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What They Neglected to Tell You About Classroom Practice in Graduate School

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Harold Modell

As a postdoctoral fellow, I had a conversation with my mentor about teaching. He told me that you couldn't be a good scientist if you were not a good teacher. His justification was that if you couldn't communicate your research results to others, you couldn't make a meaningful contribution to your discipline. At that time, teaching, in most faculty's view, was synonymous with making a good presentation. "Good" classroom teaching was synonymous with "telling the story" through lectures and answering questions from students seeking clarification.

In the mid-1970s, the view of the classroom learning environment began to change. Research focused on how we learn and what "learning" means began to appear in the literature (1). As a result of this and ensuing research, the focus on the classroom environment changed from a teacher-centered, passive learning environment to a learner-centered, active learning environment. Terms such as cooperative learning, collaborative learning, and problem-based learning entered the education vocabulary. The list of terms has continued to grow and now includes *team-based learning, flipped classroom,* and *case-based learning* among others. With this classroom evolution, the role of the instructor has changed from being a provider of information and learning opportunities to a facilitator of learning within a learning community. Unfortunately, most graduate programs do not include specific training, other than being a teaching assistant in student laboratories, for this role in the classroom.

So, if I were to enter the classroom as a new instructor today, I would have a number of questions for which I would seek answers to help give me direction for preparing for my classroom experience. I will discuss each of these questions from the perspective of a physiology educator with over 40 years of experience working primarily with medical students. For each question, take a moment to reflect on how you would answer the question before reading my answer.

Question 1: What Kind of Learning Should I Try to Promote in My Classroom?

Many students seem to equate learning with acquisition of information. The goal of their studying seems to be memorizing and recalling information. It

Continued on page 144

A Matter of Opinion

Advocacy is Essential

In 2017, change came to Washington. The 115th Congress convened with a Republican majority in both chambers, and Donald J. Trump became the nation's 45th President. As we try to determine where science stands with the new administration, it is critical for scientists to speak out on behalf of sound, evidence-based policies and robust federal support for research.

The National Institutes of Health (NIH) has historically had strong support across party lines. At the end of the last Congress, the House and Senate overwhelmingly approved the 21st Century Cures Act. This legislation outlined priorities for the agency and provided NIH with $4.8 billion in new funds over the next 5 years. To be sure, the money is targeted to specific areas

Continued on page 148

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Contents

Science Policy

APS Members Go to Capitol Hill

On March 9, 2017, more than 50 scientists from FASEB societies convened in Washington, DC to talk to members of Congress about the importance of robust and sustained funding for biomedical research. Representing APS were Jane Reckelhoff, Hannah Carey, Kevin Kregel, Laura McCabe, Christopher Waters, and JR Haywood. Together with representatives of other FASEB societies, the group met with more than 100 offices to share recommendations for research funding in fiscal years 2017 and 2018. In addition, in a show of virtual support, more than 7,000 electronic messages were sent to Congress by scientists around the country. ●

1. Hannah Carey (APS representative to the FASEB Board) and Kevin Kregel (APS representative to the FASEB Science Policy Committee) on the steps of the Supreme Court.

2. Rep. Gregg Harper (R-MS) with APS President Jane Reckelhoff

3. FASEB President Hud Freeze explains NIH's role in rare disease research during a FASEB's Congressional Briefing held in conjunction with its Hill Day.

4. Hud Freeze sports the superhero cape presented to him by Cristina Casanova Might. Might, who is the mother of a child with the protein coding disorder NGLY1, spoke at FASEB's briefing on rare disease research.

5. APS member Christopher Waters *(left)* with Doug Andres of the Association of Medical and Graduate Departments of Biochemistry *(middle)* and Christine Curran of The Teratology Society *(right)* in front of the Capitol.

6. Former FASEB President J.R. Haywood *(left)* and APS Science Policy Committee Chair Laura McCabe *(right)* with Sen. Gary Peters (D-MI).

7. APS President Jane Reckelhoff *(middle left)* with Jay Mussell of the American Association of Anatomists member *(middle right)* in the office of Sen. Thad Cochran (R-MS). With them are Cochran staff members Elizabeth Henry *(far left)* and Elizabeth Joseph *(far right)*.

Trump Budget Plan Would Cut NIH

A preview of President Trump's FY 2018 budget released on March 16 includes the recommendation to cut almost 20% from the NIH budget (*https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/fy2018/2018_blueprint.pdf*). According to the document, the President will recommend "a major reorganization of NIH's Institutes and Centers to help focus resources on the highest priority research and training activities." Although short on specifics, the preview mentions eliminating the Fogarty International Center; reducing administrative costs; and "rebalanc[ing] Federal contributions to research funding." The last statement refers to reducing reimbursements of overhead costs to research institutions. The full budget plan will not be released until May.

The preliminary budget proposes to add $54 billion to bolster defense spending while subtracting the same amount from non-defense programs (termed non-defense discretionary spending). However, the President does not have the authority to make this happen by himself. The Budget Control Act (BCA) limits how much may be spent on defense and non-defense programs, and it requires parity in budget changes in the two categories. This means that Congress would have to amend the BCA law in order for the proposed transfer to occur. Despite the fact that Republicans hold majorities in both the House and the Senate, changes to the BCA and passage of the budget as outlined in its current form are not assured. Republicans in the House are divided on how to fund the federal government: Some members of the Freedom Caucus have called for even deeper cuts both to domestic programs and to entitlements such as social security. At the same time, some moderates have voiced reservations about the extent of proposed cuts to critical government programs. In the Senate, procedural rules add another layer of complexity: Even if all 52 Republican Senators voted to amend the BCA, the measure would still require the support of 8 Democrats to get the 60 votes needed to break a filibuster. ●

APS Urges Congress to Reject Proposed Cuts to Research

The APS Council approved the following statement urging Congress to reject the proposed budget cuts.

President Trump's FY 2018 budget plans, released March 16, 2017, call for huge and damaging cuts to the National Institutes of Health (NIH). Under this proposal, NIH's budget would sustain a loss of $5.8 billion or almost 20% of its budget. Not only would this curtail scientific progress, it would also be devastating to our nation's scientific enterprise and biomedical workforce. In the long-term, these cuts threaten both the health of all Americans and the U.S. economy as a whole, which depends on an educated workforce to drive innovation in both the public and the private sectors. Dollars invested in scientific research fuel the economy by employing skilled workers, purchasing supplies, and creating intellectual property. At a time when other nations are increasing their investments in research, the U.S. needs to maintain and grow research capacity or risk losing out in a competitive global marketplace.

Funding for biomedical research is a nonpartisan issue. Champions in Congress from both parties have worked together for decades to foster research in the U.S., and the proposed cuts would reverse recent increases provided by leaders in Congress. We call on these champions to continue their commitment to the sciences.

We encourage members of the scientific community to reach out to your members of Congress and ask them to reject the President's budget proposal. Contact information for your elected representatives is available on the House (*http://www.house.gov/representatives/*) and Senate (*https://www.senate.gov/senators/contact/*) websites. Information on how much federal research funding is being invested in your state or district is

available on the FASEB website (*http://www.faseb.org/Science-Policy-and-Advocacy/Federal-Funding-Data/Federal-Funding-by-State-and-District.aspx*), along with other advocacy resources (*http://www.faseb.org/Science-Policy-and-Advocacy.aspx*). ●

This statement is available on the APS website (*http://www.the-aps.org/mm/SciencePolicy/News-and-Updates/Reject-Proposed-Cuts-to-Research.html*).

APS Reaffirms Core Values

The American Physiological Society (APS) represents scientists both in the U.S. and around the world. Our mission is to foster scientific research, education, and the open discussion and dissemination of information in the basic and applied physiological sciences. At this time of great change and many challenges at home and abroad, the APS reaffirms its commitment to the following core principles and values.

The APS is committed to open communication and the free exchange of ideas among scientists from all sectors of the workforce – industry, academia, and government. Scientists have a professional duty to share the results of their work so that others may benefit from what they have learned and build upon it. This freedom is essential to the progress of science.

The APS is committed to fostering a diverse and inclusive scientific workforce, encompassing the best and brightest minds from around the world. Science as a global and collaborative endeavor is vital to the health, safety, and economic prosperity of both the U.S. and the world at large. Scientists share the common goals of advancing knowledge and improving quality of life. If scientific progress is to continue, we must welcome scientists from all nations to engage in this bold endeavor.

This statement is available on the APS website (http://www.the-aps.org/mm/SciencePolicy/About/Policy-Statements/Core-Values.html) along with links to help scientists take action by contacting their Members of Congress. ●

APS Critiques Animal Rights Report and Congressional Requests for Investigation

APS President Jane F. Reckelhoff wrote to the Government Accountability Office (GAO) on March 2, 2017 to raise questions about recent Congressional requests to investigate animal research at federal agencies (Reckelhoff's letter is available at *http://www.the-aps.org/mm/SciencePolicy/About/Comments-Letters/APS-letter-to-Gene-Dodaro.pdf*). The GAO is an independent agency that reviews government activities on behalf of Congress. This case involves requests from 13 Representatives and 3 Senators that grew out of a report by the animal rights group White Coat Waste Project (WCWP). Its report claimed that intramural researchers at five federal agencies mistreated animals and wasted taxpayer funds. In her letter, Reckelhoff told Comptroller General Gene Dodaro that these requests contained "misleading statements and failed to validate the authors' criticisms about agency oversight of research programs."

The impetus for the Congressional requests for an investigation was a report released by the WCWP at a November 15, 2016 Capitol Hill briefing sponsored by Representatives Dina Titus (D-NV) and Ken Calvert (R-CA). The report, with the lurid title "Spending to Death" (*http://blog.whitecoatwaste.org/wp-content/uploads/2016/11/WCW-Spending-to-Death-report-FINAL-WEB-2.pdf*), accused NIH, VA, DOD, CDC, and FDA of failing to provide appropriate oversight of their intramural animal research. It also claimed that the agencies were wasting money while harming animals in "bizarre" studies that do not advance our understanding of disease. WCWP is a joint venture between Anthony Bellotti and Justin Goodman, with the stated purpose of ending federally funded animal research. Bellotti is a former Republican political strategist, whereas Goodman is PETA's former director of investigations. WCWP seeks to appeal to both Republicans and Democrats by arguing that animal research wastes money, serves no valid purpose, and harms animals.

A month after this report was released, 13 Representatives and 3 Senators wrote to ask the GAO to investigate all federally sponsored animal research. GAO provides Congress with information about how the federal government spends taxpayer dollars. It gives priority to requests from Congressional committees, but individual Representatives or Senators can also ask for GAO investigations. A December 8, 2016 letter from Representatives Titus, Calvert, and 11 others asked Dodaro to "conduct a review of systems for accountability and transparency about intramural research at federal agencies." A December 21, 2016 letter from Democratic Senators Jeanne Shaheen, Elizabeth Warren, and Cory Booker asked the GAO to "investigate current procedures and systems for the public reporting of federal spending on animal research in federal laboratories."

The APS letter made the case that the Congressional requests for this investigation were influenced by the WCWP report. It also critiqued many assertions made in the letters. Reckelhoff noted that the WCWP report included statements that were deliberately misleading and enumerated inaccurate statements in the Congressional letters that were presented as justification for the audit requests.

The letter was not sent in time to influence the GAO's decision about whether to conduct an audit. It is unclear whether it could have had any influence since the GAO works for Congress rather than for the public. At a February 23, 2017 telephone town hall meeting organized by WCWP, Rep. Titus announced that GAO had agreed to review how the federal government conducts animal research. APS continue its efforts to encourage the GAO to consider the issues raised in the Reckelhoff letter in defining the mandate and parameters for the study. ●

Max Planck Society Issues White Paper on Animal Research

On January 12, 2017, the Max Planck Society (MPS) in Germany published a white paper on the use of animals in basic research. MPS is a nonprofit research organization made up of 83 Max Planck Institutes and facilities.

According to the report, animal research is still a vital component of life sciences research. It goes on to state that balancing the harms and benefits of animal research "remains an extremely challenging task" even beyond legal and regulatory requirements. To address these ethical concerns, the report calls for an informed discourse among all stakeholders. As part of this dialogue, scientists need to communicate "the motives behind their research, the methods they apply, and the indeterminate nature of basic research."

MPS plans to develop a coordinating team to improve animal welfare. This will include promoting best practices and the 3Rs philosophy of reducing, refining, and replacing animal studies when it is appropriate to do so. The coordinating team's tasks include promoting the highest quality of science to maximize benefit to humans and animals; encouraging and financing alternatives to the use of animals; and advocating for transparent and proactive communication on animal research.

According to the white paper, MPS scientists recognize their responsibility to promote the advancement of animal welfare. This responsibility is designated as a "4th R." To achieve this goal, MPS will work toward improving the social environment of research animals; further refining the scientific basis for determining the sentience, pain, consciousness, and intelligence of research animals; and engaging the public on animal ethics.

The report represents discussions from two MPS workshops held on May 26, 2015 and January 13, 2016. A partial translation of the report begins on page 31 of the white paper (*https://www.mpg.de/10882259/MPG_Whitepaper.pdf*). ●

Continued from page 137:

What They Neglected to Tell You About Classroom Practice in Graduate School

is interesting that they take this approach to learning only in school, whereas outside of school they approach their learning in a very different way. In school, their goal is passing exams, which, traditionally, have focused mainly on recalling facts or retelling a "story." Outside of school, their goal is to use information to solve a problem or complete a task. They engage in what is called "meaningful learning" or "learning with understanding" (3).

If you ask students why they are in school, most, if they are in pre-professional or professional programs, will tell you that they want to be nurses or doctors or other healthcare professionals. Those students taking your course to satisfy distribution requirements may tell you that they want to understand how their bodies work so they can be informed consumers of healthcare services. Notice that each answer describes how they intend to use the information. In my experience, I have not encountered a single student who wanted to acquire enough facts to be a successful contestant on a television game show! If, in fact, the student wants to learn so that she/he can apply the information to solve problems, she/he should be focused on engaging in meaningful learning.

Question 2: How Do Students Engage in Meaningful Learning?

Think about something you learned to do outside of school. It can be anything (e.g., driving a car, learning to knit, buying a house, learning a language, playing a sport, playing an instrument, learning to navigate around a new city). What was the process that you went through to learn this? When faced with this question, students and faculty alike report a similar process. They have an idea (mental model) about what they are trying to learn, either without prior study or with prior study (e.g., reading instructions, doing some background reading, or viewing a video). They then try to do the task (i.e., solving the problem). Based on the success or failure of the trial, they seek additional information or clarification of their knowledge, revise their ideas, and try to do the task again. Students and faculty report that they learned whatever it is by "trial and error." By calling the process "trial and error," these learners do not seem to acknowledge the important step of revising their ideas (mental models) based on the outcome of the trial. This is the process by which they have learned to solve problems in their daily lives since they were born (1). We describe this process as building, testing, and refining mental models. It is the process described as "the scientific method."

Question 3: What is the Instructor's Role in the Meaningful Learning Process?

We cannot learn for our students. They must do the learning, and *they must take responsibility for their own learning* (10). So, if we want meaningful learning to occur in our classroom, is it sufficient that we provide resources (information) and learning opportunities (e.g., exercises, workshops) for our students, or do we have more to offer? As physiologists, we have advanced training in making sense of physiological mechanisms and solving physiological problems (e.g., through research). However, there are many instructors of physiology who do not have advanced training in physiology, but these instructors have advanced training in other science disciplines and are, therefore, familiar with the scientific method as a way of knowing. Thus we have much more to offer students than just providing resources and opportunities for learning. Indeed, our classroom can be learner-centered, in which our job is to *help the learner to learn* (3).

Question 4: What Must I Do to Help the Learner to Learn?

Changing your mindset from providing resources and opportunities to helping the learner to learn changes your whole approach to classroom practice. The focus changes from someone who "instructs" to someone who facilitates. To be a facilitator requires you to interact with the learners to find out what kind of help they need. In some cases, they need some basic information. In these cases, you should provide that information. In other cases, their current mental models may be faulty. In these cases, your job is to first help the student make their current model visible, then help *them* confront the limitations of their model, and, finally, help them engage in the *process* of revising their mental model (2). In other cases, students may need help testing their mental models. Again, your job is to model the *process* of testing their mental models. When fulfilling this role, you become a diagnostician as well as a mentor. You must ask yourself questions like, "What led the student to come to this conclusion?" and "How do *I* make sense of this mechanism?" Finally, "What question can I ask that will help the learner recognize the limitation of his/her mental model?" This is an iterative process (3). In this process, it is important to help students begin to think about how they think (i.e., engage in metacognition). In doing so, you, as a mentor, model the process of building models of physiological mechanisms and solving physiological problems.

Question 5: How Should I Design Learning Opportunities for My Students?

Physiology is a discipline concerned with mechanisms. As noted earlier, meaningful learning focuses on *applying*

information that is being acquired. The overall goal of a physiology course then is to develop models of physiological mechanisms that can be used to solve physiological problems. The difference between an introductory course and an advanced course is the complexity of the problems to be solved. When designing a course or a learning opportunity, it makes sense to first ask, "What is the problem or problems that the learner should be able to solve at the end of the course or learning exercise?" Stated another way, "How should the student be able to use the content at the end of the learning session?" Thus the first step in designing educational resources is setting educational output objectives or performance goals (3, 5). We can think of the performance goals as the destination for a learning journey.

We now have a learning destination, but what is our embarkation point? We must recognize that students come to our courses with preexisting knowledge (mental models) and that, as they acquire new knowledge, they build on their current knowledge base (1). Aspects of these preexisting mental models may correctly apply to the topic being learned, whereas other aspects may be "faulty" with respect to the current content and accepted models (that is, misconceptions may exist). We can think of this student's embarkation point as the "input state" (3). So, in our design scheme, our next step is to assess the input state. To do this, we must provide students with a task or ask them questions that will help make their current mental model (ideas) visible to us. In doing so, we also help students make their current mental models visible to themselves. An example of such a task may be to have them close their eyes and focus on their breathing. After several breaths, ask them to describe what they felt and what caused air to flow into the system during inspiration and gas to flow out during expiration.

We now have beginning and ending points for the journey; what remains are the transition steps that will help move learners from where they are to the performance goal. These steps may be a logical progression of questions that lead students to develop a model of the mechanism in question, a task that results in a causal diagram (flow diagram) of the mechanism, a concept map, or other visual organizer of the elements of the mechanism, examination of the system from a particular vantage point (8), a role-play, or other active learning activity. Finally, we must assess the learners' ability to carry out the performance goal. One way to do this is to present a perturbation of the model and ask the students to predict the results of the perturbation. (Will a variable value increase, decrease, or not change?) They must also be able to explain the basis for their prediction. Once the students are able to fulfill the performance goal, this destination becomes the embarkation point (input state) for the next performance goal (output state). This iterative process continues until the end of the session or course.

It is important during this process to help students recognize that we learn by building on previous knowledge and that many physiological mechanisms share common principles (4, 7). Hence, because life is cumulative, one question that students should be encouraged to ask is, "Where have I seen this before?" or "How is this like something that I already know?"

Question 6: How Do I Get Students to "Play the Game?"

The "helping the learner to learn" mindset requires the instructor to engage the learners in an interactive dialog. In addition, for students to engage in meaningful learning, they must engage each other in intellectual discussion (i.e., explore each other's mental models). The challenge is to create a learning environment in which students are willing to share their thoughts. In general, students are reluctant to participate in such activities for a variety of reasons that include the following:

- Based on prior experience, their expectations are not consistent with the meaningful learning experience; "Just tell me what I need to know to pass the course!" "I'm in competition with my peers."
- Contributing factors may involve self-confidence; "I don't feel comfortable talking in front of groups."
- Fear may also play a role; "If I answer a question in class, it must be the right answer. Otherwise I may be ridiculed by the instructor or my peers."

If the goal is to help the learner to learn, steps must be taken to address the reservations of the students (6). My approach to this challenge is to build a learning community within the classroom (9). Building community promotes a safe learning environment, encourages collaborative learning, provides emotional support among community members, and helps build long-lasting relationships among students and faculty. Although there are many approaches to building community, the necessary steps include the following goals: getting to know the community; setting community learning goals; setting community behavior guidelines; and reinforcing community spirit. All of these steps require discussion within the community. Some faculty argue that using class time to engage in such discussion is not advisable since it takes time away from "delivering the content." However, the emphasis of community learning is on process (problem solving) rather than information acquisition. Once the learner is familiar with the process, acquisition of new information and incorporating this information into the framework of existing mental models is more efficient than it was in the earlier classroom model.

When time permits, small groups (groups of 4-6 students) develop a mission statement for the course, set learning goals, and set behavioral guidelines. This small group activity is then followed by a community discussion to

reach consensus guidelines. When time is at a premium, the course syllabus may include suggested guidelines for community discussion. The following excerpt from a course syllabus illustrates such a statement:

> Enrollment in this course entitles you to become a member of a learning community focused on developing the necessary skills and knowledge base to build a foundation for further study in physiology. Membership in this community carries certain rights and responsibilities. Make sure that you read the following statement of Community Rights and Responsibilities. By attending course activities, you agree to be a contributing member of this community.
>
> ***Statement of Community Rights and Responsibilities***
>
> Members of the learning community have the right to expect a supportive learning environment in which they may reach their maximum potential for engaging in meaningful learning. The community should provide academic as well as emotional support for its members in an ethical and professional manner. Members of the community have responsibility for adhering to the practices and guidelines listed below.
>
> - Each member of the community takes responsibility for his/her individual learning as well as for contributing to the collective learning of the community.
> - Each member of the community arrives to course activities on time and prepared to engage in the topic(s) of the day. Note: Habitual tardiness will be interpreted as showing disrespect for the community and may compromise successful completion of the course.
> - Each member of the community shows respect for other members of the community and for the community learning environment by
>
> *1)* using cell phones responsibly during course activities; this includes using phones for texting, viewing e-mail, and accessing the web during breaks only
> *2)* using computers for engaging in course activities only
> *3)* refraining from using technology for activities that distract (individually and/or collectively) from the community focus
> *4)* providing encouragement for all community members to take intellectual risks
> *5)* sharing ideas and confusion about the topics being discussed
> *6)* being accepting of and sensitive to community members' viewpoints
> *7)* being supportive when nonacademic stresses impact community members' learning
> *8)* keeping potentially distracting side conversations to a minimum
> *9)* sharing concerns regarding the learning community
> *10)* keeping a sense of humor

Question 7: How Do I Know Whether it is Working?

One advantage of adopting the design scheme that I have described in a learning community setting is that the learning is driven by a series of performance goals (learning outcomes). Because each class period includes the instructor interacting with the learners, the learning environment has a built-in formative assessment component. During the course of this dialog, the instructor continuously assesses the progress of the "journey." Thus the learning progression is monitored and redirected as needed on a daily basis.

The performance goals also provide the basis for summative assessment. Examinations should be focused on how well the student can do the performance goals. Exam questions may ask students to make predictions about how system variables will change when the system is perturbed and explain the basis for the prediction. Other options include asking students to solve a problem (e.g., predict what will happen to cardiac output, total peripheral resistance, cardiac contractility, and heart rate if mean arterial blood pressure falls suddenly), predict the results of an experiment (e.g., predict how the resting membrane potential of a neuron will change if the relative permeability of the membrane to potassium ions increases), or analyze a case description (e.g., a patient shows signs and symptoms of hypothyroidism; explain what tests you would run and what the expected outcomes of the tests would be to determine the site of pathophysiology in this patient). In each case, the students should be required to explain the reasoning behind his/her prediction. The emphasis of all assessment should be focused primarily on the how the student applied her/his mental model and secondarily on what information has been acquired.

Final Comments

A final advantage of adopting this mindset is that your classroom becomes your laboratory. By being a reflective practitioner, you can gain a wealth of information about how students learn, how they think about physiology, and what challenges they face as they build, test, and refine their mental models. As a result, new research questions come to mind. I encourage faculty to pursue these questions by becoming active in the educational research community. Design experiments that you can conduct in your own classroom or share your ideas and develop collaborative efforts through participation in the Teaching Section of APS, the Human Anatomy and Physiology Society (HAPS), the Society for the Advancement of Biology

Education Research (SABER), or similar educationally focused organizations.

My goal for sharing these thoughts is to provide some direction for young faculty who are willing to adopt a "helping the learner to learn" mindset. Although I have not included many specific examples of how to accomplish the goals related to each of the questions that were discussed, specific examples may be found in the appropriate references listed. I invite you to contact me if you seek additional examples or answers to related questions.

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Biography of Harold Modell

Harold Modell received his PhD in Physiology in 1971. He soon became interested in physiology education and active learning. This interest led to his developing computer-based simulations of respiratory physiology for student use (1975) and involvement on a national level in activities aimed at improving classroom practice. In 1985-1986, he was instrumental in establishing the Teaching of Physiology Section of the American Physiological Society, and, in 1988, Modell was named the founding editor of *Advances in Physiology Education*.

In 1989, he gave up bench science research in Respiratory Physiology in favor of educational research and development aimed at improving physiology education at the post-secondary level. Activities in this realm have included research, materials development, and faculty development in local, national, and international settings. In 2004, Modell received recognition for these efforts by being named the Claude Bernard Distinguished Lecturer of the Teaching Section of the American Physiological Society. He continues these efforts as Director of the Physiology Educational Research Consortium, and, until his retirement in 2015, was a faculty member at Bastyr University in Kenmore, Washington.

Continued from page 137:

Advocacy is Essential

of research such as the "cancer moonshot," BRAIN initiative, and personalized medicine. But the fact that this bill became law even at a time of intense partisan rancor demonstrates the depth of bipartisan support for biomedical research.

This bipartisan backing was also evident during the FY 2017 appropriations process. In making recommendations for FY 2017 funding levels, the House Appropriations Committee called for an increase of almost $1 billion for NIH, while the Senate Appropriations Committee recommended adding nearly $2 billion. Unfortunately the 114th Congress adjourned without finalizing FY 2017 funding for NIH and most other federal agencies. Instead, Congress passed a continuing resolution extending FY 2016 funding levels until April 27, 2017. The next step in the legislative process should be for the House and Senate to finalize the FY 2017 budget, but that effort seems to have stalled. NIH has a lot at stake: If the continuing resolution is extended for the rest of the fiscal year, NIH would have a flat budget except for the small infusion of money for targeted initiatives provided under 21st Century Cures. The National Science Foundation would also forfeit an increase.

Despite this strong support in Congress, President Trump's budget plans call for nearly a 20% cut to the NIH budget, with similar cuts to other programs as well. An overview budget released on March 16 contained few details, but the magnitude of the proposed cut sent shock waves through the research community. APS issued a statement calling on Congress to reject these "huge and damaging cuts," pointing out that this would "threaten both the health of all Americans and the U.S. economy as a whole." The complete APS statement is on page 140 of this issue.

Presidential budget plans are never enacted as proposed. Even though Republicans have majorities in both houses of Congress, they do not have the 60 votes that would be needed to stop a Senate filibuster. Nevertheless, this proposal is ominous for NIH and other research funding agencies.

The APS as a Society is making the case for federal investments in biomedical research, and APS members are also encouraged to participate in such efforts as individuals. As noted on page 139 of this issue of *The Physiologist*, 6 APS representatives were among a group of 55 scientists from FASEB's member societies who went to Capitol Hill on March 9 – before the preliminary Trump budget plan was released – to encourage Congress to finalize FY 2017 funding legislation. The FASEB delegation also alerted Congressional offices to FASEB's FY 2018 recommendations concerning what increases are needed in research programs sponsored by the NIH, NSF, VA, and other funding agencies.

The budget is not the only issue of concern to the extramural community. Scientists are also worried about other policy issues including immigration. In response to the President's January 27 Executive Order on immigration, the APS Council approved a statement affirming the Society's core values, which is on page 140 of this issue (and at *http://www.the-aps.org/mm/SciencePolicy/About/Policy-Statements/Core-Values.html*). These APS values include support for science and support for open communication, free exchange of ideas among scientists, and fostering a diverse and inclusive scientific workforce.

In early February, a new grassroots organization announced that it would hold a March for Science on April 22 – the first day of Society's Annual Meeting at Experimental Biology 2017. This March is an opportunity for scientists to be heard, but if we are to have a lasting impact, researchers need to bring their concerns to their elected representatives personally and repeatedly. You can get started by signing up for legislative action alerts from FASEB at *http://www.faseb.org/Science-Policy-and-Advocacy/Become-an-Advocate/Legislative-Action-Center.aspx*. You can also get daily policy and advocacy updates by following the APS Office of Science Policy (*@SciPolAPS*) on Twitter. In addition, there are advocacy and outreach resources on the APS website at *http://www.the-aps.org/Advocacy* to help you reach out directly to your Senators and Representatives.

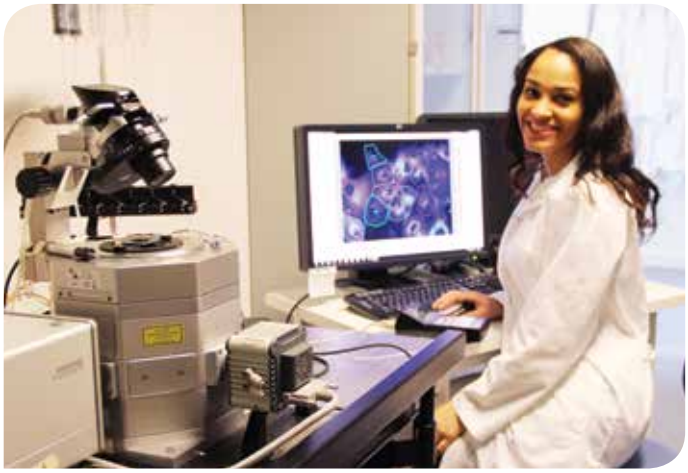
Your participation is essential. ●

Alice Ra'anan and Rebecca Osthus

Education

2017-2018 Minority Outreach Fellow Announced

The APS and Porter Physiology Development and Minority Affairs Committee congratulate the 2017 Outreach Fellow:
Lindsey Stavola, Yale University



Lindsey Stavola, 2017 APS Minority Outreach Fellow

APS Outreach Fellows attend EB 2017 and 2018, participate in online outreach activities and PhUn Week, as well as attend conferences for minority students in the fall (ABRCMS or SACNAS national conference).

The APS Minority Outreach Fellowship fosters communication between underrepresented minority (URM) graduate and postdoctoral students and middle/high school URM life sciences students. Program activities include year-long outreach fellowships for awardees to visit K-12 classrooms, help conduct teacher professional development workshops, and attend scientific meetings.

For more information, see the APS website (*www.the-aps.org/minorityoutreach*) or contact Brooke Bruthers in the APS Education Office (*education@the-aps.org*). The application deadline for the 2018-2019 fellowship year is December 1, 2017. ●

Minority Travel Fellowship Awards Available for 2017 APS Conferences

APS will be offering Minority Travel Fellowship Awards, which provide up to $1,800 in travel expense reimbursement, for the upcoming 2017 APS Conferences.

Physiological Bioenergetics: Mitochondria from Bench to Bedside

August 27-30, 2017 in San Diego, CA
Application deadline: May 12, 2017
#Bioenergetics17

Physiology and Pathophysiology Consequences of Sickle Cell Disease

November 6-8, 2017 in Washington, DC
Application deadline: July 7, 2017
#SickleCell17

For more information about the Minority Travel Fellowship Award program and to apply, visit *www.the-aps.org/minoritytravel* or contact Brooke Bruthers, Senior Program Manager, Diversity Programs, at *education@the-aps.org*. ●

Membership

Francis J. Haddy, 54th APS President (1922-2017)


Francis J. Haddy

Francis J. Haddy, the Society's 54th President, passed away at age 94 in Rochester, MN, on Wednesday, January 25, 2017. Haddy had a long and distinguished career as a professor of physiology, moved to Rochester in 2001 after retiring from the Uniformed Services University of the Health Sciences, Bethesda, MD. He had previously held positions in medical schools at Michigan State University, the University of Oklahoma, and Northwestern University. A beloved and respected teacher and researcher, Francis Haddy trained many medical students and research physiologists.

After graduating from high school in Kiester, MN, he attended Luther College in Iowa, then transferred to the University of Minnesota, where he received his BS and MD degrees. During medical school, he was supported by the Army and later served in the Army Medical Corps and as a researcher. He received training in internal medicine as a Fellow at the Mayo Clinic in Rochester and later returned to the University of Minnesota for his PhD studies in physiology under the guidance of Maurice Visscher.

Haddy had a long association with the APS, dating back to 1953 when he became a member of the Circulation Group, now the Cardiovascular Section. In 1966, he received the Carl J. Wiggers Award, recognition by this group for his outstanding research record, and from 1971 to 1974 he served on its Steering Committee. His APS editorial responsibilities also began early: in 1963, he joined the editorial boards of the *American Journal of Physiology* and the *Journal of Applied Physiology* and subsequently began service on the Editorial Board of the *American Journal of Physiology – Heart and Circulatory Physiology* (as well as on the editorial boards of a half-dozen other journals during his career, including *Circulation Research, Microvascular Research, Hypertension,* and *Microcirculation*).

In 1974, Haddy assumed the chairmanship of the newly established APS Committee on Committees; in 1976, he was elected to the APS Council; in 1980, he began serving as president-elect; and during 1981-1982, he served as the 54th President of the APS. During his presidency, Fran Haddy led the reorganization of the Public Affairs Committee and directed a major effort toward improving animal care legislation. Subsequent events have underscored the importance of these efforts. After completing his presidency, he continued to actively contribute to the APS in a variety of ways, including service on such APS committees as the Finance Committee, first as a member and then as chair, the Ray G. Daggs Committee, the Committee on Animal Care, and the Long Range Planning Committee.

In addition to his commitment to the APS, Haddy had an outstanding record at the national level in advancing physiological endeavors. For example, he served as a member of the NIH Cardiovascular Study Section, on the Cardiovascular Training Committee, on the Atherosclerosis and Hypertension Advisory Committee of the National Heart and Lung Institute, on the NASA Life Sciences Advisory Committee, and on the NASA-NIH Advisory Committee on Biomedical and Behavioral Research. His insightful analysis of policy issues in medicine and physiology and his leadership qualities were widely recognized as outstanding, as illustrated by his contributions to the expansion of two established medical schools (Northwestern and the University of Oklahoma) and his help in establishing two new medical schools (Michigan State and the Uniformed Services University). His exceptional leadership skills were also evident by his selection as Professor and Chair at the University of Oklahoma, Michigan State University, and the Uniformed Services University of the Health Sciences.

Francis Haddy exceled at bridging communication between basic scientists and clinicians, and he was a consistent advocate of joint training and joint appointments, recognizing the importance of translational research well before it was fashionable to

do so. Indeed, among Haddy's 190 primary research publications and nearly 500 other papers, editorials, and abstracts are many in translational research. His research markedly advanced our understanding of edema, shock, myocardial ischemia, and hypertension. Noteworthy were his studies related to the hypothesis that inhibition of Na-K-ATPase plays an important role in explaining the increased total peripheral resistance in hypertension, especially volume-loading hypertension. His work laid the scientific foundation for the search for a digitalis-like or ouabain-like substance in the blood that raises total peripheral resistance in hypertension. This work was summarized in several seminal reviews. Equally impressive was his work that delineated the multiple local control mechanisms that regulate tissue blood flow. His research systematically and precisely documented the role of potassium, osmolarity, sodium, calcium, magnesium, hydrogen, adenosine, and many other metabolic factors in controlling tissue blood flow. And his work on pulmonary edema demonstrated that several forms of pulmonary edema often result from increased pulmonary capillary hydrostatic pressure rather than increased capillary permeability, as was commonly believed in the 1950s and 1960s.

Over his career, Haddy worked with hundreds of medical residents and graduate students, providing them with outstanding training and mentoring. One former physiology graduate student from Michigan State fondly recalled that "as Chair, Dr. Haddy not only supported many students with funding, engaged actively in classroom teaching, and developed a strong and productive research group in cardiovascular physiology, he fostered a collegial atmosphere among all involved in the program. He is a man blessed with personal warmth, insight, and a generous spirit. One of the great pleasures of the typical work week at M.S.U was the Friday afternoon get together of faculty, students, and staff at a local watering hole where Dr. Haddy always bought the first round and stayed to chat with all."

In recognition of his outstanding research, education, and professional contributions, Francis Haddy was the recipient of numerous awards. These include the aforementioned Wiggers Award from the APS, his election as a Fellow of the American Physiological Society and the American College of Nutrition, the Medical Science Achievement Award from the American Heart Association, the Scientist Emeritus Award from the MD-DC chapter of the Society for Experimental Biology and Medicine, the Distinguished Service Award from his alma mater (Luther College), and the Distinguished Alumnus Award from the Mayo Clinic.

After retirement, Haddy developed a talent for painting in acrylics and was active in the artists' group SEMVA, the SouthEastern Minnesota Visual Artists. He was deeply devoted to his family and greatly enjoyed gatherings with extended family and friends for fishing, hunting, golfing, and other activities.

Francis Haddy is survived by his wife of 70 years, Dr. Theresa Brey Haddy; daughters, Carol Haddy Froelich and Alice Haddy Hellen; grandchildren, Kari Haddy Climer, Jennifer Haddy, Michael Haddy, Sarah Haddy, Jessica Froelich, Rachel Froelich, and Deborah Hellen; and one great-grandchild, James Climer. He was preceded in death by his son, Richard Haddy.

His love of research and learning, his great respect for his fellow human beings, and his high level of integrity in all he did were an influential example for his family, students, and colleagues. ●

James A. Schafer, 69th APS President (1941-2017)


James A. Schafer

James A. Schafer, Professor Emeritus in the Department of Cell, Developmental, and Integrative Biology (formerly the Department of Physiology and Biophysics) at the University of Alabama at Birmingham (UAB) passed away in the company of his wife, Margy, on March 5, 2017.

Schafer was born in 1941 in Buffalo, NY, where he received his education through high school. He attended the University of Michigan, receiving his BS in biophysics in 1963 and his PhD in physiology in 1968. He received 1 year of postdoctoral training in the laboratory of Erich Heinz at the Gustav-Embden Center for Biochemistry in Frankfurt, Germany, followed by a year with Thomas E. Andreoli at Duke University. He moved to UAB with Andreoli in 1970, taking a position of Assistant Professor in the Departments of Physiology and Biophysics and Medicine, where he has remained for over 40 years. Schafer was appointed to his present position in 1976.

Schafer has been a member of the APS since he was a graduate student in 1967. He has served on the Membership, Program Advisory, Publications, and Long Range Planning Committees, and was Editor of the *American Journal of Physiology – Renal, Fluid and Electrolyte Physiology* from 1983 to 1989. He has also served on the editorial boards of the *AJP – Renal, Fluid, and Electrolyte Physiology* (1980-1983), *Contemporary Nephrology* (1980-1985), the *Journal of General Physiology* (1981-present), and *Kidney International* (1990-1995). Schafer has been active in the Renal Section of the APS, serving on the Steering Committee and as secretary, and in the Epithelial Transport Group, serving on the Steering Committee and as Chairman. Schafer was elected to a term on the APS Council from 1992 to 1995, and served as President from 1996 to 1997. He also served on the board of FASEB (1995-1999) and on its Public Affairs Executive Committee (1997-1999).

Schafer has also been involved in the American Society of Nephrology (ASN), serving on its Publications, Research Advisory, and Program Committees. He was elected Secretary-Treasurer of the ASN in 1989 and served in that position and as a member of the ASN Council until 1992. He was a member of the National Kidney and Urological Diseases Program Evaluation Committee from 1985 to 1987, and was Chairman of the Research Committee of the National Kidney and Urological Diseases Advisory Committee from 1987 to 1990.

Schafer has been recognized for his research achievement in the area of renal epithelial transport and its regulation as the second recipient of the Robert F. Pitts Memorial Lectureship Award from the International Union of Physiological Sciences in 1983 and received the Homer W. Smith Award from the ASN and the New York Affiliate of the American Heart Association in 1993. He was also elected to honorary membership in the American Society of Clinical Investigation (1995); was a co-recipient, with Eberhard Schlatter of the University of Münster, of the Max-Planck Prize of the Max-Planck Society and the von Humboldt Foundation of Germany (1994); recipient of the Carl Gottschalk Award of the American Physiological Society (2001); the Berliner Award of the Renal Section of the APS (2004); and the Roy G. Daggs Award of the APS (2013). Among Schafer's other awards are an Established Investigator Award from the American Heart Association (1970-1975), a Wellcome Visiting Professorship at Dartmouth College, an award from the Mayor of the City of Birmingham, and the UAB President's Award.

Research in Schafer's laboratory was funded by the NIH, the Max Planck-von Humboldt, the American Heart Association, the Alabama Kidney Foundation, and the National Kidney Foundation. His early work focused on the mechanisms of water transport in the collecting duct and the proximal tubule and their regulation, and more recently on the regulation of ion and water transport in the collecting duct and the possible implications of altered regulation in salt-sensitive hypertension.

Schafer was appointed by the U.S. Department of

Health and Human Services as Chairman of the Research Committee on the National Kidney and Urological Diseases Advisory Board. Not only was Schafer a top-caliber physiologist and scientist, but he was also a particularly remarkable and effective teacher and mentor to many. He was well recognized for his medical school teaching efforts, including receiving the Argus Award and Outstanding Teacher award seven times. The outstanding teacher awards he received from seven medical school classes at UAB were especially important to him, as was the recognition he received when newly renovated laboratories of the UAB Nephrology Research and Teaching Center were named in his honor in 2006.

Jim enjoyed hiking, skiing, and being in the mountains. After retiring, Jim and Margy began to spend more time in their favorite vacation spot – Big Sky, Montana. One of Jim's final wishes was to end his days in Big Sky. He spent his final hours at home, in the arms of his loving wife, looking at the mountains.

Jim "exemplified the best in all of us, not least because of his integrity, kindness, generosity, and wonderful sense of humor. While we mourn our loss, we celebrate his life, his science, and the impact he has had on so many of us as a mentor, instructor, colleague, and friend," says Bradley K. Yoder, UAHSF Endowed Chair in Biomedical Research, UAB.

Jim is survived by his wife, Margy; his sister, Joan Schafer Ringheim; his two children, James Arthur Schafer, Jr. and Kirsten Schafer Smith; their spouses, Jane Ernestine Lesnick and John "Sage" Vinson Smith; and four grandchildren, Julius James Lesnick Schafer (7), Willow Rose Smith (6), Hazel Rain Smith (3), and Jacob Alessandro Lesnick Schafer (2). ●

Membership

New Regular Members

***transferred from student membership**

Olasunkanmi Adegoke
York Univ., Toronto, ON, Canada

Carlos Andres Aguilar
Univ. of Michigan, Ann Arbor, MI

Antino Recio Allen
Univ. of Arkansas for Med. Sci., Little Rock, AR

Laura Anselmi
Penn State Univ., Hershey, PA

Jodie L. Babitt
Massachusetts Gen. Hosp., Boston, MA

Kameswara Rao Badri
Morehouse Sch. of Med., Atlanta, GA

Greg Barton
Univ. of Wisconsin-Madison, Madison, WI

Petter Bjornstad
Univ. of Colorado Sch. of Med., Aurora, CO

Cary R. Boyd-Shiwarski
Univ. of Pittsburgh, Pittsburgh, PA

Elizabeth L. Brainerd
Brown Univ., Providence, RI

Justin W. Brown
James Madison Univ., Harrisonburg, VA

Sarah K. Burris
Loyola Univ., Maywood, MO

Brian Carlson
Univ. of Michigan, Ann Arbor, MI

Mark G. Carpenter
The Univ. of British Columbia, Vancouver, BC, Canada

Kaveri Chakrabarty
Hansraj Coll., Univ. of Delhi, Delhi, India

Eileen I. Chang*
Oregon Hlth. & Sci. Univ., Portland, OR

Heng-Jie Cheng
Wake Forest Univ., Lewisville, NC

Che Ping Cheng
Wake Forest Sch. of Med., Winston-Salem, NC

Nipavan Chiamvimonvat
Univ. of California-Davis, Davis, CA

Stefan Clemens
East Carolina Univ., Greenville, NC

John S. Clemmer*
Univ. of Mississippi Med. Ctr., Madison, MS

Bria Coates
Northwestern Univ., Chicago, IL

Marc Cook
North Carolina A&T State Univ., Greensboro, NC

Sarah C. Coste
Linfield Coll., McMinnville, OR

Troy Cross
Mayo Clinic, Rochester, MN

Michael P. Czech
Univ. of Massachusetts Med. Sch., Worcester, MA

Elise Demitrack
Univ. of Michigan, Ann Arbor, MI

Cory M. Dungan
Univ. of Kentucky, Lexington, KY

Jennifer J. Dupont
Tufts Med. Ctr., Boston, MA

Erika Eliason
Univ. of California-Santa Barbara, Santa Barbara, CA

David R. Emlet
Univ. of Pittsburgh, Pittsburgh, PA

Christopher Fang-Yen
Univ. of Pennsylvania, Philadelphia, PA

Francesca Fardo
Aarhus Univ., Aarhus, Denmark

Jessica Leigh Faulkner
Augusta Univ., Augusta, GA

Gordon Fisher
Univ. of Alabama-Birmingham, Hoover, AL

Hong Gao
Tulane Univ. Sch. of Med., New Orleans, LA

Andras Garami
Univ. of Pecs Med. Sch., Pecs, Hungary

Jose O. Garcia-Colon
Univ. of Puerto Rico at Carolina, Carolina, PR

Gerardo García-Rivas
Tecnológico de Monterrey-San Pedro, Garza, Mexico

Megan Stacey Grace
Baker IDI Heart and Diabetes Inst., Melbourne, VIC, Australia

John James Guers*
Rutgers New Jersey Med. Sch., Newark, NJ

Jonathan E. Harms
Penn State Univ. Coll. of Med., Hershey, PA

Andrea Hasenstaub
UCSF, San Francisco, CA

Hatim Ali Hassan
Univ. of Chicago, Chicago, IL

Christopher M. Hearon
Univ. of Texas Southwestern Med. Ctr., Dallas, TX

Harumitsu Hirata
Weill Cornell Med. Coll., New York, NY

Karen Lynne Houseknecht
Univ. of New England, Biddeford, ME

Matthew Hudson
Temple Univ., Philadelphia, PA

John Huetsch
Johns Hopkins SOM, Baltimore, MD

Michael Hutchens
OHSU, Portland, OR

Adam Jajtner
Kent State Univ., Kent, OH

Nicholas G. Jendzjowsky*
Univ. of Alberta, Calgary, AB, Canada

Hyun Jun Jung
NHLBI, Bethesda, MD

Adam Kennedy
Calico Life Sci., South San Francisco, CA

Jong-Kyung Kim
California Baptist Univ., Riverside, CA

Paul Kim
Grambling State Univ., Ruston, LA

Hojeong Kim
DGIST, Daegu, Republic of Korea

Jonathan A. Kirk
Loyola Univ. Chicago, Maywood, IL

Sandeep Kumar
Emory Univ., Atlanta, GA

Maniselvan Kuppusamy
Univ. of Mississippi Med. Ctr., Jackson, MS

Maria Isabel Larre Perez
Marshall Univ. Corp., Huntington, WV

David Joseph Lefer
LSU Hlth. Sci. Ctr., New Orleans, LA

Courtenay Dunn Lewis
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Na Li
Baylor Coll. of Med., Houston, TX

Joseph Loturco
UConn, Storrs, CT

Matthew Lucy
Univ. of Missouri, Columbia, MO

Jairo Lumpuy
Victoria de Giron Inst. of Basic and Preclinical Sci., La Habana, Cuba

Soumen Manna
Himalayan Inst. of Med. Sci., Dehradun, India

Andre Marette
Laval Hosp., Quebec City, QC, Canada

Jeffrey S. Martin
Vcom-Auburn, Auburn, AL

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Univ. of Florida, Gainesville, FL

Pablo Nakagawa
Univ. of Iowa, Iowa City, IA

Jennifer Ngo
Monash Univ., Clayton, VIC, Australia

Diego Gabriel Ogando
Indiana Univ., Bloomington, IN

Shreesh Kumar Ojha
UAE Univ., AL, AIN, United Arab Emirates

Kentaro Oki
Univ. of Michigan, Ann Arbor, MI

Raphael Rodrigues Perim
Univ. of Florida, Gainesville, FL

Jennifer M. Peterson
The Ohio State Univ., Columbus, OH

Martin Picard
Columbia Univ., New York, NY

Scott Pletcher
Univ. of Michigan, Ann Arbor, MI

Vsevolod Y. Polotsky
Johns Hopkins Univ., Baltimore, MD

Eva K. Polston
Howard Univ. Coll. of Med., Washington, DC

New Graduate Student Members

Ravikumar Adapala
North East Ohio Med. Univ. (Neomed), Kent, OH

Adelola Adeyemo
Univ. of Illinois-Chicago, Chicago, IL

Lauren Albee
Loyola Univ. Chicago, Maywood, IL

Daniele Teixeira Alves
Univ. Federal de Minas Gerais, Belo Horizonte, Brazil

Ester Arevalo
Sureda Lund Univ., Lund, Sweden

Mansoureh Barzegar
LSUHSC, Shreveport, LA

Dryden R. Baumfalk
Kansas State Univ., Manhattan, KS

Nicholas W. Baumgartner
Univ. of Illinois Urbana/Champaign, Urbana, IL

Heather Beasley
Meharry Med. Coll., Nashville, TN

Kaitlyn Beyfuss
York Univ., North York, ON, Canada

Nina Zielke Bispham
Univ. of Colorado, Boulder, CO

Anna Henry Borton
Case Western Reserve Univ. Sch. of Med., Shaker Heights, OH

Allen Bourdon
Univ. of Tennessee-Knoxville, Knoxville, TN

Scott Brown
Univ. of Missouri, Columbia, MO

Monique Opuszcka Campos
Fluminense Federal Univ., Niterói, Brazil

Katrina Jean Carter
Univ. of Wisconsin-Madison, Madison, WI

Xavier Chapa
Univ. of Puerto Rico Med. Campus, Guaynabo, PR

Cheng-Hung Chen
Synova USA, Secaucus, NJ

Ying Chen
Virginia Polytechnic Inst. and State Univ., Blacksburg, VA

Philip David Coblentz
Univ. of Florida, Gainesville, FL

Nicholas Coker
Univ. of Central Florida, Orlando, FL

Taylor Copeland
California State Univ. San Marcos, San Marcos, CA

Rory Cunningham
Univ. of Missouri-Columbia, Columbia, MO

Deena Jan Damschroder
Wayne State Univ., Fulton, MD

Gabrielle Dillon
Mayo Clinic, Rochester, MN

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Selim Fakhruddin
Univ. of Louisiana Monroe, Monroe, LA

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The George Washington Univ., Lanham, MD

Karine Correa Flor
SÃO Paulo State Univ., Araraquara/Sp, Brazil

Kelly Nicole Zender Fuller
Univ. of Illinois at Chicago, Chicago, IL

Geoff Futch
The Univ. of Texas at Austin, Austin, TX

Darryl Anthony Gaudet Jr.
Louisiana State Univ. Hlth. Sci. Ctr., Mandeville, LA

Gabrielle Elam Williams Giersch
Univ. of Connecticut, Mansfield Center, CT

Agustin Gonzalez-Vicente
Henry Ford Clinic, University Heights, OH

Ralph Gordon
Univ. of Roehampton, London, United Kingdom

Ian Mark Greenlund
Michigan Tech. Univ., Houghton, MI

Stephen Grote
Saint Louis Univ., Saint Louis, MO

Kristyn Gumpper
The Ohio State Univ., Columbus, OH

Courtney Howard
Auburn Univ., Auburn, AL

Anurag Jamaiyar
Northeast Ohio Med. Univ., Rootstown, OH

Monica Javidnia
Georgetown Univ., Washington, DC

Jason T. Kanady
Genomic Hlth., Redwood City, CA

Emma Karey
UC Davis, Davis, CA

Cory Michael Kelly
Case Western, Seattle, WA

Mia Kelly
Univ. of Florida, Gainesville, FL

Stephen A. Klassen
Western Univ., London, ON, Canada

Samuel Kohlenberg
Saybrook Univ., Denver, CO

Kellie Ann Kroscher
Virginia Tech, Blacksburg, VA

Joseph Lee
Univ. of Toledo, Toledo, OH

Matthew T. Lewis
Michigan State Univ., Lansing, MI

Virgilio Lopez
Univ. of Connecticut, Storrs, CT

Marissa Lopez-Pier
Univ. of Arizona, Tucson, AZ

Kenji John Maeda
Univ. of Mississippi Med. Ctr., Jackson, MS

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Tudor Moldovan
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Ayako Murao
Sanford Burnham Prebys Med. Discovery Inst., San Diego, CA

Trevor Tapiwa Nyakudya
Univ. of Johannesburg, Johannesburg, South Africa

Julieth Ochoa
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Abigail Owen
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Yi Xin
Univ. of Pennsylvania, Philadelphia, PA

Xiwen Zhang
Virginia Commonwealth Univ., Richmond, VA

Undergraduate Student Members

Tessa Evangeline Adler
Yale Univ., New Haven, CT

Maleeha Ahmad
Michigan State Univ., East Lansing, MI

Akame D. Alletto
West Texas A&M Univ., Canyon, TX

Annie Armstrong
Univ. of Wisconsin-Madison, Madison, WI

Zachary Allen Asa
Univ. of Florida, Gainesville, FL

Emily Blakemore
Lindenwood Univ., Fallon, MO

Alexandra Carl
Univ. of Wisconsin-Madison, Madison, WI

Annabel Chen
Stanford Univ., San Ramon, CA

Chanel Brianna Coleman
East Carolina Univ., Wake Forest, NC

Gillian Grace Hecht
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Missouri Southern State Univ., Joplin, MO

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Publications

Bodine Named Editor of *Journal of Applied Physiology*


Sue Bodine

Sue Bodine has been named Editor of the *Journal of Applied Physiology*, effective July 1, 2017.

Bodine is a Professor at the University of California, Davis, with joint appointments in the Departments of Neurobiology, Physiology and Behavior, and Physiology and Membrane Biology. She also holds a research appointment at the VA Northern California Health Care System.

Bodine received her BS, MS, and, in 1985, PhD from the University of California, Los Angeles, where she received a Graduate Woman of the Year award under the mentorship of Reggie Edgerton. Following a postdoctoral fellowship at UCLA, she joined the faculty at the University of California, San Diego School of Medicine in the Department of Orthopedic Surgery.

Since her initial academic appointment in 1988, Bodine has held positions in both academia and private industry. She worked at Regeneron Pharmaceuticals from 1996 to 2002, where she became Co-Director of the Muscle Biology Program and worked on the identification and development of targets to treat muscle atrophy. In 2003, she returned to academia and has continued to study the mechanisms that regulate skeletal muscle mass and function.

Bodine is a neuromuscular physiologist whose general field of study is skeletal muscle plasticity. Her primary research interests are in understanding the mechanisms that regulate skeletal muscle size under growth and atrophy conditions. Her lab is also interested in understanding the molecular and cellular mechanisms responsible for muscle's adaptation to exercise and inactivity, and in determining the potential role for exercise in disease prevention and increased quality of life with aging. The long-term objective of her lab is to identify and develop therapies for the treatment of muscle atrophy under a variety of conditions. Her lab has been involved in the identification of the ubiquitin ligases MuRF1 and MAFbx/atrogin-1 as key regulators of skeletal muscle atrophy, and in mTORC1 as a key regulator of skeletal muscle hypertrophy.

Bodine has served as an NIH study section member and Chair of the Skeletal Muscle and Exercise Physiology panel. She has served as a Councilor for the APS/Environmental and Exercise Physiology section (2013-2016) and as an Associate Editor of the *American Journal of Physiology – Endocrinology and Metabolism* (2010-2016), *Journal of Applied Physiology* (2011-2014) and *American Journal of Physiology – Cell Physiology* (2016). In 2016, she joined the Editorial Board of *Physiology*. ●

Current Calls for Papers

Physiological Genomics

- Omic Approaches to Understanding Muscle Biology
  Submission deadline: November 30, 2017
- Genetics of Metabolic Syndrome
- Single Cell Analysis
  Submission deadline: May 31, 2017

Journal of Neurophysiology

- Working Memory: Neural Mechanisms
  Submission deadline: December 31, 2017
- 50 Years of Microneurography: Insights into Neural Mechanisms in Humans
  Submissions deadline: December 31, 2017
- Control of Coordinated Movements
  Submission deadline: December 31, 2017
- Where Are You Going? The Neurobiology of Navigation.
  Submission deadline: June 30, 2017
- The Mouse Visual System
  Submission deadline: July 1, 2017
- Central Pattern Generators
  Submission deadline: July 1, 2017

Advances in Physiology Education

- Historical Perspectives and Living Histories

American Journal of Physiology – Cell Physiology

- Cell and Molecular Physiology of the Blood-Brain Barrier and Choroid Plexus
  Submission deadline: June 30, 2017
- Cellular Pathophysiology of Neurodegenerative Diseases
  Submission deadline: June 30, 2017
- Gasotransmitters
  Submission deadline: June 30, 2017
- Molecular Pathways in Cell Signaling
  Submission deadline: June 30, 2017
- Single Cell Physiology
  Submission deadline: June 30, 2017
- Stem Cell Niche and Differentiation
  Submission deadline: June 30, 2017

American Journal of Physiology – Endocrinology and Metabolism

- Role of Gut Microbiota and Gut-Brain and Gut-Liver Axes in Physiological Regulation of Inflammation, Energy Balance, and Metabolism
  Submission deadline: September 30, 2017
- Role of Fetal Programming and Epigenetic Regulation on the Development of Endocrine and Metabolic Alterations
  Submission deadline: September 30, 2017
- Browning and Beiging of Adipose Tissue, Its Role in the Regulation of Energy Homeostasis and as a Potential Target for Alleviating Metabolic Diseases
  Submission deadline: September 30, 2017
- Mechanisms of Effects on Sleep Disruption on Adipocyte/Obesity Metabolism and Their Relation to Other Metabolic Disease
  Submission deadline: September 30, 2017
- Metabolism and Signaling Functions of Amino Acids in the Regulation of Cell/Tissue Function in Health and Disease
  Submission deadline: September 30, 2017
- Role of Adipose Tissue Nutrient/Vitamin Metabolism in Physiological and Altered Metabolic Settings
  Submission deadline: September 30, 2017
- Endocannabinoids and Cannabinoid Receptors as Regulators of Endocrine Functions and Tissue Metabolism
  Submission deadline: September 30, 2017
- Role of Myokines and Adipokines and Other Cross-Talk Mechanisms of Regulation of Endocrine and Metabolic Functions
  Submission deadline: September 30, 2017
- Mitochondria Dysfunction in Aging and Metabolic Diseases
  Submission deadline: September 30, 2017

American Journal of Physiology – Gastrointestinal and Liver Physiology

- Gut-Brain Interactions and Brain Imaging
- Physiology of Gastrointestinal, Hepatic, and Pancreatic Cancer
- Metabolomics and Physiological Systems
- Systems Biology in Gastrointestinal Physiology and Diseases

American Journal of Physiology – Heart and Circulatory Physiology

- Mechanisms of Exercise-Induced Amelioration of Cardiovascular Disease
  Submission deadline: July 1, 2017
- Mining Natural Products for Cardiovascular Benefits
  Submission deadline: July 1, 2017
- miRNA Regulation of the Mitochondrion in Cardiovascular Disease
  Submission deadline: August 31, 2017

American Journal of Physiology – Lung Cellular and Molecular Physiology

- Electronic Cigarettes: Not All Good News?
  Submission deadline: October 1, 2017
- Ion Channels and Transporters in Lung Function and Disease
- Age-Related Dysfunction in Lung Barrier Function in Health and Disease

American Journal of Physiology – Regulatory, Integrative and Comparative Physiology

- Hypertensive Disorders of Pregnancy: Effects on Mother and Baby
  Submission deadline: December 1, 2016
- G Protein-Coupled Receptor Signaling in Metabolic Disease
  Submission deadline: December 31, 2017
- Oxygen Signaling
  Submission deadline: December 31, 2017
- New Investigator Review Award
  Submission deadline: June 30, 2017

American Journal of Physiology – Renal Physiology

- Imaging Techniques in Renal (Patho)physiology Research
  Submission deadline: June 30, 2017
- Inflammation and Inflammatory Mediators in Kidney
  Submission deadline: June 30, 2017
- Mechanism and Treatment of Renal Fibrosis and Treatment
  Submission deadline: June 30, 2017
- Renal Hemodynamics
  Submission deadline: June 30, 2017
- Gender and Hormones in Lower Urinary Tract Function
  Submission deadline: June 30, 2017
- Transport Proteins as Regulators of Blood Pressure Homeostasis
  Submission deadline: June 30, 2017
- Endothelin in Renal Physiology and Disease
  Submission deadline: June 30, 2017

For a complete list of current Calls for Papers, visit the APS website.

People and Places

Research on the Brain's Reward System Wins the World's Largest Prize for Neuroscience


Wolfram Schultz

APS member Wolfram Schultz was joined by two other neuroscientists, Peter Dayan and Ray Dolan, as recipients of the world's most valuable prize for brain research. The Brain Prize for 2017 was awarded for their analysis of how the brain recognizes and processes reward. The capacity to link reward to events and actions is the foundation of human and animal survival, and problems with the processing of reward lie at the heart of many neurological and psychiatric disorders.

The Brain Prize, awarded by the Lundbeck Foundation in Denmark, is worth 1 million Euros. Awarded annually, it recognizes one or more scientists who have distinguished themselves by an outstanding contribution to neuroscience.

The research of this year's winners has far-reaching implications for understanding human behavior, including decision-making, gambling, drug addiction, compulsive behavior, and schizophrenia.

Reward is essential to survival because humans and other animals need to learn to direct their decisions and their actions toward outcomes that will satisfy their needs and away from danger. This means that they have to learn which events in the environment predict future rewards and punishments. For instance, if you feel hungry and see a building with a sign "Restaurant," you are likely to enter because the sign predicts that your hunger will be reduced if you go inside.

The sense of reward is surprisingly complicated. It is influenced and determined by many things, such as taste and smell, as well as by fundamental motivations, such as hunger or thirst. In turn, it influences choices, decisions, and even attention. Many regions of the brain process information associated with reward, but one central linchpin for the regulation of learning and performance is a neurotransmitter (chemical messenger) in the brain called dopamine.

Thirty years ago, German-born Wolfram Schultz, professor of neuroscience now at the University of Cambridge, was studying learning in monkeys at the University of Fribourg in Switzerland. He developed methods for recording activity from neurons (nerve cells) that use dopamine to transmit information to other neurons. He found that, before learning, these dopamine neurons respond whenever a reward – fruit juice, in this case – is given to the monkey, but if the monkey is shown various visual patterns and has to respond to one of them to secure the reward, the pattern of response changes as the animal learns. The dopamine neurons now respond when the correct visual pattern appears, and the response to the reward itself disappears. If no reward is given, the activity of dopamine neurons actually decreases at the expected time after the visual signal; but if the reward is delivered at an unexpected time, the neurons respond to it.

Schultz gratefully acknowledged the contributions of his many colleagues and collaborators, as well as the institutions and funding agencies that have supported their work. "The Brain Prize is a fantastic reward for our research group. I can hear our dopamine neurons jumping up and down!" Schultz said.

The winners will share the prize of 1 million Euros, which was presented to them at a ceremony on May 4 in Copenhagen by His Royal Highness Crown Prince Frederik of Denmark. ●

Nicholas Gilpin Receives Presidential Early Career Awards for Scientists and Engineers

Nicholas Gilpin

APS member Nicholas Gilpin was awarded the Presidential Early Career Award for Scientists and Engineers by former President Obama on January 9, 2017. Gilpin is associate professor of physiology and associate director of the Alcohol and Drug Abuse Center of Excellence at Louisiana State University Health Sciences Center in New Orleans. The Presidential Award is the highest honor bestowed on early career science and engineering professionals by the U.S. government. Awardees will be honored for their accomplishments at a White House ceremony in May. For more information, visit *http://www.lsuhsc.edu/newsroom/Gilpin%20Receives%20Presidential%20Honor.html*. ●

Scott Powers Named University of Florida Teacher-Scholar of the Year

Scott Powers

The University of Florida has named APS member Scott Powers Teacher-Scholar of the Year for 2016-2017. Powers is a distinguished professor in the Department of Applied Physiology and Kinesiology in the College of Health and Human Performance. His research focuses on the effects of exercise-mediated changes in cardiac and skeletal muscle. The Teacher-Scholar of the Year is the University of Florida's most prestigious faculty award. Powers is also the APS Environmental and Exercise Physiology section's 2017 Honor Award winner, and is a past associate editor of the *American Journal of Physiology – Regulatory, Integrative and Comparative Physiology*. For more information, visit *http://news.ufl.edu/articles/2017/03/powers-named-uf-teacher-scholar-of-the-year.php*. ●

News From Distinguished Physiologists

Letter to Patangi K. Rangachari

Marcus Raichle writes: "Thank you so much for the very nice letter. Yes, my 80th birthday is just over a week away and I am writing this e-mail while sitting at my desk in my laboratory at Washington University School of Medicine. I'm still a full-time member of the faculty with graduate students and an NIH Program Project from NINDS that I've held for over 40 years. My legs are not what they used to be so I use a cane, but otherwise I'd say I'm quite functional. My autobiography, which I put together for the Society for Neuroscience, is available at *https://www.sfn.org/~/media/SfN/Documents/TheHistoryofNeuroscience/Volume%208/MarcusRaichle.ashx*. It appears in volume 8 of their series *The History of Neuroscience in Autobiography*." ●

Letter to Peter Lauf

Christos Moschos writes: "Thank you very much for your wishes.

"Following my graduation in 1954 from the Athens (Greece) Medical School, I spent the following 5.5 postgraduate years between the Departments of Medicine of Athens University and Vienna (Austria) University. I arrived in the U.S. in 1959, and, following a rotating internship in Baltimore, I was offered a research fellowship by the Massachusetts Heart Association at Boston City Hospital (Tufts Service). Subsequent to that, I was offered a position in the Department of Medicine (Cardiology) at New Jersey Medical School (former Seton Hall), where I stayed until my retirement, 35 years later, in 1997. It was an early desire of mine to stay in academic medicine, a decision evolving after my time in Vienna for 2.5 years, a historically prominent place (besides music) regarding the evolution of modern medicine, being and circulating in the same buildings, halls, and amphitheaters from where great contributions to medicine emanated in the past, with an environment offering a climate where patient care and teaching were enriched with discussions relevant to investigational issues and results at hand for further pursuit. It was during that time I worked on my dissertation for PhD (*Ganglion Blockers in the Treatment of Pulmonary Hypertension*), which I presented to the Athens Medical School in 1957.

"However, decisive for my career was my arrival in the U.S. in 1959. I can only say that it took only a very brief time to sense/realize that, in the U.S., the 'un-spoken' message for me was: Show us what you can do, and you will be rewarded accordingly. Beyond that, a measure of luck, the environment, given the prevailing circumstances at that time, determined the place of your 'landing' and was an important factor. I have been truly lucky/favored to have spent 2 years at the Boston City Hospital and took advantage of its offerings and exposure to its three (at that time) academic services, and beyond that to work under a person/director representing the best in inspiration, instruction, encouragement, and humanity, a genuine mentor who introduced me to the research field on which I subsequently based my work: Pathophysiology of Thrombosis – Platelet Acting Drugs. My subsequent years at New Jersey Medical School were in an environment that was very active in various investigational projects by its members, where encouragement, support, collegiality, and individual progress in one's career couldn't be better. After 35 years at NJ Medical School, combining research, patient care, and teaching students and residents, I retired in 1997.

"In conclusion, for a person with a desire for an academic career and what this involves, the timely exposure to the 'proper' environment with individuals who can inspire, direct, and support remains the decisive element that would allow a pursued academic career to flourish.

"Finally, my retirement years are spent between fulfilling family obligations, extensive reading (small part professional curiosity!), and my active involvement in the operation and goals of the International Hippocratic Foundation of Kos, an island in the Aegean Sea of Greece, and the birthplace of Hippocrates. The Foundation represents a forum for the discussion, views, and assessment of issues related to the practice of the Medical Profession in the context of Hippocratic Philosophy. This activity requires my frequent trips to Greece (like, proverbially, the old elephant returns to the place of birth – not yet to die in this case. . .)." ●

Letter to Lois J. Heller

Robert L. Chevalier writes: "I greatly appreciate your recognition of my 70th birthday and the invitation to share aspects of my career with members of the Society (this marks my 30th year as a member of the APS). After 36 years on the faculty of the Department of Pediatrics at the University of Virginia, I transitioned to emeritus professor status 2 years ago. Although I have closed my lab, I maintain an office there, and continue to interact with colleagues and their activities.

"I was born in Chicago but was raised in Europe in the postwar years. I then returned to the U.S. and received BS and MD degrees from the University of Chicago. This was followed by pediatric residency at the University of North Carolina, where I became enchanted with renal physiology and its application to children with kidney disease and fluid and electrolyte disorders. The 1970s were an exciting time for nephrology, with research focusing on the application of elegant physiological techniques to understanding normal and abnormal function of the mammalian kidney. While a resident, I was fortunate to meet Carl W. Gottschalk, director of the micropuncture laboratory in the Department of Physiology at UNC. I was accepted to his lab as a postdoctoral fellow and learned to apply micropuncture techniques in a rat model of ischemic acute kidney injury. The physiological approach prepared me to embrace an integrative view of biology, which I have maintained throughout my career. After a subsequent fellowship in pediatric nephrology at the University of Colorado, I became interested in the developing kidney and the pathogenesis of congenital renal disorders.

"I arrived in Charlottesville in 1978 directly following completion of my fellowship, being the first pediatric nephrologist in a small, growing department. With the support and encouragement of my department chair, Robert Blizzard (a noted pediatric endocrinologist), I established a micropuncture lab to investigate mechanisms of nephron adaptation from fetal to postnatal life, and animal models of neonatal kidney disease. Funding was less brutal at that time – I submitted an RO1 grant my first year and was funded the following year! I benefited from a rich academic environment, including collaboration with faculty in the basic and clinical sciences, and in 1984 I recruited Ariel Gomez to join me. Dr. Gomez completed his medical training in Argentina, followed by fellowships in pediatric nephrology in the U.S. He mastered fetal cardiovascular and renal physiology in the lab of Jean Robillard at the University of Iowa, using a sophisticated fetal ovine model. Dr. Gomez continues to enjoy a stellar career at UVa, investigating the biology of the renin-angiotensin system. We have maintained our collaboration at UVa for over three decades, working in adjacent labs and with continuous funding from the National Institutes of Health and the American Heart Association.

"Whereas Dr. Gomez became a dedicated molecular biologist, most of my work was accomplished using physiological and morphometric study of rodent models, as well as in vitro cell studies. The following summarizes the broad questions that captured my interest over the years, made possible by the combined effort of technicians, trainees, and collaborators from UVa and institutions throughout the world.

"Renal adaptation to extrauterine life: the importance of sodium. Compared with the adult, neonatal excretion of an acute sodium load was regarded as 'immature.' However, after birth, the neonate must maintain positive sodium balance to allow normal somatic growth. We postulated that limited dietary sodium in maternal milk promotes a reduced diuretic and natriuretic response to acute volume expansion in the neonatal period. Using a technique to artificially rear neonatal rat pups by gastrostomy feeding with either normal or high sodium formula, we found that urine sodium excretion following acute saline volume expansion was markedly increased in the rats receiving sodium supplementation, and this was associated with a rise in glomerular filtration rate. Inhibition of AT1 receptors promoted marked natriuresis and diuresis following acute volume expansion of neonatal rats.

"Further studies addressed the role of the ANP/cGMP (atrial natriuretic factor, cyclic GMP) axis in the regulation of sodium homeostasis in the neonate.

An increase in plasma ANP concentration resulted in significantly less excretion of cGMP and urine sodium excretion in the neonatal than in the adult rat, and infusion of ANP selectively stimulated formation of cGMP in glomerular podocytes. Moreover, although ANP-induced generation of cGMP by isolated glomeruli from neonatal rats was similar to that from adult glomeruli, the extrusion of cGMP out of the glomeruli was significantly greater in the adult. In a sabbatical year (1992-1993), I learned in vitro cellular techniques in the laboratory of Bernard Rossier in Lausanne, Switzerland. We subsequently found that, in cultured monolayers of LLCPKI renal tubular epithelial cells, extracellular (but not intracellular) exposure to cGMP inhibited sodium transport. Thus, in the neonate, immaturity of the organic anion transporter responsible for extrusion of cGMP out of the podocytes blunts the natriuretic response. Taken together, these results are consistent with the hypothesis that renal sodium conservation and an attenuated natriuretic response to acute volume expansion represent adaptive responses to the limited availability of sodium in maternal milk, coupled with the positive sodium balance necessary for somatic growth.

"Progression of congenital renal disease. Urinary tract malformations (including reduced nephron number and urinary tract obstruction) account for the majority of cases of renal failure in infants and children. We therefore developed models to investigate the response of the neonatal guinea pig kidney to loss of renal mass and to ureteral obstruction. These studies revealed that unilateral nephrectomy can lead to an acceleration of normal renal development, with preservation of glomerulotubular balance, but without the formation of new nephrons. We also demonstrated that autoregulation of renal blood flow in the maturing rat is shifted to higher perfusion pressures with growth-dependent increases in blood pressure. Although autoregulation is maintained following unilateral nephrectomy in the adult rat, autoregulation is impaired in the remaining kidney of the immature animal, subjecting glomeruli to increased pressures, thereby predisposing the kidney to injury later in life.

"We discovered that, following ureteral obstruction, single nephron glomerular filtration rate is heterogeneous, with function of some nephrons being preserved in some but impaired in others as a result of reduced effective filtration pressure and reduced ultrafiltration coefficient. The hemodynamic consequences of ureteral obstruction in the neonate involve significant vasoconstriction mediated by angiotensin. Studies in a neonatal rat model of ureteral obstruction revealed a marked increase in renin gene expression modulated by renal nerve activity, leading to recruitment of cells not previously secreting renin. Renal angiotensin II content more than doubled in the obstructed kidney, and mRNA and radioligand binding of the AT1 receptor was significantly enhanced, indicating upregulation of the entire renal renin-angiotensin system. When subjected to unilateral ureteral obstruction, interstitial fibrosis in the obstructed kidney was found to depend on the number of functional copies of the angiotensinogen gene in neonatal mutant mice provided by Oliver Smithies at the University of North Carolina.

"Ureteral obstruction stimulates renal tubular apoptosis and reduces the renal expression of endogenous epidermal growth factor (EGF). We found that the administration of exogenous EGF or insulin-like growth factor-1 (IGF-1) markedly inhibited apoptosis of renal tubular cells in the hydronephrotic kidney of the neonatal rat, resulting in a reduction in tubular atrophy and interstitial fibrosis. The observation that tubular apoptosis is directly related to tubular dilatation focused attention on tubular cell stretch as a mechanical signal. Mechanical stretching of rat renal tubular cells in culture induced apoptosis that was inhibited by the administration of EGF or IGF-1. Although this prevented the apoptotic cascade through preservation of BAD phosphorylation in the rat, EGF *potentiated* renal cell death in hydronephrotic neonatal mice and in cultured mouse tubular cells (human cells responded similarly to rat cells). This species difference was found to be attributable to differences in tubular cell activation of Src and underscores the importance of understanding species-specific variation in cell signaling responses in animal models of human disease.

"Additional studies in mutant mice revealed that selectins and integrins (adhesion molecules) contribute to macrophage infiltration in the neonatal rat kidney following ureteral obstruction. In vitro experiments demonstrated that activated macrophages induce apoptosis of renal tubular cells, and microarray analysis showed that upregulation of a number of immune modulator genes are likely to contribute to the renal lesions of ureteral obstruction in early development.

Ureteral obstruction in neonatal mice lacking functional osteopontin showed that this phosphoprotein contributes to activation of interstitial fibroblasts and progression of fibrosis, but also suppresses tubular apoptosis, thereby acting as a "double-edged sword." These results also suggest that caution should be exercised in moving animal studies to therapeutic clinical trials: injurious effects in one renal compartment may accompany salutary effects in another.

"Subsequent experiments demonstrated that activation of AT1 receptors is necessary for normal renal growth and that transforming growth factor-β is regulated by AT1 receptors in the obstructed, but not intact, kidneys. However, in contrast to salutary effects reported in older animals, pharmacological inhibition of angiotensin-converting enzyme, AT1 receptor, or TGF-β1 receptor actually exacerbates renal injury in the neonatal hydronephrotic kidney. These findings highlight the markedly different responses to therapeutic intervention in the developing kidney compared with the mature kidney subjected to urinary tract obstruction.

"More recently, we showed that, in mutant mice lacking functional endothelial nitric oxide synthase (eNOS), proximal tubules undergo apoptosis at the glomerulotubular junction with the formation of atubular glomeruli. We discovered that eNOS is normally localized to the proximal tubular cells in the neonate and shifts to endothelial cells in later maturation (but is downregulated following ureteral obstruction). Proximal tubular eNOS, therefore, appears to serve as a survival factor necessary for the maintenance of nephron maturation and integrity. These studies led us to an entirely new avenue of investigation. Reexamination of kidneys from previously studied adult mice with complete unilateral ureteral obstruction revealed that 60% of proximal tubular mass is lost to cell death, with the formation of atubular glomeruli. In the neonatal mouse subjected to ureteral obstruction, this process is delayed beyond 2 wk of age, and release of partial obstruction allows remodeling of remaining nephrons. In collaboration with Jared Grantham and his group at the University of Kansas, studies of mutant mice with polycystic kidney disease demonstrated that proximal tubular atrophy and formation of atubular glomeruli are directly related to the total cyst volume, consistent with progressive obstruction of noncystic as well as cystic nephrons. For patients with established polycystic kidney disease, total cyst volume is a reliable marker of progression, which may serve as a surrogate for nephron loss due to tubular obstruction.

"Although a rare pediatric disorder, nephropathic cystinosis is characterized by progressive narrowing of the proximal tubule beginning at the glomerulotubular junction ('swan neck' deformity), leading to the formation of atubular glomeruli. I therefore established a collaboration in Paris with Corinne Antignac, who developed the first mouse model with a renal phenotype mimicking the human disease (*Ctns*$^{-/-}$ mouse). Morphometric studies of the *Ctns*$^{-/-}$ - mouse revealed marked flattening of the proximal tubular S1 segment with localized oxidative injury and loss of apical brush border and mitochondria. Thus, in contrast to the response to ureteral obstruction (atrophy and cell death), proximal tubular cells subjected to cystine overload remain viable and initially provide a conduit for transit of tubular fluid to more distal tubular segments. Moreover, we demonstrated that early treatment with an antioxidant targeted to mitochondria (mitoquinone) slows the progression of the swan neck lesion. With advancing age, however, proximal tubules become separated from glomeruli, with the onset of renal failure.

"These murine models of congenital renal disease demonstrate that proximal tubular damage is an early response to a variety of insults, which, when sustained, can lead to chronic kidney disease. In fact, our studies and others suggest that the proximal tubule is the primary target of injury and progression to interstitial fibrosis. However, most investigative efforts to slow or arrest the progression of kidney disease are currently directed at interfering with interstitial collagen deposition – a late event that is likely an adaptive response rather than a cause of injury. The challenge will be to detect and treat proximal tubular stress or injury before the onset of these largely irreversible changes.

"Physiological and evolutionary adaptation. Despite many remarkable advances developed during the 40 years since I became a nephrologist, I have become increasingly discouraged by the lack of effective therapies to arrest the progression of chronic kidney disease. The paradigm that continues to drive current research is to regard progressive nephron

loss, hyperfiltration, and incomplete repair as "maladaptive." This conclusion is the result of viewing only the *proximate* causes of nephron injury – those that comprise physiological (homeostatic) adaptation. A complementary approach is to consider *ultimate* causes, which comprise evolutionary explanations based on evidence for natural selection. The value of considering both forms of adaptation was elegantly presented over 20 years ago by Garland and Carter (*Annu Rev Physiol* 56: 579, 1994) and by A. F. Bennett in the *Handbook of Physiology: Comparative Physiology* (1997). Examples include mismatch of the phenotype with environment and evolutionary tradeoffs. The mammalian kidney itself is the product of hundreds of millions of years of evolution, with sequential adaptation by our ancestors to marine, freshwater, and terrestrial environments. This resulted in a vulnerable, energy-consuming renal tubule and a hypoxic, hyperosmolar microenvironment. The apparently maladaptive nephron response to stress includes tubular cell death, which can be interpreted in the context of the life history (from kidney development to senescence), and the evolutionary importance of energy conservation in the balance between reproductive fitness and longevity.

"It has been over 150 years since the publication of *The Origin of Species,* but the incorporation of evolutionary principles in medical research has been slow. This began to change with the development of evolutionary medicine by G. C. Williams and R. M. Nesse in the 1990s, which has been successfully applied to a number of specialties, notably infectious disease, immunology, cancer, and neuroscience. I began incorporating these concepts in my work a number of years ago, and have now published a review arguing for the application of evolutionary principles in renal research (*Kidney Int Rep*, in press; doi:10.1016/j.ekir.2017.01.012).

"Throughout my career, I have benefited greatly from my training as a physiologist, retaining the perspective of an integrative approach to biology and medicine. This has helped me to assimilate the remarkable advances in genetics and cell and molecular biology that have blurred the distinctions between disciplines. I am convinced that, although we have learned much from a reductionist approach in the life sciences, we need to look beyond proximate causes to explain our observations: integrative physiology will always be there for us." ●

Positions Available

Assistant Professor: Applications are invited for a tenure-track faculty position at the level of assistant professor (Academic Programming Appointment) in the Department of Veterinary Biomedical Sciences at the University of Saskatchewan (*http://www.usask.ca/wcvm/departments/biomedical/index.php*). The position is available July 1, 2017. The department has an extensive teaching mandate in the undergraduate DVM program, responsible for the delivery of a large part of the professional curriculum. Excellence in teaching is a high priority in the department, and faculty members are regularly recognized for teaching excellence and innovation. We aim to recruit faculty committed to teaching excellence and scholarship in the professional veterinary undergraduate program. Applicants must have a DVM or equivalent degree in veterinary medicine, and MSc or PhD or equivalent. Teaching experience is required. The primary responsibility of this position is multidisciplinary teaching in the biomedical sciences for the veterinary professional undergraduate program. Successful candidates will be expected to commit to a continuous improvement of their teaching performance, incorporating the most effective approaches to education for the professional health sciences, and will develop a scholarly program in their area of research or teaching expertise. The Western College of Veterinary Medicine (WCVM; *http://www.usask.ca/wcvm/index.php*) is the premier center for veterinary medical education and expertise in western Canada. More than 230 undergraduate students are enrolled at the internationally recognized college that also includes the Veterinary Medical Centre, a state-of-the-art primary care and referral hospital; the BJ Hughes Centre for Clinical Learning; and Prairie Diagnostic Services, providing expertise in support of animal health diagnostics, teaching, and surveillance. At the university, the Gwenna Moss Centre for Teaching Effectiveness (*http://www.usask.ca/gmcte/index.php*) provides expertise and faculty support for teaching excellence. The University of Saskatchewan also has the widest array of health science colleges in Canada, including the WCVM, College of Medicine, College of Nursing, College of Pharmacy and Nutrition, and School of Public Health. The University of Saskatchewan has a student population of 20,000 and is located in the economically and culturally vibrant city of Saskatoon. Salary is in the range of $93,232 to $112,109 CAD annually, and the position also offers a comprehensive benefits package, including pension plan, life insurance, dental plan, extended health plan, vision care, academic long-term disability, sick leave, parental leave, travel insurance, death benefit, employee assistance program, professional expense account, and flexible health and wellness spending program. Applications will be reviewed beginning April 30, 2017 and continue until the position is filled. Electronic submissions by e-mail are preferred. Please send a curriculum vitae, letter of introduction, statement of teaching (max. 3 pages), research experience or scholarly plan (max. 1 page), and contact information for three referees to: Cheryl Hack, Administrative Officer, Dept. of Veterinary Biomedical Sciences University of Saskatchewan, 52 Campus Dr., Saskatoon, SK S7N 5B4 Canada; e-mail: *cheryl.hack@usask.ca*. The University of Saskatchewan is committed to a diverse and inclusive workplace that empowers all employees to reach their fullest potential. All members of the university community share a responsibility for developing and maintaining an environment in which differences are valued and inclusiveness is practiced. The university welcomes applications from those who will contribute to the diversity of our community. All qualified candidates are encouraged to apply; however, Canadian citizens and permanent residents will be given priority.

Assistant Professor: The Department of Molecular & Integrative Physiology at the University of Kansas Medical Center (*http://www.kumc.edu/school-of-medicine/molecular-and-integrative-physiology.html*) invites applications for a tenure-track faculty position at the assistant professor level in reproductive/developmental physiology. We seek outstanding candidates (PhD, MD, DVM, or combined doctoral degrees) who have demonstrated exceptional originality and productivity in research that complements research strengths of the department and Center for Reproductive Sciences (*http://www.kumc.edu/school-of-medicine/irhrm/the-center-for-reproductive-sciences.html*), including physiology and/or pathophysiology of the male or female reproductive tract, fertility/infertility, embryo development, and pregnancy. The successful candidate will be expected to establish and sustain an externally funded, independent research program, collaborate with other faculty within the department and the campus, and participate in medical and graduate teaching and academic service. The position package includes laboratory and office space within the Hemenway Life Sciences Innovation Center as

part of the Center for Reproductive Sciences, access to numerous research core facilities, a competitive salary, and generous start-up support. The Kansas City area offers a low cost of living, vibrant arts, culture, and entertainment opportunities, and excellent public and private schools. Applicants should apply online at *https://jobs.kumc.edu* for position number J0010454 by submitting the following documents in a single PDF file: *1)* a letter of interest directed to the Faculty Search Committee; *2)* a curriculum vitae; *3)* a two-page description of research plans; and *4)* contact information for at least three references. Informal inquiries may be directed to Dr. Warren Nothnick, Chair of the Faculty Search Committee, at *wnothnic@kumc.edu*. For priority consideration, applications should be received by April 1, 2017, but applications will be accepted until the position is filled. The University of Kansas Medical Center is an affirmative-action, equal-opportunity institution that welcomes applications from all qualified persons regardless of sex, race, color, religion, national origin, sexual orientation, ancestry, age, marital status, disability, or veteran status.

Assistant Professor: The Arkansas College of Osteopathic Medicine (ARCOM) has and opening for an Assistant/Associate Professor of Physiology. The Assistant/Associate Professor of Physiology will be responsible for developing interactive and didactic osteopathic medical education curricula centered around clinically relevant, systems-based physiological mechanisms of health and disease. Faculty duties will also include maintaining a viable scholarly/research agenda and engaging in institutional, community and professional service. *Minimum qualifications:* Terminal degree (PhD) in physiology or a closely related field; for assistant professor, minimum of 2 years of successful teaching experience as an instructor or course coordinator/director of a relevant scientific discipline at the undergraduate or graduate level; demonstrated productivity and contribution (e.g., presentations, publications, patents, etc.) to a relevant professional field; possess skills necessary to contribute to the establishment and formation of a Department of Physiology, Pharmacology and Pathology at a new medical school. *Preferred qualifications:* postdoctoral experience in a biomedical research setting; established track record of directing/overseeing student trainees at the undergraduate or graduate level within a research setting; terminal degree (PhD) in physiology or a closely related field; for assistant professor, 2 years academic experience as a full-time faculty member at a College of Osteopathic Medicine, College of Allopathic Medicine, College of Health or Allied Sciences. Appointments at the associate or professor level will depend on previous experience and excellent leadership and administrative skills, a demonstrated record of faculty mentorship and involvement in faculty development, and experience in medical and/or graduate education; experience in the development and implementation of courses in pharmacology, physiology and pathophysiology and related topics and demonstrated excellence in delivering course content to medical students; experience in team-based learning approaches to instruction. *Required knowledge, skills, and abilities:* demonstrate proficiency in computer skills, i.e., Microsoft Office; display professionalism for the college in all communication and interaction; ability to maintain confidentiality and privacy; ability to prioritize and organize numerous and varied assignments; high-energy, versatile, self-directed. Individuals wishing to learn more and apply, please go to *http://acheedu.org/employment-opportunities/*. ARCOM is an EEO employer and offers a competitive compensation package. Benefits include medical, dental, vision, life insurance, long-term disability, EAP, 401(k), and a generous plan for vacation, sick leave, and holidays.

Western College of Veterinary Medicine

Assistant/Associate/Full Professor: Applications are invited for two tenure-track faculty positions in the Department of Veterinary Biomedical Sciences (VBMS) at the University of Saskatchewan (*http://www.usask.ca/wcvm/research/research_areas/biomedical.php*). The department aims to build on our strengths of collaborative and interdisciplinary research into the health and disease of animals working across all levels of biological organization. We are looking for highly promising individuals with proven records of productivity and exceptional potential for success in extramural funding. Research interests must complement existing programs in VBMS, and should fit into one of the following areas. *1) Molecular/Cellular Biomedical Sciences.* The successful candidate will develop a research program focused on the application of molecular or cellular approaches to address fundamental questions in health and disease in animals and/or in animal models of human disease. *2) Integrative Systems Biomedical Sciences.* The successful candidate will develop a research program using sys-

tems or whole animal approaches to the investigation of health and disease in animals and/or in animal models of human disease. Applicants must have a PhD degree or equivalent. In addition, a DVM or MD, postdoctoral training, and teaching experience are highly desirable. Successful candidates will be expected to develop an externally funded research program and to contribute to teaching and training in the undergraduate and graduate programs in biomedical sciences offered by the department. Departmental undergraduate teaching responsibilities include animal physiology, gross and microscopic anatomy, biochemistry, pharmacology, and toxicology. The department has an active graduate program with 30-40 graduate students. The department and college are well equipped with state-of-the-art research facilities, including an imaging center with advanced microscopic capabilities (including confocal, transmission + scanning EM, live cell, ultrasound bio-microscopy), live animal imaging capabilities (CT, MRI, ultrasound), histology and immunohistochemistry, tissue and microbial culture facilities, drosophila behavioral genetics lab, molecular and reproductive biology labs, animal care facilities, and radioimmunoassay/endocrine research unit. The University of Saskatchewan (*http://research.usask.ca/*) has the widest array of health science colleges in Canada, including the College of Medicine, College of Nursing, College of Pharmacy and Nutrition, and School of Public Health. Collaborative opportunities exist with these and other research units on campus, including the Vaccine and Infectious Disease Organization (VIDO), InterVac (International Vaccine Centre), the Canadian Food Inspection Agency, Canadian Light Source and Canada's national synchrotron facility, Structural Sciences Centre, Environment Canada, the Toxicology Centre, the School of Environment and Sustainability. The University of Saskatchewan has a student population of 20,000 and is located in the economically and culturally vibrant city of Saskatoon. Appointment level and salary will be commensurate with experience. Faculty salaries are in the range of $93,293 to $152,877 CAD annually, and the positions also offer a comprehensive benefits package, including pension plan, life insurance, dental plan, extended health plan, vision care, academic long-term disability, sick leave, parental leave, travel insurance, death benefit, employee assistance program, professional expense account, and flexible health and wellness spending program. Applications will be reviewed beginning April 30, 2017 and continue until the position is filled. Electronic submissions by e-mail are preferred. Please send a curriculum vitae, letter of introduction, research statement + summary of proposed research (max. 3 page), teaching statement (max. 1 page), and contact information for three referees to: Cheryl Hack, Administrative Officer Dept. of Veterinary Biomedical Sciences University of Saskatchewan, 52 Campus Dr., Saskatoon, SK S7N 5B4 Canada; e-mail: *cheryl.hack@usask.ca*. The University of Saskatchewan is committed to a diverse and inclusive workplace that empowers all employees to reach their fullest potential. All members of the university community share a responsibility for developing and maintaining an environment in which differences are valued and inclusiveness is practiced. The university welcomes applications from those who will contribute to the diversity of our community. All qualified candidates are encouraged to apply; however, Canadian citizens and permanent residents will be given priority.

Assistant/Associate/Full Professor: American University of the Caribbean School of Medicine (AUC) is actively seeking experienced full-time physiology faculty to join a dynamic teaching group in the Department of Neuroscience and Physiology. The physiology faculty members team-teach the 16-wk Physiology I course, which is taught to first-year medical students three times a year. The successful candidate will have had significant experience teaching medical students cardiovascular physiology in a comprehensive, medical curriculum in accredited U.S., Canadian, or British medical education institutions. AUC is where teaching and mentoring aspiring physicians on their journey to successful careers is the main focus of the faculty. Our dedicated faculty are part of a caring, collaborative educational community working toward one common goal: student success. *Responsibilities:* Preparation and delivery of course materials such as lecture notes, Powerpoint slides, and USMLE-style multiple choice questions; prepare and evaluate examinations to assess student academic competence in cardiovascular physiology; advise students in academic matters and exercise professional judgement in referring students to appropriate personnel; actively participate in relevant professional activities to improve teaching and subject matter competence; serve on institutional committees as appointed or elected. *Qualifications:* PhD and/or MD from an accredited U.S., United Kingdom,

or Canadian medical school; academic teaching experience at the assistant professor rank or higher; experience teaching medical cardiovascular physiology to American, English, or Canadian medical students required; skilled in cardiovascular physiology lecture delivery and designing learning assessments; ability to evaluate students' understanding of subject matter. AUC, founded in 1978 and located on the island of St. Maarten, is one of the highest ranked Caribbean medical schools and has placed nearly 6,000 physicians into U.S. residency programs. Our mission is to provide an excellent medical education to qualified students of diverse backgrounds. This is accomplished within an environment of academic integrity and scholarship, which fosters the highest standards in professional ethics and competence. The majority of our students are from the U.S. and Canada. Students complete their first 2 years of medical sciences on our campus in St. Maarten before completing clinical rotations at our affiliated hospitals in the U.S. and United Kingdom. For a complete job description, go to *https://aucmed-devry.icims.com/jobs*. Discover AUC at *http://www.aucmed.edu*. A competitive salary, relocation assistance, and a comprehensive benefits package await the right candidate. Please send your CV with a cover letter explaining your interest in teaching cardiovascular physiology full time at AUC along with a list of cardiovascular physiology lectures you have taught and the number of years teaching those lectures to medical students. Interested candidates can apply online at *https://aucmed-devry.icims.com/jobs/search?ss=1&hashed=124496084* or contact Barbara Roberge, Senior Talent Acquisition Consultant, *BRoberge@devrygroup.com*.

Assistant/Associate/Full Professor: As part of an expansion of our existing research strengths in Xenobiotic Toxicology and Cardiovascular Health Outcomes, the Department of Physiology and Pharmacology (DPP) at the West Virginia University Health Sciences Center (WVU HSC) invites applications from outstanding scientists for one (1) tenure-track position, available July 1, 2017. This recruitment is open to all ranks, but we are especially interested in individuals with established research programs, to be appointed at the associate or full professor rank. We seek investigators with a strong fundamental background and training in physiology, toxicology, and pharmacology, with particular emphasis on the application of these approaches to study inhalation toxicology in the cardiovascular, pulmonary, and/or renal systems under conditions of environmental, personal, and/or occupational exposures. The overarching goal of the successful candidate's research program should be to improve health disparities in West Virginia. We especially seek investigators whose research programs will complement our existing strengths in inhalation exposure and systemic xenobiotic particle toxicity, nanotoxicology, microvascular toxicology, maternal toxicant exposures and fetal programming, and mechanisms of impaired vascular reactivity. Individuals utilizing experimental approaches incorporating ambient particulate matter and/or engineered nanomaterial assessments, novel exposure techniques, or modeling of physiological systems in environmental health, toxicity, and/or disease into their research programs are especially encouraged to apply. Appointees for assistant professor will be expected to develop a competitive, externally funded, independent research program and further develop their nascent skills in instruction of professional and graduate students; appointees for associate professor will be expected to have current NIH or other federal, extramural funding and demonstrable facility in instruction of professional and graduate students. Candidates for full professor will be expected to have a consistent track record of NIH or other federal, extramural funding and exceptional skills in the instruction of professional and graduate students. Appointees will be expected to contribute to the HSC-wide teaching mission of the DPP. The successful candidate will receive a generous startup package, competitive salary, fully renovated laboratory space commensurate with experience and qualifications, as well as full access to our state-of-the-art rodent inhalation facility housed within the DPP. The WVU HSC supports excellent core facilities that include proteomics and protein mass spectrometry, confocal and multi-photon microscopy, functional imaging, flow cytometry, histology, and mouse gene-editing/transgenics. Recently, the WVU HSC has initiated a significant expansion to their rodent inhalation exposure facility. This multi-million dollar infrastructure improvement will allow for up to nine exposure and telemetry chambers in AAALAC-accredited facilities. Facility construction will be completed July 1, 2017, and aerosol exposures will include nanomaterials, combustion-related air pollutants, and cigarette/e-cigarettes. West Virginia University is a comprehensive, Carnegie-designated doctoral research-extensive, public

institution. Morgantown is rated as one of the best small towns in the U.S., with affordable housing, excellent schools, a picturesque countryside, and many outdoor activities. *Minimum Qualifications:* PhD, MD, or MD/PhD, 2 or more years of postdoctoral training, evidence of significant peer-reviewed research accomplishments, and exposure to the instruction of professional and/or graduate students. Interested individuals should apply to *https://wvu.taleo.net/careersection/faculty/jobdetail.ftl?job=04906* with a complete curriculum vitae, a brief description of research interests, and the names and addresses (including e-mail) of three references. West Virginia University is an equal-opportunity/affirmative-action employer and the recipient of an NSF ADVANCE award for gender equity. The university values diversity among its faculty, staff, and students, and invites applications from all qualified individuals, including minorities, females, individuals with disabilities, and veterans.

Assistant/Associate/Full Professor: The Department of Molecular Pharmacology and Physiology at the University of South Florida Morsani College of Medicine invites applications for tenure-track faculty positions at the assistant/associate/full professor levels. A doctoral degree in medical or biomedical sciences is required. Applicants must demonstrate a strong record of academic accomplishments with NIH-supported research programs. Expertise in neuroscience, cardiovascular, metabolism, and inflammation/immunology research areas is preferred, with an emphasis on the study of molecular, cellular, and systemic mechanisms. Applicants must also demonstrate a history of medical school teaching excellence and are expected to have outstanding verbal communication skills. The department consists of 26 core faculty members with strong research expertise in circulation physiology, cardiorespiratory diseases, metabolic disorders, kidney injury, systems neurophysiology, and neurodegenerative disorders. Investigators have access to state-of-the-art core laboratories in microscopic imaging, electrophysiology, histology, animal facilities, genomics, and proteomics. Opportunities are available for interaction with USF Byrd Institute, Heart Institute, and Center for Drug Discovery and Innovation. Additional information about the Department and faculty is available at *http://health.usf.edu/medicine/mpp/index.htm*. USF Morsani College of Medicine offers generous laboratory space, substantial start-up packages, and competitive salaries. The Tampa metropolitan area is rapidly developing and provides a culturally diverse environment with a tropical climate. Candidates should send their curriculum vitae that include previous and current research funding, teaching experience, a statement of research plans, and the names/contact information of three references in a single PDF to Victoria Mothershed at *vmothershed@health.usf.edu*. USF Health is committed to increasing its diversity and will give individual consideration to qualified applicants for this position with experience in ethnically diverse settings, who possess varied language skills, or who have a record of experience that supports/benefits diverse communities or teaching a diverse student population. The University of South Florida is an EO/EA/AA employer. For disability accommodations, contact Bridget Shields at (813) 974-2543 a minimum of 5 working days in advance. According to FL law, applications and meetings regarding them are open to the public.

Chair: The University of Tennessee Health Science Center (UTHSC; *www.uthsc.edu*) College of Medicine seeks a diverse pool of nominees and applicants for the position of the Thomas A. Gerwin Professor and Chair of the Department of Physiology on the main campus of the Health Science Center in Memphis, TN. Applicants must hold a PhD, MD, MD/PhD, or equivalent degree and meet the criteria for the rank of professor with tenure. Required qualities are documented accomplishments in teaching, proven mentoring ability of junior faculty, and a national recognition in research, with a history of a strong independent research program and current externally funded grant awards. The successful candidate will also have a record of administrative and management abilities, and previous leadership experience. The Chair has oversight of the research and education missions, and leads the faculty and staff of the Department of Physiology. Salary, startup funds, and laboratory space will be commensurate with qualifications and experience. We seek a recognized leader with vision, a superb academic background, and strong research credentials. Applicants should have a demonstrated commitment to and knowledge of equal employment opportunity and affirmative action. The UTHSC Department of Physiology (*http://www.uthsc.edu/physiology/*) is currently composed of 16 tenured or tenure-track faculty and approximately 100 employees including faculty, staff, and trainees. The department

has consistently been ranked in the upper third of Departments of Physiology in NIH funding. In FY2016, UTHSC generated more than $225 million in sponsored programs, all source nonclinical grants and contracts. Furthermore, an investment of over $250 million in buildings and renovations has occurred over the last 4 years on the Memphis campus. The department and UTHSC offer state-of-the-art research and core facilities. Review of materials will begin immediately. The position will remain open until it is filled. Interested applicants should submit by e-mail a letter of interest and qualifications, a curriculum vitae, and contact information for three references, in a single Word or PDF document to Rosalind Jackson, *Rjacks12@uthsc.edu*. For questions about this position, contact Matthew Ennis, PhD, Physiology Chair Search Committee, *mennis@uthsc.edu*. The University of Tennessee is an EEO/AA/Title VI/Title IX, Section 504/ADA/ADEA institution in the provision of its education and employment programs and services.

Postdoctoral Fellow: Rutgers Biomedical and Health Sciences Department of Cell Biology and Molecular Medicine has an opening for a postdoctoral fellow. The position would perform basic scientific research activities involved in animal physiology and surgery under the direction of the principal investigator. *Essential duties and responsibilities:* Perform duties relating to animal care, including but not limited to breeding and maintenance of mouse colonies, and manipulation of animals according to approved experimental and institutional protocols (ex. injections, phlebotomy, surgery, and euthanization); performs surgery to create animal models of disease and to implant instrumentation; responsible for keeping detailed records of procedures and experiments in laboratory notebook, and compiles data, make necessary calculations, presents results at national conferences, and publish the results in high-impact journals; develop own research project(s) under the guidance of the PI; instruct and train students, technicians, and laboratory assistants as required; understand and adhere to Rutgers' compliance standards as they presently exist and as they change or are modified; perform other job-related duties as required; conduct integrative cardiovascular research and physiology research. Other duties may also be assigned. *Corporate and compliance responsibilities:* Keep abreast of all pertinent federal, state, and Rutgers' regulations, laws, and policies as they presently exist and as they change or are modified. *Job requirements:* To perform this job successfully, an individual must be able to perform each essential duty satisfactorily. The requirements listed must be representative of the knowledge, skills, minimum education, training, licensure, experience, and/or ability required. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions. *Education and experience:* MD and/or PhD and/or DVM in a related field is required, including at least 3 years of research experience relating to physiology in animal models and also cellular, molecular biology, and biochemistry techniques. *Physical demand:* This position involves prolonged standing, walking, and sitting, as well as use of laboratory equipment. Must perform complex procedures and demonstrate manual dexterity. Some stooping, reaching, climbing, and bending. Occasional lifting of 20 lbs. to a height of 6.5 ft. Hearing and speech capabilities necessary to communicate with other researchers and staff in person, on the telephone, and by e-mail. Vision capable of viewing gauges, computer monitors, charts, forms, text, and numbers for prolonged periods. *Work environment:* Must be available to work flexible hours including weekends and holidays when necessary to meet deadlines. Must be willing to work with small and large animals. *Contact information:* Principal Investigator: Dr. Stephen Vatner. Please send CV to Jie Zhang (*jz502@njms.rutgers.edu*).

Postdoctoral Fellow: Postdoctoral research fellowship positions are available immediately on an NIH-funded T32 training grant. The Training Program in Lung Physiology and Biomedical Engineering trains the next generation of biomedical researchers in lung physiology and disease. This multidisciplinary training program is designed for postdoctoral candidates who are interested in the broad area of respiratory physiology and biomedical engineering. The primary objectives of the program are to train individuals for careers in biomedical research related to lung physiology and disease. The training program is based in the Department of Physiology and Biomedical Engineering under the direct direction of Gary Sieck, PhD. Training grant faculty are members of both basic science and clinical departments. They are well funded, established investigators representing a wide range of expertise and ongoing research activities. Postdoctoral research training in their labs will provide the opportunity for training in a number of state-of-the-art research

techniques and tools. In addition to contributing to ongoing research projects, postdoctoral fellows will be training in the critical evaluation of existing literature, data collection and analysis, manuscript preparation and submission, and grant preparation. These activities will be geared to further the skill set of trainees in research and foster abilities for a successful career in academia or industry. Candidates must have a PhD, MD, or equivalent doctoral degree and be a U.S. citizen or permanent resident. Qualified individuals must have backgrounds that demonstrate their potential for research training and their competitiveness for national research grants. A track record of prior peer-reviewed publications is required. Please contact Gary Sieck, PhD, for more information: office: 507-284-6850; e-mail: *sieck.gary@mayo.edu*.

Postdoctoral Fellow: Jason H. Mateika, PhD, is a Professor in the Department of Physiology at Wayne State University and a VA Research Career Scientist. Dr. Mateika recently had two research proposals recommended for funding. The first proposal is designed to investigate the impact of genetically or spinal cord injury-induced reductions in central nervous system serotonin on mechanisms that influence breathing stability and cardiovascular/autonomic function during sleep in mice. He is seeking postdoctoral fellows and graduate students interested in this research area. Postdoctoral candidates with expertise in telemetry implantation, plethysmography, echocardiography, dissection, sectioning, and immunohistochemistry are preferred. *Qualifications: 1)* PhD/MD with experience in respiratory physiology and neuroscience; *2)* ability to work independently and as part of a collaborative team; *3)* excellent communication skills, both verbal and written; *4)* willing to perform in vivo experiments in an animal research laboratory. The second proposal recommended for funding is designed to explore whether repeated daily exposure to mild intermittent hypoxia enhances the impact of continuous positive airway pressure on co-morbidities linked to sleep apnea in humans with intact or injured spinal cords. He is seeking both postdoctoral fellows and graduate students interested in this research area. Postdoctoral candidates with expertise in microneurography and non-invasive measures of respiratory, cardiovascular, and autonomic function during wakefulness and sleep are preferred. *Qualifications: 1)* PhD/MD with experience in human sleep and respiratory physiology; *2)* ability to work independently and as part of a collaborative team; *3)* excellent communication skills, both verbal and written; *4)* willing to perform experiments in a human research laboratory. *Contact information:* Jason H. Mateika, PhD Professor of Physiology, Wayne State School of Medicine, Research Career Scientist, John D. Dingell VA Medical Center; phone: 313-576-4481; e-mail: *jmateika@med.wayne.edu*.

Postdoctoral Fellow: A postdoctoral position is immediately available in the laboratory of Dr. Lorraine Ware, Professor of Medicine and Pathology, Microbiology and Immunology at Vanderbilt University School of Medicine. Dr. Ware's translational research group studies pathogenic mechanisms of sepsis and acute lung injury, with a specific focus on mechanisms of lung epithelial and endothelial injury. A major focus is on understanding the cellular and molecular mechanisms of cell-free hemoglobin-mediated lung epithelial and microvascular endothelial permeability. This postdoctoral fellowship will afford the fellow the opportunity to drive this project forward using a multitude of tools and models available in Dr. Ware's group, including primary and immortalized cell culture, multiple genetically modified mouse lines, mouse models of acute lung injury and sepsis, as well as the ex vivo perfused human lung. *Qualifications:* Candidates must have an MD and/or a PhD in a related medical or biological sciences field. Successful candidates should be self-starters and highly motivated to thrive in a rich research environment. Expertise with cell culture and mouse studies is required. Specific expertise in mitochondrial biology, apoptosis, and/or redox biology would be helpful but is not required. The successful candidate should have a demonstrated ability to work both independently and collaboratively, possess strong oral and written communication skills, and have a strong foundation in bench science. Responsibilities include designing and implementing experiments, data collection and review, abstract and manuscript preparation, and local and national scientific presentations. A successful fellow will leave the program with a broad knowledge of acute lung injury and sepsis, a robust scientific skillset, expertise in a wide range of laboratory techniques, and an opportunity for presentation and publication. Questions about the position can be directed to *Lorraine.ware@vanderbilt.edu* or *Julie.bastarache@vanderbilt.edu*.

Meetings and Conferences

APS Conference: Cardiovascular Aging: New Frontiers and Old Friends

August 11–14, 2017 • Westminster, Colorado

APS Conference: Physiological Bioenergetics: Mitochondria from Bench to Bedside

August 27–30, 2017 • San Diego, California

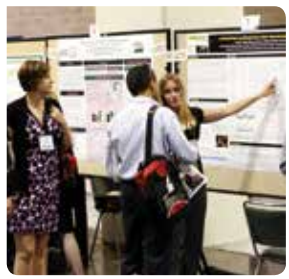
APS Conference: Physiological and Pathophysiological Consequences of Sickle Cell Disease

November 6–8, 2017 • Washington, DC

APS is also participating in the following meeting

IUPS 38th World Congress: Rhythms of Life

August 1–5, 2017 • Rio de Janeiro, Brazil



For more information on APS meetings, please visit:
the-aps.org/conferences

APS Members receive discounted registration to EB and APS Conferences!
The American Physiological Society usually holds one or more specialty conferences each year. In addition, APS joins with other societies to sponsor Intersociety Meetings as interest warrants. Please send an email to meetings@the-aps.org for questions or to propose APS Conference ideas.

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Meetings & Congresses

2017

May 13-14

50 Years of Comparative Biochemistry: The Legacy of Peter Hochachka, Winnipeg, Canada. *Information:* Internet: *https://www.csz-scz.ca/storage/app/media/PWH%20Symposium%20Webpage%20second%20announcement.pdf*

May 15-16

The World Congress on Regulatory Affairs for Medical Devices (RAMD2017), Amsterdam, The Netherlands. *Information:* internet: *http://www.ramd2017.com/default.aspx*

May 19-20

Beyond the Clinic: Blood pressure and Vascular Function-Mechanisms, Assessment and Management in Health and Disease, 7th Annual Meeting of the North American Artery Society, Chicago, IL. *Information:* internet: *http://www.naartery.org/NAA2017*

May 27-June 1

International Neuromodulation Society 13th World Congress, Edinburgh, Scotland. *Information:* internet: *http://www.neuromodulation.com/ins-congress*

June 27-29

Measuring Animal Welfare and Applying Scientific Advances - Why is it still so difficult? Surrey, United Kingdom. *Information:* Internet: *http://www.ufaw.org.uk/symposium2017*

July 8-13

International Society on Thrombosis and Haemostasis (ISTH) 2017 Congress, Berlin, Germany. *Information:* Internet: *http://www.isth2017.org*

August 1-5

IUPS 38th World Congress: Rhythms of Life, Rio de Janeiro, Brazil. *Information:* Internet: *http://iups2017.com/*

August 11-14

APS Conference: Cardiovascular Aging, New Frontiers and Old Friends, Westminster, CO. *Information:* Internet: *http://www.the-aps.org/mm/Conferences/APS-Conferences/2017-Conferences/CV-Aging*

August 27-30

APS Conference: Physiological Bioenergetics: Mitochondria from Bench to Bedside, San Diego, CA. *Information:* Internet: *http://www.the-aps.org/mm/Conferences/APS-Conferences/2017-Conferences/Bioenergetics*; #Bioenergetics17

September 8-11

47th European Brain and Behaviour Society Meeting, Bilbao, Spain. *Information:* internet: *http://www.ebbs-meeting.com/*

September 15-17

ILCA 2017 - The International Liver Cancer Association's 11th Annual Conference, Seoul, South Korea. *Information:* internet: *http://www.ilca2017.org*

October 12-14

Cognitive Development Society (CDS2017), Portland, OR. *Information:* internet: *http://www.cogdevsoc.org/destination/*

November 6-8

APS Conference: Physiology and Pathophysiology Consequences of Sickle Cell Disease, Washington, DC. *Information:* Internet: *http://www.the-aps.org/mm/Conferences/APS-Conferences/2017-Conferences/Sickle-Cell*; #SickleCell17

2018

April 21-25

Experimental Biology, San Diego, CA.

September 5-8

8th International Congress of Pathophysiology, Bratislava, Slovakia. *Information:* internet: *http://www.icp2018.com*

October

The 17th International Biochemistry of Exercise Conference (IEBC), Beijing, China. *Information:* Organized by the Chinese Association of Exercise Physiology and Biochemistry

October 18-21

34th World Congress of Internal Medicine, Cape Town, South Africa. *Information:* internet: *http://www.wcim2018.com*