alicia Schiller, PhD; Annabell Segarra, PhD; Gary Sieck, PhD, FAPS; Ashley Stewart; Annelyn Torres-Reveron, PhD; Christopher Wilson, PhD; Lila Wollman, PhD; and Council liaison Timothy Musch, PhD, FAPS. The Task Force was supported by APS Science Division staffers Brooke Bruthers, director of education and member communities, and Rebecca Osthus, PhD, associate director for government relations and science policy.

Our activities concluded in December 2019, and we forwarded a final set of recommendations to the Diversity and Inclusion Committee (formerly the Porter Physiology and Minority Affairs Committee), which, in cooperation with the Women in Physiology Committee, will be actively working toward the long-term goal of improving the culture at APS.

APS staff will also continue to work with the Societies Consortium on Sexual Harassment in STEMM to keep resources and policies up to date. This group of over 100 associations and societies is supported by the Education Counsel, a policy, strategy, law and advocacy firm. In addition, staff who attend Society meetings and conferences participated in training to learn how to enforce codes of conduct at Society-sponsored events and programs.

We'd like to thank the members of the Task Force for all their hard work to help make APS a more fair, equitable and inclusive community of researchers. 📧

SECTION AND CHAPTER NEWS



Keep Updated on Section News

Are you keeping up with the latest news in your APS section? Many of your section leaders have posted recent updates and newsletters on their section pages. Visit www.the-aps.org/sections to read the latest news about your discipline-specific communities, including available awards, information on section banquets and other ways you can get involved.

Cell & Molecular Physiology Section



The APS Cell & Molecular Physiology Section is pleased to announce that Helle Praetorius Øhrwald, MD, PhD, is the Section's 2020 Hugh Davson Distinguished Lecturer. She is a professor of medical physiology at Aarhus University in Denmark.

Praetorius Øhrwald will present her talk "The bacteria and the host—a story for purinergic signalling in urinary tract infections" during the APS annual meeting at Experimental Biology on Sunday, April 5, from 3:30 to 4:30 p.m. in Room 27 of the San Diego Convention Center. 📧

Function Editorial Team Announced



Function Editor-in-Chief **Ole Petersen, CBE, FRS**, is pleased to introduce the journal's founding editorial team. "I am excited to have an extremely accomplished group of researchers invested in the launch—and the success—of our new journal," Petersen said of the 10 researchers tapped to be involved. "With this knowledgeable group of dedicated top scientists, we are poised to create a unique and constructive editorial home for high-profile physiological research."

EDITORIAL TEAM MEMBERS:

- Allen W. Cowley Jr., PhD, FAPS**—Harry & Gertrude Hack Term Professor of Physiology at the Medical College of Wisconsin
- Patricia Molina, MD, PhD, FAPS**—Richard Ashman PhD Professor; head of the Department of Physiology; director of the Alcohol and Drug Abuse Center of Excellence at Louisiana State University
- Mark Nelson, PhD**—university distinguished professor; chair of the Department of Pharmacology at the University of Vermont
- Christopher Newgard, PhD**—W. David and Sarah W. Stedman Distinguished Professor; director of the Duke Molecular Physiology Institute; director of the Sarah W. Stedman Nutrition and Metabolism Center at Duke University in North Carolina
- Colin Nichols, PhD, FRS**—Carl Cori Professor in the Department of Cell Biology and Physiology; director of the Center of Membrane Excitability Diseases at Washington University School of Medicine in St. Louis
- Valerie O'Donnell, PhD**—professor; director of the Division of Infection and Immunity in the School of Medicine; co-director of the Systems Immunity Research Institute at Cardiff University in Wales
- Anant Parekh, PhD, FRS**—professor in the Department of Physiology, Anatomy and Genetics; director of the Centre for Integrative Physiology at the University of Oxford in England
- Tullio Pozzan, MD, FRS**—professor of general pathology in the Department of Biomedical Sciences at the University of Padova in Italy
- Jean Schaffer, MD**—senior investigator and associate research director of the Joslin Diabetes Center; faculty at Harvard Medical School, both in Boston
- Richard W. Tsien, PhD**—Druckenmiller Professor of Neuroscience; chair of the Department of Neuroscience and Physiology at NYU Langone Health in New York

MARK YOUR CALENDARS: *Function* Editor-in-Chief Ole Petersen and members of his editorial team will host the inaugural *Function* symposium on January 22, 2020, at Duke University in Durham, North Carolina. We want to hear from you! Join us for talks, interactive panel discussions and networking. Reserve your spot at www.the-aps.org/meetings.

J. Michael Wyss Receives Presidential Award for Excellence in STEM Mentoring



J. Michael (Mike) Wyss, PhD, is a recipient of this year's Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM). "PAESMEM recognizes the critical roles mentors play outside the traditional classroom setting in the academic and professional development of the future STEM workforce," wrote the White House Office of Science and Technology Policy. Wyss is a professor in the Department of Cell, Developmental and Integrative Biology at the University of Alabama at Birmingham (UAB) and director of UAB's Center for Community Outreach Development. Learn more at www.bit.ly/WyssPresidentialAward.

Douglas Zipes Publishes Fourth Novel

Douglas P. Zipes, MD, has published his fourth novel, a legal thriller titled "Bear's Promise." Zipes—who has also written a memoir and a collection of short stories—is a distinguished professor and emeritus professor of medicine, pharmacology and toxicology at the Indiana University School of Medicine.



Paul Welling Named Handler Chair at Johns Hopkins School of Medicine

Paul Welling, MD, was inducted as the inaugural Joseph S. and Esther Handler Professor in the Department of Medicine, Division of Nephrology at Johns Hopkins University School of Medicine. He was formerly director of the Maryland Center for Kidney Discovery and a professor of physiology at the University of Maryland School of Medicine. Welling, an APS member since 1996, is currently chair of the Finance Committee. Read more about his appointment at <http://bit.ly/WellingNamedHandlerChair>.



Got exciting career news to share? Let us know! Email tphysmag@the-aps.org

DATES & DEADLINES

AWARDS

Comparative & Evolutionary Physiology Section Scholander Award (Deadline: January 2, 2020)

Comparative & Evolutionary Physiology Section Travel Award sponsored by Dr. Dolittle (Deadline: January 2, 2020)

Comparative & Evolutionary Physiology Section Travel Award sponsored by Novo Nordisk Foundation (Deadline: January 2, 2020)

Barbara A. Horwitz and John M. Horowitz Outstanding Undergraduate Abstract Awards (Deadline: January 12, 2020)

Porter Physiology Development Fellowship (Deadline: January 15, 2020)

Leonard Share Award of the APS Water & Electrolyte Homeostasis Section (Deadline: January 19, 2020)

Dale J. Benos Early Career Professional Service Award (Deadline: January 24, 2020)

Annual Marion J. Siegman Lectureship Award (Deadline: January 30, 2020)

Frontiers in Physiology (Deadline: January 31, 2020)

G. Edgar Folk Senior Physiologists Award (Apply anytime)

Local Undergraduate Research Awards in Physiology (Applications accepted on an ongoing, year-round basis)

Ray G. Daggs Award (At the committee's discretion)

More details: www.the-aps.org/awards



CALLS FOR PAPERS

American Journal of Physiology—Cell Physiology (February 29, 2020)

- Intracellular Roles of Channels and Transporters
- Tissue Remodeling: From Regeneration to Fibrosis

American Journal of Physiology—Endocrinology and Metabolism (March 31, 2020)

- Immunometabolic Cross-talk and Regulation of Endocrine and Metabolic Functions

More details: www.physiology.org/calls



CONFERENCES

Experimental Biology

- Early-bird registration deadline: February 5, 2020
- Housing deadline: March 6, 2020
- Advanced registration deadline: March 13, 2020

More details: www.the-aps.org/meetings



NOTABLE PASSING

Virendra Bhushan Mahesh, PhD, DPhil, in Remembrance (1932–2019)

BY DARRELL BRANN, PHD; J. CHARLES ELDRIDGE, PHD; AND RAJAGOPALA SRIDARAN, PHD

Virendra Mahesh, PhD, a longtime friend, advocate and mentor to many APS members, passed away in July 2019.

Dr. Mahesh received his PhD degree in organic chemistry from the University of Delhi and a DPhil degree in biological sciences from Oxford University. He was regents' professor and chair emeritus of the Department of Physiology and



Endocrinology at the Medical College of Georgia at Augusta University.

He was a renowned scientist and academician whose research in steroid hormones led to a greater understanding of their role in physiology and disease and to the development of groundbreaking treatments for infertility. He is survived

by his children, Dr. Anita Mahesh Schwarz and Dr. Vinit K. Mahesh, and six beloved grandchildren.

Dr. Mahesh touched the lives of many APS members through his service as an APS councilor and Steering Committee member, member of the APS Joint Program Committee, chair of the APS Endocrinology & Metabolism Section and member of the board of directors of the Federation of American Societies for Experimental Biology. He was a tireless advocate for APS young trainees and for science in general, as best evidenced by the Virendra B. Mahesh Award of Excellence in Endocrinology, which he established in the APS Endocrinology & Metabolism Section to promote the career development of graduate students and postdoctoral fellows.

He was a caring and compassionate mentor who set high standards and goals for himself. He was very proud of the over 95 graduate students and postdoctoral fellows he trained. "Your legacy is living in all the students and postdocs that you trained," he said.

His friends in the Society will miss his scientific brilliance; his strong advocacy, support and mentorship; and his unwavering love of family, friends, colleagues, trainees and science. 🙏

Darrell Brann, PhD, is Regents' Professor and Virendra B. Mahesh Distinguished Chair in Neuroscience at the Medical College of Georgia at Augusta University. J. Charles Eldridge, PhD, is professor emeritus in physiology and pharmacology at Wake Forest School of Medicine in Winston-Salem, N.C. Rajagopala Sridaran, PhD, is professor of physiology at Morehouse School of Medicine in Atlanta. Read their full remembrance in *Steroids*: www.bit.ly/MaheshRemembrance.

OPPORTUNITY KNOCKS

Check out these featured job listings. To find your next career opportunity or to list your job announcement with us, visit www.the-aps.org/jobs.

ASSISTANT, ASSOCIATE OR FULL PROFESSOR IN PHYSIOLOGY UNIVERSITY OF GEORGIA

The Department of Physiology and Pharmacology at the University of Georgia, College of Veterinary Medicine, invites applications for a tenure-track faculty position at the rank of assistant, associate or full professor. Anticipated start date is August 1, 2020.

Read more at www.the-aps.org/ugeorgia.

PHYSIOLOGY FACULTY BASTYR UNIVERSITY

Bastyr University, a private regionally accredited institution, is accepting applications for a faculty position in the Department of Nutrition and Basic Sciences in the School of Natural Health Arts and Sciences at its San Diego campus.

Read more at www.the-aps.org/bastyr.

ASSISTANT PROFESSOR—ANIMAL PHYSIOLOGY MARQUETTE UNIVERSITY

The Department of Biological Sciences at Marquette University is seeking to hire a tenure-track assistant professor with expertise in the broadly defined field of animal physiology whose research uses a mixture of classic and modern approaches.

Read more at www.the-aps.org/marquette.

ASSISTANT PROFESSOR IN VERTEBRATE PHYSIOLOGY UNIVERSITY OF WISCONSIN-LA CROSSE

The Department of Biology in the College of Science and Health at UWL invites applications for an academic year, tenure-track assistant professor position in vertebrate physiology.

Read more at www.the-aps.org/uwl.

PHARMACOLOGY TENURE PATHWAY FACULTY UNIVERSITY OF VERMONT

The Department of Pharmacology at UV invites applications for a faculty position at the assistant professor level on the tenure pathway, although associate and full professor candidates will be considered.

Read more at www.the-aps.org/vermont.

ADVICE TO MY YOUNGER SELF

We asked emeritus member Ananda S. Prasad, MD, PhD, for a piece of advice he would tell his younger self. Here's what he had to say:



“If you observe something very unusual, develop your hypothesis based on a prepared mind. You must design your experiments and obtain experimental data to test your hypothesis. Selection of a great mentor is the first critical step to get you prepared for a career in research.”

—Ananda S. Prasad, MD, PhD, is a distinguished professor of oncology at Wayne State University School of Medicine and Karmanos Cancer Center in Detroit.

Read his full letter at www.the-aps.org/tphysmag.

Why Marathons Are Getting Faster

BY MICHAEL J. JOYNER, MD

For years, researchers and running enthusiasts have asked “Will humans be able to run a marathon in less than two hours?” On October 13, 2019, we got our answer ... sort of. During an exhibition run in Vienna, Austria, Eliud Kipchoge of Kenya ran 26.2 miles (42.2 km) in 1:59:40.2, becoming the first person to run the sub-two-hour marathon. Kipchoge’s time does not count as a world record—he was not running in a sanctioned race, and he had a team of rotating pace makers, allowing him to draft. However, he does hold the official world record of 2:01:39, set in 2018.

His remarkable time—along with the 2:14:04 marathon run by Brigid Kosgei of Kenya the following day, which set a new women’s world record—highlights progress in marathon performances in recent decades. We’ve also gained a greater understanding of the three main determinants of what allows humans to run so fast for so long.

First, the maximal oxygen uptake ($\dot{V}O_{2max}$) of these athletes is very high, typically about two times that of a young, healthy untrained male or female. Second, they are able to run at 80 percent or more of $\dot{V}O_{2max}$ (on the order of 20 times resting metabolic rate), while key homeostatic markers—such as body temperature, pH, blood

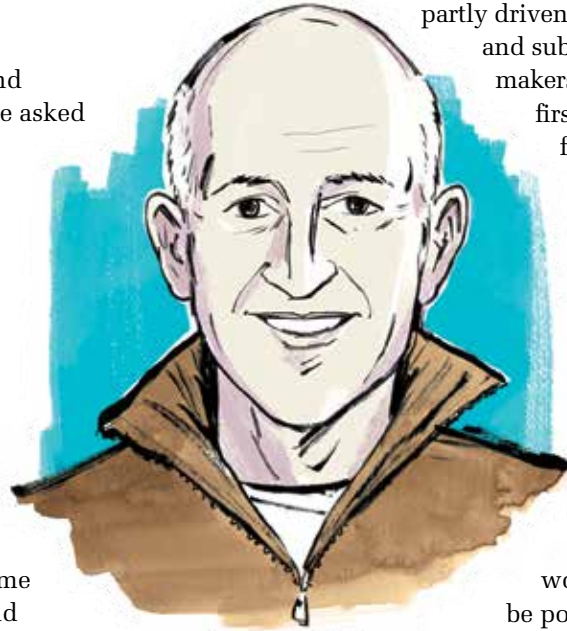
gases, blood glucose and lactic acid levels—remain at or near resting values. Third, many top marathoners have excellent “running economy,” meaning they are efficient and have a low oxygen cost.

Marathon times have also gotten faster as athletes “move up” to the marathon earlier in their careers. Careers are also much longer, partly driven by lucrative shoe contracts and substantial prize money. Pace makers are sometimes used in the first half or more to ensure a fast time. Many races are held at times of the day and year with favorably cool temperatures and on flat courses. Recent innovations in shoe technology reduce energy loss when the foot strikes the ground and improve running economy. These improvements suggest that if the right group of top runners worked together it should be possible to run in under two hours in a sanctioned race. Rigorous doping control is also essential for fast times to have credibility.

Two questions moving forward are: When will such an optimized sanctioned race occur? And will shoe technology be regulated? Improvements in cycling, swimming and speed skating equipment have made athletes more efficient and improved records. However, their equipment is regulated. Perhaps the recoil properties of running shoe midsoles should also be regulated.

As someone involved in the scientific thinking about the two-hour marathon from the outset, to see physiological ideas translated into practice has been validating. ☞

Michael J. Joyner, MD, is a physiologist and professor of anesthesiology in the Department of Anesthesiology and Perioperative Medicine at the Mayo Clinic in Rochester, Minn. His 1991 modeling paper in the *Journal of Applied Physiology* explored the possibility of a sub-two-hour marathon.



“Improvements suggest that if the right group of top runners worked together it should be possible to run in under two hours in a sanctioned race.”

A large, abstract graphic on the right side of the page. It consists of a network of interconnected nodes and lines, resembling a molecular structure or a social network. The nodes are circles in various shades of pink, purple, and blue, and the lines are thin and connect the nodes. Some nodes contain small, circular inset images of people or scientific equipment.

STAY UNITED WITH YOUR PROFESSIONAL FAMILY

We see the American Physiological Society (APS) leading advancement in the physiological sciences. While we position our members to make critical breakthroughs, the Society relies on involvement from top researchers and educators to realize this vision. Stand with fellow physiologists and **renew your APS membership today.**

**Secure your position in the future of physiology
at the-aps.org/renew-membership.**

register for our upcoming conferences



A NEXUS OF COLLABORATION AND DISCOVERY

APS Annual Meeting at Experimental Biology 2020

April 4–7, 2020
San Diego
apsebmeeting.org

Institute on Teaching and Learning

June 22–26, 2020
Minneapolis

Eleventh International Conference on Heme Oxygenase and Related Enzymes: From Physiology to Therapeutics

June 28–July 1, 2020
Los Angeles

Integrative Physiology of Exercise

November 11–13, 2020
Austin

APS members enjoy discounted registration.

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