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We've Come a Long Way!

How Diversity is Becoming a Reality in the American Physiological Society

Patricia E. Molina (Louisiana State University Health Sciences Center), **Barbara Horwitz** (University of California, Davis), **Hannah V. Carey** (University of Wisconsin, Madison), **Susan M. Barman** (Michigan State University), **Kim E. Barrett** (University of California, San Diego), and **Jane F. Reckelhoff** (University of Mississippi Medical Center)

Each year during Experimental Biology (EB), an informal class reunion takes place at the President's Reception that is traditionally documented by a group picture of the current, past, and elected presidents in attendance. Marty Frank, APS Executive Director, shared the most recent one a few days after EB. This year's presidents' picture – with a distinctive and impressive group of women front and center – prompted a gut reaction that inspired us to seize this moment to emphasize a message of hope, progressive thinking, and accomplishment for our Society. During the first 100 years of APS's existence, only one woman, Bodil Schmidt-Nielsen, served on APS Council, first as a councillor (1971) and then as president (1976). Sadly, this issue of *The Physiologist* also bears her obituary (p. 162). But we like to think she would enjoy our progress and the visible evidence of it shown in the picture. Now, women leaders within APS are no longer a rarity, but the norm! The contribution to diversity, through our training, professional experiences, personal life challenges, and focus of discipline that each of us, as women leaders, brings to our Society is captured below. Each woman's trajectory to the



APS Presidents. *Front:* Shu Chien, Sue M. Barman, Kim E. Barrett, David Pollock, Patricia E. Molina, Janie F. Reckelhoff, Hannah V. Carey. *Back:* John Williams, Walter Boron, Bill Dantzler, Irv Zucker, John Hall, Barbara Horwitz, Doug Eaton, Joey Granger, Gary Sieck, Alan Cowley.

Continued on page 161

A Matter of Opinion Off the Grid

At the end of April, Patricia Molina, David Pollock, and I had the opportunity to travel to Cuba to follow-up on our discussions with Alberto Dorta Contreras, President of the Cuban Society for Physiological Sciences. Even though Cuba is only 90 miles off the coast of Florida, it has not been a destination for most Americans. For us, Cuba is a country of unknowns, a country "off the grid."

The decision to travel to Cuba was precipitated by our discussions with Alberto Dorta during the Pan-American Congress in Brazil. Patricia Molina, Kim Barrett, and I met with Alberto Dorta in Iguassu Falls to determine whether there were opportunities for

Continued on page 169

THIS ISSUE:

- 167 Bodil Schmidt-Nielsen
(1918-2015) 48th APS President
- 172 Cuban and American
Physiological Societies Sign
Historic Agreement
- 188 APSselect: Year One
a Success!
- 193 APS Suggests Ways for USDA
to Reduce Regulatory Burden
- 197 The W's of Networking
in Physiology

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Headquarters phone: 301-634-7118

Fax: 301-634-7241

Email: webmaster@the-aps.org

<http://www.the-aps.org>

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Contents

We've Come a Long Way!	159	Publications	
Off the Grid	159	APSselect: Year One a Success!.....	188
Obituary		Calls for Papers.....	191
Bodil Schmidt-Nielsen (1918-2015)		APS Comments on Sustaining the Research Enterprise.....	192
48th APS President.....	167	Science Policy	
APS News		APS Suggests Ways for USDA to Reduce Regulatory Burden	193
Cuban and American Physiological Societies Sign Historic Agreement for Research Collaboration.....	172	APS Submits Testimony in Support of Research Agencies	194
Dale Named Chair of Trainee Advisory Committee	173	Congress Introduces Authorizing Legislation for NIH, NSF	195
Davenport Named Chair of the Perkins Memorial Award.....	173	Mentoring Forum	
Rickards Named Chair of Women in Physiology Committee	174	The W's of Networking in Physiology	197
Sigmund Named Chair of Publications Committee	175	Membership	
Kaley Lecturer 2015, Mark T. Nelson.....	176	New Regular Members	200
Tang Prize Lecture to be Presented at Experimental Biology	176	New Graduate Student Members	201
APS Announces a New Development Program	177	Undergraduate Student Members	202
APS, FASEB Highlight Role of Professional Societies in Annual Postdoc Meeting.....	178	Affiliate Members.....	203
Chapter News		Book Review	
6th Annual Meeting of Tennessee Physiological Society	180	The Handbook of Ion Channels.....	205
Education		Books Received	208
Serving Our Society	181	Letters to the Editor	
2014 Frontiers in Physiology Teachers Complete Fellowship.....	183	Response to "Bias is Stagnating Physiology"	209
Learning How to Share the PhUn at the EB 2015 Physiology Understanding Week Training Session.....	184	Impact Factors.....	209
Bodil M. Schmidt-Nielsen Distinguished Mentor and Scientist Award.....	186	Correction to "Association of Chairs of Departments of Physiology 2014 Survey Results"	210
Minority Travel Fellowship Awards for 2015 Endothelin, Bioenergetics, and Sex & Gender Conferences.....	186	Positions Available	211
EB 2015 Career-Track Symposia Online	187	Meetings & Congresses	216

Continued from page 159: We've Come a Long Way!

presidency paved the way for the next one. Each one of us can recall distinct moments during our formative years that inspired, fueled, encouraged, and drove us to seek training, advancement, and commitment to the development and nurturing of the next generation of scientists. We agreed that these messages (listed in chronological order according to the term during which we each served or will serve as APS President) deserve to be shared and believe they will inspire those who still may doubt the power of diversity.

“Now, women leaders within APS are no longer a rarity, but the norm!”

Barbara Horwitz (President 2002-2003) shared: “My grandparents emigrated to the United States in the early 1900s, had little formal education, worked hard physically as they raised seven children between them, and encouraged all of them to get more formal education than they had – convinced that more education would improve quality of life. All completed high school, and several went on to professional school. My parents did not go much further than high school, and perhaps for this reason they had higher expectations for me. As a result, going on to college and trying to do my best was pre-ordained.

“I entered college with the thought of becoming a high school science teacher, but, after a few courses in education, I decided that if I were to be a teacher, it would be at a more advanced level. Although I liked most of my undergraduate science and math courses, I chose zoology as a major – primarily because of my interests but also because I thought it would be a ‘better fit.’ In retrospect, I believe that my concept of fit reflected the fact that there were few, if any, other women in my physical sciences/math courses at the university, and although the zoology courses weren’t overflowing with female students, I was not alone.

“The idea of going beyond a Bachelor’s degree, which was unthinkable when I entered college, grew as I became involved in research as an undergraduate, and with the encouragement of several faculty in the zoology department, I decided to continue studies as a graduate student in an area of physiology. My graduate student

experiences were for the most part very positive. I never felt that I was disadvantaged by being a female, and my faculty mentors (all of whom were male) were extremely supportive. Of course, it helped that there were four other women in the physiology department at the time, and although we had different types of projects, just knowing that someone had your back was comforting.

“My postdoc at UCLA led me to UC Davis as a researcher on soft-money, and there I met and married a newly hired assistant professor. When I applied for an open faculty position in his department, I ran into significant opposition from one of the senior faculty members. His arguments focused on potential nepotism, even though the University of California had recently adopted a clear policy dealing with spouses and other near relatives. Fortunately, the department chair was a forward-thinking ‘bull dog’ who convinced the other faculty members that I was the best candidate for the position. When I last met him several years after his retirement, he told me that my hire ‘was one of the best if not the best he had ever made.’

“My identity as a physiologist was reinforced when, as a postdoc, I was introduced to APS. I subsequently served on a number of committees, and when Helen Cooke asked me if I would be willing to stand for election to Council, I agreed. And I was thrilled when I was elected. My first year on Council was somewhat intimidating, but the presence of Helen was calming. My involvement in APS continued and intensified, and ultimately I became the second woman president of APS, 27 years after Bodil cracked the glass ceiling.

“...it is gratifying to see the APS continue to evolve in positive directions, becoming more inclusive and effective in supporting excellence in research and education.”

“I had two major goals as president. The first was to strengthen the involvement of the APS in activities that brought science to young students and, where possible, facilitated their engagement in research. These programs gained momentum and have become increasingly effective with each subsequent APS leader. (I continue to

be a strong advocate of student engagement in research because such engagements build critical thinking skills and, ultimately, more informed citizens.) My second goal was that my serving as an effective president would help open doors for the long-overdue election of more women to APS leadership roles.

“In looking back, while I encountered some comments that were inappropriate, they paled in comparison to the support I have had from numerous mentors (most of whom were male) and colleagues. Moreover, slighting comments had the effect of strengthening my determination to excel, and it is gratifying to see the APS continue to evolve in positive directions, becoming more inclusive and effective in supporting excellence in research and education.”

Hannah Carey (President 2007-2008) wrote: “The themes that ran through my trajectory to the APS Presidency include persistence in following your passions and goals, perseverance through adversity, and, importantly, listening to the wisdom and accepting the encouragement of mentors who present themselves to you along the way. My mother was the biggest supporter in my pursuit of a scientific/academic career. She felt strongly that women should not have to take on the traditional roles of wife, mother, ‘home-maker’ to the exclusion of their own careers, and my father followed my mother’s lead. That early support was extremely helpful. I believe I was a scientist at heart from a very young age and was fascinated by the killifish I caught and dissected as a child. I did well in school – through elementary, high school, and college, never getting below a B in my grades. But in graduate school, something happened that I’ve told only a few people about, primarily my trainees or other students I’ve mentored who needed encouragement to persevere through adversity in their careers. I failed the physiology portion of my PhD oral exam, a prerequisite to moving on to dissertator status in my program. In our system, the student could suggest the four topics on which to be examined. I chose variants of ecology, behavior, and evolution because, although I had the idea of developing my career in what’s called ‘physiological ecology,’ in the end my PhD research was principally a field-based project focused on nutritional ecology of feeding in a hibernating species – there being no actual physiology. I had insisted on being examined in the area of ‘environmental physiology’ in my oral exam, and although I’d taken some physiology courses in undergrad and grad school, including one lab, I had minimal interactions with other physiology grad students or professors, did not attend physiology seminars, etc. I did

not grasp at the time that these sorts of things are critical to really understanding a scientific field rather than just reading about it in textbooks – which is all I really did to prepare myself for the oral exam. I was given only a ‘conditional’ pass for my orals, with physiology being the red X; it was suggested I take a few months away to work on increasing my understanding of physiology in preparation for being re-examined at a later point. I was devastated, embarrassed, and confused – this was my first academic failure in life, and I questioned if I really knew what I was doing. A setback in your academic career can be really hard; it can make you doubt your abilities and consider giving up and doing something else. Setbacks happen to budding scientists more often than you’d think; however, they can turn out to be positive experiences that help to shape you as a scientist and as a human being. With the encouragement of my PhD advisor and another professor who shared a similar story, I picked myself up, was re-examined, and the committee gave me the full pass on the exam. And, as it turned out, I eventually went on to become the president of the largest scientific society in the very same field in which I had my major setback. I will also never forget the generous help of two trainees from other labs who saw me struggle at times with my research and took me under their wings. One was a postdoc who helped me with experimental design and hypothesis construction, and the other a senior grad student who mentored me in the multivariate statistics I needed to analyze my data. This was my first exposure to the idea that key mentors – who may turn out to be quite instrumental in your success – can come from a variety of sources.

“Setbacks happen to budding scientists more often than you’d think; however, they can turn out to be positive experiences that help to shape you as a scientist and as a human being.”

“Mentoring and encouragement by male professors again set me on the next path as my PhD work was coming to a close. They helped me through the process of thinking constructively about what to do next, and one made a crucial phone call that led me to finally getting myself into a real physiology lab. I had to trust my instincts, be grateful for some serendipity, and be open to new challenges, but it paid off as I found myself in Helen Cooke’s nascent laboratory shortly after she received her first R01. I don’t know how she had the conviction to accept a newly minted PhD who had done



Sue M. Barman, Barbara Horwitz, Kim E. Barrett, Patricia E. Molina, Janie F. Reckelhoff, and Hannah V. Carrey

little to no bench work throughout graduate school, but she did – thank goodness! This was a truly wonderful mentoring/collegial/friend relationship that continues to this day, even in her retirement. She was my first female mentor who believed in me from day one and who not only mentored me as a physiologist but also as a member of the community of physiologists. She taught me early on that being an active member of the APS was part of what I should be doing as I progressed in my career as a scientist. She laid it out quite simply – one works hard to produce new knowledge that benefits health and society, trains others who will be coming up the pipeline, and engages with other scientists along the way to communicate what you are doing, support each other, and support the scientific enterprise. She was one of the very early ‘activists’ pushing to increase representation of women on APS committees, as committee chairs, on Council, and the presidency. There is no question that Helen’s strong love of physiology and our Society rubbed off on me in a big way. I was so grateful that I was lucky enough to end up with such a terrific, female scientist, and that led to the development of the APS Women in Physiology Mentoring Program, one of many wonderful programs that our Society supported in years past or currently supports to assist the careers of junior physiologists.

“Starting with my postdoc, my career as a physiologist took me away from the ‘field’ as my laboratory and toward the bench, but for the most part that love of tying the ‘why’ of physiological adaptations to the ecological, environmental milieu has been a long-standing theme in my work. The importance of understanding how different animal species adapt physiologically to their particular environments, along with the potential for translating that knowledge to improving the health of both animals and humans, is a theme I worked to promote during my

time as APS President. It was also a way to highlight the strength we gain as physiologists from appreciating our diversity in terms of the research topics and approaches we use. Diversity, on many levels, is the key, isn’t it? Diversity and supporting each other.”

Sue Barman (President 2012-2013) recently received a certificate recognizing her 40 years as an APS member. She wrote: “I actually have been a member for a few years longer because I became a student member once I passed my qualifying exams in physiology in 1973 at Loyola University Medical Center. This was thanks to late Walt Randall, then chair of the department, who enrolled all doctoral candidates into the Society to help them realize at an early stage that there is value in belonging to this professional organization. Like my colleagues, I owe much of my success as a researcher/professor to men who believed in me and helped me in so many ways. Actually, I would never have even gone to graduate school had it not been for a new assistant professor in my undergraduate years at Loyola who taught Vertebrate Physiology. He was the one to recognize that I loved physiology and advised me to pursue a PhD. I don’t think I had any female professors during undergrad, but I had many male instructors who always encouraged me even when I thought I was not doing well enough.

“But this does not mean that I didn’t have to endure and overcome some incredibly sexist remarks along the way. I was initially turned down at Loyola grad school with ‘REJECT, FEMALE PROBLEM’ written across my file. I was not supposed to see that, but the files were being moved from one office to another and were lying on a table in the lab where I was rotating. In hindsight, I realized the rejection was because they had less-than-satisfying female graduate student role models to use as a benchmark. Once I was enrolled in the program, each of the faculty helped me and encouraged me. I certainly never felt like a reject. An even earlier case of sexism was on my first day at Indiana University (after getting turned down initially at Loyola). I was the only female in the class of five, and a professor looked straight at me and said, ‘Well, gentlemen, let’s begin class.’ He frightened me until I was the only one who aced the first exam. Suddenly, I was one of his favorite students, and he hoped to recruit me to his lab. Years later when I interviewed for a faculty position in Wake Forest, a faculty member said, ‘Why should we hire a woman? You might get married, and that could disrupt your career.’ I asked if he was married, and he said ‘yes.’ I said, ‘Well what if you got a divorce? That could really be disruptive to your career.’ He said nothing, but when I left the room,

a woman sitting right outside his office who heard that said, 'Good for you,' and then said, 'I am his wife!'

"I believe a key to success is being involved and not letting setbacks prevent you from persevering."

"I believe a key to success is being involved and not letting setbacks prevent you from persevering. As I stated in my introduction as the 85th APS President, 'To be a physiologist, I think it is important to give back to the Society and be a real player in its activities. This does not mean that you need to become president or a councillor. Indeed, one of the easiest ways a person can begin to "make a difference" is to volunteer to serve on a Section Steering Committee. To the best of my knowledge, all recent presidents including myself have participated at this grass-roots level.' And I should add, if you don't get selected the first time, keep trying. Spending time on an APS committee is not only a valued service but a very rewarding experience.

"When I was president-elect, I learned at the Fall Council Meeting that the minority travel fellows program that had been funded by the NIDDK for 25 years was losing that support. I then successfully rallied support around a proposal from the Porter Committee to use APS funds to support fully this program, which includes Minority Travel Fellowships to APS meetings, K-12 Minority Outreach Fellows, and Minority Summer Research Teachers. I am also proud of my contribution to strengthening our relationship with the Brazilian Physiological Society, including taking the Writing & Reviewing Scientific Journal Articles to students in Brazil who were extremely appreciative of our efforts."

Kim Barrett (President 2013-2014) shared: "One of the most important and influential events for me in anything I have accomplished in provinces that have traditionally been male dominated was a chance comment from my department chairman when I was a graduate student. He opined that 'over my dead body would I ever appoint a woman to my faculty.' At the time I was shocked that anyone, not least in a position of authority, would be so overtly sexist, and I immediately resolved to make it my business not only to succeed personally but also to help other women to do likewise. This 'I'll show you!' attitude had a delicious payoff a few years ago when I was invited back to the department to be the

after-dinner speaker at the annual departmental dinner. I was incredibly pleased to see the huge representation of women amongst the current students and academic staff and to be able to say 'and I AM now a professor, and the chair is dead!' I do nevertheless credit that former chair, as well as some wonderful male mentors along the way, for instilling the drive to seek a variety of roles that were most definitely outside my comfort zone. These included a postdoc in the U.S., applying for the editorship of *AJP-Cell*, and ultimately allowing my name to go forward for the presidential ballot (and sticking with it after being beaten twice). And those words have also been in my mind as I have contributed to local, national, and international efforts to ensure that women have equitable working conditions and recognition for their contributions. As my postdoc mentor told me, ideas are cheap – it's the people who actually act on the ideas and see the stories through who are successful.

"We have come a very long way in this regard, as the recent APS leadership reveals. And although more remains to be done, we are far more fortunate in this sphere than many. This was really brought home to me when I was invited to lunch by the women members of the Physiological Society of Japan at their annual meeting in Tokyo. Even with language difficulties, it was shocking to hear that female scientists in Japan can be fired for getting pregnant and are not allowed to retain their maiden names professionally if they continue to work after marriage.

"...ideas are cheap – it's the people who actually act on the ideas and see the stories through who are successful."

"Unlike many of my predecessors, as president I have essentially no actual training as a physiologist beyond one course taken with the medical students during my first term as an undergraduate and have never worked in a Department of Physiology. I would like to think that my presidency therefore illustrated that we have a big tent that is welcoming to those from a wide variety of backgrounds who hope to apply physiological principles to the understanding of disease. My two major priorities as president were to ensure a pipeline of well prepared younger members to ensure the future of the Society and discipline (and I am truly pleased that the Leadership Institute, an important tactic toward this end, will move forward next year) and to increase our synergistic partnerships with sister societies that share our goals.

In the latter arena, our increased engagement with the Brazilian Physiological Society (including replicating our Professional Skills Course on Writing and Reviewing twice in Brazil), our joint journal and forthcoming joint meeting with The Physiological Society (UK), and our recent outreach to the Cuban Physiological Society are all efforts in which I was directly or indirectly involved, and are hugely gratifying."

President Patricia Molina (President 2015-2016) recently shared her personal story in the March 2015 issue of *The Physiologist* (vol. 58, p. 63). For this piece, she wrote: "I recall overhearing my mother tell the family dentist that I wanted to go to medical school, and she just wasn't sure I had the brains. I was a good student throughout school, and I know that there was an unconscious bias in her unwillingness to accept my pursuit of a career she considered meant for men. Following much power struggle, I succeeded in pursuing my dream only to decide to pursue a career in research, specifically in physiology. My first academic appointment, at the Universidad Francisco Marroquin, followed an interview with the director of the Research Unit (male MD) who, within 5 minutes of my walking into his office, asked if I was planning to turn around and get pregnant again (my firstborn son was barely 9 months old). That line of questioning was commonplace in our culture, and I would hope this has changed since those days. Coming to the United States, training with so many fabulous scientists always left room for me to feel that I needed to work hard not to disappoint those who were investing in my future. The trust and encouragement coming mostly from male mentors gave me confidence to explore new directions and aim for academic progression. The support from my husband and colleagues gave me the confidence that I belonged, despite my mother never understanding why I did not have a clinic where I took care of patients. Raising children in a culturally different environment from where I had grown up was challenging and at times overwhelming. Our society was not designed by and for working mothers, much less for those who want to make their work a profession. Schedules and limitations in flexibility of so many of the activities we are involved with left me at a disadvantage from the 'full-time moms' that I slowly learned to accept and eventually identify ways to counter. With time, I gained support and respect from my sons for my professional choices, and more recently for my leadership roles. They have become my best advocates for my professional choices. While often women make sacrifices in their personal choices to fully dedicate themselves to their careers, I have been

fortunate to have a loving and supportive husband. He has always been my most valuable commodity and asset, until I was told by the department chair at one point that I did not need a raise because I was married to an MD. I was shocked that my worth was diminished by the fact that I was married to a successful physician. We need to change that culture!

"You too can do it; but only if you set your mind to it!"

"Being elected President of the APS provides me with a new platform where I can provide the nurturing and supportive message that so many women and underrepresented minorities need to hear. You too can do it; but only if you set your mind to it! As in planning an experiment, decide what your goals will be (specific aims) and develop a plan to achieve them (experimental approach). The outcome may not always be as expected (plan for alternative strategies), and success will have a different definition for each individual (rethink your outcome measures), so think of all the possibilities for achieving satisfaction at a personal level, define your own criteria for success, and once you do, give it your all!"

President-elect Janie Reckelhoff (2016-2017) shared: "I was a non-conventional student. For 10 years, I was a critical care nurse, taking classes at a community college and raising two children. I transferred to a university where the average age of students was 19 and they were brilliant, and I was 30 and average! I went to school full time and worked 11 PM to 7 AM shifts every Friday and Saturday night at the local hospital. I was taking a full load of classes to finish as soon as possible with a chemistry major. I wasn't a stellar student. I had a B and C average. I had my sons when I was young, and we grew up together. On occasion, I had to bring them (Eric was 11 and Jason was 7) to class if I they were out of school, since I couldn't afford a babysitter. One day, one of my professors asked me what was wrong with my husband that he couldn't keep me at home. (I didn't have a husband.) I was told, 'You need to go home and take care of your children because you are never going to amount to anything.' Well, wrong thing to say to me! I worked hard, got accepted to grad school, and had a great graduate school mentor and supporter in Judy Bond. She once told me, 'There are two kinds of scientists who are successful, those who are brilliant, and those who are persistent.' I am persistent.

"I don't think of myself as a woman scientist. I'm a scientist! I was the first woman ever hired in the Physiology Department in Jackson. Along the way, I've heard things like chairs who say they wouldn't hire women with small children because women need to be at home taking care of their children (I was OK, because mine were high school and college age by the time I got my first faculty position), and the only reason I got an NIH grant was that I married a prestigious scientist! Funny, I've since received many more!

"There are two kinds of scientists who are successful, those who are brilliant, and those who are persistent."

"I have had incredible mentors, especially Joey Granger. It took the guys a little while to get used to having a woman around, but they soon warmed up to me. They are like my brothers now. A visiting scientist from Europe who was doing a sabbatical in Jackson during my early years as faculty later told me that when he met me, he had the impression that I was fighting every day to be counted and taken seriously.

"Much has changed, but just 2 weeks ago, I was in a meeting with five women faculty, and a senior official (a man), and the senior official, who is a friend of mine and a psychologist who is very interested in unconscious bias, said, 'It's amazing to see so many accomplished women from our different schools sitting around the table having this discussion!' I pointed out to him that, while that was somewhat flattering, it was an incredibly sexist thing to say! I think he was shocked – he was trying to be nice!

"I believe that to be a successful scientist, you have to 'be brave,' work hard, be persistent, and get great mentors, both men and women, who will be honest. It's also OK to cry in your office when the grants don't get funded or the papers don't get accepted, as long as the door is closed! I am honored to have been elected to the presidency of the APS, a dream I've had for years."

So, in closing, we believe collectively that sharing our stories should encourage others to engage and actively participate in developing their personal careers and also lead the future generation of scientists. Currently, women account for 50% of the U.S. population. Since 1993, the proportion of women in biosciences has increased to between 49% and 58%. When Hannah Carey was Chair of the Women in Physiology Committee (1992), she reported in *The Physiologist* that women accounted for a mere 12% of our membership. Today, women account for 27% of our regular members, and 47% of our graduate student members, so there is the potential for even more progress toward parity. Moreover, 27% of councilors and 8% of all APS presidents are or have been women. There is no doubt that we have come a long way. Not by chance, but by determination to participate and engage! Our roles have been earned and deserved. We have made significant contributions to our discipline and society, but recognize that work remains to be done. We aim to eliminate unconscious bias in the hiring and promotion process. We aspire to a system that supports a woman's desire to have a successful scientific career and also have a fulfilling family life. We stand ready to ensure that compensation equity becomes a reality in our field. We want our message to be one of courage for the next generation. Here's looking at us! ●

The authors are grateful for editorial assistance from Rebecca Gonzalez and for support in obtaining accurate data from Linda Allen and Esther Samuel. The authors are also grateful for the ongoing support from Marty Frank throughout periods of our consideration, pursuit, and fulfillment of leadership roles within APS.

Obituary

Bodil Schmidt-Nielsen (1918-2015) 48th APS President

Bodil Schmidt-Nielsen, an eminent renal and comparative physiologist and the 48th President of the American Physiological Society, passed away peacefully on the night of April 27, 2015. She was 96.

During a long career, Bodil Schmidt-Nielsen carried out many significant studies on fluid and electrolyte balance and nitrogen excretion in mammalian and non-mammalian vertebrates. The studies that first brought her national and international attention involved fluid balance in kangaroo rats, pocket mice, and wood rats in southern Arizona, performed with her first husband, Knut Schmidt-Nielsen, during the summers of 1947 and 1948. These studies were remarkable in their completeness and set a new standard for understanding water balance in animals living in diverse environments. These and later studies on camels in the Sahara Desert formed the basis for her Bowditch Award Lecture for the American Physiological Society (of which she was the second recipient) in 1957.

Of particular significance for her later scientific career, the early studies on kangaroo rats led to her enduring interest in renal function and a series of studies on the mechanisms involved in urea excretion and their possible contribution to the mammalian urine concentrating mechanism. These later studies had a significant impact on our understanding of mammalian renal function. They also led to her meeting with Homer Smith and an invitation to spend the summer of 1952 at the Mount Desert Island Biological Laboratory (MDIBL) in Maine, thus beginning her long association with that laboratory.

In a series of brilliantly conceived clearance and tissue studies on kangaroo rats and laboratory rats, she provided evidence first for carrier-mediated urea reabsorption by the renal tubules and second for both active urea reabsorption and urea secretion by the renal tubules under certain circumstances. At the time, the scientific community was unaccepting of her data and her conclusions. However, in recent years, studies on mammalian renal inner medullary collecting ducts with newer physiological techniques and molecular techniques have shown that she was largely correct.



Bodil Schmidt-Nielsen

Schmidt-Nielsen's studies on urea excretion in a number of mammalian species led to an increased understanding of the way in which it accumulates in the inner medulla and contributes to the osmotic gradient in that region. Although the mechanism by which this osmotic gradient is established remains a mystery to this day, Schmidt-Nielsen's studies on the significance of urea formed the basis for a number of theoretical models for the inner medullary concentrating process. In addition, in the final years of her active research career, she demonstrated the importance of the peristaltic contractions of the intact renal pelvis on the flow of fluid in the inner medullary blood vessels and renal tubules, and on the size of the cells and intercellular spaces. She suggested ways in which these effects might contribute to the development of the osmotic gradient, an idea that has been expanded and extended by other scientists. Although there is no experimental data to support any exact model relative to the pelvic contractions and it is not clear how large an effect this would have on the overall urine concentrating process, Schmidt-Nielsen's research certainly continues to have a significant influence on thinking in this area.

Schmidt-Nielsen was born on November 3, 1918, in Copenhagen, Denmark, the youngest of four children

of two other eminent physiologists, the Nobel Laureate August Krogh and Marie Krogh. Throughout her childhood and youth, she was regularly exposed to her parents' discussions of the research problems of the day. Although originally considering medicine as a career, she instead chose to enter the School of Dentistry at the University of Copenhagen, from which she received her Doctor of Dental Surgery degree in 1941. It was during her dental studies that she became especially intrigued by physiology and performed her first physiological research on the exchange of calcium and phosphorus in teeth. She continued studies on calcium and phosphorus metabolism in the School of Dentistry during World War II, but even then began to consider wider studies on fluid and ion balance. She received her Doctor of Odontology degree in 1946 and her Doctor of Philosophy degree in 1955, both from the University of Copenhagen.

Schmidt-Nielsen came to the United States in 1946. Initially, she was a research associate at Swarthmore College (1946-1948), Stanford (1948-1949), Cincinnati (1949-1952), and Duke (1952-1957). She then served as an associate research professor at Duke (first in Zoology and then in Zoology and Physiology) from 1957 to 1964, when she left to become Professor of Biology at Case Western Reserve University. However, in 1971, after a year as chair of the department, she resigned her tenured professorship there to become the first permanent research scientist at MDIBL because, as she stated, "I wanted to spend all of my time on research rather than administrative duties." She retained this position at MDIBL until 1986, when she closed her active research laboratory. However, she continued to be present at MDIBL during the summers, contributing to research discussions, and until 1997 held an adjunct appointment in the Physiology Department at the University of Florida, where she spent her winters.

Schmidt-Nielsen was very active in the American Physiological Society, serving as a member of Council and, in 1975-1976, as the Society's 48th President. She was the Society's first and, for the next 28 years, only woman president. In addition to the Bowditch Award Lectureship of the Society in 1957, she was awarded the first August Krogh Distinguished Lectureship by the Comparative and Evolutionary Physiology Section of APS in 1994 and the Robert W. Berliner Award for excellence in renal physiology research by the Renal Section of APS in 1998. For her contributions to physiology and her service to the American Physiological Society, she received the Ray G. Daggs Award from the Society in 1989.

Over the years, Schmidt-Nielsen received many other honors acknowledging her contributions to physiological research. These include election as a Fellow of the New York Academy of Sciences (1958), AAAS (1959), and the American Academy of Arts and Sciences (1973). She was also a Guggenheim Fellow (1953-1954), Established Investigator of the American Heart Association (1954-1962), and Career Awardee of the National Institutes of Health (1962-1964). She received an honorary DSc from Bates College in Lewiston, Maine in 1983 and an honorary MD from Aarhus University in Denmark in 1997.

Schmidt-Nielsen married Knut Schmidt-Nielsen in 1939, with whom she had three children, Astrid, Bent, and Mimi. This marriage ended in divorce in 1966. In 1968, she married Roger G. Chagnon, who passed away in 2003. She is survived by two of her children, Astrid and Bent (Mimi passed away in 1984), four grandchildren (Mimi, Tom, Erik, and Peter), four great grandchildren, and two great-great granddaughters. ●

William H. Dantzer

In December 2005, Bodil Schmidt-Nielsen established a charitable remainder trust through the APS, naming the Society as the beneficiary. A charitable remainder trust is a gift that provides fixed retirement income to an individual for life, after which the remaining assets go to the chosen beneficiary. The APS will use this gift to partially fund an endowment for the Bodil M. Schmidt-Nielsen Distinguished Mentor and Scientist Award, which recognizes APS members who have made outstanding contributions to physiological research and have also demonstrated dedication and commitment to excellence in training of young physiologists.

The Society's goal is to fully endow the award by creating a \$100,000 endowment fund. With Schmidt-Nielsen's gift, the goal is over 60% complete. In addition, to honor Schmidt-Nielsen for her generous gift, the APS inducted her into the newly created 1887 Legacy Circle. Details on membership in the 1887 Legacy Circle will be forthcoming in the next several weeks on our new APS Giving website (www.apsgiving.org). If you would like to honor Bodil Schmidt-Nielsen yourself, please consider making a \$500 gift to the Bodil Schmidt-Nielsen Fund to preserve the Bodil Schmidt-Nielsen Distinguished Mentor and Scientist Award in perpetuity (<http://bit.ly/1JHhlmx>).

Continued from page 159: Off the Grid



Patricia Molina, Martin Frank, and David Pollock

cooperation and collaboration. During the Congress, we drafted a Memorandum of Understanding (MOU) that was tweaked and finalized before we visited Cuba. On Tuesday, April 28, we went to the Consejo Nacional de Sociedades Científicas de la Salud to sign the MOU, which was designed to serve as the “basis for the future development of formal relations between the parties to improve education and research in the physiological sciences in our respective countries.”

President Obama announced in December 2014 that he was seeking “a new course in U.S. relations with Cuba that will engage and empower the Cuban people.” The signing of the MOU was our way to do the same for physiology. Our goal was to learn about medical education in Cuba and the role of physiology in the curriculum. It was also our goal to meet with Cuban physiologists at health institutions and research centers to learn about the types of research being carried out in physiology laboratories.

During our visit to Havana, we went to two institutions, the Instituto de Ciencias Básicas y Preclínicas (Basic and Preclinical Institute) and the Centro de Neurociencias de Cuba (Neuroscience Center of Cuba), meeting with investigators from both and learning about the research conducted at those institutions. At the Basic and Preclinical Institute, we learned they were conducting research in areas being studied by our members, specifically renal failure, obesity, hypertension, and diabetes. At the Neuroscience Center, we learned that they were studying hypertensive subjects to identify biomarkers for brain vascular damage. They had also developed a versatile radiotracer molecule to attack β -amyloid plaques. Most interesting was their effort to take discovery from the bench to bedside; having developed a system to carry out early detection of hearing loss, they now also produce external parts for hearing aids for the whole country using 3D printing.

Cuban students start medical school soon after high school, taking a 6-year program that leads to a medical degree. After receiving their MD degree, the students specialize, and those interested in physiology pursue a 4-year traineeship in physiology that follows completion of the MD degree. There are medical schools in each of the provinces, and there are multiple medical schools in Havana, including one exclusively for students from China. In each of the medical schools, class sizes are large and include students from Cuba as well as from South and Central America and Africa. We were told that there are even students from the U.S. in the Cuban medical schools. Guyton and Hall’s *Textbook of Medical Physiology* is the basis for the physiology curriculum, even though the availability of current textbooks is limited.





Sciences. Our hope is to organize small, research-focused meetings in Cuba to bring together physiologists working on common research problems. Our ability to do so is currently limited by the ability of U.S. residents to easily travel to Cuba. Once travel restrictions are eased, it will become possible for us to fulfill this aspect of the agreement.

We are in the early stages of an historic agreement between the APS and the Cuban Society for Physiological Sciences. The agreement puts the APS at the forefront of U.S. efforts to improve relations with Cuba and to learn from their expertise in a number of areas. By the time we go back to Cuba for the Pan-American Congress, I expect that Cuba will be on the grid, serving as a dynamic research hub for physiology and for medical education. Who knows, it may be on the grid even sooner if discussions between our governments continue to move forward. ●

Martin Frank

As our part of the MOU, the APS will work with our colleagues to provide access to the Society's journals as well as educational resources available through our website. The Society will also work with our Cuban colleagues to organize the 2nd Pan-American Congress of Physiological Sciences in Havana in 2019. We will also work to facilitate the development of research collaborations between our membership and the members of the Cuban Society for Physiological



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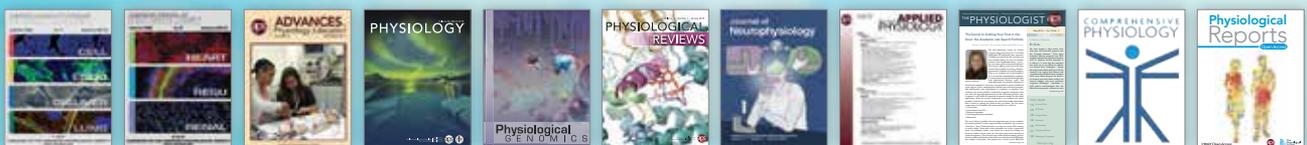
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<i>AJP–Endocrinology and Metabolism</i>	ajpendo.org	<i>Physiological Reports</i>	physiologicalreports.org
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<i>AJP–Regulatory, Integrative and Comparative Physiology</i>	ajpregu.org	<i>The Physiologist</i>	the-aps.org/physiologist
<i>AJP–Renal Physiology</i>	ajprenal.org		
<i>Journal of Applied Physiology</i>	jappl.org		
<i>Journal of Neurophysiology</i>	jn.org		
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*AJP consolidated is composed of the seven AJP section journals.



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APS News

Cuban and American Physiological Societies Sign Historic Agreement for Research Collaboration

On Tuesday, April 28, the leadership of the American Physiological Society (APS) and the Cuban Society of Physiological Sciences (SCCF) met in Havana to sign a memorandum of understanding (MOU), formalizing an agreement for the exchange of scientific information and resources between the two organizations. APS hopes that this relationship will facilitate more global interactions among Cuban, American, and other international physiologists.

The agreement was signed by APS President Patricia Molina, APS Past-President David Pollock, APS Executive Director Martin Frank, SCCF President Alberto J. Dorta Contreras, and Director of the Cuban National Council of Scientific Societies of Health Pedro Luis Veliz.

This partnership fits as part of APS's goal of sharing breaking physiological research to inform medicine today and inspire the medical advances of tomorrow. "Both the American and Cuban physiological societies have a lot to learn from each other's experiences, having worked in very different cultures for many years. During my visit, I was very impressed by the passion and knowledge of physiology and scientific inquiry in Cuba," Pollock said.

In addition to having an active research community, Cuban medical institutions attract a number of international students, making it a significant destination on the global medical education stage. Havana will also be the site of the 2nd Annual Pan-American Congress of Physiological Sciences in 2019.

"We had a great experience, met some inspiring students and scientists, and left with hope and conviction that this partnership was the right step for us to take," Molina said. "The creative and courageous approach [Cuban researchers] have used to address health care issues and implement translational science at their Neuroscience Institute, and their eagerness to cooperate and develop approaches to bring the two societies together, will fuel our initiative."

As part of the MOU, APS will send a delegation of physiologists to Cuba to foster collaboration between the countries. "A number of Cuban physiologists are exploring areas of research that parallel what researchers



From left to right: David Pollock, Alberto Dorta, Patricia Molina, and Martin Frank formalize an agreement for the exchange of scientific information and resources between the American and Cuban physiological societies.

in the U.S. are studying," Frank said. "Making these international connections can be essential for advancing new findings and areas of research. As a professional membership organization, part of our job is to set the stage for collaboration between our members and other researchers, and provide support for their efforts."

The opportunities for international collaboration are scheduled to begin very soon. "We've already extended an invitation to a physiology specialist in training (a 4-year traineeship in physiology that follows completion of the MD degree) to participate in a work-shop sponsored by APS in Guatemala this summer. We believe that small steps at the personal level will be catalysts of what could be a strong collaborative initiative between Cuban and American physiologists," Molina said.

According to the agreement, APS will also provide updates on a wide range of topics in physiology to help Cuban students and faculty keep up to date on the current state of physiological research. APS will facilitate access to its collection of 14 scientific journals and to the Life Science Teaching Resource Community. The Society will also provide guidance on procedures for submitting manuscripts to research journals and for avoiding ethical publishing pitfalls.

"I firmly believe that personal contact among scientists provides benefits that cannot be gained from simply reading the literature or even sending e-mails. It is my hope that, as our governments improve relations, we as physiologists will be there to grow and develop strong and lasting relationships," Pollock said. "Science should know no boundaries as we all strive for new discoveries that can improve the human condition." ●

Dale Named Chair of Trainee Advisory Committee



Erica Dale

Erica Dale has been named Chair of the Trainee Advisory Committee.

Erica Dale received a PhD in comparative biomedical sciences (minor: neuroscience) at the University of Wisconsin, where she focused on mechanisms of spinal respiratory neuroplasticity and, more

specifically, the roles that hypoxia-inducible genes play in phrenic motor facilitation. She is currently a postdoctoral fellow in the Department of Integrative Biology and Physiology at the University of California-Los Angeles. There, she focuses on utilizing epidural stimulation to modulate and/or facilitate spinal motor output after severe spinal cord injury. In her spare time, she enjoys playing and watching ice hockey, and K-12 science outreach. ●

Davenport Named Chair of the Perkins Memorial Award



Paul W. Davenport

Paul W. Davenport has been named Chair of the Perkins Memorial Award.

Davenport, Distinguished Professor of Physiological Sciences, joined the University of Florida faculty in 1981 as an Assistant Professor.

A specialist in respiratory and neurophysiology, he has published peer reviewed research papers and review articles with emphasis on the perception of breathing symptoms, children with life-threatening asthma, respiratory muscle rehabilitation, conscious control of breathing, traumatic brain injury, and airway defensive reflexes. His research has been funded by the National Institutes of Health, Department of Defense, State of Florida Department of Health, and private foundations and companies.

He graduated with his bachelor's degree in chemistry from Greenville College. He completed his PhD in 1980 in physiology and biophysics at the University of Kentucky. He completed a NIH-funded postdoctoral fellowship at the Department of Physiology and

Biophysics at the University of Texas Medical Branch in Galveston, Texas. In 1981, he was recruited to the College of Veterinary Medicine at the University of Florida, where he has taught anatomy and physiology. He holds a joint appointment in the Department of Physiology and Functional Genomics in the University of Florida, College of Medicine. He was appointed as a University of Florida Distinguished Professor in 2012.

He has active national and international research collaborations, including mentoring of clinicians and scientists in the U.S., France, Germany, Belgium, and Taiwan. He has been a guest professor and invited speaker at multiple institutions, including the University of Auckland, New Zealand; Chang Gung University, Taiwan; and University of Leuven, Belgium. He has participated in graduate education, mentoring 14 University of Florida PhD graduates. He has mentored postdoctoral and clinical fellows.

At the University of Florida, he served as Chair of the Department of Physiological Sciences. He has served as Chair of the University of Florida Faculty Senate and on several departmental, college, and university committees and councils. ●

Rickards Named Chair of Women in Physiology Committee



Caroline Rickards

Caroline Rickards has been named Chair of the Women in Physiology Committee.

Caroline Rickards is an assistant professor in the Department of Integrative Physiology & Anatomy at the University of North Texas Health Science Center (UNTHSC) in Fort Worth, Texas. Caroline completed her undergraduate (BSc, University of Melbourne)

and graduate (PhD, RMIT University) education in her home country of Australia before moving to the U.S. in 2005 to pursue a postdoctoral fellowship at the U.S. Army Institute of Surgical Research in San Antonio. Caroline commenced her current position at UNTHSC in the summer of 2012 following 3 years at the University of Texas at San Antonio as a research assistant professor.

Caroline's general research interests encompass understanding the integrated cardiovascular, autonomic, and cerebrovascular responses to environmental and behavioral stressors that challenge vital organ perfusion in humans, with an emphasis on hemorrhage,

orthostasis, exercise, and smoking (specifically, electronic cigarettes). A major area of research focus has been on the early detection of hemorrhagic injury in trauma patients, characterizing physiological differences between individuals with high vs. low tolerance to this stress. In addition to investigating these physiological mechanisms, Caroline's laboratory also collaborates with academic, industry, and government partners to develop and test sensor technologies in the laboratory that may improve the early detection of tissue hypoperfusion in the clinical setting. Furthermore, her laboratory explores potential therapies that may improve cardiovascular and cerebrovascular responsiveness to tissue hypoperfusion, including resistance breathing, oscillatory perfusion therapy, and occlusive exercise. It is anticipated that these studies will have potential clinical applications to stroke, traumatic brain injury, hemorrhage, migraine, myocardial infarction, and orthostatic intolerance.

Caroline is actively involved in the APS as Chair of the Women in Physiology Committee, as a regular member of this committee from 2011 to 2013 and of the Cardiovascular Section Trainee Advisory Committee from 2010 to 2013. Caroline has also chaired and presented in a number of scientific sessions at the annual Experimental Biology meeting. ●

Awards, Grants, and Fellowships of the APS

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Sigmund Named Chair of Publications Committee



Curt D. Sigmund

Curt D. Sigmund has been named Chair of the Publications Committee.

Sigmund is the Roy J. Carver Chair in Hypertension Research, Professor and Chair of the Department of Pharmacology, and Director of the UI Healthcare Center for Hypertension Research at the University of Iowa. Since his faculty appointment at

Iowa in 1991, he has been studying the mechanisms regulating expression of genes in the renin-angiotensin system, the role of tissue renin-angiotensin systems in the kidney and brain in blood pressure, and the mechanisms by which the ligand-activated transcription factor PPAR γ in endothelium and smooth muscle regulates vascular function and blood pressure. He is the principal investigators on R01 and P01 grants from the NIH and was recently named the Center Director of an American Heart Association

Strategically Focused Research Network on Hypertension. He has published over 225 research papers, reviews, chapters, and editorials. Sigmund has been involved with the APS for over 20 years. He was the Chair of the Joint Program Committee and ex officio member of Council from 2002 to 2007, and elected member of Council from 2009 to 2012. He served as an Associate Editor of two APS journals: *AJP: Endocrinology and Metabolism* (1994-2000) and *Physiological Genomics* (2000-2007); and of *Hypertension*, a journal of the American Heart Association. In 2013, he completed a 6-year term as the Editor-in-Chief of *AJP: Regulatory, Integrated and Comparative Physiology*. Sigmund's philosophy has always been that the APS is strongest in advancing physiology as a discipline when considered as a unified society rather than a group of sections. His role as Chair of the Publications Committee and ex officio of Council is to provide both oversight and strategic vision to the publications program. He views his role as chair to function as a liaison between the editorial teams with other programs of the society such as meetings, policy, education, and membership, and to be the editors' representative with APS leadership. ●

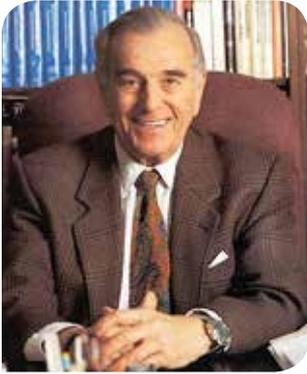
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Kaley Lecturer 2015, Mark T. Nelson



Gabor Kaley

The 2nd Annual Kaley Lecturer is Mark T. Nelson, Chair and University Distinguished Professor of Pharmacology at the University of Vermont. This lectureship is made possible by a generous donation by the family of Gabor Kaley, who was Professor and Chair of Physiology at the New York Medical College in Valhalla, NY. Kaley is remembered

by his long-standing excellence in research and in mentoring students, postdoctoral fellows, and junior faculty, whether they worked directly with him or interacted with him at scientific meetings. Nelson's excellence in research and mentoring follows this path closely. The American Physiological Society and The Microcirculatory Society were honored to have Harriette

Kaley attend the 2015 Kaley Lecture and to present a plaque to Nelson after his lecture. ●



Merry Lindsey (APS Cardiovascular Section Chair), Mark T. Nelson (2015 Kaley Lecturer), Harriette Kaley, Mary D. (Molly) Frame (Past-President, The Microcirculatory Society), and Rolando E. Rumbaut (President, The Microcirculatory Society). Photo courtesy of Bernadette Englert.

Tang Prize Lecture to be Presented at Experimental Biology

Taiwan's Tang Prize Foundation signed an agreement with the executive officers of the Experimental Biology meeting sponsoring societies to present the prestigious

award lecture at the EB meeting for the next decade. Established in 2012, the Tang Prize in Biopharmaceutical Science awards ~\$1.2 million in recognition of "original biopharmaceutical or biomedical research that has led to significant advances toward preventing, diagnosing, and/or treating major human diseases to improve human health."



Tang Prize Foundation CEO Chern Jenn-chuan with American Association of Anatomists Executive Director Shawn Boynes and APS Executive Director Martin Frank sign a cooperative pact at EB 2015. (Photo Credit: Taiwan Today.)

The Tang Prize in Biopharmaceutical Science Lecture will be presented biennially at the EB meeting. The inaugural lecture "Immune Checkpoint Blockade in Cancer Therapy: New Insights and Opportunities" was delivered by James Allison at this year's EB meeting. APS member and past president Shu Chien was integral in coordinating the new relationship and bringing the Tang Prize Lecture to the EB meeting.

Read more about the award and the ceremony at this year's meeting in Taiwan Today: <http://ow.ly/N6VGS>. ●

APS Announces a New Development Program

The American Physiological Society announces the addition of a new Development Program. The creation of this program grew from deliberations at Council, recognizing the need and desire to cultivate additional philanthropic support for the numerous programs and awards offered by the Society. The newly added Development team will work with the Society's leadership and staff to build relationships with individuals, corporations, and private foundations so that gifts and grants can be solicited for the Society's current endeavors and, ultimately, build the Society's endowed funds to ensure that the Society is able to continue to realize its important mission for future physiologists and the science of physiology.

As part of this new program, the Development Office has revamped the donation portion of the APS website. Please check out the changes at www.the-aps.org/giving. In addition, a new leadership annual giving program has been created, The Founder's Circle, to encourage and recognize members who contribute \$250 or more annually to the APS. These individuals will become members of The Founder's Circle and will receive special recognition for their generous gifts. The newly created 1887 Legacy Circle recognizes donors who have made a major gift of \$25,000 or more to the APS

or have made formal plans to include the Society in their wills. Furthermore, more deliberate and systemic plans are being made to pursue major gifts and grants from corporations and foundations; thus a list of giving opportunities for such donors has been added to the donation web pages. Finally, the Development staff has also begun advising sections on their sponsorship efforts. ●

Please welcome the new APS Development Office staff:

John R. Van Ness
Development Officer
301-634-7604
jvanness@the-aps.org

Megan M. Mitzelfelt
Development Specialist
301-634-7991
mmitzelfelt@the-aps.org

Did you know that many corporations offer employee giving programs where donations to the APS are matched? Please check with your employer to see if you can double your donation to the Society.

Support the American Physiological Society and support the future of physiology

The APS has been a leader among professional societies devoted to the life sciences, especially in supporting an array of programs that promote and assist underrepresented minority students aspiring to careers in physiology. This has been a hallmark of our Society's distinctive contribution, of which we are all quite proud. Please consider a donation to APS and support the future of physiology!



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APS, FASEB Highlight Role of Professional Societies in Annual Postdoc Meeting

Melinda Lowy (APS) and Anne Deschamps (FASEB)

Professional societies and the role they play in assisting postdoctoral fellows to achieve their career and professional goals were the topics of two recent sessions at the 13th Annual National Postdoctoral Association (NPA) meeting, the largest meeting and networking event in the postdoctoral community. Formed in 2003, the mission of NPA is “to improve the postdoctoral experience by supporting enhanced research training and a culture of enhanced professional growth to benefit scholarship and innovation.” The organization seeks to enhance the quality of the postdoctoral experience in the U.S. by 1) advocating for policies that promote positive change, 2) developing and providing resources that postdocs and administrators need for success, and 3) providing opportunities for the postdoctoral community to connect.

Hosted by the University of Maryland, Baltimore, the March 13-15 meeting featured a mixture of keynote addresses, plenary sessions, concurrent workshops, and “Innovation in Action” sessions. The meeting sessions focused on those issues of most interest to postdocs, such as career options, diversity issues, and mentoring and developing postdocs. There were also themed lunches, networking events, a poster session, and a vendor area. For a detailed meeting agenda, see nationalpostdoc.org/meetings-and-events-4/annual-meeting/2015-annual-meeting. Attendees included current postdocs, postdoc office administrators, school administrators/deans, professional society staff, funding agency staff, and small business owners serving the postdoc community. The meeting allowed these professionals the opportunity to interact and exchange ideas and resources.

One of the two plenary sessions given during the meeting was titled “Promoting Community, Education and Leadership: How Associations and Societies Develop Postdocs.” Moderated by Yvette Seger, Director of Science Policy at the Federation of American Societies for Experimental Biology (FASEB), this

session featured Jean H. Shin (American Sociological Association), Cynthia Simpson [Association for Women in Science (AWIS)], and Joe Z. Sostaric (American Chemical Society). The speakers discussed resources and programs offered to postdocs by their respective societies and also highlighted the many ways societies can assist postdocs’ professional, mentoring, and career development. Following their individual presentations, the panel answered a multitude of questions that the attendees had about societies, what they offer, and how postdocs can get more involved.

On day 2 of the NPA Meeting, concurrent “Innovation in Action” sessions took place. The goals of these sessions were to exchange ideas and share knowledge on a variety of topics through a 90-min interactive format. Melinda Lowy of the American Physiological Society (APS), Anne Deschamps of FASEB, Rachel Horak of the American Society for Microbiology (ASM), and Cynthia Simpson of AWIS organized the session, “Engaging with Professional Societies to Meet the Diverse Needs of Today’s Postdocs,” the objective of which was to help inform societies of ways they can improve resources, opportunities, and programs for postdocs.

Session moderators briefly reviewed the opportunities and resources available to postdocs and trainees through their societies. Lowy from APS highlighted the multitude of awards for trainees in all fields of physiology and their Trainee Advisory Committee, which advises APS Council on the needs of trainees. Horak discussed some of ASM’s resources, such as their travel awards and networking opportunities. Providing opportunities for women to achieve equity in science was highlighted by AWIS’s Simpson. Finally, Deschamps described FASEB, noted that FASEB’s member societies have myriad opportunities and resources for postdocs, and briefly discussed FASEB’s Maximizing Access to Research Careers (MARC) program.

Session attendees were then broken up into groups with society facilitators to answer the following questions: 1) If you are not a society member, why not? 2) If you are not an active society member, why would entice you to be more involved? 3) What communication strategies are most effective in reaching postdocs? 4) What are some gaps that you see in professional development opportunities for postdocs? 5) What are some key characteristics of resources, programs, opportunities that make society-sponsored programs helpful to you? 6) What could societies do to facilitate networking and mentoring? Additional staff members from ASM, the Genetics Society of America, and The American Association of Immunologists assisted with facilitating conversations.

Some key takeaways from the interactive session focused on communicating effectively and efficiently with postdocs, engaging postdocs at the local/institutional level, and making sure postdocs are aware of resources and opportunities early in their postdoc career. Because

of the usefulness of the information, session moderators plan to write up the findings as a report that will be distributed widely.

For questions or more information about the “Innovation in Action” session, please contact Rachel Horak (rhorak@asmusa.org), Anne Deschamps (adeschamps@faseb.org), Melinda Lowy (mlowy@the-aps.org), or Cynthia Simpson (simpson@awis.org). For questions or more information about the plenary session, contact Yvette Seger (yseger@faseb.org).

The next NPA annual meeting will be held on March 4-6, 2016 at the Van Andel Institute in Grand Rapids, MI. For more information about the meeting, see the NPA website at nationalpostdoc.org/meetings-and-events-4/annual-meeting/2016-annual-meeting. Anyone with an interest in postdocs and the issues related to mentoring, careers, or professional development should consider attending. ●

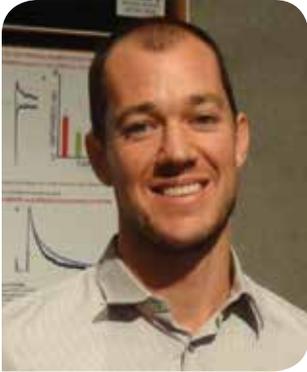
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Chapter News

6th Annual Meeting of Tennessee Physiological Society



Keynote speaker Matthew Hirschey

The Tennessee Physiological Society (TPS) held its sixth annual meeting on Friday, January 23, 2015 at the Vanderbilt University Student Life Center. The meeting was supported by the Vanderbilt Department of Anesthesiology and co-hosted by the Departments of Anesthesiology and Molecular Physiology & Biophysics. Five Tennessee institutions were repre-

sented at the meeting, including Vanderbilt University, Meharry Medical College, Tennessee State University, University of Tennessee Health Science Center, Memphis, and East Tennessee State University, Johnson City.

The meeting began with opening remarks by Brad A. Grueter, president of the TPS, from the Department of Anesthesiology. The morning sessions featured presentations from Evangeline Motley-Johnson ("Distinct Roles of Protease-Activated Receptors in the Regulation of Endothelial Nitric Oxide Synthase in the Vasculature"), Kristen O'Connell ("Diet Composition, Not Calorie Intake, Alters Neuronal Excitability of Hypothalamic AgRP/NPY Neurons in Mice"), Hugh Fentress ["Activation of the JAK/STAT Pathway by the Human Serotonin 2C (5-HT_{2C}) Receptor"], and Josh Fessel, "BMP Signaling is a Key Regulator of Metabolic Program"]. Afternoon sessions featured presentations from Louise Lantier ("SIRT3 is Crucial for Maintaining Skeletal Muscle Insulin Action in High Fat Fed Mice") and Cerrone Foster ("Ataxia Telangiectasia Mutated

Kinase: Role in Cardiac Myocyte Apoptosis and Myocardial Remodeling"].

The keynote address from Matthew Hirschey, Assistant Professor of Medicine, Division of Endocrinology, Metabolism and Nutrition; Department of Pharmacology & Cancer Biology, Duke University Medical Center, Durham, NC was titled "Mitochondrial Protein Acetylation and Acylation Regulate Metabolism." In his talk, Hirschey addressed mammalian Sirtuins, a family of deacetylases that play a role in a variety of biological processes. He described a newly characterized protein modification called lysine glutarylation that is enriched on mitochondrial proteins, a posttranslational modification regulated by SIRT5.

An afternoon poster session featured 20 posters from students and postdoctoral fellows. The poster presentations were evaluated, and four were selected for monetary awards. The poster presentation award recipients were Dipanwita Ghose, Christian Marks, Sujay Kharade, and Martha Wall.

The TPS meeting was made possible by financial support from the Department of Anesthesiology and Vanderbilt University Medical Center. We are grateful to the Department of Anesthesiology staff, especially Kristie Lee and Christine Goldsberry. We are also grateful to Carrie Grueter (TPS treasurer), who managed local arrangements including scheduling conference rooms, poster session boards, and food and beverages served throughout the meeting (breakfast, lunch, coffee breaks, etc.) as well as printing the meeting program. ●

Education

Serving Our Society

Karen L. Sweazea

Arizona State University, Tempe, Arizona



Karen L. Sweazea

I am both honored and humbled to have received the 2014 Dale J. Benos Early Career Professional Service Award. Dale J. Benos was Chairman of the Department of Physiology and Biophysics at the University of Alabama at Birmingham when he died in 2010 of natural causes at the young age of 60. This award was named after Benos in honor of his service to not only the

American Physiological Society as the 79th President (2006-2007) but also for his long-standing commitment to service activities, mentoring, and excellence in teaching for which he received numerous awards throughout his career.

As a tenure-track assistant professor, I have been advised countless times to protect my time and minimize service activities. In my opinion, accepting the role of a professor also entails the responsibility of sharing enthusiasm and passion for physiology and research with as many people as possible. This responsibility is not limited to the classroom or laboratory. Rather, it is a responsibility to society as a whole.

As a condition of receiving the award, I was asked to write a short article on professional service. At the time, I thought this would be a very easy task. However, one of the side-effects of being actively involved in service activities is having limited time in which to accomplish them. Therefore, one of the skills that I am striving toward is learning to prioritize. It is simply not possible to volunteer for every opportunity that comes along. Therefore, a decision needs to be made as to what your overall goals are, realizing of course that these goals may change over time. Sometimes saying “no” just might be the best choice since it not only protects your time when necessary but also opens the door for others to become more involved. Declining offers graciously allows you to

consider volunteering for the opportunity in the future, should a position open when your schedule might be more permissible.

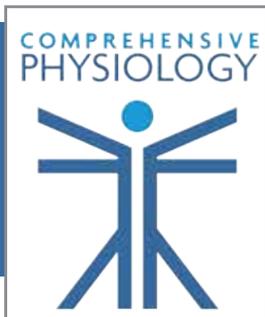
I consider education and advancement of future physiologists a major goal. To promote STEM careers, I have been involved in a local chapter of the Association for Women in Science (AWIS) through which we offer several career development workshops and seminars. Serving as a judge at the American Physiological Society conferences is also an excellent way to meet and encourage young physiologists to continue in the field. One of the joys of K-12 outreach activities in particular is to witness the students having fun while learning. I recently took on the task of developing a series of weekend workshops at which we used a variety of hands-on activities to teach a group of middle school students about digestive physiology and nutrition. Having the opportunity to answer their questions and perhaps dispel myths or misconceptions about research, especially animal research, is an important way to positively impact perceptions about physiology. In fact, some of these students are now considering a career in physiology.

Let’s not forget about research obligations, of course. Involving students from all levels not only promotes research progress, it also gives the students an invaluable experience and insight into what a career in physiology might be like. I have had the pleasure of hosting two undergraduate students who received summer research fellowships from APS as well as an international undergraduate student with sponsorship from his home institution. While it may seem that the summer term is not long enough for them to develop sufficient skills to carry out high-caliber research, I have found that, when given the opportunity to conduct research full time, these students can accomplish almost anything. It also turned out to be a great opportunity for the local undergraduate students in my laboratory to develop close connections with students from other institutions. Encouraging peers to participate in outreach activities or hosting K-12 teachers for the summer to enhance their science courses are other great ways to have a broad impact.

Another way to promote physiology is to become involved with the American Physiological Society. There are countless ways that we can help promote the scientific society to which we belong while at the same time promoting physiology to not only the general public but also our institutions and funding agencies. It can be as simple as organizing a scientific session at one of the various APS-sponsored conferences, volunteering as a judge at a local K-12 science fair, or organizing a Physiology Understanding Week event at a local school to help inspire youth who may not have otherwise considered physiology as a potential career choice. Also consider joining one of the various APS committees through which you can impact not only your society and the decisions it makes, but also the future of our field through advocacy and support of young physiologists. Each committee that I have served on thus far (Trainee Advisory, Communications, Women in Physiology, Comparative and Evolutionary Physiology section Steering Committee) has offered the opportunity to serve in a variety of capacities, such as organizing symposia and workshops on various topics of interest, reviewing applications and selecting awardees, and developing

content for the general public *PhysiologyInfo.org* website. Service as Treasurer of the Comparative and Evolutionary Physiology section Steering Committee has additionally provided the opportunity to organize the annual business and dinner meeting through which I have had the pleasure of getting to know many physiologists with similar research interests, in addition to selecting symposia and featured topics for the Experimental Biology meetings.

Service is part of our job description. Professional service in particular is something we are called to do to promote our institutions and societies. I would argue that service should not be considered something that gets in the way of research progress, but rather something that may enhance progress, since becoming more involved in promoting physiology and taking advantage of the networking opportunities that service brings may lead to new collaborations and attract talented students to the lab. In my experience, service has not only enhanced my career, it has enhanced my life. ●



FREE Access for APS Members to *Comprehensive Physiology* through December 31, 2015

Comprehensive Physiology is the most authoritative and comprehensive collection of physiology information that has ever been assembled. Its starting point is more than 30,000 pages, 34 volumes of content from the American Physiological Society's renowned *Handbook of Physiology* series, which is presented now for the first time in a new, dynamic online format.

Comprehensive Physiology covers all areas of current research and practice, has a world-renowned editorial team, and is fully citable. **APS members receive FREE access through December 2015.**

www.comprehensivephysiology.com

2014 Frontiers in Physiology Teachers Complete Fellowship

Frontiers in Physiology Research Teacher Fellows completed their fellowship year in April with their attendance at EB2015 in Boston. Thirteen middle and high school teachers from across the nation began this course in April of 2014 and progressed through the online professional development lessons for 9 months. The Frontiers in Physiology Program was made available by generous support from APS. Teachers participated in reading, sharing of resources, experimental design, poster sessions, discussion boards, lesson development, peer reviews, production of Bench-to-Bedside Primers, and pre- and post-fellowship content surveys and physiology

tests. Lead Mentor Instructor Robert Manriquez (2005) was assisted by Mentor Instructor Tonya Smith (2005) and Monica Erwin (2008) in leading the online forum of modeling inquiry methods for use in the classroom. Overall, teachers from nine states took part in this rigorous professional development course, learning not only about physiology but also about the best ways to help their students learn science via the scientific method.

The teachers participating in the program are listed in the table below. ●



2015 Frontiers Mentor Instructors (left to right) Monica Erwin, Tonya Smith, and Robert Manriquez enjoy meeting at the Frontiers Award luncheon.



2014-2015 Frontiers in Physiology Fellowship awardees at EB 2015.

Frontiers in Physiology 2014-2015 Research Teachers and Hosts

Teacher	Research Host
Jason Ambler – Hershey High School, Hershey, PA	R. Alberto Travagli – Penn State-College of Medicine
Amy Anderson – BASIS Phoenix, Phoenix, AZ	Layla Al-Nakkash – Midwestern University
Shannon Baird – The Preuss School UCSD, San Diego, CA	Alan Hargens – University of California, San Diego
Brandy Cahoon – Clark County School District, Las Vegas, NV	Frank van Breukelen – University of Nevada, Las Vegas
Katahdin Cook Whitt – Dayton Regional STEM School, Kettering, OH	David Goldstein – Wright State University
Barbara Gafford-Hampton – Miller Grove High School, Lithonia, GA	Jeff Sands and Janet Klein – Emory University
Aaron McCalister – John Quincy Adams Middle School, Metairie, LA	Dane Crossley – Louisiana State University
June Miller – Marist Catholic High School, Eugene, OR	Jason Gardner – University of Oregon
Richard Phillips – Jefferson Parish School Board, Slidell, LA	Liz Simon and Flavia Souza-Smith – LSUHSC, New Orleans
Kathleen Stewart – Garrett Middle School, Austell, GA	Nicholas Gilpin – LSUHSC, New Orleans
Robert Stewart – Coan Middle School, Smyrna, GA	Russ Price – Emory University
Scott Troy – Westminster High School, Westminster, CO	Rodger Kram – University of Colorado, Boulder
John Ward – North Clayton High School, Atlanta, GA	Mitsi Blount – Emory University

Learning How to Share the PhUn at the EB 2015 Physiology Understanding Week Training Session

Twenty-five poster presenters described strategies for outreach and hands-on physiology-related activities across primary, elementary, middle, and high school levels at the Physiology Understanding (PhUn) Week

fosters a community of sharing best practices and grassroots outreach efforts by APS members who participate in the APS annual Physiology Understanding Week (PhUn Week) outreach program held each fall (www.PhUnWeek.org). In addition to classroom activities, topics included working with a teacher, recruiting and training of a volunteer team, and organizing special community events. APS Education Committee member Patricia Halpin organized and opened the poster session. Approximately 100 attendees flowed through the 90-minute open poster session. The continental breakfast session was co-sponsored by the APS and ADInstruments, Inc.



Alvaro Gurovich and his undergraduates from Indiana State University presented three posters at this year's PhUn Week Poster Session.

The following is the presenter and poster title list. ●

Poster	School Level	Title	Presenter
1	Pre-school to Middle School	Investigating Physiology at the Boston Children's Museum	Andrea Gwosdow
2	Elementary	Elementary PhUn in Ponce, Puerto Rico	Raymond Isidro
3		"Elementary" Physiology of Exercise and Nutrition	Kim Henige
4		Glomerular Damage can be PhUn!: Bringing Renal Physiology to Inner City Elementary Schools	Carmen DeMiguel
5		Wading into the Wonderful World of Water Molecules	Diane Munzemaier
6		Measuring Brain Activity in Fourth Grade Students Through Applied Technology	Shannon Hamilton
7		The Cardiovascular System for Fourth Graders Using Applied Technology: Heart Rate and Physical Activity During PhUn Week	Jaylyn Brown
8		How to Teach Physiology to 4th-Grade Children? High Tech PhUn!	Alvaro Gurovich
9		Reaction Time as a Physiological Process in Fourth Grade Students	Emily Barrett
10		Bringing PhUn Week in Line With Special Community Events	Jessica Ibarra
11		Elementary to Middle School	Educational Outreach as a Simple, Yet Effective, Service Learning Opportunity for Exercise Science Undergraduate and Graduate Students
12	Hands-on Activities in Cardio-Respiratory Physiology		J. Michael Wyss
13	Eye Can Learn About Physiology Through PhUn Week		Lourdes Fortepiani
14	Museum-Based PhUn Week 2014: Reflections from the Third Year		James Poteracki

table continued on page 185

Poster	School Level	Title	Presenter
15	Elementary to High School	Promoting Physiology Understanding (PhUn) Week in the New Orleans Area	Lauri Byerley
16		Teaching Physiology to Homeschool Children in Rural Mississippi	Ellen Gillis
17	Middle School	UD and DECA: Successful Stations in a Seventh-Grade Classroom for PhUn Week	Anne Crecelius
18		Investigating Social Jet Lag in the 6th Grade, a 2015 PhUn Week Activity to Introduce Circadian Physiology in Middle School	Kristen Solocinski
19		Filtration Made "PhUn": Teaching Middle School Students About Kidney Function	Shreya N. Kashyap
20	Middle and High School	Perceptions of Students from Nebraska and South Dakota Native American Reservations on Scientific Related Careers Before and After Participation in Outreach Activities	Alicia Schiller
21		Assessing Knowledge of and Excitement Toward Physiology of Native American Students Following Participation in a Day of Interactive Physiology-Based Activities.	Bryan Becker
22	High School	Diving into Physiology!	Jessica Kutz
23		Changing Student Attitudes Towards Science in Secondary School: The Effect of Temperature and Exercise on Peripheral Oxygen Saturation Levels	Takisha Reece
24		Repetition of Key Words During PhUn Week Activities Increases Correct Answers in a Population of Junior Students in Puerto Rico	Neysha Martínez-Orengo
25	Elementary	An Early Introduction to STEM with an Emphasis on Physiology	Keisa Mathis



PhUn Week poster session in full swing.



Former Frontiers in Physiology Teacher presents University of North Texas Health Sciences Center PhUn Week Poster

BODIL M. SCHMIDT-NIELSEN

DISTINGUISHED MENTOR AND SCIENTIST AWARD

www.the-aps.org/schmidtnielsen

Award: \$1,000 + travel expenses for EB 2016 meeting

Deadline: September 15, 2015

The Women in Physiology Committee invites you to nominate an APS member (male or female) who is judged to be both a superb mentor and an outstanding scientist for the 2016 Schmidt-Nielsen Award. Visit the website above for details on the nomination packet requirements and for the online application link.

Minority Travel Fellowship Awards for 2015 Endothelin, Bioenergetics, and Sex & Gender Conferences

APS will be offering Minority Travel Fellowship Awards, which provide up to \$1,800 in travel expense reimbursement, for the upcoming 2015 APS Conferences.

14th International Conference on Endothelin: Pathophysiology and Therapeutics

September 2-5, 2015 in Savannah, Georgia

Application deadline: June 10, 2015

2015 APS Conference: Physiological Bioenergetics: From Bench to Bedside

September 9-12, 2015 in Tampa, Florida

Application deadline: June 10, 2015

2015 APS Conference: Cardiovascular, Renal and Metabolic Diseases: Physiology and Gender

November 17-20, 2015 in Annapolis, Maryland

Application deadline: July 8, 2015

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.

EB 2015 Career-Track Symposia Online

Be sure to check out the EB 2015 career-track symposia presentations. Now available online!

Career Symposium

Resilience is Power: Dealing with the Ups and Downs of Your Scientific Career

the-aps.org/resilience

Presentations include:

- How do People Bounce Back After Disappointment or Distress?
Karen Quigley, *Northeastern University*
- What Can Scientists as Mentees or Mentors do to Overcome Challenges in the Workplace – First Manuscript or Grant Rejection, Difficult Relationship in the Lab or Department?
Howard Adams, *H.G. Adams & Associates, Inc.*
- What are Positive Ways to Deal With a Changing Work Environment – New Research Direction/Boss/Department/Institution/Job Description?
Jennifer Pollock, *University of Alabama, Birmingham*
- How Can a Scientist be Resilient During a Difficult Job Search for a Position in Academia or Industry?
Magdalena Alonso-Galicia, *Bayer Healthcare LLC*

Mentoring Symposium

Mentoring for Diverse Careers: Mentor and Protégé Perspectives

the-aps.org/mentoringdiversecareers

Presentations include:

- I Want to Pursue an "Alternate" Career Path
Lisamarie Collins, *Foley & Lardner LLP*
- How Can I Help Train a Mentee for an "Alternate" Career in Science?
Jessica Schwartz, *University of Michigan*
- Career Opportunities That Fit: You Beyond the PhD
Maria Urso, *Smith & Nephew*

Trainee Symposium

Scientists as Supervisors: Hiring, Firing and Beyond

the-aps.org/supervisor

Presentations include:

- Hiring and Firing: Finding the Right Employees
Michael B. Reid, *University of Florida*
- Effectively Managing People and Resources
Kim Barrett, *University of California, San Diego*
- Dealing with Difficult Situations and People
Francine Montemurro, J.D., *Boston University*

Publications

APSselect: Year One a Success!

Joseph M. Metzger
Linda C. Samuelson

In 2014, the APS launched the exciting new initiative “APSselect” (<http://apsselect.physiology.org/>). The mission of APSselect is to highlight and promote our society’s very best original research scholarship through a new society-wide “virtual journal.” APSselect highlights the “best of the best” of the more than 200 research papers published every month by the Society’s 10 research journals. We are pleased to update the APS membership regarding metrics and milestones for the first year of APSselect.

APSselect aims to shine a bright light on the latest major scientific discoveries in physiology. To achieve this goal, APSselect endeavors to be a timely, convenient, and concise “one-stop shopping” mechanism to broadly promote our Society’s most exceptional discoveries. APSselect has a mission to serve all of the 11,000+ APS members. APSselect also seeks a broader mission to advance excellence of the physiological discipline to researchers in other fields.

Two immediate beneficial outcomes are already emerging from this initiative. First, there is increased attention to APSselect-promoted papers. A secondary consequence is more viewer traffic directed to each of the ten APS research journals.

APSselect Performance Metrics: Year One in Review

Significant evidence has accrued over the past year that APSselect is achieving its primary directive of promoting top APS original scholarship to our membership and beyond. Over the past year, APSselect has featured some 100 papers out of ~3,000 total the APS published. Similar to other journals seeking high impact, the APSselect is mindful of the less-is-more axiom as it strives to be compact and timely. On average, APSselect highlights 7-8 papers each month from a pool of the more than 200 published. APSselect papers are prominently transmitted to the APS membership and others via the APS.org website, as well as being communicated via e-mail blasts. Emerging metrics are showing APSselect

is serving its goal of evaluating and disseminating outstanding APS scholarship.

One measure of success is demonstrated by the marked increase in viewer downloads (“hits”) that APSselect papers have received compared with the other papers published across all the APS journals (Fig. 1). The average APSselect paper has more than *three times* the usage hits than the average APS paper immediately following publication (Fig. 1). In addition, over the 6-month period following publication, the average APSselect paper has a dramatic increase in downloads compared with the average APS paper. Even at the 1-year time point after publication, the average APSselect paper has twice the downloads as the average APS paper. This finding suggests that APSselect papers have significant carrying power, with increased interest sustained over time. It will be interesting to track in the coming years whether this increased usage will ultimately translate to increase numbers of citations per paper and thus enhance overall impact.

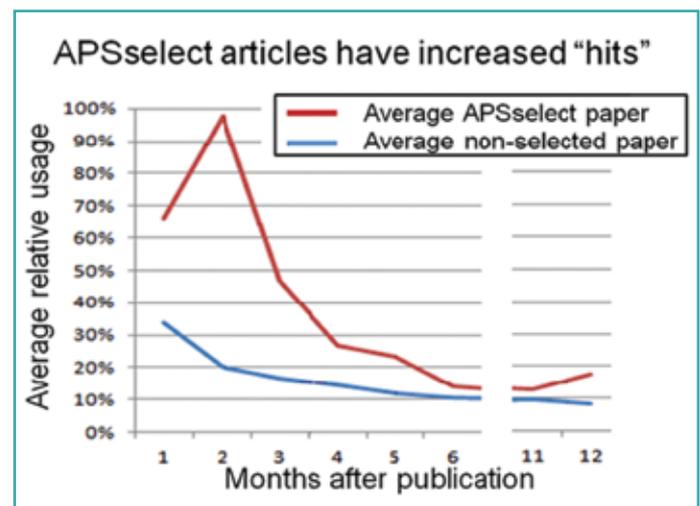


Fig. 1. Average APSselect article downloads compared with the average APS paper over the past year. Data are normalized for total traffic to each of the 10 APS research journals to allow usage calculation between the different APS journals. APSselect papers have a dramatic increase in total average downloads, especially notable during in the first few months after publication.

APSselect: Evaluation of Nominated Papers

To best maximize impact, a critical feature of APSselect centers on its selectivity. Collectively, the 10 APS research journals promote some 50 papers every month as editor's picks and featured works. From these, 20 papers are nominated each month to the APSselect editorial board. The APSselect editorial team evaluates and rates these nominated papers with an eye toward assessing their interest and potential impact across all disciplines in physiology. To this end, the rank-order voting mechanism used has proven excellent in selecting the top papers.

APSselect: Review of Selection Mechanism

Evidence is substantial that the rank-order voting system is working to determine the best-of-the-best research articles. Rank-order voting utilizes a 1 to 10 rank-order ballot, where paper 10 is the top-ranked paper and paper 1 is the lowest scored by each voter, among a group of outstanding nominated papers. Votes are averaged and tabulated to select the top-tier papers. This voting mechanism has proven to be excellent at stratifying the nominated papers. This point is made more clear by displaying voter ballot scores using a "heat map" graphic for visualization (Fig. 2). Here, the hot colors represent high scores, whereas the cool colors represent lower scores. It is evident that across multiple voter

ballots there is a high concurrence in voting patterns such that the warm colors rise to the top and cool colors drop to the bottom across all ballots (Fig. 2). Thus, while all nominated papers are considered excellent, it is evident that the rank-order voting mechanism can effectively discriminate among these to point out the "best of the best." The cumulative voting Heat Map is striking in that the APSselect voters come from different physiological areas of focus (discussed further below). APSselect voters are asked to judge papers based on their collective training and experience in physiology as a whole. This is akin to editorial judgments made by other editorial boards whose journals seek and attain high impact, which requires the resolve to be selective.

It may be asked, "What are the qualifications of the APSselect voting members, and are these sufficient to achieve a fair and expert evaluation of the potential impact of APSselect papers?" The APS select editorial team consists of 12 APS members. Each member has an outstanding academic record in the physiological sciences, and each has demonstrated a strong commitment to advancing the discipline. Voting members include the current APS President, the APS President-Elect, and the immediate Past President for our Society. In addition, all current APS Publications Committee members are voting members, along with the immediate Past Chair of the Committee. This structure ensures that each year the APSselect editorial team will have a regular influx of new members as others rotate off. The APSselect editorial team is led by Joseph Metzger, Editor-in-Chief, and Linda Samuelson, Associate Editor.

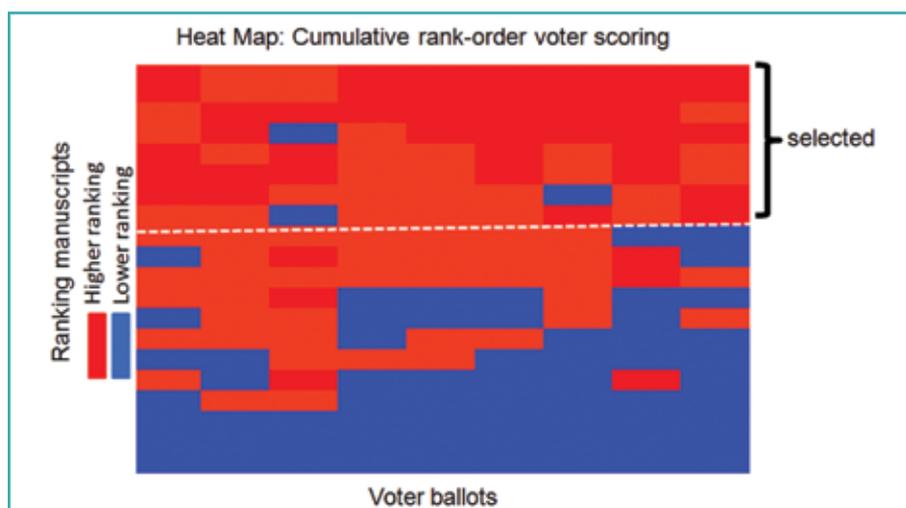


Fig. 2. Heat Map of summary cumulative voter ballots averaged across multiple rounds of voting for APSselect over the past year. The y-axis stratifies the scores for each voter for the 20 nominated papers. The x-axis represents individual voter ballots, with 10-1 rank-order votes color coded. Red indicates high scores, and blue denotes lower scores. Selected papers (marked by bracket) display significant continuity in garnering very high scores across multiple ballots.

Collectively, the 12-member APSselect editorial board has tremendous expertise in physiology. This includes publishing over 1,000 peer-reviewed manuscripts, including those that prominently feature physiological principles. APSselect voters regularly publish state-of-the-art reviews, position papers, and chapters and textbooks in both introductory and advanced physiology. In addition, APSselect voters have extensive experience as reviewers and have noted credentials as editorial board

members of numerous prestigious journals, including APS journals. Voting members also participate in the teaching of physiology to undergraduates, graduate students, and medical students at leading universities. Taken together, the APSselect board's physiological perspective and vast experience, in hand with a deep commitment to the APS mission, lends confidence to the fair and expert selection of APSselect papers.

Looking Forward

The APSselect experiment is off to a strong start. The substantial increase in traffic, hits, and downloads

is already being demonstrated. All 10 APS research journals are reaping the benefits of this initiative, as evidenced by the increased traffic to their journals. Importantly, the 11,000+ APS members are being well served by the monthly compilation of outstanding original scholarship. This is just a start, and continued resolve to enhance APSselect will be essential. In the years to come, it will be important to continue to track APSselect metrics to evaluate the long-term impact. So far, the increased traffic to APS journals suggests a bright future for APSselect, and, in turn, the discipline of physiology will no doubt reap great benefits. ●

Acknowledgements

We thank all the APS journal editorial teams for their timely nomination of excellent papers each month to APSselect. Hats off to the APSselect editorial board members for their great efforts in the assessment of the submitted papers. Special thanks to all the APS team, especially, Bonnie Bright, Mike Gentry, Mark Goodwin, Christina Bennett, Marty Frank, and Rita Scheman for their tremendous support and considerable efforts on behalf of APSselect.

apsselect.physiology.org

APSselect

Article Collection from the American Physiological Society

About the Website

The editorial team carefully selects the top articles published each month across the 10 APS research journals that highlight, promote, and rapidly disseminate our very best original research. This collection provides:

- Outstanding scientific discoveries published by our Society each month.
- Timely, convenient, and concise "one-stop shopping" mechanism to broadly transmit our exceptional work.
- Access from the APS website (www.the-aps.org).

APSselect is an ideal mechanism to enable a broader mission: to promote excellence of the physiological discipline to biomedical researchers in other fields.

Access the website now to read these top articles while they're still available for free. Remember to check back every month to see the latest top articles at apsselect.physiology.org.

Read more about the APSselect collection at apsselect.physiology.org.

The American Physiological Society (APS) has been a leader in publishing multidisciplinary physiology journals for more than 115 years. Learn more and submit to our journals at www.physiology.org.



View this month's collection of the best articles from the APS research journals

apsselect.physiology.org



Calls for Papers

Physiological Genomics

- Cellular Plasticity
- Gut Microbiota in Health and Disease
- Systems Biology and Polygenic Traits

Journal of Neurophysiology

- Methods to Understand Brain Connections and Neural Function
(Submission deadline: January 1, 2016)
- Neurological Disease and Autonomic Dysfunction
(Submission deadline: January 1, 2016)
- Active Sensing
(Submission deadline: January 1, 2016)
- Auditory System Plasticity
(Submission deadline: July 1, 2016)
- Glial Cells and Neuronal Signaling
(Submission deadline: July 1, 2016)
- Comparative Approaches in Neurobiology
(Submission deadline: July 1, 2016)

Advances in Physiology Education

- Pre-Professional Education in Transition

Journal of Applied Physiology

- Analogs of Microgravity: Space Research Without Leaving the Planet
(Submission deadline: October 1, 2015)

American Journal of Physiology – Cell Physiology

- Cell and Molecular Processes in Cancer Metastasis
(Submission deadline: December 31, 2015)
- Cell Signaling: Proteins, Pathways and Mechanisms
(Submission deadline: December 31, 2015)
- Cellular Responses to Hypoxia
(Submission deadline: December 31, 2015)
- Omics and Epithelial Cell Biology
(Submission deadline: December 31, 2015)
- Stem Cell Biology
(Submission deadline: December 31, 2015)
- STIM and Orai Proteins in Calcium Signaling
(Submission deadline: December 31, 2015)

American Journal of Physiology – Endocrinology and Metabolism

- Stress-Induced Metabolic Regulation
(Submission deadline: December 31, 2015)

American Journal of Physiology – Gastrointestinal and Liver Physiology

- Innovative and Emerging Technologies in GI Physiology and Disease
- Intestinal Stem Cells in GI Physiology and Disease
- Physiology and GI Cancer

American Journal of Physiology – Heart and Circulatory Physiology

- Small Vessels – Big Problems: Novel Insights into Microvascular Mechanisms of Diseases
(Submission deadline: January 15, 2016)
- Mechanisms of Diastolic Dysfunction in Cardiovascular Disease
(Submission deadline: August 1, 2015)
- Arrhythmias, Electrophysiology and Optical Mapping
(Submission deadline: August 1, 2015)

Calls for Papers, *continued*

American Journal of Physiology – Lung Cellular and Molecular Physiology

- Ion Channels and Transporters in Lung Function and Disease
- Age-Related Dysfunction in Lung Barrier Function in Health and Disease
- Real-Time Visualization of Lung Function: from Micro to Macro

- Bioengineering the Lung: Molecules, Materials, Matrix, Morphology, and Mechanics
- Biomarkers in Lung Diseases: from Pathogenesis to Prediction to New Therapies
- Sex Differences in the Respiratory System
- Translational Research in Acute Lung Injury and Pulmonary Fibrosis

American Journal of Physiology – Renal Physiology

- Transport Proteins as Regulators of Blood Pressure Homeostasis
(*NEW Submission deadline: December 31, 2015*)

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

APS Comments on Sustaining the Research Enterprise



APS provided comments in response to an NIH request for information (RFI) on strategies

to optimize the impact and sustainability of biomedical research. In early April, NIH asked the community for ideas on how to “maximize the impact of the taxpayers’ investments in biomedical research” by identifying strategies to “maximize the productivity and creativity of the biomedical research workforce it funds” and “ensure funding for a broad and diverse group of investigators studying a wide range of important questions.”

The response was generated in consultation with the members of the Science Policy Committee and the APS Council. It represents the points of greatest consensus. Nevertheless, it is important to note that there was a diversity of opinions on every issue.

To view the APS response in its entirety, go to <http://www.the-aps.org/SustainingRFI>.

Science Policy

APS Suggests Ways for USDA to Reduce Regulatory Burden

On May 14, 2015, APS submitted comments to the USDA providing examples of regulations that could be modified, streamlined, expanded, or repealed to reduce regulatory burden. USDA's request for information (RFI) was part of a government-wide review mandated by the White House in 2012. USDA specified that it wanted ideas for ways the agency could save time and money while still achieving program outcomes mandated under law. The APS issued the following response, which focused on three topics that were identified as overly burdensome to investigators and IACUCs. The response and RFI is available online at <http://www.the-aps.org/USDARegulatoryRFI>.

Alternatives Search Requirement

As currently applied, the alternatives search requirement is an inefficient and burdensome approach to Animal Welfare Act §2143(a)(3)(B). This section mandates that the Principal Investigator "considers alternatives to any procedure likely to produce pain or distress in an experimental animal." The regulatory interpretation of this section should be modified. *Animal Care Policy 12* recommends "a database search as the most effective and efficient method for demonstrating compliance with the requirement to consider alternatives to painful and/or distressful procedures." It further states that researchers should submit the names of the databases searched; the dates of searches; the time periods covered by the searches; and key words and specific strategies used in such searches. This requires significant effort on the part of the investigator while providing little insight into the investigator's actual consideration of alternatives strategies, which are defined by Russell and Burch [Russell WMS, Burch RL. *The Principles of Humane Experimental Technique* (Online). Accessed at http://altweb.jhsph.edu/pubs/books/humane_exp/het-toc] as efforts to reduce, refine, or replace potentially painful procedures.

We recommend that APHIS instead require a brief written narrative justifying the selection of the animal model, including how reduction, refinement, and/or replacement were incorporated into the consideration of animal numbers. Such a narrative gives the review body (IACUC) much more insight into the consideration

of alternatives, satisfies the regulatory objectives of the Animal Welfare Act, and reduces burden for researchers.

Expired Medical Materials

When cited, the presence of expired medical materials should be classified as an IACUC issue. AWA §2143 (a)(3)(A), which addresses adequate veterinary care, authorizes the USDA to issue standards "for animal care, treatment, and practices in experimental procedures to ensure that animal pain and distress are minimized, including adequate veterinary care with the appropriate use of anesthetic, analgesic, tranquilizing drugs, or euthanasia." The specific guidance of *APHIS Policy 3* states that the use of expired medical materials such as drugs, fluids, sutures, anesthetics, sedatives, or analgesics on regulated animals during a survival procedure is considered inadequate veterinarian care. Therefore, facilities "should either dispose of all such materials or segregate them in an appropriately labeled, physically separate location from non-expired medical materials." However, *Policy 3* clarifies that APHIS "has no jurisdiction over facilities using expired medical materials for non-regulated animals or nonregulated activities." Furthermore, such materials are permissible in "acute terminal procedures" as long as their use "does not adversely affect the animal's well-being or compromise the validity of the scientific study."

Treating the mere possession of expired materials as a veterinary care deficiency is inappropriate since they might be intended for a permissible use. Since the IACUC is responsible for compliance, it ought to have policies in place to provide for the appropriate disposal, segregation, or labeling of these materials. If so, then the possession of expired materials will depend on their planned use being identified and is a matter of IACUC oversight rather than veterinary care.

Collecting Animal Numbers

Although numbers of animals are not specifically mentioned in the AWA, AWR §2.36(a)(5-8) specifies their inclusion into annual reports. It further states that annual reports include the common names and numbers

of animals used for experiments, teaching, research, surgery, or tests and how many were classified under each pain category. While it makes sense to report the exact number of animals that are enrolled in studies, it is burdensome to report the exact number of animals being bred, conditioned, or held by the institution that have not yet been assigned to a study. We therefore

recommend that APHIS AC allow institutions to report ranges of animals being held prior to assignment to a study instead of exact numbers. Doing so will fulfill the requirements of documenting “number of animals used” while reducing regulatory burden. ●



APS submits testimony in support of research agencies

Each year as Congress considers funding levels for federal agencies and programs, outside organizations have the opportunity to provide input by submitting testimony for the record. APS submits testimony annually on behalf of the NIH, NSF, and NASA. For each agency, the APS recommends increased funding to support the research enterprise and to begin to reverse the damage done by reductions in federal spending.

The testimony is available on the APS website:

- **NIH:** <http://www.the-aps.org/NIH-FY16>
- **NSF and NASA:** <http://www.the-aps.org/NSF-NASA-FY16>

Congress Introduces Authorizing Legislation for NIH, NSF

This year, two committees in the House of Representatives have drafted separate legislative packages that would establish multi-year authorizations for the NIH and NSF. [All federal agencies, including the National Institutes of Health (NIH) and National Science Foundation (NSF), are subject to Congressional oversight in the form of authorizing legislation.] These bills are still works in progress, so the summaries below reflect where things stood as of mid-May. Both bills are lengthy and cover multiple agencies, so these summaries focus on the provisions most relevant to scientists in the extramural community.

NSF

The America COMPETES Reauthorization Act of 2015 (H.R. 1806) covers NSF, the National Institute of Standards and Technology, the Department of Energy Office of Science and Research programs, STEM Education programs across the federal government, and the Office of Science and Technology Policy. Sponsored by House Science Committee Chair Lamar Smith (R-TX), the legislation sets funding targets for fiscal year (FY) 2016 and 2017 and would make several significant policy changes for the NSF. It should be noted that funding levels included in authorizing bills are recommendations, whereas actual funding levels are set by the Appropriations Committees.

H.R. 1806 would authorize \$7.6 billion for the NSF in FY 2016, an increase of 4% over the agency's FY 2015 funding. However, it does not authorize any increase in FY 2017. The bill also specifies how much funding each of NSF's directorates would receive. This differs from previous authorizing bills that set a budget target for the agency as a whole. While the authorized funding level for the Biological Science Directorate's budget would increase under H.R. 1806, there would be substantial decreases for the Geoscience, Social, Behavioral and Economics, and Education and Human Resources Directorates. Many in the scientific community have expressed concern that directorate-level funding authorizations would curtail NSF's ability to set priorities based on scientific need and may introduce politics into funding decisions.

Chairman Smith has focused heavily on oversight of NSF research in the past few years, including numerous requests for information about how funding decisions are made. This led to concerns in the scientific community about how to maintain the integrity of the peer review system while complying with Congressional oversight. Finally, a compromise was reached after extensive discussions between the Committee and NSF about how the agency should explain its portfolio. H.R. 1806 includes a provision that would require NSF officials to make a determination that each research project serves the national interest and is worthy of federal funding. There is also language stating that these requirements should not be construed as altering NSF's review criteria regarding the intellectual merit or broader impacts of the research.

H.R. 1806 has been approved by the House Science Committee and is expected to go to the House floor in late May. While there is currently no companion bill in the Senate, a joint press release from Chairman Smith and his Senate counterpart, Senator John Thune, Chair of the Commerce, Science and Transportation Committee, signaled their intention of working together this year to complete reauthorization.

NIH

For the past year, the House Energy and Commerce Committee has been working on an authorization bill for the NIH and FDA with the working title the 21st Century Cures Act. (The legislation is still in draft form and has not yet been introduced.) The legislation is expected to set targets for funding levels in FY 2016-2018 and will include numerous policy provisions. As previously noted, the funding levels in authorization bills are only recommendations and are subject to implementation by appropriators.

The 21st Century Cures Act is expected to authorize funding for the NIH at \$31.811 billion in FY 2016 (5% over FY 15); \$33.311 billion in FY 2017 (4.7% over FY 16); and \$34.851 billion in FY 2018 (4.6% over FY 17). In addition, the bill will authorize the creation of an Innovation Fund that would provide an additional \$2 billion per

year for FYs 2016-2020. However, these funds would only become available if the NIH baseline funding remains at or above the FY 2016 appropriated level.

The bill provides a complex allocation formula for the Innovation Fund. For example, not less than \$500 million of the Innovation Fund must go to a new "Accelerating Advancement Program." Under this new program, the NIH Director would partner with institutes and centers to "accomplish important biomedical research objectives." The institutes and centers would also be required to use their own funds to match whatever funding they receive from this program. The remaining money in the Innovation Fund is to be distributed according to percentages rather than specified dollar amounts:

- Research in which "a principal investigator has shown promise in biomedical research; and funding is not tied to a specific project or specific objectives" (Not less than 35%)
- High-risk, high-reward research (not less than 20%)
- Intramural research (not more than 10%)

In addition to the areas of focus listed above, the bill notes that the Innovation Fund may be used to support innovative biomedical research in which specific projects are funded, research carried out by early stage investigators, and research carried out by small businesses.

The 21st Century Cures Act would also implement these policy changes:

- Require NIH to prepare an agency-wide, scientifically based strategic plan every 5 years that includes "strategic focus areas." These strategic focus areas should be "identified in a manner that considers the return on investment to the United States public through the investments of the National Institutes of Health in biomedical research and contributes to the expanding knowledge to improve the United States public's health through biomedical research." The research strategic plan should "ensure that basic research remains a priority."

- Increase accountability by:

- 1) Limiting the term of service for institute and center (IC) directors to 5 years, subject to reappointment.
- 2) Requiring IC directors to "review and approve" all research grants prior to award funding, taking into consideration "the mission of the national research institute or national center and the scientific priorities identified in the strategic plan" and "whether other agencies are funding programs or projects to accomplish the same goal."
- 3) Commissioning an Institute of Medicine study on "the extent to which biomedical research conducted and supported by Federal agencies is duplicative."

- Establish a working group to examine administrative burden associated with federally funded research.
- Require the NIH director to submit to Congress a report on NIH efforts to "attract, retain and develop emerging scientists."
- Establish a "Capstone Award" for outstanding NIH-funded scientists to "facilitate the successful transition or conclusion of research programs." Individuals who receive a Capstone Award would not be eligible for principle investigator status on subsequent awards from the NIH.
- Give the NIH director the authority to require NIH grant recipients to share scientific data generated by research funded by the NIH. Excluded from this provision are identifiable human subject information, trade secrets, and privileged financial information.

The House Energy and Commerce Committee expects to complete work on the legislation in late May. As of yet, no companion bill has been introduced in the Senate. ●

Mentoring Forum

The W's of Networking in Physiology

Keisa W. Mathis

Department of Integrative Physiology, UNT Health Science Center, Fort Worth, TX



Keisa W. Mathis

Who Should Network?

In answer to the question, "Who should network?"—everyone should network! We should all understand the value of networking and how to do it effectively. I began to learn about networking in physiology when I attended my very first Experimental Biology meeting in San Diego in 2005. I vividly remember my graduate mentor,

Patricia Molina, introducing me to her past professors, classmates, and colleagues. I even met a few "superstars" of physiology who wrote my textbooks and others whose papers I read during my coursework. At that meeting, I attended APS Minority Travel Fellowship activities, like the opening reception and networking breakfast, where I met several APS members and staff, and had the chance to interact with many other trainees. At the time, I had no idea how important these "connections" and relationships would be for helping to shape my future in physiology. We've all heard the saying "it's not what you know but who you know," but it wasn't until my career progressed that I realized the truth in this statement. As I continued on in my training as a postdoc, my mentor, Michael Ryan, encouraged me to reach out to leaders in the field and stressed the importance of building relationships with my scientific peers (i.e., other trainees at my level) and being well connected. I also acquired important networking strategies along the way from others whom I consider mentors, like Barbara Alexander and Marsha Matyas. I hope that you enjoy reading this essay and that you are able to gain at least a little from my experiences in networking in our discipline.

What Is Networking?

One must fully understand what a network is and the importance of forming mutually beneficial relationships to be successful at networking. A *network* is an informal support group composed of interrelated individuals who exchange information and experience. A network

is most valuable when one is able to share information about oneself and in return gain important insight into his or her career or research from someone who is more experienced. *Networking* is putting this into action and building that important interconnected group of individuals who can help mold your career.

When Should You Start Networking?

No matter what stage or age, you should network. An undergraduate student could benefit from networking by learning about different programs and fellowship/scholarship opportunities and by establishing relationships with senior scientists early on. A graduate student and/or postdoc could benefit from networking for the same reasons. A strategy at these training stages is to target people who may be members of the study sections to which you or your boss submit grants and members of editorial boards and other important committees to make them aware of you, your research, and your career goals. This is also an important strategy for those who have already earned a faculty position, industry job, or other career in physiology. In addition, once you have reached your job goal and have established your career, you should continue to network to stay abreast of new research, services, and/or technologies and to interact with emerging young researchers and other professionals.

I began to value networking during my time as a postdoc. I wouldn't consider myself a networking expert, and I admit that I still struggle at times with having the courage to approach a senior scientist to discuss my work or his/her research. However, I know how important it is for me to approach leaders in the field to discuss research and exchange ideas. As scientists, many of us are introverts, quirky, and sometimes socially awkward, but if you try to overcome your fears and make a move, conversation will come. If you don't think you are very good at networking, don't worry, you will become a natural with practice.

Where Do You Network?

The best place to network by far is a scientific meeting. No matter large (e.g., Experimental Biology, American Heart Association Scientific Sessions) or small (e.g.,

FASEB Science Research Conferences, APS-sponsored science conferences), there will likely be someone at the conference with similar interests as you, someone at your career stage, or a leader/expert in your field whom you can connect with to exchange ideas and discuss your research and/or career path. There are strategies on increasing your networking at large meetings. One could participate in small interests groups within large meetings (e.g., attend APS section-related events such as your Section luncheon or dinner at Experimental Biology), attend workshops during the meeting (e.g., FASEB- or APS-sponsored workshops during Experimental Biology), and/or attend other small social events during the conference (e.g., the Physiologists in Industry Mixer at Experimental Biology and university alumni events specific to your institution). Another strategy at both large and small conferences is to aim for oral presentations. If you are selected for an oral presentation, you will have the opportunity to have more people see your face, hear your name, and learn about your research than just those who would stop by your poster. Smaller conferences may involve group meals and planned social events, and provide an overall more casual atmosphere that fosters time for networking and interacting with others. If you attend such a meeting, take advantage! Don't just hang out with your friends. Participate in any offered social events and mingle during poster sessions, especially when you are not a presenter. Grab a friend if needed and join a table at dinner that includes individuals with whom you would like to interact.

There are many other occasions to network in physiology. Trainees can attend professional development workshops, such as those offered by FASEB, the APS (i.e., Professional Skills Courses), and other professional societies, which are great opportunities to network with leaders and peers. We can all volunteer and participate on committees within professional societies (e.g., APS committees or Section steering committees). It is also important to attend functions at your institution (e.g., seminars, journal clubs, and social events) because connections can be made there as well. Some departments organize opportunities for visiting scholars to meet with trainees and faculty. If this is not an option at your institution, suggest a trainee round table event or request time to meet with the speaker during his/her visit during the coffee break or lunch. Also consider reaching out to researchers in institutions near you to build your local network. I recently took advantage of this and networked

with visiting scientists from a nearby institution, which led to an invitation to give a talk, and I was connected to an important contact that may serve as a mentor and collaborator in the future.

Why Is Networking So Critical?

To reiterate all that I've mentioned so far, networking is crucial to connect with potential collaborators, to aid in recruitment for a postdoctoral or faculty positions, and to establish scientific ties with your peers and other scientists. It is also important to help you identify and connect with other scientists who can serve as referents for your scientific career and assist with nominations for awards, recommendations for committee service, placement in postdoctoral and faculty positions, or professional advancement in the promotion and tenure process. Finally, networking can aid you in your selection for the peer-review process for journal articles and grants.

How Do You Network?

When preparing to attend a conference, always plan for networking opportunities. Make a list of questions that you can use and re-use to help get the conversation started. In addition, prepare and practice your "elevator talk," which is your 2-3 minutes to impress. In the elevator talk, state your name, position, and current location, then give a brief summary of your research interests and the significance. Conclude with a short statement of your latest and/or most interesting finding. Don't include too many in-depth details but provide enough information so that they have a good idea of the big picture. This elevator talk can be used whenever you approach someone in hopes to broaden your network.

When you attend conferences, set specific goals to help you stay on track with networking. Set a goal to reconnect with people whom you have met previously and make a point to let them know your progress. If you are a trainee, ask your mentor to introduce you to important collaborators and colleagues in similar fields. In addition, ask your friends in other laboratories at other institutions to introduce you to their mentors and reciprocate. Trainees should remember that all senior scientists were also trainees at some point. Most senior scientists are just as eager to meet you as you are to meet them. They may be looking for a postdoc or shopping for potential faculty candidates at their own institution, or they could be interested in future collaborations. Don't be afraid to ask if you can contact them later if you have a specific

question about their research or if you are interested in pursuing a potential collaboration. If you are searching for a postdoctoral position, set a goal to introduce yourself and discuss your research with individual principal investigators whose research is of interest to you and heads of training grants in departments where you would like to train. If you are searching for a faculty position, set a goal to introduce yourself and discuss your research ideas with department chairpersons. These interactions may lead to interviews and potential advancements in your career that otherwise might be missed. The “hidden” job market is “who” you know. Finally, if you are a faculty member, discuss research ideas with scientific administrators, editors, and senior scientists on study sections.

Always have a “business card” handy with your current contact information, including phone and e-mail. Cost is minimal, and they are easy to exchange if someone requests your contact information. When you receive business cards, make a note on the card so that you will remember why this person is an important piece to your network. Don’t force relationships; give yourself time to develop and maintain your network. While every contact won’t be beneficial to you, you will never know unless you make the first steps to reach out to that person.

Networking via social media is a growing trend. Social networking sites like LinkedIn, ResearchGate, Facebook, and Twitter are all appropriate options to find others with similar interests and “connect.” You should closely monitor everything from the picture you choose for your profile on these social media sites, to the posts that you create and/or share. Don’t let your “social” sites negatively impact your professional career. I am not a social media guru, but I understand that social media is the outlet for reaching the public and networking in this generation. However, social networking is not a substitute for face-to-face interactions. Whenever you have the opportunity, seek out those you want to connect with and reach out to them in person.

Networking is about meeting people at all levels. Your fellow trainees one day will be your peers who are serving on scientific study sections and as reviewers and editors for scientific journals. Treat everyone as you would like to be treated and never doubt that everyone you meet may one day have the opportunity to impact your career in a positive or negative manner. Try not to “burn bridges.” Be prepared to step outside your shell and don’t just “hang with your friends.” Be professional and act like a “colleague.” Always be gracious and say thank you when you have received assistance or help. Be sure to follow-up if someone asks you for additional information. Practice networking whenever you get the chance. Remember, you are the main person responsible for promoting your career. Take advantage of every opportunity. ●

To comment on this article or ask a question of the author, see the-aps.org/forum-networking.

Resources

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Keisa W. Mathis attended graduate school at Louisiana State University Health Sciences Center in New Orleans, LA and completed her postdoctoral training at the University of Mississippi Medical Center in Jackson, MS. She was recently recruited to the Department of Integrative Physiology at University of North Texas Health Science Center in Fort Worth, TX as assistant professor. Her research focuses on neuroimmune mechanisms of hypertension, and she is currently funded by the American Heart Association. She has served on the APS Porter Physiology Development and Minority Affairs Committee and was recently selected to serve on the Neural Control and Autonomic Regulation Steering Committee as Science Policy and Communication Liaison.

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Mayo Clinic, Rochester, MN

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Boulder, CO

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Bhupal P. Bhetwal*
Indiana Univ. Sch. of Med.,
Indianapolis IN

Abigail Winslow Bigham
The Univ. of Michigan, Ann Arbor, MI

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Univ. of Oxford, Oxford, United
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Philadelphia, PA

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Vanderbilt Univ. Med. Ctr.,
Nashville, TN

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Cambridge, MA

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Daisuke Hoshino
The Univ. of Tokyo, Tokyo, Japan

Seong-Woo Jeong
Yonsei Univ. Wonju Coll. of Med.,
Wonju, Republic of Korea

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Univ. of Oklahoma Hlth. Sci. Ctr.,
Oklahoma City, OK

Peter Oketa-Onyut Julu
Imperial Coll. London, London,
United Kingdom

Shin-Ichiro Karaki
Univ. of Shizuoka, Shizuoka, Japan

John R. Keener
Univ. of Minnesota-Duluth,
Duluth, MN

Arash Kheradvar
Univ. of California-Irvine, Irvine, CA

Derek Stephen Kimmerly
Dalhousie Univ., Halifax, Canada

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Univ. of Washington, Seattle, WA

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Saint Louis Univ., Saint Louis, MO

Beata Kosmider
National Jewish Health, Denver, CO

Karsten Kristiansen
Univ. of Copenhagen, Copenhagen,
Denmark

Fong Wilson Lam
Baylor Coll. of Med., Houston, TX

Timmy Lee
Univ. of Alabama at Birmingham,
Birmingham, AL

Sarah Jane Lessard
Joslin Diabetes Ctr., Boston, MA

Sarah Jane Lessard
Joslin Diabetes Ctr., Boston, MA

Pieter Mark Lokman
Univ. of Otago, Dunedin, New Zealand

Steven K. Malin*

Univ. of Virginia, Charlottesville, VA

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Republic of Korea**Graham Ripley McGinnis***Univ. of Alabama at Birmingham,
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McGill Univ., Montreal, Canada

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Cincinnati, OH**Jonathan Patrick Moore**Bangor Univ., Bangor,
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Texas Tech Univ., Lubbock, TX

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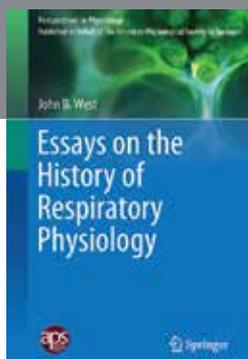
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Book Review

The Handbook of Ion Channels

Jie Zheng and Matthew C. Trudeau (editors)

London: CRC Press, 2015, 691 p., \$179.96 (hardback),

from \$90.00 (eBook)

ISBN: 978-1605353258

The book introduces ion channels by defining basic concepts of conductance, channel selectivity to specific proteins within the membrane, cable theory, and cellular excitability. Opening (gating) of Na and K channels are used as prototypical voltage-sensitive channel proteins. Given the history of the origins of membrane potential (V_m or E_m) and regenerative electrical events, it is reasonable to focus on these two channels with respect to ion conductance systems, membrane gates (i.e., protein subunits), and pores. The Na gene, closely followed by sequencing of the protein channel, was accomplished in the early 1980s and opened a new chapter of membrane biology (chapters 1 and 2). Chapter 3 uses the basic biophysical principles regulating movement of Na and K to begin to expand our understanding of the mechanisms related to voltage sensing by specific regions of multi-domain membrane-spanning proteins.

Chapters 3 and 4 do an excellent job of defining the biophysical, mathematical, and membrane biology of “gating,” i.e., the process of an ion entering a charged pore, allowing movement through the membrane. Chapter 4 defines the principles of the probability of an ion moving through the pore-selective region of a channel protein. Moreover, there is excellent discussion regarding mathematical definitions, the “language” of ion channels, ion movement through pore domains, description of membrane electrophysiology, and the role of physiological mediators in initiating the gating process.

Chapter 5 describes models by which mechanical events occurring within cells may initiate channel gating and subsequent changes in cellular signaling events that manipulate E_m . Given the current and ongoing research on “stretch-operated” ion channel activity in many cell and organ systems. This chapter gives the reader a “taste” of things to come. There could have been more space given to mechanical activation of channel activity, especially with respect to the cardiovascular system. However, chapter 5 is well done and provides insight into this topic.

Chapter 6 describes the fundamental leap in technically allowing measurement of single-channel unitary conductance using tight-seal membrane patches, referred to as the patch-clamp technique, the Nobel Prize-winning methodology providing the fundamental framework of modern kinetic analysis of ion channels pioneered by many contributors but refined by Neher and Sakmann.

Chapter 6 is a major contribution to this handbook and establishes the language and methods related to the study of ion channel kinetics, laying the background for chapters 7-9. These chapters describe development of model systems related to channel gating, thereby allowing prediction of ion channel mutation, involvement in specific disease states, and statistical probabilities allowing prediction of electrical excitability.

Chapter 8 takes the fundamental observations of Hodgkin and Huxley in squid axon, to molecular studies in bacteria and other cell types, electively laying the fundamental concept of combining molecular and electrophysiological techniques to define ionic mechanisms of disease. The role of developmental and molecular changes in channel proteins related to disease is discussed throughout the book. The reader will find it amazing how many pathological and disease processes involve dysfunction of ion channel permeation, gating, and manipulation of membrane potential (V_m or E_m). Prime examples of disease (many genetic) that emanate from ion channel dysfunction include cystic fibrosis, Parkinson's, epilepsy, most cardiac arrhythmias, and many, many others, including metastatic cancers. Thus the reader of this book who is not a biophysicist does not need to understand the wealth of mathematical characterization within each chapter to get a great deal of useful benefit regarding the specific function of the numerous ion channels expressed in organ systems. On the other hand, much can be learned about ion stochastics, gating, permeability, open permeability, statistics and modeling, and much more by reading the math describing separation of ionic charge and its relationship to cellular function.

Chapter 13 discusses molecular mechanisms for changing and or manipulating ion channel function. By using

standard techniques for manipulation of genetic message and/or animal models using knockout or transgenic techniques, channel proteins can be manipulated using standard techniques for mutation of membrane proteins, including base-pair deletion. This is a useful chapter for investigators studying molecular mechanisms of ion channel function. There are fine examples of genetic conservation of channel proteins across species from single-cell organisms to humans. This is among the most interesting and informative contribution to this book. Many of the pathological conditions having ion channel proteins as a specific disease target and/or effect is nicely discussed. The tables in this section are well done and very useful.

Chapter 14 reviews mechanisms of ion channel inhibitors and is useful to investigators who use specific inhibitors to manipulate cellular channel proteins or identify ionic mechanisms of action. *Chapter 15* provides the reader with alternate means (i.e., non-electrode patch-clamp measurement) to identify the role of ion channels to manipulate membrane potential under experimental conditions.

Specific Characterization of Voltage-Gated Ion Channels

Sodium (Na⁺). *Chapter 16* discusses the concept of the voltage dependence of channel-gating tetrodotoxin (TTX)-sensitive Na⁺ channel. The “fast” Na⁺ was among the first ion channel extensively studied. The major reason this channel was so extensively characterized was due to its function in the cells of the CNS and the conservation of its structure and function across “essentially” all animal, both vertebrate and non-vertebrate, species. The voltage gating of this channel continues to be the prototypical voltage-sensitive channel protein with very rapid activation and in-activation kinetics. Similarly, the conservation of mechanisms for both rapid activation and inactivation are conserved between two excitable cells and across species. For example, Hodgkin and Huxley’s m³h formulation of gating kinetics is universal as a quantitative description of Na⁺ current gating kinetics. The classic nature of models used to describe voltage sensitivity emanates from our understanding of specific channel domains, i.e., a voltage-sensing region, pore region, inactivity regions, extracellular domains, and intracellular domains along with specific sites for inhibitor binding. This is the perfect chapter to introduce these mostly universal concepts.

Chapter 17 discusses a channel that introduces several key elements of ion channel biophysics and pharmacology: the large conductance voltage-sensitive and “Ca²⁺”-sensitive K channel or the BK channel. This large channel of 100-300 ps efficiently hyperpolarizes channel membranes due to its large unitary conductance and ability to carry outward current. The authors do a great job in discussing the importance of this channel in physiology and the fact that it is among the largest of the species of ion channels that are sensitive to intracellular Ca²⁺. The concept of the importance of beta and alpha subunits is discussed in detail. The interaction between channel subunits and intracellular second messengers such as IP₃ and molecules such as ryanodine, which manipulate intracellular Ca²⁺ concentrations, is well discussed. Similarly, the role of BK channels in membrane “spark” activity and control of excitability is well discussed. This chapter is an important addition to the handbook due to the channel’s ubiquitous nature and multicellular actions.

Chapter 18 discusses properties of individually rectifying K⁺ channels. The description of channel rectification is well done. The KCNQ family of channels is superbly discussed along with its role in maintaining and, in part, “setting” the membrane potential. The discussion of channel rectification is essential to the understanding of cellular ion channels, but with specific reference to K⁺ channels and inward rectification in the presence of divalent cations that tend to block the open channel pore, thereby allowing K⁺ to exhibit inward current during excitation. Members of the KIR family are sensitive to ligand-induced gating, namely, ATP, proteins, and others that govern the pharmacology of this important K⁺ channel. This chapter is nicely done and provides informative reading; moreover, it leads beautifully into *chapter 19*, which discusses two-pore domain K⁺ channels. These channels first identified as K⁺ leak currents by Hodgkin et al. and Goldman et al., and beginning with the study of yeast through specific cells within the CNS. The K2P channels were elegantly described in neurons and are currently being identified as modulators of channel excitability in numerous cells throughout the body. The involvement of t15 channel species in regulating the membrane potential and, through these changes in membrane potential, the involvement in a variety of disease states are elegantly described in this chapter.

As in the other chapters of this handbook, discussion on what is now known as KCNQ family of voltage-sensitive K channels begins with the history related to function and genetic translation. This family of channels is responsible for the non-inactivating slow “M” current in peripheral neurons. These are classic channels with specific membrane-spanning domains with classic voltage, pore, activation, and inactivation domains. The classic long QT syndrome in the heart can be localized to a KO channel named for its function, i.e., KV IQTS (long QT syndrome). The many functional variations of this channel identified from *C. elegans* to human cells primarily in the CNS all display the common characteristics of slowly inactivating M-type currents. This chapter is captivating to read. This channel is among the first channel families to be identified as being modulated by membrane lipids, namely, PIP₂, i.e., PLC, IP₃, PKA, DAG, and PKC. The KCNQ channel also has a G-protein regulatory unit. The authors did a very nice job with respect to the many channel species and subtypes within this voltage-sensitive K⁺ channel family. Especially compelling is the discussion around the pathologies associated with channel dysfunction, genetic variants responsible in part for CNS disturbance such as epilepsy. Similarly, many cardiac arrhythmias are mediated by variants of M currents mediated by these channels.

Chapters 21-24 describe species of channel proteins that might be described as specific mediator-gated ion channels. These include glutamate (chapter 21), 5-HT₃ receptor-gated ion channels, GABA_A receptor-mediated channels, and cyclic nucleotide-gated ion channels. The gating kinetics of these channels each have unique properties and are, for the most part, related to cells within the CNS. These chapters discuss in adequate detail the interaction of a wide variety of signaling modulates, neurotransmitters, and receptor subtypes that exert actions by interfacing with channel subunits to exert physiological actions. Numerous examples of “cross-talk” between receptor agonists and antagonists to elicit changes in ion channel activity and manipulation of membrane potential are given, making these chapters useful to these physiologists, pharmacologists, and biophysicists needing to understand the complex interactions between signaling molecules, ion channels, and cellular function.

Chapters 25 and 26 discuss protein-activated ionotropic molecules emanating from epithelial channels known

collectively as ENaC/DEG families with diverse actions and activated by protons. (Hydrogen ions are also referred to as acid-sensing channels.) These channels are most robustly found in neurons and were reported in a variety of other tissues; the basic properties and role of protons in addition to these small conductance channels is discussed in a manner that is somewhat confusing. The conductance and function of Degenerin (ENaC) channels are summarized in chapter 26, which goes into specific detail regarding the epithelial origins of this channel family-related to Na⁺ currents, originally described in invertebrates. The phylogenetic profile of this incompletely understood but potentially important channel is detailed in chapter 26.

Transient receptor potential channels (TRP) are currently receiving intense study. Chapter 27 does an excellent job in defining the origins of the Conical, C Channel family, of which 28 members have been identified. This family of channels is found in nearly all tissues in which it has been looked for. TRP channels of the C family are activated by mediators downstream of P₁P₂ and PLC. These channels allow permeation of divalent cations and are modified/regulate by downstream fatty acids like arachidonic acid mediators such as 20-HETE. Other members of the TRP family of ion channels include TRP-M, TRP-ML, and TRP-V. All TRP channels can regulate the influx of Ca²⁺ and heavy metals, and function as transporters with H⁺, a topic not given enough space to be discussed in this handbook. The authors of the chapters discussing TRP channels were given little space. This is probably due to the ongoing study of this diverse and little understood species of ion channels. However, the volumes of TRP channel function give important insight into the potential importance of these channel.

Chloride (Cl) channels and transporters are discussed in chapters 31 and 32. Little space was given to the study of Cl channels. However, there is good discussion of gating mechanisms of Cl⁻ channels. Good description of Cl⁻/H⁺ anti-porters are presented, as is activation of Cl⁻ currents. CLC currents are involved in numerous physiological and pathophysiological cellular functions. Activation of fast CLC gating is important in regulation of the G phase of cancer cells. The mechanisms of Cl⁻ channel inhibitors such as DID₁ is discussed in detail, making chapter 31 an important chapter to electrophysiologists and pharmacologists.

Concluding Remarks and Summary

The remaining chapters in this handbook are dedicated to the discussion of physiological functions of ion channels, including the role of second messengers included in gating of voltage-sensitive channel proteins. Each of the chapters of this handbook describe in detail the molecular structure of channel proteins, and how alternative splicing and alternative molecular modulation of channel proteins have important actions on gating mechanisms. The last section of this book discusses the role of ion channels in specific disease states. The handbook is set up such that the reader will get a firm understanding of gating mechanisms, specific ion channel subunits, and the functional significance of specific channel activation and pharmacological inhibition. In this manner, the reader is better able to understand the pathophysiological actions of altered channel activity on specific cellular functions and the role altered gating mechanisms and conductance alter normal cell function. Furthermore, the discussion of the role of channel manipulation on reversing disease processes can be understood by having these chapters at the end of the handbook. This handbook cannot discuss ionic processes in tissues due to the sheer number of channels and channel mutations. The majority of discussion regarding the physiological significance is in reference to the CNS and heart. However, this book provides an excellent reference source to those wanting

to understand, or better understand, basic mechanisms and the diversity of ion channels with respect to cellular function. ●

David R. Harder
Medical College of Wisconsin,
Clement J. Zablocki VA Medical Center

Books Received

Diving Seals and Meditating Yogis: Strategic Metabolic Retreats

By Robert Elsner

Chicago, IL: The University of Chicago Press,
2015, 192 p., \$32.50 (Hardback)
ISBN: 9780226246710

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Letters to the Editor

Response to "Bias is Stagnating Physiology"

Robert Naeije

To the Editor: In the March issue of *The Physiologist* (vol. 58, p. 63), Keith Baar contends that sex or race biases might be prominent reasons for the fall from grace of physiology. This is surprising. Is there evidence that physiology is more biased than any other biomedical discipline? Baar evokes the shooting of Michael Brown, a shocking event indeed. He tells the story of the unjustified identity control of his friend and colleague Dr. Ojuka, a "tall, ebony skinned, former triple jump champion from Uganda." We sympathize. He evokes the moral stature of Malcolm X. We might be less sure about that. He then muses about the bigger brains of our hunter-gatherer ancestors. But this is frankly unstable

ground! Anthropometry with in particular brain size measurements and intellectual correlates has been at the origin of a lot of discrimination since it took off in the early 19th century. Let us be serious. In my lifetime career devoted to research and teaching in physiology, I have seen around me scientific excellence and humanistic endeavor rather than the practice of biases. In my opinion, the decline of physiology is mainly explained by a failure to convincingly redefine its scope and purpose. An evidence-based analysis and clear thinking should be preferred to media-inspired emotions for the defense of a discipline that remains essential to medical education and translational research. ●

Impact Factors

Arnold M. Katz

To the Editor: I agree fully with your article about impact factor in the May 2015 issue of *The Physiologist* (2). Although I am more familiar with the Citation Index for individual papers, I believe that both suffer from the same limitations, which are not trivial.

In the case of the Citation Index, I suspect that it may still be true that methods papers get the most attention and that the record many years ago – when I last looked this up – was for Oliver H. Lowry's method for determining protein concentration (4). My own experience was as first author on a "citation classic" that describes a peptide mapping method (3). This paper, which was cited 619 times between 1961 and 1975 (1), added little new information and the method is now obsolete. On the other hand, my two real discoveries – that tropomyosin regulates actin-myosin interactions and the role of phospholamban – never made the big marquee.

I suspect that this hullabaloo reflects the need for scholars to measure everything, even though some of

what they purport to be measuring cannot be quantified. Consider the *US News and World Report* evaluations of colleges and the many efforts to use numerical scales to measure the quality of health care. Like JIF and JAF (Journal Impact Factor and Journal Authority Factor), these exemplify efforts that, even though they generate numbers with many significant figures, often fail to provide the information they claim to quantify." ●

References

1. Citation Classics. Current Contents 1977 (No. 45, November 7, 1977). p. 172.
2. Frank M. Impact factors. The bane of our existence. *The Physiologist* 58: 115, 127-128, 2015.
3. Katz AM, Dreyer WJ, Anfinsen CB Jr. Peptide separation by two-dimensional chromatography and electrophoresis. *J Biol Chem* 1959;234:2897-2900.
4. Lowry OH, Rosebrough H NJ, Farr AL, Randall RJ. Protein measurement with the Folin phenol reagent. *J Biol Chem* 193: 265-275, 1951.

Correction to "Association of Chairs of Departments of Physiology 2014 Survey Results"

Information from Table 5 of "Association of Chairs of Departments of Physiology 2014 Survey Results" published in the May 2015 issue of *The Physiologist* (vol. 58, p. 117-121; Table 5 is on p. 121) was missing information. Below is the corrected table with all information. ●

Complete Ranking According to Total Dollars

Rank Total Dollars	Total Dollars	Rank Research Grant Dollars	Research Grant Dollars	Rank Research Dollars/Faculty	Research Dollars/Faculty	Rank Total Research Space	Total Research Space	Rank Research Dollars/sqft	Research Dollars/sqft	No. of Faculty
1	19,256,442	2	11,528,887	1	606,784	5	36,042	5	320	19
2	18,838,317	1	12,134,020	6	404,467	8	34,591	3	351	30
3	12,762,473	3	7,671,551	3	451,268	9	26,926	8	285	17
4	11,264,373	5	6,045,424	7	318,180	4	38,634	24	156	19
5	9,766,870	9	5,110,555	15	232,298	21	18,799	10	272	22
6	9,003,148	16	3,777,581	31	125,919	11	24,166	25	156	30
7	8,840,532	7	5,564,873	17	222,595	12	23,477	14	237	25
8	8,668,507	6	5,904,367	12	256,712	2	44,170	31	134	23
9	8,653,198	8	5,359,033	4	412,233	7	35,407	26	151	13
10	8,541,509	22	3,445,729	16	229,715	37	10,486	4	329	15
11	8,398,050	11	4,767,971	27	158,932	20	18,850	11	253	30
12	8,314,292	12	4,659,481	14	232,974	6	35,919	33	130	20
13	8,232,407	28	2,724,187	33	108,967	17	20,613	32	132	25
14	7,997,375	10	4,902,165	19	213,138	14	21,825	15	225	23
15	7,944,542	23	3,366,952	20	210,435	22	16,975	18	198	16
16	7,611,661	15	4,009,190	30	133,640	32	12,729	6	315	30
17	6,982,510	24	3,334,236	28	158,773	13	22,095	27	151	21
18	6,899,312	14	4,069,538	10	290,681	23	16,401	13	248	14
19	6,818,640	20	3,638,178	29	139,930	28	14,492	12	251	26
20	6,801,283	36	1,363,000	40	45,433	3	38,867	40	35	30
21	6,552,694	17	3,722,784	9	310,232	16	20,873	21	178	12
22	6,067,540	19	3,650,457	23	192,129	15	21,084	23	173	19
23	5,875,120	29	2,600,578	18	216,715	10	25,288	37	103	12
24	5,782,333	32	2,149,822	38	74,132	1	49,427	39	43	29
25	5,650,500	13	4,253,274	11	265,830	26	15,065	9	282	16
26	5,386,662	30	2,583,960	24	172,264	27	14,774	22	175	15
27	5,239,231	26	2,907,142	21	207,653	30	13,500	16	215	14
28	5,089,223	4	6,075,783	2	506,315	24	15,955	2	381	12
29	4,735,243	33	2,043,826	34	107,570	19	19,040	36	107	19
30	4,702,089	25	2,909,924	13	242,494	18	19,848	28	147	12
31	4,535,950	21	3,449,048	8	313,550	36	11,236	7	307	11
32	4,462,650	37	1,351,119	37	75,062	34	12,484	35	108	18
33	4,118,955	38	1,310,810	36	81,926	29	13,535	38	97	16
34	4,090,935	27	2,893,105	22	192,874	25	15,924	20	182	15
35	3,948,242	31	2,216,606	32	116,663	35	12,048	19	184	19
36	3,931,839	18	3,695,839	5	410,649	39	6,000	1	616	9
37	3,863,404	39	1,305,421	39	56,757	38	6,165	17	212	23
38	3,535,766	34	1,862,199	25	169,291	31	12,994	29	143	11
39	3,144,891	35	1,512,312	26	168,035	33	12,500	34	121	9
40	2,124,839	40	741,345	35	82,372	40	5,283	30	140	9
41	1,116,407	41	42,000	41	5,250	41	5,064	41	8	8

Positions Available

Postdoctoral Fellowships: Postdoctoral positions are immediately available in the Harvard Trauma Inflammation Training Program. Areas of research are centered on the cellular and molecular mechanisms of inflammation, immune dysfunction, cell-cell communication, mitochondrial function, and calcium and purinergic signaling in response to trauma, infection, and sepsis. Successful candidates must have a PhD in immunology or other biomedical sciences or an MD or equivalent degree. A strong record of productivity and interest in immunology and cell biology or in trauma surgery and critical care medicine are desirable. Applicants should send a CV, a letter of interest, and the names and contact information for three references to Dr. Wolfgang Junger (via e-mail: wjunger@bidmc.harvard.edu). This position is funded through the NIH and is restricted to applicants who are permanent U.S. residents or U.S. citizens. Women, minorities, and persons with disabilities are encouraged to apply. Salary is based on current NIH payscale. Contact information: Wolfgang G. Junger, PhD, Professor, Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, 330 Brookline Ave., Feldberg Building, Rm. 870, Boston, MA 02215, USA; wjunger@bidmc.harvard.edu.

Postdoctoral Fellowship: Postdoctoral fellow position is available for a highly motivated individual interested in studying the integration of the gut and CNS in regulation of metabolism, with a particular focus on therapeutic targets for obesity and Type 2 diabetes. How this system is regulated via various gut peptides and how it adapts to bariatric surgery is a major focus of this laboratory. We use diverse and cutting edge neuroscience and in vivo techniques to study both glucose and lipid metabolism in complex genetic mouse models and rats. The successful applicant must have experience with handling and phenotyping laboratory animal models. This position is within a multi-PI laboratory that works as a large multi-disciplinary, highly collaborative research group. Basic required qualifications: MD or PhD in physiology, neuroscience, or related biological science discipline. Recent experience and publications in metabolism, neuroscience, or physiology. Excellent communication skills. Contact information: Darleen Sandoval, PhD, Assistant Professor, Department of Surgery, University of Michigan, 2800 Plymouth Rd. Bldg. 26, Rm. 341N, darleens@umich.edu.

Postdoctoral Fellowship: Postdoctoral fellow position is available for a highly motivated individual interested in studying the integration of the gut and CNS in regulation of metabolism, with a particular focus on therapeutic targets for obesity and Type 2 diabetes. How this system is regulated via various gut peptides and how it adapts to bariatric surgery is a major focus of this laboratory. We use diverse and cutting edge neuroscience and in vivo techniques to study both glucose and lipid metabolism in complex genetic mouse models and rats. The successful applicant must have experience with handling and phenotyping laboratory animal models. This position is within a multi-PI laboratory that works as a large multi-disciplinary, highly collaborative research group. Basic required qualifications: MD or PhD in physiology, neuroscience, or related biological science discipline. Recent experience and publications in metabolism, neuroscience, or physiology. Excellent communication skills. Contact information: Darleen Sandoval, PhD, Assistant Professor, Department of Surgery, University of Michigan, 2800 Plymouth Rd. Bldg. 26, Rm. 341N, darleens@umich.edu.

Postdoctoral Fellowship: Postdoctoral fellow position is available for a highly motivated individual interested in studying the integration of the gut and CNS in regulation of metabolism, with a particular focus on therapeutic targets for obesity and Type 2 diabetes. How this system is regulated via various gut peptides and how it adapts to bariatric surgery is a major focus of this laboratory. We use diverse and cutting edge neuroscience and in vivo techniques to study both glucose and lipid metabolism in complex genetic mouse models and rats. The successful applicant must have experience with handling and phenotyping laboratory animal models. This position is within a multi-PI laboratory that works as a large multi-disciplinary, highly collaborative research group. Basic required qualifications: MD or PhD in physiology, neuroscience, or related biological science discipline. Recent experience and publications in metabolism, neuroscience, or physiology. Excellent communication skills. Contact information: Darleen Sandoval, PhD, Assistant Professor, Department of Surgery, University of Michigan, 2800 Plymouth Rd. Bldg. 26, Rm. 341N, darleens@umich.edu.

Postdoctoral Fellowships: Two postdoctoral fellow positions in Computational Neuroscience are available immediately in the laboratory of Dr. Sherif Elbasiouny

at the Departments of Neuroscience, Cell Biology, and Physiology (NCBP) and Biomedical, Industrial and Human Factors Engineering (BIE), Wright State University, Dayton, Ohio. The research work involves the development of computational models of neurons in the spinal cord to investigate the basis of their excitability. Dr. Elbasiouny's lab is currently investigating the ionic mechanisms underlying motoneuron function for neurorehabilitation applications and in neurodegenerative diseases, such as amyotrophic lateral sclerosis. Dr. Elbasiouny's lab is located in Wright State University's state-of-the-art Neuroscience Engineering Collaboration new facility. More information on Dr. Elbasiouny's research can be found at <https://webapp2.wright.edu/web1/newsroom/2015/03/30/best-feeling-possible/>. Required: The successful applicant should have 1) a PhD in computational neuroscience, engineering, physics, computer science, mathematics, or related areas by the start date, and 2) previous research experience in computational neuroscience demonstrated by at least one first-author publication. Preferred: Experience in the development of anatomically detailed computational models and/or using the NEURON simulation environment are highly desirable. The positions are available immediately. The salary package is very competitive and will be proportional to the applicant's experience. Funding for the positions is available for 2 years, with possible extension upon performance. Questions about the positions should be directed to Dr. Sherif Elbasiouny at sherif.elbasiouny@wright.edu. Qualified applicants can apply at <https://jobs.wright.edu/postings/8907> and should submit 1) CV including a list of publications, 2) brief personal statement of research interest and future career goals, and 3) contact information of three references. Wright State University is an Equal Opportunity/Affirmative Action Employer. It is the university's policy to prohibit discrimination and provide equal opportunity to all employees and applicants for employment, without regard to their race, sex (including gender identity/expression), color, religion, ancestry, national origin, age, disability, veteran status, military, or sexual orientation.

Research Scientist: The Liberty Mutual Research Institute for Safety (www.libertymutualgroup.com/researchinstitute), Center for Physical Ergonomics invites applications at the Research Scientist/Senior Research Scientist level. A researcher with a background in applied or occupational physiology is sought to

lead and execute research to address safety issues in home, work, built environment, or automotive settings. Physiological research to better understand the ability to safely perform work across the lifespan and research to better understand the causes and prevention of slips, trips, and falls are areas of interest. To apply, please visit <http://www.careers.libertymutualgroup.com/> and search job ID 60401. Applications should include a cover letter, full CV, and copies of two relevant scientific papers. The cover letter should include a narrative of your research interests and goals. Applicants should have a PhD in applied or occupational physiology or a related background. Experience or background in solving real-world problems is beneficial. Applicants must have a record of multiple publications in high-quality peer-reviewed journals. Experience in planning and accomplishing human subjects research is essential. This is a fully salaried, permanent position with excellent compensation and benefits. The Liberty Mutual Research Institute for Safety recently celebrated 60 years of generating scientific knowledge to help people live safer lives. The Research Institute employs approximately 50 people and engages in multidisciplinary collaborative field and lab research in areas of physical ergonomics, behavioral sciences, epidemiology, and return to work/disability. The Institute staff is well published in the open literature and active in many national and international scientific societies and conferences.

Research Associate: A Research Associate position is available in the Department of Emergency Medicine at the University of Nebraska Medical Center. A PhD or equivalent in Medicine/Physiology or related field is required. The research focuses mainly on the cellular and molecular mechanism responsible for dysfunction of afferent and efferent ganglionic neurons in experimental diabetes and chronic heart failure. The successful applicant will be expected to master electrophysiological techniques (including patch clamp), molecular biological methods, and intricate surgical procedures. Applicant will also be expected to incorporate his/her previous skills and knowledge into the evolution of experimental designs, methodology, data interpretations, and pursuit of scientific goals. Previous experience performing in cardiovascular and neurophysiological experiments is preferred. Applications are accepted at <http://unmc.peopleadmin.com/postings/23811>. Individuals from diverse backgrounds are encouraged to apply.

Associate Lecturer/Lecturer: The Department of Biology at UW-La Crosse invites applications for an academic year, nontenure-track position at the level of associate lecturer or lecturer. The individual will teach laboratories in a cadaver-based human anatomy and physiology course. Dependent on qualifications and experience, individuals may be asked to teach additional classes. A PhD or MS in an area of biology is required (PhD is desirable). Previous teaching experience at the college level is highly desirable. Our dynamic and collegial department supports and values diversity in its faculty, staff, and students. We seek colleagues who will be dedicated teachers and effective mentors for students with diverse backgrounds, preparation, and career goals. Experience with disadvantaged students and/or diverse populations is desirable. Contract begins August 31, 2015. Applicants are required to submit a letter of application, curriculum vitae including teaching experiences, and contact information for three references. Questions may be directed to the Search Committee Chair Ms. Kerrie Hoar at khoar@uwlax.edu. Review of applications will begin May 7, 2015 and continue until the position is filled. *Note: Electronic submission of application materials is required.* For additional information about this position and to apply, please visit <https://employment.uwlax.edu/>. UW-L is an AA/EEO employer. Employment will require a criminal background check.

Visiting Assistant Professor: Alfred University's College of Liberal Arts & Sciences invites applications for a visiting faculty position in biology for the 2015-2016 academic year, with possibility of renewal for up to 2 years. We seek someone with a strong commitment to undergraduate teaching in a liberal arts setting and who values and practices scientific and active teaching pedagogies. Candidates who may bring research interests, which can be expanded to include undergraduates or who focus in STEM/Biology education research, are encouraged to apply. The successful candidate will be able to teach an introductory level Anatomy and Physiology sequence (lecture and lab sequence for allied health majors), participate in teaching our first semester student-centered Biological Foundations course, and teach general chemistry laboratories. Classes at Alfred are small, with significant opportunity to make a positive impact on students' learning. PhD and teaching experience preferred; Master's degree in a biological field required. Review of applications will begin Jun 10 and will continue until the

position is filled. In one pdf format file, please email 1) application letter, 2) curriculum vitae, 3) statements on teaching philosophy and research interests, 4) teaching evaluations (if available), and 5) contact information for three references. Official transcripts will be required for employment. Contact: Search Committee, Division of Biology, Alfred University, One Saxon Drive, Alfred, New York 14802. Electronic submissions and questions may be sent to the search committee chair at biologydept@alfred.edu. More information can be found at www.alfred.edu/hr/. Alfred University actively subscribes to a policy of equal employment opportunity and will not discriminate against any employee, student, or applicant because of race, age, sex, color, sexual orientation, physical or mental disability, religion, ancestry or national origin, marital status, genetic information, or political affiliation. Protected veterans, minorities, and women are encouraged to apply.

Assistant, Associate, or Full Professor: The Department of Nutritional Sciences at the University of Michigan School of Public Health is seeking candidates for an open-rank, tenure-track position at the assistant, associate, or full professor level in Nutritional Sciences in the area of Nutritional Biochemistry. Required qualifications: Candidates should hold a PhD, MD, or equivalent doctoral degree in nutritional sciences, biochemistry, or related public health or medical discipline, and should have research experience in basic, clinical, or translational research in nutrition or closely related sciences. Expertise, credentials, and research potential evidenced by strong publications, professional meetings, and scholarly writing are essential. For junior faculty candidates, completion of a postdoctoral fellowship is recommended. Prior teaching experience and proven ability to communicate and interact effectively in interdisciplinary venues are highly desirable. Responsibilities: The successful candidate will be expected to 1) develop a rigorous, externally funded research program that complements and integrates with active nutrition-related programs and Centers in the Schools of Public Health, Medicine, Kinesiology, and other units on the Michigan campus. Anticipated areas of expertise include but are not limited to nutritional biochemistry, immunology, nutritional epigenetics, nutrigenomics, metabolism, molecular nutritional epidemiology, obesity, and complex interactions of nutrients in chronic diseases. 2) Contribute to teaching interdisciplinary graduate courses in nutrition and

related areas. 3) Mentor pre- and postdoctoral trainees. 4) Participate in service to the Department, School, University, and community. Department/School/University: The Department of Nutritional Sciences is a new department within the School of Public Health (effective 07/01/15) that was previously housed within the Department of Environmental Health Sciences. The new department will build on this foundation and the work of affiliated research centers (Michigan Nutrition and Obesity Research Center, the Michigan Diabetes Research and Training Center, the Michigan Comprehensive Cancer Center, the Environmental Health Sciences Core Center, the Children's Environmental Health and Disease Prevention Center, and the Momentum Center on Childhood Obesity). The University of Michigan is an equal-opportunity, affirmative-action employer. Women and persons of all racial and ethnic backgrounds are strongly urged to apply. To apply, please send (electronically in PDF format) a letter of application, including a statement of current and future academic interests, current curriculum vitae, and contact information for three references to Nancy Polderdyke (nop@umich.edu). Please include "Nutritional Sciences Open-Rank Faculty Search" in the subject line of your e-mail submission.

Open Rank Position: We invite outstanding individuals to apply for a faculty position at any rank in the area of Protein Biophysics and/or Structural Biology. Mid-career scientists with outstanding accomplishments at the level of Associate Professor or full Professor are especially encouraged to apply. We are particularly interested in applicants who are using interdisciplinary approaches to work on basic or translational aspects of human diseases. Visit our website at <http://Biophysics.case.edu>. The Department and School have excellent infrastructure, particularly in X-ray crystallography and solution NMR spectroscopy (see <http://Cmsb.case.edu>). Applicants for a position as Assistant Professor should have a PhD and/or MD degree, 3-5 years postdoctoral experience, and a strong record of scholarly activity. Competitive candidates for Associate Professor should have a strong publication record and an international reputation. Competitive candidates for Professor should have achieved records of leadership in the profession and have a substantial record of scholarly publications. Applicants should submit a cover letter, a full curriculum vitae, including a record of prior/current funding, a brief description of their research, as

well as the contact information for three professional references. Candidates at the Assistant Professor level should also submit a research plan. Please submit application materials with separate file attachments by email to Dr. Walter F. Boron, Chair, Department of Physiology and Biophysics, Case Western Reserve University, BiophysicsSearch@case.edu. In employment, as in education, Case Western Reserve University is committed to Equal Opportunity and Diversity. Women, veterans, members of underrepresented minority groups, and individuals with disabilities are encouraged to apply. Case Western Reserve University provides reasonable accommodations to applicants with disabilities. Applicants requiring a reasonable accommodation for any part of the application and hiring process should contact the Office of Inclusion, Diversity and Equal Opportunity at 216-368-8877 to request a reasonable accommodation. Determinations as to granting reasonable accommodations for any applicant will be made on a case-by-case basis.

Chair: Applications and nominations are invited for the Chair of the Department of Neuroscience, Cell Biology and Physiology at Wright State University. The successful candidate will have the opportunity to lead and expand a department that is fundamental to the research and educational missions of the College of Science and Mathematics and the Boonshoft School of Medicine. Applicants should have a PhD, MD, or equivalent, qualify for a tenured appointment as Associate or Full Professor, be a nationally recognized scientific leader in an area that complements departmental strengths, and have a substantial record of research funding. We seek a candidate with excellent interpersonal, communication, and administrative skills, and a strong commitment to faculty mentoring. The department houses a state-of-the-art imaging core and, in part, occupies the newly constructed Neuroscience and Engineering Collaboration Building. Opportunities exist for collaboration across the university, including with a Cell Signaling Cluster, a Computational Cluster, and faculty in basic science departments such as Psychology, Biological Sciences, Biochemistry and Molecular Biology, and Pharmacology and Toxicology, as well as with faculty in the College of Engineering and Computer Science. In addition, the department has strong ties to the Department of Neurology and to partner clinical institutions including the largest health system in Dayton, Premier Health, as well as Dayton Children's Hospital. The department

houses two masters programs, one in Anatomy and the other in Physiology & Neuroscience, and participates in an interdisciplinary PhD program in Biomedical Sciences. A competitive start-up package, resources to hire new faculty, and laboratory space will be provided. Departmental faculty are appointed in both the School and the College, and tenure-line faculty are members of a collective bargaining unit represented by AAUP. Please submit a letter of application, curriculum vitae, the names and contact information for five references, and a one-page summary of research interests. Applications must be submitted at <http://jobs.wright.edu/postings/8982>. Review of applications will begin June 30, 2015 and will continue until the position is filled.

For questions or to submit nominations, please contact David Goldstein, PhD, david.goldstein@wright.edu, or Timothy Broderick, MD, timothy.broderick@wright.edu, Co-Chairs of the Search Committee. Please visit <http://med.wright.edu/ncbp> to learn more about the department and <http://wright.edu> for information regarding Wright State University and the Dayton area. Wright State University is an NSF ADVANCE institution (<http://wright.edu/leader>). Wright State University, an equal-opportunity/affirmative-action employer, is committed to an inclusive environment, and strongly encourages applications from minorities, females, veterans, and individuals with disabilities. ●

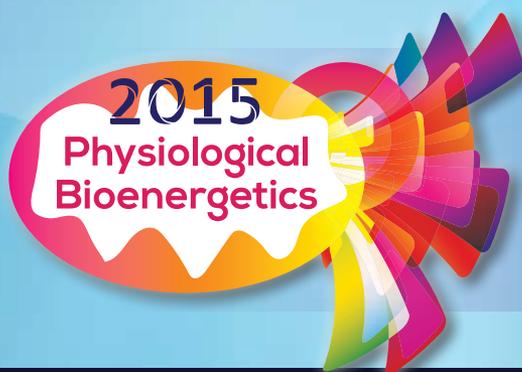
Registration Deadline Approaching for Two of the Conferences

ET 14
SAVANNAH



**14th International Conference on Endothelin:
Physiology, Pathophysiology and Therapeutics**
September 2-5, 2015 • Savannah, Georgia

Advance Registration: August 3, 2015
Housing: August 3, 2015



**Physiological Bioenergetics:
From Bench to Bedside**
September 9-12, 2015 • Tampa, Florida

Advance Registration: August 3, 2015
Housing: August 15, 2015

the-aps.org/conferences

Meetings & Congresses

2015

July 6-8

Physiology 2015, Cardiff, Wales, UK. *Information:* e-mail: events@physoc.org; internet: <http://www.physiology2015.org>

July 10-12

National Directors of Graduate Studies in Pharmacology and Physiology, Cincinnati, OH. *Information:* e-mail: montromh@ucmail.uc.edu; internet: <http://www.the-aps.org/ndogs2015>

July 13-23

IV International Course on Comparative Physiology of Respiration, Sao Paulo, Brazil. *Information:* Luciane Gargaglioni, PhD, e-mail: lucihel@fcav.unesp.br

August 3-7

14th International Congress on Amino Acids, Peptides and Proteins, Sao Paulo, Brazil. *Information:* Professor Gert Lubec, c/o Medical University of Vienna, Wahringer Gurtel 18, A-1090 Vienna, Austria; e-mail: icapp@meduniwien.ac.at; internet: <http://www.meduniwien.ac.at/icaap>

August 23-28

The 9th International Congress of Comparative Physiology and Biochemistry: From Molecules to Macrophysiology, Kraków, Poland. *Information:* internet: <http://www.iccpb2015.confer.uj.edu.pl/>

August 29-September 1

The 11th World Congress on Neurohypophysial Hormones (WCNH2015), Queenstown, New Zealand. *Information:* Colin Brown, e-mail: colin.brown@otago.ac.nz; internet: <http://wcnh.otago.ac.nz/>

September 2-5

APS Conference: 14th International Conference on Endothelin: Physiology, Pathophysiology and Therapeutics, Savannah, GA. *Information:* internet: <http://www.endothelins.com/Conferences/ET-14/#Endothelin14>

September 4-6

International Liver Cancer Association (ILCA) 9th Annual Conference, Paris, France. *Information:* internet: <http://www.ilca2015.org/>

September 9-12

APS Conference: Physiological Bioenergetics: From Bench to Bedside, Tampa, Florida. #*Bioenergetics15*

September 11-12

5th Annual Meeting of North American Artery (NAA) Society - Hemodynamics & Target Organ Damage: Mechanisms, Measurements, Management, Chicago, IL. *Information:* North American Artery, c/o Hansen Global Event Management, 68 Carlton Terrace, Stewart Manor, NY 11530; e-mail: info@naartery.org; internet: <http://naartery.org/NAA2015>

September 14-17

Endothelium-Dependent Hyperpolarizations in Health and Disease, Nyborg, Denmark. *Information:* internet: http://www.sdu.dk/en/Om_SDU/Institutter_centre/IMM_Molekylaer_Medicin/Forskning/Forskningsenheder/Kardiovaskulaer/EDH2015

September 28-October 1

Safety Pharmacology Society 15th Annual Meeting, Prague, Czech Republic. *Information:* <http://www.safetypharmacology.org/am2015/index.asp>

November 17-20

APS Conference: Cardiovascular, Renal and Metabolic Diseases: Physiology and Gender, Annapolis, Maryland. #*SexGender15*

2016

January 13-16

Genomics of Neurodegenerative Disorders, Cairo, Egypt. *Information:* internet: <http://www.goldenhelix.org/index.php/education/golden-helix-conferences/symposia/upcoming-symposium/222-2016-golden-helix-symposium-cairo-egypt#welcome>

April 2-6

2016 Experimental Biology, San Diego, CA.

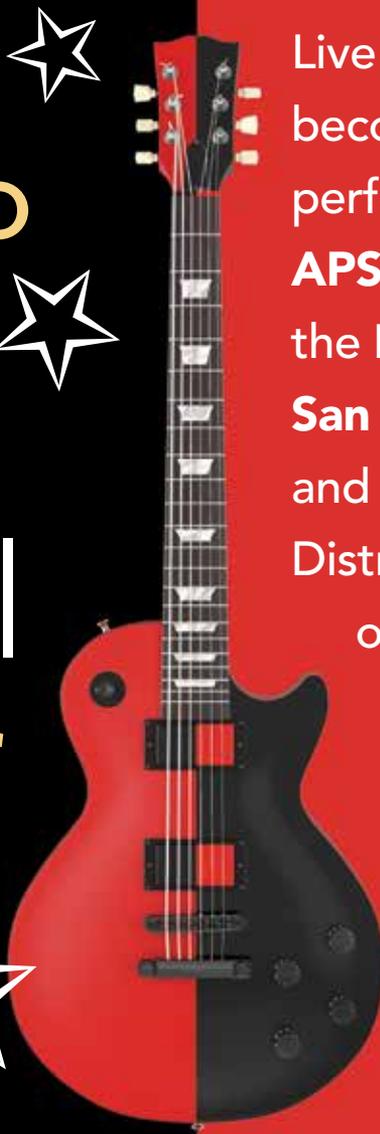
July 21-25

12th International Congress of Cell Biology, Prague, Czech Republic. *Information:* internet: <http://www.cscb.cz/>

July 29-31

APS/TPS Joint Meeting: Physiology 2016, Dublin, Ireland. # *Physiology2016*

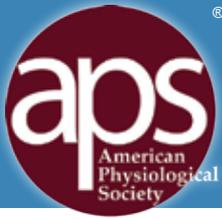
Do You
Want to
Be a
Rock
& Roll
Star



Live your dream,
become one of the bands
performing at the
APS Closing Party during
the **EB 2016 Meeting** in
San Diego. Cormac Taylor
and the members of GI
Distress are willing to take
on all challengers in a
"Battle of the Bands."

Are you up for the
challenge?

If so, contact
mfrank@the-aps.org.



Meetings and Conferences

APS Conference: 14th International Conference on Endothelin: Physiology, Pathophysiology and Therapeutics

September 2-5, 2015 • Savannah, Georgia

APS Conference: Physiological Bioenergetics: From Bench to Bedside

September 9-12, 2015 • Tampa, Florida

APS Conference: Cardiovascular, Renal and Metabolic Diseases: Physiology and Gender

November 17-20, 2015 • Annapolis, Maryland

Experimental Biology 2016

April 2-6, 2016 • San Diego, California

APS Workshop: Institute on Teaching and Learning

June 2016 • Wisconsin

Physiology 2016

July 29-31, 2016 • Dublin, Ireland

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 e-mail to: meetings@the-aps.org for questions on APS Conferences.