The Career Opportunities in Physiology Committee serves as a resource for current information regarding career options in physiology, professional development at diverse levels, and fostering career interest in physiology.

**Career Development at Experimental Biology**

In 2016, committee members Christine Schnackenberg and Clintoria Richards-Williams chaired the session entitled, "Leadership and Management Skills: What You Might Not See in Your CV." The purpose of the symposium was to explore, identify, and apply inherent and learned leadership/management skills. Experts in leadership and management from various backgrounds spoke for about 25 minutes each, and then participated in a short panel discussion. The workshop drew a good-sized group of about 200 attendees. Recording of these talks, as well as additional materials, are being prepared for posting on the APS website.

For 2017, APS members can look forward to “The Many Facets of a ‘Teaching' Career.” This session is being organized by Committee members Clintoria Richards-Williams and Josef Brandauer.

**Career Presentations at APS Conferences**

Since 2006, the Committee has worked with the organizers of APS conferences to include career development sessions and/or activities at those meetings. These have included both informal sessions at the APS table/booth and formal sessions with a room assignment. The Education Office budget supports a workshop at one APS conference per year. APS member Jennifer Sasser and committee past-member Erica Wehrwein chaired a career development session at the “Renal and Metabolic Diseases: Physiology and Gender” conference held in Annapolis, Maryland, November 17-20, 2015.

The committee has also encouraged APS chapters to include career development sessions in their annual meetings. Past-member Erica Wehrwein moderated a career panel at the 3rd Annual Meeting of the Michigan Physiological Society, held May 12-13, 2016, in Detroit, Michigan.

**Undergraduate Summer Research Fellowship Program**

The APS Undergraduate Summer Research Fellowship (UGSRF) Program was established in 2000 with the goal “to excite and encourage undergraduate students worldwide to pursue a career as a basic research scientist.” It has developed into a flagship APS program that influences hundreds of undergraduates. Students complete surveys at the start and end of their fellowship year, submit abstracts and research reports during their fellowship, and participate in post-fellowship follow-up surveys two and four years after completing the program. Committee members Seth Fairfax and Andrew Roberts are working with staff to optimize the survey instruments for more rigorous tracking of participants and evaluation of the program.

In its current form, the UGSRF Program supports up to 24 full-time undergraduate students annually to work in the laboratories of established investigators. Faculty sponsors/advisors must be active members of the APS in good standing. These Fellowships provide a $4,000 summer stipend to the student (10 weeks support), a $300 grant to the faculty sponsor/advisor,
and a $1,300 travel award/reimbursement for the students to attend and present their data (if appropriate) at Experimental Biology. Financial support for the program is provided by the APS. In addition to their laboratory work, the UGSRFs complete interactive online assignments that explore how to structure a research project/series of experiments and exploring/discussing physiology-related careers.

In the application cycle for 2016, 81 eligible applicants were reviewed by the Committee and the names of 24 suggested awardees were forwarded to Council for approval. Over the 17-year history of the program, the program has received over 1000 applications with an average funding rate of 32%. Evidence that the program is indeed encouraging interest in research is provided by the continued involvement of UGSRF students in APS activities. All 24 2015 UGSRF students attended EB, and 17 submitted a first-author abstract. Thirteen of these submitted applications for the 2016 David S. Bruce research awards. Four received a David S. Bruce Outstanding Undergraduate Abstract Award, and two of these, Allison Giuffre and Samuel Norton, went on to win a David S. Bruce Excellence in Undergraduate Research Award.

**APS Undergraduate Research Excellence Fellowship Program**

The APS Undergraduate Research Excellence Fellowship (UGREF) Program was launched in 2013 with the goal “to encourage undergraduate students worldwide who are already involved in research to continue on that track toward a career as a basic research scientist.” Students with previous research experience are encouraged to apply. As with the UGSRF program, UGREF awardees complete surveys at the start and end of their fellowship year, submit abstracts, research reports and draft manuscripts during their fellowship, and participate in post-fellowship follow-up surveys two years after completing the program.

The UGREF Program annually supports up to 6 full-time 2nd-4th year undergraduate students who have more than 9 months of research experience to continue working in the laboratories of established investigators. Both students and faculty sponsors/advisors must be active members of the APS in good standing. These Fellowships provide a $4,000 summer stipend to the student, a $300 grant to the faculty sponsor/advisor, and a $1,300 travel award/reimbursement for the students to attend and present their data at EB. As with the UGSRFs, funding for the UGREF program is provided by the APS, and awardees are selected by the Committee with subsequent approval by Council.

The UGREFs complete interactive online assignments using an online course management platform, exploring how to structure a research project/series of experiments and exploring/discussing physiology-related careers. The UGREF activities are built on UGSRF activities, developing UGREF’s writing and presentation skills. UGREFs are also required to submit an abstract to EB.

In the application cycle for 2016, 27 applicants were reviewed by the Committee and the names of 6 suggested awardees were forwarded to Council for approval. Over the 4-year history of the program, the program has received over 100 applications with an average funding rate of 20%. Although a relatively new APS initiative, the UGREF program is also achieving its goal of encouraging continued interest in research while maintaining a rigorous review process. Two of the 2016 awardees, Gabriela Wong and Jacob Young, were participants in the 2015 UGREF program. Five former UGREF students attended EB in 2016 and submitted first-author abstracts. Four submitted David S. Bruce research award applications. One, Slavina Goleva, was ineligible for competition because she was a previous winner.
Undergraduate Orientation Session at EB
Since 2008, all undergraduates who submit a first-author abstract to APS are invited to a special Saturday session. It is a joint project of COPC and the Education and Trainee Advisory Committees. The session includes “how-to” presentations on making the most of the EB meeting, making a poster presentation, and introducing oneself. It has served as the formal recognition session for the UGSRFs. Again this year, for the third time, it also served as the formal recognition session for the UGREFs, STRIDE and IOSP Fellows. It serves as an informal recognition for the David Bruce Abstract Awardees, as well as for the Video Contest award winners.

The EB 2016 orientation session was organized by committee members Carrie Quinn and Josef Brandauer and attracted well over 100 undergraduate students. As in the past, undergraduate students who submitted a first-author physiology poster were invited, and announcements were posted in emails to the Trainee and All-APS listservs. Members of the APS Executive Cabinet welcomed the undergraduate students and presented certificates to the UGSRF, UGREF, STRIDE and IOSP Fellows. All three committees were well-represented with multiple members attending to talk with the students during and after the session and assist in distributing materials.

APS Careers Poster
COPC sends a physiology careers poster to each US and Canadian undergraduate biology/life sciences department to encourage students to visit the APS website and attract students to physiology graduate work. The most recent poster has been distributed annually since 2012. A subcommittee from the COPC worked with the APS Marketing Office to create the design. A survey was conducted of the undergraduate departments receiving the poster in 2013. After examining that data, committee member Carrie Quinn reported that career information is being provided primarily by the faculty member or advisor with whom students interact, but some students get information from Internet or career services. In 2016, the poster is being sent as a hard copy to every life science department in the US and Canada. A follow-up email includes a digital file of the poster, and a second follow-up email includes links for the undergraduate summer research fellowship programs.

APS Career Cards
Based on suggestions from teachers, the Committee replaced a career brochure previously distributed by the APS with trading cards describing the work of diverse physiologists (career stage, research area, gender, racial/ethnic group, etc.) that are made available online and to teachers on request. COPC coordinates with the Education Committee so that career cards can be distributed as part of PhUn Week activities. During each calendar year, a different group of scientists are featured in a new set of cards. These career cards provide an opportunity for greater interaction with students. If students go to the website on the card, they can answer a question about the physiologist on the card, unlocking an additional biography card that they can print out. Overall, the cards offer a way to be more interactive with the students who receive them.

Feedback was very positive from both physiologists and teachers about the new trading cards. During PhUn Week 2015, “trading card” sets (3-4 biography cards, a physiology career card, and a Physio-Facts card with fun facts about human/animal physiology) were distributed to every 5th-12th grader taking part in PhUn Week events. Sets were also distributed at the APS booth during the National Association of Biology Teachers Conference, Association of Middle Level Educators Conference, the EB 2016 Teacher-Student Workshop, and in April at the United States of America Science and Engineering Festival. Following these events, there was
a spike in web traffic on the APS careers web site, suggesting that links on the cards were used. As we accumulate a larger number of cards, we will introduce career-planning “games” and “ask a physiologist” into the site. The development of teaching resources that go along with the trading cards will provide a more effective learning tool for teachers and students.

In 2016, there were five additional cards added; Patricia Molina, David Pollock, and three younger APS researchers. Also, 8.5 x 11 mini-posters for use by teachers on bulletin boards were distributed in the fall as resources for teachers participating in PhUn Week events.

Developing Physiology Interest at the Elementary Level
The COPC works closely with the Education Office to develop materials appropriate for young students. In 2015, 21% of the children participating in PhUn Week events were PreK-2nd graders (i.e., “pre-readers”) for whom there were no APS resources available. To provide career info and physiology engagement for early elementary grades (K-2), the committee expanded the current Phizzy Bear activity booklet. Age-appropriate activities were added that align with new K-12 science education standards. The new activity book is a resource for PhUn Week outreach to early elementary students. With the help of the Puerto Rico Physiological Society (an APS chapter), the activity was also translated into Spanish. It is expected that the artwork can be used for future early elementary projects such as interactive web pages or digital interactive stories or activity books.

Career Outreach Resources
The APS Careers Web Site was developed by the COPC and launched in March 2003. It provides extensive resources for two major purposes: 1) to assist students and new and experienced physiologists in the development of their careers; and, 2) to help the general public gain a better understanding of the work that physiologists do. The site includes resources for elementary, middle/high school, undergraduate, graduate/professional, postdoctoral fellows, new investigators, established investigators, and the general public. Within each section, the user finds resource categories customized to their needs. The specific resources (such as biographies, hands-on experiments, career resources, etc.) are written at the appropriate educational level. It also serves as a dissemination site for the macromedia flash (PowerPoint plus audio) versions of EB career-related sessions developed by the COPC and Women in Physiology and Trainee Advisory Committees. It also includes hyperlinks for career development resources associated with each skill listed in the APS-ACDP List of Professional Skills.

In 2011-12, the career website was reconfigured to better fit both the new website content management system and to provide easier access to the growing set of professional development resources APS has developed for trainees. Features include a “Career Development and Mentoring Forum” that provides one-click access to APS resources (webinars, EB symposia, Mentoring Forum articles, etc.). All resources on the site are catalogued in the Life Sciences Teaching Resource Community digital library and pushed to the website as a folder of resources, allowing new materials to easily be added to individual pages. Along similar lines, the Committee has developed APS Career Presentations that consist of downloadable PowerPoint files for use at the middle and high school levels, as well as lower and upper undergraduate levels.

This past year, Committee members Erika Boesen and Norma Ojeda reviewed the content of the Website and Career Presentations, respectively. Both raised concerns that the material is becoming out-of-date and in the case of the website, increasingly plagued by broken links. The
Committee and staff have corrected many of the technical problems with the website, but it is clear that both the Website and the Presentations are in need of significant updates. It is anticipated that a review of the purpose, objectives, and overall concepts for these resources will be a major priority of the Committee over the next year as preparation for redesign and implementation of the overall APS website.

## APS Local and Regional Science Fair Awards

This program encourages APS members to make an APS physiology award at their local or regional science fair at the elementary, middle, or high school level. The program provides opportunities for students from elementary through high school to learn what physiology is and to become “associated with the field” through recognition of their work. The program also builds connections between APS members and their local schools. Finally, it encourages local fairs to promote physiology-based projects to their students, since there are potential awards to be won. Student winners receive an APS t-shirt and a certificate for the best physiology project. The teachers of the winning students receive the APS book, *Women Life Scientists: Past, Present, and Future* and an APS resource packet. Up to 100 awards are available each year on a first-come, first-served basis. Advertisements are posted in *The Physiologist* and the All-APS News email updates for members and sent to all past participants. The judge (or judges) must be an APS member in good standing who is willing to present the award on behalf of the APS to the student with the best physiology project (one winning student per science fair). Standard conflict of interest policies apply. After the science fair, the judge reports the winner’s name and school via an online report form. Winners’ names and pictures are posted on the APS Local and Regional Science Fair website.

In the first half of 2016, 15 APS members requested packets for use as Science Fair Awards and we received 10 follow-up reports. We typically track Science Fair activities on a calendar-year basis (rather than a school year) from Jan. through Dec. to better account for the requests and presentations.

## Physiology Video Contest for Undergraduate and Graduate Students

In 2011, the COPC launched the APS video contest, “*APS Presents…Phantastic Physiology Voyage: “Function Follows Form,”*” designed to engage undergraduate and graduate students by creating engaging accurate, informative and entertaining physiology videos for the general public. These videos must creatively demonstrate and/or explore a specific physiological function in five minutes or less (including credits). The video can be staged as a short play, commercial, news broadcast, talk show, music video, or documentary. The contest rules are based on a review of video contests sponsored by other professional associations and foundations. They include standards for copyright, use of humans or animals, and use of university facilities.

A selection committee consisting of members of the COPC and past APS Summer Research Teachers (invited) evaluates the videos and identifies a first-place video based on specific criteria for approval by Council. The YouTube links to the finalists’ videos are promoted through the APS website and APS Facebook sites. The YouTube viewing statistics are used to name the Viewer’s Choice Award winning video (i.e., the video with the most “hits” on YouTube during the period leading up to EB). The contest makes two awards. A $750 first prize is given to the best video as selected by the Committee and $250 is given for the Viewer’s Choice Award. The best video, selected by the Committee, is shown and announced at the Undergraduate Orientation Session at EB. All of the videos meeting eligibility requirements are shown at the
Undergraduate Poster Session at EB, and the winner of the Viewer’s Choice Award is announced at this session.

In 2016, the Committee received 9 submissions for review. The applicants included both undergraduate and graduate students. The Committee selected and forwarded to Council for approval “Hyperthyroidism: Not as Grave as You Think” by Emilee Friedman and Jennie Wiggins of Augusta University. The video takes advantage of the whiteboard technique popularized by organizations such as the Khan Academy. The video also received the Viewer’s Choice award, which was selected by the general viewing public. Both awardees were able to attend EB and accept their award.

One of the advantages of the video contest is that the videos continue to promote physiology long after the contest has ended. Each video remains on YouTube (unless the video creator deletes it), and it can be accessed with links from other sites. For example, each video is catalogued in the Life Science Teaching Resource Community with an embedded YouTube link.

**Excellence in Professional Student (MD or DO) Research Travel Award**

The APS Excellence in Professional Student (MD or DO) Research Travel Award Program launched in 2013 with the goal “to encourage MD or DO students to attend, present their research, and participate fully in the Experimental Biology (EB) meeting.” The award supports up to 10 MD or DO students who are first authors on abstracts to attend EB, present their research, and attend an orientation session. Faculty sponsors/advisors must be active members of the APS in good standing. Applicants are reviewed by the Committee and suggested awardees are submitted to Council for approval.

In the application cycle for 2016, 17 applicants were reviewed by the Committee and the names of 10 suggested awardees were forwarded to Council for approval. These students were matched with a mentor for EB, similar to what is done for the APS Minority Travel Fellows Program. Fellows and mentors corresponded via email and then met each other at an Orientation Session on Sunday morning. This session was organized by COPC Members Erika Boesen, Rasna Sabharwal, and Norma Ojeda. APS President Patricia Molina, an MD herself, gave a short presentation encouraging the students and emphasizing the importance of continuing to conduct research. As part of the orientation presentation, three clinician scientists at different career stages gave their perspectives on combining research and medicine. Assigned mentors and additional clinician scientists were also present and participated in one-on-one "speed mentoring" of the students during the session.