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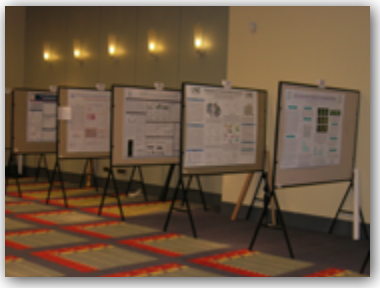


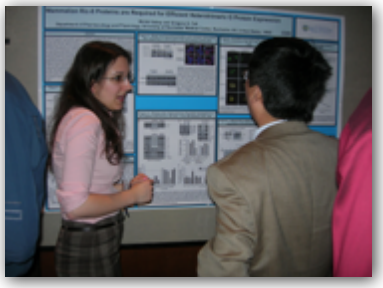


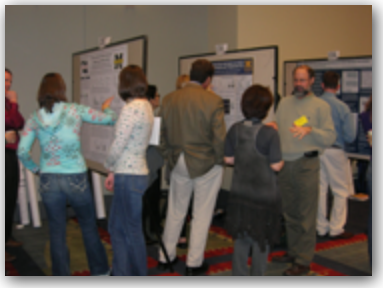


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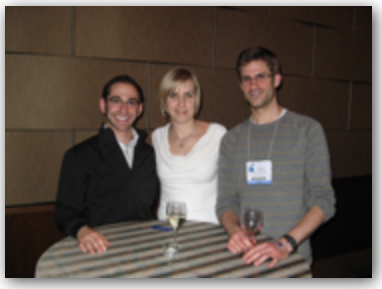








The Pharmacologist

News

Features

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Message from the President

Dear ASPET Members,

It has been an honor and privilege to serve as President of ASPET. As my immediate predecessors Joe Beavo and Brian Cox have noted, the year in office goes very quickly. Thanks to the outstanding work of our Executive Officer, Christie Carrico, Journals Director, Rich Dodenhoff, and their respective staff members, the operations of the society have proceeded virtually seamlessly. Laine Cocca, Director of Accounting and Customer Service Operations, has kept our accounting house in great shape. Thus the Council has been able to focus on more programmatic and long-term matters.

Once again financial issues have dominated the agenda, prompting some difficult decisions. On the bright side, the financial recovery has increased significantly the value of ASPET's investments. Thanks to Chip Rutledge and the Investment Subcommittee for their oversight. However, a large portion of the income from these investments is restricted to specific purposes, and publications provide almost 80% of our annual revenue. Despite the uniformly high quality of our journals, declines in subscriptions created an unsustainable projected budget deficit for the Society in 2011. Therefore the Board of Publications Trustees found itself compelled to cease publication of *Molecular Interventions (MI)*. Although Harry Smith and John Nelson had created a first-rate journal that has been very popular with our members, *MI* had run a substantial loss each year since its inception. Currently, other means are being sought to keep *MI* alive albeit, not under ASPET.

Another overriding issue has been current and projected cutbacks in federal funding for biomedical research. Public advocacy is more important than ever, and the efforts of the FASEB leadership under President William Tallman and our own Public Affairs Office under Jim Bernstein are especially vital now. A promising development is the involvement of increasing numbers of students and other young scientists in public advocacy, as evidenced during the recent Experimental Biology meeting.

To insure that ASPET continues to meet the needs of its members in the future, Council will be holding a long-range planning retreat this fall. The focus will be on the three to four major challenges that the Society is likely to face in the next 15 years. Currently solicitations are out to Council members, Division Chairs, and Committee Chairs to provide suggestions of the most important topics. Ideas from individual members are also welcome.

In closing, I thank you for the opportunity to serve the Society and will continue to be very active as Past-President. I welcome our new President, Lynn Wecker, who has many exciting ideas for new initiatives.

Sincerely,

James R. Halpert, PhD
President

Experimental Biology 2011 in Review

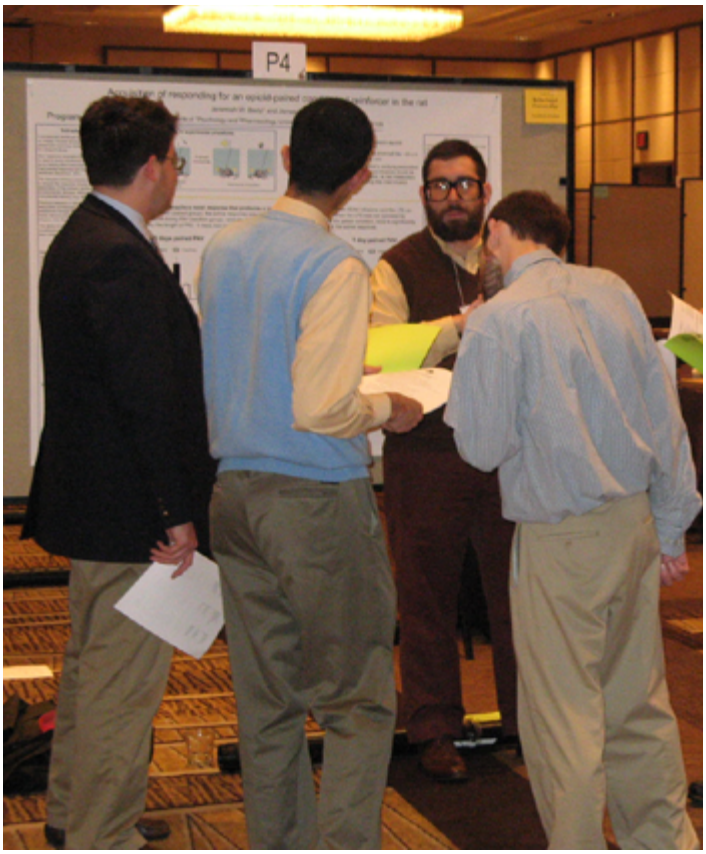
ASPET met as part of Experimental Biology 2011 from April 9 - 13 in Washington, DC. With over 13,000 attendees, the meeting provided registrants with a mix of important science and fun networking events.

Prior to the start of EB, on Friday, April 8, attendees at the EB 2011 meeting spent the day volunteering at SOME (So Others Might Eat). The event was organized by the Behavioral Pharmacology Division of ASPET. Volunteers prepared and served lunch to nearly 200 guests. For more than 40 years SOME has provided food and clothing, medical, dental, and mental health services, job training, and housing to the homeless and poor in Washington DC. A volunteer activity will be available on Friday, April 20, for those attending EB 2012 in San Diego.

The WIP Into Shape Networking Walk took place on Sunday, April 10. Walkers had a chance to snap a picture in front of the White House during a free tour of the White House grounds.

Clockwise from top left: Volunteers served lunch to nearly 200 guests for the organization SOME; Secretary/Treasurer, Dr. Bryan Cox speaks at the ASPET Business Meeting; Dr. Ron Hines, Chair of Public Affairs Committee; WIP Walk Participants get a tour of the White House grounds.

Best Abstract Competition



Student/Postdoc Mixer

ASPET Award Winners

Winners of the PhRMA Foundation Predoctoral and Postdoctoral Fellowships and Research Starter Grants in Pharmacology and Toxicology.

ASPET SURF Travel Award winners at EB 2011.

ASPET Graduate Student Travel Award Winners at EB 2011.

ASPET Young Scientist Travel Award Winners at EB 2011.

ASPET Award Winners

Poster Award Winners

Behavioral Pharmacology Division

Postdoctoral Fellows
First Place - Lindsey Hamilton
Second Place - Kevin Murnane

Graduate Students
First Place - Michelle Baladi
Second Place - Jeremiah Bertz

Cardiovasular Pharmacology Division

Postdoctoral Fellows
First Place - Stephane Bourque
Second Place - Abdul Khan
Runner Up - Michael Tranter

Graduate Students
First Place - James Kleinedler
Second Place - Sujay Kharade
Third Place - Deepesh Pandey
Fourth Place - Ketul Chaudhary
Runner Up - Kristen Osterlund
Runner Up - Bharath Mani
Runner Up - Erin Kohler

Drug Discovery, Drug Development and Regulatory Affairs Division

First Place - Bradford Fischer
Second Place - Remy Brim
Third Place - Azusa Takahashi
Fourth Place - Yohei Kakamu

Drug Metabolism Division

Postdoctoral Fellows
First Place - Dan Li
Second Place - An Wang
Third Place - Zhican Wang

Graduate Students
First Place - Emily Salman
Second Place - Caitlin Lynch
Third Place - Colleen Flynn

Integrative Systems, Translational and Clinical Pharmacology Division

Postdoctoral Fellows
First Place - Ross Corriden
Second Place - Tricia Smith
Third Place - Ahmed El-Yazbi

Graduate Students
First Place - Stephanie Mathews
Second Place - Crista Royal
Third Place - Nisha Nanaware
Fourth Place - Ozhan Ocal
Honorable Mention - Kelly Thuet
Honorable Mention - Mark Zimmerman

ASPET Award Winners

Poster Award Winners

Molecular Pharmacology Division

Postdoctoral Fellows
First Place - Benita Sjogren
Second Place - Mikel Garcia-Marcos
Third Place - Karen Kassel
Honorable Mention - Poulomi Acharya
Honorable Mention - Jacqueline Sayyah
Honorable Mention - Angeline Lyon
Honorable Mention - Rebecca Roof

Graduate Students
First Place - Meital Gabay
Finalist - Wei Kan
Finalist - Tracy Thennes
Finalist - Kevin Bigham
Finalist - Chuu-Yun Wong

Neuropharmacology Division

Postdoctoral Fellows
First Place - Spring Farrell
Runner Up - Kirsten Raehal
Runner Up - Sudhirkumar Yanpallewar

Graduate Students
First Place - Jason Kehrl
Second Place - Lisa Cortez
Second Place - Hideaki Yano
Third Place - Blaine McGuire

Toxicology Division

Postdoctoral Fellows
First Place - Kosuke Saito
Honorable Mention - Rakhee Agarwal

Graduate Students
First Place - Jessica Morgan
Second Place - Elina Pathak
Third Place - Christpher Kuhlman

Dolores Shockley Award

Carlos Monroy of the University of Iowa won the 2011 Dolores Shockley Award at the EB '11 meeting in Washington, DC for his abstract entitled, "Endogenous modification of RGS4 during oxidative stress.

Dolores Cooper Shockley is the first African American woman to earn a Ph.D. from Purdue University and the first African American woman in the United States to receive a Ph.D. in pharmacology. In 1977 she became chair of the Department of Microbiology at Meharry Medical College.

Stay connected with the ASPET Diversity Space on Facebook!

The object is to bring together ASPET members concerned and interested in minority issues to share and discuss news, updates, and important upcoming events. www.Facebook.com/ASPETDiversitySpace.

Save the Date!

2012 ASPET Annual Meeting

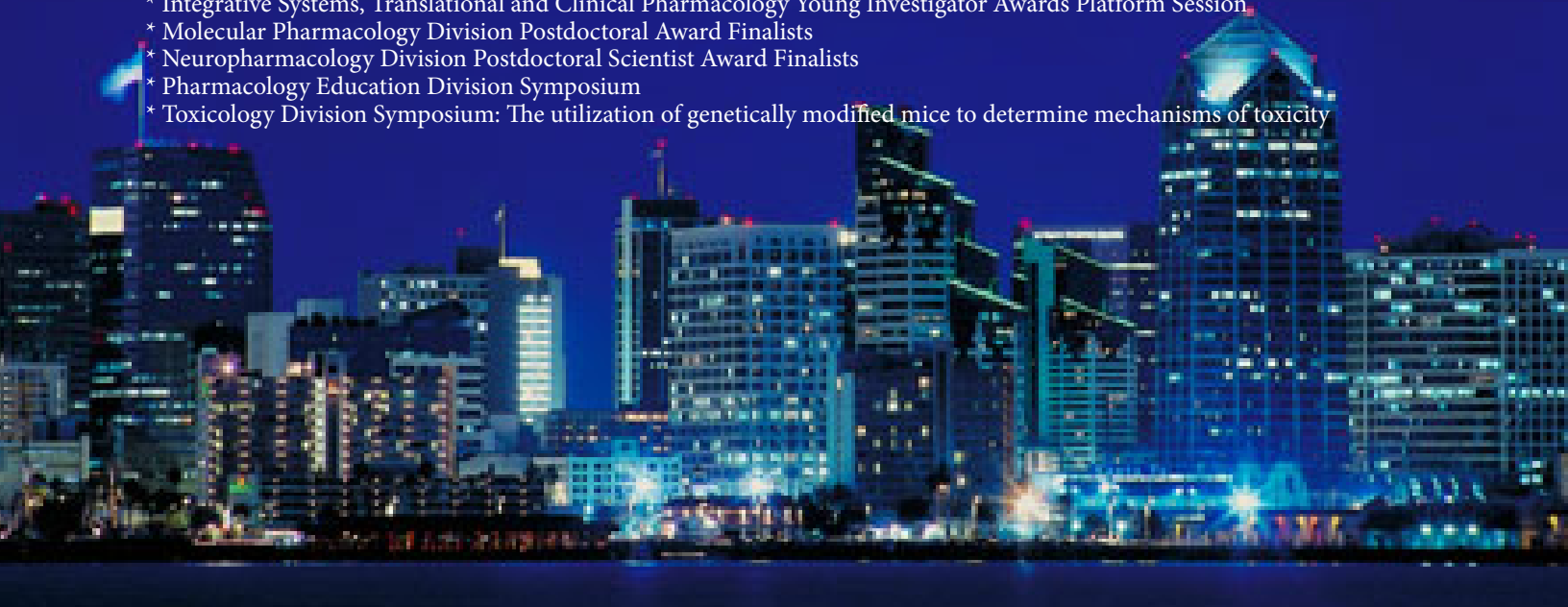
April 21 - 25
San Diego, CA

2012 Preliminary Symposia

* Adapting TBL techniques to teach pharmacology to graduate, professional and medical students
* Applications of biomaterials and drug delivery systems for enhancing tissue engineering and regeneration,
* Building a pharmacology course from scratch: Benefits and pitfalls of a cut and paste pharmacology course
* Clinical pipeline of marine natural products: The odyssey continues
* Discovery of Protein Kinase inhibitors for CNS Disorders: Opening new avenues for unmet needs
* Emerging concepts in G protein dependent PLC regulation and physiology
* Emerging role of heme oxygenase in cardiovascular and metabolic diseases
* From structure to knockout: Common themes between CYPs and ABC transporters
* Lifting the fog: Cognitive enhancement to improve treatment outcome and quality of life associated with neuropathologies
* Location, location, location: The role of membrane microdomains in dopamine transporter function and trafficking
* Membrane rafts in endothelial signaling
* Models of affective disorders and pharmacological interventions: The influence of etiology in treatment approach
* Multi target agents – the yin and yang of rational drug discovery
* NADH-Cytochrome P450 oxidoreductase: Roles in physiology, pharmacology, and toxicology
* Neurophyschological correlates of stimulant treatment for ADHD in adolescents and adults
* Opioid-induced bowel dysfunction
* Perivascular (p) fat: Pharmacology, physiology and phunction
* Pharmacology and therapeutic potential of histamine H3 and H4 receptor ligands
* Protein-protein interaction (PPI) interfaces as therapeutic targets: promises and challenges
* Regulation of TRP channels
* Role of nuclear receptors in lipid dysregulation and obsesity-related diseases
* Role of pharmacogenetics in oncology
* Steroid signaling via G protein-coupled receptors
* Targeting PI3K for human diseases
* The behavioral pharmacology of pain
* The Nociceptim/orphanin FQ-NOP receptor system: Neurobiology, pharmacology and therapeutic opportunities
* The real world of therapeutic drugs: Bench to boardroom, the bedside and beyond
* Toll-like receptors in neuroplasticity and disease

DIVISION SESSIONS

* Behavioral Pharmacology Division Symposium:The behavioral pharmacology of drugs of abuse and drug dependence: A tribute to Steve Holtzman and Bob Schuster
* Cardiovascular Pharmacology Division Trainee Showcase
* Drug Discovery, Development & Regulatory Affairs Division Symposium: Mitochondrial dysfunction in human disease
* Drug Metabolism Division James Gillette Best Paper Award and Platform Session
* Integrative Systems, Translational and Clinical Pharmacology Young Investigator Awards Platform Session
* Molecular Pharmacology Division Postdoctoral Award Finalists
* Neuropharmacology Division Postdoctoral Scientist Award Finalists
* Pharmacology Education Division Symposium
* Toxicology Division Symposium: The utilization of genetically modified mice to determine mechanisms of toxicity



Journals
by Rich Dodenhoff

Coming Soon to the Small Screen

ASPET's journals are going mobile! By July, a version of the Society's journals optimized for the small screens of mobile devices will be available. The mobile version will work on any device with a web browser and is device neutral. A variety of operating systems including iPhone, Android, Blackberry, Microsoft Windows, Palm, Symbian, and Linux will be supported. Readers will be able to access tables of contents, abstracts, and both the full-text XHTML and PDF versions of all articles from the Society's four journals.

Figures, tables, citations, and supplemental data will also be available. The mobile device version includes search functionality and links, just like the regular online version. Don't want to read any entire article on your smart phone? You can email the citation of any article that interests you to your desktop for later reading.

To optimize the space available on small screens, the mobile version has no advertising and omits some of the links found on the desktop version. For example, readers can use key word searches of titles, abstracts, and full text articles or search by author. However, the pull-down menus to limit the range of dates of a search are not available on the mobile version. But, the mobile version search results can be sorted by best match or newest first.

Reading an article on a tiny screen may not be for everyone, but the number of mobile phones in use now greatly surpasses desktop computers. A rapidly growing reader base is comfortable with small screens and expects to access information from mobile devices. Mobile device versions are often used to search content or provide alerts to new content. The resulting articles are then forwarded to desktop devices for later use. Recognizing this growing demand, the Board of Publications Trustees decided to implement a mobile device version for ASPET's journals.

Accessing ASPET content from a mobile device will be as easy as from a desktop. Members will log in with their normal subscription user name and password. Institutional subscriptions will be accessed through campus Wi-Fi connectivity based on IP address recognition—just as with desktop access.

The mobile version sites are currently undergoing quality assurance testing. Their availability will be announced through ASPET's Twitter feeds, a notice on each journal's homepage, and the regularly scheduled email updates from the Society. ASPET's rich corpus of pharmacological research will find new audiences and be more accessible than ever.

Journals
by Rich Dodenhoff

The End of Print Is Near

At least it is for ASPET's journals. This is the last year that *JPET*, *Pharmacological Reviews*, *Molecular Pharmacology*, and *Drug Metabolism and Disposition* will be available in print. The Society will move to online-only publication starting in 2012.

The number of print subscriptions to ASPET's journals has been decreasing ever since the journals went online in 1998, and the pace at which libraries are converting to online-only access has accelerated in recent years. As of late May, only 31% of ASPET's institutional subscriptions include print. From what librarians and readers tell us, most of those print copies go directly into library stacks, never to be touched again.

On the bulletin board in my office I have a cartoon that is at least 15 years old. It shows a bedraggled prophet (of the locusts-and-honey ilk) on a crowded city sidewalk, a large, weighty cathode-ray television set on his shoulder with the message "The end of printed matter is near." A beloved publishing mentor gave me the cartoon years ago, and we had a good laugh over it. It seemed implausible then. The man with the big TV is also carrying an enormous battery to power it. For scientific publishing, however, it has proved to be prescient.

The online version of ASPET's journals has evolved into a greater resource than its print sibling. Remember author and subject indexes? Readers have been using search engines for more than a decade to look across journal titles for the content they need. Data supplements provide information that cannot be presented in print or would be too costly to print—and they are one reason the online version is the version of record for ASPET's journals. The ability to correct errors, provide links to many types of resources, and present content in ways that meet reader needs beyond the limits of ink on paper are just some of the advantages of online publication.

The Board of Publications Trustees debated ceasing print publication during two meetings earlier this year. Print has been around for centuries, we're used to it, it's comfortable and familiar, and many hate to see it go. At the same time, research articles in the life sciences are rarely read in hard copy. When was the last time you read the print version of a research journal? Print takes up a lot of dearly needed space in library buildings—or, increasingly, in off-site storage facilities where the copies are difficult to access. Rising print production and mailing costs contribute to rising subscription rates. Concerns about long-term access have been addressed by archives in distributed networks of servers such as CLOCKKS, which safeguards ASPET's journals for the future.

For the time being, articles will be formatted based on printed pages. Reprints, for the few who still buy them, will be available after this year. A print-on-demand service for entire issues is being looked into for those who absolutely have to have a hard copy. By moving away from print, we can explore and take advantage of new ways of organizing and presenting information, ways that break free of 8½ x 11 inch pages. There will be no need for color publication fees once the journals appear online only, and I expect that color will be used much more to convey information and make illustrations more interesting.

The end of print is less of a loss than an opening to new opportunities in scientific communication, and ASPET's journals are going to take advantage of those opportunities.

Public Affairs
by Jim Bernstein

Legislative Update

The House issued what are known in Washington parlance as the 302(b) allocations that provide overall funding levels for each of the 12 subcommittees that fund federal programs and agencies in FY 2012.

While funding for the Defense appropriations subcommittee would receive an increase of 3.3% above FY 2011, the 11 other appropriations subcommittees would receive cuts totaling $48 billion, an 8.8% decrease from FY'11.

The subcommittee responsible for providing programmatic FY 2012 funding levels for NIH is the Labor/HHS & Education subcommittee. Labor/HHS would receive a decrease of $18.2 billion, or an 11.6% cut from its FY'11 allocation. The Agriculture subcommittee that funds FDA received a 13.4% cut, and on May 24 that subcommittee proposed a $287 million or 11.5% cut to the FDA. The Labor/HHS subcommittee has not yet met to decide it programmatic funding decisions.

Given the political and economic climate, even if the numbers improve - and these numbers may be politically unsustainable - they will still not be favorable to allow for increases among various programs and agencies. But the significance of the 302b numbers is obvious. There will be less money to spend on programs this year than the year before. Appropriation subcommittee's have finite numbers of dollars to spend. Should the $18.2 billion cut be finalized by Labor/HHS, it would put even greater pressure on the subcommittee to make significant reductions to programs under its jurisdiction. And with the NIH already consuming approximately 18% of the subcommittee's portfolio, it becomes more difficult to realize even a modest increase and increasingly hard to avoid more substantial cuts to the agency.

In the meantime, this summer will likely see little progress on a budget resolution. The Senate has already decided to defer any budget resolution to discussions led by Congressional leadership and the White House. And the so-called Gang of Six - a bipartisan group of six Senators that was trying to agree to a comprehensive deficit reduction package that included tax increases as well as spending cuts - is now short one. There is also discussion about possible enactment of provisions that would force automatic cuts if deficit reduction targets are not met. Senate Minority Leader Mitch McConnell (R-KY), referring to the various budget and deficit reduction packages floating about, stated that compromise on the deficit and raising the debt ceiling limit would likely come out of discussions with Congressional leadership and the Vice President, and that "something significant is going to come out of that, or you are not going to be able to get the votes to raise the debt ceiling."

So in the coming weeks we will certainly see difficult, hard-line negotiations and some significant spending cuts to the end line before the debt ceiling limit is raised later this summer. Congress almost certainly won't address entitlement spending in any meaningful way until after the 2012 elections. But Congress will have to have something to show with respect to deficit reduction, and that will fall hard on domestic discretionary spending programs like NIH, FDA and other worthwhile programs. And NIH and other federal programs are likely to face another year of a series of Continuing Resolutions that will fund the government beyond October 1, when the FY 2012 begins. At the AAAS Forum on Science and Technology Policy, John Holdren, the White House's science and technology adviser, noted the "enormous challenge…will be sustaining support for science and technology in a regime of overall budget cuts."

Public Affairs
by Jim Bernstein

Fed's Bernanke Supports R&D to Promote Economic Growth

Federal Reserve Chairman Ben Bernanke, in a speech last month at Georgetown University, underscored the role of federal funding for research and development to help promote economic growth. Bernanke mentioned several studies that indicate the many social and economic benefits from basic research, including the development of the biotech industry and the role of computer science and engineering in forming the internet economy. Bernanke also indicated that new measurements must be created to evaluate research output to better inform health and science policy.

NRC Forms Panel to Review Use of Chimpanzees in Biomedical Research

The National Research Council has formed a panel to review "The Use of Chimpanzees in Biomedical and Behavioral Research." The committee's charge is to "conduct a study and issue a letter report on the use of chimpanzees in NIH-funded research that is needed for the advancement of the public's health. The primary focus will be animals owned by the National Institutes of Health, but will also include consideration of privately owned animals that are currently financially supported by NIH." For more information, visit: http://www8.nationalacademies.org/cp/projectview.aspx?key=49370

Staying on Schedule

by D. E. McMillan

P. B. Dews Award Lecture
Lecture given at Experimental Biology 2010
by the P. B. Dews Lifetime Achievement Award Recipient

B. F. Skinner's operant conditioning provided the techniques for the first of Peter Dews' major contributions to behavioral pharmacology. In a simple, but elegant experiment, Dews (1955) showed that the effects of pentobarbital on behavior depended on the schedule of reinforcement maintaining the behavior. Food-deprived pigeons were rewarded for key pecking under a fixed-ratio (FR) schedule which required a fixed number of responses to produce the food reinforcer or under a fixed-interval (FI) schedule which required that a response be made after a fixed time had elapsed. Responding was decreased at a dose four times lower under the FI schedule than the FR schedule. Since all the pigeons were tested under both reinforcement schedules, these differences in the effects produced by pentobarbital could not be attributed to individual differences in sensitivity to the drug. Obviously, the effects of pentobarbital depended on the schedule of reinforcement maintaining the behavior. This experiment had an impact on pharmacology not only because of the elegance of the findings, but also because they were published in the *Journal of Pharmacology and Experimental Therapeutics*, the flagship journal of pharmacology.

Fig. 1 Some of the early behavioral pharmacologists at Harvard Medical School pictured with B. F. Skinner (upper right) who was a major influence during the formative years of the discipline. Clockwise from Skinner are Peter Dews, Bill Morse, Roger Kelleher, Jim McKearney and Don McMillan. These photos may have been taken by Victor Laties at a Behavioral Pharmacology Society Meeting in the 1970s.

A second major contribution of Peter Dews to behavioral pharmacology evolved from other early observations of drug effects on schedule-controlled behavior. In these early experiments, Dews (1958) observed that methamphetamine increased low rates of responding maintained under some schedules, while decreasing higher rates of responding under other schedules. This observation became known as rate dependency, and became a focus for research in behavioral pharmacology for several decades.

These two contributions were relatively new when I arrived at Harvard Medical School (HMS) in January of 1965 with the ink hardly dry on a new diploma from the University of Pittsburgh. My mentor, Robert A. Patton, and Peter Dews sat on the same NIH study section which led to my opportunity to do postdoctoral work at HMS. This was a great time to be at HMS. Peter Dews, Bill Morse, and Roger Kelleher were at the peak of their creativity. Otto Krayer, one of the most respected names in pharmacology, was the Chair of the department. There were no other post-docs in the behavioral pharmacology group when I arrived, although later I was joined by George Vaillant and Sue Iversen. Two pre-doctoral students who had important impacts on ASPET and pharmacology in the United States were finishing up their degrees. C. B. Smith was completing an M.D./Ph.D. program at HMS, and part of his training had taken place in the Dews lab. Charles Rutledge was completing his Ph.D. under the direction of Norman Weiner, and Chip also had spent time in the Dews laboratory working with Roger Kelleher. This was an exceedingly stimulating group of scientists. My major mentor at HMS was Bill Morse, the initial recipient of this award. The behavioral pharmacology group is shown in Figure 1. My first studies with Bill were on the effects of narcotics and narcotic antagonists on schedule-controlled behavior in pigeons. It would be some years before ideas about mu, kappa, and delta receptors were described, but we were impressed by the similar effects of morphine, methadone, and several narcotic agonist/antagonists on behavior in these experiments.

I quickly became interested in the emphasis of these pioneer investigators on the interaction of schedule-controlled behavior and drug effects. One of my early experiments was to extend Dews' experiments on methamphetamine to other sympathomimetic amines (McMillan, 1968a) by studying the effects of a number of these compounds in pigeons responding under a multiple FR FI schedule of food presentation (Figure 2). Ephedrine, d-amphetamine, and mephentermine produced inverted U-shaped dose-effect curves with clear increases in the low rates of responding at the peak of

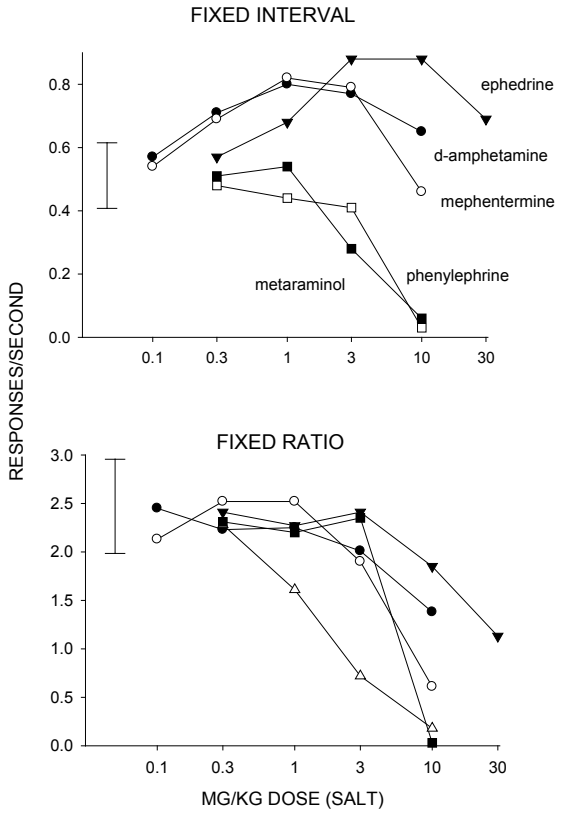


Fig. 2 Effects of various sympathomimetic drugs on responding under a fixed-interval (upper) and fixed-ratio (lower) schedule by pigeons. Points are means from a group of pigeons. Brackets show the control rate of responding without drugs. Modified from McMillan (1968a).

the dose-effect curve under the FI component of the schedule. Phenylephrine and metaraminol, sympathomimetic drugs with very limited penetration into the central nervous system, only decreased rates of responding under the FI schedule. The higher rates of responding under the FR component were only decreased by all of these drugs, regardless of their CNS penetration. Thus, the rate-dependent effects of methamphetamine that were described by Dews were extended to other centrally active sympathomimetic drugs. Although these data were confirmed in other species with other schedules of reinforcement, to simplify this presentation all of the experiments in this manuscript will be confined to studies with pigeons using FR and FI schedules.

My doctoral thesis had been concerned with the putative role of changes in the levels of serotonin, norepinephrine, and dopamine as mechanisms underlying the behavioral effects of amine-depleting agents and MAO inhibitors, so it was natural for me to turn to studies on the mechanism underlying the rate-dependent effects of amphetamine. Toward this end, I used tetrabenazine to deplete catecholamines, anticipating that it would block the rate-increasing effect of d-amphetamine, which was thought to produce its effects indirectly by releasing catecholamines (McMillan, 1968b). Under the FR component a 10 mg/kg dose of tetrabenazine reduced responding by about one-third, while 30 mg/kg almost eliminated responding (Figure 3). When d-amphetamine was administered alone, the usual inverted U-shaped dose-effect curve was obtained with clear increases in rates of responding. In the presence of tetrabenazine, the inverted U-shaped dose-effect curve for d-amphetamine was retained, although the curve began at a lower rate due to the dose-related decreases in response rates produced by tetrabenazine.

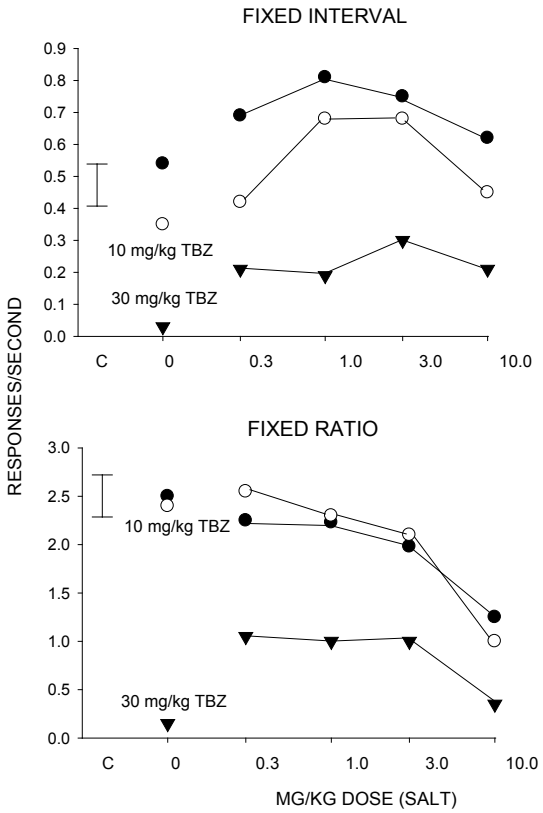


Fig. 3 Effects of d-amphetamine on responding under a fixed-interval (upper) and a fixed-ratio (lower) schedule after administration of saline or two different doses of tetrabenazine. Points are means from a group of pigeons. Brackets show the control rate of responding without drugs. Modified from McMillan (1968b).

Only the 30 mg/kg dose of tetrabenazine lowered the control rate of responding under the FR component showing that the effects of tetrabenazine also were schedule dependent, just as the effects of pentobarbital had been in Dews' original report. More interesting is the observation that the rates of responding under the FR component which were not increased before tetrabenazine were increased by d-amphetamine after the 30 mg/kg dose of tetrabenazine had lowered these response rates. Thus, this study replicated both important observations of Dews by showing that the effects of tetrabenazine and amphetamine were schedule dependent and that amphetamines increased low rates of responding and decreased high rates, even when the low rates of responding were drug induced.

In 1967, I completed my post-doctoral work at HMS and accepted a position in Robert Furchgott's Department of Pharmacology at the Downstate Medical Center in Brooklyn. In addition to Bob Furchgott, who was later to be awarded the Nobel Prize, the Department had several faculty members who were to become chairs of pharmacology departments, including Ronald Rubin and Stanley Friedman. There were 196 medical students in the class but student laboratories could accommodate only 100, so we ran the labs twice a week. These labs were extensive, beginning at 10 am and often lasting until 3 pm. During my time at Downstate serving as a laboratory instructor, I learned a great deal of autonomic and cardiovascular pharmacology, particularly with the help of Jules Belford. The Downstate faculty in the late 1960s is shown in Figure 4.

Fig. 4 The pharmacology faculty at Downstate Medical Center about 1968. Robert Furchgott and Jules Belford are in the middle of the front row. Don McMillan, Stanley Friedman, and Ronald Rubin are in the middle of the second row.

At Downstate, my interests in drug effects on schedule-controlled behavior and rate dependency continued. In his original rate-dependency paper, Dews (1958) had used both ratio and interval schedules in demonstrating the rate-dependent effects of methamphetamine, but it still was not entirely clear if the effects of amphetamines depended primarily on the baseline rate of responding, or if the effects depended on whether an interval or a ratio schedule maintained the behavior. To answer this question, I compared the effects of d-amphetamine on responding under FR and FI schedules at a variety of parameter values (McMillan, 1969). Most experiments using pigeons as subjects at the time

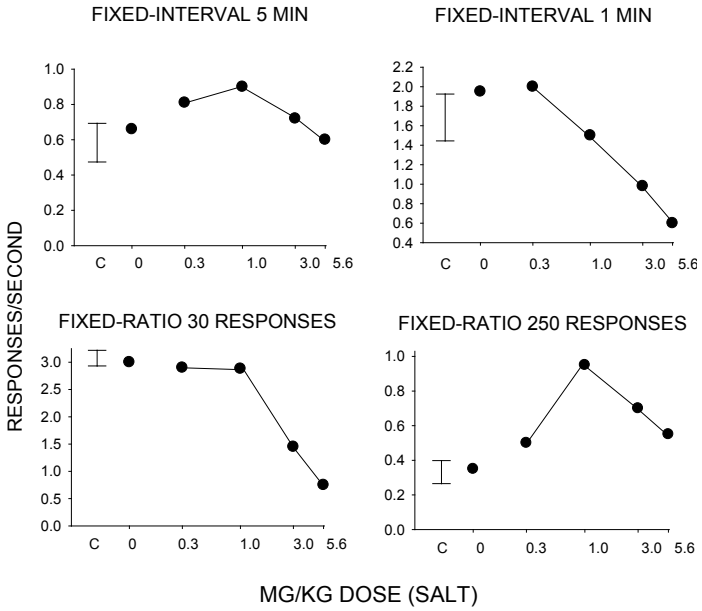


Fig. 5 Effects of d-amphetamine on responding under fixed-ratio and fixed-interval schedules that generate differential control rates of responding. Points are means from a group of pigeons. Brackets show the control rate of responding without drugs. Modified from McMillan (1969).

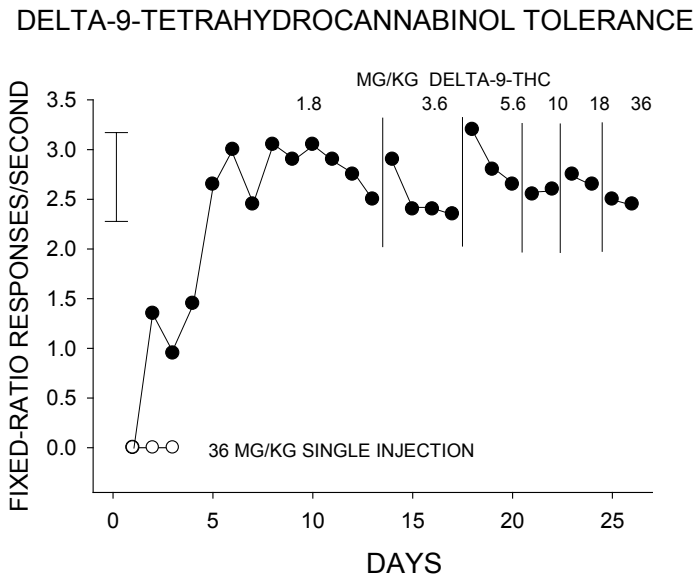


Fig 7. Effects of repeated administration of Δ9-tetrahydrocannabinol on responding under a fixed-ratio schedule. Points are means from two pigeons. The brackets show the control rate of responding without drugs. A tremendous tolerance to the drug effect was obtained. Modified from McMillan et al. (1970).

used FI schedules of 5 or 10 minutes and FR schedules of 20 to 50 responses. In pigeons, these schedule values generated low rates of responding under the FI schedule (usually well under 1 response/second) and high rates under the FR schedule (usually 3-4 responses/second). To determine which was more important for the effects of amphetamine, the rate of responding or the schedule of reinforcement, I compared the effects of d-amphetamine on responding maintained under FI 1-min schedules (in which the rate of responding was relatively high) and FR 250 schedules (in which the rate of responding was relatively low) with the more customary FI and FR values that had been employed in the past. The results are shown in Figure 5. Under a mult FR 30 FI 5-min schedule of reinforcement, the usual rate-increasing effects of d-amphetamine were seen during the FI component, while the much higher rates under the FR component were only decreased. Shortening the FI to 1 min markedly increased the baseline rate of responding and abolished the rate increases usually produced by d-amphetamine when behavior was maintained under FI schedules. In contrast, increasing the FR requirement to 250 responses greatly decreased the baseline rate of responding and allowed increases in response rate after d-amphetamine, which had a dose-effect curve of the usual inverted-U shape. Thus the amphetamine effect depended more on the baseline rate of responding than on whether the schedule maintaining the behavior was an FI or an FR schedule.

Although working in the Department of Pharmacology at Downstate was a rewarding learning experience, my family and I did not like living in a big city, so I was receptive to the offer from Louis Harris to join his group in the Department of Pharmacology at the University of North Carolina (UNC). At Chapel Hill I worked with Lou and Bill Dewey on the pharmacology of the cannabinoids. We are shown in Figure 6.

Jerry Frankenheim, who was my postdoc at Downstate, had stimulated my interest in marijuana research, so it was a natural transition for me to conduct research in this area. At both HMS and Downstate, I had studied opioid tolerance using schedule-controlled behavior (McMillan and Morse, 1967; Heifetz and McMillan, 1971) so the study of tetrahydrocannabinol tolerance was of early interest. However, I had to obtain enough Δ9-tetrahydocannabinol to conduct these studies, which was a problem since limited supplies of the drug were available.

At the time, marijuana was believed to produce a "reverse tolerance" because human reports suggested that experience with marijuana smoking was a necessary condition for experiencing the effect. When adequate supplies of the drug became available, we began our tolerance experiments by injecting Δ9-tetrahydocannabinol into pigeons responding under a mult FR FI schedule. The results for the FR schedule are reproduced in Figure 7 (McMillan et al., 1970).

Now & Then

Fig. 6 Faculty members of the CNS group at the University of North Carolina. Right to left in the front row of the right side: Don McMillan, Bill Dewey, Lou Harris. Billy Martin is shown in the second row. The photo on the right was taken in Chapel Hill in the 1970s and the photo on the left was staged at a meeting of the College on Problems of Drug Dependence in the early 2000s.

An initial dose of 1.8 mg/kg Δ9-tetrahydocannabinol completely abolished responding at two hours after administration. However, after the second injection, given one day later, there was partial recovery of responding; and by the fifth injection responding was virtually unaffected. Over a period of several weeks the dose was gradually increased to 36 mg/kg with no further decreases in response rate. When the 36 mg/kg dose was injected into drug naïve pigeons, the pigeons were unable to even stand up for 2-3 days, much less

respond under any schedule of reinforcement. In fact, some of these birds had stopped drinking and had to be intubated with water to maintain hydration. In subsequent experiments we further established the phenomenal magnitude of the tolerance by increasing the dose to 180 mg/kg. Subsequent studies showed that the effect could be replicated in other species, with other responses, that there was cross tolerance to other active cannabinoids, and that the mechanism of the tolerance was not metabolic (McMillan et al, 1972; McMillan et al, 1973). Could these studies of tetrahydrocannabinol tolerance have been made without the use of schedule-controller behavior? Certainly, but it is also true that the use of schedule-controlled behavior established the phenomenal magnitude of the tolerance in part because they allowed a quantitative basis for measuring behavioral effects of drugs, and because the schedule-controlled behavior was exquisitely sensitive to the effects of cannabinoids.

Although I was occupied by a wide range of experiments in behavioral pharmacology at UNC, the issue of rate dependency continued as one of my primary interests. One of the questions facing the rate-dependency hypothesis involved punished responding. The usual procedure for studying drug effects was to establish a response using schedule-controlled behavior and then to suppress responding by punishing responses according to a schedule of punishment using mild electric shock as the punishing stimulus. Geller and his colleagues (e.g., Geller, 1964) had shown that a number of anti-anxiety drugs increased responding suppressed by punishment. Since punishment reduced responding to low rates, the question arose as to whether drugs that increased punished responding did so simply because punished responding occurred at a low rate, or if other factors influenced the effect of these drugs on punished responding.

The key to answering the question was to develop a way to match rates of punished and unpunished responding. To do so, I turned to FI schedules again. Responding under FI schedules is characterized by a pause at the beginning of the interval, followed by a gradually increasing rate of responding as the interval progresses. By comparing the patterns of responding under FI schedules with and without punishment it was possible to match rates of punished responding occurring late in the FI with similar rates of unpunished responding occurring earlier in the interval. The entire range of response rates generated by these schedules were further analyzed by plotting regression lines for different rates of punished and unpunished responding that occurred within the FI schedules according to the method of Dews (1964).

Figure 8 shows for individual subjects the rate-dependent effects of pentobarbital and chlordiazepoxide, two drugs well known to increase punished responding (McMillan, 1973). As was true of responding that was not punished, low rates of punished responding were increased more than higher rates of punished responding. In addition, the slopes of the regression lines fitted to the points for punished responding were uniformly steeper than those for unpunished responding. Both pentobarbital and chlordiazepoxide increased punished responding more than matched rates of unpunished responding. Thus, the effects of these drugs on punished responding were rate dependent, but the increases in punished responding were not simply due to increases in the normally low response rates, as low rates of punished responding were increased more than matched rates of unpunished responding.

Interestingly, drugs that do not increase punished responding have quite the opposite effect. Chlorpromazine and d-amphetamine increased rates of unpunished responding to a consistently greater extent than matched rates of punished responding. Overall, the effects of each of these drugs were also rate dependent, but clearly factors in addition to control response rates influence the effects of drugs on punished behavior.

After I moved to the University of Arkansas for Medical Sciences in 1978, my research focused on models of drug abuse using oral drug administration, and again on behavioral tolerance. But eventually my attention returned to the role of the schedule of reinforcement, this time in drug discrimination. Many drugs produce pharmacological stimuli that the drug user can detect, and these stimuli probably relate importantly to the subjective effects of drugs, which in turn relate to the issues of drug abuse and non-compliance to medication schedules. In the most common procedure for studying drug discrimination, subjects are trained to make one response if drug is administered and to make a second response if vehicle is administered before the session. The only discriminative stimuli upon which the subject can make the response choice are those produced by the drug. The procedure can be further extended to more than two response options. Indeed, pigeons are able to discriminate among four response options with a high degree of accuracy (Li and McMillan, 2001).

In some early experiments on morphine discrimination, we observed some marked differences in the shape of the dose-

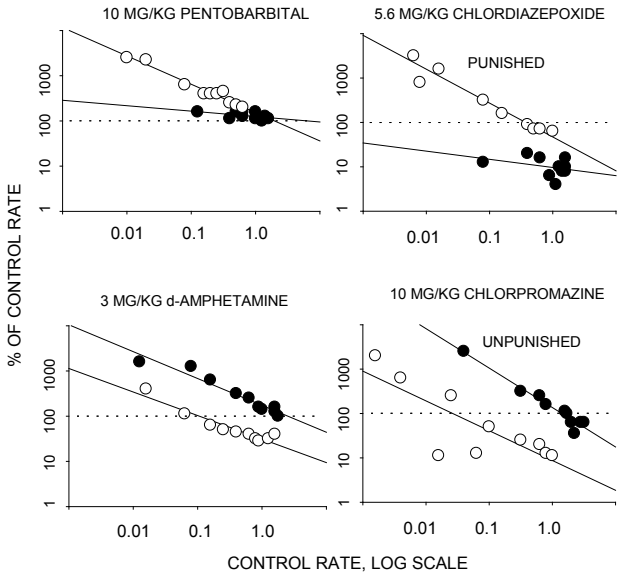


Fig. 8 Effects of drugs on local rates of punished and unpunished responding within fixed-interval schedules. Note that rates of punished responding (open points) were increased more than comparable rates of unpunished responding (filled points) by pentobarbital and chlordiazepoxide. In contrast, with d-amphetamine and chlorpromazine rates of unpunished responding were increased more than comparable rates of punished responding. Coordinates are logarithmic. Modified from McMillan (1973).

effect curves that depended on the schedule of reinforcement maintaining the behavior (Massey et al., 1992). Under an FR schedule, subjects switch from emitting almost exclusively saline-appropriate responses to emitting almost exclusively morphine-appropriate responses as dose is increased beyond some minimum. Under an FI schedule, exclusive emission of one of the responses is rarely the case, and the shift to responding on the morphine-appropriate key as dose is increased occurred more gradually with intermediate doses producing responding on both keys.

These observations bear on a fundamental controversy in drug discrimination research in particular and behavioral research on stimulus control more generally. Colpaert (1991) has argued that drug discrimination is quantal: the subject emits the drug-appropriate response if the drug is detected and emits the "vehicle-appropriate" response if the drug is not detected. On the other hand, Stolerman (1991) has suggested that the response to drug stimuli in drug discrimination is graded with the proportion of drug-appropriate responses determined by the degree to which a particular dose produces stimuli that are similar to those of the training drug. Holloway and Gauvin (1989) suggested that perhaps the schedule of reinforcement was what determined whether the drug discrimination dose-effect curve was quantal or graded with some schedules favoring quantal responding and other schedules favoring graded responding. With these questions in mind, we embarked on a series of experiments to study the role of the schedule of reinforcement on drug discrimination dose-effect curves.

In one of these experiments, we trained a discrimination among three stimuli: saline, morphine, and pentobarbital (McMillan et al, 2001) where responding on the three keys was maintained under a mult FR FI schedule. After responding stabilized, greater than 90% of responses were on the appropriate key. Subsequent assessments of dose effects yielded curves for morphine and pentobarbital that were quantal in shape when determined under the FR schedule, but graded with slopes that were not as steep under the FI schedule (Figure 9).

Colpaert (1985) suggested that quantal responding maintained under FR schedules in drug discrimination experiments occurs because responses on the incorrect key are never reinforced during training sessions. To determine if quantal dose-effect curves in drug discrimination experiments depend on the absence of reinforcer delivery for one of the response alternatives during training sessions, we employed concurrent reinforcement schedules. During training sessions under a concurrent FR 10 FR 40 schedule, each tenth response on the drug-appropriate key was reinforced after pentobarbital administration, but each 40th response on the saline-appropriate key was also reinforced. After saline administration, the response contingencies for the two keys were reversed. Thus during training sessions, responses were reinforced on both keys, with drug discrimination being established when the subjects consistently responded on the key associated with the smaller FR requirement (McMillan and Li, 1999). Similar experiments were conducted using concurrent FI schedules using a short and a longer FI duration (McMillan et al., 1997). Under both of these concurrent schedules, responding on the "incorrect" key was reinforced during training, and this occurred more frequently under the concurrent FI FI schedule than under the concurrent FR FR schedule. During the determination of dose-effect curves the ratio values in the concurrent FR FR schedules were equalized under the two components as were

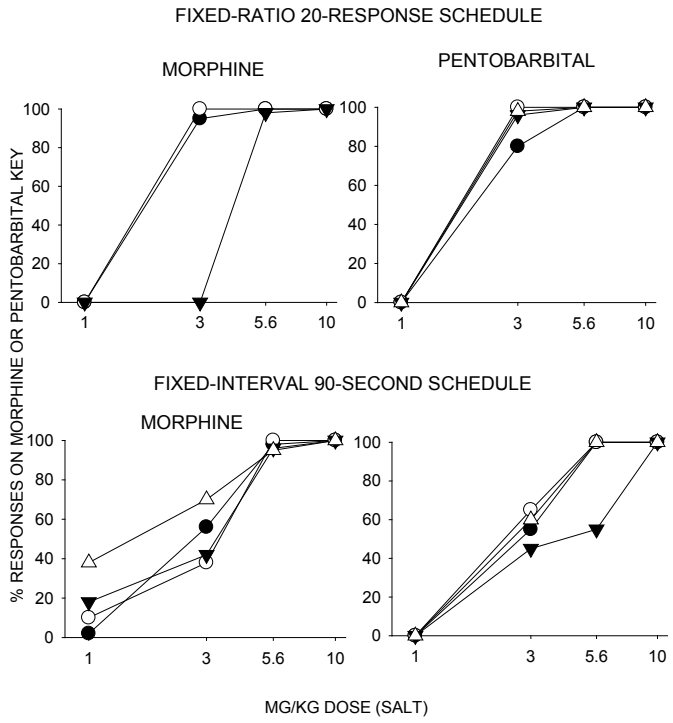


Fig 9. Dose-effect curves for morphine (left) and pentobarbital (right) under a fixed-ratio (top) and fixed-interval (bottom) schedule of reinforcement in pigeons trained to discriminate among morphine, pentobarbital and saline. Points are means from a group of pigeons. Modified from McMillan et al. (2001).

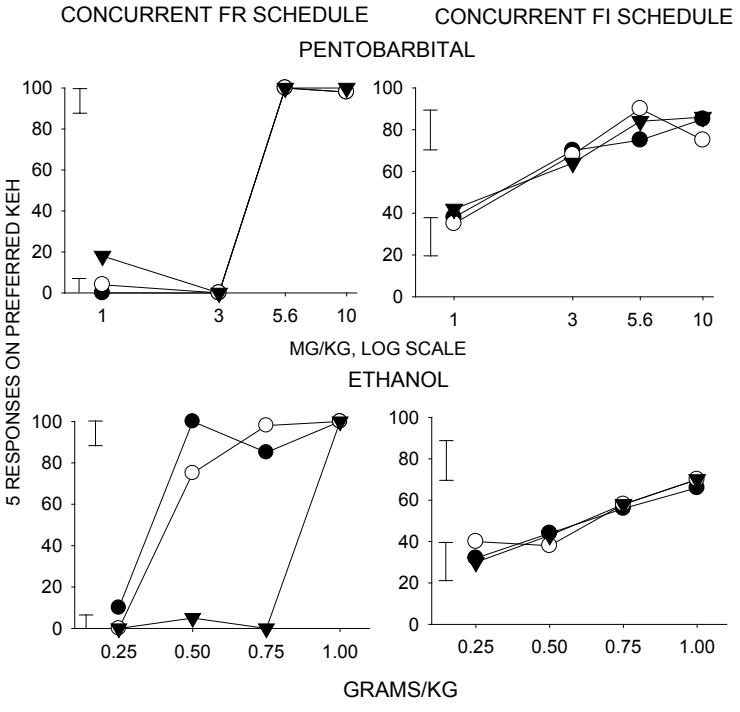


Fig 10. Effects of pentobarbital and ethanol in pigeons trained to discriminate between pentobarbital and saline under concurrent FR FR and concurrent FI FI schedules. Points are means from a group of pigeons. Brackets show the percentage of responses on the preferred key without drug administration. Modified from McMillan et al. (1997).

the FI durations under the concurrent FI FI schedules. Quantal pentobarbital dose-effect curves were obtained under the concurrent FR FR schedule and graded dose-effect curves were obtained under the concurrent FI FI schedule even though responding had been reinforced on both keys drug training sessions under these schedules (Figure 10). Thus the development of quantal dose-effect curves in drug discrimination does not depend on the absence of reinforcement for responses on the "incorrect" key during training.

Most drug abusers take many different drugs, and often take those drugs in combination. When drug combinations are administered, the potential stimuli for the discrimination include those produced by each of the component drugs alone and those produced by the drug combination. Most studies on the stimulus effects of drug combinations have trained animals to discriminate between a drug mixture and saline. When subjects trained under this procedure receive either of the component drugs, responding is usually restricted to the drug combination key (e.g. Mariathasan and Stolerman, 1994). If subjects are trained to discriminate between the drug combination and the individual drugs in the combination, pharmacological specificity is increased (e.g. Stolerman et al., 1999) although the procedure does not differentiate the mixture and its components from other drugs that produce discriminative stimuli very different from the mixture and its components.

Our approach to this problem has been to develop four-choice drug discrimination procedures in which the subjects are trained to discriminate among a drug combination, each of the components in the drug combination, and saline (McMillan and Li, 2002). In addition to allowing a unique study of the effects of drug mixtures, the procedure is potentially useful for studying the discriminative stimulus effects of drugs whose effects are depend on more than one mechanism. For example, many sdfdf drugs produce their effects, including discriminative-stimulus effects, by binding to more than one type of receptor. This procedure offered the potential of determining the contribution of each receptor population to the discriminative-stimulus effects of a drug known to produce effects by binding to two receptors by training subjects to discriminate among drugs relatively selective for each of those receptors and the combination of those drugs, as well as saline. Thus these procedures had the potential for studying the contribution of multiple receptor mechanisms to the complex discriminative-stimulus effects of a drug.

The question arises as to what schedule of reinforcement would be most appropriate to maintain responding in such studies. Might graded responding have greater potential for revealing the influence of different mechanisms to the discriminative stimulus effect of a drug? The empirical approach to this question would be to perform these studies using both FR and FI schedules. Toward this end, we chose to study opioid drugs because of the availability or drugs with specificity for binding to mu or kappa receptors (Wessinger et al., in press). One group of pigeons was trained under a four-choice procedure in which responses on one key were reinforced under an FR schedule when 5 mg/kg of morphine was given before the session, on a second key when 5 mg/kg of U-50,488 was given before the session, on a third key when a combination of these drugs (at the same 5 mg/kg doses) was given, and on a fourth key when saline was given. Once subjects were trained, combinations of morphine and U-50,488 (other than those used during training) and single drugs whose effects were purported to be mediated by binding to both mu and kappa receptors were studied. Similar 4-choice experiments with these drugs were performed in a different group on subjects under FI schedules.

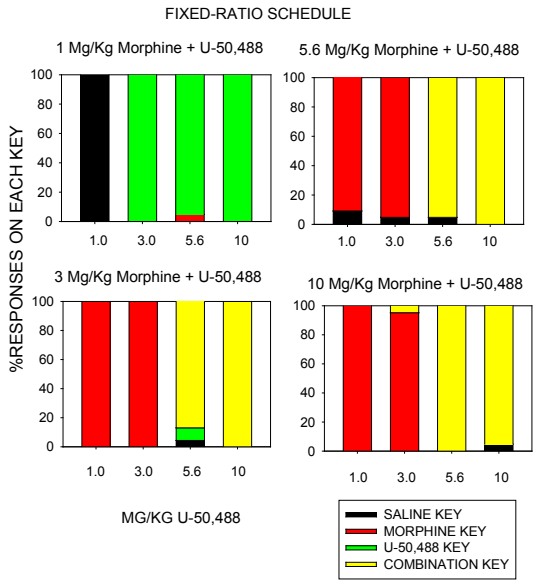


Fig 11. Responses on each key under the FR schedule after combining increasing doses of morphine with increasing doses of U-50,488 in pigeons trained to discriminate among 5 mg/kg morphine, 5 mg/kg U-50,488, a combination of these drugs at these doses, and saline. Data are means from 6 birds. Modified from Wessinger et al. (In press).

After about a year of training, performances of all six subjects were stable enough for the determination of dose-effect curves under the FR schedule. After almost two years of training, performances of only three of the six subjects trained under the FI schedule were sufficiently stable for further studies. As in past experiments, dose-effect curves for morphine and U-50,488 in individual subjects under the FR schedule were quantal in shape while those under the FI schedule were graded. Under the FI schedule, almost all of the responses that did not occur on the appropriate drug key were on the saline key. Consistent with the relative potency of naloxone at mu and kappa receptors, the dose of naloxone required to block the discriminative-stimulus effects of 10 mg/kg U-50,488 was about three times greater than that required to block the discriminative-stimulus effects of 10 mg/kg morphine under both schedules of reinforcement (data not shown).

Figure 11 shows the effects of a number of combinations of different doses of morphine and U-50,488 on responding under the FR schedule. Despite the quantal nature of the dose-effect curves, these data are reported as means across subjects for direct comparison between data under the FR and FI schedules. Combinations of 1 mg/kg doses of each of the two drugs produced responding on the saline-appropriate key. Higher doses of U-50,488 combined with 1 mg/kg morphine produced responding on the U-50,488-appropriate key. When higher

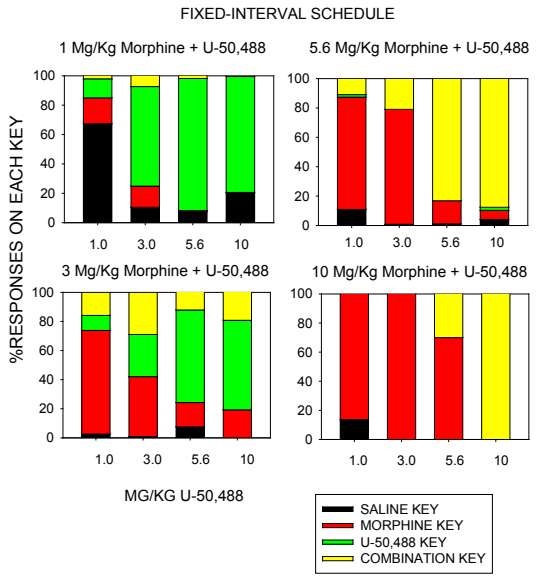


Fig 12. Responses on each key under the FI schedule after combining increasing doses of morphine with increasing doses of U-50,488 in pigeons trained to discriminate among 5 mg/kg morphine, 5 mg/kg U-50,488, a combination of these doses of these two drugs, and saline. Data are means from 3 birds.

doses of morphine were combined with the two lower doses of U-50,488, responding was confined to the morphine-appropriate key. When these same doses of morphine were combined with the two higher doses of U-50,488, responding was confined to the drug-combination-appropriate key. In summary, combinations of low doses of both drugs produced responding on the saline-appropriate key. High doses of morphine combined with low doses of U-50,488 produced responding on the morphine-appropriate key, and high doses of U-50,488 combined with low doses of morphine produced responding on the U-50,488-appropriate key. High doses of both drugs produced responding on the drug-combination-appropriate key. The quantal nature of the dose-effect curves is indicated by means that almost always approach 100% of responding on one of the keys.

Figure 12 shows similar data for these same dose combinations under the FI schedule. The results are strikingly similar to those for the FR schedule. In fact, the summary of effects of the drug combinations above for FR fit the data from the FI schedule very well, except that the graded shape of the dose-effect curves is emphasized by the distribution of responses across keys, especially when 3 mg/kg morphine is combined with increasing doses of U-50,488.

The final phase of this story shows the discrimination of butorphanol under both reinforcement schedules. Butorphanol has been considered to be a partial agonist at mu receptors and an agonist at kappa receptors (Gutsein and Akil, 2001). Under both schedules, responding on the saline-appropriate key predominated after the lowest dose. At the 0.1 mg/kg dose, under both schedules responding on the morphine-appropriate key begins to replace responding on the saline-appropriate key. At 0.3 mg/kg, there is responding on all keys although responding on the morphine-appropriate key predominates. At the highest dose, responding on the drug-combination-appropriate key predominates. These data suggest that at low doses of butorphanol, mu-receptor activity predominates with kappa-receptor activity not apparent until higher dose levels are reached at which point both receptor populations contribute to the discriminative stimulus effects produced by butorphanol in pigeons.

Clearly, these complex experiments using four-choice procedures to study drug discrimination show that the study of drug mixtures has promise for the study of drugs whose effects depend on more than one pharmacological mechanism. The much greater difficulty in training under the FI schedule to produce results that are qualitatively similar but more variable than those produced under the FR schedule would argue in favor of the use of the FR schedule should future experiments of this type be attempted. However, the FI schedule may point to more subtle nuances in the discriminative effects of drugs alone or in combination that might be overlooked when only FR schedules are used.

In addition, fundamental questions of whether the discriminative effects of drug stimuli are quantal, as suggested by Colpaert, or graded as suggested by Stolerman, have been answered at least in part. The present data clearly indicate that the situation may determine whether drug stimuli influence behavior in either a quantal or graded fashion. For example, a driver approaching a red light at an intersection makes a quantal response and stops (hopefully), because only slowing the vehicle could have negative consequences presumably according to a ratio schedule. Yet it is clear that in other situations the discrimination of red colors, such as those produced by different degrees of the oxygenation of blood, can be substantially more nuanced. Clearly the schedule of reinforcement is a powerful determinant of how subjects discriminate external stimuli in the environment as well as internal stimuli produced by drugs.

I hope that this brief review of some of our studies on the influence of schedules of reinforcement in determining the behavioral effects of drugs compellingly showed the importance of reinforcement schedules in behavioral pharmacology. Although almost every behavioral pharmacologist uses reinforcement schedules in their research, most studies use schedules toward other ends and do not really emphasize the role of the schedule. Although the study of reinforcement schedules in behavioral pharmacology has become less fashionable than it was in earlier days, I believe that there remains much gold to be mined in their study. Perhaps Peter Dews (1963) said it best almost 50 years ago when he stated the following:

> "In emphasizing the importance of schedules, it is not intended to imply that all of psychology should be reduced to a study of them. An influence can be all pervading without being all embracing. No one would maintain that all mechanisms of physiology can be reduced to the laws of osmosis; yet osmotic phenomena are ubiquitous in physiology; whenever they can operate they do; and the student of any physiological mechanism ignores osmosis at his peril. Similarly, it is suggested that schedule influences operate generally in psychology; that when these influences can operate, they will, and that a student of any problem in psychology – whether it be motivation, generalization, discrimination or the functions of the frontal lobes – ignores the consequences of the precise scheduling arrangements of his experiments at his peril."

This statement is as relevant today as it was when it was first made almost 50 years ago.

ACKNOWLEDGMENTS

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Member News

Susan B. Horwitz, PhD, Rose C. Falkenstein Professor of Cancer Research and co-chair of the Department of Molecular Pharmacology at Albert Einstein College of Medicine, was awarded the American Association for Cancer Research Award for Lifetime Achievement in Cancer Research at the AACR meeting earlier this year. Dr. Horwitz is the eighth recipient of this prestigious award which she received for her pioneering work in discovering the mechanism of action of paclitaxel (Taxol), isolated initially from the Pacific yew. Paclitaxel has been used successfully against a variety of solid tumors, especially breast, ovarian, and lung tumors. Her discovery that paclitaxel acts by stabilizing microtubules, leading to mitotic arrest, has also contributed to the understanding of how microtubules function in normal and malignant cells and why stabilization of microtubules is a promising target for drug discovery. Her current research continues the study of natural products that might prove effective in the treatment of cancer. The AACR Award for Lifetime Achievement in Cancer Research was established in 2004 to honor an individual who has made significant fundamental contributions to cancer research, either through a single scientific discovery or a body of work. Dr. Horwitz was the 1994 recipient of the Pharmacia-ASPET Award for Experimental Therapeutics.

V. Craig Jordan, Vincent T. Lombardi Professor of Translational Cancer Research and Scientific Director of the Lombardi Comprehensive Cancer Center at Georgetown University, has been named the recipient of the 2011 St. Gallen Breast Cancer Award in Clinical Breast Cancer Research. Dr. Jordan received the award for his research on the scientific principles underlying the effective use of tamoxifen and raloxifene in the treatment of breast cancer. The St. Gallen Breast Cancer Award is given biennially to a scientist who has made exceptional contributions to the field of breast cancer research. Dr. Jordan received the award earlier this year at the St. Gallen International Breast Cancer Conference in St. Gallen, Switzerland. Dr. Jordan delivered the opening address at the conference, "Evolution of long-term adjuvant anti-hormone therapy: Consequences and Opportunities."

AACP is pleased to announce that **Dr. Vincent Lau** will join AACP as the new Vice President for Research and Graduate Education and Chief Science Officer. Lau comes from the University of Houston where he is the John and Rebecca Moores Professor in the Department of Pharmacological and Pharmaceutical Sciences. He received a B.S. in biology from the University of Hawaii, Honolulu, as well as an M.S. and Ph.D. in pharmacology from the University of Hawaii, Honolulu. He completed his post-doctoral work in pharmacology at the University of Michigan. He'll begin his new role at AACP around July 1.

Two ASPET members were recently elected to the National Academy of Sciences. **Brian Kobilka, MD** (far left), who was the Julius Axelrod Award recipient in 2010 and the John J. Abel Award recipient in 1994, and **J. Andrew McCammon, PhD**.

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Promotions,
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Staff News

Jane Nelson, ASPET's Awards Coordinator and Assistant to the Executive Officer, retired on May 6. Jane had been at ASPET since 2008, prior to which she worked for the American Society for Human Genetics. Jane is best known for managing the Student-Postdoc Best Abstract Competition at the annual meeting and for seeing that things ran smoothly for committees and divisions at the ASPET on-site office. Many individuals charged with overseeing their divisional awards knew Jane as the person who kept all the various awards balls in the air in the months leading up to the meeting. Jane and her husband, Jeff, along with their dog Chip have moved back to her hometown of Fall River, Massachusetts, where their place overlooks the water and the Tipsy Seagull.

Erin Salb, who was Senior Editorial Coordinator for *Molecular Pharmacology*, left ASPET in May 2011 to pursue a career in the Editorial Department at the American Society for Biochemistry and Molecular Biology. Erin's fun loving attitude, friendliness, and superb shoe collection will be missed in the ASPET office. Mary Blackwood has taken over Erin's responsibilities.

Jess Hammett joined ASPET as Web and Marketing Manager in April 2011. Jess is responsible for website maintenance, social media and membership marketing, and graphic design. Jess comes to ASPET from the Chesapeake Beach Resort & Spa where she was Marketing and Social Media Coordinator. In her spare time, Jess loves watching hockey and football, attending concerts, and hanging out with her cat.

New ASPET Members

ASPET welcomes the following new members:

Regular Members

Michael G. Aman, Ohio State Univ. Research Unit on Pediatric Psychopharmacology
Mustafa Ark, Gazi Univ. Faculty of Pharmacy
Jiri Aubrecht, Pfizer Global Research and Development
Christopher Austin, NIH
Shannon M. Bailey, Univ. of Alabama at Birmingham
Jean-Louise Baneres, Inst. des Biomolécules Max Mousseron
Shirish S. Barve, Univ. of Louisville
Supriya A. Bavadekar, Long Island Univ.
L. Tony Beck, NCRR, NIH
Nicholas Bello, Rutgers Univ. Sch. of Environmental and Biological Science
Jason A. Burdick, Univ. of Pennsylvania
Elizabeth J. Burnett, Wake Forest Univ. Graduate School of Arts & Sciences
Mairead A. Carroll, New York Medical College
Martin Childers, Wake Forest Univ. Hlth. Sci. Center
Ray C.J. Chiu, McGill Univ. Faculty of Med., Canada
Michael Chopp, Henry Ford Hlth. System
Diane C. Chugani, Wayne State Univ. School of Medicine, Children's Hospital of Michigan
Bryan L. Copple, Univ. of Kansas Medical Center
Rebecca L. Corwin, Pennsylvania State Univ. College of Hlth. and Human Development
David N. Dahdal, Ferring Pharmaceuticals
Derek Daniels, Univ. at Buffalo, SUNY
Robert Dantzer, Univ. of Illinois at Urbana-Champaign College of Medicine
Michael Davis, Emory Univ.
Xavier Deupi, Paul Scherrer Inst.
Darragh P. Devine, Univ. of Florida
Alejandro M. Dopico, Univ. of Tennessee HSC, College of Medicine
Mona F. El-Azab, Suez Canal Univ.
Scott Emr, Cornell Univ. Weill Institute for Cell and Mol. Biol.
Odette A. Fahmi, Pfizer, Inc.
Michael Fanselow, Univ. of California-Los Angeles
Richard Foltin, New York State Psychiatric Inst.
Robert J. French, Univ. of Calgary
Jordan Fridman, Incyte Corp.
Felix W. Frueh, Medco Health Solutions, Inc.
Vittorio Gallo, Children's National Medical Center
Annette Gilchrist, Midwestern Univ.
Joseph Goldenberg, Univ. of Illinois - Chicago
Jesus Tito Gonzalez, Avelas Biosciences
Iain Greenwood, St. George's Univ., London
John (Jack) R. Grider, Virginia Commonwealth Univ.
Anna I. Guerdjikova, Univ. of Cincinnati College of Medicine
Alison Gurney, Univ. of Manchester
H. Kirk K. Hammond, Univ. of California - San Diego and VA San Diego Health Care System
Margaret Haney, Columbia Univ. College of Physicians and Surgeons
Richard Hargreaves, Merck, Inc.
Marius C. Hoener, F. Hoffmann-La Roche Ltd.
Stefan Hofmann, Boston Univ.
Patricia Hoyer, Univ of Arizona Hlth. Sci. Ctr.
William J. Hrushesky, Dorn Veterans Affairs Medical Center
Michael Irwin, UCLA Semel Institute for Neuroscience
Fakhreddin Jamali, Univ. of Alberta
David Jewett, Univ. of Wisconsin-Eau Claire
Tom Kawabata, Pfizer, Inc
Brian Keith, Univ. of Pennsylvania, Abramson Family Cancer Research Inst.
Dan Kiel, Massachusetts College of Pharmacy and Health Sciences
Iaian Kilty, Pfizer Global R&D
Midhun C. Korrapati, NIH
Mario Kratz, Fred Hutchinson Cancer Research Ctr.
Athan Kuliopulos, Tufts Univ. Sch. of Medicine
Diana L. Kunze, MetroHealth Medical Center
John LaPres, Michigan State Univ.
Anh-Chi Le, Howard Hughes Medical Inst.
Annarosa Leri, Dana-Farber/Harvard Cancer Center
Anita H. Lewin, RTI International
Stephen D. Liberles, Harvard Medical School
William Macias, Eli Lilly and Co.
Kacey G. Marra, Univ. of Pittsburgh
Kirill Martemyanov, The Scripps Research Inst.
Donna L. Mendrick, NCTR/FDA
Matilde Merino-Sanjuan, Univ. of Valencia Avda
Andrew Miller, Emory Univ. School of Medicine, Winship Cancer Institute
Michael P. Murphy, MRC Mitochondrial Biology Unit
Aye-Mu Myint, Ludwig-Maximilians Univ.
Jens Peter Norgaard, Ferring Pharmaceuticals
John O'Shea, NIAMS, NIH
Alan R. Olzinski, GlaxoSmithKline

New ASPET Members

Regular Members (continued)

Dennis Paul, Louisiana State Univ. HSC, New Orleans
Gang Pei, Shanghai Inst. for Biological Sciences
Ryan M. Pelis, Novartis Inst. for Biomedical Research
Jennifer Pluznick, Johns Hopkins Univ. School of Medicine
Craig M. Powell, Univ. of Texas Southwestern Medical Center
Eric R. Prossnitz, Univ. of New Mexico
Peter S. Rabinovitch, Univ. of Washington
Christopher M. Rembold, Univ. of Virginia
Kimberlei A. Richardson, Howard Univ. College of Medicine
Patricia C. Rose, Hofstra Univ.
Ivan Rusyn, Univ. of North Carolina at Chapel Hill
Nicole Schmitt, Univ. of Copenhagen, Faculty of Health Sciences
Robert Schultz, Center for Autism Research, Children's Hospital of Philadelphia
Petra Schweinhardt, McGill Univ. Alan Edward Ctr. For Res. on Pain
Ronald See, Medical Univ. of South Carolina
Virginia L. Shepherd, Vanderbilt Univ.
Amruthesh C. Shivachar, Texas Southern Univ. College of Pharmacy
Fraser J. Sim, SUNY at Buffalo
Todd C. Skaar, Indiana Univ. Sch. of Medicine
Gary Skiles, Amgen, Inc.
Georgios Skiniotis, Univ. of Michigan
Konstantine W. Skordos, GlaxoSmithKline
Michael H. Smolensky, Univ. of Texas HSC - Houston
Art Spector, NIAAA, NIH
Jeffrey W. Strovel, Noble Life Sciences
Malu G. Tansey, Emory Univ. School of Medicine
David W. Thomas, TJ Long School of Pharmacy, Univ. of the Pacific
Kenneth K. To, The Chinese Univ. of Hong Kong Sch. of Pharmacy
Rhian M. Touyz, Ottawa Hospital Research Inst., Univ. of Ottawa
Lauren A. Trepanier, Univ. of Wisconsin-Madison Sch. of Veterinary Medicine
Rachel Tyndale, Univ. of Toronto
Robert Ursano, Uniformed Services Univ. of the Health Sciences
Alexander A. Vinks, Cincinnati Children's Hospital Medical Center
Beth A. Vorderstrasse, Washington State Univ.
Robert C. West, Univ. of Wisconsin - Madison
Alison E. Willing, Univ. of South Florida College of Medicine
Jiping Xiao, Univ. of Pennsylvania
Chang-Guo Zhan, Univ. of Kentucky
Jia L. Zhuo, The Univ. of Mississippi Medical Center
Michael Zinda, AstraZeneca R&D Boston
Issam Zineh, CDER/FDA

Affiliate Members

Sujit K. Rambhade, Peoples Institute of Pharmacy and Research Ctr.

Postdoctoral Members

Patrick Giguere, Univ. of North Carolina at Chapel Hill
Yanci O. Mannery, Univ. of Louisville
Uzma I. Zakai, Univ. of Wisconsin - Madison

New ASPET Members

Graduate Student Members

Jon-Kar Zubieta, MBNI
Ninitha A. Jeyaraj, Michigan State Univ.
Mourad W. Ali, Univ. of Georgia
Odelia Y. Bongmba, Univ. of Houston
Elaina M. Chambers, Univ. of Louisville
Tatiana Claro da Silva, Univ. of Maryland
Patrick S. Dib, Univ. of Oklahoma
Keren Ettinger, Hebrew Univ. of Jerusalem
Adarsh Gandhi, Univ. of Houston
Sara L. Gil-Mast, Univ. of Medicine and Dentistry of New Jersey
Bradley D. Hammond, Michigan State Univ.
Weishan Huang, Cornell Univ.
Philippe Huot, Toronto Western Hospital
Youming Jiang, West Virginia Univ.
Heather E. King, American Univ.
Sharanya M. Kousik, Rush Univ. Graduate College
Mitchell Lakner, Case Western Reserve Univ.
Chee Woei Lim, Univ Putra Malaysia
Allyson C. Marshall, Wake Forest Univ. Baptist Medical Center
Bradley J. Martin, Ohio State Univ.
Anlys Olivera, Emory Univ.
Aysun Ozdemir, Gazi Univ. Faculty of Pharmacy
Vincent P. Ramirez, Univ. of Connecticut
Sunae Ryu, Campbell Univ.
Stephanie Tedford, Rush Univ. Medical Center
Priyanka P. Trivedi, National Inst. of Pharmaceutical Education and Research
Erkan Tuncay, Biophysics
Wes Wayman, Rush Univ. Medical Center
Bradley Wetzell, American Univ.

Undergraduate Student Members

Mary Ellen Amos, Ohio Northern Univ.
Brittany Appleboom, Wesleyan College
Wesley L. Cai, Univ. of Arizona
Martin K. Faridian, Univ. of Arizona
Frank F. Fofie, Howard Univ.
Karla P. Franco Melendez, Vanderbilt Univ.
Daniel L. Jones, Washington Univ.
Stanton Kochanek, John Carroll Univ.
Nathaniel Mabe, Ohio Northern Univ.
Nathaniel May, The Univ. of Arizona
Amalia McDonald, Wake Forest Univ.
Praveena Narayanan, Univ. of Minnesota - Twin Cities
Basant Nassar, Penn State Univ.
Brendan W. Robinson, Anderson Univ.
Emily Robinson, Boston College
Octavio Romo-Fewell, San Diego State Univ.
Bryan Seelnacht, Univ. of Pittsburgh
Ana Shapiro, Colby College
Jinglu Shi, Univ. of Arizona
Stephanie Stras, Carnegie Mellon Univ.
Kelsey Sugrue, Saint Mary's College
Petria S. Thompson, Emory Univ.
Emily K. Wu, Univ. of Michigan

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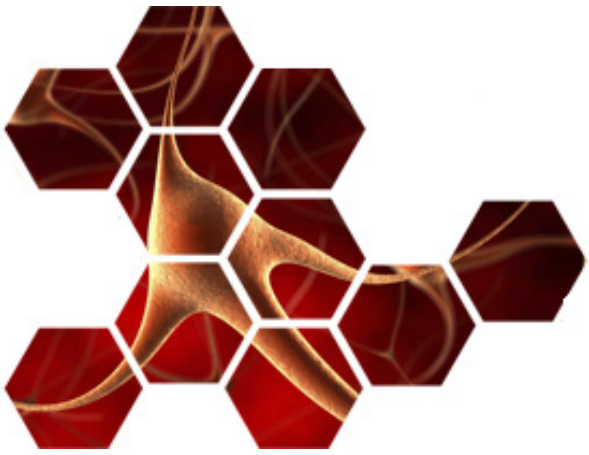

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50 Year ASPET Members

ASPET honors the following researchers for their 50 years of membership in the Society:

Mary F. Argus
Donald R. Bennett
George A. Condouris
Peter G. Dayton
William F. Durham
James W. Fisher
William W. Fleming
Robert W. Gardier
Jean Himms-Hagen
Leo E. Hollister
Richard L. Klein
Albert S. Kuperman
Victor G. Laties
Tsung-Min Lin
Jean M. Marshall
Richard J. Matthews
John W. Poutsiaca
William H. Prusoff
Adolph R. Rozkowski
Hubert C. Stanton
Stephen Szara

Thank you for your commitment to ASPET and the discipline of pharmacology for 50 years!

In Sympathy

ASPET notes with sympathy the passing of the following members:

Ralph F. Banziger
Wesley Dill
Stephen G. Holtzman
William B. Prusoff
Tobias O. Yellin

Obituary

Stephen G. Holtzman, PhD (1943 – 2011)

Stephen G. Holtzman, past-president of three professional societies including the American Society of Pharmacology and Experimental Therapeutics, passed away on April 23, 2011. Born in Brooklyn, NY on August 14, 1943, he received his B.S. in pharmacy from Columbia University in 1965, and Ph.D. in pharmacology from the University of Michigan in 1969, where he studied in the laboratory of Julian Villarreal. That same year, Steve joined the Department of Pharmacology at Emory University as a postdoctoral fellow and spent the rest of his career at Emory until retiring as Professor in 2007.

One of Steve's lasting scientific achievements is the principal role he played in the development and validation of behavioral drug discrimination in the characterization of CNS-acting drugs. He was among the first to propose that the discriminative stimulus effects of drugs in animals are analogous to their subjective effects in humans. His published reports in the 1970s through the 1990s contributed significantly to the eventual widespread adoption of drug discrimination methodology within the scientific community. The method is used widely to study drug-receptor interactions in behaving organisms, and has also become a standard screening procedure within the pharmaceutical industry as it can provide important information for early decision-making on new compounds in the early stages of preclinical development.

Much of Steve's research concentrated on the consequences of chronic administration of opioids and psychomotor stimulants like caffeine. In a landmark 1974 paper cited over 400 times to date (JPET 189:51-59, 1974), Steve showed that naloxone was almost as effective as d-amphetamine in suppressing eating by hungry animals, a finding that presaged the discovery of the endogenous opioid peptides in 1975-1976. Steve was a proponent and practitioner of "small science"; all but a handful of his more than 230 full-length publications had no more than three authors. With an h-index of 48, Steve Holtzman has contributed strongly to neuropharmacology.

Throughout his career Steve pursued a rich life of engagement and service to the pharmacology community. In 1991 he was elected President of the Society for the Stimulus Properties of Drugs. From 1992 to 2009 he served as a member of the Board of Directors of the College on Problems of Drug Dependence (CPDD) and was elected President of CPDD in 1997. He served as CPDD Treasurer from 1998-2004. Steve served and chaired numerous NIH review panels, was a member of many editorial boards, as well as the Scientific Advisory Board of the Center for the Treatment of Addictions at The Rockefeller University. Throughout his career Steve participated in the American Society for Pharmacology and Experimental Therapeutics (ASPET) as a member of numerous committees and on the editorial board of the *Journal of Pharmacology and Experimental Therapeutics* from 1976-1997, culminating in his election to President of ASPET in 2004. Beginning with his graduate school days and extending until his retirement in 2007, Steve had a remarkable 42 year record of continuous NIH funding, including a MERIT award from the National Institute of Drug Abuse, Research Scientist Development awards, Scientist awards, and Senior Scientist awards from NIDA. In 1999 he was selected Outstanding Alumnus of the Department of Pharmacology at the University of Michigan.

At Emory Steve was well known as an outstanding research mentor. He trained 17 PhD graduate students and mentored 21 postdoctoral fellows. This year he was selected to receive the Mentorship Award from CPDD. His wife and companion of nearly 43 years, Dr. Yung-Fong Sung, M.D., will travel to the CPDD meeting in June to receive the award on Steve's behalf. Dr. Stephen Holtzman will be remembered for his scientific achievement, mentorship, graciousness, and dry wit by all who knew him.

Steve will receive his Mentorship Award posthumously on Sunday morning (8:30-11:00), June 19th, 2011 at the 73rd Annual Meeting of the College on Problems of Drug Dependence (CPDD) at The Westin Diplomat in Hollywood, Florida (www.CPDD.org). In lieu of flowers, please send donations payable to CPDD for the Stephen G. Holtzman Fund (Dr. M. W. Adler, Executive Officer, CPDD, Center for Substance Abuse Research, Temple University School of Medicine, 3400 North Broad Street, Philadelphia, PA 19140-5104).

Submitted by Ray Dingledine, PhD, Emory University School of Medicine

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Call for Award Nominations for 2012

John J. Abel Award

Deadline for submission of nominations is September 15, 2011

The John J. Abel Award in Pharmacology, named after the founder of ASPET and supported by Pfizer, was established to stimulate fundamental research in pharmacology and experimental therapeutics by young investigators. The annual award, sponsored by Pfizer, Inc., consists of $5,000, a plaque, hotel and economy airfare for the winner and spouse to the award ceremony at the annual meeting of ASPET. The winner will be invited to give a lecture at the annual meeting.

Nominees for this award shall not have passed his/her forty-fifth birthday by September 15 (nomination deadline) of the year in which s/he is nominated. The candidate need not be a member of the Society; however, the nomination must be made by an ASPET member. No member may nominate more than one candidate a year and no candidate may be nominated for more than one major ASPET award in any given year.

The Award shall be made for original, outstanding research in the field of pharmacology and/or experimental therapeutics. Independence of thought, originality of approach, clarity, and excellence of data presentation are important criteria. Candidates shall not be judged in comparison with the work of more mature and experienced investigators. Quality rather than the number of contributions shall be emphasized. It shall be the responsibility of the sponsor to make clear the contribution of the candidate to any jointly authored reprints and manuscripts and the originality and independence of the candidate's research. Selection will be made by the ASPET Awards Committee, appointed by the President of ASPET.

Nominations shall be submitted electronically to awards@aspet.org and shall consist of:

1. Summary that describes the importance of the candidate's work.
2. Six published articles or manuscripts accepted for publication that are a representation of the candidate's work (provided as PDFs or as hyperlinks to the article). Submit each manuscript PDF as a separate attachment.
3. Brief biographical sketch of the candidate.
4. Candidate's curriculum vitae and bibliography.

Nominations for this award must be received no later than 5:00 pm on September 15 of the year prior to the year in which it is to be awarded.

The John J. Abel Award is sponsored by Pfizer, which is pleased to support the recognition of young scientists who will provide the breakthroughs of tomorrow.

Recipients of the John J. Abel Award in Pharmacology

1947	George Sayers	1969	Ronald Kuntzman	1991	Terry D. Reisine
1948	J. Garrott Allen	1970	Solomon H. Snyder	1992	Frank J. Gonzalez
1949	Mark Nickerson	1971	Thomas R. Tephly	1993	Susan G. Amara
1950	George B. Koelle	1972	Pedro Cuatrecasas	1994	Brian Kobilka
1951	Walter F. Riker, Jr.	1973	Colin F. Chignell	1995	Thomas M. Michel
1952	David F. Marsh	1974	Philip Needleman	1996	John D. Scott
1953	Herbert L. Borison	1975	Alfred G. Gilman	1997	David J. Mangelsdorf
1954	Eva K. Killam	1976	Alan P. Poland	1998	Masashi Yanigasawa
1955	Theodore M. Brody	1977	Jerry R. Mitchell	1999	Donald P. McDonnell
1956	Fred W. Schueler	1978	Robert J. Lefkowitz	2000	William C. Sessa
1957	Dixon M. Woodbury	1979	Joseph T. Coyle	2002	Steven A. Kliewer
1958	H. George Mandel	1980	Salvatore J. Enna	2003	David S. Bredt
1959	Parkhurst A. Shore	1981	Sydney D. Nelson	2004	David P. Siderovski
1960	Jack L. Strominger	1982	Theodore A. Slotkin	2005	Randy Hall
1961	Don W. Esplin	1983	Richard J. Miller	2006	Christopher M. Counter
1962	John P. Long	1984	F. Peter Guengerich	2007	Michael D. Ehlers
1963	Steven E. Mayer	1985	P. Michael Conn	2008	Katarina Akassoglou
1964	James R. Fouts	1986	Gordon M. Ringold	2009	John J. Tesmer
1965	Eugene Braunwald	1987	Lee E. Limbird	2010	Russell DeBose-Boyd
1966	Lewis S. Schanker	1988	Robert R. Ruffolo, Jr.	2011	Laura M. Bohn
1967	Frank S. LaBella	1989	Kenneth P. Minneman		
1968	Richard J. Wurtman	1990	Alan R. Saltiel		

Call for Award Nominations for 2012

Julius Axelrod Award in Pharmacology

Deadline for submission of nominations is September 15, 2011

The Julius Axelrod Award in Pharmacology was established 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. The Julius Axelrod Award is presented annually for significant contributions to understanding the biochemical mechanisms underlying the pharmacological actions of drugs and for contributions to mentoring other pharmacologists.

The award consists of an honorarium of $2,500, a medal, hotel, and economy airfare for the winner and spouse to the annual meeting. The formal presentation of this award and medal will be made at the annual meeting of ASPET. The recipient will be invited by the President of the Society to deliver the Julius Axelrod Lecture and organize the Julius Axelrod Symposium at the annual meeting a year hence. The recipient will also be invited by the Catecholamine Club to give a less formal presentation at its annual dinner meeting the year of the award.

There are no restrictions on nominees for this award. However, a nomination must be made by a member of the American Society for Pharmacology and Experimental Therapeutics (ASPET) or the Catecholamine Club. No member may nominate more than one candidate in a year and no candidate may be nominated for more than one major ASPET award in any given year. The award shall be made on the basis of originality and uniqueness of accomplishments throughout a long career distinguished by sustained, significant contributions to research and mentoring in pharmacology. Selection of the recipient will be made by the Axelrod Award Committee, appointed by the President of ASPET and comprised of members of ASPET and the Catecholamine Club.

Nominations shall be submitted electronically to awards@aspet.org and shall consist of:

1. Letter of nomination describing the research and mentoring contributions to pharmacology of the candidate that make him/her eligible for this Award, listing major contributions. Up to two additional letters of support would be welcome (need not be from ASPET members).
2. Brief biographical sketch of the candidate.
3. List of individuals mentored by the individual. Up to two letters from former trainees describing the quality of their training with the nominee and its impact on their careers would be welcome (need not be from ASPET members).
4. Candidate's curriculum vitae and bibliography.

Receipt date for nominations for the Julius Axelrod Award will be 5:00 pm on September 15 of the year prior to the year in which the award is to be given.

Recipients of the Julius Axelrod Award in Pharmacology

1991	Ullrich Trendelenberg	2003	Richard Weinshilboum
1992	Arvid Carlson	2004	Richard Palmiter
1993	Norman Weiner	2005	Marc Caron
1994	Robert Furchgott	2006	Susan Amara
1995	Irwin Kopin	2007	Tong H. Joh
1998	Sidney Spector	2008	Randy D. Blakely
1999	Solomon Snyder	2009	Palmer W. Taylor
2000	Erminio Costa	2010	Brian Kobilka
2001	Toshi Nagatsu	2011	Elaine Sanders-Bush
2002	Salomon Langer		

Call for Award Nominations for 2012

Pharmacia-ASPET Award for Experimental Therapeutics

Deadline for submission of nominations is September 15, 2011

The Pharmacia-ASPET Award in Experimental Therapeutics is given annually to recognize and stimulate 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. The award is supported in perpetuity by a gift from Pharmacia (now Pfizer).

The winner will receive a $2,500 honorarium, a plaque, hotel, and economy airfare for the winner and spouse to the award ceremony at the ASPET annual meeting.

There are no restrictions on nominees for this award. The candidate need not be a member of the Society; however, the nomination must be made by an ASPET member. No member may nominate more than one candidate a year and no candidate may be nominated for more than one major ASPET award in any given year. The award shall be made on the basis of published reprints, manuscripts ready for publication, and a two-page summary. Selection will be made by the ASPET Awards Committee, appointed by the President of ASPET.

Nominations shall be submitted electronically to awards@aspet.org and shall consist of:

1. Two-page summary that details the importance of the candidate's work.
2. Six articles published or ready for publication by the candidate that have direct bearing on the award (provided as PDFs or as hyperlinks to the article). Submit each manuscript PDF as a separate attachment
3. Brief biographical sketch of the candidate.
4. Candidate's curriculum vitae and bibliography.

Nominations for this award must be received no later than 5:00 pm on September 15 of the year prior to the one in which the award is to be made.

Recipients of the ASPET Award for Experimental Therapeutics

1969	John A. Oates	1984	Sir James Black	1999	Yung-Chi Cheng
1970	Joseph R. Bertino	1985	Louis Lemberger	2000	Saloman Z. Langer
1971	Elliot S. Vesell	1986	Alan C. Sartorelli	2001	George R. Breese
1972	Francois M. Abboud	1987	Albrecht Fleckenstein	2002	Darryle D. Schoepp
1973	Dean T. Mason	1988	Jean-Francois Borel	2003	William C. DeGroat
1974	Leon I. Goldberg	1989	Benedict R. Lucchesi	2004	Philip Needleman
1975	Mackenzie Walser	1990	Albert Sjoerdsma	2005	Donald P. McDonnell
1976	Louis Lasagna	1991	Theophile Godfraind	2006	John C. Lee
1977	Allan H. Conney	1992	James W. Fisher	2007	P. Jeffrey Conn
1978	Attallah Kappas	1993	V. Craig Jordan	2008	Jerry J. Buccafusco
1979	Sydney Spector	1994	Susan Band Horwitz	2009	Kenneth A. Jacobson
1980	Sanford M. Rosenthal	1995	Henry I. Yamamura	2010	Garrett A. FitzGerald
1981	David G. Shand	1996	Robert F. Furchgott	2011	Jan Balzarini
1982	William H. Prusoff	1997	Michael M. Gottesman		
1983	Marcus M. Reidenberg	1998	Phil Skolnick		

Call for Award Nominations for 2012

Robert R. Ruffolo Career Achievement Award

Deadline for submission of nominations is September 15, 2011

The Robert R. Ruffolo Career Achievement Award in Pharmacology has been established in recognition of the contributions made to drug discovery and development by Dr. Ruffolo. The award is presented annually to recognize 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.

The award consists of a $2,500 honorarium, a commemorative medal, complimentary registration to the annual meeting, hotel, and economy airfare for the winner and his/her spouse to the award ceremony at the annual meeting.

There are no restrictions on nominees for this award. However, the nomination must be made by a member of the American Society for Pharmacology and Experimental Therapeutics (ASPET). No member may nominate more than one candidate in a year and no candidate may be nominated for more than one major ASPET award in any given year. The award shall be made on the basis of the originality and impact of the nominee's accomplishments in pharmacology. Selection of the recipient will be made by the ASPET Awards Committee, appointed by the President of ASPET.

Nominations shall be submitted electronically to awards@aspet.org and shall consist of:

1. Summary that describes the importance of the candidate's work and his/her seminal discovery.
2. Six published articles or manuscripts accepted for publication that are a representation of the candidate's work (provided as PDFs or as hyperlinks to the article), including early seminal discoveries. Submit each manuscript PDF as a separate attachment.
3. Brief biographical sketch of the candidate.
4. Candidate's curriculum vitae and bibliography.

Receipt date for nominations for the Robert Ruffolo Award will be 5:00 pm on September 15, 2011 for an award to be presented at Experimental Biology '12 in San Diego, CA.

Pharmacology Educators Travel Award

Deadline for submission of nominations is January 4, 2012

The ASPET Division of Pharmacology Education is pleased to announce the opening of applications for the 2012 Travel Awards for Pharmacology Educators. The primary goal of this travel award is to promote participation in an ASPET meeting by pharmacology educators and to foster career development in pharmacology education.

Although there are no restrictions on faculty rank, the eligibility criteria are that the applicant (1) has significant teaching responsibilities in the area of pharmacology and (2) is a member of ASPET (primary or secondary membership in the Division of Pharmacology Education is required). Applications for two types of awards will be considered; one to a junior candidate and one to a senior candidate. An applicant will be considered a junior candidate if they have relatively less experience as a pharmacology educator and/or are a junior faculty member (e.g., Assistant Professor). All other applicants will be considered as senior candidates. Areas of teaching responsibilities in pharmacology can include instruction in graduate and undergraduate college classes as well as professional schools. In addition to curriculum delivery, preference will be given to the applicant demonstrating efforts in creative aspects of pharmacology education, e.g., curricula design, assessment, and faculty development. Preference will be given to applicants who have submitted an education abstract to Experimental Biology 2012.

The award (not to exceed $1,000) can be used to defray any of the following as needed: ASPET dues, travel expenses, registration, hotel accommodations, and cost of meals. All reimbursement expenses must be consistent with the guidelines of ASPET. Official announcement will be posted on the ASPET Division of Pharmacology Education Web site. Successful applicants will receive plaques in recognition of their receipt of the award at the Pharmacology Education Business Meeting.

Application, updates, and submission information may be found online at: www.aspet.org/awards.

Call for Award Nominations for 2012

Bernard B. Brodie Award in Drug Metabolism

Deadline for submission of nominations is September 15, 2011

The B. B. Brodie Award in Drug Metabolism has been established to honor the fundamental contributions of Bernard B. Brodie in the field of drug metabolism and disposition. The award is presented biennially in even years to recognize outstanding original research contributions in drug metabolism and disposition, particularly those having a major impact on future research in the field. The B. B. Brodie Award is sponsored by the Division for Drug Metabolism, and funds to support the award come from members' contributions.

The award consists of a $2,000 honorarium, a commemorative medal, hotel, and economy airfare to the award ceremony at the annual meeting. A lecture, delivered by the awardee at the annual meeting, describing appropriate research accomplishments and their future direction, will be published in *Drug Metabolism and Disposition*.

There are no restrictions on institutional affiliation, and a candidate need not be a member of the Society. The only restriction for the award is that supporting research accomplishments must not be used to win any other major award. Only one nominator is necessary, although more are acceptable, and the nominators need not be members of ASPET. Selection of an awardee will be made biennially by the B.B. Brodie Award Committee, appointed by the President of ASPET with input from the Division for Drug Metabolism.

Nominations shall be submitted electronically to awards@aspet.org and shall consist of:

1. Nominating letter and no more than five supporting letters detailing accomplishments of the nominee.
2. List of, and comments on, the outstanding papers.
3. Brief biographical sketch of the candidate.
4. Candidate's curriculum vitae and bibliography.

Nominations for this award must be received no later than 5:00 pm on September 15 of the year prior to the year in which the award is to be given.

Recipients of the Bernard Brodie Award

1978	James R. Gillette	1996	Anthony Y.H. Lu
1980	Minor J. Coon	1997	Ronald W. Estabrook
1982	Donald M. Jerina	1999	Marion W. Anders
1984	Gilbert J. Mannering	2000	Bettie Sue Masters
1986	Daniel W. Nebert	2002	Eric F. Johnson
1988	Wayne M. Levin	2004	Thomas L. Poulos
1990	Daniel M. Ziegler	2006	Frank J. Gonzalez
1992	F. Peter Guengerich	2008	Curtis D. Klaassen
1994	Paul R. Ortiz de Montellano	2010	James R. Halpert

Call for Award Nominations for 2012

Goodman and Gilman Award in Drug Receptor Pharmacology

Deadline for submission of nominations is September 15, 2011

The Louis S. Goodman and Alfred Gilman Award in Drug Receptor Pharmacology, contributed by GlaxoSmithKline, was established to recognize and stimulate outstanding research in pharmacology of biological receptors. Such research might provide a better understanding of the mechanisms of biological processes and potentially provide the basis for the discovery of drugs useful in the treatment of diseases.

The award is presented biennially in even years and consists of an honorarium of $2,500, a plaque, hotel, and economy airfare for the winner and spouse to the award ceremony at the ASPET annual meeting.

There are no restrictions on the nominees for this award; however, nominations must be made by a member of ASPET. No member may nominate more than one candidate a year, and no candidate may be nominated for more than one major ASPET award in any given year. The award is to be made on the basis of the research contributions described in published work or submitted manuscripts and a summary of those contributions described in the letter of the individual who nominates the candidate. Selection will be made by the ASPET Awards Committee, appointed by the President of ASPET.

Nominations shall be submitted electronically to awards@aspet.org and shall consist of:

1. Summary that details the importance of the candidate's work.
2. Six articles published or ready for publication that have direct bearing on the award. (provided as PDFs or as hyperlinks to the article). Submit each manuscript PDF as a separate attachment
3. Brief biographical sketch of the candidate.
4. Candidate's curriculum vitae and bibliography.

Nominations for this award must be received no later than 5:00 pm on September 15 of the year prior to the year in which the award is to be given.

Recipients of the Goodman and Gilman Award

1980	Solomon H. Snyder	1996	Elliott M. Ross
1982	Pedro Cuatrecasas	1998	David Garbers
1984	Robert F. Furchgott	2000	Melanie H. Cobb
1986	Robert J. Lefkowitz	2002	William B. Pratt
1988	Ronald M. Evans	2004	Lee E. Limbird
1990	Alfred G. Gilman	2006	Anthony R. Means
1992	Paul Greengard	2008	Craig C. Malbon
1994	Jean-Pierre Changeux	2010	Alan R. Saltiel

Call for Award Nominations for 2012

P.B. Dews Award for Research in Behavioral Pharmacology

Deadline for submission of nominations is September 15, 2011

ASPET's Division of Behavioral Pharmacology sponsors the P. B. Dews Award for Research in Behavioral Pharmacology to recognize outstanding lifetime achievements in research, teaching and professional service in the field of behavioral pharmacology and to honor Peter Dews for his seminal contributions to the development of behavioral pharmacology as a discipline. The biennial award is supported by an endowment made possible by contributions from Aventis, Centre de Recherche Pierre Fabre, Eli Lilly, Harvard University, International Life Sciences Institute Caffeine Committee, Merck (San Diego), Pepsi Cola Company, Pfizer Central Research and Pfizer Global Research and Development, Pharmacia, Wyeth Research, and ASPET members.

The award consists of $1000, a plaque, and partial travel expenses to the award ceremony at the ASPET annual meeting. The recipient will be invited by the Chair of the Division of Behavioral Pharmacology to deliver a special lecture on this occasion. The lecture may be published subsequently in an appropriate ASPET-sponsored publication. There are no restrictions on nominees for this award. Nominations may be made by members of ASPET or of any relevant scientific society. Selection will be made by the P.B. Dews Award Committee, appointed by the President of ASPET with input from the Division for Behavioral Pharmacology.

Nominations shall be submitted electronically to awards@aspet.org and shall consist of:

1. Description of the candidate's major contributions, including scientific, teaching, and professional achievements.
2. Candidate's curriculum vitae and bibliography.
3. List of the candidate's trainees.
4. Five major publications (provided as PDFs or as hyperlinks to the article). Submit each manuscript PDF as a separate attachment.
5. Brief biographical sketch of the candidate.

Recipients of the P.B. Dews Award

2002	William H. Morse	2008	Charles R. Schuster
2004	Joseph V. Brady	2010	Donald E. McMillan
2005	Leonard Cook		

Paul M. Vanhoutte Award in Vascular Pharmacology

Deadline for submission of nominations is September 15, 2011

The Paul M. Vanhoutte Award in Vascular Pharmacology was established to honor Dr. Vanhoutte's lifelong scientific contributions to our better understanding and appreciation of the importance of endothelial cells and vascular smooth muscle function in health and disease and for his mentoring of countless prominent endothelial and vascular biologists and pharmacologists.

The Paul M. Vanhoutte Award is a biennial award, consisting an honorarium of $1,000, a custom-designed crystal bowl depicting the named lectureship, and up to $2,000 travel expenses including registration to the annual spring ASPET meeting. A recipient will be selected and invited to deliver a state-of-the-art lecture on recent advances in vascular biology and pharmacology at the spring ASPET meeting (Division's programming session). The presentation of his/her research should be of broad interest and contribute to the growth of the Cardiovascular Pharmacology Division.

There are no restrictions on institutional affiliation, nationality, or age of the candidate, but the recipient must be an active member of the ASPET before receiving the award nomination. Nominations must be made by a member of ASPET, and no member may nominate more than one candidate per year. Final selection of the recipient will be made by the Award Committee of the Division for Cardiovascular Pharmacology.

Nominations should consist of not more than five letters from nominators describing the contributions to vascular biology and pharmacology of the candidate that make him/her eligible for this award and listing of his/her major contributions, together with a complete curriculum vitae. To ensure consideration, all information must be submitted electronically to: awards@aspet.org.

Recipients of the Paul M. Vanhoutte Award

2008 Donald D. Heistad
2010 William B. Campbell

Membership Information

Definitions of Categories of ASPET Membership

Regular Members: Any doctoral level investigator who has conducted and is the primary author on at least one publication of an original study in the area of pharmacology published in a peer-reviewed journal is eligible for membership in ASPET. Exceptions may be made for someone who does not meet the degree requirement but who has made major research contributions to pharmacology. Regular members must be nominated by one (1) Regular or Retired ASPET member.

Affiliate Members: An investigator who does not meet the requirements for Regular membership because of the lack of a degree or lack of publication is eligible to apply for Affiliate membership. Affiliate members receive all the same member benefits as Regular members except that they may not vote in ASPET elections. Affiliate members must be nominated by one (1) Regular or Retired ASPET member.

Postdoctoral Members: Any qualified person who has received their Ph.D. or equivalent degree in pharmacology or a related field within the past five years is eligible for Postdoctoral membership. Postdoctoral members will receive the same benefits as Regular members, including the right to vote in ASPET elections. Individuals may remain in the Postdoctoral membership category for a maximum of five (5) years from the date of receipt of their PhD (or equivalent) degree after which time they must upgrade to Regular Membership. Applicants for Postdoctoral membership must be sponsored by one (1) Regular or Retired ASPET member.

Student Members: Individuals who are enrolled in undergraduate, graduate, or professional degree programs are eligible for Student membership in ASPET. Student members receive all the same benefits as Regular members except that they may not vote in ASPET elections. Individuals may remain in the Student member category for up to two (2) years following completion of their research doctoral degree. Student members must be nominated by one (1) Regular or Affiliate ASPET member.

Sponsors should send an email or letter addressing the applicant's qualifications for ASPET membership directly to the ASPET office (rphipps@aspet.org).

Regular Member Benefits (Dues $140):
- Reduced page charges for corresponding authors to publish in ASPET journals – pay $50/page instead of $90/page and save enough with one four-page article to pay your annual ASPET dues!
- Half-price color fees to publish color figures in ASPET journals.
- Free full-text access to all four online ASPET journals, including all back issues.
- Free subscription to *The Pharmacologist* (online).
- Reduced subscription rates for ASPET print journals.
- Reduced registration fees for ASPET meetings.
- Sponsorship of papers at the ASPET meeting.
- Best abstract awards for young scientists at the ASPET meeting.
- Free listing in the FASEB Directory.
- Membership in multiple ASPET Divisions for no additional dues.

Postdoctoral Members (Dues $70) have all the benefits of Regular members.

Affiliate Members (Dues $105) have all the benefits of Regular members except they may:
- Sponsor candidates for Student membership only.
- Not sponsor a paper for a non-member at a Society meeting.
- Not vote in Society elections.
- Not hold an elected office in the Society.

Student Members (Dues $30) have all the benefits of Regular members except they:
- Pay no dues their first year.
- Pay only $30 annual dues thereafter. Undergraduate Student members pay no dues and get their first graduate year free.
- Must have their papers at Society meetings sponsored by a member.
- May not vote in Society elections nor hold an elected office in the Society.

2011 Publication Subscription Rates for Members

All Society Members qualify for the following reduced print publication subscription rates:
- *Journal of Pharmacology and Experimental Therapeutics* (Monthly) - $220/year
- *Pharmacological Reviews* (Quarterly) - $89/year
- *Drug Metabolism and Disposition* (Monthly) - $151/year
- *Molecular Pharmacology* (Monthly) - $180/year

Application Instructions

Submit the completed Application for Membership form or use the online application form on the ASPET web site at www.aspet.org/membership/apply. Submit a current curriculum vitae including bibliography for Regular and Affiliate Membership. You may e-mail the CV to the ASPET Membership Coordinator, Robert Phipps, rphipps@aspet.org.

Sponsor Statements: Submit a statement of qualifications of the applicant from one Regular/Retired Member of ASPET for Regular Membership, Affiliate Membership and Student Membership (Affiliate Members may also sponsor student applicants). In addition to the statement certifying that the applicant is qualified for ASPET membership, sponsors should provide their own current address, phone, fax, and email. It is the responsibility of the applicant to insure that these documents are submitted to the ASPET office.

American Society for Pharmacology and Experimental Therapeutics
9650 Rockville Pike, Bethesda, MD 20814-3995 USA
Phone: 301-634-7060 ♦ Fax: 301-634-7061 ♦ www.aspet.org

Membership Application

Please Complete All Sections:

Section 1: Application Details

Application for:

❑ **Regular Membership**

❑ **Affiliate Membership**

❑ **Postdoctoral Membership – Date of Graduation: _____**

❑ **Graduate Student – Expected Date of Graduation: _____**

❑ **Undergraduate Student - Year: ❑ Fr ❑Soph ❑Jr ❑Sr**

Section 2: Source

How did you hear about ASPET:

❑ **Meeting _____**

❑ **ASPET Journal _____**

❑ **Mentor _____**

❑ **Website _____**

❑ **Other _____**

Section 3: Personal Information

Name:

Institution:

Mailing Address:

Telephone:

Fax:

Email:

Section 4: Optional Demographics (Not Required)

Date of Birth: _____

Sex: ❑ Female ❑ Male

Ethnicity:

❑ Asian

❑ Black or African American

❑ American Indian or Alaskan Native

❑ Hispanic or Latino

❑ Native Hawaiian or Pacific Islander

❑ White

❑ Other: _____

The information in this section will be used by ASPET to collate statistics and will be kept private. Completion of this section is voluntary.

Section 5: Sponsor (Must be an ASPET Member)

Name and email of your sponsor:

Please have your sponsor send us a brief letter or e-mail outlining your qualifications for Membership in ASPET to the Membership Coordinator , Robert Phipps, (rphipps@aspet.org).

Section 6: Division Selection

Divisions: *Division membership is a benefit of ASPET membership and there is no additional charge to belong to a division. It is highly recommended that you join a division so that you may take full advantage of Society participation. Joining a division allows you to participate in creating the scientific program for the annual meeting, network with people in your field at mixers and divisional programs, and receive special notices and newsletters about items and activities of interest in your field. Be sure to pick a division!*

Indicate primary (1) and as many secondary (X) divisions to which you wish to belong:

___Division for Behavioral Pharmacology
___Division for Cardiovascular Pharmacology
___Division for Drug Discovery, Development & Regulatory Affairs
___Division for Drug Metabolism
___Division for Integrative Systems, Translational & Clinical Pharmacology
___Division for Molecular Pharmacology
___Division for Neuropharmacology
___Division for Pharmacology Education
___Division for Toxicology

Section 7: Curriculum Vitae

Regular, Affiliate, and Graduate Student applicants: Please send your *Curriculum Vitae* (including bibliography) by email to the Membership Coordinator, Robert Phipps, (rphipps@aspet.org).

Undergraduate Student Applicants Only:

Current Education :

Expected Degree & Date: School: City/State/Country: Major Field:

Applications are reviewed on a rolling basis. Please DO NOT submit payment with your application.
Upon membership approval, you will be sent a dues statement and welcome package.
Student Membership is FREE for the first year.

Call or e-mail the ASPET Membership Department for additional information: 301-634-7135 / rphipps@aspet.org.

Future Meetings...

2011 Annual Meeting of the Great Lakes Chapter
Friday, June 10 * University of Chicago

Experimental Biology 2012
April 21 - 25 * San Diego, California

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