

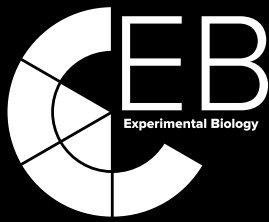
THE **Physiologist** MAGAZINE

SEPTEMBER 2019



THE 'NOW' GENERATION

Call them unique, call them insightful, call them trailblazers
... just don't call them "Next Generation."



American Physiological Society Annual Meeting at Experimental Biology

April 4–7, 2020
San Diego

Abstract Submission

Deadline: November 14, 2019

Bring your research to EB 2020 and present the findings to some of the most renowned scientists in your field.

Travel awards available at the-aps.org/awards.



#ExpBio

the-aps.org/EB

CONTENTS

FEATURES



18

The ‘Now’ Generation

Call them unique, call them insightful, call them trailblazers ...
just don’t call them “Next Generation.”

BY STACY BROOKS

24

Off Track

Why today’s early-career researchers are looking beyond tenure.

BY DARA CHADWICK

30

Up in Vapor

As more people embrace e-cigarettes, scientists weigh in on
whether “healthier” is actually healthy.

BY CHERYL ALKON

CONTENTS

DEPARTMENTS

BASELINE

4 Building a World-class Physiology Meeting

IN REVIEW

8 Control of Renal Function Conference

Leading renal researchers headed to “Kidney Camp” to discuss the latest in renal function and kidney disease.

10 Summer Leadership Summit

More than 50 APS member leaders attended the first APS Summer Leadership Summit.

LAB NOTES

MENTORING Q&A

12 You ... In Charge

Finding the right career path and being a focused, efficient and productive leader

POLICY IQ

14 APS Brings Physiology to Capitol Hill

15 Advocating for Animal Research at #HillDayAPS

15 Creating a Stronger Future for Biomedical Research

UNDER THE MICROSCOPE

16 Rapid Fire Q&A

Karen Sweazea, PhD, talks science versus dance, the upside of overflowing carboys and what she's got in common with birds.



TRANSPORT

36 Career successes and milestones of APS members

NOTABLE PASSING

37 Marilyn Merker, PhD, FAPS, in Remembrance (1954–2019)

DATES & DEADLINES

38 Calendar of upcoming events and calls for awards and papers

NEWS FROM THE FIELD

39 The JPC invites EB abstracts, plus updates from the WEH Section.

LAST WORD

40 Physiology: Dying ... Or Thriving?

Erica A. Wehrwein, PhD, examines the gap between physiology students and faculty.



#HillDayAPS

Join us for Digital Hill Day!

The Science Policy Committee will be on Capitol Hill, **Thursday, September 12, 2019**, advocating for federal research funding.

YOU can help amplify our message by joining us on social media.

Visit the-aps.org/ResearchFundingHillDay for facts, tips and sample tweets, and don't forget to follow our Twitter hashtag to keep up with our progress.

Building a World-class Physiology Meeting

BY SCOTT STEEN, CAE, FASAE



In July, our member leaders met at our first Leadership Summit and Council meeting at the Lansdowne Resort in Virginia. More than 50 Council members, section and committee chairs, trainee representatives and select APS staff attended the three-day meeting. On day one, the group discussion centered around setting priorities for the next few years at the Society, including how we will grow our membership, increase our global footprint and provide the most value to our members.

Day two was focused on one topic: how to create a world-class physiology meeting. The group discussed what a world-class physiology meeting would look like. Several key elements and themes emerged. The meeting must:

- Be built on scientific excellence.
- Engage the entire APS membership and the global physiology community.
- Provide an exceptional, “must-attend” experience that attracts scientists from all career levels.
- Raise the awareness and stature of the discipline of physiology.
- Be financially viable, supporting the mission and growth of the Society into the future.

On day three, the APS Council made a momentous and unanimous decision to create a new stand-alone annual meeting, leaving the Experimental Biology (EB) meeting after 2022. Though creating a new meeting is an exciting opportunity, it also means that we will be ending our long-standing relationship with the EB meeting, a decision that was not taken lightly.

In December 2018, APS enlisted a consulting firm to evaluate member satisfaction with the current EB meeting and determine our members’ overall meeting preferences. The process included an extensive post-meeting survey, completed by more than 1,700 meeting attendees, along with focus groups and dozens

of one-on-one interviews. They also performed a comparative analysis of EB and other similar scientific meetings.

The research found that while most students expressed high satisfaction with the meeting, satisfaction among non-student APS attendees was far lower than expected. More than 40 percent of non-student APS attendees rated their overall satisfaction with the meeting as three or below on a five-point scale. An even higher number rated the meeting poorly with regard to value, and around 65 percent of non-student attendees rated the meeting poorly when comparing value to cost. While most acknowledged that EB was a very good meeting for trainees, we were clearly not hitting our mark with other key audiences.

Summit participants first explored whether we could provide a world-class physiology meeting within the EB framework, but ultimately concluded that we would be better able to serve our members and the physiology community by developing an independent meeting.

Even with this commitment to strike out on our own, we are committed to making EB ’20, ’21 and ’22 exceptional meetings. In fact, Summit participants discussed how we might use the APS annual meeting at EB as a laboratory for testing ideas for our new meeting. Our intention is to make changes to the program and the event over the next three years that will both strengthen the quality of science and the overall experience.

The process to create our new annual meeting will begin in earnest this fall, with an expected launch in spring of 2023. APS President Meredith Hay, PhD, will be appointing and personally leading a diverse, representative planning task force. The talented APS staff will bring their many years of combined experience in meeting and event planning and professional service into this process every step of the way.

Together, our goal is to produce a global event where the entire physiology community can learn, collaborate and network. We look forward to sharing this world-class event with you. ☞

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

“Our goal is to produce a global event where the entire physiology community can learn, collaborate and network.”

why submit?

We believe the voices shaping the future of physiology should be those of working scientists.

The American Physiological Society (APS) publishes 15 highly respected scientific journals covering research in physiology and related fields. As practicing scientists who are among the leading experts in their respective fields, our editors are positioned to provide a fair and expedient review process and make decisions about what topics truly serve the needs of their fields.

Articles in our journals are primed for maximum impact and reach. In addition to hosting articles on a highly-discoverable journal publishing platform, the Society supports article promotion with social media, press releases, content alerts, special collections and more.

Discover APS journals and submit your best work at physiology.org/submit.



average time to
first decision



articles widely
promoted



format neutral
submissions



customizable
content alerts



mobile-friendly
interface



indexed in all major
abstracting and
indexing services



average time
to publication



editors are
working
scientists

THE Physiologist MAGAZINE

VOL. 62 | SEPTEMBER 2019

The Physiologist Magazine is published bimonthly and distributed by the
American Physiological Society (APS).
6120 Executive Boulevard, Suite 600, Rockville, MD 20852-4911

Scott Steen, CAE, FASAE

*Publisher
Executive Director*

Meeghan De Cagna, MSc, CAE

*Associate Publisher
Chief Engagement and Partnerships Officer*

Stacy Brooks

*Editor-in-Chief
Director of Communications and Social Media*

Melanie Padgett Powers

Managing Editor

FREELANCE WRITERS

Cheryl Alkon, Dara Chadwick

CONTRIBUTORS

Sean Boyer; Brooke Bruthers; Audra Cox, PhD, ELS; Julie Levin, Rebecca Osthus, PhD; Alice Ra'anani; Erica Roth, MS; Linda Yang, PhD

DESIGN

Latham Creative, LLC

SUBSCRIPTIONS

The Physiologist Magazine (ISSN 0031-9376) is distributed to members as part of their membership. Nonmembers in the U.S. (print only):

Individuals \$260. Nonmembers international: Individuals \$315. Tier definitions/custom pricing: www.physiology.org/tiers.

The American Physiological Society assumes no responsibility for the statements and opinions advanced by contributors to *The Physiologist Magazine*. Please notify the APS Membership Department of changes to your address or telephone number.

Phone: 301.634.7118 | Fax: 301.634.7241 | Email: tphysmag@the-aps.org | www.the-aps.org

Printed in the U.S. by Cenveo Publisher Services on acid-free paper.
Please recycle.



APS EXECUTIVE CABINET

Meredith Hay, PhD

*President
University of Arizona*

Linda Samuelson, PhD

*President-Elect
University of Michigan*

Jeff M. Sands, MD

*Past President
Emory University*

APS COUNCILLORS

Sue Bodine, PhD, University of Iowa; **Jason R. Carter, PhD**, Michigan Technological University; **Carmen Hinojosa-Laborde, PhD**, U.S. Army Institute of Surgical Research; **Charles H. Lang, PhD**, Pennsylvania State University; **Merry L. Lindsey, PhD**, University of Nebraska; **Ronald M. Lynch, PhD**, University of Arizona; **Timothy I. Musch, PhD**, Kansas State University; **Larissa A. Shimoda, PhD**, Johns Hopkins University



american
physiological
society

#APSBenefitsMe



“[The award] allowed me to invest in a new technology in my lab. The recognition also helped increase my visibility within APS and tangibly helped with respect to my successful tenure application.”

—Declan McCole, PhD, APS Member, S&R Foundation Ryujii Ueno Young Investigator Awardee

WITH MEMBERSHIP COMES OPPORTUNITY

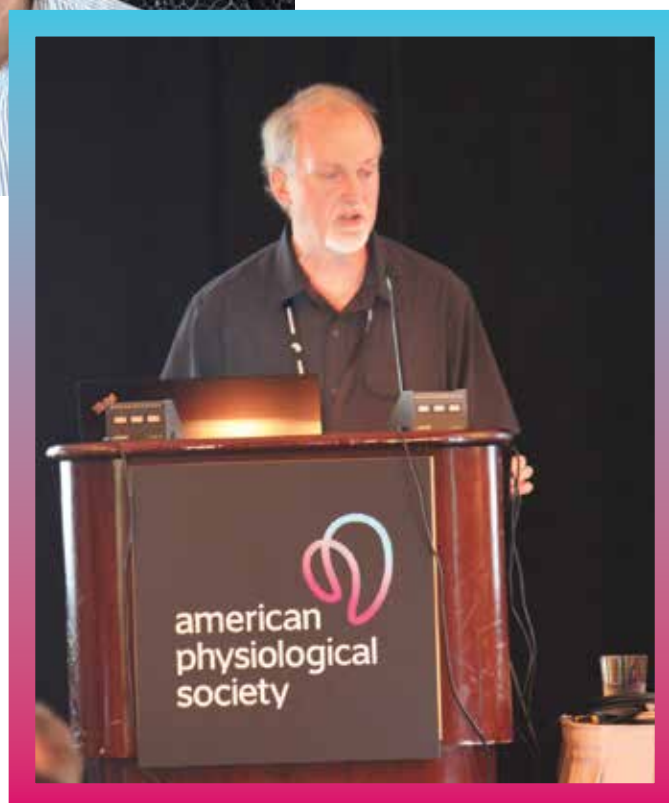
American Physiological Society (APS) members benefit from eligibility to hundreds of awards for trainees, researchers and educators. As part of our goal to foster education, scientific research and dissemination of information in the physiological sciences, APS provides more than 400 awards in the field of physiology each year totaling more than \$1.2 million. Take advantage of your benefits at the-aps.org/awards.

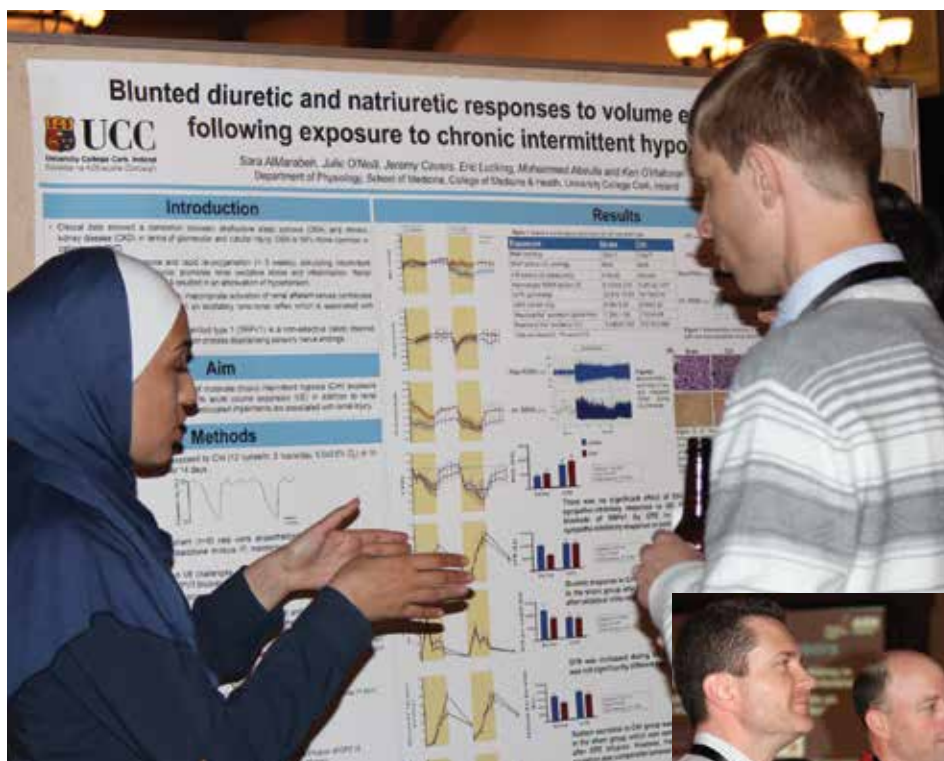
the-aps.org

IN REVIEW | CONTROL OF RENAL FUNCTION CONFERENCE

Leading renal researchers discussed recent insights in renal function and promising new treatments and diagnostics for kidney disease at the Control of Renal Function in Health and Disease Conference in Charlottesville, Va. Check out photo highlights—plus snippets of the Twitter conversation on the #KidneyCamp hashtag—from the meeting.

Courtesy of Julie Levin and Niru Rammakumar, MD





TWITTER MOMENTS

AJP Renal
@AJPRenal

While at [#kidneycamp](#) listening to outstanding talks on potassium, RAAS, autoregulation, blood pressure control etc. I keep seeing kidneys everywhere. 📍 drapes in the hotel.

[@APSPHysiology](#)
[@ASNKidney](#) [#Physiolconf](#)



Lauren Douma, PhD
@DoumaPhD

Had a blast at [#KidneyCamp](#)! One of the best conferences I've been to. I really appreciate the established investigators who took the time to chat with me. Saw amazing science & I learned archery! Can't wait for the next one!

[@APSPHysiology](#)
[@ASNKidney](#)
[#PhysiologyConf](#)





Chuck Fazio

More than 50 APS member leaders—including APS councilors, section and committee chairs and trainee representatives—attended the first APS Summer Leadership Summit in Leesburg, Va. The two-day meeting focused on the future of the APS annual meeting and the foundations of the Society's next strategic plan. Following the Summit, the APS Council held its summer meeting. Read more about the decisions that were made in the Baseline column on page 4.



LABNOTES

MENTORING Q&A YOUR QUESTIONS ANSWERED
POLICY IQ PHYSIOLOGY ON THE HILL AND IN THE HALLS
RESEARCH FIZZ BUZZ-WORTHY RESEARCH
STATS & FACTS PHYSIOLOGY BY THE NUMBERS
UNDER THE MICROSCOPE OUR MEMBERS, UP CLOSE
PUBLISH WITH POLISH BUILD A BETTER RESEARCH PAPER

STATS & FACTS

400,000

Number of people in the academic workforce with doctorates in science, engineering and health (2015)

NSF Science & Engineering Indicators 2018

RESEARCH FIZZ



Case studies in physiology: temporal changes in determinants of aerobic performance in individual going from alpine skier to world champion time trial cyclist

This case study explores changes in exercise performance in a young man who transitioned from alpine skiing to competitive cycling.

Journal of Applied Physiology, June 2019

<https://doi.org/10.1152/jappphysiol.00798.2018>



MENTORING Q&A | CAREER CHANGE AND LEADERSHIP

You ... In Charge

Finding the right career path and being a focused, efficient and productive leader

Each issue, we'll ask a trainee member to pose their career questions to an established investigator and mentor. Here, **Jody Greaney, PhD** (left), assistant professor of kinesiology at the University of Texas at Arlington, asks for tips on changing careers and balancing greater responsibility in the lab. **Jennifer Pollock, PhD**, professor of medicine in the division of nephrology and co-director of the cardio-renal physiology and medicine program at the University of Alabama at Birmingham, shares her advice for finding the right career path and being a focused, efficient and productive leader.

Above: Illustration by Kagan McLeod; bottom left: iStockphoto

Q: Where can I find information about and exposure to non-academic careers?

A: All career paths have strengths and weaknesses—you need to find your career niche that fits at this time of your career. APS and many scientific societies have information about a variety of non-academic careers, and most are just an internet search away. You can also use your networking connections within APS and at your institution for introductions to internships and shadowing opportunities for non-academic career paths.

“Setting goals (with deadlines) for all functions of your new lab, including completing regulatory paperwork and submitting manuscripts, abstracts and grants, is critical for staying highly productive.”

Q: What is an effective way to initiate a conversation with your mentor about changing career paths?

A: Determining your career niche is difficult, but talking to your mentor should not be. You should not feel intimidated by this at all. Having several shorter conversations is better than having just one long conversation. This also allows you to digest information between conversations. Self-evaluations are also

helpful in deciding when you might be ready for a change in your career.

Q: As a graduate student or postdoc, how do you manage “drinking from the fire hose” and juggling many new responsibilities—teaching, new preps, committee work, advising students, family responsibilities, etc.—all at once?

A: By setting priorities and focusing on the important parts! I am not a particularly “organized” person. However, I am very focused on what I consider important. My family, students and fellows always

are a priority for me. You need to figure out what is the top priority for you at your career level and then keep this your focus. Also, only take on tasks that you know you can do well

and efficiently—this helps you keep your focus on the things that matter.

Q: How can junior faculty effectively transition from a highly productive postdoc lab—equipped with all the right tools, resources and systems—to the total halt in productivity and data collection that can occur when getting your own lab up and running?

A: Getting a lab up and running is not trivial, and the time and effort should

not be underestimated. One strategy for this transition is to have one or two manuscripts that you will finalize and submit during the time that you are setting up your new lab. This actually helps you to show productivity during this transition and to prevent a gap in your publication record. Setting goals (with deadlines) for all functions of your new lab, including completing regulatory paperwork and submitting manuscripts, abstracts and grants, is critical for staying highly productive.

Q: What’s a strategy to form new collaborations with colleagues at another institution or outside academia?

A: In collaborations, there needs to be a “win-win” for both sides. In other words, there should be something that you are bringing to the collaboration for the other person and vice versa. You need to be very clear what the expectations and timeline will be. Quite often, this is done in small increments until a regular working relationship is established. It is best to have this in writing—it’s usually an email but can even be a formal collaborative agreement. This way, there are no surprises, which could undermine trust. ⑤

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.

RESEARCH FIZZ



Development of solitary chemosensory cells in the distal lung after severe influenza injury

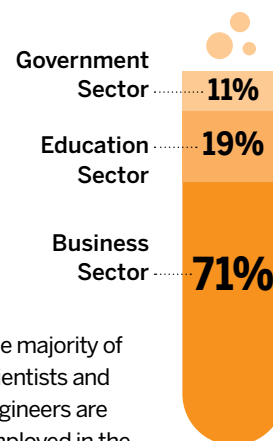
Scientists found taste bud-like cells in the lungs of mice after flu exposure. The finding may be linked to inflammation.

American Journal of Physiology, Lung Cellular and Molecular Physiology, June 2019

<https://doi.org/10.1152/ajplung.00032.2019>

STATS & FACTS

Where Scientists Work



The majority of scientists and engineers are employed in the business sector, followed by the education and government sectors. Within the business sector, for-profit businesses employ the bulk of scientists and engineers.

NSF Science & Engineering Indicators 2018

RESEARCH FIZZ



Beyond the sleep-amyloid interactions in Alzheimer's disease pathogenesis

Researchers explore the pathophysiological factors linking sleep disturbances and Alzheimer's disease.

Journal of Neurophysiology (JNP), July 2019
<https://doi.org/10.1152/jn.00118.2019>



Modest changes to glycemic regulation are sufficient to maintain glucose fluxes in healthy young men following overfeeding with a habitual macronutrient composition

This study suggests that the length of a bout of overeating can affect how the body adapts glucose and insulin processing when calorie intake increases.

American Journal of Physiology, Endocrinology and Metabolism, June 2019

<https://doi.org/10.1152/ajpendo.00500.2018>

POLICY IQ | LIFE SCIENCES FAIR

APS Brings Physiology to Capitol Hill

On June 20, APS member Daniel Michele, PhD, shared his physiology research with congressional staff and members of the public at the Life Sciences Fair on Capitol Hill. Representatives from 30 scientific societies and institutions of higher education presented interactive displays to highlight the cutting-edge research that the National Institutes of Health (NIH) funds nationwide.



Clockwise from top left: Daniel Michele demonstrates how to measure grip strength, one of the variables he tracks in his muscular dystrophy research. A participant checks out the tools Michele uses in his laboratory to measure grip strength in a mouse model of muscular dystrophy. Life Sciences Fair attendees learn about the Michele lab's NIH-funded work.

Far left, top and bottom: iStockphoto; all other photos, this and facing page: APS Science Policy Department

Advocating for Animal Research at #HillDayAPS

Sixteen current and former members of the Animal Care and Experimentation Committee went to Capitol Hill on June 18 to discuss the importance of humanely conducted animal research and its benefits for both people and animals.

Clockwise from top left: Liz Simon, PhD; Sue Bodine, PhD; and Corey Reynolds, PhD, on the steps of the U.S. Capitol. Edward Dzialowski, PhD; Laura McCabe, PhD; and Nara Parameswaran, PhD, discuss the humane use of animals in research with Sen. Gary Peters (D-MI). Peters is second from left. APS members before heading to Capitol Hill.



Creating a Stronger Future for Biomedical Research

NIH has sharpened its focus on the long-term stability of the biomedical research workforce. This comes amid concerns about declining grant application success rates and the increased age at which investigators achieve independent funding.

The Next Generation Researchers Initiative was established to develop policies to help scientists enter the workforce sooner and prepare them for long-term success. A working group of the Advisory Committee to the NIH Director presented draft recommendations in December 2018. (Read the full report at http://bit.ly/2018NextGen_Report.)

The NIH defines early-stage investigators (ESIs) as researchers who are within 10 years of having received their terminal degree and have not held an independent NIH research award. To help ESIs enter the workforce, the working group recommends that NIH:

- Expand funding pathways that do not require preliminary data.
- Review, score and calculate percentiles for grant applications from ESIs separately from applications from experienced investigators.
- Allow ESIs to retain their status after receiving a multiple investigator award.
- Extend R01 funding to five years for ESIs.
- Expand the R15 Academic Research Enhancement Award mechanism to more institutes and centers and extend the length of funding.

The working group also recommends prioritizing funding for “at-risk” investigators. These are defined as applicants who have submitted meritorious applications that, if not funded, would leave the investigators without significant research funding from NIH. To avoid negative labeling during the review process, applicants would not be assigned at-risk status until the program review level.

Finally, in light of the need to address diversity and effective mentoring, the working group called for implementing recommendations made by the NIH working group on diversity. These call for professional development and training plans for trainees funded by research grants and expanding mentoring resources such as those created by the National Research Mentoring Network program. ⑥

UNDER THE MICROSCOPE

Rapid Fire Q&A

Karen Sweazea, PhD, talks science versus dance, the upside of overflowing carboys and what she's got in common with birds.

Q: Ever had a “eureka” moment? Tell us about it in 10 words or less.

A: Discovering birds do not have an insulin responsive glucose transporter.

Q: What inspired you to become a scientist?

A: I was always fascinated with science as a kid, but as an undergraduate student I'd decided to pursue a degree in dance. That is, until I took a summer course in anatomy and physiology. My professor was a forensics anthropologist who had a way of teaching and storytelling that made the topics unforgettable. Her passion for the subject sparked my own interest in pursuing a career in science.

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

A: I enjoy being in the lab in the mornings and during the summer when there are fewer outside distractions and we can really focus on the research.

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

A: I still use X-ray film for western blots. Oldie, but still a goodie!

Q: Most challenging laboratory technique you've learned to use?

A: Cannulating small resistance arteries to measure vascular reactivity. It is tedious but really fun.

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

A: My surgical tools and pipettors.

Q: Favorite lab mishap story that you can share without incriminating the innocent?

A: A student was filling the carboys (water jugs) with deionized water and left the room for a minute to check on something else. When they came back, they discovered the water jugs had overflowed and had to mop up the whole room. At least the floors were clean after that!

Q: Best “MacGyver” moment in the lab?

A: Our humidified slide staining chamber mysteriously went missing on a day we really needed it. So, I created one using a tray from the cafeteria and some plastic pipettes.

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

A: As a comparative physiologist, I would have loved to meet Dr. August Krogh.

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

A: I would be a bird. I have a lot of energy, and I really like to eat breads, fruits and seeds.

Q: Briefly, what do you wish the general public understood about science or research?

A: I often have to remind my students that there is rarely “proof” in science. We can support or refute hypotheses through well-designed studies. But another lab may have a different way of testing their hypothesis or they may test it using a different population, which is how research outcomes can be contradictory at times.



A proud moment: Karen Sweazea with her grad students Anthony Basile (left) and Alex Mohr, who received awards from the APS Comparative and Evolutionary Physiology Section.



Sweazea “walks like an Egyptian” at the King Tut exhibit in Los Angeles.

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

A: At the moment, that would be “The Forever Fix: Gene Therapy and the Boy Who Saved It” by Ricki Lewis.

Q: Most influential scientist on your career?

A: My graduate mentor, Dr. Eldon Braun. He was one of my professors for an upper-division physiology course at the University of Arizona, and he encouraged me at that time to pursue a doctoral degree in physiology. His encouragement, support and friendship have been invaluable to my career.

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

A: “Star Trek” and, if I’m watching TV with the kids, “Brain Child.”

Q: “Old school” technique you’re most proud of mastering?

A: I still use X-ray film for western blots. Oldie, but still a goodie!

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

A: Multiplex ELISAs. They are quite useful.

Q: What is the biggest misconception about comparative physiology in six words?

A: Comparative physiology compares animals to people.

Q: Least favorite part of your job?

A: The mountain of paperwork and emails.

Q: Notable scientists you follow on Twitter?

A: APS members of course!

Q: Title you’d use on your autobiography?

A: “A Tale of Two Lives: My Life as a Scientist and a Mother.”

Q: One thing every researcher/scientist should try at least once in their life?

A: Collaborating with a colleague outside of their field on a project. It is a great way to step outside the box and develop novel approaches.

Q: Next book on your reading list?

A: “Darwin Comes to Town: How the Urban Jungle Drives Evolution,” by Menno Schilthuizen

Q: Favorite musician/musical artist/band?

A: Danny Elfman

Q: All-time favorite city in the world?

A: New Orleans 🍷

Karen Sweazea, PhD, is an assistant professor at the College of Health Solutions and School of Life Sciences at Arizona State University.

PUBLISH WITH POLISH | REFERENCES

Rev Up Your References

Formatting references can be complicated—especially when different publications use different numbering and output styles. To simplify the process, authors can download journal-specific output templates for their preferred bibliographic software, such as EndNote, Mendeley, RefWorks and Zotero.

Using EndNote as an example, authors should search for “American Physiological Society” as the publisher at <https://endnote.com/downloads/styles>. Search results will list all 13 APS journals, from which the desired template file can be downloaded and incorporated into EndNote.

Conveniently, nearly all APS journals use the same style, so downloading one of these templates is sufficient for APS’ other journals. The notable exception is the *Journal of Neurophysiology (JNP)*, for which the formatting style is distinct and requires a separate download.

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.

RESEARCH FIZZ



Effects of training, detraining, and retraining on strength, hypertrophy, and myonuclear number in human skeletal muscle

Previously trained human muscles do not respond differently to a second training period compared with previously untrained muscles.

Journal of Applied Physiology, June 2019

<https://doi.org/10.1152/jappphysiol.00917.2018>

STATS & FACTS

Among younger individuals (those degreed since 1995), women constituted

44%

of the academic doctoral workforce, while among the older cohort (those degreed in 1994 or earlier), women constituted only 26%.

NSF Science & Engineering Indicators 2018



‘THE NOW’ GENERATION

Call them unique, call them insightful,
call them trailblazers ... just don't
call them “Next Generation.”

BY STACY BROOKS

In June, five early-career APS members joined *The Physiologist Magazine*'s Editor-in-Chief Stacy Brooks for a virtual roundtable. They shared their thoughts on the landscape for scientists climbing the ranks of academia in a research community that looks a lot different from what their mentors experienced, their tips for trying to achieve work-life harmony, their favorite clichéd pieces of career advice and why we shouldn't call them “the next generation.” Their conversation has been edited and condensed.

Research suggests that fewer than 20 percent of those who attain PhDs go on to tenure-track positions. Why do you think that is?

Anne Crecelius: Oftentimes, people are scared out of academia because they associate it only with a large-scale environment. Most of the training programs within academic research are at large, public institutions with NIH research project (R01) grants. Sometimes in this job market, these opportunities are thought to be the best—or the only—option. But academic research isn't one-size-fits-all. Competitiveness and challenges are different throughout all of academia, and there are different ways to be engaged in research, whether you're at a large R01 institution, a small liberal arts school or a mid-sized school.

Daria Ilatovskaya: Statistics can also be very deceiving. Tenure as a concept is changing very dramatically now. We should take that into consideration and maybe stop defining research by the concept of getting to a tenured position as the endpoint of the research or as the concept that defines us as researchers.

Miguel Zarate: Many U.S. cities are building biotech hubs where they can provide more appealing salaries for young trainees and require

fewer qualifications. Academic jobs are demanding—you need to have publications, a history of some type of funding and, on top of that, good networking skills—but biotech companies are looking more for experience. So I think it's a new area for young trainees. We are interested in looking for other options that can actually help us in improving work-life balance as well.

But what drives me to stay in academia is the passion for what we're doing—the love of discovery of new methods or therapies to improve human health. I think love of what you're doing is essential in order to be successful in academia.

“What drives me to stay in academia is the passion for what we're doing—the love of discovery of new methods or therapies to improve human health.”



Is the traditional academic research model—the single principal investigator (PI) with a major grant, tenure and a lab supported by trainees—the framework we need today to advance science?

DI: Training is essential for everyone who wants to be in—and succeed in—science and research. I don't think there is any other model that would provide the necessary training at any level, from undergrad to established faculty. Without training and development that we are getting using this model, there is no way of going further. Even if you're at a smaller institution, you're still the PI, you're working with trainees that are working under you and you're training them. You're providing that training for whatever career path they will choose in the end. It's all about the trainee-mentor relationship.

AC: I'm at a smaller institution. I run a lab, but though I don't have staff or expectations for external funding, my institution provides support that funds small scale projects where I'm able to engage undergraduates in the discovery process. Some of those

undergraduates might go on to a research career, but more often they're going on to clinical careers. I think it's still contributing to the enterprise because if we have clinicians who are aware of the research process and methods, that's really what's going to drive actual patient impact and the benefit to human health further. It's important to appreciate the differences.

Shawn Bender: The training is really important, though I think the model is starting to change. When I was a trainee, the papers I was reading had one, two, three authors on them. So that was essentially one lab—a PI and a trainee or two. Now, you have 10 authors on a paper. The advancement of techniques and technologies, and the fact that we want to try to be as translational as possible, is forcing us to try different ways of looking at the problem that we're investigating and collaborate more with other labs than PIs at research institutions may have done historically.

How has a changing research landscape shaped your career approach compared to your mentors?

Clintoria Williams: Some of my older mentors talk about how they were given opportunities based on potential. Nowadays, we have to have a proven track record before someone will present us with opportunities. I also think there is an expectation for graduate students to become the mini version of their mentor or their professors. But my philosophy is to love what you do, do what you love. So it's important to develop your own niche through which you can contribute to a scientific team.

AC: I think there's a need for nimbleness. It's harder to be novel now than it was 50 years ago, and

nothing is guaranteed anymore. All of us have probably seen giants in the field who we've looked up to not get that grant funded. Academic institutions are literally closing their doors. So the idea that "if I make it to this certain point, I can do my job and get my grants and have this lab and this legacy and everything will stay relatively the same for 50 years," I don't think exists anymore. It doesn't exist anymore from a funding perspective or a higher-ed perspective.

SB: Collaboration really is expected now. The promotion and tenure process considers whether you are a good academic citizen. So a component of my job is "am I collaborating with people on campus?" That shouldn't be a forced thing. Thankfully, at my institution there's a lot of people in cardiovascular research, so it's a much more organic thing that benefits everybody.

What is the truest "clichéd" piece of work advice you have received?

MZ: "Your publications are your currency."

SB: "In science, all you have is your integrity." I suppose when I first heard it, I thought "that's oversimplified." But the longer you're in it, and the more you see people that make bad choices and do things that are unethical and they get caught, you realize just how devastating it actually is and how difficult it is to come back from something like that, if they come back at all. Now I try to pass this advice on to my trainees.

"There's a need for nimbleness. It's harder to be novel now than it was 50 years ago, and nothing is guaranteed anymore."

CW: “Perception is the co-pilot of reality.” Meaning that how you see yourself is how others see you. So it’s good to make sure that you always move in line with your values and your integrity.

What is the most challenging professional obstacle you’ve faced and how did you overcome it?

CW: Going from the day-to-day grind doing the experiments to now becoming what I consider a “lab-preneur.” I feel like we’re in the business of science now; we’re running small companies. It’s a steep learning curve for us all.

“My legacy in life is not my grants and my papers. My legacy is my kids, then my trainees, the people in the relationships that I have; those are the priorities.”

DI: Establishing my own lab and starting real life as an independent PI is way more complicated than I ever expected. And it is a definitely a big change from being a postdoc and not being responsible for people compared to becoming an actual person in charge. And that’s probably one of the biggest obstacles, changing your mindset from being a trainee to being an actual person in charge.

Being a PI, I now feel more like a manager or like a person in an administrative position. So that’s a different take on this career. People going into research should probably understand that it’s not

going to be actual lab research you’re doing if you become a PI, but more of a managerial position. I think this has shifted over the last 15 or 20 years.

MZ: I am not an assistant professor yet, but I can tell you, from my perspective, the transition from graduate student to postdoc was a little challenging for me.

When I was working under my PI’s grant, I had a plan for experiments and step-by-step things I had to do to accomplish the goals of his grant. But when I came to university, I realized I had to do everything from scratch, starting from having the idea, to developing an important question,

to putting it into a grant, creating the experimental design, doing the work, analyzing the data and using the conclusions to create more ideas. But I am thankful for the people here, my current boss for the guidance and training, and I feel more mature and ready for the next stage.

How do you find “work-life harmony” as you advance in your career?

SB: I’m a proud dad of four daughters under eight, and my wife and I both are professionals and work full-time. For me, even coming into an assistant professor position—I’m now five years in—I tried to be

as intentional as I could early on about putting some boundaries in place to make sure that balance was maintained. And I think an important skill to learn is how to say no.

I’m, thankfully, in a wonderful place where my chair and my dean and other people there all expect you to have priorities outside of work. My legacy in life is not my grants and my papers. My legacy is my kids, then my trainees, the people in the relationships that I have; those are the priorities. I’ve tried to be as intentional as I can, as a dad and as a husband, to maintain that balance as best I can.

DI: I do not think that I have reached a work-life balance yet. And I don’t even have kids! Setting boundaries is definitely great, but sometimes it’s very hard to do.

MZ: Academia is really hard work, and the time that you have available for yourself or your family should be specifically for yourself and your family.

I know that it’s getting harder every day to be successful in academia, and I am really concerned that this can take a toll on young trainees. Universities should also focus on having programs to help us and to teach us how to craft not so much balance, but a harmony between work and life. It’s hard, but with great support I don’t think it’s impossible.

AC: I’m single and don’t have kids. I joke that I’ve started to say “I have to go pick up the kids” when I need to leave because people accept it and don’t think twice about you taking off. But then a colleague said to me, “By saying that, you’re devaluing it. If you’re going to yoga class, say you’re going to yoga.” It really shouldn’t be any different to take care of yourself and your own personal well-being.

“The advancement of techniques and technologies, and the fact that we want to try to be as translational as possible, is forcing us to try different ways of looking at the problem that we’re investigating and collaborate more with other labs.”

And that the notion that work and life have to be separate isn’t always true. For example, I’ve taught study abroad the past two summers. I went to work one day last summer riding a horse on the beaches in Spain. So that was definitely overlapping and that was awesome and that brought harmony to my life. Everyone has to figure out individually what works for them. It’s not one-size-fits-all.

CW: There are different models of work-life harmony. I think we have to be honest and share what those look like because sometimes it does feel like there’s a one-size-fits-all way to work where you’re

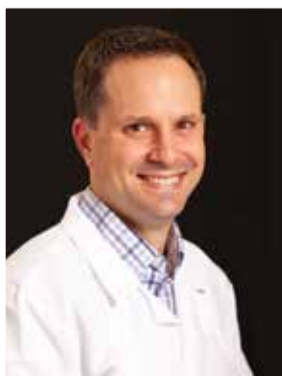
expected to come in early, leave late at night and come in on the weekend. But if we’re not sharing that we have life outside of work, then we’re sending the message to younger researchers that this is how it’s supposed to be and that this is the only way for you to become successful in this profession.

Do you feel like “next generation” is the right way to describe today’s early-career researchers? If not, why not?

SB: Am I the only one that thought of “Star Trek” when we heard “next generation?”

AC: People are in the early-career stage at a variety of age points, depending on their life circumstance. Any use of “young,” I think, should also be avoided because there are people who may be in early career who are two decades apart in age from one another.

DI: I think we should think about physiology as a community, independent of age and career stage. We’re all the future of physiology—undergrads, postdocs, graduate students, investigators and senior researchers together. Physiology must be in perpetual development. And it’s all of us who are contributing to that development. ☞



Shawn Bender, PhD, is an assistant professor in the department of biomedical sciences at the University of Missouri.



Anne Crecelius, PhD, is an associate professor at the University of Dayton.



Daria Ilatovskaya, PhD, is an assistant professor at the Medical University of South Carolina in Charleston.



Clintoria Williams, PhD, is an assistant professor at Wright State University.



Miguel Zarate, PhD, is a second year postdoctoral fellow at the University of Colorado College of Medicine.



OFF TRACK

Why today's early-career researchers are looking beyond tenure

BY DARA CHADWICK

Once upon a time, graduating with a PhD in biomedical research meant pursuing a tenured position at an academic institution. Long considered the “gold standard” career for PhD graduates in STEM, postdoctoral fellows would spend years—often many years—working long hours in the lab, trying to secure funding, all in pursuit of the ultimate goal: Tenure.

“The beauty of the tenure system is that once you secure tenure, you have your job forever,” says Karla Haack, PhD, lecturer of anatomy and physiology at Kennesaw State University in Kennesaw, Ga. But getting there involves not only an incredible amount of time and work,

but also a “complicated” set of expectations, she says.

This getting-to-tenure challenge is exacerbated by a dwindling number of available positions.

“Universities are bloated with mid- to late-level tenured faculty who don’t always have consistent, if

any, funding,” Haack says, meaning they have job security without the productivity that new hires are expected—and often required—to bring. “There’s a restructuring happening in academia, and departments are downsizing. It’s a multifactorial problem that is

driving young people away from tenure-track positions.”

Terms like “broken pipeline” have been used to describe this shift away from the tenure track. But some say it’s less about broken pipelines and more about early-career physiologists tapping into their decision-making power.

“The ‘pipeline’ is a terrible metaphor for describing biomedical career trajectories,” says Kenneth Gibbs Jr., PhD, MPH, director of the Postdoctoral Research Training (PRAT) program at the National Institute of General Medical Sciences (NIGMS) in Bethesda, Md. “It reinforces the idea that career paths are linear, when they often are not. When choosing a career away from academia, a person doesn’t ‘leak’ but is expressing agency over their own career journey.”

HEAVY EXPECTATIONS

Gibbs says it’s a myth that most PhDs become tenure-track professors. “It’s just not true and hasn’t been for a long time,” he says. In fact, National Science Foundation research shows that in 2015, only 8.1 percent of biological and life science PhDs held tenure or tenure-track appointments three to five years after earning their doctorate. That number was 17.3 percent in 1993 and has steadily declined.

While academic careers can be rewarding, “all careers where a scientist can use their skills and express their values are good careers,” Gibbs says. “Academia is just one of many.”

Still, a tenured position remains the primary goal for some young physiologists—at least at the start of their careers. “My intention was to be a true academic,” Haack says. “I enjoyed teaching and got a lot of experience teaching as a grad student.”

Haack started in science at 15, when she participated in a program for high school students. Her mentor was exceptional, she says. “I fell in love

with bench research,” she says, noting it was extraordinary for a high school student to have the lab experience she did. “Unfortunately, that is not a stereotypical experience in science.”

She earned a bachelor’s degree in biology from Louisiana’s Xavier University and then decided to go to medical school. But after a year at Morehouse School of Medicine in Atlanta, she left. “I wanted to do clinically relevant research,” she says.

She moved on to Georgia Tech, where she studied cell physiology and earned a PhD in applied biology. But as a postdoctoral fellow, she found the constant funding chase burdensome.

“The funding climate has been terrible, but this is not a new problem,” Haack says. “It’s an incredibly challenging numbers game.”

The near-constant grant writing—along with expectations that tenure-track postdoctoral researchers will generate data, publish and fulfill heavy teaching and service requirements—contributes to a deep sense of burnout. When coupled with fierce competition for fewer jobs, it’s no surprise that many PhDs with academic aspirations consider alternative paths.

Haack, who has two young children, says her willingness to be open to other things ultimately helped her step away from the pursuit of tenure. Her current role as lecturer involves 90 percent teaching and 10 percent service, which includes administrative work, mentoring and sitting on committees. She teaches two large lecture classes—no grants involved.

“My choice to pursue the lecturer position I have was about balance. Statistics show that a lot of women who have children don’t return to STEM careers,” says Haack, incoming chair of APS’ Porter Physiology Development and Minority Affairs Committee. “In underrepresented minorities, this is magnified even more.”

A MINDSET SHIFT

While not every biomedical PhD ends up in a tenured position, stepping away from this path can require a mindset shift.

“There’s been a culture in academic science where with mentors, there was no correct answer other than ‘I want to pursue a tenure-track position,’” Haack says. “But there simply aren’t enough jobs. You have to prepare to do something else.”

For Kathy Ryan, science and technology manager and department chief in the U.S. Army Institute of Surgical Research at Fort Sam Houston in San Antonio, keeping an open mind—along with a bit of serendipity—has led to an amazing career.

Ryan oversees a department of 15, performing research that ultimately supports wounded soldiers on the battlefield, as well as projects that benefit civilians involved in trauma. She earned a bachelor’s degree in biology from Trinity University in San Antonio and a PhD in physiology from the University of Texas Health Science Center in San Antonio before beginning a postdoctoral fellowship in pharmacology at the University of Texas Health Science Center.

“I thought I wanted to be a pharmacist, so I enrolled in pre-med at Trinity University. But then I found out pharmacists actually count pills all day. And I didn’t want to be a doctor,” she says. “But I really loved physiology, and one of my professors took me under his wing, telling me, ‘Do you know they pay people to go to graduate school?’”

When Ryan’s college mentor got a research grant from the U.S. Air Force, he brought Ryan with him as a contract scientist following her postdoctoral fellowship. She spent a few years there, while also teaching night classes at Trinity and St. Mary’s University in San Antonio. In 1999, she became a civilian scientist with

the U.S. Army, a role that Ryan—who has never served in the military—says requires no military commitment. She worked as a research physiologist studying hemorrhage control and physiological monitoring, remaining at the lab bench until taking an administrative role in 2012.

Choosing not to pursue a tenured position required changing her mindset, Ryan says. “I had a huge inferiority complex,” she says. “A tenure-track position is considered the norm, and I felt like I was letting my professors down. I thought they were saying, ‘Look at that Ryan kid. She had potential, but look at her now.’”

A former member and chair of the Society’s Career Opportunities Committee, Ryan says she didn’t get involved in work on APS committees until she was in her mid-40s. “I never thought I was good enough because I’m not an academic,” she says. “But I came to the realization that if you work in industry or for the government, it’s just a different career, not a lesser career.”

EXPLORING POSSIBILITIES

That message is important, Gibbs says. His research into why people choose to get a science PhD shows that many simply really like science, but they don’t necessarily want to become professors.

“At NIGMS, we recognize there are a broad variety of careers in the biomedical research workforce and ensure our training programs provide trainees with the knowledge, skills and experiences that allow them to identify and transition into the career they choose,” he says. “It’s important that trainees find careers that leverage their skills and align with their values.”

Those values can include everything from advancing basic discovery, embracing work-life balance or promoting equity, Gibbs says. He starts by helping students understand

Terms like “broken pipeline” have been used to describe this shift away from the tenure track. But some say it’s less about broken pipelines and more about early-career physiologists tapping into their decision-making power.

their motivations to find a good fit. Maybe they are thinking: “I want to direct a research program” or “I want to live near my family.”

“There are a number of tools, for example, myIDP from AAAS, which can help scientists at any stage think about their values, skills and interests and ensure their career choices align with them,” Gibbs says.

In addition to his role with PRAT, Gibbs is program director of both the Division of Training, Workforce Development and Diversity and the Division of Genetics and Molecular, Cellular and Developmental Biology at NIGMS. He got his start in a lab at the University of North Carolina as part of a high school research program. Inspired by a teacher who told him that one of the best ways to deal with problems in the world is to create more knowledge, Gibbs saw research as a way to serve his community. He earned a bachelor’s degree in biochemistry and molecular biology at the University of Maryland, Baltimore County and earned a PhD in immunology from Stanford University in California.

Yet as his training progressed, Gibbs says he felt he was getting farther away from the reason he went into science. A postdoctoral fellowship with the

National Cancer Institute “helped me blend the different pieces,” he says. “I’ve been very fortunate to work on issues I think are important.”

Among those issues? Helping to ensure biomedical research training aligns with the needs of trainees in an evolving scientific and career landscape so that PhDs know academia isn’t the only place to use their skills, and promoting diversity and equity within the scientific enterprise. “There are plenty of opportunities out there,” he says. “I encourage people to learn more about NIH programs, including those at NIGMS, that support early-career scientists, as well as our efforts to ensure our environments support students from all backgrounds.”

For Carrie Northcott, PhD, director and project lead within Digital Medicine and Translational Imaging for Pfizer in Cambridge, Mass., stepping off the tenure track was about knowing herself. “I really liked my research, but I couldn’t see myself in the same position for the rest of my life,” she says of her former tenure-track faculty position at Michigan State University, where she earned a PhD in pharmacology and toxicology. “Tenure is great and serves a purpose in academia, but it’s not the be all and end all.”

Moving to an industry job with Pfizer—first in preclinical cardiovascular safety and now in

digital medicine—has allowed Northcott to work in a highly collaborative, team-based environment with team members who are at the top of their field, she says. “I work with top engineers and data scientists,” she says. “I tell them the physiological endpoints I want to measure, and they design a program. We’re all working toward a common goal of trying to make people’s lives better, and I get to see that goal achieved.”

If there’s a downside to working in industry, Northcott says it’s an absence of job security. “My position could change or be eliminated,” she says, adding that industry jobs can require significant collaboration and flexibility.

“You might have a research passion, but the needs of the company might change,” she says. “You have to be able to pivot.”

Ryan says the skills she’s developed as a physiologist are transferrable across a number of career paths, such as medical writing and editing, working as a medical liaison, science technology management, program management, regulatory work, clinical trial coordination, non-lab academic positions, pharmaceutical industry work and patent law (for those who attend law school).

“With a physiology PhD, you’ve learned to think critically and to write,” she says.

Haack urges early-career physiologists not to discount the

value of their analytical skills. “As scientists, we are problem solvers. We can look at a data set, analyze it and propose a solution based in data,” she says. “In the technology sector, that skill is very much in demand.”

For those who prefer to stay in academia, opportunities beyond the tenure track are emerging. Haack says universities are creating positions to accommodate the shift away from tenure, such as research-track faculty positions, in which an independent scientist is housed in somebody else’s lab, writing grants, doing research and fulfilling a service commitment that doesn’t include teaching. Teaching-only tenure-track positions are emerging as well, allowing academic institutions to retain bright trainees in teaching positions.

“We may see a division of folks who do research from folks who do teaching,” Haack says.

Exploring new career paths is about research, Northcott adds. “Network, network, network,” she says. “Reach out and ask questions. Get different perspectives. Find out what the day-to-day is like.”

Gibbs says students are getting savvier. “While science can be viewed as a ‘calling,’ many of the students I talk to today are very clear that they need to be intentional about ensuring they ultimately end up in the career they want. They know it won’t just happen on its own.” ☞

Career Exploration Resources

National Institutes of Health Training Opportunities

www.nih.gov/research-training/training-opportunities

National Institute of General Medical Sciences’ Division of Training, Workforce Development and Diversity

<https://nigms.nih.gov/research-areas/areas-of-research/training-workforce-development-and-diversity>

APS’ Physiologists in Industry Committee

www.the-aps.org/Physiologists-in-Industry-Committee

Professional Skills Training Course

Writing and Reviewing for Scientific Journals



“It was a fantastic course. I felt so privileged to listen to the instruction and discussion of experts in the field.”

—
Anna Manis
Medical College of Wisconsin
Milwaukee

Work in person with journal editors and highly published authors to improve your first-author draft manuscript. Learn about the submission process and receive feedback from those working in the field. Come prepared with your first-author draft manuscript and expand your professional network.

January 23–26, 2020
Disney's Yacht and Beach Club Resort
Orlando, Fla.

Apply Today:

the-aps.org/pst/writingworkshop | education@the-aps.org

Save \$50 on the standard registration fee. Early-bird registration ends December 1, 2019.



Up in Vapor

As more people embrace e-cigarettes, scientists weigh in on whether “healthier” is actually healthy.

BY CHERYL ALKON

E-cigarettes are hot, both literally and figuratively.

When the *American Journal of Physiology—Lung Cellular and Molecular Physiology* put out a special call for papers in 2017 through 2019 about the science and research of electronic cigarettes and vaping titled “Electronic cigarettes: not all good news?” the response was overwhelming.

“We received more correspondence related to our call for e-cigarettes than we have for anything else,” says Rory E. Morty, PhD, the journal’s editor-in-chief and research director at the European Respiratory Society. “People tend to have strong opinions about the subject, positive or negative.” Dr. Morty is also a research scientist in the Department of Lung Development and Remodeling at the Max Planck Institute for Heart and Lung Research in Bad Nauheim, Germany, and a physician at the Department of Internal Medicine (Pulmonology) at the University of Giessen School of Medicine and the teaching hospital of the University Hospital Giessen and Marburg, Germany.

The question mark in the call for papers’ title was meant to reflect both the benefits and drawbacks of electronic cigarettes, a system where users inhale, or “vape,” a heated vapor into their lungs. The vapor typically includes nicotine, propylene glycol and glycerin, as well as assorted flavorings such as fruit, candy or chocolate; it has been found to contain volatile organic compounds and heavy metals as well. E-cigarettes are marketed as a cleaner, healthier alternative to traditional cigarettes, but researchers counter that “healthier” is not the same as having “minimal” or “no” health risks.

Researchers submitted about 30 papers in response to the call; the journal has since published 14 papers on various aspects of e-cigarettes and vaping. Each paper, Dr. Morty says, “robustly reported on experiments that suggest that e-cigarettes may be less damaging than combustible cigarettes, as well as studies highlighting concerns about the safety of e-cigarettes and their damaging effects on the lung.”

As the debate continues, the journal aims to provide a neutral

platform where physiologists can exchange data and interpretations about the topic, Dr. Morty says.

WHAT THE RESEARCH SAYS

Electronic cigarettes have been around in the U.S. since 2007, according to Laura E. Crotty Alexander, MD, associate professor of medicine at the University of California at San Diego and staff physician at the VA San Diego Healthcare System. For the past six years, her lab has studied whichever product is most popular at the time. At first, she researched vape pens, then moved to devices known as mods. Now she focuses on Juul, a brand of e-cigarette that resembles a USB flash drive and currently dominates the market. Fifty percent of all American e-cigarette users choose Juul.

Since these products have only been available little more than a decade, “it will take a really long time to know exactly what they are doing,” Dr. Alexander says. “E-cigarettes will cause health problems and diseases, and we are working as quickly as possible to identify the causal factors.”

Dr. Alexander works with mouse models as well as human subjects and says that early cell-based and animal studies indicate the e-cigarette vapor has adverse effects on cells, tissues and organs. “It’s unclear how many years it will take for people to develop cardiovascular,

kidney and brain effects. But we see that e-cigarette use is altering the lungs under certain conditions.”

Dr. Alexander looks at how mice respond in experiments lasting three to six months (the equivalent of three to six decades in humans) and then looks for early signs of the same problems in her human subjects, typically through changes noticed in human blood tests.

“What that will look like is increased airway activity, and asthma and bronchitis will be revved up with airway bronchoconstriction,” she says. “The immune system is being dramatically altered by exposure to e-cigarette vapor as well. Many immune cells don’t work correctly, and I’m worried people will be at risk for more infections and more severe infections. Finally, it looks like e-cigarettes are driving inflammation, indicating that allergies will go up, and we’re seeing signals that some of the rheumatological diseases might get worse.” Other potential problems could be the development of acute interstitial pneumonia, eosinophilic pneumonia and lipoid pneumonia, based on how different immune cells react to e-cigarette use.

Dr. Alexander and others’ papers have shown that e-cigarette vapor induces double-stranded DNA breaks, which is associated with the development of cancer, but the vapor caused fewer strand breaks

“E-cigarettes and vaping are making it easier for people to become addicted to nicotine than they would have if they had started smoking cigarettes.”

than traditional cigarette smoke. This means e-cigarettes might have a lower cancer risk compared to regular cigarettes, but the cancer risk remains unknown.

Using Juul products, called Juuling, is particularly concerning, as it is causing a nicotine addiction epidemic among young adults who would have otherwise not starting smoking, says Ilona Jaspers, PhD, University of North Carolina at Chapel Hill professor in pediatrics, microbiology and immunology, and environmental science and engineering. Dr. Jaspers is also the director of curriculum in toxicology and environmental medicine and deputy director of the Center for Environmental Medicine, Asthma and Lung Biology.

Juul itself delivers a higher amount of nicotine to the lungs than a traditional cigarette does, and “the teen brain gets addicted to nicotine faster than someone in their 40s or 50s does,” Dr. Jaspers says. A 2016 University of Michigan study showed that the majority of teenagers thought they were only vaping flavoring, not nicotine, with an e-cigarette. Combined with targeted advertising to teens and young adults that makes Juul seem hip, along with social media posts that glamorize Juul accessories, plus some classic peer pressure, Juul addiction is “a perfect storm,” Dr. Jaspers says.

In the U.S., one Juul cartridge contains 20 cigarettes’ worth of nicotine, which is equivalent to the nicotine in a pack of traditional cigarettes, according to the Truth Initiative, an anti-tobacco campaign. If a person vapes one pod a day, that’s like smoking one pack of cigarettes, as far as the nicotine intake.

With mod devices, users took in 3–6 mg/ml of nicotine at a time, but Juul users inhale 59 mg/ml at a time—a significant increase, according to Dr. Alexander.

“E-cigarettes come with their own set of health concerns, but it is also fair to point out that in the limited number of studies conducted to date, e-cigarettes are twice more successful as, for example, nicotine patches, in promoting smoking cessation.”

DOES “HEALTHIER” = HEALTHY?

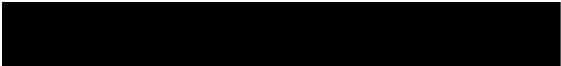
While vaping is sold as a healthier, greener alternative to combustible cigarettes and are touted for their lack of ash or tobacco smell, positioning e-cigarettes this way is harmful, Dr. Jaspers says.

“Traditional cigarettes are the No. 1 cause of preventable deaths, have been linked to numerous different cancers and other chronic diseases and contain almost 70 cancer-causing chemicals,” she says. “It would be difficult to imagine a consumer product that is worse for your health than cigarettes.”

Comparing the two types of cigarettes and asking if e-cigarettes are healthier is a loaded question, Dr. Morty says. While e-cigarettes don’t have many of the toxic substances such as tar and smoke that exist with traditional cigarettes, e-cigarettes “may contain more nicotine, which is not healthy, and they generate steam, which may also irritate the lung,” he says. Vaping solutions also contain formaldehyde, and the e-cigarette device itself generates nanoparticles—neither of which are healthy to inhale.

There are also reports of the devices exploding in the hands and

“It’s like chugging a whole beer. It’s such a high that the addiction potential is so much worse.”



mouth of users, causing physical damage and medical emergencies, as well as the potential for burn hazards. “These physical concerns are not theoretical since case reports are appearing regularly in the medical literature that highlight this spectrum of dangers to e-cigarette users’ health,” Dr. Morty says.

E-cigarettes and vaping are making it easier for people to become addicted to nicotine than they would have if they had started smoking cigarettes. With public health efforts, fewer people are starting smoking such cigarettes because

“in comparison, smoking a cigarette seems gross,” Dr. Alexander says.

None of the researchers interviewed for this story have tried e-cigarettes. But people who have vaped with Juul tell Dr. Alexander that “it’s like chugging a whole beer. It’s such a high that the addiction potential is so much worse,” she says.

“You don’t have to use them much, but nothing

else will give you the same level of activation of the dopamine reward pathway. That’s why the addiction potential is so intense.”

Another problem is that there is a lack of clinical data on pharmacological efficacy of smoking-cessation medication in younger people, Dr. Jaspers says. Smoking cessation therapy typically consists of a combination of group therapy, reinforcement and other psychological aspects, which either have not been widely studied or are not recommended for people younger than 18.

“There is a problem and a lack of awareness,” Dr. Jaspers says. Pediatricians don’t know how to

help their young patients, she added, while “adult pulmonologists, on the other hand, tell their adult smokers to try e-cigarettes. The messaging is confusing, and that is part of the problem.”

CESSATION ADVOCATES AMONG E-CIGARETTE SKEPTICS

U.S.-based smoking cessation experts are fairly consistent with their disapproval of e-cigarettes, grouping them with all tobacco products in policy and practice. Many cities and states have followed suit and ban vaping in public places such as airports and restaurants, Dr. Alexander says.

The Truth Initiative “has done a really good job in providing information directly targeting teenagers and young adults, and I like the fact that they clearly state that ‘safer than smoking doesn’t make it safe,’” Dr. Jaspers says. However, such advertising needs to be sought out to be found. “You have to go to their website to see it, and even though there are television commercials, how many kids are watching them on live TV? We just got rid of cable in our own house because no one was watching it.”

The mixed messaging continues to make the issue less clear cut. “E-cigarettes come with their own set of health concerns, but it is also fair to point out that in the limited number of studies conducted to date, e-cigarettes are twice more successful as, for example, nicotine patches, in promoting smoking cessation,” Dr. Morty says. “At the same time, there are real concerns about e-cigarettes being a means for adolescents to start smoking, and perhaps, also promoting progression from vaping to smoking combustible cigarettes. These are probably the biggest public health concerns related to teen smoking.” ☞

Jobs Board

Your Next Opportunity Awaits

Looking for a new lab? In search of your next team member?
Our Career Center helps connect employers with top
physiology talent across the country and around the globe.

Find your next

TRAINEE,
FACULTY,
RESEARCH SCIENTIST,
INSTRUCTOR,
LECTURER OR
LEADERSHIP

position on the APS Jobs Board.

\$250 for 30 days
\$350 for 60 days
\$450 for 90 days

*Upgrade to post
in *The Physiologist*
Magazine or
LinkedIn.

the-aps.org/jobs

APS MEMBERS RECEIVE PRESIDENTIAL EARLY CAREER AWARD FOR SCIENTISTS AND ENGINEERS



Blair Johnson, PhD, and **Sandeep Mallipattu, MD**, are recipients of this year's Presidential Early Career Award for Scientists and Engineers (PECASE).



The PECASE is the highest honor bestowed by the U.S. government to outstanding scientists and engineers who are beginning an independent

research career. Johnson is assistant professor in the department of exercise and nutrition sciences at University at Buffalo in New York. Mallipattu is the DCI-Martin Liebowitz Endowed Professor of Nephrology at Stony Brook School of Medicine in New York.

ROBERT HESTER DELIVERS TEDX TALK ON COMPUTER SIMULATION OF HUMAN PHYSIOLOGY



Robert Hester, PhD, **FAPS**, a Billy S. Guyton Distinguished Professor

and director of the Center for Computational Medicine at the University of Mississippi Medical Center, delivered a TEDx talk titled "The Most Complete Computer Simulation of Human Physiology." Hester described how his research team has refined the way computer simulation of human physiology improves both the development and testing of new drugs and treatment protocols and the training of medical professionals. A longtime APS member, Hester is the chair of the APS Joint Program Committee. His TEDx talk is available at <http://bit.ly/RobertHesterTEDxTalk>.

APS Welcomes Class of 2019 Fellows

The following members have recently been awarded the prestigious status of Fellow of the American Physiological Society (FAPS). FAPS honors distinguished leaders who have made significant contributions to physiological sciences and related disciplines and have served the Society for at least 15 consecutive years. Congratulations to the Class of 2019!

P.D. Allen, MD, PhD
Thomas J. Barstow, PhD
Daniel Beard, PhD
Michael Beers, MD
John Bissonnette, MD
Bonnie Blazer-Yost, PhD
James L. Boyer, MD
Eldon Braun, PhD
George Brooks, PhD
John Buckwalter, PhD
Warren Burggren, PhD
Michael Caplan, MD, PhD
Joseph Cheung, MD, PhD
Parimal Chowdhury, PhD
John Ciriello, PhD
Margarita Curras-Collazo, PhD
Fitz-Roy Curry, PhD
Roger Dampney, PhD
Christopher DeSouza, PhD
Walter Duran, PhD
M. Faadiel Essop, PhD
Ronaldo P. Ferraris, PhD
Jerome L. Fleg, MD
Joanna Floros, PhD
Hubert Forster, PhD

Walter R. Frontera, MD, PhD
Gerardo Gamba, MD, PhD
Robert E. Goldstein, MD
Chaya Gopalan, PhD
Sanjeev Gupta, MD
Guillermo Gutierrez, MD, PhD
Kirk Hamilton, PhD
Markus Hecker, PhD, DSc
Michael Hlastala, PhD
Kimberly Huey, PhD
Brant E. Isakson, PhD
Douglas L. Jones, PhD
Martin Joyce-Brady, MD
Jonathan D. Kaunitz, MD
Bellamkonda K. Kishore, MD, PhD
Wolfgang Kuebler, MD, Dr.med.
Hsinyu Lee, PhD
Lin Liu, PhD
Julian Lombard, PhD
Thomas Lutz, DVM, PhD
Robin McAllen, PhD
Anne McArdle, PhD
Kenneth Harrington McKeever, PhD
Scott Medler, PhD
Kathryn E. Meier, PhD

Hiroko Nishimura, MD
Thomas Pannabecker, PhD
David Paterson, DPhil, DSc
Michael R. Pinsky, MD
Quentin Pittman, PhD
Rolf K. Reed, MD, PhD
Roberto Refinetti, PhD
Thomas Resta, PhD
Andrej A. Romanovsky, MD, PhD
Laszlo Rosivall, MD, PhD
Lawrence Schramm, PhD
Eckhart Simon, MD
Nina Stachenfeld, PhD
Alexander Staruschenko, PhD
Jun Sun, PhD
Steven Swoap, PhD
Andrew Tsin, PhD
David Warburton, MD, DSc
Christopher Waters, PhD
R. Clinton Webb, PhD
Harel Weinstein, DSc
Ora A. Weisz, PhD
Jason X.-J. Yuan, MD, PhD

MICHAEL RYAN RECEIVES UMMC'S TOP EDUCATOR HONOR



Michael Ryan, PhD, of the University of Mississippi Medical Center (UMMC), is the 2019 recipient of the university's most prestigious educator award, the

Regions Toward Educational Advancement in Care and Health (TEACH) Prize. The award honors one outstanding faculty member each year. Ryan is associate dean for student affairs in UMMC's School of Graduate Studies in the Health Sciences and is director of the department of physiology and biophysics' PhD track.

KEVIN KREGEL PROMOTED TO PROVOST POSTS AT UNIVERSITY OF IOWA



Kevin Kregel, PhD, FAPS, was appointed executive vice provost and senior associate provost for faculty at the University of Iowa.

Kregel has been an APS member since 1988 and is the FASEB vice president-elect for science policy.

JASON CARTER NAMED MSU VICE PRESIDENT FOR RESEARCH



Jason Carter, PhD, has been named vice president for research, economic development

and graduate education at Montana State University (MSU). Carter, a current member of APS Council, was previously associate vice president for research at Michigan Technological University. ☞

Got exciting career news that you'd like to share with your APS colleagues? Email it to tphysmag@the-aps.org for consideration in a future Transport column.

Marilyn Merker, PhD, FAPS, in Remembrance (1954–2019)

BY MELISSA BATES, PHD

Marilyn Merker, PhD, a longtime friend and mentor to many members of APS, passed away in April following a battle with pancreatic cancer.

Dr. Merker received her PhD in pharmacology from Yale University and was professor emeritus of pharmacology at the Medical College of Wisconsin, where she enjoyed a distinguished career studying the regulation of bioactive compounds by the pulmonary endothelium. She is survived by her husband, Robert Goldman, and, her greatest legacy, her children, Daniel and Rebecca.

Dr. Merker touched the lives of many APS members as chair of the Respiration Section and as an APS Councilor (2012–2015). She was a tireless advocate for

trainees, co-founding an annual trainee breakfast at EB and catalyzing the growth of trainee involvement in the Respiration Section. Dr. Merker will be profoundly missed by her colleagues and remembered as a source of advice, wisdom, laughter and love. She will be remembered not only as a brilliant and accomplished scientist, but as a champion community builder and a mentor who shared openly of her own experiences as a wife, mother and scientist. She frequently responded to requests for advice with bits of her own mother's wisdom.

Many owe their active APS membership to Dr. Merker, who always carried extra banquet tickets in her purse that she would trade for the promise of committee service. She was exceptional in her ability to find avenues to apply everyone's talents and make everyone's contribution feel valued. Her friends in the Society will truly miss her scientific brilliance, her unwavering support and mentorship, her infectious laughter and enthusiasm, her outrageous generosity and her knack for forthrightness.

Many of us are in her debt for not only climbing the ladder herself, but remembering to reach back and pull us up behind her. ☞

Melissa Bates is assistant professor of health and human physiology at the University of Iowa where she studies the physiological impact of oxygen. Bates served on the Respiration Section Steering Committee with Marilyn Merker, who became her close friend and mentor.



Melissa Bates, left, and Marilyn Merker

DATES & DEADLINES

AWARDS

Bodil M. Schmidt-Nielsen Distinguished Mentor and Scientist Award

(Deadline: September 15, 2019)

Clifford Barger Underrepresented Minority Mentorship Award

(Deadline: September 15, 2019)

Henry Pickering Bowditch Award Lectureship

(Deadline: October 1, 2019)

Physiology in Perspective: The Walter B. Cannon Award Lecture

(Deadline: October 1, 2019)

John F. Perkins Jr. Memorial Award for International Physiologists

(Deadline: October 15, 2019)

Cardiovascular Section Outstanding Postdoctoral Trainee Award

(Deadline: November 10, 2019)

Cardiovascular Section Outstanding Graduate Student Trainee Award

(Deadline: November 10, 2019)

Cardiovascular Section Clinical Science Young Investigator Award

(Deadline: November 10, 2019)

Cardiovascular Section New Investigator Award

(Deadline: November 10, 2019)

Cardiovascular Section Research Recognition Award

(Deadline: November 10, 2019)

Arthur C. Guyton Awards for Excellence in Integrative Physiology

(Deadline: November 15, 2019)

Beverly Petterson Bishop Award for Excellence in Neuroscience

(Deadline: November 15, 2019)

Dean Franklin Young Investigator Award

(Deadline: November 15, 2019)

Giles F. Filley Memorial Awards for Excellence in Respiratory Physiology and Medicine

(Deadline: November 15, 2019)

Lazaro J. Mandel Young Investigator Award

(Deadline: November 15, 2019)

S&R Foundation Ryuji Ueno Award

(Deadline: November 15, 2019)

Shih-Chun Wang Young Investigator Award

(Deadline: November 15, 2019)

G. Edgar Folk Senior Physiologists Award

(Apply anytime)

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



CALLS FOR PAPERS

American Journal of Physiology—Cell Physiology

(Deadline: September 30, 2019)

- Metabolism, Oxidative Stress and Cell Signaling

American Journal of Physiology—Endocrinology and Metabolism

(September 30, 2019)

- Browning and Beiging of Adipose Tissue: Its Role in the Regulation of Energy Homeostasis and as a Potential Target for

Alleviating Metabolic Diseases

- Immunometabolic Cross-talk and Regulation of Endocrine and Metabolic Functions
- Mitochondria Dysfunction in Aging and Metabolic Diseases
- Role of Gut Microbiota, Gut-brain and Gut Liver Axes in Physiological Regulation of Inflammation, Energy Balance and Metabolism

Advances in Physiology Education

(Submit anytime)

- Curricular Integration of Physiology
- K-12 Outreach

More details: www.physiology.org/calls



CONFERENCES

Interface of Mathematical Models and Experimental Biology: Role of the Microvasculature Conference

(September 11–14, 2019, Scottsdale, Ariz.)

- On-site registration available
- More details: www.the-aps.org/mathmodels

2019 APS Aldosterone and ENaC in Health and Disease: The Kidney and Beyond Conference

(October 2–6, 2019, Estes Park, Colo.)

- Advanced registration deadline: September 2, 2019
- Hotel reservation deadline: September 8, 2019
- Registration cancellation deadline: September 12, 2019
- More details: www.the-aps.org/enac

APS Annual Meeting at EB 2020

(April 4–7, 2020, San Diego)

- More details: <http://www.apsebmeeting.org>

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



NEWS FROM THE FIELD

JOINT PROGRAM COMMITTEE

You're Invited to the 2020 APS Annual Meeting at EB

The APS Joint Program Committee has organized an exciting conference highlighting the broad range of emerging physiological research topics and professional development sessions. Submitting your abstract is the first step to optimizing your meeting experience.

BE CONSIDERED FOR AN ORAL PRESENTATION

Submit your abstract to one of the many Featured Topic abstract categories. If selected, you both present during a poster session and are scheduled for a 15-minute oral presentation during the Featured Topic session: double the exposure!

FIND THE PERFECT POSTER SESSION

With more than 300 physiology poster topic categories, we've made it easy for you to find a place for your research. Find more details at www.apsebmeeting.org and submit your work by November 14.

We hope to see you on April 4–7 in San Diego!

WATER & ELECTROLYTE HOMEOSTASIS SECTION

Consider applying for a Water & Electrolyte Homeostasis Section Award

Sharing your science, increasing visibility and networking opportunities with other scientists in the field, gaining the opportunity to give an oral presentation and, of course, award money and incentives—are just a few of the reasons you should apply for Water & Electrolyte Homeostasis Section (WEH) awards. Polish up your CV, keep an eye out for upcoming WEH award deadlines for EB and apply! Award types, submission deadlines and judging criteria are posted on the section website. Check it out!

WEH Section FAPS Awardee

Congratulations to **Kenneth H. McKeever, PhD**, from the WEH Section, who was recently awarded APS Fellow status. If you are interested in nominating a WEH member (or want to nominate yourself) for FAPS, please visit www.the-aps.org/faps.

APS sections, committees and chapters are invited to share their news and information. Email tphysmag@the-aps.org for consideration in a future News from the Field column.

american
physiological
society

New look.
New website.
What's next
for APS?

NEW LOOK

This year we revealed a new brand for the Society including new themes and messaging. The new brand presents a dynamic image that represents the process of scientific discovery itself, how idea leads to idea and discovery leads to discovery.

NEW WEBSITE

Our new state-of-the-art website reflects APS' commitment to provide our members and community with exceptional experiences.

MY APS FEATURE NOW LIVE

Our new website now features the My APS dashboard where you can update your membership information, stay in touch with your fellow members and view the latest Society news.

THE PHYSIOLOGIST MAGAZINE

Our new member magazine has a journalistic style that dives deeper into what our members do, the conversations they're having in the lab and the interesting stories and experiences that set our membership apart from the rest.

FUNCTION

Function, a new, high-profile journal that will provide a home for physiology-focused papers that might otherwise have been published in other top-tier, high-impact journals, is in development and scheduled to launch in 2020.

APS ANNUAL MEETING 2023

Recently announced, the APS Council unanimously voted to part ways with Experimental Biology following the 2022 meeting. Join us as we begin the process of building a new, world-class APS Annual Meeting.

MORE INITIATIVES

Look out for more on developing Society initiatives geared toward strengthening our membership, our community and the discipline.



**We're spotting physiology in
everyday life on the
I Spy Physiology blog!**

APS member-contributors use physiology
to explain how humans and animals
function and stay healthy in this public-
facing, translational blog.

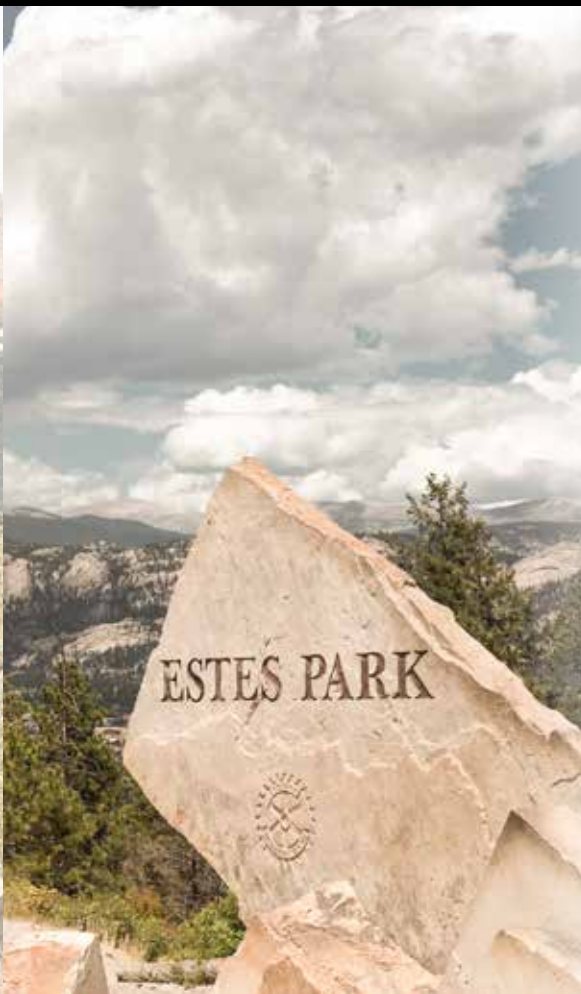
Interested in contributing? Email
communications@the-aps.org.

ISpyPhysiology.com
#ISpyPhysiology on Twitter

register for our upcoming conferences



INQUIRY



COLLABORATION



DISCOVERY

2019 APS Interface of Mathematical Models and Experimental Biology: Role of the Microvasculature

September 11–14, 2019

Scottsdale, Ariz.

the-aps.org/mathmodels

2019 9th Annual International Conference of Aldosterone and ENaC in Health and Disease: The Kidney and Beyond

October 2–6, 2019

Estes Park, Colo.

the-aps.org/enac

APS Annual Meeting at EB 2020

Abstract Submission Deadline: November 14, 2019

April 4–7, 2020

San Diego

Physiology: Dying ... or Thriving?

BY ERICA A. WEHRWEIN, PHD

PWe are seeing alarming trends in physiology: restructuring of departments, loss of physiology teaching in medical schools and declining APS membership. However, increasing numbers of undergraduate physiology programs and thriving student enrollment present a more optimistic view.

How can physiology be simultaneously dying and thriving? This is likely due to the two silos—both calling themselves “physiology”—that signify opposite trends in the discipline: basic physiology researchers focused on bench-based discovery versus undergraduate physiology students seeking a holistic, integrative view of human health.

We refer to physiology as “molecule to man.” However, in practice it is “molecule” and “man.” Starting from the undergraduate level, there is a research track and a clinical track, which continue into the profession with non-overlapping training, separate clinical and research conferences, limited direct clinical and basic science partnership, and inadequate application of basic research findings to bedside care. Misalignment between students and faculty values leads to educational experiences that do not serve our undergraduate or medical students and frustrate the faculty who experience lack of student engagement.

Undergraduates prefer an integrative, organ-systems perspective with real-world applications. They see physiology as the basis

of human medicine and courses to be well-aligned with careers in health care. About 90 percent of students surveyed aspire to careers in health care and are excited to learn about human

research. These students are empathetic and

compassionate, which fuels a desire to serve in a career that influences people and communities in tangible and more immediate ways. In contrast, their faculty are largely analytical and visionary, seeking intellectual challenge and methodological discovery over a longer time span. Therefore, the core values of the typical physiology undergraduate are usually not well-aligned and not understood, nor appreciated, by the basic science faculty who educate them.

We—the members of APS—can be instrumental in helping our Society bridge the gap between the “molecule”

and “man” silos without compromising our research interests. APS could adopt the orphaned physiology undergraduate programs, which have lacked national-level coordination until recently when programs self-organized as an external consortium. APS could partner with the Physiology Majors Interest Group to develop curricular guidelines and program-level assessment tools in consultation with clinical professionals. Furthermore, APS could provide students with resources to develop their professional skills and assist with career placement at the bachelor of science level.

There is an army of brilliant and motivated undergraduate physiologists seeking to make a difference in the world. Currently, APS’ focus on research-track undergraduates is at odds with the needs and interests of most pre-health students. The undergraduates are the bridge and will help realize the vision of “molecule to man” physiology. Will we at APS support them? ☺

Erica A. Wehrwein is an associate professor at Michigan State University. She is director of the Physiology Majors Interest Group (P-MIG), a consortium of physiology undergraduate programs.



“There is an army of brilliant and motivated undergraduate physiologists seeking to make a difference in the world.”