A Publication by The American Society for Pharmacology and Experimental Therapeutics

THE Pharmacologist

Vol. 62 • Number 2 • June 2020

THE FDA'S CRUSADE for Safe Food & Drugs

INSIDE

ASPET
Transforming Discoveries into Therapies

The Pharmacologist is published and distributed by the American Society for Pharmacology and Experimental Therapeutics.

Contents

The Pharmacologist (ISSN 0031-7004) is published quarterly in March, June, September, and December by the American Society for Pharmacology and Experimental Therapeutics, 1801 Rockville Pike, Suite 210, Rockville, MD 20852-1633. Annual subscription rates: $25.00 for ASPET members; $50.00 for U.S. nonmembers and institutions; $75.00 for nonmembers and institutions outside the U.S. Single copy: $25.00. Periodicals postage paid at Rockville, MD. GST number for Canadian subscribers: BN:13489 2330 RT.

Postmaster: Send address changes to: *The Pharmacologist*, ASPET, 1801 Rockville Pike, Suite 210, Rockville, MD 20852-1633.

Message from The President

Dear Members of ASPET,

I am writing to you during an unprecedented time. With the stay at home orders, the shifting of university classes, corporate and society meetings moving to an online format, and the cancellation of meetings around the world, we are all adjusting to the "new normal." Many of us are learning new skills, such as remote learning, social distancing, and *Zoom* calls.

When I looked at my message from the previous issue of *The Pharmacologist*, which discussed a preview of the upcoming meeting, I realized that the coronavirus pandemic made most of it irrelevant. The cancellation of EB 2020 has been a disappointment for all of us. This is normally a time of celebration, not only for presentation of our scientific advances, but also a time where we can visit with our friends and colleagues, meet new people, provide mentoring for our students and postdocs, and learn.

Let's start with the cancelled EB 2020 conference. So much was already in place in preparation for the annual meeting. Symposia chairs and co-chairs had done much to organize their aspects of the scientific program. Responding to the efforts of those who did so much to make EB 2020 successful, we have invited the EB 2020 chairs to resubmit their symposia to be considered along with the new ones that were submitted for EB 2021. All the symposia proposals will be considered by the Program Committee.

I am also sorry that the winners of our scientific awards were not able to receive their awards in person and were not able to present summaries of their work during the conference. The winners and some of their achievements are highlighted in the previous issue of *The Pharmacologist*.

Cancellation of EB 2020 not only disrupted the symposia and scientific workshops, but also led to postponement of the Society and Division business meetings. Some of these meetings are being converted to Zoom meetings. Overall, the platform is working well.

As we have mentioned previously, we began testing our new online community ASPET*Connect* in 2019 with several groups, including ASPET Council, the Science Policy Committee, the Young Scientists Committee, and the Mentoring and Career Development Committee, to name a few. ASPET staff had been excited about introducing ASPET*Connect* at the 2020 annual meeting, but of course this was delayed. It was launched on May 27, 2020 to the full membership. All 10 divisions now have an active online community. If you have not had a chance to explore your division community yet, I encourage you to visit https://connect.aspet.org to get engaged. As a private, member-only community, you now can connect with friends and colleagues, meet new people, and actively discuss topics that are important to you. To learn more about this exclusive member benefit, turn to page 84.

ASPET staff have done, and continue to do, outstanding work in managing the disruptions resulting from cancellation of EB 2020. They have been busy managing the rescheduling of our meetings, communicating with our membership, and trying to minimize our financial exposure from the cancellation. Their continued efforts during these trying times are very much appreciated. I would particularly like to thank Judy Siuciak and Matt Hilliker for their help in coordinating our COVID-19 response.

As we are all aware, the COVID-19 disruptions have affected finances throughout the world. It is no surprise that ASPET also faces challenges. From the cancellation of our annual meeting to the effect of a volatile investment market on our reserves portfolio, the Society is not immune to the pressures facing many societies. However, although our investment reserves have decreased in value, along with the rest of the market, we work closely with our investment advisors who are actively involved in ensuring the long-term security of our reserves. That being said, I urge you to continue to support ASPET during this difficult time. This can be done by renewing your membership, as this is an important source of our operating revenue, or making a donation to our general fund. In addition, I encourage you to submit your work to the ASPET journals, which are such an important part of ASPET, both to our revenue and the stature of the Society. Please remember ASPET, especially during the coming months.

Although most of our efforts have been directed at our annual meetings and our response to the COVID-19 disruptions, we are continuing to monitor our more long-term goals. Eddie Morgan is serving to serve as chair of our new Partnerships Committee. This committee is charged with establishing and fostering outreach to our global partners as well as supporting our chapters. Another ongoing topic involves Open Access for journals and Plan S. Although we do not currently know how Open Access will affect our journals, we are continuing to monitor its development and will make the necessary adjustments to best position our journals and the Society.

I would like to thank the members of ASPET Council and the division representatives who will be rotating out of their offices. Alan Smrcka has been councilor for the last three years, and we all appreciate his thoughtful approach to the issues that ASPET has faced during this time. Margaret Gnegy is rotating off as past-secretary treasurer. Her efforts are very much appreciated, and the good news is that she will remain on Council as president-elect. Finally, I would like to thank Eddie Morgan who has been a stalwart member of Council in the presidential role and before that as secretary-treasurer. He has proven to be a role model for these offices. Although he will be rotating off Council, he will continue to contribute through the Partnerships Committee as mentioned above.

On a personal note, I value the friendships that I have made and colleagues I have gotten to know during my years as an ASPET member, and am appreciative of your continued support for our society. I regret not being able to connect with you at EB 2020, but I am looking forward to seeing everyone at EB 2021 in Indianapolis. I hope that you are all safe and healthy.

Best regards,

Wayne L. Backes, Ph.D.
ASPET President

Business Meeting

Submitted by Wayne Backes, Jin Zhang, Emily Scott, and Judy Siuciak

Due to concerns over the spread of COVID-19, ASPET was forced to cancel our annual scientific meeting that occurs in conjunction with Experimental Biology. Our program included many exciting symposia, events, and opportunities to network and socialize. From a historical perspective, the last time an ASPET Annual Meeting was cancelled was during World War II (1943-1945).

In addition to cancelling our scientific program, we were also faced with the cancellation of ASPET's annual business meeting and the presentation of our 2020 awards. We know we have a responsibility to you, our members, to report annually on what ASPET has accomplished over the last year. This year the meeting presenters, Dr. Wayne Backes, ASPET President; Dr. Judy Siuciak, ASPET Executive Officer; Dr. Jin Zhang, ASPET Secretary/Treasurer; and Dr. Emily Scott, ASPET Board of Publications Trustees Chair, would like to utilize *The Pharmacologist*, our member magazine, to share the contents of the planned meeting presentations with our membership.

The **2020 ASPET election** closed on February 7, 2020. Congratulations to newly-elected Council members Dr. Margaret E. Gnegy (President-elect), Dr. Carol L. Beck (Secretary/Treasurer-elect), and Dr. Randy A. Hall (Councilor), who will begin their terms on July 1, 2020. This was the first year that graduate student members and affiliate members were eligible to vote, and we had the highest voter turnout (17%) in years.

We always take time during the business meeting to recognize our colleagues celebrating their **25th and 50th year membership anniversaries**. There are 24 members celebrating their 25th anniversary with ASPET and an amazing 41 members who have been part of ASPET for 50 years (see page 119). We are greatly appreciative of their dedication to ASPET.

ASPET would like to acknowledge the passing of our members and colleagues, all of whom have contributed significantly to the field of pharmacology. Our thoughts and prayers are with their families, friends. and colleagues. We hope you had the opportunity to read the tribute articles which have been published in *The Pharmacologist* over the past year. You will also find ASPET member obituaries on our website (https://www.aspet.org/aspet/news/all-news/member-obituaries).

We would like to give a special thanks to all our **individual donors and institutional partners**. It is through their generosity that we can provide quality programs and services to our members. We would also like to commend those in our membership who not only donated but gave their time and effort to the Society by participating on Council, a leadership role in the divisions, and our many committees. The names of our individual donors can be found in the December 2019 issue.

Thank you to our 2020 ASPET Institutional Partners

PLATINUM PARTNER

Molecular and Cellular Pharmacology Training Program
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

GOLD PARTNER

UT Health San Antonio
Physiology & Pharmacology

SILVER PARTNER

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MEDICAL SCHOOL
UNIVERSITY OF MINNESOTA
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College of Pharmacy and Pharmaceutical Sciences
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SUPPORTERS

Stony Brook University

UNIVERSITY OF GEORGIA
College of Pharmacy
Pharmaceutical & Biomedical Sciences

Tax-deductible donations to ASPET support research, travel awards, science advocacy, and career development for scientists. Donating is a great way to demonstrate your commitment and support to the future of ASPET and pharmacology. We appreciate that our members keep ASPET in mind as a home for their charitable donations.

In 2017, ASPET Council announced the development of a **strategic plan** that highlighted the approaches that the Council saw as necessary to keep pharmacology at the cutting edge of biomedical research. The new strategy was designed to enhance the core functions of the Society in a way that is consistent with ASPET's vision and mission. The plan identified six overarching goals and ASPET's leadership, committees and staff have made great strides during the past several years toward implementing some of the identified strategies toward achieving these goals. We have used the business meeting to highlight a few key strategic plan activities each year. This year, we wanted to mention several new initiatives including the ASPET Fellows Program, ASPET*Connect*, the new online member community, and a governance review effort.

The 2020 ASPET Fellows program was recently opened for nominations (including self-nominations) and the Fellows Review Committee is now actively reviewing submissions. The class of 2020 Fellows will be announced in September's issue. You can learn more about this exciting new program at https://www.aspet.org/aspet/about-us/aspet-fellows-(faspet)-program.

Last year, former ASPET President Edward Morgan announced plans for a new **ASPET Fellows (FASPET) Program** aimed at honoring ASPET members who have demonstrated distinction and peer recognition in pharmacology. Fellows are recognized for their efforts to advance pharmacology through their scientific achievements, mentorship, and service to the Society. Dr. Wayne Backes was looking forward to honoring the inaugural recipients of ASPET Fellows status (https://www.aspet.org/aspet/meetings-awards/aspet-awards/aspet-fellows-(faspet)-program/2019-fellows) at this year's meeting.

ASPET*Connect*, ASPET's new online community opened to members on May 27, 2020. Offering a new member benefit, the community is a place for you to network with members, ask questions, and hold discussions. We hope you'll take advantage of making connections on ASPET*Connect*. Learn more about the community on page 84.

As part of the "Strengthening ASPET" goal, the ASPET Council undertook an **independent review of our governance**. This effort hopes to ensure the Society's governance structure, function, policies, and documents are designed to support and promote effective stewardship and model best practices. A number of opportunities to add or adjust governance practices were recommended to strengthen performance and Council is working on enacting these over the course of the year.

One recommendation from the ASPET governance effort was to ensure the Society had a **Code of Conduct** in place. ASPET is committed to providing a safe, welcoming environment for everyone, and creating an environment where the exchange of scientific ideas, open communication, and equal opportunity can occur free of harassment and discrimination. ASPET Council has adopted a Code of Conduct policy which is applicable to all Society activities including programs, meetings, ancillary events, and official and unofficial social gatherings. The policy outlines the process for reporting harassment of any kind and how it will be investigated. You can learn more about the ASPET Code of Conduct here (https://www.aspet.org/conduct)

Dr. Emily Scott became the Chair of the Board of Publications Trustees at the beginning of the year. The Society thanks Dr. Mary Vore for her six years of service as the previous Chair. Dr. Vore served from 2014 through 2019 and steered the Society's publishing program through important advancements and changes. These include the implementation of plagiarism detection software and image forensics, support for NIH guidelines for greater transparency in reporting preclinical research, the adoption of an open access option for ASPET's authors, and—most recently—the adoption of new guidelines for displaying data and reporting data analysis and statistical methods in ASPET's journals.

ASPET is grateful to all those who review for the journals and serve on editorial boards. The success of the journals is thanks to their dedication and hard work. We recognize and thank in particular those who completed the largest number of reviews: Drs. Robert S. Foti and Swati Nagar tied for most reviews for *DMD*, and Drs. Nazareno Paolocci and Wen Xie completed the greatest number of reviews for *JPET* and *Molecular Pharmacology*, respectively. Dr. Xie was the top reviewer for *Molecular Pharmacology* for the second consecutive year.

Molecular Pharmacology launched the **Highlighted Trainee Author program** with its October 2017 issue to spotlight one trainee author in each issue. *JPET* and *DMD* joined the program in October and November 2019, respectively. Undergraduate students, graduate students, and postdoctoral researchers may be nominated for the issue in which their article is published. Fifteen early career researchers were selected to be Highlighted Trainee Authors in 2019: https://www.aspet.org/aspet/journals/journals-information/highlighted-trainee-authors

An important theme throughout all planned presentations of the business meeting was to inform our members of the potential impact of open access on the Society and its members. As Dr. Zhang would have noted, publications revenue accounts for 75% of the Society's revenue. Not only does the revenue generated by our journals ensure the high quality of our publications, but they also provide much needed resources for our member benefits, annual meeting, support for young scientists and advocacy for the discipline of pharmacology. As the publishing landscape moves to open access, the ASPET finances and programs will have to adapt to adjust to this change in revenue. The shift to open access will impact ASPET's ability to carry out our mission and will directly affect our other programs and initiatives.

ASPET has long supported wide access to the content published in its journals. Beginning in April 2005, the manuscript version of all articles published in *DMD*, *JPET*, and *Molecular Pharmacology* has been made freely accessible immediately upon acceptance and remains freely accessible after the formatted version of the article goes online. The Society makes special sections freely accessible for the first 90 days, and the formatted version of all journal content becomes freely accessible after 12 months for a period of 5 years. Since 2015, ASPET's journals have been available for free in developing countries through a program called Research4Life. The Society added an open access option in 2015 and has co-published *Pharmacology Research & Perspectives*, an entirely open access journal, with the British Pharmacological Society and Wiley since 2013.

Dr. Mary Vore spoke last year about Plan S and its efforts to move subscription journals to open access. The Society's journals revenue currently comes from multiple sources, including low subscription rates. Most of that revenue disappears under an open access

model because publishing costs are shifted from readers to authors. Open access publishing fees are not sufficient to support the journals, much less provide 75% of the Society's financial needs. The publishing program will have to adapt to an open access publishing world, but those changes will severely decrease the income that funds most of ASPET's programs. ASPET as a whole will have to adapt to this new environment. Stay tuned to the Society's communications as we grapple with and adjust to these changes.

ASPET continues to make an effort to keep you well informed throughout the year. **Communicating to our membership** is an important part of making sure our members are aware of their ASPET member benefits, programs and services. We appreciate that our members may have different preferences for how they receive their information and we try to offer a variety of options for getting ASPET updates. The ASPET website is a primary resource for information ranging from the latest news, important dates as well as an extensive opportunity to discover more about ASPET divisions, committees, publications, education and science policy. Every month we send out key information via the ASPET Newsbrief. *The Pharmacologist* is our quarterly news magazine which provides an extensive update on ASPET programs and services as well as a great feature article by ASPET member Dr. Rebecca Anderson. If social media is how you get your information, make sure you access ASPET's Facebook, Twitter or Instagram accounts. PharmTalk is a blog generated by the ASPET Young Scientists Committee. And of course, there is the newly available ASPET online community, ASPET*Connect*.

Every member, volunteer, chair, editor and Council member has played a huge role in ASPET's success this year and every year, and we are grateful for their significant contributions. There are many ways for our members to get more involved in their Society including:

- ASPET leadership
- ASPET Annual Meeting and Awards
- Divisions
- Committees
- Science Policy
- Education
- Journals

For more information, check out our "How to Get Involved" webpage (aspet.org/how-to-get-involved) or contact us as membership@aspet.org.

Each year during the business meeting, ASPET honors the current president and their service to the Society by inviting the incoming president on stage to say a few words. While we were not able to "pass the gavel" in person this year, ASPET thanks Dr. Backes for his service to ASPET for the 2019-2020 year and welcomes Dr. Charles France as he begins his presidential term on July 1, 2020.

It is clear that ASPET has been working on many new and continuing initiatives throughout the year. In the face of this unprecedented global pandemic, we have had to cancel, adjust, and reinvent the way we do things. While it hasn't been the easiest of adjustments, our mission remains to serve our membership and be your professional home. As a result, you will be seeing much more to come, including webinars and meet-ups, moderated discussions on ASPET*Connect*, and more opportunities to interact and network with members.

ASPET CONNECT

Your Member Community

ASPET*Connect*, ASPET's member-only online community launched to the full membership on May 27, 2020. The new community gives members the ability to network, communicate, and collaborate with fellow ASPET colleagues from anywhere, at any time. As a member, you get exclusive access to discussion forums on your division community to connect with members, get or give advice, and discuss topics that are important to you.

Log in to ASPET*Connect* Today and Begin Connecting: https://connect.aspet.org.

To help get you started on the community, ASPET has developed a Getting Started Guide, FAQ's, and some video tutorials. Check them out https://connect.aspet.org/help/getting-started!

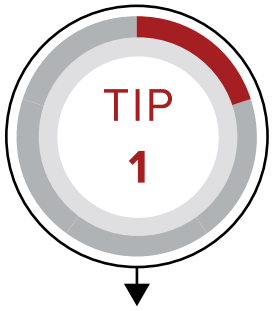
Explore Your Division Community

ASPET's 10 divisions each have a community on ASPET*Connect*. You are automatically a member of your primary division community, but each community has open enrollment and you are welcome to join any division community.

To join a secondary division community:

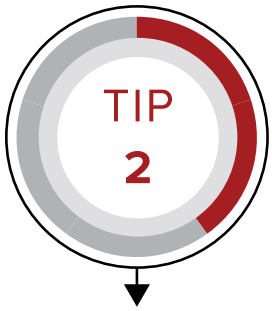
- Click on Communities
- Scroll to find the division community you would like to join
- Click on Join

Tips for Using ASPET*Connect*



UPDATE YOUR PROFILE

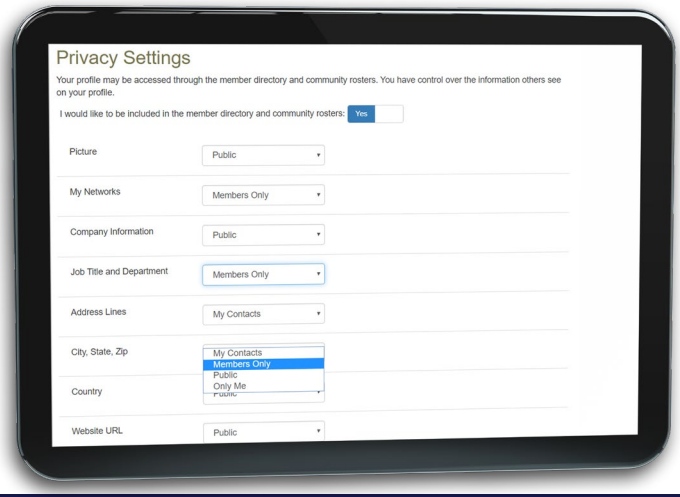
Your My Profile tab is where you can share any information about yourself with fellow members. The types of demographic information you can provide include your personal bio, education history, job history, focus areas, and ASPET positions held. Think of this area as a place where you can tell members more about yourself, your area of expertise, and what makes you unique. The information provided here helps others get to know you and perhaps reach out to you with similar interests and networking opportunities. Adding a profile picture is also a great way to make your profile more complete.



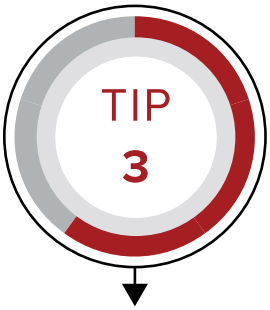
SET YOUR PRIVACY SETTINGS

You control who sees what in your profile. Personal information like your phone number and email address are kept private unless you choose to share them. Your privacy is important, which is why you can set the privacy on each item of your profile. Privacy settings include:

- My Contacts – only people who you have made a contact may see this item
- Members Only & Public – these two settings mean the same thing since ASPET*Connect* is a private member only community; any member of ASPET who is logged into the community may see this item
- Only Me – only you may see this item (reserve this setting for items like your phone number or email address)

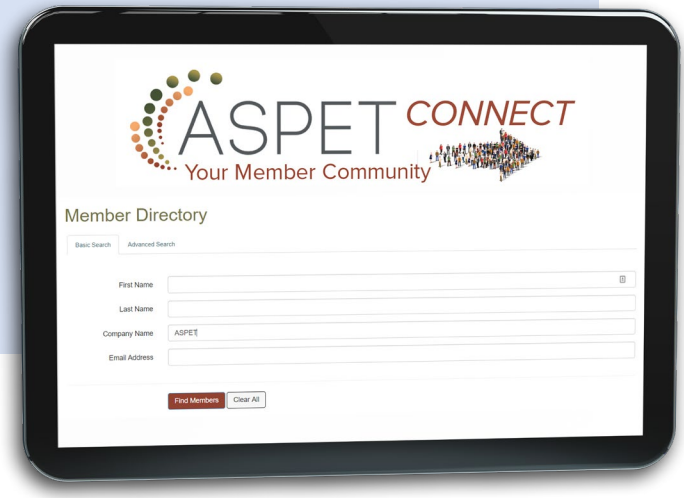


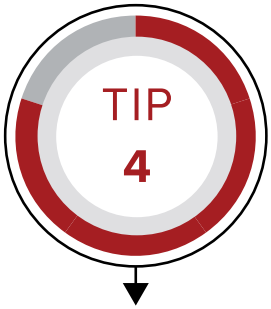
Note that the contact information found on your profile is hidden from members unless you change the privacy setting. You can update your contact information in your profile; but remember that, if you do, it will also change your contact information in ASPET's membership database.



UPDATE YOUR NOTIFICATIONS

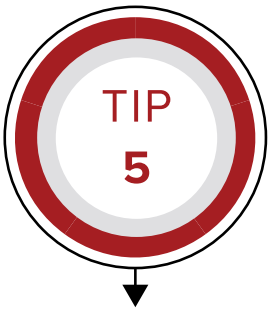
Don't miss out on discussions taking place in your community! Your primary division notifications are automatically set to send you weekly digests. If you want to receive notifications more frequently, set it to Daily Digest or Real Time notifications. You can always change your notifications settings on any of the communities to which you belong.





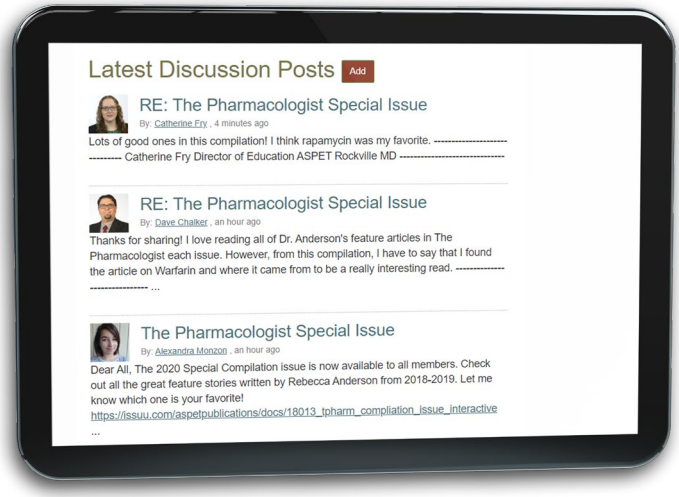
CONNECT WITH MEMBERS

ASPET*Connect* is not just another membership directory; it's a community for networking and making connections. Find members with similar interests to you – a good way to do this is to ask questions and participate in discussions. Get to know others while discussing topics important to you and send contact requests to members you want to connect with. The membership directory in ASPET*Connect* provides you with robust search options and member profiles.



START A DISCUSSION

What are you currently working on? Are you facing any challenges? Did you come across an interesting article? Do you have a specific question about your career path? Share your thoughts, questions, advice, expertise, and more on your division community. If you're not sure how to get started, talk to your division communications officer to help start a conversation on ASPET*Connect*.



Get Started Now!

https://connect.aspet.org

- Sign in using the same username (your email address) and password that you use to log in to www.aspet.org.
- Accept the terms and conditions
- Click on Communities/My Communities
- Click on your primary division community
- Start exploring

Get More Involved with Your Division Community

If you are interested in becoming more involved with your division community, please contact your division communications officer on ASPET*Connect* (see sidebar). Volunteers are needed to help lead discussions, start conversations, and advocate for your division.

Division Communications Officers

Behavioral Pharmacology
Vanessa Minervini
Alison G. Wakeford

Cancer Pharmacology
Markos Leggas
Megan Zavorka Thomas

Cardiovascular Pharmacology
Rayna J. Gonzales

Drug Discovery & Development
Alicja J. Urbaniak

Drug Metabolism & Disposition
D. Fernando Estrada
Michael J. Espiritu

Molecular Pharmacology
Jason E. Davis

Neuropharmacology
Luisa Torres

Pharmacology Education
Helmut Gottlieb

Toxicology
Cheryl Rockwell

Translational & Clinical Pharmacology
Brandi M. Wynne

ASPET Has A New Code of Conduct

ASPET is committed to providing a safe, welcoming environment for everyone, and creating an environment where the exchange of scientific ideas, open communication, and equal opportunity can occur free of harassment and discrimination. To promote a culture of inclusion, respect, and professionalism, ASPET has adopted a Code of Conduct policy, which is applicable to all Society activities including programs, meetings, ancillary events, and official and unofficial social gatherings.

Read the full ASPET Code of Conduct at www.aspet.org/conduct

Call for 2021 Award Nominations

ASPET is dedicated to recognizing the best research in, contributions to, and accomplishments in all areas of pharmacology. We encourage members to nominate deserving scientists to raise awareness of the outstanding work being done in our field.

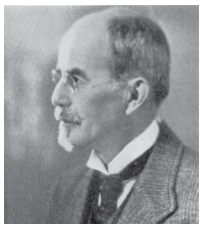
ASPET is strongly committed to diversity. Nominations for members of underrepresented groups, women, and persons with disabilities are particularly encouraged.

- **Who can submit a nomination?** You must be an ASPET member to submit nominations.
- **Who is eligible to receive awards?** Scientists from all over the world and at all career stages are eligible for ASPET's various awards. Learn more about the specific eligibility details for each award at http://www.aspet.org/awards.
- **How do I submit a nomination?** To nominate someone, visit: http://www.aspet.org/awards. Review the award criteria and nomination requirements. Access the Awards Portal and log in as a member to be routed to the nomination forms.
- **When are nominations due?** The deadline for nominations is Tuesday, September 15, 2020 at 5:00 PM EDT.
- **What happens after a nomination is submitted?** Each nomination is reviewed by the members of a designated committee. Scores and rankings are given, and compiled results are discussed by the committee, leading to the final selection of the 2021 awardee.

ASPET SCIENTIFIC ACHIEVEMENT AWARDS

Have you mentored a young investigator whose original research is outstanding?

Nominate them for the



J. ABEL AWARD IN PHARMACOLOGY

This award is presented for original, outstanding research in the field of pharmacology and/or experimental therapeutics by a candidate who is younger than 45. Named after the founder of ASPET, it was established in 1946 to stimulate fundamental research in pharmacology and experimental therapeutics by young investigators.

Did your mentor have a profound impact on you and the pharmacology community?

Nominate them for the

JULIUS AXELROD AWARD IN PHARMACOLOGY

This award is presented for significant contributions to understanding the biochemical mechanisms underlying the pharmacological actions of drugs and for contributions to mentoring other pharmacologists. It was established in 1991 to honor the memory of the eminent American pharmacologist who shaped the fields of neuroscience, drug metabolism, and biochemistry and who served as a mentor for numerous eminent pharmacologists around the world.

Are you an investigator looking for extended funding for research directed toward improving human health?

Apply for the

DAVID LEHR RESEARCH AWARD

This award is intended to extend funding for preclinical or clinical research directed toward improving human health. This award is made possible by an endowment to ASPET from Mrs. Lisa Lehr in honor of her husband, the late Dr. David Lehr, former chair of the Department of Pharmacology of New York Medical College. It includes two years of funding at $50,000 per year.

Do you know a clinical pharmacologist who excels in research and/or teaching?

Nominate them for the

REYNOLD SPECTOR AWARD IN CLINICAL PHARMACOLOGY

This award recognizes excellence in research and/or teaching in clinical pharmacology. It was established in recognition of Dr. Spector's dedication and contributions to clinical pharmacology and is made possible by the generosity of Dr. Reynold and Mrs. Michiko Spector.

Is the head of your department or lab at the height of their career, having made significant contributions to an area of pharmacology?

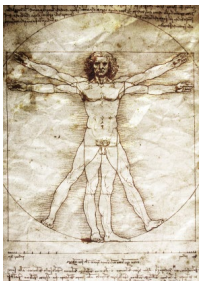
Nominate them for the

ROBERT R. RUFFOLO CAREER ACHIEVEMENT AWARD IN PHARMACOLOGY

This award honors the scientific achievements of scientists who are at the height of their careers (typically mid-to late-career) and who have made significant contributions to any area of pharmacology. It recognizes the contributions made to drug discovery and development by Dr. Ruffolo.

Do you have a colleague who has made a major impact on the pharmacological treatment of disease?

Nominate them for the



PHARMACIA-ASPET AWARD IN EXPERIMENTAL THERAPEUTICS

This award recognizes and stimulates outstanding research in pharmacology and experimental therapeutics, basic laboratory, or clinical research that has had, or potentially will have, a major impact on the pharmacological treatment of disease.

NORMAN WEINER LECTURE

The Norman Weiner Lecture was established in memory of Dr. Norman Weiner, past ASPET President and chair of the department of pharmacology at the University of Colorado. It is in honor of his many contributions to both ASPET and to pharmacology research and education. The award lecturer is selected by the ASPET Program Committee and will be announced in September. Outside nominations are not being accepted.

ASPET DIVISION-SPONSORED AWARDS

ASPET is strongly committed to diversity. Nominations for members of underrepresented groups, women, and persons with disabilities are particularly encouraged.

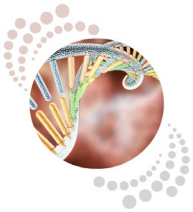
AWARDS FOR ESTABLISHED SCIENTISTS

Sponsored by the ASPET Division for Drug Discovery and Development

The **Scientific Achievement Award in Drug Discovery and Development** recognizes outstanding investigators who have made significant contributions in drug discovery, translational and/or drug development science. This can include investigators who have developed technologies, methods or processes that have enhanced the process of drug discovery or enabled accelerated drug development. Contributions to any therapeutic area or therapeutic modality (small molecule, oligonucleotide, gene therapy, biologic or drug-device combination) will be considered.

Sponsored by the ASPET Division for Pharmacology Education

Travel Awards for Pharmacology Educators which defray costs to participate in the ASPET Annual Meeting at EB 2021 are available for pharmacology educators at all career levels who are faculty members. Applicants must have significant teaching responsibilities in pharmacology: either graduate, undergraduate college classes, or professional schools.



Sponsored by the ASPET Division for Toxicology

The **Division for Toxicology Career Award** recognizes outstanding original research contributions to toxicology by an established investigator.

Sponsored by the ASPET Division for Translational and Clinical Pharmacology

The **Ray Fuller Lecture** was established to honor the achievements of Ray W. Fuller, PhD in applying an improved understanding of the central nervous system to discover better treatments for the mentally ill. Dr. Fuller was part of the team that discovered fluoxetine (Prozac), leading to an entire new approach to the therapy of depression. The award lecturer will be selected by the TCP division. Outside nominations are not being accepted.

EXERCISE YOUR MEMBERSHIP BENEFITS!

Nominate someone who has made an impression on you. What better way to give long-deserved kudos to our everyday unsung heroes! Only ASPET members may nominate candidates for awards, so please make sureyour membership is up to date.

EARLY CAREER AWARDS

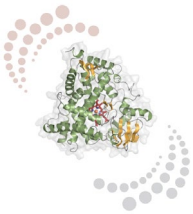
Division-sponsored early career awards are intended for ASPET members who are past the postdoc or trainee career stage but still early in their careers (no more than 15 years after receiving their doctorate). Applications and nominations are welcome from members in academia, industry, government, or other organizational affiliations.

Sponsored by the ASPET Division for Behavioral Pharmacology

The **JH Woods Early Career Award in Behavioral Pharmacology** recognizes outstanding original research by early career investigators in the area of behavioral pharmacology. Past participation in the Division for Behavioral Pharmacology and in other ASPET events will be considered when evaluating candidates.

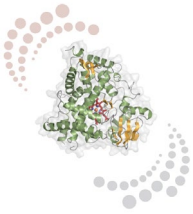
Sponsored by the ASPET Division for Cardiovascular Pharmacology

The **Benedict R. Lucchesi Young Scientist Travel Award in Cardiac Pharmacology** was established to honor Dr. Lucchesi's lifelong scientific contributions to our better understanding and appreciation of the pharmacological treatment and prevention of cardiovascular disease and for his mentoring of countless prominent cardiovascular pharmacologists in translational approaches. The award recognizes a member early in their career whose research interest is related to cardiovascular pharmacology.



Sponsored by the ASPET Division for Drug Metabolism and Disposition

The **Richard Okita Early Career Award in Drug Metabolism and Disposition** recognizes excellent original research by early career investigators in the area of drug metabolism and disposition. The awardee will be invited to deliver a talk at the ASPET Annual Meeting at EB 2021 and to publish a review article in *Drug Metabolism and Disposition*.



Sponsored by the ASPET Division for Drug Metabolism and Disposition

The **James R. Gillette Awards** are presented each year to two outstanding papers published in Drug Metabolism and Disposition, one each in the broad categories of a) drug metabolism and b) disposition and pharmacokinetics. All articles published in *DMD* 2020 issues will be considered.

Sponsored by the ASPET Division for Molecular Pharmacology

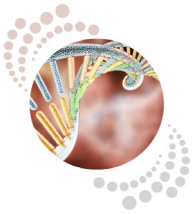
The **Division for Molecular Pharmacology Early Career Award** recognizes scholarly achievements by early career independent investigators in the area of molecular pharmacology.

Sponsored by the ASPET Division for Neuropharmacology

The **Division for Neuropharmacology Early Career Award** recognizes and honors a young independent investigator who is working in any area of neuropharmacology. Preference is given to candidates who hold an independent position. An independent position is considered to be one that is responsible for securing and administering their own budgets for research (traditionally a faculty position, or a team leader in a non-university setting).

Sponsored by the ASPET Division for Pharmacology Education

Travel Awards for Pharmacology Educators which defray costs to participate in the ASPET Annual Meeting at EB 2021 are available for pharmacology educators who have relatively less experience as a pharmacology educator and/or junior faculty members (e.g., assistant professor). In addition to promoting participation in the ASPET meeting by pharmacology educators, this award is intended to foster career development in pharmacology education. Applicants must have significant teaching responsibilities in pharmacology, either graduate, undergraduate college classes, or professional schools.

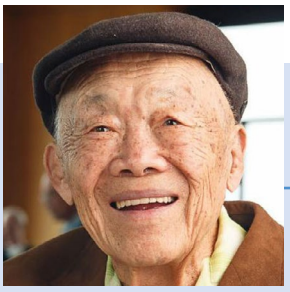


Sponsored by the ASPET Division for Toxicology

The **Division for Toxicology Early Career Award** recognizes excellent original research by early career investigators in the area of toxicology.

Sponsored by the ASPET Division for Translational and Clinical Pharmacology

The **Division for Translational and Clinical Pharmacology Early Career Awards** recognize excellence in translational and clinical pharmacology research that comes from early career scientists. The purpose is to provide travel support to defray costs for two members to participate at the ASPET Annual Meeting. The awardees will be invited to share with the division their research and ideas pertinent to the division's mission.



Are you an ASPET emeritus member in need of travel funding to attend the ASPET Annual Meeting at EB 2021?

E. LEONG WAY EMERITUS TRAVEL AWARD

The E. Leong Way award provides financial support to defray the expenses for an ASPET emeritus member to attend the ASPET Annual Meeting at EB. The award honors Edward Leong Way (1916-2017). Dr. Way, a former president of ASPET, is remembered for his contributions to drug metabolism research, opioid pharmacology, and a western understanding of Chinese traditional medicine, as well as the numerous scientists he mentored over 75 years of his professional life. Self-nominations are permitted.

EB 2020 Post-Meeting Resources

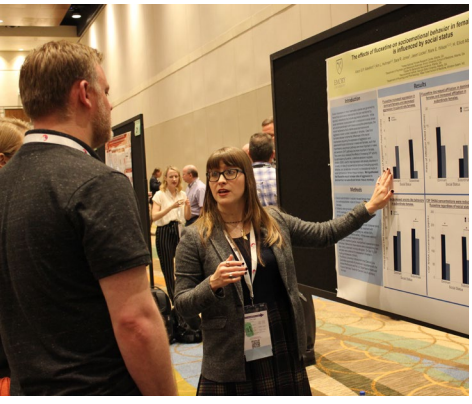
Pharmacology Research

We are all disappointed about the cancellation of the ASPET Annual Meeting at EB 2020 which was scheduled for April in San Diego. Before being sidelined by COVID-19, the meeting had attracted a record-breaking number of pharmacology abstract submissions. We are offering several ways for you to still learn from these research advances.

Abstract Publication in *The FASEB Journal*

The link below will connect you with over 900 pharmacology abstracts and over 6,500 total Experimental Biology 2020 abstracts.

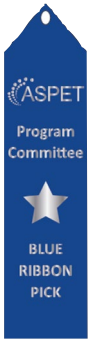
https://faseb.onlinelibrary.wiley.com/toc/15306860/2020/34/S1



E-Posters

Abstract authors have the option to upload a PDF of their poster and share their contact information so others can communicate questions or insights about their work. By June 1, over 500 authors loaded PDF posters, including 84 in pharmacology. The link below will connect you with the e-Posters that are available to view through the end of August. If you are an author, you can add your PDF poster at any time by logging back into the EB abstract submission system.

https://submissions2.mirasmart.com/EB2020/eposter/PosterResultsProgram.asp



ASPET Program Committee Blue Ribbon Picks

Not sure where to start with all this pharmacology research? The ASPET Program Committee put together a list of the top-scoring abstracts. Check it out: https://www.aspet.org/aspet/meetings-awards/meetingsannual-meeting/aspet-annual-meeting-at-eb-2020/abstracts/2020-program-committee-blue-ribbon-picks

While the ASPET Annual Meeting at EB 2020 was cancelled, we nonetheless want to recognize the work being done by ASPET's young scientists.

Congratulations to the 2020 ASPET Travel Award Winners

Check out the winners:
aspet.org/2020-travel-awards

2020 Poster Award Candidates

Check out the young scientists who were invited to compete in the 2020 poster competition:
aspet.org/2020-poster-candidates

2020 Division Oral Presentation Award Candidates

Check out the young scientists who were invited to compete in division oral award competitions:
aspet.org/2020-oral-candidates

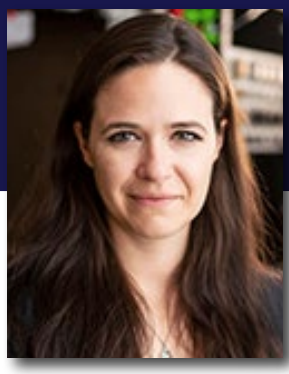
EB Press Releases

Check out the EB press releases: https://experimentalbiology.org/2020/About/Press.aspx

What do you miss most about not attending EB this year?

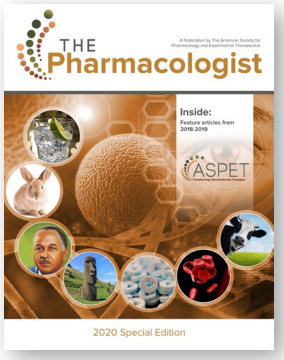
"I really miss seeing everyone. ASPET is one of the highlights of my year and I love catching up with old friends and colleagues and meeting new ones. I also really miss all of the great science I get to see at the meeting and the inspiration I get from it for my own science."

- Erin Calipari



ASPET Booth at EB

What staff miss the most about the annual meeting is the opportunity to connect with members in our booth as you stop by to purchase the latest ASPET t-shirt and pick up our giveaways. Here are some alternatives until we see you again.



Booth Giveaway – Digital Version

Enjoy the digital version of the ASPET 2020 booth giveaway - the third compilation in a series of special editions of our quarterly news magazine, *The Pharmacologist*. This special compilation issue highlights feature articles written by ASPET member and science writer Dr. Rebecca J. Anderson. In each issue of *The Pharmacologist*, Rebecca focuses on science stories that take us on an adventure in pharmacology. Read the featured articles from 2018 and 2019 here: https://issuu.com/aspetpublications/docs/18013_tpharm_compliation_issue_interactive

Shop ASPET

After a prolonged period of teleworking in your most casual attire, it may be time to refresh your inventory of t-shirts. Check out the many styles here: aspet.org/store

EB Career Central

EB Career Central provides meeting attendees with opportunities to develop their career skills, meet with potential employers, network with peers, and talk to institutions offering graduate programs. Although, Career Central did not take place, ASPET offers many resources to help your career.

Job Openings

The ASPET board is kept up to date in real time. View the ASPET Career Center at https://careers.aspet.org/jobs/.

What do you miss most about not attending EB this year?

"I will definitely miss the student/postdoc poster competition at EB. I enjoy serving as a judge and learning about some of the of the exciting work young toxicology researchers are doing. Looking forward to EB 2021!"

- Brendan Stamper

What do you miss most about not attending EB this year?

"I miss seeing the Neuropharmacology Division members and the high quality programming EB provides. Also missed presenting the data our lab is excited about sharing!"

- Shaifali Bhalla

ASPET CONNECT
Your Member Community

Networking Opportunities

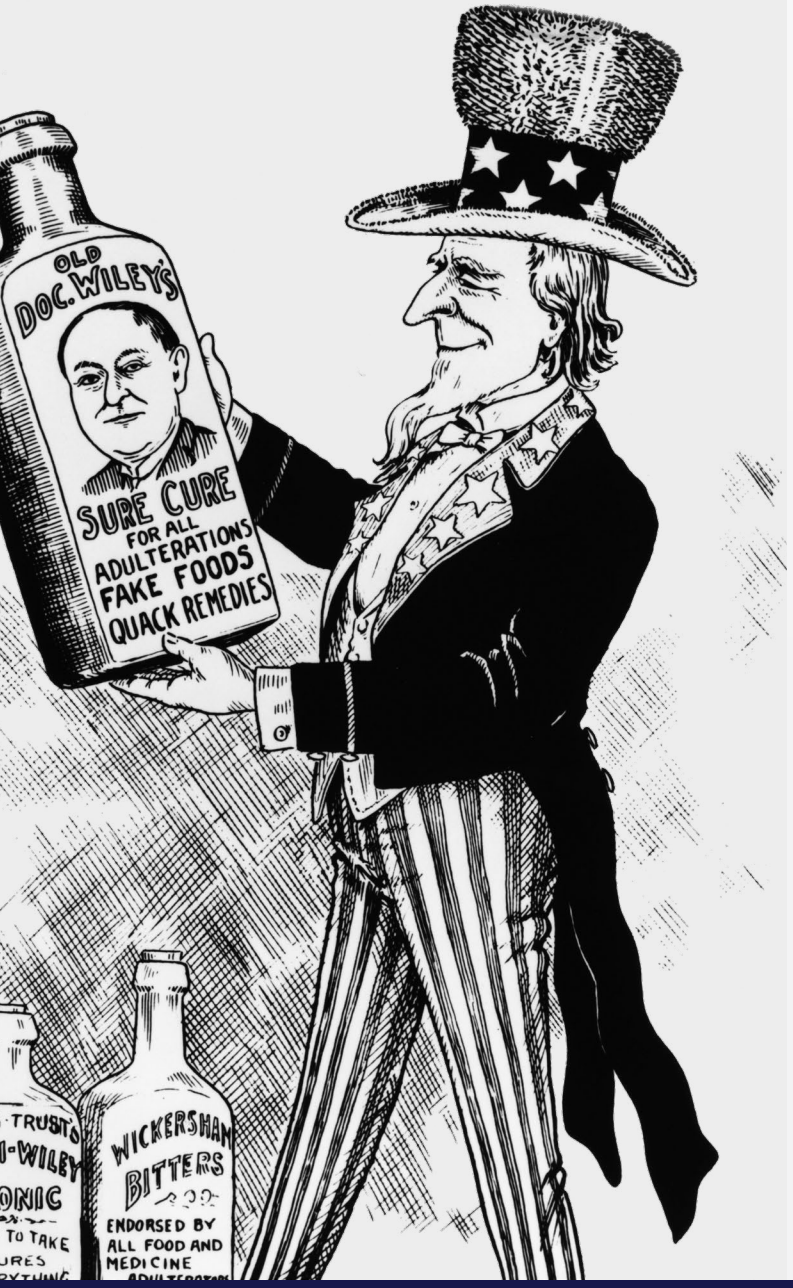
Join others in your division's community in ASPET*Connect* to take advantage of discussion forums where you can connect with subject matter experts, get or give advice on career matters, or work with your committee or division members. Have a question or discussion topic? Post it on the community and allow members to provide their input. Want to see what other members are discussing? Visit your division community and scroll through the discussions. Search for colleagues by name, company, location, division, or research focus in the ASPET*Connect* membership directory; https://connect.aspet.org

Information on ASPET Institutional Partners

Visit our ASPET Institutional Partners at https://www.aspet.org/aspet/news/news/2020/05/12/2020-institutional-partners to learn more about their graduate programs.

THE FDA'S CRUSADE for Safe Food & Drugs

Rebecca J. Anderson, PhD



On a ship to Cuba during the Spanish-American War, Lt. Colonel Theodore Roosevelt caught a trooper throwing his rations overboard. "I can't eat the canned meat," the red-haired Kentuckian said (*1, 2*). Roosevelt called him a baby and ordered, "Eat it and be a man" (*2*). The shamed soldier tried to obey but vomited.

In the public domain

Theodore Roosevelt

Examining the canned beef himself, Roosevelt found it "stringy and coarse" with a "layer of slime" on top (*1, 2*). "I would rather have eaten my hat," he said (*1*). In Cuba, he spent $5000 out of his pocket ($155,000 in today's currency) to provide better food and medicine for his men (*3*).

Nelson Appleton Miles, commanding general of the US Army, received similar reports from the field. One letter from Maj. W. H. Daly, a physician from Pittsburgh, said the meat "had an odor similar to that of a dead human after being injected with preservatives" (*2*). Gen. Miles coined the term "embalmed beef" for the rations, which had been supplied by big meatpackers under government contracts. Newspapers popularized the embalmed beef moniker, and Congress held hearings. But nothing changed.

The Food Fight

During the 19th century, farm workers moved to urban jobs, making fresh foods less readily available. Fortunately, industrial canning innovations extended the food's shelf life and permitted nationwide shipment.

Canners maximized profits by loading substandard foods with spices, preservatives, and dyes to mask the taste and enhance appearance (*4*). Preservatives included borax, formaldehyde, and salicylic acid. Food coloring agents included copper salts, which turned vegetables bright green, and aniline compounds—the same coal tar dyes used in the textile industry.

Large quantities of processed foods at cheap prices threatened the livelihood of farmers and farming communities, which at that time still made up over half of the US population. In 1862, Abraham Lincoln established the Department of Agriculture to protect farming interests (*1, 5*).

From the beginning, the Agriculture Department maintained a chemistry laboratory, tasked with analyzing the composition of food and beverages (*1*). But little was accomplished until Harvey Wiley arrived in 1883.

The Go-To Guy

An Indiana farm boy, Harvey Wiley volunteered for the state's infantry during the Civil War. He contracted measles, along with many in his unit, and that drove Wiley to study medicine (*1, 2*). But after receiving his MD from Indiana Medical College in 1871, he decided he liked research more than attending to patients.

He earned a bachelor's degree in chemistry from Harvard in six months, and in 1874, became the first chemistry professor at newly opened Purdue University (*1, 2*). His classes emphasized analytical chemistry and lab exercises. In 1878, he took a sabbatical to Germany, the global leader in chemical research. At the Imperial Health Office, he observed the newest techniques for analyzing food and exposing adulterants (*2*).

Wiley was designated Indiana's "state chemist" and quickly earned a reputation as the go-to scientist for analyzing virtually anything—water quality, rocks, soil samples, adulterated fertilizers, and, especially, foodstuffs (*1, 2*).

In 1881, the Indiana State Board of Health asked him to examine the purity of honey and maple syrup. His presentations at the American Association for the Advancement of Science enhanced his reputation as one of the country's leading sugar chemists (*1*).

At a meeting of sugarcane growers in December 1882, Wiley's even-handed presentations caught the attention of George Loring, Commissioner of the Department of Agriculture. Two months later, Loring offered Wiley the chief chemist job (*1, 2*).

In 1883, the Agriculture Department's sprawling campus sat between the Smithsonian Institution's red brick castle and the almost-completed Washington Monument. The grounds contained experimental gardens, greenhouses, conservatories, and a grand, modern main building (*1*). Wiley's Division of Chemistry consisted of a small lab in the building's basement.

Taking Charge

Wiley was tall and stocky, with a rough-hewn oval face and penetrating dark eyes. With his collegial banter and colorful expression, he made friends easily (*2*). But he was passionately dedicated to his work and tackled food safety with boundless energy and a driving ambition (*1, 2*).

In 1886, he purchased an apparatus to study dairy products and published the results in Bulletin 13, *Foods and Food Adulterants*. It was the first of a 10-part Bulletin 13 series, which reported on many food groups and would total 1400 pages over the next 16 years (*2*).

In 1888, the Department of Agriculture became a cabinet-level department (USDA). The newly installed USDA Secretary became more influential in the executive branch, and Congress increased appropriations for Wiley's Division of Chemistry, which became the Bureau of Chemistry in 1901 (*2, 6*).

Manufacturers had progressively incorporated larger and larger quantities of preservatives and coloring agents in their products without checking the effect on consumers. Everyone, including Wiley, assumed that these substances were safe. But in the absence of data, no one knew for sure. In 1902, Wiley received $5000 from Congress—one-third of his funding request—to determine the effect of food additives on human health and digestion (*1, 2*).

The Poison Squad

Wiley solicited volunteers by posting ads to government employees. They were required to eat all of their meals in a purpose-built dining room in the USDA building's basement. An expert cook kept the adjoining kitchen scrupulously clean and prepared wholesome, tasty meals containing only the best quality, mostly fresh ingredients (*1, 2*). Coffee and tea were permitted but no alcohol (*2*).

U.S. Food and Drug Administration

The Poison Squad

The volunteers kept a daily log, recording the precise amounts of everything they ate and drank; their weight, temperature, and pulse before every meal; and any symptoms that might be attributed to the tested preservative. They were encouraged to maintain their regular work and sleep schedules (*1, 2*).

Each volunteer also carried a satchel wherever he went with containers for urine and feces, which were delivered daily to the Bureau chemists. Wiley often joined the chemists who analyzed the excretions for major nutrition indicators and the chemical preservative (*2*). Twice a week, physicians from the Public Health Service—or Wiley himself—examined the volunteers (*1*).

With so many restrictions and requirements, Wiley worried that he could not attract enough healthy young men for the study. In fact, the Bureau was deluged with applications. For young men struggling to stretch their meager government salary, the free meals were an attractive incentive (*1, 2*).

The first trial examined borax, a widely used food preservative and one that Wiley thought was least likely to cause harm (*1, 2*). For 10 days in December 1902, 12 young clerks from USDA ate a normal (control) diet. Then, the preservative was added to their meals for just over 1 month. Five dose levels were introduced stepwise to the limit of tolerance by each volunteer. This was followed by a post-dosing washout period (*2*). Although innovative at the time, this dose-escalation study design is now a standard in clinical pharmacology trials.

At first, Wiley mixed the preservative in the volunteers' food or beverages. But soon he found that the administered dose could be controlled better by incorporating it in gelatin capsules (*1*).

The results, reported in 1903, showed that borax was not nearly as benign as Wiley had assumed (*1*). Although all of the volunteers remained in good health while eating the control diet, only half of them completed the entire 5-dose schedule. Appetites declined, accompanied by feelings of fullness, discomfort, and occasional stomach pain (*1, 2*). The men were also plagued by dull, stubborn headaches, and the highest dose produced "inability to perform work of any kind" (*2*).

Although innovative at the time, this dose-escalation study design is now a standard in clinical pharmacology trials.

Wiley still thought that preservatives served a useful purpose (*1, 2*). But he now advised "each article of food should be plainly labeled and branded" so that consumers could make informed decisions (*1*).

Wiley intended to publish his results discreetly in scientific reports and tried to limit contact between his staff and journalists (*1, 2*). But a persistent *Washington Post* reporter gathered details from the study's cook. When he could not get enough content for his articles, he simply made it up (*1*). Those articles, in which he called Wiley's volunteers the "Poison Squad," turned

a sedate clinical trial into a popular phenomenon, and the name stuck (*1, 2*).

Wiley soon realized that publicity about the Poison Squad, even the exaggerations, served his purposes—advocating for food labeling and "pure" food. So, he confided in reporters and groomed that relationship throughout the rest of his career (*2*).

After borax, Wiley's Poison Squad tested salicylic acid, sodium sulfite, and sodium benzoate, which caused even worse symptoms. Wiley remained a prudent, methodical chemist, but the accumulating data transformed him into a pure food crusader (*1*). "I was converted by my own investigation" (*2*).

Wiley wrote lay press articles, and his repartee made him a popular speaker on the lecture circuit. He presented data in a simple, sensible manner and swayed many pure food advocates, including women's groups, state public health officials, and agricultural food chemists—all of whom had seen firsthand the harmful effects of adulterated food.

Heinz Catches Up

Sodium benzoate had been widely used in food processing for centuries (and is still used), and Wiley assumed it was not particularly dangerous. Plus, the highest Poison Squad dose fell far below the amount used by meatpackers (*1*). To his surprise, 11 of 12 volunteers lost weight, suffered stomach pains and nausea, and in most, recovery was painfully slow (*1, 2*). Only three of the men completed the study.

After seeing the sodium benzoate results, Wiley realized that simply identifying preservatives on the label was not enough. "I could not consciously… urge that the addition of a preservative to food was harmless in any quantity" (*2*).

Ketchup was the most common household condiment. Traditionally, it was a watery sauce made from fermented fish, and later, might include mushrooms, oysters, or walnuts. Tomato-based ketchup emerged in the 19th century, and large-scale producers cut costs by incorporating tomato trimmings, ground pumpkin rinds, apple pulp, cornstarch, and synthetic red dyes (*1*). Because bottling was not sterile, they loaded it with preservatives (primarily sodium benzoate).

Following the Poison Squad results, Wiley directed his chemists to experiment. They made ketchup using fresh tomatoes, heated to kill microbes. When placed in sterile containers, it remained safe without preservatives—and tasted better (*1*).

Wiley's results made a deep impression on Henry Heinz, whose commercial ketchup was based on his mother's recipe (*1*). He directed his staff to eliminate sodium benzoate. Their new recipe required fresh, high-pulp tomatoes and balanced the acid concentration with vinegar, which acted as a natural preservative.

The result was a much thicker sauce that cost a few cents more than the preservative-loaded ketchups. It set a new industry-wide standard: Americans began to think all good ketchup was thick and rich (*1*).

Lagging Legislation

Wiley served as a scientific advisor to sympathetic members of Congress and testified at committee hearings on his Poison Squad results and other food analyses. Starting in 1887, he assisted with drafting pure food legislation, which was re-introduced in every session for the next 20 years (*1, 2, 7*). Some of these bills died in committee, some were referred to the floor but not voted upon, and some passed one house but not the other.

USDA Secretary James Wilson generally supported the Bureau of Chemistry's efforts. But Wiley's uncompromising crusader style increasingly irritated Wilson and his boss, President Roosevelt. His vocal criticism also generated increasing resistance from the food industry and its various organizations (dairy, meat, and whiskey). They denounced Wiley personally and lobbied powerful members of Congress, who blocked passage of the bill year after year (*1*).

By 1905, though, Wiley had acquired a national reputation and won the support of a wide coalition of pure food advocates: women's clubs, state health officials, farmers, and physicians. And each successive session of Congress made greater strides toward a pure food law.

The War on Drugs

In the first half of the 19th century, most drugs were imported from Europe. Many of them were adulterated, and pharmacy schools were established—in Philadelphia (1821), Boston (1823), and New York (1829)—to ensure the purity of dispensed drugs (*7*). To aid their efforts, a group of physicians, pharmacists, and colleges of pharmacy created the US Pharmacopeia. This formulary listed organic chemicals, botanicals, and

other substances typically kept by pharmacists, along with tests for determining their purity (*8*).

Heavy drug use during the Mexican-American War (1846-8) amplified concerns about drug quality and led to passage of the 1848 Drug Import law. All drugs entering America's six largest ports were to be inspected. But instead of qualified inspectors, as the law specified, most were political appointees lacking proper training or credentials.

During the Civil War, several pharmacists (Edward Squibb, Eli Lilly, and Gideon Searle) began manufacturing drugs on a large scale to meet demand. They sold mostly plant preparations (e.g., opium, belladonna). Parke, Davis, & Co., the largest of these firms, searched the world for new botanicals, which were made into liquid extracts (*2, 9*). These drugs typically complied with US Pharmacopeia standards.

German chemists pioneered synthetic drugs, as an offshoot of their discovery of cheap aniline dyes for the textile industry. The first such drug was antipyrine, which was enthusiastically welcomed as a fever and pain remedy, followed by acetanilide and phenacetin. Because of serious side effects, those drugs were overshadowed at the end of the century by aspirin—another German drug and a safer alternative (*2*).

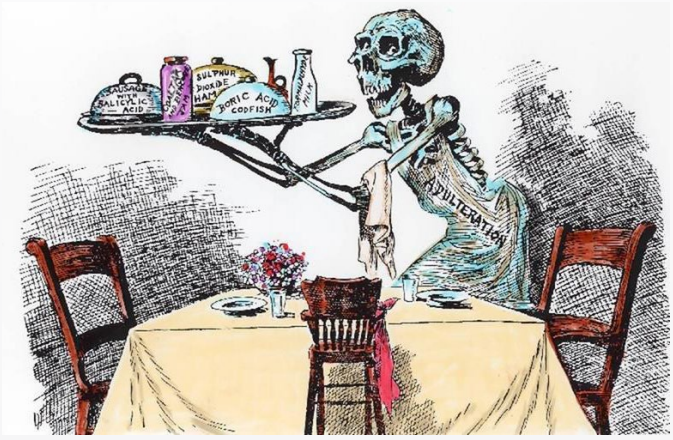
Almost all of them were fakes, quacks, or swindlers.

Fakes, Quacks, and Swindlers

Conditions were ripe for exploitation. In the free-market economy of the 19th century, clever entrepreneurs concocted and trademarked their own remedies. Although these were called "patent medicines," most had not been officially patented (*7, 9*).

Many patent medicines contained ingredients that were also prescribed by physicians. And those ingredients provided some relief. Often, retail druggists sold patent medicines alongside the drugs from ethical manufacturers, because they were very profitable. But whereas ethical manufacturers accurately labeled the drugs they sold (per the US Pharmacopeia), patent medicines were complex mixtures with fancy names that even knowledgeable practitioners did not recognize.

Patients who were frustrated by the inability of qualified physicians to cure their ailments turned to patent medicines, which made exaggerated promises. Few drugs (except quinine for malaria and Salvarsan for syphilis) could cure patients, but nothing stopped savvy salesmen. Liquozone, for example, claimed to cure asthma, gout, neuralgia, goiter, "most forms of



U.S. Food and Drug Administration

"How Death Came, Unbidden, to Mrs. Sales Dinner Party" – The Philadelphia Inquirer, Nov. 30, 1919

kidney, liver, and heart troubles," and a dozen other conditions (*9*). The grander the claims, the more popular and profitable the remedy.

Executives at large patent medicine firms frankly admitted (to each other, at least) that the last thing they wanted was to cure patients. Rather, they incorporated high concentrations of opiates, cocaine, or alcohol to make their customers dependent and ensure repeated purchases (*9*). While these doped remedies might make the patient feel better in the short term, they most certainly did not cure.

Lydia Pinkham's Vegetable Compound was a popular remedy that claimed to ease "women's problems." Unsuspecting women who campaigned for temperance during the day would return home and take a dose of Mrs. Pinkham's medicine, unaware that it was 40-proof alcohol (*9*).

One of the most vicious tactics was used by swindlers who advertised treatments for "private diseases of men" (*9*). Men who simply sent an inquiry (not a purchase order) might receive a $25 treatment C.O.D. If he refused to accept the high-priced product,

he would be told, "Another gentleman in your town has also written us. We will turn over your shipment to him, explaining the circumstances" (*9*). The blackmailed "customer" paid the price—and kept paying, to preserve his secret.

Patent medicine vendors spent $40 million a year on advertising—the largest source of income for newspapers and magazines (*3, 9*). And patent medicine firms began inserting a "red clause" in their advertising contracts. This clause—boldly printed in red ink—stated that the contract would be canceled, if articles or editorials in support of drug regulation appeared in the paper (*3, 9*). This devastating financial threat made newspapers and magazines complicit in the patent medicine industry's fight against regulation.

By the late 1800s, patent medicines were so pervasive that pharmacists and physicians became quite concerned. Patients were avoiding proper medical care and being unnecessarily harmed by false cures.

Patients were avoiding proper medical care and being unnecessarily harmed by false cures.

Getting Organized

A group of physicians founded the American Medical Association (AMA) in 1846 (*2, 8*). But no organization, including the AMA, set standards for medical education or practice. By 1900, for every doctor who graduated from a bona fide medical school, a score of others bought bogus diplomas from fly-by-night institutions (*2*). Quackery flourished. A few physicians were enticed to endorse patent medicines in ads that flooded medical publications, including the AMA's journal, *The Journal of the American Medical Association* (*JAMA*).

Finally, in 1905, the AMA established a Council on Pharmacy and Chemistry to evaluate drugs for their composition, therapeutic claims, and advertising (*2, 9, 10*). Drugs recommended by the Council were published in the AMA's *New and Nonofficial Remedies*, and only those drugs could be advertised in *JAMA* and other medical journals (*2, 10, 11*).

The American Pharmaceutical (now Pharmacists) Association (APhA) was established in 1852 by a group of pharmacists and pharmaceutical chemists. APhA compiled the National Formulary, which set standards for drugs not listed in the US Pharmacopeia (*8*).

Countering these professional organizations was the Proprietary Association of America, formed in 1881 by the owners of the largest patent medicine firms. This organization was an influential lobbying group and opposed all legislation aimed at drug regulation (*2, 9*).

The last thing they wanted was to cure patients. Rather, they incorporated high concentrations of opiates, cocaine, or alcohol to make their customers dependent and ensure repeated purchases.

Snake Oil

In the 1880s, a few firms (Parke-Davis, Eli Lilly, and G. D. Searle) hired chemists to standardize drug production (*2, 10*). Mahlon N. Kline, an original partner at Smith, Kline, & French, Co., went further. To address widespread drug adulteration, he established the first industrial department of analytical chemistry in 1893 (*11*). Before production of the company's pharmaceuticals, Kline mandated that all starting materials be tested and certified by analytical chemists. He hired Lyman Kebler to head the department (*11*).

A native of Michigan, Lyman Kebler received his pharmaceutical chemist (PhC) degree from the University of Michigan in 1890. He stayed to earn bachelor's and master's degrees in chemistry while working as a chemistry assistant. Following graduation in 1892, Kebler joined Smith, Kline, & French Co. in Philadelphia (*11*).

Kebler was precise to a fault and relied heavily on the US Pharmacopeia as his analytical reference. He established a close working relationship with the Philadelphia College of Pharmacy, whose students and staff frequently worked alongside his chemists. In parallel, Kebler took medical courses at Jefferson Medical College and later at Temple University (*11*).

Kebler also joined APhA and frequently presented his results at the APhA annual meetings. In his 11 years at Smith, Kline, & French, Kebler's department generated more than 200 reports, which covered analyses of chemicals and medicinal plants and the consequences of adulteration (*11*).

Kebler had a "delicate humor characterized by understatement," which was apparent in an APhA article he published on medicinal oils, a traditional remedy for rheumatism (*11, 12*). His tongue-in-cheek report methodically reviewed dozens of oils from animal sources (ant, bat, bear, catfish, dog, fox, mermaid, porcupine, raccoon, skunk, etc.) and contained an especially precise chemical analysis of rattlesnake oil (*12*).

Kebler's attention to detail and accuracy in identifying adulterants greatly aided pharmacists. If they could not examine their goods carefully for adulteration, he advised them to place orders exclusively with trusted wholesalers and manufacturers (*11*).

The Best Man

With elevation of the USDA Division of Chemistry to a Bureau in 1901, Harvey Wiley had funds to establish a Drug Laboratory (*2, 6, 10*). He asked John Uri Lloyd, a leader in the APhA, for recommendations of chemists to head the new lab. Lloyd replied without hesitation, "Lyman F. Kebler…is the best man in America for your purpose…He knows more today concerning tricks of the trade and probable adulterations than any man in the drug line" (*6*).

Wiley agreed. Kebler wrapped up his work at Smith, Kline & French in a few months and reported to the Bureau of Chemistry in March 1903. He found Wiley in the USDA basement weighing out rations for the Poison Squad (*6*). Unfortunately, the Drug Laboratory appropriation covered only Kebler's salary. He was issued "a chair, part of a desk, with reagents, chemicals, and apparatus" (*6*).

Nevertheless, the new Chief of the Drug Laboratory happily began work. In looking at the Bureau's stock chemicals and reagents, Kebler recognized many from his earlier studies and knew they were mislabeled or adulterated. He reported this to Wiley, who directed him to examine all of the Bureau's incoming chemicals and reagents—a big task that delayed his study of drugs (*6*). Within 2 years, he had analyzed 700 reagents (*11*).

The Drug Laboratory quickly assumed a central role in improving pharmaceutical analysis. Kebler's objective was "to place in the hands of the druggists of the United States pure drugs, so that they could fill physicians' prescription with drugs of the proper character" (*11*). His early patent medicine investigations exposed fraudulent hair restorers and cures for consumption, "lost manhood," and obesity (*10*).

The Drug Laboratory analyzed dozens of drugs for the AMA's Council on Pharmacy and Chemistry, especially identifying false, misleading, and exaggerated therapeutic claims (*6, 10*). And Kebler assisted the APhA's Committee on Adulterations in evaluating essential oils, botanicals, and drug adulteration in general (*10*).

Americans were spending $90 million a year to buy some 50,000 different patent medicine brands.

Lacking its own regulatory authority, the Drug Laboratory cited postal code violations. If a patent medicine was sold through the mail, the Post Office could investigate, indict, convict, and sentence felons for fraudulent use of the mails (9). Kebler's first case for the Postmaster General involved the claims of "Vitality Pills" (*6*).

The pills allegedly contained animal extract derived from healthy bulls. But Kebler's analysis revealed that the pills had the same general ingredients as other commonly so-called aphrodisiacs. After consulting several prominent physicians, he concluded that the product's claims were exaggerated, and the pill promoter was indicted (*6*).

Kebler's lab subsequently assisted the Post Office's investigation of quack drugs that claimed to cure tuberculosis, syphilis, cancer, drug addiction, epilepsy, and other ailments (*6*). All of those vendors were prosecuted for federal postal violations (*10, 11*).

In conjunction with this work, Kebler enrolled at George Washington University to continue his medical studies and received his MD in 1906 (*11*).

Like Wiley, Kebler recognized the importance of informing the general public. Americans were spending $90 million a year to buy some 50,000 different patent medicine brands (*2*). Kebler wrote

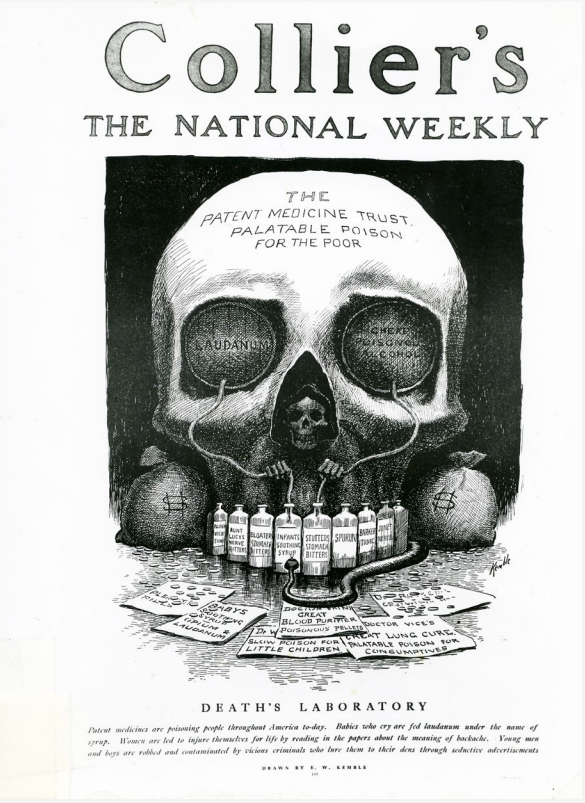
magazine articles, as well as scientific reports, to inform the public about high priced, useless drugs.

Wiley also asked Kebler to provide Congress with "all possible information and assistance regarding pure and adulterated drugs" (*6*). That data persuaded many legislators. But Congress was also feeling increased pressure from patent medicine lobbyists. Tipping this seesaw, finally, in favor of pure food and drug legislation has been attributed to two journalists.

Raking the Muck

Theodore Roosevelt called them muckrakers. But these pioneering investigative journalists turned the derogatory term into a "badge of honor" and rallied public opinion (*3*). The most influential "muckraker" of patent medicines was Samuel Hopkins Adams.

A native of New York, Samuel Hopkins Adams was distantly related to Bostonians John, John Quincy, and Samuel (*7*). After college, he took premedical courses before turning to journalism (*2*). At the *New York Sun*, he served as a crime reporter for nine years and then wrote reports on medical topics (tuberculosis, typhoid fever, and surgical techniques) for *McClure's Magazine*. This led to a contract with *Collier's Weekly* to write a series on patent medicines (*2*).



U.S. Food and Drug Administration

Cover of Collier's

Adams bought bottles of patent medicines, collected ads, and consulted state chemists, physicians, and pharmacists. He also tracked down people whose testimonials were printed in magazine ads and interviewed patent medicine executives (*2, 9*).

Adams arranged for qualified chemists to analyze more than 200 of the remedies (*2, 3*). Many were harmless but misleading. An ointment containing clay and glycerin was marketed as a cancer cure. And a pink starch and sugar pill promised to relieve paralysis (*3, 9*). Other potions were downright dangerous. Throughout his investigation, Adams consulted Harvey Wiley (*2*)

The first installment of Adams's exposé appeared in *Collier's Weekly* on October 7, 1905 (*9*). The series of 10 articles named and denounced 264 patent medicines, quack doctors, firms, institutes, and institutions (*9*). Almost all of them were fakes, quacks, or swindlers.

In February 1906, the AMA published Adams's first six articles in a book, *The Great American Fraud* (*9*). Sales were brisk, expanded public awareness of the evils of patent medicines, and underscored the need for drug regulation.

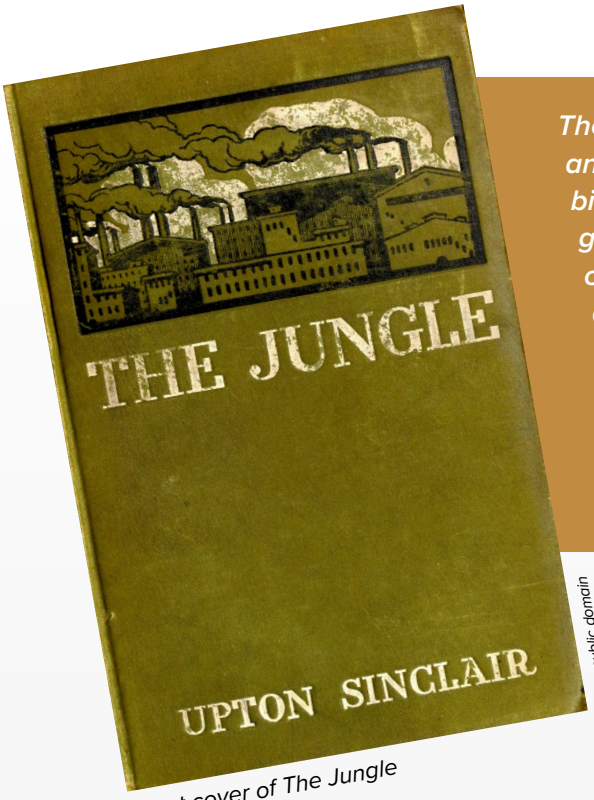
Minced Meat

The other muckraker of note was Upton Sinclair. Sinclair worked his way through City College of New York by writing jokes, dime novels, and magazine articles (*1*). He attended graduate school at Columbia but left to pursue a career as a novelist and freelance journalist. His early work was praised but sold poorly. Two years after he joined the Socialist Party, a workers' strike drew his attention (*1, 7*).

In July 1904, butchers at packing houses from Omaha to New York went on strike for higher wages. "Beef Trust" owners countered by hiring non-union workers, and the strike failed after two months (*1*). Sinclair wrote a passionate, pro-strike article, which he submitted unsolicited to the populist-socialist weekly, *Appeal to Reason* (*1, 2, 7*).

Impressed by Sinclair's writing, the paper's editor offered him $500 for a serialized fictional story about the struggles of stockyard workers (*1, 2*). Sinclair then negotiated a contract with Macmillan, the publisher of his novels, to turn the installments into a book and received another $500 advance (*1*).

In October 1904, 26-year-old Sinclair researched the story in Chicago, where meatpacking firms like Armour and Swift processed 20 million animals a year



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Front cover of The Jungle

> *There would be meat that had tumbled out on the floor, in the dirt and sawdust, where the workers had tramped and spit uncounted billions of consumption germs. There would be meat stored in great piles in rooms; and the water from leaky roofs would drip over it, and thousands of rats would race about on it. It was too dark in these storage places to see well, but a man could run his hand over these piles of meat and sweep off handfuls of the dried dung of rats. These were nuisances, and the packers would put poisoned bread out for them; they would die, and then rats, bread and meat would go into the hoppers together.*
> – *Upton Sinclair*, The Jungle

(*1-3*). He checked into a settlement house opposite Chicago's Union Stockyards and wandered around for seven weeks, taking notes and making sketches (*1, 3, 7*). Dressed in grubby clothes and carrying a dinner pail, he blended in with the workers, fooling everyone including the bosses (*1-3*).

In the evenings, he met with ex-strikers in their homes and added their stories to his own observations. He also gathered relevant details from lawyers, doctors, nurses, policemen, politicians, real estate agents, and settlement house workers (*2*). "I made notes on everything" (*3*).

On Christmas day 1904, Sinclair began writing in a cabin near Princeton, NJ (*2*). The serial installments of *The Jungle* appeared in *Appeal to Reason* from February to November 1905 (*1, 2*).

The Jungle's central theme was the stark, tragic lives of meatpacking laborers: corrupt hiring practices, long work hours, and job insecurity. But the darkest passages were the descriptions of working conditions: noisy cattle pens, bloody killing beds, damp chilling rooms, and fetid, steamy tank rooms (*2*). Repeated exposure to acid (used to pickle beef) ate away workmen's fingers (*1*).

To maximize profits, meatpackers wasted nothing (*2, 3*). Potted chicken really contained pork and beef fat, tripe, and waste ends of veal. Old, crippled, diseased cattle were ground and canned (*2*). Spoiled hams were pumped with chemicals to mask the smell "so bad that a man could hardly bear to be in the room with them" (*13*). Carcasses of cattle that died on freight trains and cholera-infested hogs were rendered into lard (*2, 3*). Sausage might be made from tubercular pork unfit to export, moldy meats doused with borax, or hams too badly spoiled to refurbish (*2, 3, 7*).

Breaking Through

As the installments appeared in *Appeal to Reason*, the editors at Macmillan became increasingly dismayed. They asked Sinclair to tone down the stark slaughterhouse scenes for the book (*1, 2*). Sinclair refused, saying, "I had to tell the truth" (*1*).

They reached a stalemate, and Macmillan canceled Sinclair's contract. He could keep his $500 advance (*1*). Sinclair then shopped the manuscript to four other publishers, who also rejected it, fearing lawsuits (*1, 3*). Finally, he resorted to self-publishing a version of the book, which netted nearly $4000 ($117,000 in today's currency). But the book failed to attract national attention (*1*).

Walter Page and Frank Doubleday of Doubleday, Page & Co. indicated some interest, but they, too, were concerned about readers' reaction to the revolting details (*1*). They sent an editor and the company's lawyer to Chicago. Both came back disgusted and horrified by what they had seen (*1, 3*).

Doubleday, Page offered Sinclair a contract but wanted 30,000 words cut from the final chapters, which were an overly preachy, socialist diatribe. After so many struggles with publishers, Sinclair gave in. Doubleday, Page published *The Jungle* on February 18, 1906, and heavily advertised it (*1, 2*).

By July, *The Jungle* was the nation's best seller, and by the end of 1906, an estimated 1 million Americans had read it. The novel also became an international sensation and was translated into 17 languages (*2*).

President Roosevelt received several copies from pure food advocates—and an autographed copy from Sinclair (*1-3*). Roosevelt did not need much convincing. The Beef Trust had disgusted him since his days in the Spanish-American War and had literally left a bad taste in his mouth.

USDA Secretary Wilson had already dispatched three investigators to Chicago. They refuted Sinclair's graphic descriptions, and Wilson defended their findings (*2*). Roosevelt suspected that Wilson was more interested in covering up the problem than solving it (*1*). So, he sent his own investigators to Chicago: his Commissioner of Labor, Charles P. Neill, and the social reformer, James B. Reynolds (*1, 2*).

"Revolting!"

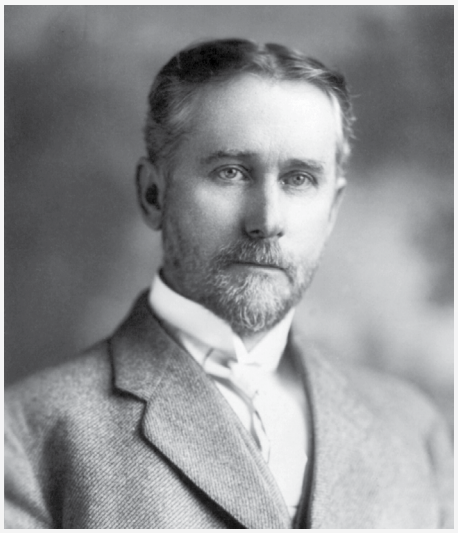
Neill and Reynolds spent 2.5 weeks in Chicago. Despite the meatpackers' efforts to clean up before they arrived, Reynolds and Neill's observations were graphic: "We saw meat shoveled from filthy wooden floors, piled on tables rarely washed, pushed from room to room in rotten box carts, in all of which processes it was in the way of gathering dirt, splinters, floor filth, and expectoration of tuberculous and other diseased workers" (*14*).

Neill was so distressed when he returned home that he insisted his household prepare only fresh meat from local farms (*1*). Neill and Reynolds briefed Roosevelt in early May 1906 (*2*). The President summed it up in one word: "revolting" (*14*). Sinclair, who had rushed to Washington to be briefed by Neill and Reynolds, felt vindicated but lamented, "I aimed at the public's heart, and by accident I hit it in the stomach" (*2*).

Roosevelt shared some of the Neill-Reynolds findings with supportive legislators and pushed for a robust federal meat inspection program (*1, 3*). On May 25, 1906, a Meat Inspection Amendment was attached to the Agricultural Appropriations Bill and passed without dissent in the Senate (*1-3*). "Beef Trust" lobbyists were more successful in the House, which watered down the bill (*1, 3*).

Roosevelt kept pushing for strong legislation—quietly through political channels—but Sinclair grew impatient. Through the night, he dictated to stenographers at the *New York Times*, summarizing his briefing from Neill and Reynolds and adding his own notes, affidavits, and other documentation (*1, 3*). The *Times* published the sensational news on May 28-29, 1906 (*2*).

A sympathetic congressman, John Williams, immediately requested the Neill-Reynolds report (*2*). Roosevelt sent it to him on June 4—and made it clear that he was out of patience (*1, 14*). The President wanted strong, enforceable Meat Inspection legislation on his desk, or he would release the full report publicly (*1-3*). After some tough negotiations between the House and Senate, the reconciled Meat Inspection Amendment passed Congress on June 29, 1906 (*2, 7*).



Library of Congress, Prints and Photographs Division

Charles P. Neill

The bill required federal inspection of all meat processed for interstate and foreign commerce, before and after slaughter. Condemned meat was to be destroyed. And tough sanitation and hygiene standards in meatpacking plants were established (*7*).

Pure Food and Drugs

During his first years in office, Theodore Roosevelt focused mainly on breaking up monopolies, including the "Beef Trust" (*2*). But by 1905, Kebler's results and Samuel Hopkins Adams's exposés had generated public pressure for drug regulations, too (*1, 2*). In

his end-of-year address to Congress in December 1905, Roosevelt formally announced that he was backing regulation of misbranded and adulterated drugs, along with foods and beverages (*1*). The next day, the Senate, once again, introduced a pure food and drugs bill, S 88.

James B. Reynolds

In the public domain

The hullabaloo over the Meat Inspection Amendment generated considerable momentum for advocates of pure food and drugs (*1*). Referencing Adams's *The Great American Fraud*, women's clubs mounted a letter writing campaign and AMA members sent a flurry of telegrams.

Adams, Wiley, and Kebler provided legislators with patent medicine analyses, supporting documents, and case histories of addiction and deaths (*1, 2*). For every case of poisoning and death from unclean meat, they said, patent medicines caused 100 cases. And, unlike spoiled meat, which no one ever ate again, misleading patent medicines turned unwitting consumers into addicts (*2*).

Unlike the contentious controversy over the Meat Inspection Amendment, the House and Senate displayed a rare willingness to compromise. On June 19, 1906, they passed the Pure Food and Drugs Act, which was written largely by Wiley (*2*).

This landmark bill authorized the federal government to examine the contents of processed food and patent medicines, forbade the sale of adulterated or misbranded food and drugs, and required proper labeling of every package and bottle (*3*).

Drugs, including patent medicines, had to meet the identity, purity, and potency standards specified in the US Pharmacopeia and National Formulary (*7*). Drug labels were required to show the place of manufacture and the quantity of "dangerous" drugs: alcohol, morphine, opium, cocaine, heroin, chloroform, cannabis, chloral hydrate, and acetanilide (*7, 11*).

As Adams gleefully noted, patent medicine fraudsters now had three choices: They could go out of business; they could change their formulas, leaving out specified "dangerous" ingredients; or they could disclose those ingredients and remove untrue "cure" claims from their labels (*9*). For the first time, Adams said, fraudsters were on the defensive.

On June 30, 1906, a steamy hot day and the last day of the legislative session, Theodore Roosevelt went to Capitol Hill to sign the Meat Inspection Amendment and the Pure Food and Drugs Act into law, along with nearly 100 other bills. After midnight, he changed into summer clothes and left by train for Oyster Bay (*2*).

Pure food and drug advocates did not get everything they wanted, but the new law was more satisfactory than they could have anticipated. Wiley said it was "a splendid foundation on which to erect a more perfect structure in the future" (*2*).

The Drug Laboratory's work did not change. Kebler continued investigating drug adulteration, analyzing patent medicines, perfecting analytical methods, and examining chemical reagents. But now, he also had the authority to relay evidence of adulterated and misbranded drugs to the Justice Department for prosecution (*7, 10*).

For every case of poisoning and death from unclean meat, they said, patent medicines caused 100 cases.

Harvey Wiley receives much of the credit for passage of the 1906 law, but Lyman Kebler deserves most of the credit for its implementation (*11, 15*). In 1908, the Drug Laboratory was elevated to the Drug Division, with four labs (all under Kebler) to handle the workload. One lab conducted drug inspections, two others performed chemical analyses, and the fourth was the Pharmacological Laboratory, headed by William Salant, a founding member of ASPET (*10*).

Moving On

Kebler persistently tackled drug adulteration and quackery until his retirement from the Bureau of Chemistry in 1929. He continued actively as a consultant and also wrote frequently on the history of what would become the Food and Drug Administration—effectively becoming the agency's first, albeit unofficial, historian (*11*).

Samuel Hopkins Adams and Upton Sinclair continued their prolific writing. Adams wrote novels, biographies, memoirs, short stories, non-fiction books, and screenplays.

Sinclair ran unsuccessfully for governor of California and remained a lifelong socialist. His novel, *Oil*, about the 1924 Teapot Dome scandal, sold well after Boston banned it because it mentioned birth control (*7*). His "Lanny Budd" series of 11 novels further enhanced his literary reputation, and one of those novels earned him a Pulitzer Prize. Many of Sinclair's books, including *The Jungle*, are still in print.

Harvey Wiley left the USDA after 29 years to take a newly created position at *Good Housekeeping* magazine. He was given a state-of-the-art laboratory and tested products for quality. Those that passed his stringent criteria received a "seal of approval" and were highlighted in the magazine. He also frequently wrote articles for the magazine on consumer safety issues. In his lifetime, the Pure Food and Drugs Law was commonly called Wiley's Law. He is buried in Arlington National Cemetery.

U.S. Food and Drug Administration

The U.S. Food and Drug Administration building

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Biosketch:

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In the next issue of *The Pharmacologist...*

Dr. Anderson will share the story of naloxone

Don't miss the September 2020 issue.

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Science Policy News

ASPET's Washington Fellows Advocate for Research Funding

In early March, the 2020 class of Washington Fellows traveled to Washington, D.C. to receive advocacy training from ASPET staff and guest speakers, and then meet with the congressional representatives to advocate for increased funding for biomedical research and the necessity of the use of animal models in research. This year's advocacy training took place at the Sofitel Hotel in Lafayette Square one block from the White House. Moutray McLaren, Chief of Staff to Rep. William Timmons (SC-R), gave the fellows inside tips on how to host an effective meeting with staffers on the hill. Among his insights, he stressed to come prepared with direct "asks" and an understanding of the scope of the staffer's responsibilities and the range of solutions that a member or senator can offer. He also highlighted that offices take great care to be responsive to their constituents, and that traveling to D.C. to speak with staff is a highly effective method of advocacy.

Melissa Wilkinson and Jerry Madukwe

Anastasia Robinson, Cameron Kieffer (guide), and Lindsey Galbo

After taking group photos in Lafayette Square, the fellows returned to the conference room to hear from previous fellows and invitees about how they've used their fellowship as a launchpad for their involvement in policy. Sophia Kaska told the fellows that she joined ASPET's Young Scientists Committee and leveraged that experience to solicit an invitation to join ASPET's Science Policy Committee, where she helps ASPET identify and respond to legislative and regulatory issues that impact the field of pharmacology. Nicholas Warren shared how he used his fellowship experience to decide on a career in science policy and talked about his new role at the American Association for Cancer Research. And Cameron Kieffer recapped his experiences as an AAAS Science and Technology Policy Fellow at the U.S. Department of State. Several recent fellows have used ASPET's fellowship as a steppingstone to the more intensive AAAS fellowship, and this year's fellows were eager for information on that process. Following a brief break, the fellows and guides walked across the street to D.C. landmark Joe's Stone Crab for a private dinner.

Sean Collins, Bayli Dean, and Joseph Flores-Toro (guide)

Rep. Cathy McMorris-Rodgers (WA-5) and Chris Szlenk

The next day, armed with ASPET policy documents and their recent training, fellows met with their partners and guides and traveled to Capitol Hill for a day of advocacy. Fellows had meetings with their current congressional representative and senators, and, if applicable, their hometown representative and senators. Fellows reported that the majority of offices were supportive of increasing funding for the National Institutes of Health and the National Science Foundation. They also relayed that many congressional offices were grateful for the primer offered by the fellows on animal research, as most offices rarely hear from advocates about the issue. After departing the hill, fellows gathered their belongings and traveled home. In total, ASPET's ten fellows met with eleven House offices and twenty-two Senate offices, including the offices of the Speaker of the House, the Chair of the House Energy and Commerce committee, the Senate Minority Leader, the Ranking Member of the Senate Health, Education, Labor, and Pensions committee, and multiple members of the House and Senate Appropriations committees. Next, the fellows will tackle the final portion of their fellowship: writing and publishing an op-ed on a policy issue of their choice.

COVID-19 Legislative Update

The following week after the fellows' hill day, much of the federal government closed to the public as the spread of COVID-19 became apparent within Washington, D.C. and the rest of the U.S. Congress immediately began work on additional legislation far larger in scope and resources than the initial supplemental appropriations packages to tackle the pandemic. The two most recent bills, the CARES Act and the Paycheck Protection Program and Health Care Enhancement Act ("CARES 3.5"), provide roughly $2.5 trillion worth of stimulus and relief, with a chunk of that money going to research and public health. Below are highlights from each bill that may relate to those in the pharmacology profession.

CARES ACT:

- $945 million for the National Institutes of Health (NIH). Specific funding is included for the Centers for Disease Control and Prevention and a number of NIH institutes, including the National Institute of Allergy and Infectious Diseases (NIAID), the National Heart, Lung, and Blood Institute, the National Center for Advancing Translational Sciences, the National Institute of Biomedical Imaging and Bioengineering, and the National Library of Medicine
- $27 billion is set aside in an emergency fund for the Biomedical Advanced Research and Development Authority (BARDA) for research and development of vaccines and therapeutics to fight the virus and other medical needs
- $100 million for the Department of Energy's Office of Science
- $80 million for the Food and Drug Administration
- $75 million to the National Science Foundation for Rapid Response Research (RAPID)

"CARES 3.5":

- $11 billion will be for states, localities, territories, and tribes to develop, purchase, administer, process, and analyze COVID-19 tests, scale up laboratory capacity, trace contacts, and support employer testing. Funds are also made available to employers for testing.
- $2 billion will be provided to states consistent with the Public Health Emergency Preparedness grant formula, ensuring every state receives funding.
- $750 million will be provided to tribes, tribal organizations, and urban Indian health organizations in coordination with Indian Health Service.
- $1 billion will be provided to Centers for Disease Control and Prevention (CDC) for surveillance, epidemiology, laboratory capacity expansion, contact tracing, public health data surveillance and analytics infrastructure modernization.
- $1.8 billion will be for the National Institutes of Health (NIH) to develop, validate, improve, and implement testing and associated technologies; accelerate research, development, and implementation of point-of-care and other rapid testing; and partnerships with governmental and non-governmental entities to research, develop, and implement the activities.
- $1 billion will be for the Biomedical Advanced Research and Development Authority (BARDA) for advanced research, development, manufacturing, production, and purchase of diagnostic, serologic, or other COVID-19 tests or related supplies.
- $22 million will be for the Food and Drug Administration (FDA) to support activities associated with diagnostic, serological, antigen, and other tests, and related administrative activities.
- Up to $1 billion can be used to cover tests for the uninsured.

Drafting on additional relief/stimulus packages are already underway. However, recent statements from Majority Leader McConnell and President Trump indicate that a consensus on what to include may be more difficult to reach this time around. ASPET will continue to advocate for increased appropriations for researchers impacted by the pandemic. Additionally, if there are any ASPET members with suggestions on what else should be included in the next round of COVID-19 supplemental appropriations, please reach out to our Public Affairs staffer Tyler Lamb at tlamb@aspet.org with your suggestions.

Education News

ASPET Names 2020 Individual Summer Undergraduate Research Fellows

The ASPET Summer Undergraduate Research Fellowship (SURF) program is designed to introduce undergraduate students to pharmacology research through a 10-week summer laboratory research experience. The goal of the program is to use authentic, mentored research experiences in pharmacology to heighten student interest in careers in research and related health care disciplines. ASPET offers both institutional and individual SURF awards. Institutions with funded fellowship programs are listed at: http://www.aspet.org/awards/SURF/institutional-Funded/. The individual fellowships are designed to support students whose home campus lacks an institutional program, or who seek more specialized training opportunities at a different university. ASPET congratulates the three students selected for 2020 individual fellowships:

Alex Major will work in the laboratory of Dr. Rong Chen at Wake Forest School of Medicine with the assistance of Dr. Christopher Tracy to examine the effects of chronic exposure to drugs of abuse (e.g., cocaine and alcohol) on the ceramide content in rodent brains. Alex will use mass spectrometry to quantitatively analyze ceramide species in various brain regions along with biochemical assays to determine the mechanisms underlying disrupted ceramide metabolism by drugs of abuse.

Matthew Siegel will be working in the lab of Dr. Taben Hale at the University of Arizona, College of Medicine-Phoenix, where he will investigate the mechanisms by which transient treatment with angiotensin converting enzyme (ACE) inhibitors protect against future cardiac fibrosis in hypertensive rats. The goal of Matthew's research will be to determine the degree to which changes in expression of reactive oxygen species generating and/or scavenging enzymes relate to the persistent anti-fibrotic effect of ACE inhibition.

William Wisen will be working in the laboratory of Dr. Prasad Katakam at Tulane University. His summer research will examine the novel role of nitric oxide synthase isoforms in ischemia-reperfusion injury to the brain. He will employ experimental stroke combined with two-photon excitation microscopy to determine the neuronal injury and blood-brain barrier breach.

We wish the 2020 individual fellows as well as the fellows participating in the SURF institutional programs a productive and fun summer of research!

Journal News

Drug Metabolism and Disposition Editor Search

ASPET's Board of Publications Trustees is seeking the next editor of *Drug Metabolism and Disposition*. The deadline for nominations is **5:00 PM EDT on July 15, 2020**. Self-nominations are welcome.

ASPET editors serve for a three-year term that can be renewed for one additional three-year term. The position includes an honorarium. The peer-review process is managed at the ASPET office using an online manuscript submission and peer review system.

Nominees must be an ASPET member in good standing and should have served on an editorial board. Before nominating a candidate, please make sure the person is willing to serve if selected. Nominations should include a brief statement supporting the candidate and the candidate's CV. Self-nominations are welcome.

The selection process will include telephone interviews with the top candidates and is expected to be completed no later than mid-September 2020. The incoming editor will begin working with the outgoing editor and ASPET staff during the fall and will assume all responsibilities of the editor effective January 1, 2021.

Nominations, including a supporting statement and the candidate's CV, should be sent to Rich Dodenhoff, ASPET Journals Director, at rdodenhoff@aspet.org. You will receive confirmation of receipt of the nomination.

For more information, please contact rdodenhoff@aspet.org.

Board of Publications Trustees Freezes Subscription Prices for 2021

In recognition of the economic impact of COVID-19, ASPET's Board of Publications Trustees voted to freeze the Society's institutional subscription prices for 2021.

These are extraordinary times for libraries, universities, businesses, and, indeed, the world. ASPET recognizes that upcoming budgets will be affected and that both short- and long-term planning are difficult, at best. The Society is committed to working through this time and doing all that we can to make journals access a continued possibility for our institutional subscribers.

Full access to *DMD*, *JPET*, *Molecular Pharmacology*, and *Pharmacological Reviews* is a benefit of ASPET membership. Members who need help accessing the journals should contact subscriptions@aspet.org. ASPET staff are working remotely to continue serving the Society's members and will gladly assist you.

New *Molecular Pharmacology* Editorial Board Members

The Board of Publications Trustees recently approved Dr. Angeline M. Lyon and Dr. Rennolds S. Ostrom to serve on the *Molecular Pharmacology* Editorial Board.

Angeline M. Lyon

Rennold S. Ostrom

Dr. Lyon is an assistant professor in the Departments of Chemistry and Biological Sciences at Purdue University. Her research focus has been on the role of phospholipase C isoforms in cell signaling and has particular expertise in molecular modeling, a prominent feature of papers published in *Molecular Pharmacology*. Dr. Lyon has been a member of ASPET since 2009 and currently serves as secretary/treasurer of the Division for Molecular Pharmacology.

Dr. Ostrom is professor of biomedical and pharmaceutical sciences at the Chapman University College of Pharmacy. His research expertise is in compartmentalization of cAMP signaling, GPCRs, and signal transduction in general. He currently serves on the editorial boards of three other journals and has been a reviewer for many more. Dr. Ostrom has been an ASPET member since 1998 and has served as secretary/treasurer of the Division for Molecular Pharmacology.

Highlighted Trainee Authors

Congratulations to the latest Highlighted Trainee Authors selected for *Drug Metabolism and Disposition, The Journal of Pharmacology and Experimental Therapeutics*, and *Molecular Pharmacology*:

DMD

- Daiki Mori (University of Tokyo/ Astellas Pharma Inc.) – May 2020 issue

Daiki Mori

JPET

- Violeta Balbás-Martinez (Navarra University) – March 2020 issue
- Alex Roberts (University of Birmingham) – April 2020 issue
- Salwa Aburageh Said Abuiessa (Alexandria University) – May 2020 issue

Violeta Balbás-Martinez

Alex Roberts

Salwa Aburageh Said Abuiessa

MOLECULAR PHARMACOLOGY

- Muluneh Fashe (National Institute of Environmental Health Sciences) – March 2020 issue
- Liming Chen (University of Connecticut) – April 2020 issue
- Ilya S. Senatorov (Mercer University) – May 2020 issue

Muluneh Fashe

Liming Chen

Iya S. Senatorov

A concise description of their areas of research, current projects, the anticipated impact of their work, and what they enjoy when not in the lab is online at https://bit.ly/2yX1YeH. We congratulate all of them for being selected.

Membership News

New Members

REGULAR MEMBERS

Andrea N. Belovich, Idaho Coll of Osteopathic Med
Sudin Bhattacharya, Michigan State Univ
Siva Reddy Challa, Univ of Illinois, Chicago
Xiaoyan Chen, Chinese Academy of Sciences, China
Xin Chen, Presbyterian Coll Sch of Pharmacy, SC
Jenna L. Jewell, Univ of Texas Southwestern Med Center
James M. Kasper, Univ of Texas Med Branch
Sailaja Koduri, National Inst of Health, MD
Justin C. Leavitt, Hamit-Darwin-Freesh, Inc, UT
Chih-Hung Lee, Abbvie Inc, CA
Hyuna Lee, Biola Univ, CA
Marta Melis, Weill Cornell Med, NY
Natali A. Minassian, Neurocrine Biosciences, Inc, CA
Scott Moore, Duke Univ, NC
Shengyu Mu, Univ of Arkansas for Med Sci
Jason Munguia, Forge Therapeutics, CA
Joseph Nichols, Michigan State Univ
Clive P. Page, Kings Coll London, UK
Murali Prakriya, Northwestern Univ, IL
Md. Mustafizur Rahman, Khulna Univ, Bangladesh
Arfaxad Reyes Alcaraz, Sr, Univ of Houston, TX
Matthias L. Riess, Vanderbilt Univ Med Center, TN
Manuel Sanchez Santos, Univ of Granada, Spain
Alex Thomsen, New York Univ
Yaping Tu, PTC Therapeutics, Inc, NC
Xin Wang, East China Normal Univ, China
Kenneth R. Watterson, Univ of Glasgow, UK
Rose P. Webster, Christ Coll of Nursing & Health Sciences, OH
George Zhang, Corning Life Sciences, MA

POSTDOCTORAL MEMBERS

Abdurrahman Aslan, Louisiana State Univ HSC
Yasmeen Attia, British Univ in Egypt
Srinivas Pittala, National Inst of Health, MD

AFFILIATE MEMBERS

Laura A. Jennings, US Army Med Res Inst of Chem Defense, MD
Bethany E. Johns, Univ of South Florida
Shuaibing Liu, Sr, First Affiliated Hospital of Zhengzhou Univ, China
Jeff Schoellerman, Janssen R&D, CA

GRADUATE STUDENTS

Jason M. Albert, Univ of Michigan
Amera M. Alsitary, Western Univ of Health Sciences, CA
David Cowart, Univ of Cincinnati, OH
Nesma Elsayed A. Hassanc, Cairo Univ, Egypt
Nuhad Jassem, Chicago State Univ, IL
Fang Jiang, Univ of Hong Kong
Rifka Joly, Chicago State Univ Coll of Pharmacy, IL
Nathan T. Jones, Univ of Wisconsin-Madison
Megan L. Koleske, Univ of California - San Francisco
Hannah M. Kramer, Louisiana State Univ HSC
Kylie McPherson, Oregon Health & Science Univ
Jacob Meariman, Louisiana State Univ HSC New Orleans
Nicole Mohajer, Chapman Univ, CA
Gabrielle R. Moody, Stony Brook Univ, NY
Mark D. Namba, Arizona State Univ
Lifen Qiu, Augusta Univ, GA
Thomas Shroka, Univ of California - San Diego
Maria Luisa Valle, Univ of Georgia
Matthew Varney, Thomas Jefferson Univ, PA
Hetika Vora, Univ of California San Diego, CA
Robert P. Weinberg, Massachusetts Coll of Pharmacy & Health Sciences

UNDERGRADUATE STUDENTS

Noah M. Cline, Biola Univ, CA
Lauren K. Graham, Biola Univ, CA
Posani Sai Harshita, Osmania Univ, India
Thaddeo Pia, Biola Univ, CA
Danny A. Ramirez, Biola Univ, CA
Dana C. Son, Biola Univ, CA
HyunJi Song, Biola Univ, CA
Grace R. Stieglitz, Biola Univ, CA
Stephanie Sun, Biola Univ, CA
Abby M. Vigil, Univ of Wisconsin Eau Claire

ASPET 25 Year Members

Thank you to the following members who have devoted 25 years to ASPET and the growth of our discipline!

Susan G. Amara, PhD
George Battaglia, PhD
Dennis J. Cheek, PhD
John Y. Chiang, PhD
David D. Christ, PhD
Ronald L. Dundore, PhD
Kenneth E. Ferslew, PhD
Sharathchandra S. Hegde, PhD
Basil O. Ibe, PhD
Norbert E. Kaminski, PhD
Nancy L. Kanagy, PhD
Daniel R. Kapusta, PhD
Hyun D. Kim, PhD
Edward Leung, PhD
Beth Levant, PhD
Alexandra C. Newton, PhD
Andreas Papapetropoulos, PhD
Sandra L. Pfister, PhD
Patrick H. Roseboom, PhD
Craig W. Stevens, PhD
Archie W. Thurston, Jr. PhD
Ashiwel S. Undieh, PhD
Kurt J. Varner, PhD
Jack C. Yalowich, PhD

ASPET 50 Year Members

Thank you to the following members who have devoted 50 years to ASPET and the growth of our discipline!

Reevis S. Alphin, PhD
M. S. Amer, PhD
Leslie E. Bailey, PhD
George R. Breese, PhD
Klaus Brendel, PhD
Jules Brodeur, MD, PhD
Sergio S. Cardoso, MD, PhD
Thomas R. Castles, PhD
Stanley N. Cohen, MD
Colin Dalton, PhD
William C. de Groat, PhD
William L. Dewey, PhD
Carl P. Dietrich, MD
Balwant N. Dixit, PhD
Jerome H. Fleisch, PhD
Oleh Hornykiewicz, MD
Mario A. Inchiosa, PhD
Alphonse J. Ingenito, PhD
Stanley Kalsner, PhD
Curtis D. Klaassen, PhD
Harvey J. Kupferberg, PhD
Horace H. Loh, PhD
Michael E. Maragoudakis, PhD
Donald E. McMillan, PhD
John H. McNeill, PhD
Ferid Murad, MD, PhD
Sunil K. Niyogi, PhD
Achilles J. Pappano, PhD
Robert G. Pendleton, PhD
Larissa A. Pohorecky, PhD
Sanford R. Sampson, PhD
Leonard D. Saslaw, PhD
Philip Seeman, MD, PhD
Walter B. Severs, PhD
John C. Smith, PhD
Anthony J. Triolo, PhD
Knox Van Dyke, PhD
Jerrold C. Winter, PhD
Dorothy E. Woolley, PhD
Albert C. Yard, MD, PhD
Allan S. Yard, PhD

A Tribute to Ronald Stanton Duman, PhD

Submitted by S.J. Enna

In February of this year, pharmacology and the neurosciences suffered a significant loss with the passing of Ron Duman. At the time of his death, Ron was the Elizabeth Mears and House Jamison Professor of Psychiatry and Professor of Neuroscience at the Yale University School of Medicine, and Director of the Abraham Ribicoff Research Facility at the Connecticut Mental Health Center.

An intelligent and strapping young man, Ron attended the College of William and Mary where he excelled in the classroom and on the football field as a varsity linebacker. Following graduation, he worked for three years as a laboratory director in the Department of Biology at Notre Dame University.

In 1980 Ron joined my laboratory at the University of Texas Medical School-Houston (UTMSH) as a graduate student. I didn't hesitate to welcome him to our group as during an earlier laboratory rotation he had shown himself to be a diligent and dedicated student with an abiding interest in neuropharmacology. Having taught undergraduate biology at Notre Dame, he displayed a pedagogical maturity and professional commitment seldom seen with entering students. He quickly gained the respect of everyone in the laboratory, not only the other graduate students, but postdoctoral fellows, visiting scientists, and technicians alike. He became widely known on campus as someone with outstanding technical skills who was generous in sharing his knowledge. For years, Ron was our point man for establishing productive collaborations with local scientists and investigators throughout the world. This talent would serve him well throughout his career.

Ron spent six years with me, four as a graduate student and two as a postdoctoral fellow. His research in Houston resulted in the publication of 13 research articles, 5 book chapters, and numerous abstracts. His first manuscript, which described a portion of his dissertation work, was published in 1982 in the *Journal of Pharmacology and Experimental Therapeutics* (222:566-571). Described in this report are biochemical experiments demonstrating an interaction between adrenocorticotropin and the response to antidepressants, a topic Ron would expand upon during his career, with his subsequent findings bringing him international recognition and acclaim. This included the 2004 Distinguished Alumnus Award from UTMSH in recognition of the respect he earned while a graduate student and his accomplishments as an independent investigator.

In 1986 Ron undertook two years of postdoctoral training with Dr. John Tallman at Yale, the institution where he would spend the rest of his career. It was during this time that he courted and married Dr. Catherine Heninger, a fellow neuroscientist. Their union yielded two lively and intelligent daughters, Katie and Carolyn.

Ron was appointed an assistant professor at Yale in 1988 and began expanding what became a highly productive research collaboration with Dr. Eric Nestler, a faculty colleague. Together, they published seminal works on molecular mechanisms responsible for alterations in brain associated with psychiatric conditions, including major depressive disorder. This work led to the neurotrophic hypothesis of depression, which posits that neural plasticity of key brain regions is regulated by monoamine-mediated increases in cAMP and changes in the expression of neurotrophic factors. These findings help explain the relationship between stress and depression as well as the underlying mechanism of action of antidepressant therapies. In recent years, in collaboration with students, fellows, and faculty colleagues, such as Drs. George Aghajanian and John Krystal, Ron provided molecular insights into the mechanisms responsible for the rapid antidepressant action of ketamine. His corpus encompasses over 300 publications in the leading journals of pharmacology, neuroscience, and psychiatry.

A long-standing member of ASPET, Ron was the recipient of a host of prestigious awards and appointments in recognition of his leadership skills

and contributions to psychiatric research. A partial list includes the Anna-Monika Foundation Award, the NARSAD-Nola Maddox Falcone Prize, the NARSAD Distinguished Investigator Award, the Dr. Paul Janssen Prize, the Colvin Prize of the Brain and Behavior Research Foundation, and appointment to the National Academy of Medicine. He was admired by all who knew him for his enthusiasm for research, generosity, honesty, and self-effacing demeanor.

Ron and his six siblings were raised in rural Western Pennsylvania. This bucolic setting instilled in him a love of wildlife and the outdoors. An avid hiker, throughout his life he provided homes for countless animals regardless of species or temperament. On Saturday, February 1, 2020 Ron died of a heart attack while hiking near his home. He was 65 years old.

Alan Poland, MD, MS (1940-2020)

Submitted by Ian Blair and Caroline Dwyer

Alan Poland obtained his MD and MS in pharmacology from the University of Rochester in 1966. After working at the USPHS at the Center for Disease Control in Atlanta during the Vietnam war era, he joined the Department of Pharmacology and Toxicology at the University of Rochester as an assistant professor. He was subsequently recruited to the prestigious McArdle Laboratory for Cancer Research at the University of Wisconsin in the late 1970s. During his time as a junior faculty member at Rochester, Alan realized that workers exposed to 2,3,7,8,-tetrachlorodibenzo-p-dioxin (TCDD) in trichlorophenol-processing factories were at a very high risk for developing chloracne and porphyria.

Working with his career-long collaborator in the laboratory, Ed Glover, chicken egg liver was used to show that TCDD was approximately 36,000 times more potent than any of the polycyclic aromatic hydrocarbons (PAHs) for induction of δ-aminolevulinic acid synthetase, which is a key enzyme in the biosynthesis of porphyrins. He then made the seminal discovery that the dioxin, TCDD, bound to a receptor and activated an aryl hydrocarbon hydroxylase activity. The paper describing this work [Poland et al. (1976) *J Biol Chem*., 251:4936] has been cited over 1,000 times. He had earlier hypothesized that the genetic trait of aromatic hydrocarbon non-responsiveness in certain inbred strains of mice resulted from a mutation that caused expression of receptor with a reduced affinity for the inducing compound. The data he obtained suggested that the receptor was in the cytosol and that it bound TCDD to induce a hepatic aryl hydrocarbon hydroxylase activity. Furthermore, he showed that non-responsive mice had an altered receptor with a diminished affinity for inducing compounds such as TCDD. The receptor was subsequently given the name aryl hydrocarbon receptor (AhR) and the hydroxylase was identified as cytochrome P4501A1.

Alan worked closely with Andrew Kende, a chemistry professor at the University of Rochester who synthesized TCDD and many analogs, to test the TCDD analogs' activities. Because of his expertise, Alan acted as an advisor to the Italian government to help deal with the release of a cloud of TCDD from the Hoffmann La Roche chemical plant in Seveso, Italy

in July 1976. A review article written in collaboration with Joyce Knutson in 1982 at the University of Wisconsin describes the importance of the AhR and its activation by TCDD and has been cited over 2,000 times (*Annu Rev Pharmacol Toxicol*, 22:517). Studies with his post-doctoral fellow, Chris Bradfield, led to the development of a competitive binding assay for TCDD and related ligands for the AhR, and to the purification and molecular cloning of the AhR. After his departure from the University of Rochester, Alan rose rapidly up through the ranks to become a full professor of oncology in the McArdle Laboratory at the University of Wisconsin. His important work on the AhR has stimulated thousands of studies that continue to the present day. It is now realized that the AhR is a prototype of the basic-helix-loop-helix Per-Arnt-Sim (bHLH/PAS) family that comprises many transcription factors, found throughout life. Members of bHLH/PAS members can "sense" both intracellular and extracellular signals that arise from such diverse entities as xenobiotics, endogenous compounds, gases, photons, osmotic pressure, heat, and gravity. The resulting signals can then activate downstream signaling. The AhR participates in many different signaling pathways involved in critical biological processes that affect virtually every organ and cell-type in animals and many invertebrates.

Alan's pioneering work has facilitated the studies that hundreds of investigators have conducted on the role of the AhR in a myriad of processes including liver toxicity, aging, cancer, autophagy, vascular development, immunotoxicity, immune responses, pituitary development, and pituitary dysfunction. After his successful research career at the University of Wisconsin, Alan took up a position at the National Cancer Institute as a program officer in the Division of Cancer Biology. He brought his innovative research background to the National Cancer Institute and provided an invaluable resource in evaluating innovative proposals. He was an incredibly knowledgeable, engaging, and humble man who was a delight to converse with. Time seemed to flash by during conversations with him about science, politics, or the world in general. He will be sorely missed.

In Sympathy

ASPET notes with sympathy the passing of the following members:

Melissa M. Clemens
Oleh Hornykiewicz
Victor G. Laties
Benedict R. Lucchesi
Ernest Reit
Eric J. Simon

Members in the News

Achievements, Awards, Promotions, and Scientific Breakthroughs

Namandjé Bumpus

Johns Hopkins University School of Medicine

Namandjé Bumpus

Namandjé Bumpus PhD, has been named the new director of the Department of Pharmacology and Molecular Sciences at Johns Hopkins University School of Medicine. She joined the faculty of the Johns Hopkins University School of Medicine in 2010 originally as an assistant professor in the Department of Medicine. Dr. Bumpus has recently held positions in the dean's office, including associate dean for institutional and student equity, and more recently associate dean for basic research. In these roles, she made significant contributions through her creative thinking about programmatic opportunities that would increase engagement across the school.

Dr. Bumpus has been a member of ASPET since 2008 and is a member of the **Divisions for Drug Metabolism and Disposition, Toxicology, and Translational and Clinical Pharmacology**.

Michelle A. Clark

Nova Southeastern University

Michelle Clark

Michelle A. Clark, PhD has been appointed as Dean of The College of Pharmacy. Appointed Interim Dean in August 2018, Dr. Clark has served the college as Appointed Interim Dean since August 2018, Executive Associate Dean, Interim Associate Dean for Research and Graduate Education and Chair of the Department of Pharmaceutical Sciences.

Dr. Clark has proven herself a visionary leader, finding innovative ways to enhance the college's program offerings and student success. She was instrumental in the establishment of the college's PhD program in pharmaceutical sciences that matriculated its first students in 2010 and the development of the Master of Science in pharmaceutical sciences that graduated its first cohort in 2019. Dr. Clark is passionate about creating innovative educational opportunities within the College of Pharmacy. As founding member and faculty advisor of the Student National Pharmaceutical Sciences Association, and a dissertation advisor for PhD students, Dr. Clark serves as a mentor to all NSU's College of Pharmacy students.

As a proponent of promoting the pharmacist's role in health care, Dr. Clark focuses her research on pharmacy and health-related issues for underserved and underrepresented communities. She involves students in her research, providing opportunities that allow them to develop skills in leadership and scientific inquiry.

Prior to joining the college, Dr. Clark was a researcher at Wake Forest University in the Hypertension and Vascular Disease Center and received her PhD and MS in medical sciences specializing in pharmacology and experimental therapeutics from the University of South Florida. She has been a member of ASPET since 2012 and is a member of the **Divisions for Molecular Pharmacology, Neuropharmacology**, and **Pharmacology Education**.

Ekundayo Samuel

Dove-Haven Foundation

Ekundayo Samuel

Ekundayo Samuel, DVM, MSc, is the Founder and Chairman, Board of Trustees of Dove-Haven Foundation, a cancer foundation in Nigeria. He is currently completing his PhD in the laboratory of Professor Oyeronke Odunola of the Department of Biochemistry, University of Ibadan, Nigeria. His research is focused on isolating and characterizing bioactive components from medicinal plants, and also addressing the lack of mechanistic information on their roles in cancer.

Dr. Samuel will be joining the 2020 class of the prestigious leadership CAS (Chemical Abstract Services) Future Leaders Program. He will be the first-time scholar from any Nigerian University to participate in this global award. CAS is a division of the American Chemical Society. Each participant will receive a fully sponsored trip to CAS Headquarters in Columbus, Ohio and the American Chemical Society (ACS) National Meeting & Exposition in San Francisco, California, USA from August 10-20, 2020. He will also receive a certificate of distinction, become a life member of CAS and a member of ACS, among other benefits.

Dr. Samuel has been a member of ASPET since 2015 and is an alumnus of the ASPET Mentoring Network Program and a member of the **Divisions for Toxicology, Cancer Pharmacology, Molecular Pharmacology**, and **Neuropharmacology**.

Shankar Munusamy

Drake University

Shankar Munusamy

Shankar Munusamy, BPharm, MS (Pharm), PhD, is an associate professor of pharmacology in the Department of Pharmaceutical and Administrative Sciences at Drake University College of Pharmacy and Health Sciences (CPHS). He was recently awarded the "CPHS Teacher of the Year" Award from his institution for his unique teaching techniques that encouraged student-teacher interaction and special abilities that promoted student learning.

Dr. Munusamy has been an ASPET member since 2013 and is a member of the **Divisions for Translational and Clinical Pharmacology, Cancer Pharmacology, Drug Discovery and Development**, and **Pharmacology Education**.

Brandi Wynne

University of Utah

Brandi Wynne

Brandi M. Wynne, PhD moved to Salt Lake City in 2019, where she is currently an assistant professor of internal medicine at the University of Utah, in the Division of Nephrology & Hypertension. Dr. Wynne received her MS from East Carolina University, and her PhD from the Medical College of Georgia at Augusta University. Her PhD focused on redox regulation of the vasculature during hypertension under Dr. R. Clinton Webb. She then went to Emory University for her postdoctoral fellowship and later as faculty, where she shifted her focus to renal-centric mechanisms of hypertension and dysregulation of sodium transporters. Her current research program focuses on the role of the immune system in the development of salt-sensitive hypertension from a multi-organ approach, including a strong emphasis on cardio-renal systems. Her research is funded by the National Institutes of Health and the American Society of Nephrology.

Dr. Wynne was recently awarded the prestigious Ryuji Ueno Award from the American Physiological Society, which is given to an individual for demonstrating outstanding promise based on research in wound healing, tissue remodeling, organ regeneration, or stem cell biology.

Dr. Wynne is an active member of ASPET since 2007, and a member of the Executive Committee for **Division for Translational and Clinical Pharmacology**, as well as a member of the **Division for Cardiovascular Pharmacology**.

Michelle Duffourc & Donald Hoover

East Tennessee State University College of Medicine

Michelle Duffourc

Donald Hoover

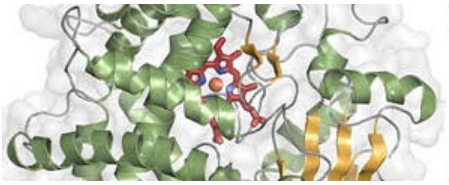
In response to the ongoing Covid-19 pandemic, the American Association of Medical Colleges (AAMC) has strongly encouraged medical schools to pause all clinical rotations for their students. This break is to give schools time to develop clinically relevant educational opportunities for learners while ensuring both their, and their patients', safety. The AAMC mandate presents a number of educational challenges, but also affords us a unique opportunity to trial methods designed to help clerkship-level students revisit and learn how to apply basic science knowledge to clinical practice.

To address this goal, Michelle Duffourc, PhD designed a new online course for rising fourth year medical students entitled "*Back to the Basics: Microbiologic Principles and Pharmacotherapy of Immunologic and Infectious Disorders*". The course utilizes a combination of student-led patient case and laboratory technique presentations, basic science lectures, and daily journal clubs to reinforce how basic science concepts form the foundation of clinical decision making. Drs. Jennifer Hall, Russ Hayman, Don Hoover, and Rob Schoborg will join Dr. Duffourc in this endeavor. This course was the most requested of all of the proposed electives with over one-third of Quillen College of Medicine (QCOM) students listing it as their first choice. This observation suggests that when given the opportunity, students will readily pursue educational modalities which promote integration of basic science and clinical teaching.

Dr. Duffourc is a professor of biomedical sciences at QCOM at East Tennessee State University. She has been a member of ASPET since 2012, serves on the Executive Committee for the **Division for Pharmacology Education** and is a member of the **Division for Molecular Pharmacology**.

Donald Hoover, PhD is a professor of biomedical sciences at QCOM at East Tennessee State University. He has been a member of ASPET since 1980 and is a member of the **Divisions for Cardiovascular Pharmacology, Neuropharmacology**, and **Translational and Clinical Pharmacology**.

Division News



Drug Metabolism & Disposition
a division of ASPET

James R. Gillette Best Paper Award

Submitted by Michael Espiritu and D. Fernando Estrada

In recent years, the Division for Drug Metabolism and Disposition has had the pleasure of presenting the James R. Gillette Best Paper Award for two outstanding papers: one for the best paper of the year in drug metabolism and one for the best paper of the year in pharmacokinetics and transporters. Receipt of these awards is normally accompanied by the opportunity for the authors to present their work at the ASPET Annual Meeting, a cash award, and a certificate of recognition for their outstanding scientific achievements. Unfortunately, due to cancelation of the 2020 meeting, the awardees were not able to present their work. Instead, we highlight their award-winning accomplishments here.

The Gillette Award honors the late NIH pharmacologist James R. Gillette, PhD (http://dmd.aspetjournals.org/content/31/12/1474), who was a scholar, scientist, philosopher, and mentor of pharmacologists worldwide. During his career, Dr. Gillette published more than 300 papers and book chapters and co-edited seven books. He was considered a visionary and significant contributor to the field of drug metabolism and pharmacokinetics.

The winner of the James R. Gillette Award in the category of drug metabolism is **Drew R. Neavin, PhD** from the Mayo Clinic in Rochester, Minnesota. Dr. Neavin's paper is titled "Single Nucleotide Polymorphisms at a Distance from Aryl Hydrocarbon Receptor (AHR) Binding Sites Influence AHR Ligand–Dependent Gene Expression," published in the September 2019 issue of *Drug Metabolism and Disposition* (http://dmd.aspetjournals.org/content/47/9/983). Drew published this work with co-authors Jeong-Heon Lee, Duan Liu, Zhenqing Ye, Hu Li, Liewei Wang, Tamas Ordog, and Richard Weinsilboum. The article reports the discovery of novel pharmacogenetic expression quantitative trait loci (eQTLs). Neavin and his coauthors relied on a combination of chromatin immunoprecipitation-seq, RNA-seq, and genotype data to demonstrate that these single-nucleotide polymorphisms are located distant from ligand-activated transcription factor binding sites, yet become eQTLs conditionally upon addition of ligand for the TF aryl hydrocarbon receptor. Significantly, these loci are not eQTLs in the absence of drugs, suggesting that knowledge of eQTL's under basal conditions does not adequately predict individual drug response.

Drew R. Neavin


Takeshi Miyake

The winner of the James R. Gillette Award in the category of pharmacokinetics and transporters is **Takeshi Miyake, PhD** from the University of Tokyo, Japan. Dr. Miyake's paper is titled "Elucidation of N^1-methyladenosine as a Potential Surrogate Biomarker for Drug Interaction Studies Involving Renal Organic Cation Transporters," published in the November 2019 issue of *Drug Metabolism and Disposition* (http://dmd.aspetjournals.org/content/47/11/1270). Takeshi published this work along with coauthors Tadahaya Mizuno, Issey Takehara, Tatsuki Mochizuki, Miyuki Kimura, Shunji Matsuki, Shin Irie, Nobuaki Watanabe, Yukio Kato, Ichiro Ieiri, Kazuya Maeda, Osamu Ando, and Hiroyuki Kusuhara. The article documents the discovery of N^1-methyladenosine (m^1A) as an endogenous substrate of the organic cation transporter (OCT2) and the multidrug and toxin exclusion protein (MATE2-K). Takeshi and colleagues measured m^1A levels in renal excretions in wild-type and OCT1/2 double knockout mice, as well as in the presence of an OCT2/MATE2-K inhibitor. Significantly, m1A seems to have certain advantages over other endogenous substrates due to apparent selectivity and low diurnal and inter-individual variations, which support its potential use as a surrogate biomarker for detection of drug-drug interactions that involve organic cationic transporters.

Division for Pharmacology Education Inducts Three New Fellows into the Academy of Pharmacology Educators

The Academy of Pharmacology Educators was established in 2010 to recognize individuals who have made exemplary contributions to pharmacology education in one or more of the following areas: student-teacher interaction, innovative contributions, scholarly endeavors, professional development, and service. Three new fellows were inducted into the Academy this year by the Division for Pharmacology Education. Additional information about the Academy, including application instructions and a roster of inductees, can be found at http://www.aspet.org/Education/Academy/.

The Division for Pharmacology Education considers it a privilege to add these educator-scholars to the roster of the Academy of Pharmacology Educators and appreciates their many contributions to the discipline.


Joey V. Barnett

Joey V. Barnett, PhD is Professor of Pharmacology, Medicine, Pediatrics, and Pathology, Microbiology & Immunology at Vanderbilt University School of Medicine. He completed a PhD in pharmacology at Vanderbilt University in 1986 and a postdoctoral fellowship at Brigham and Women's Hospital and Harvard Medical School before returning to Vanderbilt in 1992. For over 25 years, he has taught in the classroom, mentored students in the laboratory, and developed innovative educational programs. Dr. Barnett has directed NIH-funded pre- and postdoctoral training programs in pharmacology, co-directed the

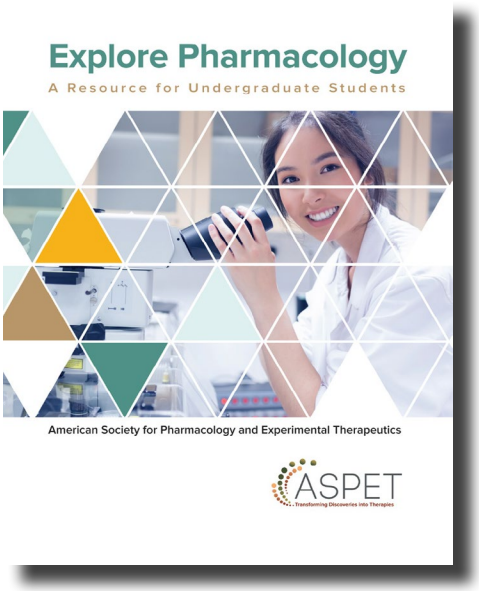
Program in Molecular Medicine, and developed a trans-institutional PharmD, PhD program. As Assistant Dean of Physician Researcher Training, he developed and now directs a 4-year research curriculum for medical students. He is a member of the Vanderbilt Academy for Excellence in Teaching, Alpha Omega Alpha Honor Medical Society, and is a Master Science Teacher in the School of Medicine. In 2005, he established the biennial National Meeting of Directors of Graduate Study in Pharmacology. Dr. Barnett is a longtime reviewer for NIH PhD training programs and a member of ORPHEUS, an organization that advances PhD training in Europe. He has served on the FASEB Training Committee and the executive committee of ASPET's Division for Pharmacology Education. In 2017, he was awarded the American Heart Association's Louis B. Russell, Jr. Memorial Award for developing research mentoring partnerships with minority serving institutions. Dr. Barnett was elected an AAAS Fellow in 2015 for elucidation of the molecular and genetic pathways that regulate formation of the cardiovascular system.

Margaret (Peggy) Bush

Margaret (Peggy) Bush, PhD received her PhD in pharmacology in 1993 from the University of California, Los Angeles and her BS in pharmacy from Ohio State University. She is a licensed pharmacist with board certification in oncology pharmacy. She has 18 years of experience teaching pharmacology to health professions students in traditional classrooms as well as online platforms. Prior to teaching, she worked in clinical research and drug development in the therapeutic area of hematology and oncology, with a focus on early stage clinical development. She is currently an associate clinical professor at Duke University in the School of Nursing, where she teaches graduate pharmacology to nurse practitioner and nurse anesthesia students. Additionally, she advises graduate students on capstone projects related to pharmacotherapy topics. She holds a graduate certification in e-learning from North Carolina State University and is interested in the design and development of novel and effective instructional strategies for online pharmacology education. She remains actively involved in research and is currently working with an international team to study the pathophysiology of vascular dysfunction in malaria and the role of nitric oxide in this process. She currently serves on the executive committee of ASPET's Division for Pharmacology Education.

Ashim Malhotra

Ashim Malhotra, PhD is a pharmacist, an NYU-trained molecular pharmacologist, and a pharmacy educator with 14 years of experience in academia. He has taught more than 1,500 graduate, undergraduate, and pharmacy students nation-wide. Dr. Malhotra is the founding director of the Institute of Teaching and Learning Excellence (ITLE) at the California Northstate University. Working with the university vice president of academic affairs, he oversees the implementation of pedagogy programs for 500 university faculty. Additionally, as the university lead for interprofessional education (IPE), he has created many learner-centered multimodal IPE platforms including didactic, high fidelity simulation, and case-based and team-based case conferences that integrate pharmacology education with clinical training. Dr. Malhotra has served as a pharmacology course coordinator/director for over nine years. He has developed expertise in team-based learning, and problem- and case-based learning, and high-fidelity simulation. This passion led to 13 teaching innovations, shared with academe in 50 podium presentations. He has also chaired national professional organizations in pharmacy education. Dr. Malhotra has received 28 professional awards, including 13 teaching awards such as the "Professor of the Year," the ASPET Pharmacology Educators Travel Award, the American Association of Colleges of Pharmacy (AACP) "Teacher of the Year," University President's Faculty Award, and the AACP "Innovations in Teaching" award. Awards for innovative program development include the CNU President's Leadership in Program Development and the Vice President's Leadership in IPE awards. He feels humbled and grateful at being inducted as a fellow of the Academy of Pharmacology Educators.



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