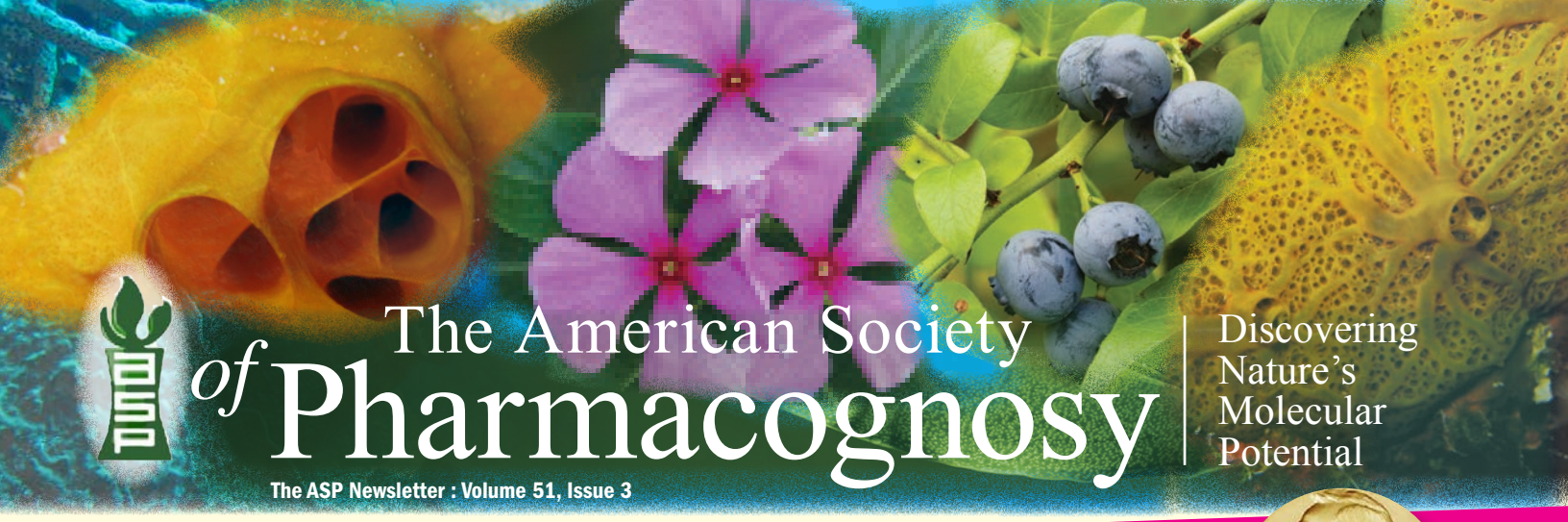

The American Society of Pharmacognosy

Discovering Nature's Molecular Potential

The ASP Newsletter : Volume 51, Issue 3

ASP Fellow Ōmura Wins Nobel Prize

By Dr. David J. Kroll

The international pharmacognosy community is bursting with pride over the October 5th announcement of the 2015 Nobel Prize in Physiology and Medicine, recognizing two natural products chemists and a former Merck biologist for the discovery and development of drugs against debilitating and deadly parasitic infections. Among this year's laureates is ASP Fellow Dr. Satoshi Ōmura, Distinguished Professor Emeritus of Kitasato University and Institute Advisor, the first ASP member to receive a Nobel Prize in any discipline. Dr. Ōmura most recently published in the *Journal of Natural Products* in 2007.

Dr. Ōmura was jointly awarded half of the prize with his then-

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President Kennelly Addresses ASP Members

Dr. Edward Kennelly

By Dr. Edward J. Kennelly

It is truly an honor to begin my one-year term as the President of the American Society of Pharmacognosy. As I think back over the past 25 years I have been an ASP member, so many important events in my scientific career are tied closely to the Society. I would not be where I am today without the help of the Society and its members. I hope whether you are a long-time or new ASP member you too have experienced the many positive benefits of ASP membership.

I feel fortunate to become President at a time that the Society is going particularly strong. Our flagship publication, the *Journal of Natural Products,* edited for 21 years by Dr. A. Douglas Kinghorn, continues to thrive with a strong impact factor and expanded pages. The ASP agreement with our co-publisher, the American Chemical Society, has provided significant revenue to the Society that helps to subsidize many of our activities. Our membership is holding steady over the past several years. Our annual meetings are popular with members and non-members alike. There is much indeed to be thankful for in our Society.

While the Society is going strong, I do not think it is a time to sit back and rest on our

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EDITOR'S CORNER

This is the first issue of the *ASP Newsletter* that I have edited in my role as ASP President. I hope you will take a look at the lead article I wrote that sets forth my assessment of the current state of the Society, and some of my goals as ASP President this year. I think it is an exciting time in the Society, especially with ASP Fellow Ōmura's Nobel Prize announcement, but also a time to consider ways we can continue to grow and flourish.

The ASP Annual Meeting in Cooper Mountain, Colorado was a great success with over 570 attendees. I want to thank Drs. Robert Cichewicz, Susan Mooberry, and all of the members of the organizing committees for making this such a great meeting on both the scientific and social fronts. Robert recaps some of the highlights from this meeting in his *Newsletter* article. We also have individual articles on the winners of three major prizes for the Society, the Norman Farnsworth Achievement Award (Dr. Raymond Andersen), the Varro Tyler Prize (Dr. Cindy Angerhofer), and the Matt Suffness Award (Dr. John MacMillan). I congratulate all of the award winners (see the complete list in this *Newsletter*), and I hope this will inspire others to apply or nominate candidates for the 2017 awards. The 2016 annual meeting will be a joint conference with our European colleagues in Copenhagen (July 24-27); for those not able to attend, we will also have an interim meeting in Oxford Mississippi (April 11-14). Please mark your calendars.

Two ASP Fellows, Drs. Koji Nakanishi and Mansukh Wani, turned 90 years old this year. Both remain active members of ASP. Dr. Wani joined us as usual for the annual meeting where there was a special symposium in his honor. Please read the *Newsletter* account of this symposium, and learn more about Dr. Wani's amazing career in natural products. Dr. Nakanishi celebrated his birthday with a gathering of former students, postdocs, and colleagues at Columbia University. I was glad to stop by this celebration, and see so many ASP members participating. You can learn more about his long career in the *Newsletter* article written by Dr. Roy Okuda.

I want to thank the more than 120 ASP members who completed the online *ASP Newsletter* survey over the summer. At the Annual Meeting, the *Newsletter* Editors and *Newsletter* Committee met to go over the results, and discuss ways to implement changes in the future. One clear message from the survey was that members appreciated articles related to scientific advances in pharmacognosy, and ASP Fellow, Dr. Dave Newman's "Hot Topics" article was cited as the most read column in the *Newsletter.* I appreciate Dave's commitment to writing for the *Newsletter*, and this edition he has a wonderful contribution about opioid compounds. ASP Fellow Dr. Gordon Cragg also contributed an article about the scientific achievements and setbacks of ASP member Dr. Robert Pettit. I hope we can expand our science-based articles in future *Newsletter*s.

Finally, on a sad note, ASP Business Manager, Ms. Laura Stoll, lost her husband, Scott, at the age of 43. Many ASP members who attended meetings in New York (2012), St. Louis (2013), and Copper Mountain (2014) may remember Laura as a caring and unflappable person manning the ASP table at these conferences. I extend my deepest sympathies to Laura and her two young children, Laura's parents, Dr. David Slatkin (former ASP Treasurer), his wife Judy, and the entire Stoll-Slatkin family. When I heard of this terrible news, I wrote to the ASP Executive Committee, saying "While I realize we are foremost a professional society, I think the bonds of friendship many of us form is a key reason for the success of the ASP. I still remember the late Matt Suffness describing in the *ASP Newsletter* how important the notes and cards he received from fellow ASP members were to him during his battle with cancer." If you know Laura, I hope you will take a moment to reach out to her during this difficult time.

Dr. Edward J. Kennelly

EMPLOYMENT SERVICE

The Society offers a placement service to aid our members in seeking positions or employees. This service is available only to ASP members and is free to both the applicant and the employer.

For more information see the services website.

www.pharmacognosy.us/jobs/

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President Kennelly Addresses ASP Members

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laurels. Rather, I think we need to take actions that ensure that the Society will be well positioned for the next half century of its existence. Part of that forward-thinking approach is the rebranding initiative that the Society underwent in the past year with graduate students at Virginia Commonwealth University's Brand Center. Some of the more straight-forward recommendations are already under way, like the redesign of the ASP website and outreach to new members.

Outgoing ASP President Phil Crew passes the gavel to incoming President Edward Kennelly.

DR. AMY KELLER

The issue I find most challenging is the proposed name change. The Brand Center suggested several new names for the Society to make it easier for the general public to understand what we do. The idea of changing the name of the ASP has undergone about three serious discussions and/or ballot initiatives in the past 56 years since our founding. A name change requires a change to the ASP Constitutional that would require the vote of a majority of the membership. Such a vote has been recommended by the ASP Executive Committee at Copper Mountain.

I myself feel that **any** name that could encompass what we members do would require some sort of explanation, especially for those not directly in our field. Many successful societies have names or acronyms that are hard to understand. Therefore, I've have discussed with the Executive Committee that we add such an explanation or "tag line" to the current name and logo. This short phrase would define who we are and what we do to a larger group. I think a tag line may be a good compromise to an outright name change. The tagline appears along with our logo in this issue of the *Newsletter.*

Finally, as authors like Shakespeare have suggested over the years, names are less important than actions. I think ASP is involved in activities that have made us leaders in the field, like co-publishing the *Journal of Natural Products*, holding world-class annual meetings, providing travel grants to students and members, and recognizing outstanding scientists in our field. The rose smells sweet indeed no matter its name.

In addition to the rebranding, I have been in discussion with the Executive Committee about ways in which we can invest in our future due to our strong financial situation at the moment. Currently, the foundation has about $1,000,000, and we draw on the interest to pay for many wonderful travel and scientific awards that the Society offers to members at all levels, from undergraduate students to distinguished scientists. We are looking to expand the awards portfolio as well. I truly appreciate the hard work of the ASP Foundation board members who guide these investments to benefit the Society as a whole.

However, I want to challenge the Society to consider ways in which we can invest in other ways. I specifically look at the actions of the first ASP President, Dr. Varro Tyler, who decided to invest the newly formed Society's money into a small journal published by the Lloyd Library in Cincinnati, Ohio. This somewhat risky investment has paid off handsomely. The *Journal of Natural Products* has grown it into one of the premier natural product chemistry journals in the world. That action not only strengthened the Society's scientific prominence, but also has been very financially rewarding. Are there opportunities today in our increasingly global and digital environment for ASP to make investments that could reap substantial returns both scientifically and financially in the next half century? I am hopeful that we may find exciting investments to explore this year.

The Society functions through the hard work of many volunteers. In my recent quick count, we have over 100 members, or about 15% of the membership, who volunteer their time on some ASP Committee. I want to give each volunteer my sincere thanks. Also, I have spoken with a number of members who are interested in volunteering, and I hope as the year moves forward, I can call upon you as well.

Outgoing Executive Committee members, Past President, Dr. Bradley Moore, and EC Board Member Dr. Leonard McDonald, are thanked for their leadership. A person who exemplifies the long-term commitment to running the Society is former ASP Secretary Dr. William Keller, who retired this year from this position after decades of service. Thank you Bill, Brad, Lenny, and all past and current Executive Committee members for your hard work and leadership.

In closing, I look forward to working with many ASP members this year. Please contact me (edward.kennelly@lehman.cuny.edu) if you have any suggestions for the Society. ■

ASP Fellow Omura Wins Nobel Prize

THE KITASATO INSTITUTE

Dr. Omura, left receives the 2013 Norman R. Farnsworth Achievement Award in St. Louis, Missouri, above.

DR.GUIDO PAULI

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Merck collaborator, parasitologist Dr. William C. Campbell, whose group identified the *in vivo* anthelmintic activity of the macrocyclic lactone avermectins from one of 5,000 soil cultures. Dr. Campbell, now a member of the innovative Research Institute for Scientists Emeriti (RISE) at Drew University, led Merck efforts to produce the semi-synthetic ivermectin, a life-transforming treatment for river blindness, lymphatic filiariasis (elephantiasis), and scrotal hydrocele.

The other half of the prize was awarded to Ms. Youyou Tu for the discovery of artemisinin from sweet wormwood. Her work was done under Mao Zedong's Project 523 to identify treatments for soldiers in North Vietnam and others suffering from malaria in southern China. The work of Ms. Tu, who never received a doctorate, has particularly drawn public attention to the techniques of natural products isolation and extraction. Her use of a 340 A.D. Chinese medicine text led her to use cold water or ether extractions so as not to destroy the antiparasitic activity of the molecule by typical boiling techniques.

Collectively, this recognition marks the first time that chemists have been awarded the medicine prize since 1988 when Drs. Gertrude Elion and George Hitchings were recognized for antimetabolites, and Sir James Black for beta-blockers and histamine-H2 receptor antagonists.

ASP President Edward Kennelly said "On behalf of the ASP I congratulate Dr. Ōmura on this remarkable accomplishment. This marks the first time an ASP member has been awarded a Nobel Prize. I've heard from many ASP members how excited they are for the recognition of Dr. Ōmura's work and for natural product drug discovery in general."

When Dr. Ōmura was called by a Nobel representative, he elaborated about the legend that the one of 5,000 soil collections leading to the avermectin-producing Streptomyces avermitilis was made on a golf course. "People believe that because I'm fond of golf. . . But in the golf course, there may be grass and sand, but sometimes wood. We took it near wood."

Dr. Ōmura was at the Kitasato Institute, whose namesake was the first to isolate the tetanus bacterium at the turn of the 20th Century. Dr. Ōmura, Kitasato's resident expert on actinomycetes, came to the United States to work as a visiting scientist in the laboratory of Dr. Max Tishler at Wesleyan University, Middletown, Connecticut. Dr. Tishler, former Merck director of research served as matchmaker for a March 20, 1973, agreement for Merck to fund Kitasato's screening for novel anti-bacterial fermentation metabolites from soil microbes. That agreement was later amended such that the Kitasato would send lyophilized cultures of the most chemically or morphologically "unusual" ones to Rahway, New Jersey, for any other assays at the Merck Sharp and Dohme Research Laboratories.

Merck's animal health interests required screening for anti-bacterial or anti-parasitic activity in whole animals. But that was impractical for several thousand fermentation extracts. The Merck team decided to use a one-mouse, dual-infection screen where each lyophilized broth sample would be mixed with mouse feed at one dose and fed to a single mouse infected with a protozoan and a roundworm causing poultry coccidiosis. The now-famous golf course isolate by Drs. Ōmura and Ruiko Oiwa, OS3153, was almost missed because the one mouse receiving it was close to death at the time of the scheduled necropsy. But the confirmatory tests showed powerful antiprotozoal and anthelmintic activity without any significant antibacterial activity.

Three back-to-back papers describing the discovery and activities were published in the March 1979 issue of *Antimicrobial Agents and Chemotherapy*, with Drs. Ōmura and Oiwa as senior authors of the first paper. And the rarity of Dr. Ōmura's original isolate cannot be underestimated: in 250,000 extracts screened for anthelmintic activity at Merck, *Streptomyces avermitilis*/avermectium never came up again. As of 2012, Dr. Campbell could find only one other published instance of the organism from a culture of Italian origin.

Merck chemists also synthesized avermectin analogs with better pharmacokinetics, selecting ivermectin (22, 23-dihydroavermectin B1) for further development. The drug was only used in animal products until Dr. Campbell learned that horses can be infected with *Onchocerca volvulus*, the same black fly-transmitted roundworm that causes river blindness in humans. That observation led to the first human clinical trials for the disease in 32 Senegalese patient volunteers, with positive efficacy and safety results published in 1982.

Merck CEO P. Roy Vagelos announced in 1987 that the drug would be provided free of charge to any country requesting it. At the time, Senator Edward Kennedy told *The New York Times,* "This discovery is an answered prayer for the third world. Merck's gift to the World Health Organization is more than a medical breakthrough – it is truly a triumph of the human spirit." ■

ASP Annual Meeting a Resounding Success

By Dr. Robert Cichewicz

Participants were presented with a combination of great science and amazing landscapes at the Copper Mountain Resort. Nestled in the heart of the mountainous White River National Forest in Summit County Colorado.

The ASP Annual Meeting, "*Natural Products Rising to the Top*," in Copper Mountain, Colorado, was a resounding success, with 18 parallel scientific sessions, and 579 people representing 34 countries. This meeting was a truly outstanding event, as seen by member participation, comradery, and scientific spirit.

Participants were presented with a combination of great science and amazing landscapes at the Copper Mountain Resort. Nestled in the heart of the mountainous White River National Forest in Summit County Colorado, the venue offered meeting attendees the chance to explore the beautiful Rocky Mountain countryside before and in between the meeting's scientific sessions. This year's ASP Annual Meeting brought back many of the Society's conference traditions, but also added several new features for attendees to enjoy.

Saturday, August 25, offered a variety of great workshops that were well attended (and in some cases, sold-out during pre-meeting ticket sales). The workshops provided in-depth seminars covering a range of topics including modern nuclear magnetic resonance (NMR) spectroscopy methods, bioassay quality control, natural product entrepreneurship, and others. The workshop leaders (Mr. Mark O'Neil-Johnson, Dr. Babu Tekwani, Dr. Dale Birkle Dreer, Dr. Craig Hopp, Dr. Cedric Pearce, Dr. Nicholas Oberlies, Dr. Gary Martin, and Dr. David Russell) are kindly thanked for their generous service to the Society. With over three hundred posters accepted for the 2015 meeting, a new poster session (one of three) was added that coincided with the Saturday night opening reception.

Sunday kicked off with breakfast in the Copper Pavilion where all of the meeting vendors were located. The 2015 meeting was host to more vendors than any previous ASP Annual Meeting, with 20 in total. This, together with outstanding support from many sponsors, was instrumental in generating nearly one-third of the entire meeting's revenue. The Society is grateful to all of the vendors and sponsors for their contributions to the ASP.

Sunday also delivered some exceptional scientific presentations with both morning and evening symposia sessions that dealt with a range of issues including natural product PAINS (Dr. Jonathan Baell), microbial genomics (Dr. Ben Shen), marine-derived therapeutics (Dr. Amy Wright), and natural product patent law (Dr. Leslie Fischer). Two sets of parallel sessions kept participants busy throughout the afternoon as well. One of the highlights was a new session, "ASP Younger Members Research Spotlight,"

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The Annual Meeting featured 18 parallel scientific sessions, with 579 people representing 34 countries

ASP Annual Meeting a Success

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which was hosted by Dr. Jim Fuchs. During this event, ten graduate and postdoctoral researchers took center stage to present their research to the Society. The terrific presentations in that session left no doubt that the future of natural products research is in great hands.

Monday opened with two superb symposium talks on marine microbial natural product genomics (Dr. Paul Jensen – winner of the 2015 Waters Award for Excellence in Natural Products Innovation) and natural product antiinfectives (Dr. Carole Bewley). Following that afternoon's parallel sessions and the meeting's third poster session, participants loaded onto buses for a short ride to Keystone Stables for an evening of fun and entertainment. In addition to a wonderful barbeque dinner, meeting attendees enjoyed on-site activities, as well as a stunning performance by the Austin-based bluegrass band Wood and Wire. Based on the hundreds of people who packed the dance floor and bleachers, it is clear that the Society had a great time that went well into the night.

Tuesday opened with exciting talks concerning natural product diversity-orientated synthesis (Dr. Derek Tan) and chemical biology (Dr. John Tallarico). After further parallel sessions, the meeting broke early for the afternoon to give members a chance to enjoy the Colorado countryside and enable our younger members to gather for comradery and focus on career development. After a guided hike on the mountainous Hallelujah Loop, the younger members returned to the conference center for a more intimate gathering, led by Dr. Brain Murphy, focusing on several important aspects of career building and management.

The meeting finished strong Wednesday, August 29, with terrific symposium talks concerning bioactivity-guided natural product synthesis (Dr. Daniel Romo) and natural product based antibody conjugates in pharmaceutic development (Dr. Peter Senter). Following further parallel scientific sessions, the Society's 2015 awardees for the Farnsworth Research Achievement (Dr. Raymond Andersen), Tyler (Dr. Cindy Angerhofer), and Suffness (Dr. John MacMillan) Awards shared summaries of their scientific exploits in the ASP Awards Symposium. The meeting concluded that evening with an enjoyable banquet

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in which the Society's new President Dr. Edward Kennelly was introduced, and the outgoing president Dr. Phil Crews was roasted by the ASP's one and only Dr. Barry O'Keefe.

I would like to thank his University of Oklahoma colleagues and members of the meeting organizing committee (Drs. Anthony Burgett, Adam Duerfeldt, Indrajeet Sharma, Brad Stevenson) for their help and support. Critical to the success of the meeting was the extraordinary effort of Ms. Candace Coker from the University of Oklahoma Institute for Natural Products Applications and Research Technologies. She worked tirelessly behind the scenes to make this meeting a grand success. The help of our meeting volunteers is also greatly appreciated for making sure the meeting ran smoothly each and every day. Additionally, the numerous member of the scientific organizing committee (Co-Chaired by Dr. Susan Mooberry and me) are thanked for their efforts. And most importantly, the Society thanks all of its members, both new and seasoned, for their tremendous support. ■

During this event, ten graduate and postdoctoral researchers took center stage to present their research to the Society. The terrific presentations in that session left no doubt that the future of natural products research is in great hands.

Andersen Receives Farnsworth Award

By Michael Mullowney

ASP member Dr. Raymond Andersen, professor in the Department of Chemistry and the Department of Earth, Ocean, and Atmospheric Sciences at the University of British Colombia since 1977, was honored on Wednesday, July 29 with the Norman R. Farnsworth ASP Research Achievement Award at the ASP annual meeting in Copper Mountain, Colorado. The history of this award spans three decades and was renamed to honor the late Dr. Norman R. Farnsworth when he was the award's recipient in 2005.

Dr. Susan Mooberry of the University of Texas Health Science Center at San Antonio introduced Dr. Andersen, whose accolades include the co-founding of two biotech start-up companies, and among several other honors, receiving the ASP Arthur E. Schwarting Award in 2003. Dr. Andersen began his award lecture entitled "Sponging off Nature for New Drug Leads," by displaying the names of his legions of past and present PhD students, post docs, research assistants, lab technicians, and sabbatical visitors, thanking them generously, stating "this award should be theirs." Andersen also expressed his "debt of gratitude" to collaborating research groups and funding organizations that have made his successes possible. The core of the presentation that followed highlighted the development of the Andersen lab's most promising drug leads into viable, marketable drug candidates currently in clinical trials.

Dr. Raymond Andersen

GRETCHEN KELLEY PHOTOGRAPHY

ASP President, Dr. Edward Kennelly commented, "I congratulate Ray Andersen on receiving the ASP Farnsworth Achievement Award. His seminal work in the field of marine natural products has led to the discovery of important compounds as drug leads. Throughout his storied career, he has mentored a number of ASP members, and collaborated in major research projects with others. I wish him continued success."

Since his beginnings with the ASP more than 30 years ago, Andersen has maintained relationships with many key members, at times serving as mentor or collaborator. Notably, Professor Roger Linington, the 2014 recipient of the Matt Suffness Award, received his PhD from UBC under the guidance of Dr. Andersen. Following the mention of the great number of Andersen's students who now occupy leadership positions in both industry and academia, Dr. Linington remarked, "From my own experience, exposure to the power of integrating synthetic chemistry with natural products discovery and high value assay systems has certainly shaped the way my own program has developed. I'm sure that many other Andersen alumni have similar observations of how Ray's guidance has made them more careful and thoughtful scientists and shaped their scientific careers."

Additionally, Andersen fondly recalls collaborating in "a highly rewarding and enjoyable" NIH National Cooperative Drug Discovery/Development Group (NCDDG) titled 'Anticancer Agents from Unique Natural Products Sources' with Chris Ireland, Jon Clardy, and Guy Carter, all current members and past presidents of the ASP. "This collaboration was a very important part of our research efforts between 1990 and 2010 and it gave me an invaluable inside look at Big Pharma drug discovery efforts," Andersen stated. Clearly, this

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Andersen defined his research program as the search for bioactive marine natural products for use as molecular probes and drug leads. With a focus on marine sponges as the source, his aim has been to address unmet medical needs by screening molecules against unique targets.

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was a perspective that would prove invaluable for his own ventures in the pharmaceutical industry.

Setting the foundation for his talk, Andersen defined his research program as the search for bioactive marine natural products for use as molecular probes and drug leads. With a focus on marine sponges as the source, his aim has been to address unmet medical needs by screening molecules against unique targets. Making light of the sample collection approach in natural products, he cited David Newman's quote, "If it is slow moving, brightly colored, and has no shell – we want it." Andersen then told the story of the sintokamides from a *Dysidea* sp. collected in Indonesia. This class of chlorinated peptides and their synthetic derivatives were revealed to exhibit a novel mode of androgen receptor (AR) binding at the N-terminus. With great selectivity, they inhibited AR-dependent proliferation in castration-resistant prostate cancer (CRPC), for which there are few treatment options. The co-discovery of this new AR receptor target with the Dr. Marianne D. Sadar lab led to their increased interest in treating CRPC by finding new inhibitors with this mode of action, which in turn progressed to Andersen's co-founding of ESSA Pharma. Professor Andersen is "a firm believer in the need for interested academic scientists to get involved as entrepreneurs in the drug development process" and cites his own decision to do so twenty years ago as a defining moment in his career.

"If it is slow moving, brightly colored, and has no shell – we want it."

He continued the lecture, noting the $30 million in venture capital that was raised to found ESSA, with the purpose of advancing their most potent AR N-terminal domain-targeting sponge-derived drug lead, EPI-506, to clinical trials. This bridging of natural products discovery in academia to further development in pharma has so far been a considerable success, with plans for the first prostate cancer patient to be dosed with EPI-506 in a clinical trial during the 3rd quarter of 2015.

Andersen also spoke of the synthetic optimization of pelorol from a sponge in Papua New Guinea after its discovery in an assay designed to identify SHIP1 activators that would modulate PI3K cell signaling as a treatment for inflammatory disorders and cancer. The compound has been further optimized to improve solubility and potency under Andersen's second biotech firm Aquinox Pharmaceuticals, a company solely focused on the development of SHIP1 activators. He gave an inspiring account of the firm's second lead compound, contignasterol, a novel sponge natural product discovered in the Andersen lab at UBC. The molecule was initially developed as a treatment for asthma but failed in phase II clinical trials. Andersen explained that under Aquinox, a synthetic analog of the natural product called AQX-1125 successfully completed multiple preclinical studies. In the time since, it has advanced to Phase II development for the treatment of asthma, inflammatory bladder pain (interstitial cystitis), atopic dermatitis, and chronic obstructive pulmonary disease.

"My involvement in these companies has taken me in new scientific directions that I would never have envisioned otherwise…" Andersen stated in a later interview. And he encourages younger researchers to call upon the same kind of courage that he has displayed by embarking on his entrepreneurial endeavors: "Follow your curiosity and don't try to do what everyone else is doing. Have the confidence to find your own path." Andersen stands as testament that achievement of success in natural product drug discovery is possible and likely reliant on this sort of ethic.

His tenacity for the development of his leads as marketable therapeutics has resulted in many successes, even since the Norman R. Farnsworth Award lecture. A week following the ASP meeting in Copper Mountain, Aquinox Pharmaceuticals announced that their lead compound AQX1125 cleared phase II clinical trials with positive data and plans to move into phase III trials as a prelude to registration and clinical use.

"Follow your curiosity and don't try to do what everyone else is doing. Have the confidence to find your own path."

"The previous recipients of the Norman R. Farnsworth Award are a distinguished and inspirational group of natural products chemists who have been my scientific heroes and role models throughout my career," Andersen stated humbly in a private interview. "I am delighted and deeply honored to join this group as a recipient of the ASP Norman R. Farnsworth Award." ■

Angerhofer Receives Tyler Prize

Dr. Edward J. Kennelly

ASP Vice President, Dr. Cindy Angerhofer, has been awarded the 2015 Tyler Prize from the Society. This prize, named in honor of ASP's first president, Dr. Varro (Tip) Tyler, is given in recognition of her distinguished career in botanical research.

Dr. Angerhofer received the prize at the 2015 ASP Annual Meeting in Copper Mountain on Wednesday, July 29. As part of the award, she presented a talk, "The Ins and Outs of Pharmacognosy: Plants for Health and Beauty". In this presentation, Dr. Angerhofer detailed her work in botanicals from her early days at the University of Illinois at Chicago (UIC) to her current work in industry at Aveda. This included examples from her doctoral research on natural toxins, to her UIC research on cancer prevention and antimalarial drugs, to the development of a new line of botanical dietary supplements at Tom's of Maine, and now her work at Aveda in the field of botanicals for skin care. Through these examples, she clearly demonstrated the wide range of research topics and career paths available for people with an interest in botanicals.

Dr. Cindy Angerhofer

DR. AMY KELLER

Dr. Angerhofer began her talk drawing from Dr. Tyler's classic work, *The Honest Herbal* published first in 1982, by noting the importance of this work for consumers who wanted to try various botanical products. She emphasized that, "Tip reviewed the literature on safe and effective use of herbs…" and made recommendations based on his reading. Sometimes these findings were not popular at various times with those in industry or government. After the passage of the Dietary Supplement Health and Education Act in 1994, Dr. Tyler's work became even more important to help consumers navigate the many new products that came on to the botanical market in the US.

Dr. Angerhofer received her doctorate in Pharmacognosy at the University of Minnesota College of Pharmacy in 1989. She then moved to UIC to conduct postdoctoral research with ASP member Dr. John Pezzuto, and rose to the ranks as Assistant Professor. She left academia in 1997, to become the Director of Research and Product Development at Tom's of Maine, and since 2009 she has served as Executive Director of Botanical Research at Aveda.

When asked how she felt about this recognition, Dr. Angerhofer wrote, "Winning the Tyler Prize is a tremendous honor for me, and I am humbled to be in the company of the previous awardees who have advanced the scientific knowledge of plants in such diverse ways. I was guided by Tip Tyler's writings as I was beginning my career, and embrace his philosophy that scientific rigor can and should be directed toward traditional herbal medicine in order to illuminate benefits and limitations for efficacious, modern application. I continue to believe that the biodiversity of the plant kingdom is a deep yet vulnerable resource that has many therapies, secrets, and surprises still to yield. I am sincerely grateful to the ASP for recognizing my contributions with this award."

ASP President, Dr. Edward Kennelly, noted, "I am very glad for Cindy's success. I worked at UIC as a postdoc when Cindy was an Assistant Professor in the department, and I always respected her rigorous approach to natural products research. Her service and dedication to the Society over has been exemplary." ■

I continue to believe that the biodiversity of the plant kingdom is a deep yet vulnerable resource that has many therapies, secrets, and surprises still to yield.

MacMillan Presented Suffness Award

By Dr. Amy Keller

ASP member Dr. John MacMillan, Associate Professor in Biochemistry at University of Texas Southwestern Medical Center, University of Texas, Dallas, Texas, was awarded the 2016 Matt Suffness Young Investigator Award at the ASP Annual Meeting in Copper Mountain, Colorado, this July.

Dr. MacMillan told the *Newsletter* that "receiving the Suffness Award is a tremendous honor that recognizes the creativity and hard work that my graduate students, post-docs, and I have put into building a natural products focused research program."

Dr. MacMillan's research applies results from phenotypic screening into bioactivity (mechanisms of action along with cellular and molecular targeting). A highlight of his research is functional signature ontology (FUSION), a technique of investigating gene expression with the use of silent and micro RNA to analyze the bioactivity of natural products on a cellular level.

Dr. MacMillan diving off the island of Curacao.

MR. BAS HARTS OF BAS HARTS DIVING.

This technique was part of Dr. MacMillan's award presentation, as he discussed an example of using FUSION to take positive results of natural products in cancer toxicity forward to elucidate a family of bioactive natural product compounds, the discoipyrroles. Dr. MacMillan's laboratory also discovered ways to synthesize analogs of these compounds with more targeted bioactivity.

Although Dr. MacMillan never met Dr. Suffness, he related that, "Receiving the Suffness Award has given me an opportunity to share my research program and scientific vision with a greater number of people in natural products and related fields." Dr. MacMillan is optimistic that FUSION and other techniques for investigating the bioactivity of natural products that his laboratory has ushered forth will greatly influence the field of pharmacognosy.

ASP President Edward Kennelly noted, "I congratulate Dr. MacMillan as the recipient of the 2015 Suffness Award, our highest recognition for colleagues early in their research career. In his role at NCI, the late Dr. Matt Suffness was a great advocate for early investigators and natural products in cancer therapy, and I am pleased that John's cutting-edge research on cancer and natural products has been acknowledged by the Society." ■

Dr. MacMillan's research applies results from phenotypic screening into bioactivity (mechanisms of action along with cellular and molecular targeting).

A highlight of his research is functional signature ontology (FUSION), a technique of investigating gene expression with the use of silent and micro RNA to analyze the bioactivity of natural products on a cellular level.

ASP Annual Awards

The *Newsletter* wishes to recognize and congratulate all ASP award winners. Best wishes and congratulations to all.

Norman R. Farnsworth Research Achievement Award

Dr. Raymond J. Andersen
University of British Columbia, Vancouver, Canada

Varro Tyler Prize for Botanical Research

Dr. Cindy Angerhofer
Aveda, Minneapolis, Minnesota

2014 Arthur E. Schwarting Award

Dr. Souvik Kusari and Dr. Michael Spiteller
Technical University of Dortmund, Dortmund, Germany

2014 Jack L. Beal Award

Dr. William A. Maio
New Mexico State University, Las Cruses, New Mexico

Matt Suffness Young Investigator's Award

Dr. John MacMillan
University of Texas Southwestern Medical Center,
University of Texas, Dallas, Texas

D. John Faulkner Travel Award

Dr. Sandra Loesgen
Oregon State University, Corvallis, Oregon

ASP Research Starter Grant

Dr. Jason Kwan
University of Wisconsin, Madison, Wisconsin

ASP Student Research Award

Ms. Mayuramas Sang-Ngern
University of Hawaii at Hilo, Hilo, Hawaii

ASP Undergraduate Research Grants

Ms. Andrea Romanowski
Palm Beach Atlantic University, West Palm Beach, Florida

Ms. Nicole Nightingale
University of Pittsburgh, Pittsburgh, Pennsylvania

Mr. Paul Scesa
Florida Atlantic University, Boca Raton, Florida

Travel Awards

ASP Travel Award for Active Members

Dr. Emily Mevers
Harvard University, Cambridge, Massachusetts

ASP Student Travel Awards

Mr. Andrew Osborn
Oregon State University, Corvallis, Oregon

Dr. Brittany Graf
Rutgers University, New Brunswick, New Jersey

Mr. Chris Thomas
University of Wisconsin, Madison, Wisconsin

Ms. Jessica Ochoa
University of Santa Cruz, Santa Cruz, California

Ms. Krista Gill
University of Prince Edward Island, Charlottetown, Canada

Kyuho Moon
Seoul National University, Seoul, South Korea

Ms. Maryam Elfeki
University of Illinois at Chicago, Chicago, Illinois

Lynn Brady Student Travel Award

Mr. Ben Naman
Ohio State University, Columbus, Ohio

Mr. Mary Choules
University of Illinois at Chicago, Chicago, Illinois

Ms. Yun Seo-Kil
Ewha Womans University, Seoul, South Korea

ASP David Carew Student Travel Award

Mr. Bailey Miller,
University of California San Diego, San Diego, California

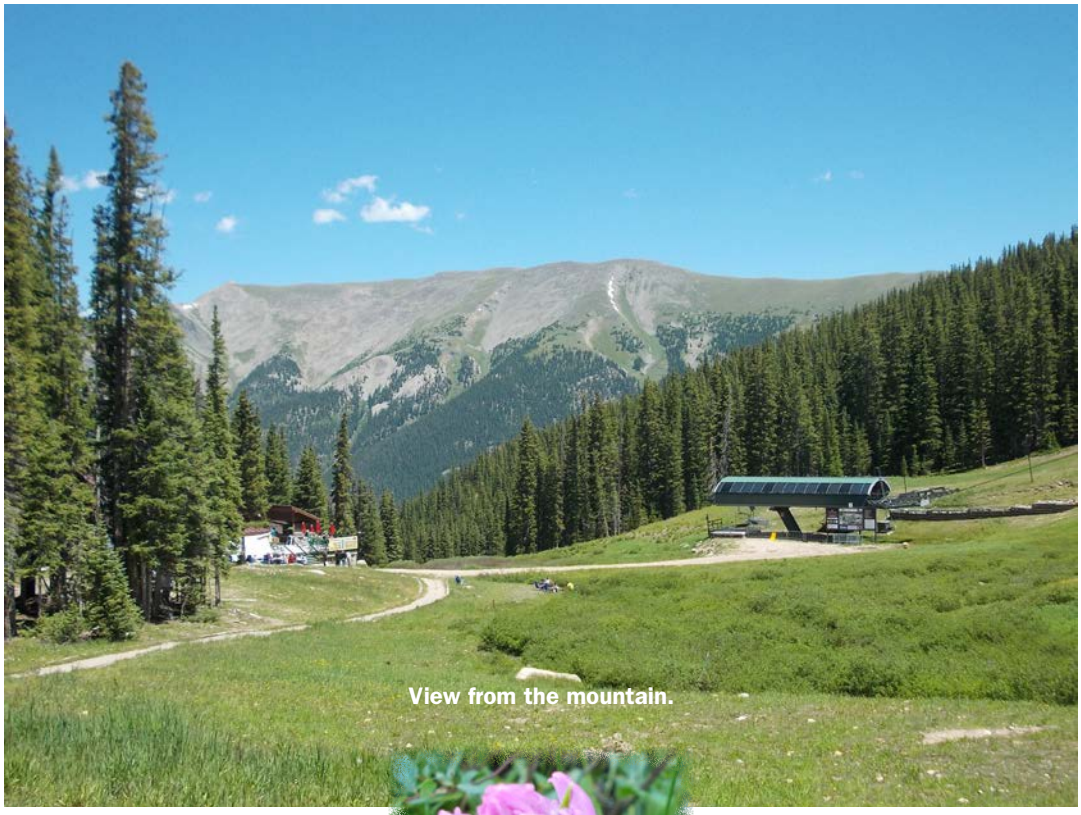
ASP Waqar H. Bhatti Student Travel Award

Ms. Ashley West
University of Connecticut, Storrs, Connecticut

ASP Jerry McLaughlin Student Travel Award

Mr. Ian Miller
University of Wisconsin, Madison

Younger Members Get High in Colorado



View from the mountain.

By Dr. Brian Murphy

Each year at its annual meeting, the ASP hosts an event for its younger members. This year the event began with a majestic hike up Copper Mountain followed by a series of small roundtable discussions led by select academic and industrial professionals.

The purpose of this event was to afford younger ASP members a chance to interact with junior faculty and industry professionals, and to facilitate networking amongst each other in an informal atmosphere (adult beverages optional). The logistics for this event were organized by Ms. Candace Coker and Dr. Robert Cichewicz at the University of Oklahoma (among others), and we personally thank them for their efforts.

Each of the attendees split up into smaller groups that rotated through one of six stations in a "chemistry speed dating" format. Drs. Kevin Tidgewell (Duquesne University) and Brian T. Murphy (University of Illinois at Chicago) led discussions focused on life as a professor in academia. Discussion topics of interest to the students were grant writing, how to build and manage a research group, and interviewing tips to help them acquire a position at an academic university.

Castilleja rhexifolia.

Dr. Amy Lane (University of North Florida) and Dr. Brian J. Doyle (Alma College) shared their experiences teaching and running a research laboratory at predominantly undergraduate universities. Dr. Jeremy Beau (Bayer CropScience) offered advice to students interested in careers at larger companies, while Dr. Eduardo Esquenazi shared his unique experiences as

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Lunch at the Younger Members' Event.

PHOTOS BY DR. AMY KELLER

Younger Members Get High in Colorado

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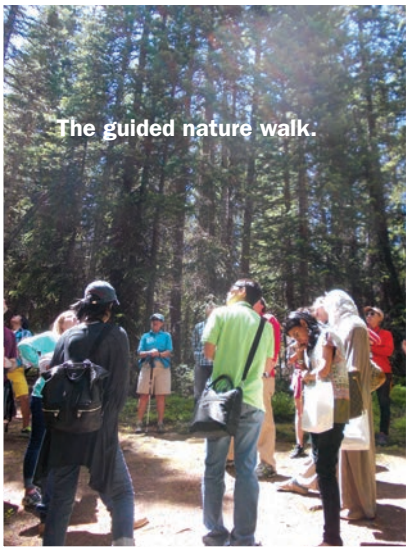
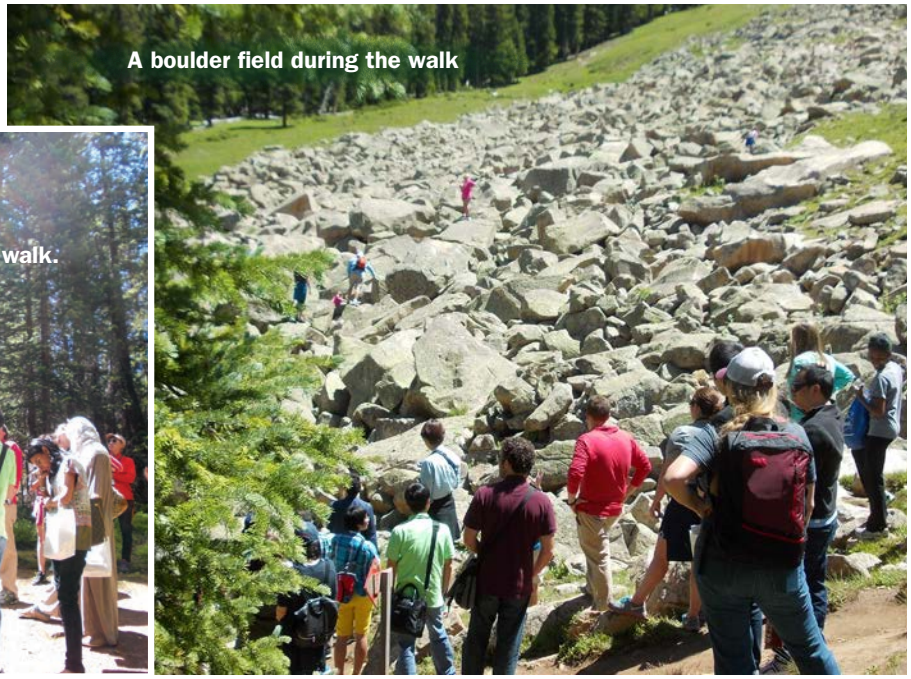
the founder of Sirenas, a San Diego-based marine drug-lead discovery company.

This year we added two new sessions that are often ignored at younger member events: challenges of managing dual spousal careers (Dr. Sandra Loesgen, Oregon State University), and managing a family and work-life balance (Dr. Marcy Balunas, University of Connecticut; Dr. Barbara Timmermann, University of Kansas). Throughout the rotations, these two sessions were heavily populated and should alert advisers in our field that the need for advice here is in high demand.

Overall the event was a success, as the committee implemented several suggestions we received from students the prior year. Expect to see a similar event format in the upcoming ASP meetings. ■



The guided nature walk.



A boulder field during the walk

Above: Members of the panel: Drs. Brian Murphy, Marcy Balunas, Barbara Timmermann, Kevin Tidgewell, Sandra Loesgen, Jeremy Beau, Amy Lane, and Eduardo Esquenazi.

Left: Ms. Andrea Rague, Ms. Annécie Benatrehina, Ms. Garima Agarwal, and Mr. Ben Naman.

Right: Members of the panel: Drs. Jeremy Beau, Brian Doyle, and Eduardo Esquenazi.

ASP Foundation Donors

The *Newsletter* wishes to acknowledge and thank ASP Foundation Donors.

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ASP Rebranding Initiative Update

In 2014, the ASP executive committee commissioned a "rebranding" project from the Virginia Commonwealth University Brand Center, one of the top US graduate schools in branding.

Dr. Barry O'Keefe

In 2014, the ASP executive committee commissioned a "rebranding" project from the Virginia Commonwealth University Brand Center, one of the top US graduate schools in branding. In November, 2014, recommendations were presented to the ASP, and at the 2015 Executive Meeting in Copper Mountain, ASP agreed to move forward on a number of fronts to implement some of the suggestions.

To start the process last fall, the ASP provided a prospectus document to VCU detailing areas of potential improvement for the Society including: 1) the name of the society, 2) improving membership, 3) the organizational structure of the ASP, 4) how the society disseminates information, 5) the "technical footprint" of the society, 6) how to improve coverage of our annual meetings, and 7) the society's logo and graphics. The written prospectus was followed by an oral presentation on the ASP by Dr. Barry O'Keefe at VCU.

The ASP project was very popular at VCU and was selected by five different graduate student groups (five members each) as their project. Each graduate student group, mentored by faculty mentor, then took on a semester-long project at evaluating the needs of the ASP and suggesting alternatives to address those needs. They presented their findings and suggestions in November 2014. ASP members, Drs. John Cardellina (ASP Foundation Chair), Nam-Cheol Kim (Assistant Treasurer) and Barry O'Keefe (Executive Committee member) traveled to Richmond, Virginia to see the presentations and evaluate the students. Several other members of the Executive Committee also video-conferenced into the meeting to see the presentations.

The result of this "re-branding" effort was several action items taken up by the ASP Executive Committee and presented at the ASP Business Meeting in Copper Mountain Colorado. These include:

1. The creation of an ASP Sponsorship committee to include Treasurer, meetings committee member, awards committee member, ASP foundation committee member, and representatives of next two ASP annual meetings.

2. Initiation of the "catalyst initiative" in combination with Farnsworth and Tyler Award. ASP will commission original art (inspired by award winners science) to be presented to the award winners and produce 100 lithographs of art to sell at annual meeting. ASP will place artwork and photo/bio of award winner on website and use in advertising for annual meetings. A second item for the catalyst initiative was the sponsoring of 2-4 lectures per year as part of an ASP lecture series. These would be held at different universities and recorded for inclusion on the ASP website. The ASP would provide funds to support individual lectures.

3. A re-design of ASP website was suggested to make it better for portables (phones, pads). Several possibilities for improving content were discussed including stressing nature and discovery more (movie created for the ASP), add "pharmacognosy on the go" site where members can upload movies, pictures of their travels, work in lab; add ASP fellow blog with ideally bi-weekly entries from the fellows, also potentially from young members. The ASP Executive Committee voted to initiate getting quotes for the re-design.

4. The ASP Executive Committee voted to add a young member representative to the Executive Committee – term to be 2 years, based on vote of society in special young members election. It will bring more young members into the workings of the society at a younger age, 2 yr term will insure more young members get a chance to serve, and will be good for the CVs of the young members and good for the society.

5. Possible name change of the ASP. After undertaking focus groups, surveys, evaluations of name recognition and the potential target audiences for new APS members, four of the five VCU teams suggested changing the name of the ASP. Two surveys were undertaken to discern if the members of the ASP wanted to change the name of the Society. Both, unfortunately, did not get strong response. Of those responding, ~60% were in favor of changing the name of the ASP in each of the two surveys. Suggestions for potential names were also requested. The two most common suggestions were:

   a. American Society of/for Natural Products

   b. Society/Association of/for Natural Product Sciences

As the previous surveys had a poor response, the Executive Committee decided to undertake a final non-binding survey of the members. A non-binding survey amongst four choices will be undertaken: [1] do not change the name, [2&3] change the name to one of the above, [4] change the name but to neither of the two listed above (write in name). If "do not change the name of the ASP" garners 50 % of the vote, we will not continue efforts to change the name of the society. If it does not, a binding vote will take place with one possible new name for the ASP.

6. Initiate an outreach program for pre-baccalaureates including sponsorship of student groups at universities.

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7. The VCU student groups all thought the ASP should look into shorter, more frequent newsletters and investigate the possibility of advertising. Incoming ASP President and Newsletter Editor Ed Kennelly has initiated a survey of ASP members to determine their views on the newsletter.

8. The final suggestion was that ASP should start an ad hoc Social media committee to maintain ASP presence and "Pharmacognosy" in general on: Reddit, FaceBook, LinkedIn etc… This would require regular postings on topics of interest and coordination with newsletter and website. The Executive Committee decided this effort was best undertaken by the ASP Publicity Committee headed by Marcy Balunas.

The VCU students and faculty did an outstanding job of evaluating the needs of the ASP, and the ASP Executive Committee has shown leadership in putting many of these ideas into action. As the ASP moves into its second 50 years it is important that we stay relevant in the scientific community and to future generations of scientists. Hopefully some of the changes suggested above will make that goal a little easier. In the final analysis though, it is only through an active and engaged membership that the ASP can meet the challenges of the future. So reach out to your ASP committee members and offer your help, get involved in some of the new initiatives and don't forget to respond to the coming surveys and vote. ■

Meet the 30 ASP Fellows

ASP former and current Presidents, including seven ASP Fellows (as initialed) Drs. Ed Kennelly, Phil Crews, David Newman, Tadeusz Molinski, Barbara Timmermann, Guy Carter, John Beutler, Jim McAlpine, Douglas Kinghorn, Gordon Cragg, and William Gerwick.

DR. GUIDO PAULI

In 2006, a unique passage was added to the ASP Constitution and By-Laws, providing special recognition for up to 5% of members. Candidates are presented to Executive Committee as potential ASP Fellows. The guiding principle for appointment is extremely rigorous, "Fellows shall be appointed based on exceptional contribution to the sciences promoted by the society."

As of September 2015 there are 30 ASP Fellows. An inaugural group of seven ASP Fellows was approved in 2006. I would hope that all ASP members are familiar with these individuals, so I now task you to: (1) peruse the literature and read one of their recent papers, and (2) make a sketch of one or more significant natural product molecules discovered by this group. I predict you will be inspired by the collective discoveries made by these inaugural ASP Fellows. Deserving of special attention is the career of Prof. Nakanishi. He is a nonagenarian and his achievements were celebrated on the cover of *Chemical & Engineering News* issue which appeared in July 20, 2015.

The ASP fellows are a fascinating group. On the last day of the 2015 Copper Mountain meeting many ASP Fellows gathered for a photo-op (which also included past presidents).Take a moment to connect the two letter code above each ASP Fellow with their identity.

The current 'thought-leader' for this group is Professor Bill Gerwick. He leads annual, sustained discussions by the fellows on many contemporary issues. For example, there is continuing concern that funding for natural products based research is unstable for academic and corporate scientists at all career levels. Stay tuned for further developments and use the list of ASP fellows (and images shown here) to corral them at future ASP Annual General Meetings! ■

ASP Symposium Honors Wani

By Drs. Nicholas Oberlies and James Fuchs

ASP Fellow, Dr. Mansukh Wani, co-discoverer of camptothecin and paclitaxel (along with the late Dr. Monroe Wall) and long-time member of the ASP, celebrated his 90th birthday with a symposium entitled, "Enhancing Natural Product Leads Via Synthetic Manipulation: In Celebration of Dr. Mansukh Wani's 90th Birthday" July 28, 2015, in Copper Mountain.

Drs. Nicholas Oberlies, Dale Boger, Mansukh Wani, Tom Prisinzano, and James Fuchs.

MR. VINCENT SICA.

Invited speakers included Drs. James Fuchs, Associate Professor of Medicinal Chemistry and Pharmacognosy at Ohio State University (OSU), Columbus, Ohio, Tom Prisinzano, Professor and Chair of the Department of Medicinal Chemistry at the University of Kansas, Lawrence, Kansas, and Professor Dale Boger, the Richard and Alice Cramer Professor of Chemistry and Chairman, Department of Chemistry, Scripps Research Institute, La Jolla, California. These scientists were perfect choices to honor Dr. Wani, as they represented two of his great interests in natural products chemistry: medicinal chemistry and young scientists. The latter is fairly easy for him to accomplish, as nearly no one at an ASP meeting is older than Dr. Wani (with the exception of Dr. Koji Nakanishi). To address the former, we assembled the afore-mentioned three chemists all working with medicinal chemistry to enhance the potency of natural product leads.

Dr. Fuchs started the series off by telling us about lead optimization efforts associated with the phyllanthusmin class of natural products isolated from Vietnamese plants by Dr. Douglas Kinghorn's group at OSU. Through chemical synthesis, his group strives to enhance the supply of the native natural product leads for biological and mechanistic studies, explore the structure-activity relationships and enhance the potency of these molecules through the generation of a library of structural analogues; the group improves upon physicochemical properties of these compounds to facilitate *in vivo* studies against various cancers.

Dr. Prisinzano spoke in detail about synthetic approaches to the natural product myricanol, a diarylheptanoid which has been shown to affect the levels of tau protein in the central nervous system and is therefore of interest in the study of neurodegenerative diseases. In particular, he explained the use of various strategies designed to access both enantiomers of myricanol, since the absolute configuration of the compound including the axial chirality of the biaryl system, has been shown to be critical for the activity of this compound.

Finally, we were honored to have Dr. Boger conclude the session. His talk was a tour de force of medicinal chem-

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Hopefully you have met Dr. Wani at ASP meetings over the years. He loves talking to young people, especially relaying his stories regarding the discoveries of camptothecin and taxol with his long-time colleague, Dr. Wall.

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istry, containing a vast amount of structural and biological data from his research into the anticancer agents vincristine and vinblastine. He demonstrated the ability to effectively synthesize and modify these complex alkaloids, while simultaneously enhancing their potency. The true measure of the progress on these compounds was the precision with which he manipulates the structures and the ability to make previously unknown deep-seated structural changes to these classic molecules. In reference to this presentation, Dr. Wani noted to me that it was refreshing to see the amount of research that could be conducted on compounds that have been drugs for a period of time longer than even he has had his PhD.

Hopefully you have met Dr. Wani at ASP meetings over the years. He loves talking to young people, especially relaying his stories regarding the discoveries of camptothecin and taxol with his long-time colleague, Dr. Wall. If you look back on those seminal papers,[1,2] you will realize quickly that they did not use 1 and 2D NMR to solve the structures of those compounds; ^{13}C was not feasible at the time, and 2D NMR had many more years to wait until the computer advancements made it possible. At the time of those pivotal discoveries, there was much more emphasis on piecing the molecules together based on knowledge of organic chemistry.

One of us (Dr. Oberlies) has had the pleasure of working with Dr. Wani for over 15 years, and in all that time, I cannot recall ever discussing with him questions about nuclear magnetic resonance (NMR) or mass spectrometry (MS) data. Instead, if you want to see his eyes and brain perk up about science, ask him an organic chemistry question, talk to him about a potential derivatization that could enhance your ability to make a crystal, or see what he thinks about "med chem-ing" a certain portion of a molecule to enhance its potency. Organic chemistry is where his many years of training were centered, and for decades and decades, those were likely the greatest contributions he made to many molecules at Research Triangle Institute (RTI), Research Triangle Park, North Carolina. In fact, when I left RTI in 2009, I know that he was a co-inventor on more patents than any other researcher there, including Dr. Wall, due to his many contributions of synthetic chemistry expertise.

Scientific contributions of the magnitude of Dr. Wani's are rare. This symposium was a fitting intellectual tribute to a giant in the field of natural products chemistry. ■

Instead, if you want to see his eyes and brain perk up about science, ask him an organic chemistry question, talk to him about a potential derivatization that could enhance your ability to make a crystal, or see what he thinks about "med chem-ing" a certain portion of a molecule to enhance its potency.

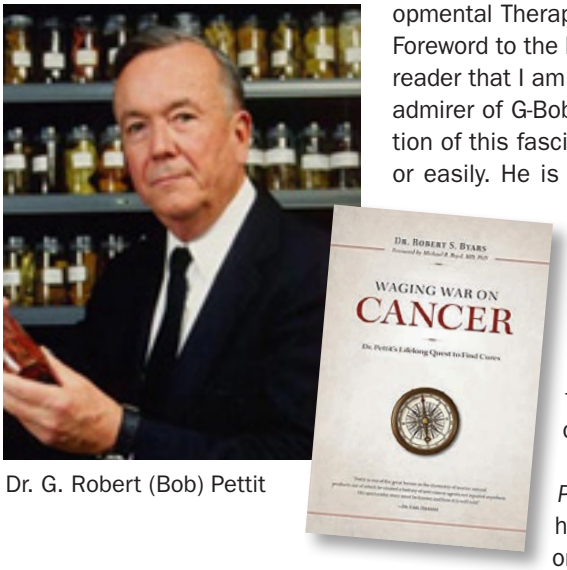
1. Wall, M.E., Wani, M.C., Cook, C.E., Palmer, K.H., McPhail, A.T. and Sim, G.A. Plant antitumor agents. I. The isolation and structure of camptothecin, a novel alkaloidal leukemia and tumor inhibitor from Camptotheca acuminata. *J. Am. Chem. Soc.,* **1966**, 88, 3888-3890.

2. Wani, M.C., Taylor, H.L., Wall, M.E., Coggin, P. and McPhail, A.T. Plant antitumor agents: VI. The isolation and structure of taxol, a novel antileukemic and antitumor agent from Taxus brevifolia. *J. Am. Chem. Soc.,* **1971,** 93, 2325-2327.

New Book on Pettit's Successes and Struggles

By Dr. Gordon Cragg

Many ASP members know Dr. G. Robert (Bob) Pettit as a colleague and a friend, and "a tireless soldier waging battle against cancer," as noted by Dr. Kevin Pinney. Dr. Robert S. Byars, who as Director of the Arizona Disease Control Research Commission first met Bob in 1987, has authored a book *Waging War on Cancer. Dr. Pettit's Lifelong Quest to Find Cures* (Friesen Press, 2015) based on extensive interviews conducted between September, 2011 and September, 2014.



Dr. G. Robert (Bob) Pettit

Dr. Byars notes in the preface that his book "portrays the life, times, struggles, successes, and setbacks of Dr. G.R. Pettit *as he sees them and lives them.*" He presents this absorbing biography in six chapters, "Growing Up in the Jersey Shore, The College Years, Working and Enlisting in the War on Cancer, Devising Strategies and Waging War on Cancer, Expeditions to Exotic Places in Search of Cures, and International Diplomacy, the War on Cancer and the Seychelles". A seventh chapter comprises an article by Megan Irwin entitled "A Cancer on ASU" which appeared in the *Phoenix New Times* on January 18, 2007. The article has the subtitle "Could Bob Pettit Have Cured Cancer in His Lifetime? We Might Never Know, Thanks to Nasty University Politics", and relates the events and confrontations which led to the demise of the Cancer Research Institute at Arizona State University (ASU) in January, 2006.

The early chapters are fascinating in that they recall what drove and inspired Bob, first as a "young boy raised in a tough New Jersey neighborhood to become enamored with the promise of Nature and chemistry as a potential source of anticancer drugs", and then later "to develop a heightened sense of community service which would enable him to overcome many obstacles and setbacks, and to establish one of the world's leading natural products drug discovery and development programs devoted to alleviating the ravages of cancer".

Dr. Laurent Meijer, President of ManRos Therapeutics, and Research Director at the CNRS Station Biologique de Roscoff in France, puts it well, "Dr. Byars captures Bob Pettit's generosity, humanity, inextinguishable energy, outstanding expertise, stubbornness and fighting spirit". Indeed, Bob's stubbornness, tenacity and fighting spirit are readily apparent to those who know him well. Dr. Michael Boyd, a former Associate Director of the NCI Developmental Therapeutics Program, comments in his Foreword to the book: "It should be obvious to the reader that I am an unapologetic and enthusiastic admirer of G-Bob. I did not come to this appreciation of this fascinating and important man quickly or easily. He is complex. He is controversial. He can exhaust you in his efforts to bring you to his points of view. He can flat wear you out. Yes, he is incredibly tough. Yet he also is one of the most sensitive and caring individuals when it comes to his fellow man and the human condition that I have ever known."

ASP Fellow and *Journal of Natural Products* Editor, Dr. Douglas Kinghorn noted, "For those of us working on the discovery of natural product anticancer drugs who are about a generation younger, G. Robert 'Bob' Pettit has always been a superb role model, not only for his many outstanding successes in discovering novel lead compounds, but also for his persistence, thoroughness, and his encouragement of others."

The book closes with an Epilogue in which Bob elaborates on his early but unfulfilled dreams of a 'Manhattan Project for combating cancer', his views on the dwindling funding for natural products research, his thoughts on a strategy for future progress, and his philosophy for leading a worthwhile and productive life. Central to his thoughts are the need to be "humanitarian, regardless of the challenges, the turmoil, and the attacks." This commitment and tenacity is clearly evident in his "still actively pursuing his lifelong quest to find new cures and treatments, but with only a handful of researchers."

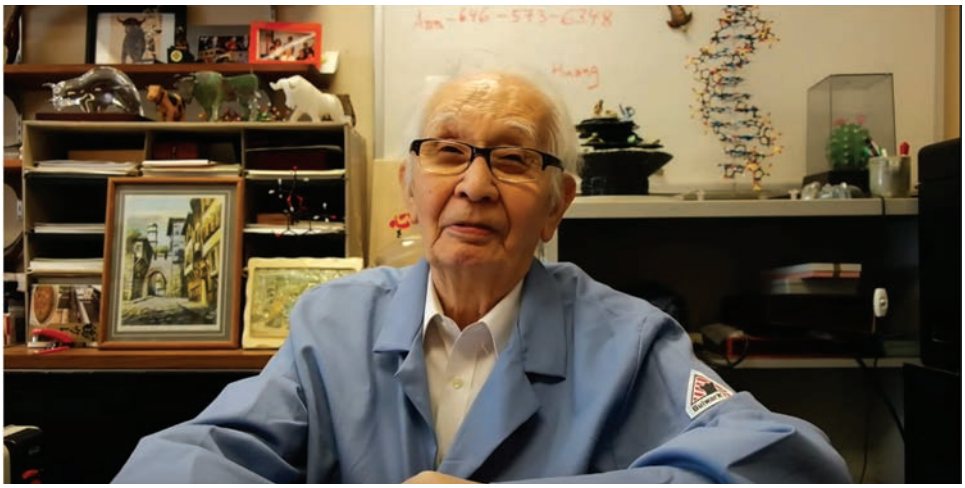
Despite the demise of his Institute at ASU, "he fully anticipates that he will be able to rebuild in his lifetime all that was dismantled and destroyed" - this at the age of 86! I strongly encourage all those interested in natural products drug discovery and development to read this book. As Dr. Boyd says, "I expect that most readers will, at one level, find this biography both entertaining and captivating. At another level, I expect that those who are inclined to ponder human behavior and motivation will find much to reflect on." Details on the purchase options may be found at http://www.robertsbyars.com/. ■

...a "young boy raised in a tough New Jersey neighborhood ... and to develop a heightened sense of community service which would enable him to overcome many obstacles and setbacks, and to establish one of the world's leading natural products drug discovery and development programs devoted to alleviating the ravages of cancer".

Celebration! Nakanishi Turns 90

By Dr. Roy Okuda

On May 11, 2015, Dr. Koji Nakanishi, long-time ASP member and Fellow celebrated his 90th birthday. He joins other nonagenarian ASP member and Fellow Dr. Mansukh Wani, also celebrating a 90th birthday earlier in the year. An article in *C&E News* on July 24, 2015 featured both of our esteemed colleagues, who continue to be scientifically active.



Dr. Koji Nakanishi

Dr. Nakanishi was born in 1925 in Hong Kong and lived his early life in Alexandria, Egypt and Hong Kong. His academic training was in Japan, where he obtained his PhD from Dr. Yoshimasa Hirata, at Nagoya University, Nagoya, Japan, one of the foremost natural products chemists of the day. Dr. Nakanishi was the first postdoctoral student in the United States from postwar Japan, where he worked in the laboratory of Dr. Louis Fieser at Harvard University, Cambridge, Massachusetts.

Returning to Japan, he began his academic career at Nagoya University, Tokyo Kyoiku University (Ibaraki), and then Tohoku University, Sendai, Japan. In 1970, he moved to Columbia University, New York, New York, where he has remained since. However, while at Columbia, he founded and directed research institutes in Osaka, Nairobi, and Brazil, all dedicated to discoveries in natural products and bio-organic chemistry.

Dr. Nakanishi's work has centered on solving problems of biological significance involving the tools of chemistry. He is considered an early proponent of bio-organic chemistry. His research program has always involved natural products in some manner. Among his notable projects are the structure of the gingkolides in the 1960s. Nearly 50 years later, he is collaborating with his former student Dr. Akira Kawamura (now Associate Professor at Hunter College, City University of New York) on a paper on the binding of gingkolide to a receptor in mouse hippocampus. Recently, he has been involved in research of bioactive phenols from bilberry which may have activity against age-related macular degeneration.

Another major part of Dr. Nakanishi's research has been an effort to deduce the role of retinal as a visual pigment in rhodopsin. By using an extensive series of analogues and models of visual pigments, the Nakanishi group has contributed significantly to our understanding of the visual cycle.

Dr. Nakanishi has always been keen to employ "new" methods to help solve chemical problems. He saw the value of a novel method called infrared spectroscopy (IR) in the 1950's and showed how it could be use to deduce chemical structures. He wrote the first book on practical use of IR in Japanese in 1962; it was translated to English in 1977. He also promoted the application of NMR in the 1960s as a tool for structure determination, including one of the first applications of the nuclear Overhauser effect to stereochemical assignment. Dr. Nakanishi is perhaps best known for his work (with Dr. Nobuyuki Harada) to discover and develop the "exciton chirality method" to determine absolute stereochemistry by CD measurements of suitably derivatized compounds. At Columbia, Dr. Nina Berova continues work on developing this important technique.

An accurate count does not exist of the total number of Nakanishi group members from his time in Japan, Columbia, and other institutes he founded, but it is believed to be in the range of 700-800. Colleagues who have passed through one of the Nakanishi labs can be found on every continent (except perhaps Antarctica) and in many countries worldwide.

A full summary of Dr. Nakanishi's long and storied career, his publication list, and awards and honors is beyond the scope of this brief article - his autobiography "A Wandering Natural Products Chemist" (Dr. Jeffrey Seeman, ed, 1991.) gives a full account until the year of its publication. During the 1985 ASP meeting in Chapel Hill, North Carolina, Dr. Nakanishi received the very first ASP Research Achievement Award (now the Normal R. Farnsworth Research Achievement Award). He has been an invited speaker of numerous ASP meetings. In 2011, a special issue of *J. Nat. Prod.* was dedicated to Koji's 85th birthday. He has been a member of the *J. Nat. Prod.* Editorial Board for decades, and is currently an ASP Fellow. Today, Dr. Nakanishi still goes into his office most days.

Besides his many contributions to science, Dr. Nakanishi is known worldwide for his skills as a magician and for entertaining countless chemists whenever he has the opportunity. On his 90th birthday, we wish Dr. Nakanishi the best, and look forward to more from our chemical "magician" and his bag of tricks. ■

On his 90th birthday, we wish Dr. Nakanishi the best, and look forward to more from our chemical "magician" and his bag of tricks.

Hot Topics in Pharmacognosy: Opiates from Modified Microbes

Dr. David J. Newman

As known by all pharmacognosists, throughout the ages humans and other animals relied on nature for their basic needs. Plants, in particular, formed the basis of sophisticated traditional medicine systems, with the earliest records dating from around 2900-2600 BCE,[1] documenting the uses of approximately 1,000 plant-derived substances in Mesopotamia[2] and the active transportation of medicinal plants and oils around what is now known as Southwest Asia. These included oils of *Cedrus* species (cedar) and *Cupressus sempervirens* (cypress), *Glycyrrhiza glabra* (licorice), *Commiphora* species (myrrh), and the star of this story, *Papaver somniferum* (poppy juice). It should be noted that all are still used today for the treatment of ailments ranging from coughs, colds, and analgesia to parasitic infections and inflammation.

Although it is not often realised, the initial discoveries that may be considered to have revolutionized drug discovery and development were made by European chemists in the 1803-1805 time frame, building upon the physico-chemical principles evolving in the recent past from the work of experimental and theoretical chemists such as Proust, Davy, Gay-Lussac, Berzelius, and Dalton. This body of theory and experiment which moved "healers" away from "polypharmacy" towards "pharmacology of single (pure) agents" was probably first enunciated by Cadet de Gassicourt[3] in 1809.

ALKALOIDS

This brings us to the star of this discourse, the story of morphine (1). The initial report of isolation of fractions from the opium poppy was reputedly made by Derosne[4] in 1803 at the Institute of France and then published in 1814.[5] There was one flaw, however; this preparation had no narcotic properties whatsoever and was probably noscapine with a little meconic acid extracted by the ethanol-water system. A controversy arose. The German pharmacist Seturner then published his work in 1805[6] claiming that he had commenced work before Derosne. Inspection of this title implies investigation of the acidic and not the basic fractions of opium, probably meconic acid, as demonstrated in a paper published the next year.[7]

In 1817 however, using hot water extraction followed by precipitation with ammonia, led to colorless crystals that had the narcotic properties of opium.[8] What surprised scientists at the time reading this publication was that the material obtained was alkaline, not acidic; thus, this was the first non-acidic compound with biological properties purified from a plant.

Subsequent conversion into heroin (2) was first reported in 1874 by Wright in the United Kingdom as a result of boiling morphine acetate. It was commercialized by Bayer AG in 1898 and sold as a "tonic" by then Smith Kline and French laboratories (precursor of GlaxoSmithKline) in the United States around the turn of the 20th Century. The use and abuse of these compounds is much too complex to discuss here, but in 1973, Pert and Synder reported the identification of opioid receptors in brain tissue,[9] and this report was closely followed in 1975 by Kosterlitz and Hughes.[10] This identification of "endogenous morphine-like substances" over the next few years led to the discovery of enkephalins, endorphins, and dynorphins, all of which had the common N-terminal sequence of Tyr-Gly-Gly-Phe-(Met/Leu), leading to the concept that morphine actually mimics this sequence.[11]

In the years between the "use" of morphine and heroin (both legal and illegal), derivatives were made by either direct synthesis, or by modification of the purified natural products (semisynthesis), leading to 15 plus agents that have been approved to date that are either opioids or direct opioid antagonists. This number includes both morphine and heroin but not thebaine.[12]

Why is this of import in the scientific community and of some concern to law enforcement? The reasons are as follows. In 2006, the Keasling group in California reported the production of artemisinic acid in genetically engineered yeast following the addition of the necessary gene clusters from the producing plant. This demonstrated that to obtain reasonable yields, they had to make certain that the necessary precursors for both the normal cell growth and production of the "parasite pathway" (my comment) were available for production.[13] This is a well-known problem for anyone who used to "persuade microbes to produce antibiotics on an industrial scale" but has often been forgotten by investigators in academia who modify microbes.

In 2008 Hawkins and Smolke reported that they had been successful in producing benzyl isoquinoline alkaloids in a modified yeast strain by adding selected gene clusters from *Thalictrum flavum* and *Papaver somniferum* to the yeast.[14] The "choke point" in the biological production was the provision of reticuline as the correct enantiomer. Hawkins and Smolke overcame this by using an enzymatic conversion of exogenous (*R,S*)-norlaudanosoline to (*R,S*)-reticuline as feedstock for the production of the morphinan pathway as well as sanguinarine and berberine. They also showed that a human P450 converts (*R*)-reticuline to salu-

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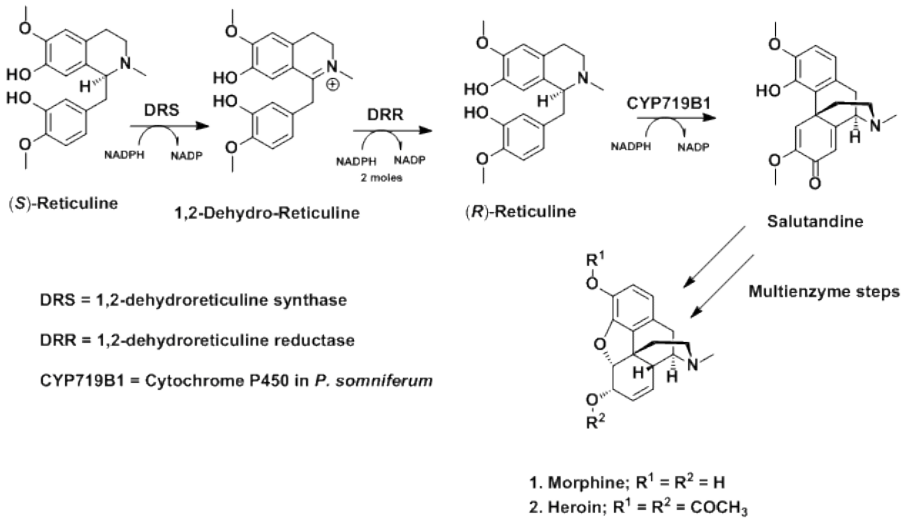
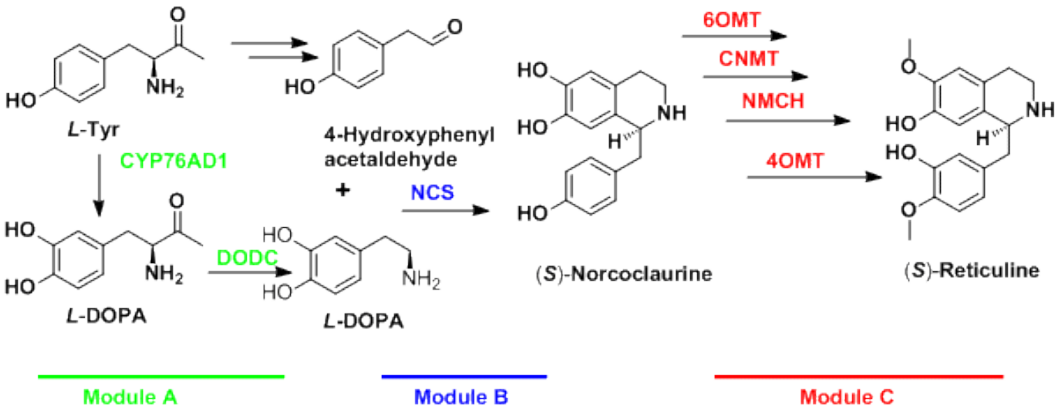
taridine which might explain a report that humans can synthesize small amounts of morphine.[15] Thus, they had demonstrated the later parts of the pathways leading to these agents, but had not yet produced reticuline.

In 2014, the Smolke group reported further work using their modified *Saccharomyces cerevisiae* strains only now adding genes from *Pseudomonas putida* to those from *P. somniferum* that enabled the conversion of thebaine to codeine, morphine, hydromorphone, hydrocodone and oxycodone, thus producing high value added products from the "plant metabolite."[16] In addition, they found a novel pathway to neopine and neomorphine, with total opioid titers of around 130 mg/L.

The last enzymatic step in the "puzzle" came in a very recent paper by Facchini's group at the University of Calgary, where they were able to locate the remaining enzyme in the pathway (Figure 1) and show that it was the result of a fusion between a cytochrome P450 (CYP) and an aldo-keto reductase (AKR) catalyzing the *S*-to-*R* epimerization of reticuline via 1,2-dehydroreticuline, as shown below.[17]





However, what was still missing from the equation was a good producer of the L-DOPA required to produce the necessary intermediates. By some very clever gene manipulations, producing a linked chromophore when the gene required was isolated, the Dueber group identified a tyrosine hydroxylase and then effectively produced the required enantiomer, (*S*)-reticuline from glucose in yeast.[18]

Although it has not yet been reported in the literature, from the work of these investigators the necessary enzymatic processes are now "available" to produce opioids from glucose in genetically modified *S. cerevisiae*. Not only morphine but also the possibilities of producing high-value added compounds such as oxycodone. This latter compound, though extremely valuable as an analgesic, is also a major "player" in drug abuse. To counter this, in 2014 the FDA approved Targiniq(R), which is a mixture of oxycodone and naloxone, and looked at an opioid and an opioid antagonist pharmacologically.

Hot off the press: *Science Express* (August 13, 2015) has a paper from the Smolke group demonstrating the production of thebaine and oxycodone from yeast starting with glucose.[19] They succeeded! ■

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Meet a New ASP Member

New ASP Member Dr. MyPhuong Le is an Assistant Professor, Division of Renal Diseases and Hypertension, University of Colorado's Anschutz Medical Campus. Dr. Le is a molecular biologist by training and has conducted research into dietary factors of chronic disease for several years. Her work in this vein led to her recent K01 award with the National Center for Complimentary and Integrative Health. We were pleased to meet her at this year's Annual Meeting in Copper Mountain, Colorado, and are excited to hear more about her work and enthusiasm for intergalactic television.

By Dr. Dan Kulakowski

How did you hear about the ASP?
Dr. Amy Keller, a fellow colleague at the University of Colorado Anschutz Medical Campus, recommended ASP.

Why did you join ASP?
I joined ASP to be exposed to various aspects of working with natural products, but more importantly, to connect with other researchers in this field.

Do you belong to any other scientific societies?
I am also a member of American Association of Pharmaceutical Scientists, American Thoracic Society, American Society of Nephrology, and Phytochemical Society of North America.

Dr. MyPhuong Le

DR. LEAH VILLEGAS

What are your current research interests in pharmacognosy?
My current research interests are to develop therapeutics against fructose-induced adverse metabolic effects and to develop an antioxidant peptide that could be used for a targeted delivery approach in the treatment of pulmonary hypertension.

What is your scientific background?
I serendipitously became interested in pharmacognosy. My scientific background was mainly as a molecular biologist. I started out as a research technician at the Genome Center at the University of Washington, Seattle, Washington, where we were sequencing a part of the human genome. From there, I joined a startup biotech company, Blue Heron Biotechnology, Inc., Bothell, Washington, and helped generate genetic products from scratch for our customers. I then joined the Pharmaceutics Department in the College of Pharmacy, University of Florida, Gainesville, Florida, where I became interested in developing therapeutics, particularly personalized medicine through pharmacogenomics. My interest in pharmacognosy came during my postdoctoral fellowship where we collaborated with a nutraceutical company interested in developing a dietary supplement that could be used to ameliorate the effects of carbohydrate-induced metabolic adverse effects. I am relatively a baby in the field of natural products, but hope to combine my background in molecular biology to develop natural-based therapeutics.

What would you like to achieve through your membership?
Hopefully by being a part of ASP, I can find a supportive and collaborative community that will teach me about various aspects with working with natural products so that I can move my research forward.

What do you like doing in your spare time?
I enjoy building, especially wood-working. My goal for the next couple of years is to build a wrap-around deck, a shed, and ultimately cabinets and an island for our kitchen.

What are you currently reading?
We just went to the Denver Comic Con, and I am reading Farscape comics. If you have not seen the television series, you are missing out! It is my favorite science-fiction show.

What is your favorite plant, fungus, animal or microbe (for research or general interest) and why?
I have no favorites. But if it was possible, Zhann (from Farscape) would be my favorite plant organism. ■

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New Members of ASP 2014

Welcome to ASP!

ASP would like to welcome new members. The Society's main objectives are to provide the opportunity for association among the workers in pharmacognosy and related sciences, to provide opportunities for presentation of research achievements, and to promote the publication of meritorious research. New members include 21 domestic full members, 6 international full members, and 5 associate members. We look forward to meeting you and learning more about you and your work.

ACTIVE MEMBERS

Dr. Mohamed AlAjmi
Riyadh, Saudi Arabia

Dr. Donald Anderson
Friant, California

Steven Baugh
Broomfield, Colorado

Dr. Jonathan Bisson
Chicago, Illinois

Dr. Muriel Cuendet
Geneva, Switzerland

Clinton Dahlberg
Saratoga Springs, Utah

Dr. Denise Daley
Kingston, Jamaica

Dr. Xiang Fu
Memphis, Tennessee

Mr. Douglas Fyvolent

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Malam Jibrin Yusuf
Lefkosa, Nigeria

Conference Calendar

The *Newsletter* is pleased to announce the following upcoming conferences and meetings. The events portrayed here reflect what listings and notices the *Newsletter* has specifically received. For a more extensive calendar, please visit the ASP website at www.phcog.org. If you have a conference or event you would like mentioned, please send us relevant information, including any graphics or appropriate fliers, at asp.newsletter@lehman.cuny.edu.

2nd International Conference on Natural Products Utilization

October 14-17, 2015

Novotel Plovdiv Hotel

Plovdiv, Bulgaria

icnpu2015.cim.bg

Society of Economic Botany 57th Annual Meeting

June 3-9, 2016

Pine Mountain Settlement School

Harlan County, Kentucky

www.econbot.org/index.php?module=content&type=user&func=view&pid=103

Interface of Science and Technology as Applied to Natural Product Research

December 4-7, 2015

Budapest, Hungary

www.fusion-conferences.com/conference33.php

9th Joint Natural Products Conference 2016

July 24-27, 2016

Tivoli Congress Centre

Copenhagen, Denmark

www.jnpc2016.dk

251st American Chemical Society National Meeting & Exposition

March 13-17, 2016

San Diego, California

www.acs.org/content/acs/en/meetings/san-diego---spring-2016.html

The 9th International Countercurrent Chromatography Conference (CCC 2016)

July 30-August 3, 2016.

Dominican University

Chicago, Illinois

www.ccc2016.com

Interim Meeting of the American Society of Pharmacognosy

and

16th Annual Oxford International Conference on the Science of Botanicals

Oxford, Mississippi

April 11-14, 2016

oxfordicsb.org

Gordon Research Conference: Natural Products

July 31- August 5, 2016

Proctor Academy

Andover, New Hampshire

www.grc.org/programs.aspx?id=11733

Brief News From Washington

By Dr. Georgia Perdue

- At the end of July, Eisai Co., Ltd. submitted an application to the Food and Drug Administration (FDA) and equivalents in the European Union and Japan for **Eribulin**. This drug is for patients with inoperable soft tissue sarcoma that have already received at least two chemotherapy regimens for metastatic disease. **Eribulin is the natural product, halichondrin B, which was isolated from the marine sponge *Halichondria okadai*.** (for a brief history of halichondrin B, please see the "Brief News From Washington" in the September 2010 *ASP Newsletter)*.
- In June, the FDA approved **Rapamune®** (sirolimus or rapamycin) as an orphan drug, submitted by Wyeth, a subsidiary of Pfizer, Inc., **for the treatment of the rare lung disease** lymphangioleiomyomatosis (LAM). **Rapamune is from *Streptomyces* hygroscopicus**.
- **Milestone**: It appears that **GlaxoSmithKline (GSK) will soon make history as the first company to have a malaria vaccine available to treat malaria in children Africa. The vaccine, Mosquirix™, (RTS, S)** (please see the "Brief News From Washington" in the September 2014 *ASP Newsletter*) is expected to soon receive approval from the European Medicines Agency. This would clear it for World Health Organization (WHO) approval, which enhances GSK's chances of approval in individual African countries.
- **Artemisinin** just keeps on giving. In July, the FDA approved **Coartem®, a Novartis "high dose" drug combination of artemether and lumefantrine to treat "acute, uncomplicated malaria in both adults and children…."** A statement from Novartis read in part, "…with the [rise] in the number of malaria cases in the United States (U.S.) due to [increased] travel, **it is important to make artemisinin-based combination treatment…the most effective therapy for malaria, available to American patients…."**
- **Coartem received WHO "prequalification" which would make the drug available to at least 25 million patients in Africa.**
- A press release from the National Science Foundation (NSF) titled, ***Breaking the Cycle of Malaria Transmission,*** details the findings of research by Dr. Jun Li, University of Oklahoma, Norman, Oklahoma, biochemistry professor, on blocking the transmission of malaria. Dr. Li, whose research is supported by both NSF and NIH, suffered from malaria as a child in China, an added incentive for his research. **Dr. Li has isolated the mosquito protein, FREP 1, found in the mosquitoes' 'midgut'** which makes the insects more susceptible to the malaria parasite life cycle; once the parasite gets into the mosquito, it multiplies. **This could lead to a treatment with an injectable mosquito protein.**
- In mid-June, the **U.S. Agency for International Development awarded the Reston, Virginia, defense company, Leidos, a five-year $23.7 million contract to develop a malaria vaccine.** Leidos is considered a "science and technology solutions leader." It was formerly known as Scientific Applications International Corporation (SAIC) and located in in Frederick, Maryland; it was part of the National Cancer Institute's efforts there.
- Merrimack Pharmaceuticals could receive approval very

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soon for its drug, **MM-398, (NAPOLI-1) to treat metastatic pancreatic cancer.** As reported in the June 2014 column, the addition of **irinotecan liposome** to 5FU and leucovorin showed good results in Phase III trials. The new drug application (NDA) was filed late last year to the FDA; **in late June, the FDA announced it was granting fast review of MM-398!**

- In June, the National Institutes of Health (NIH) Director, Dr. Francis Collins, told the Advisory Committee to the Director (ACD), while there is "wide scale support [for NIH in the Congress] they are "weak in providing the funds." There is bipartisan support to increase funds for NIH but "how to pay for it, where the funds would come from [is problematic]." NIH is also working on **a new Strategic Plan**, which will be a **"living document that would require refinement through its life cycles."** A final version is due in Congress by December 16. Dr. Collins told the ACD, "we should look at it as what are our priorities and how do we get our hands around it, should we get the money." Dr. Collins also mentioned that on July 8, there was a second meeting between members of the Bill & Melinda Gates Foundation and NIH focusing on coordinating a response to the next Ebola-type outbreak. **He also noted NIH has made four videos, now on the NIH website, dealing with science reproducibility, "a critical issue" in published papers. "[B]ecause ethics is part of reproducibility, NIH is looking into bar-coding cell lines, which improves reproducibility."**
- After only three months on the job, **NCI Acting Director Dr. Douglas Lowy** chaired his first combined National Cancer Advisory Board / Board of Scientific Advisers meeting in late June. He told the advisers that he intends to continue many of the ongoing programs. He singled out the **Outstanding Investigator Award** for long term research that **"allows for greater risk." He strongly supports basic research even without immediate translational applications.** In referencing the budget, he noted that its "purchasing power is that of 1995." **"The freeze in the budget may be undergoing a thaw."** [He is] "cautiously optimistic there may be an increase for NCI and [all of] NIH."
- **FDA and Britain's University of Manchester, Manchester, United Kingdom,** have formed a partnership to train new researchers. The University's **School of Pharmacy will work closely with FDA.** Other goals include advances in drug safety, developing personalized dosing and developing new research initiatives.
- The National Institute of Allergy and Infectious Diseases reported in mid-August that **an experimental vaccine of a synthetic DNA protein has shown "broad protection against different MERS-CoV types."** The research, funded by NIH, was led by a team of scientists at the University of Pennsylvania, Philadelphia, Pennsylvania. They hope the vaccine will ultimately be used in camels and people (please see the "Brief News From Washington" in the December 2014 *ASP Newsletter; Science Translational Medicine*, August 19, 2015). ■

"The freeze in the budget may be undergoing a thaw." [He is] "cautiously optimistic there may be an increase for NCI and [all of] NIH."

From the Archives: The Nigerian Society of Pharmacognosy

By Ms. Devhra Bennett-Jones

The Nigerian Society of Pharmacognosy (NSP) can trace its roots back more than three decades. *Man, Plants, and Medicine in Africa: Some Fundamental Perspectives* is a title containing key words that the majority of ASP members can identify with. On January 8, 1981, Professor of Pharmacognosy Abayomi Sofowora, of the University of Ife in Ile-Ife, Osun State, Nigeria, (now Obafemi Awolowo University) delivered the intellectually stimulating lecture sparking the establishment of the Pharmacognosy Group of Nigeria (PGN).[1] During this meeting of Nigeria's pharmacognosy teachers and professors a motion was agreed upon that they commit to an annual gathering. The following year, on March 26, 1982, PGN unanimously endorsed their organization into a formal society. The PGN constitution committee submitted a draft which was adopted on January 14, 1983 founding the Nigerian Society of Pharmacognosy (NSP).[2]

The constitutional objectives of the newly established NSP resonate with our own ASP scientists exhibiting that pharmacognosists across the globe hold fundamental professional values.

A) To make pharmacognosy more meaningful and useful to the community;

B) To find ways of improving the methods of teaching the subject in order to highlight its relevance to the practice of pharmacy in Nigeria;

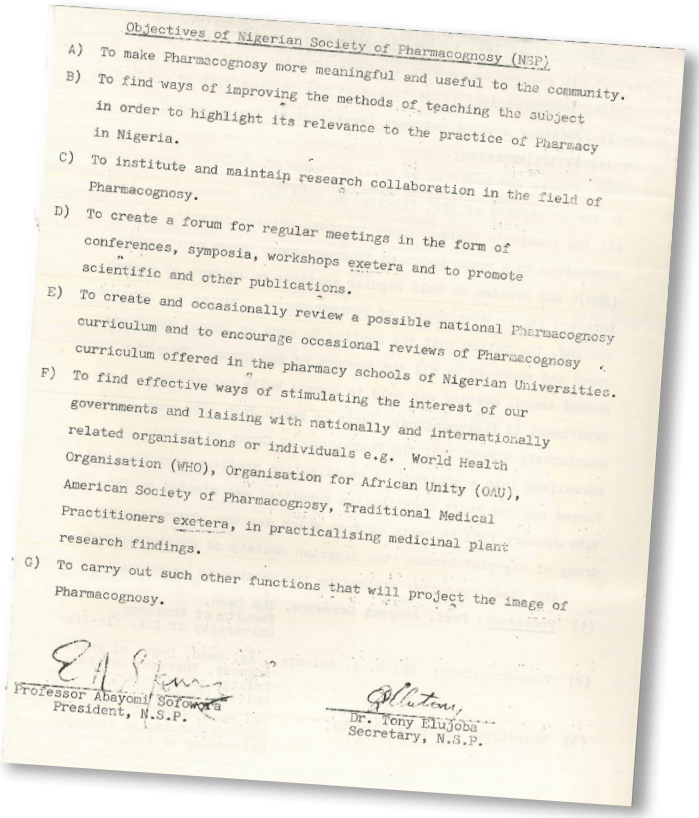
C) To institute and maintain research collaboration in the field of pharmacognosy;

D) To create a forum for regular meetings in the form of conferences, symposia, workshops, etc., and to promote scientific and other publications;

E) To create and occasionally review a possible national pharmacognosy curriculum. Also to encourage occasional reviews of pharmacognosy curriculum offered in Nigerian faculties of pharmacy;

F) To find effective ways of stimulating the interest of our Governments and liaising with nationally and internationally related organizations or individuals, e.g., World Health Organisation (W.H.O.), Scientific Technical and Research Commission of the Organisation for African Unity (OAU/STRC), **American Society of Pharmacognosy (ASP)**, Traditional Medical Practitioners (TMP), etc., in practicalising medicinal plant research findings;

G) To carry out such other functions that will project the image of pharmacognosy.[3]



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G) To carry out such other functions that will project the image of Pharmacognosy.

Professor Abayomi Sofowora
President, N.S.P.

Dr. Tony Elujoba
Secretary, N.S.P.

As does the ASP, today's NSP constitutional objectives and values remain as resolute as they did at the organizations' inception.[4] At the 2013 28th General Meeting of the NSP the membership resolved that, "…Researches in Pharmacognosy are to urgently address documentation of indigenous knowledge as well as conservation of potentially useful but endangered flora and fauna. [And] There should be collaboration between Nigerian Society of Pharmacognosy and allied organizations, such as West African Network of Natural Products Research (WANNPRES) and American Society of Pharmacognosy."[5] ■

1 Sofowora, Abayomi. *Man, Plants and Medicine in Africa: Some Fundamental Perspectives,* Issue 48 of Inaugural Lecture Series, University of Ife Press, 1982.

2 *The American Society of Pharmacognosy Collection,* Box 4, File 14, p. 1, Lloyd Library and Museum, Cincinnati, Ohio.

3 *The American Society of Pharmacognosy Collection,* Box 4, File 14, p. 3, Lloyd Library and Museum, Cincinnati, Ohio.

4 Nigerian Society of Pharmacognosy website, constitution and bylaws, http://www.nsp.com.ng/constitution-and-by-laws

5 Nigerian Society of Pharmacognosy website, COMMUNIQUÉ OF THE 28th GENERAL MEETING (SAGAMU 2013), http://www.nsp.com.ng/news.php?id=15

Jim McAlpine, Ph.D, Treasurer
The American Society of Pharmacognosy
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Northbrook, Illinois 60062

ASP Membership

Full Membership

Full membership is open to any scientist interested in the study of natural products.
Current membership dues and Journal of Natural Products subscription rates can be found at **www.pharmacognosy.us**.

Associate Membership

Associate membership is open to students of pharmacognosy and allied fields only. These members are not accorded voting privileges.
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