



The American Society of Pharmacognosy

The ASP Newsletter
Volume 49, Issue 3

ASP President Moore Addresses Members



President Moore

ERIK JEPSEN/UC SAN DIEGO PUBLICATION

By President Brad Moore

It is my privilege and honor to serve as the new ASP President for 2013-2014. I look forward to working together with the ASP committees and membership to help broaden the outreach and appeal of the Society as our nation's sounding board in natural products research and education. I thus invite all members to share your thoughts and ideas with me on how to strengthen and grow our Society's central role in promoting the science and benefits of natural products.

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tunity to increase its scientific footprint not just in the United States but internationally. ASP members have been instrumental in discovering and harnessing the benefits of natural products from various life forms as pharmaceuticals, agrochemicals, nu-

continued on page 3

IN THIS ISSUE: FALL 2013

FEATURES

President Moore Address	1
Annual Meeting Recap	4
Farnsworth Award Recipient	5
Suffness Awardee McPhail	7
Betz Receives Tyler Award	10
Field Notes in Pharmacognosy	14
ASP Annual Awards	19
In Memoriam: Yenamandra Venkateswarlu	21

DEPARTMENTS

Editor's Corner	2	New Members	18
Hot Topics	9	Conference Calendar	22
Behind the Scenes	11	Brief News from Washington	23
Fun with Pharmacognosy	13	From the Archives	25
Meet a New Member	17		

EDITOR'S CORNER



Autumn has arrived here in New York, and the weather has been great. This edition of the *ASP Newsletter* covers a wide range of topics related to the Society including a wrapup on the ASP Annual Meeting in July and new visions for the Society from our incoming President, Dr. Brad Moore.

The 2013 ASP Annual Meeting in St. Louis, Missouri, was a great success and Ray Cooper and Mark O'Neil-Johnson provide a rundown of some of the many memorable scientific and social events from the July meeting. Articles on the two major award winners, Dr. Satoshi Ōmura (Farnsworth Awardee) and Dr. Joseph Betz (Tyler Awardee) are both described in more detail. I am especially pleased that younger ASP member Mr. Michael Mullowney, a doctoral student at the University of Illinois at Chicago, wrote the article on the Farnsworth Award. It is great involving more ASP members, especially younger members, in the *Newsletter*.

One of the social highlights of the 2013 ASP Annual Meeting was the evening at the Missouri Botanical Garden. This evening began with a welcome to the garden by its president, Dr. Peter Wyse Jackson. The remainder of the evening included food, drink, and exclusive access to the entire Garden for attendees. Next year's Annual Meeting will be held in Oxford, Mississippi, at the University of Mississippi. I hope many members will be joining us there.

We welcome the new President of the Society, Dr. Brad Moore. In the lead article by Dr. Moore, he lays out his vision for the Society. As part of this, Dr. Moore is encouraging a discussion about the name of the Society. This issue has been looked at previously by the Society, most recently in 2004-2005. Dr. Moore has encouraged the Society members to think about how we want the Society to grow in the future, and to ensure that people understand the scope of research interests encompassed by our members. As Dr. Moore writes in his column, he would like the society to "discuss whether this title still captures and encompasses the interests of our membership base and the rapidly changing face of natural products research." To that end, Dr. Moore is establishing an ad hoc committee to examine the name of Society, and he encourages members to engage the committee and its members in this conversation. Dr. Moore also announces the establishment of a second ad hoc committee that will explore increasing the Society's student membership by creating ASP student organizations at United States universities and institutions that host concentrations of active ASP researchers.

To accompany Dr. Moore's letter, we asked Ms. Devhra BennettJones to devote her "From the Archives" column to the history of the word "pharmacognosy." Ms. BennettJones does a terrific job of explaining how the word has evolved over the years, from its Greek etiology to its earliest appearance in written records in the early 19th century, to its current usage.

Other regular articles include Dr. Georgia Perdue's "News from Washington." During our work on this issue, the federal government has undergone both sequestration and a shutdown. For the *Winter Newsletter*, Dr. Perdue has agreed to cover the impact of sequestration on pharmacognosy researchers. If you have been impacted by the sequestration or shutdown, I encourage you to contact Dr. Perdue to relate your stories at gbperdue@verizon.net for possible inclusion in her upcoming article.

In "Behind the Scenes in Pharmacognosy," we learn about the recent research by ASP member Dr. Tomofumi Miyamoto and colleagues at Kyushu University, Fukuoka, Japan, regarding the structure, synthesis, and biological activity of a bisacetylenic alcohol from a marine sponge, and I also learned the definition of "futsal," according to Wikipedia, "a variant of association football that is played on a smaller pitch and mainly played indoors."

I hope everyone has a great autumn and, as always, I encourage all ASP members to contact me if you have any news you think would be appropriate for the *Newsletter*.

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/?page_id=163

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Incoming ASP President Moore Addresses Members

continued from page 1

traceuticals, chemical research probes, and the like, while also educating the public about the harmful properties and consequences of naturally occurring toxins and contaminants. With the molecular revolution upon us, ASP members are embracing and employing various 'omics' approaches to the field of natural products. This is an actively growing area of research that promises an orthogonal approach to discover and bioengineer new natural product chemicals and enzymes through connecting genes to molecules.

At the recent Society for Industrial Microbiology and Biotechnology meeting in San Diego this summer, National Institute of General Medical Sciences (NIGMS) Program Officer Dr. Barbara Gerratana pointed out that the National Institutes of Health (NIH) total investment in 2013 for natural products research finally returned to 2007 levels of approximately \$70 million, and that funds dramatically rebounded by a staggering 26% over the past year. What a welcome relief to United States academic researchers! Of the three major areas of funding, discovery, synthesis and biosynthesis, it is interesting to note that biosynthesis has benefited from the most growth (50% increase from 2007 levels to a 38% share of the 2013 budget), while discovery and synthesis have both seen overall declines. This trend in NIH funding levels parallels some of the modern changes to our field of natural products that has progressively become more molecular. As a Society, how will we react to incorporate these changes and stay relevant on the international stage? I see that as the science of natural products research continues to expand into new research disciplines, we have an opportunity and obligation to rebuild and diversify our membership base to reflect these national trends.

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As your President, over the coming year, I will work to engage this conversation with our distinguished ASP Fellows and members through the creation of two ad hoc committees. The first committee will take stock of our Society's name, the American Society of Pharmacognosy, and discuss whether this title still captures and encompasses the interests of our membership base and the rapidly changing face of natural products research. First of all, our members and those who attend our annual conferences are increasingly international. And second, while the word pharmacognosy aptly applies to the study of natural product chemicals, this term has become antiquated and is infrequently used in modern scientific language. Will a change in our Society's name allow us better access to other scientists, policy makers, and the public? Or does the "ASP" capture the current interests of our Society members and no change is needed? Let us have this conversation.

The second new committee will explore increasing our student membership base through the creation of ASP student organizations at United States universities and institutions that host concentrations of active ASP researchers. Our Society's future lies with the next generation of natural product researchers; thus, we need to get more students involved early in their education and to encompass their vision of where our scientific discipline is heading.

I look forward to sharing with you pieces of this conversation during the course of the year up through our next Annual Meeting on August 2–6, 2014, in Oxford, Mississippi, when I hope to summarize the committee's recommendations. So please come to Oxford next year and help celebrate our Society's 55th year.

I wish to take this opportunity to thank past ASP President Dr. David Newman who masterfully recruited Dr. Ikhlas Khan to chair the 2014 Annual Meeting in Oxford when the original conference site of Halifax, Canada, was lost only last year. We are very fortunate to have many dedicated ASP members, like David and Ikhlas, who tirelessly serve the greater community. I thus feel fortunate to represent all of you as the President of the ASP. Thank you for your support. ■

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The 54th ASP Annual Meeting: A Look to the Future

By Dr. Ray Cooper and Mark O'Neil-Johnson

The American Society of Pharmacognosy 2013 Annual Meeting in St. Louis, Missouri, was a great success. The meeting included 440 delegates from the United States and around the world for five days of stimulating lectures on “Natural Products at a Crossroad: Current and Future Directions.” The Organizing Committee wishes to thank all the speakers, exhibitors, the organizing committee, and the attendees for participating in this special midwestern-hosted event.

synthesis, recently commercialized drugs inspired from natural products, and Dr. Tony Keller of Bruker gave his perspective of the evolution of NMR over the last 70 years. Several noteworthy sessions included new anticancer therapeutics derived from natural products and natural products enhancing the experience of pet foods.

There was a special presentation from Drs. Paulo Vieira and Vanderlan da Silva Bolzani, former students of the Dr. Otto Gottlieb,



Highlights from the 54th Annual Meeting. DR. GUIDO PAULL

There were three well-attended workshops: metabolomics, NMR techniques, and microbiology, followed by four days of great science talks and posters. The meeting featured guest speakers from the United States, Brazil, Mexico, Lagos, South Africa, many nations in the European Union, New Zealand, Hong Kong, and China, to name but a few of the countries represented. There was participation by a broad and diverse natural products community from industry, academia, government, and education.

While there were many highlights, a special mention must go to Dr. Peter Raven, President Emeritus of the Missouri Botanical Gardens who gave an inspiring opening address on the need for conservation. This was followed by an fascinating talk from Dr. Paul Wender interspersed with some of his thoughts and philosophy on natural products research. The Norman R. Farnsworth ASP Research Achievement Award was given this year to Dr. Satoshi Ōmura, of the Kitasato Institute, Tokyo, Japan, who shared with us the enormous contributions the institute has contributed to natural products drug discovery and microbial products research.

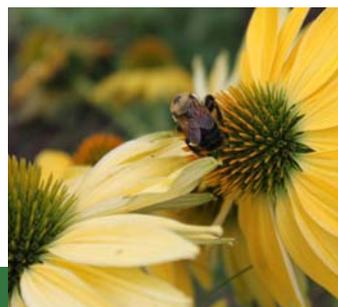
The scientific program continued with advanced analytical technologies emphasizing the importance to the long term success of natural products and the traditional topics of natural products in drug discovery, marine and microbial natural products, botanicals and ethnobotany. This year's plenary lectures highlighted several remarkable successes in natural product

eb, considered the “Father” of Natural Products in Brazil. Dr Paulo Vieira gave a very poignant tribute to Professor Gottlieb on his life and contributions to natural products and chemosystematics.

The Monday evening event at the world famous Missouri Botanical Gardens was everything we hoped for. The current President of the Gardens, Dr. Peter Wyse Jackson welcomed everyone and invited us to take full advantage to enjoy the surroundings. It was such a good party, the bar had to be closed in order to get everyone back on the buses! And of course our Young Investigator Event (with over 90 participants) was enjoyed by all at the Anheuser-Busch Brewery.

On behalf of the Scientific Organizing Committee, it was a privilege and a pleasure to see you all in St. Louis, Missouri, and we look forward to another great meeting next year at Ole Miss, Oxford, Mississippi. ■

Scenes from the Missouri Botanical Gardens. DR. SCOTT BAGGETT



Ōmura Honored: 2013 ASP Research Achievement Award

By Mr. Michael Mullooney

On July 14, 2013, at the 54th Annual Meeting in St. Louis, Missouri, Dr. Satoshi Ōmura was honored with the Norman R. Farnsworth ASP Research Achievement Award. The award, with its three-decade history, was renamed in honor of the late Dr. Norman R. Farnsworth when he was the award's recipient in 2005. Professor Emeritus Dr. James McAlpine, from University of Illinois at Chicago, Chicago, Illinois, introduced Dr. Ōmura as a researcher whose contributions toward natural products drug discovery are rivaled only by the impact that his research has imparted on the betterment of human health.

Dr. Ōmura has served as a professor for more than 40 years; he has worked nearly two decades as Director of the Kitasato Research Institute in Tokyo, Japan, and eight years as Max Tishler

Professor of Chemistry at Wesleyan University, Middletown, Connecticut. His award lecture, entitled "Discovery, Investigation, and Development of Microbial Metabolites," highlighted his group's many discoveries over the course of his prolific career. In the words of current ASP president Dr. Brad Moore, "Professor Ōmura is a giant in the field of microbial natural products and a most deserving recipient of the 2013 Norman R. Farnsworth ASP Research Achievement Award."

Dr. Ōmura has maintained a longstanding relationship with the ASP and many of its key members. He works with Dr. Moore on the editorial advisory committee for the *Journal of Antibiotics*, where he has been Editor-in-Chief for a decade. Collaborations with other accomplished ASP members and past Research Achievement Award recipients such as ASP members Drs. Heinz Floss, Koji Nakanishi and the late Dr. Kenneth L. Rinehart, also decorate Dr. Ōmura's career.

Dr. Ōmura presented a compilation of novel molecules his group



Dr. Ōmura (left) and Mr. Mullooney at the ASP Annual Meeting at the Monday, July 15th outing at the Missouri Botanical Gardens.

DR. AKIHIRO SUGAWARA.

These diseases have affected millions of impoverished people in developing countries and as a result, ivermectin is considered one of the world's most important therapeutic agents of the last 50 years.

has discovered over the years, punctuating the research feat by displaying each of the molecules (totaling greater than 460 on a single presentation slide). He joked, "I am sorry, do you need a magnifying glass?" Among these, a few noteworthy molecules include staurosporine, the protein kinase-specific inhibitor and first discovered of the indolocarbazole compounds; cerulenin, the first fatty acid and polyketide biosynthesis inhibitor that later helped elucidate mechanisms of fatty acid biosynthesis; and lactacystin and Ōmuralide, the first discovered selective inhibitors of the proteolytic activity of the 20S subunit of the human proteasome. This overview served as an introduction to the story of what has become Dr. Ōmura's most globally significant contribution, the discovery of avermectin.

Coloring his presentation with an easy humor, Ōmura described the collection of the drug's microbial source, *Streptomyces avermitilis*, a soil actinomycete from the edges of a golf course near his birthplace in Yamanashi Prefecture, Japan. As Dr. Moore later stated, "the polyketide anthelmintic macrolides avermectin and ivermectin... have become indispensable drugs in human and veterinary medicine." Avermectin was the first endectocide to be discovered and it quickly became the world's most commercially successful drug in regard to animal health. Ivermectin, its safer and more potent dihydro derivative, was developed through collaboration with Merck Sharp & Dohme Corp. research laboratories and was initially used in veterinary medicine to control parasites in livestock.

Soon after, the drug was recognized for its ability to treat human diseases such as onchocerciasis (also known as river blindness) and lymphatic filariasis (commonly known as elephantiasis). These diseases have affected millions of impoverished

continued on page 6

USP Initiates New Herbal Medicines Compendium

By Dr. Amy Keller

At the ASP Annual Meeting in St. Louis, Dr. Maged Sharaf, Director of Herbal Medicine Standards of the United States Pharmacopeia (USP), introduced attendees to the *Herbal Medicines Compendium* (HMC) via a presentation entitled, “Herbal Medicines Compendium: A New Initiative from USP for Global Herbal Standards.” The HMC, originally launched earlier this year, provides a framework for standards, and is designed to guide the quality and safety of botanical medicines that may originate from various global locations or companies.

Dr. Sharaf told the *Newsletter*, “Since the HMC is a new venture for USP, it is important for us to communicate to manufacturers, researchers, regulators and other stakeholders, about the role the HMC can play in supporting good quality herbal medicines in international commerce.”

HMC is free, and may be accessed online (<https://hmc.usp.org/>), and the standards are available to ingredient manufac-



turers, herbal product manufacturers, and regulatory agencies, to aid in ensuring quality. Included are tests and procedures that have been conducted using validated analytical techniques with the purpose of identifying herbal components.

The USP is a nonprofit that produces standards to ensure the quality of medicines and components of medicines, including ingredients of foods and dietary supplements, either manufactured or sold in the United States. The USP has a long history of providing quality standards for medicines and their ingredients to the public and utilizes a Council of Experts consisting of manufacturers, academic researchers, regulators, and other volunteers from around the world. These professionals are instrumental in the HMC standard development and revision.

According to Dr. Sharaf, “our standards are used throughout the world, and the organization is well positioned to develop global public standards for herbal medicines.” ■

Ōmura Honored: 2013 ASP Research Achievement Award

continued from page 5

people in developing countries and as a result, ivermectin is considered one of the world’s most important therapeutic agents of the last 50 years. As a testament to his character, Dr. Ōmura relinquished all royalties associated with the use of ivermectin to the continued humanitarian application of the drug. In collaboration with the World Health Organization (WHO), the anthelmintic drug is now given free of charge to 200 million people annually with the aim of eliminating two of the most devastating and disfiguring diseases. It is the first and largest drug donation program ever organized. Today, statues stand commemorating the discovery and success of ivermectin at the Kitasato Institute for Life Sciences, the WHO, The World Bank, Merck & Co Inc., Lions Clubs International Headquarters, and at African Programme for Onchocerciasis Control (APOC) headquarters. They depict a child leading an adult blinded by onchocerciasis.

Citing a source of the ideology behind his research, Dr. Ōmura quoted renowned artist and founder of Japanese flower arrangement, Sōfū Teshigahara:

*Without searching, nothing will be found.
That is why the act of seeking must go on.
Somewhere, there are blessings for you alone.*

*There is no telling when such rewards may emerge.
Perhaps, they will never be realized.
But without searching, you will never know.*

This philosophy of curiosity and dedication has guided Dr. Ōmura and his team through decades of microbial natural products research and discovery. While his career can be measured by his nearly 500 discovered novel molecules, the impact Dr. Ōmura’s work has had on humanity is immeasurable.

“It was a great honor, and more than I deserved,” Dr. Ōmura said later, “to receive the Norman R. Farnsworth ASP Research Achievement Award from the world’s most active academic society devoted to natural products chemistry.” ■

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2013 Suffness Award Recipient

By Dr. Amy Keller

Editor's Note: This issue of the Newsletter, we continue our ongoing series on winners of the ASP Matthew Suffness Award by focusing on the most recent recipient, Dr. Kerry McPhail of Oregon State University, Corvallis, Oregon. In the early 1990's, former ASP President Matthew Suffness was a pivotal player in developing what was then called the Young Investigator Award, conceived as a mechanism to highlight the achievements of some of our younger members as they established independent careers. Recognizing that our younger members are not so fortunate as to have known Dr. Suffness, we thought a series of reflections by previous winners of the Suffness Young Investigator Award would help provide them with a sense of the man, his vision, and his contributions. We hope to draw broader attention to the award itself and, hopefully, inspire members to nominate deserving individuals for the award in the years to come.

At this year's ASP Annual Meeting in St. Louis, Missouri, the Matthew Suffness Award was given to Dr. Kerry McPhail, Associate Professor of Medicinal Chemistry at Oregon State University, Corvallis, Oregon. Dr. McPhail delivered a presentation on her work as part of the award. Dr. McPhail told the *Newsletter*, "I feel tremendously honored to be a Suffness Award winner. It is extremely motivating, and brings a sense of being connected and contributing to the natural products research community."

Dr. McPhail's laboratory focuses on natural products from microbes that may potentially be useful in treating cancer and infectious diseases. Her work utilizes nuclear magnetic resonance spectroscopy and she collaborates with the university's Pharmaceutical Sciences department for many biological directions. Dr. McPhail investigates anti-cancer compounds from cyanobacteria, as well as antibacterial compounds isolated from deep-sea vent microorganisms, and bioactive microbial compounds found in South African tunicates.



Dr. Kerry McPhail

DR. KERRY MCPHAIL

Dr. McPhail's award presentation discussed the macrocyclic cyanobacterial depsipeptides as anticancer compounds. The structure and bioactivity of thiazoline-containing cyclic depsipeptides, as well as an unprecedented metal-binding macrocycle, isolated from cultured Red Sea cyanobacteria were highlighted. The Panamanian cyanobacterial metabolite coibamide A, discovered as part of the Panama International Cooperative Groups (ICBG) project, was also presented. Dr. McPhail shared this compound's antiproliferative bioactivity, synthesis, and in vivo results.

When asked how the significance of being given the Suffness Award impacted her work, Dr. McPhail related, "I was not fortunate enough to meet Matt Suffness. The visibility afforded by being named alongside inspirational researchers previously receiving the Suffness Award has already had an impact both in the number of students and postdoctoral researchers who express interest in our research, and a desire to explore opportunities at Oregon State University, as well as networking with potential collaborators who can enhance and extend our

Dr. McPhail investigates anti-cancer compounds from cyanobacteria, as well as antibacterial compounds isolated from deep-sea vent microorganisms, and bioactive microbial compounds found in South African tunicates.

Younger Members Event: A Taste of St. Louis

By Dr. Kurt Reynertson



At this year's Annual Meeting in St. Louis, about 120 ASP younger members left the air conditioned Hyatt conference center to tour the sprawling grounds of the Anheuser-Busch world headquarters and brewery, on a hot and sunny July afternoon.

For some of us, the breezy tour began as soon as we stepped on the bus, where we were entertained by a steady stream of St. Louis facts and anecdotes by our animated bus driver. We passed the

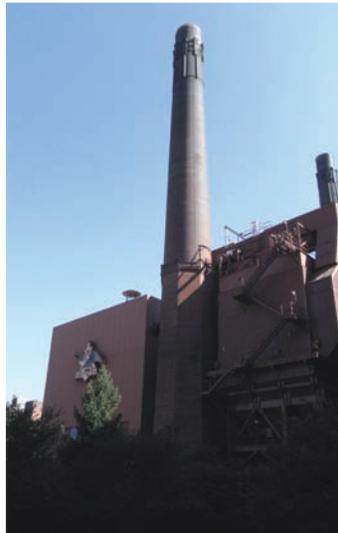
courthouse where the former slave Mr. Dred Scott successfully sued for his freedom in 1847, Busch Stadium, several jazz clubs, and the historical Soulard neighborhood.

The brewery grew organically over the years, taking up more real estate as it grew; thus, it sits on what appeared to be several city blocks. The capacity at the site is enormous, and our tour guide showed us a series of fermentation tanks, each containing enough beer to fill some 200,000 6-packs of beer. Many of the buildings still retain turn-of-the-century architectural embellishments, including wrought-iron railings, cornices, and chandeliers decorated with imagery of hops and barley grains. The brewing operations, however, are all modern.

The bottling facility retains nothing of the old, and is a fully-automated modern facility. I remember touring breweries many years ago when you would still see many people working the floor. This facility moved with exacting precision, requiring very few people. Overall, attendees were impressed with the dichotomy of beautiful old architecture and adornments, which houses some massive modern production facilities. The scale was really impressive, and inspired questions about quality control, chemistry, and agriculture.

Our poor tour guide was not prepared to deal with some of the questions that came from a group of natural products chemists, and we were unfortunately not allowed a glimpse of the analytical QC labs. Instead, we saw a couple of the Clydesdale horses, the huge mash tanks, grain houses, and fermentation vessels. We ended the tour at the tasting room, a welcome spot for many a thirsty participant. ■

PHOTO CREDITS: DR. CHARLOTTE SIMMLER



Hot Topics in Pharmacognosy: Australian Folk Medicine to the Rescue

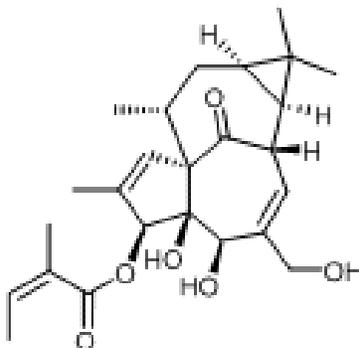
By Dr. David Newman

In 2012, the FDA approved a classical phorbol ester, ingenol 3-angelate (see structure below) known as Picato™ for the treatment of actinic keratosis (AK). For those of you who remember the early pharmacology of phorbols, phorbol esters, and the initial reports of the classical protein kinase C (PKC) inhibitor (and sometimes activator) bryostatin 1 and its analogues, this news was quite heartening. Approval in the European Union occurred later in 2012.

There were reports from a variety of sources including a report from Egypt in *Phytochemistry* in 1985 and in 1976, and a report in the *Medical Journal of Australia* on home treatment, that the sap of *Euphorbia peplus* (also known as petty spurge in the United Kingdom and radium weed in Australia) may well be an effective treatment for AK and related “cancers.”¹

Further literature searching brought up a very interesting reference with a well-known ASP member as one of the authors. In fact it may well be part of Dr. Doug Kinghorn’s Ph.D. doctoral research at the University of London.² It gives an extensive coverage of the diterpenes from *Euphorbia* spp. and *Elaeophorbia* spp. with extensive reports of the occurrence of ingenol or its esters and derivatives.

The compound, effectively the natural product under the origi-



Picato™
Ingenol 3-angelate

Picato™, ingenol 3-angelate.

DR. DAVID NEWMAN

nal name PEP 005 from the Australian company Peplin, has been in a variety of clinical trials mainly as a treatment for AK; but, there were also reports of Phase II trials against superficial and nodular basal cell carcinoma (results have not yet been published). A Phase II trial against non-melanoma skin cancer using mainly the sap of *Euphorbia peplus* was reported as being effective by Australian researchers in 2011.³ Leo Pharma in Denmark purchased Peplin in 2009, and Peplin now operates as a United States subsidiary. Aside from the Australian trials there have been to date, 41 trials are listed in the Clinicaltrials.gov database with Picato.

There are also two other very interesting recent publications related to this compound. In 2013, Xing and Siliciano demonstrate that ingenol will reactivate latent HIV4 and perhaps more importantly, Baran et al has just published a 14 step stereospecific synthesis of ingenol from the relatively easily available, (+)-3-carene,⁵ using synthetic schema that will permit the syntheses of analogues that have not yet been “seen.”

The bottom line however, is that the “folk medicine” originally described and used in Australia (granted an “N” of 1), reported in Hartwell’s compendium, has now become an approved drug as the natural product. ■

1. Hartwell JL, Plants used against cancer. A survey. *Lloydia*, **1969**, 32, 78-107.
2. Evans, F.J, and Kinghorn, A.D. A comparative phytochemical study of the diterpenes of some species of the genera *Euphorbia* and *Elaeophorbia*. *Bot J Linnean Soc.* **1977**, 74, 23-35).
3. Ramsay, J.R., et al. The sap from *Euphorbia peplus* is effective against human nonmelanoma skin cancers. *Br J Dermatol.* **2011**, 164, 633-636
4. Xing, S., et al. Targeting HIV latency: pharmacologic strategies toward eradication. *Drug Discov Today*, **2013**, 18, 541-551.
5. Jorgensen, L., et al. 14-step synthesis of (+)-ingenol from (+)-3-carene. *Science*, **2013**, 341, 878-882.

The bottom line however, is that the “folk medicine” originally described and used in Australia (granted an “N” of 1), reported in Hartwell’s compendium, has now become an approved drug as the natural product.

Betz Receives Tyler Award

By Dr. Edward J. Kennelly

Dr. Joseph Betz, Director, Analytical Methods and Reference Materials Program at the National Institutes of Health (NIH) Office of Dietary Supplements (ODS), and long-time ASP member, was awarded the Varro E. Tyler prize at the 2013 ASP Annual Meeting in St. Louis, Missouri.

The Varro E. Tyler Prize, named in honor of the first ASP President, was established by the ASP to recognize an individual who has made outstanding scientific contributions to the broad field of dietary supplements, with special emphasis on botanicals, thereby reflecting the research inter-

ests of the late Dr. Tyler. Awardee contributions are typically in an area of phytochemistry, pharmacognosy, or pharmacology.

Dr. Betz told the *Newsletter*, "I am humbled and honored to be selected to receive the American Society of Pharmacognosy's Tyler Prize. Tip Tyler was a dear friend and a champion of the rational use of botanical products. He was an advocate for both critical examination of the science underpinning the use herbs and for creation and careful adherence to quality standards for marketed products. My work at both FDA and NIH was inspired in large part by Dr. Tyler's vision and tireless insistence on scientific rigor."

Dr. Betz's award talk spanned the course of his career, and showed common themes of applying state-of-the-art analytical methods for purposes of identification and safety of botanicals or dietary supplements. Dr. Betz earned his PhD in Pharmacognosy at the Philadelphia College of Pharmacy and Science, where he began to use analytical methods for determination of botanical quality and in plant toxins. He recalled joining the United States Food and Drug Administration (FDA) Center for Food Safety and Applied Nutrition as a Staff Fellow on April Fool's Day in 1987; he stayed for 12 years before being promoted to a Research Chemist.

His tenure at FDA involved the investigation of some critical is-



Dr. Joseph Betz

DR. GUIDO PAULI

issues of toxicity with botanicals and dietary supplements, including the L-tryptophan and ephedra public health crises in the United States. Furthermore, he was involved in developing analytical methods at FDA, often in collaboration with his colleague Dr. William Obermeyer, including: agaritine in mushrooms; glycoalkaloids in potatoes; ergot in rye; L-tryptophan with regard to eosinophilia-myalgia syndrome; lignans in flax (secoisolariciresinol);

and nordihydroguaiaretic acid in chaparral.

After a brief departure from the federal government to work as the Vice President for Scientific and Technical Affairs at the American Herbal Products Association (AHPA), Dr. Betz joined the NIH ODS as Director of the Dietary Supplements Methods and Reference Materials Program in 2001 where he oversees efforts to promote development of validated analytical methods and reference materials for dietary supplements. In his award talk, he discussed several of the programs he heads at ODS, including Quality Assurance Program for Analysis of Dietary Supplements; Quality Assurance Program for Measurement of Vitamin D metabolites in Serum; and Quality Assurance Program for Omega-3's in Serum, currently in development.

Since 2006, Dr. Betz has spearheaded more than 100 ODS-funded methods studies published; 17 ODS-funded single-laboratory validation studies published; 10 collaborative methods studies published. With regard to reference materials, Dr. Betz has led the effort for ODS to foster and fund 27 National Institutes of Standards and Technology standard reference materials. He continues to play a key role in dietary supplements and botanicals. ■

“My work at both FDA and NIH was inspired in large part by Dr. Tyler's vision and tireless insistence on scientific rigor.”

Behind the Scenes in Pharmacognosy

By Dr. Amy Keller

This summer, the *Journal of Natural Products* published work from ASP member Dr. Tomofumi Miyamoto and colleagues at Kyushu University, Fukuoka, Japan, entitled, "Structure, Synthesis, and Biological Activity of a C-20 Bisacetylenic Alcohol from a Marine Sponge *Callyspongia* sp." Dr. Miyamoto discusses his lab's work on marine sponges and explains the origin of their futsal team name. Please read the full article in the *Journal of Natural Products*, 2013;76: 1337–1342 [dx.doi.org/10.1021/np400297p](https://doi.org/10.1021/np400297p).

1. How did you become interested in working with bioactive compounds from marine sponges, and how did you come to focus on compounds that targeted the lymphatic system in the context of cancer?

First, I am interested in the chemical defenses (allelochemicals) of marine opisthobranchs. The order Nudibranchia comprises shell-less mollusks dressed in a colorful coat; their allelochemicals are often derived from the sponges they prey on. Some allelochemicals have shown a potent bioactive property against mammalian cell lines.¹ Our interest moved to the bioactive compounds of marine sponges. These organisms are much more abundant than those of marine mollusks. Since 2000, we have been applying molecular targeted screening against natural resources such as marine invertebrates and medicinal plants (crude drugs), and one of our molecular targets is angiogenesis and related factors in the endothelial cell proliferation. Some of them showed a good potential for lead compounds. Recently, we have focused on compounds that inhibit new lymphatic vessels, as therapeutics targeting tumor-associated lymphangiogenesis have not been established yet. In addition, we can use a lymphatic cell line (TR-LE), which was established by co-workers Drs. Koizumi and Saiki in 2006. This is our second paper about anti-lymphangiogenic compounds from natural resources.²

2. Who in your laboratory carried out the research?

This work was a collaborative effort among several research groups, however, the cell proliferation assay, bioassay-guided isolation, structure determination, and synthetic study, have been done by Dr. Takayuki Shirouzu. Dr. Shirouzu was a Ph.D. candidate of natural products chemistry and this work was part of his doctoral thesis; now he is a corporate researcher. One of our collaborators, Dr. Watari, who graduated from our lab, now an assistant professor of Dr. Ono's lab, Department of Pharmaceutical Oncology, assisted with the lymphangiogenic and cell cycle studies.

Dr. Rob van Soest, now in his new office at the Naturalis Biodiversity Center in Leiden, The Netherlands, continually helped



THE MIYAMOTO TEAM. Front left: Dr. Takayuki Shirouzu, holding synthetic reagents; front right: Dr. Chiaki Tanaka, holding marine sponge; back left: Dr. Kosuke Watar, holding a microplate; back right: Dr. Miyamoto, holding a copy of the manuscript.

MS. YAUKO HIGUCHI

us to identify marine sponges. Unfortunately, Dr. Shirouzu is not a good swimmer and is afraid of marine diving, so Dr. Chiaki Tanaka and I gathered marine sponges for him.

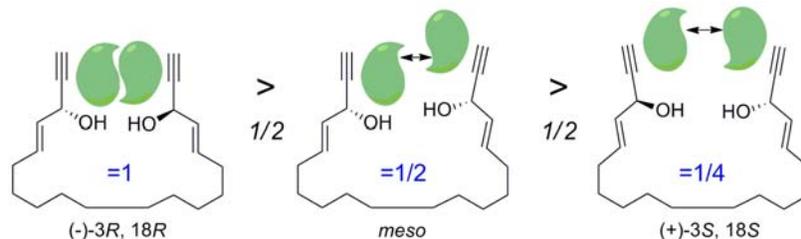
3. Could you provide a brief explanation of the work and results in your own words? In what way are the data in your paper new?

When Dr. Shirouzu isolated and determined the bisacetylenic alcohol, he and I were disappointed at the result because the compound was known and isolated from the same species. However, our compound was an isolated racemic mixture. The (-)-enantiomer had not been reported, and the anti-lymphangiogenic activity

continued on page 12

The natural products which have both anti-inflammatory and anti-lymphangiogenic activities might be good candidates for novel anti-cancer and anti-metastatic agents.

Behind the Scenes in Pharmacognosy



Plausible mechanisms of action of acetylenic alcohols.

continued from page 11

of bisacetylenic alcohol had not been examined. We separated the racemate using chiral-phase HPLC and evaluated the biological activity of each enantiomer; we found that these enantiomers showed different properties. To confirm this result and investigate the structure-activity relationships of bisacetylenic alcohols, we synthesized 11 derivatives and clarified the essential structure requirements for antiproliferative activity. Although the anti-lymphangiogenic activity of bisacetylenic alcohol was irrelevant, we are interested in the mechanism of the action of bisacetylenic alcohol, and we proposed a mechanism of action involving the stabilization of protein dimers. We are preparing a photo-affinity probe of bisacetylenic alcohol to identify the target molecule and to establish our plausible mechanism of action.

4. What impact does this research have on natural product science and health research in general?

Recently, the close association of inflammation, angiogenesis, lymphangiogenesis and cancer progression, and metastasis in the tumor microenvironment has been highlighted. A lot of anti-inflammatory natural products have been reported, and several types of anti-angiogenic compounds have been found from natural resources. Furthermore, Dr. Watari has presented evidence that proinflammatory cytokine, IL-1 β can induce lymphangiogenesis and that this activity is mediated by the up-regulation of lymphangiogenic factors together with the recruitment and activation of macrophages.³ Hence, the natural products which have both anti-inflammatory and anti-lymphangiogenic activities might be good candidates for novel anti-cancer and anti-metastatic agents.

1. *Progress in Molecular and Subcellular Biology Subseries Marine Molecular Biotechnology*, Eds. Cimino, G., Gavagnin, M. Springer-Verlag, **2006**, Berlin, Heidelberg.

2. Jeong D, et al. Studies on lymphangiogenesis inhibitors from Korean and Japanese crude drugs. *Biol Pharm Bull.* **2013**, 36, 152-157.

3. Watari K, et al. Role of macrophages in inflammatory lymphangiogenesis: enhanced production of vascular endothelial growth factor C and D through NF-kappaB activation. *Biochem Biophys Res Commun.* **2008**, 377, 826-831.

5. What is a favorite nonscientific activity of your lab?

We enjoy playing tennis and futsal for recreation. "Anny" is the name of our futsal team. "Anny" is derived from Dr. Miyamoto's pet's name (a border collie). He mentions that the name of "Anny" is also the nickname of "Anakin Skywalker (Darth Vader)", but he accidentally spelled it "Annie" instead of "Anny."



The futsal uniform of team "Anny."

DR. TOMOFUMI MIYAMOTO

6. What is your lab's motto?

"Love nature, enjoy nature, and learn from nature!" We remind ourselves that the improvement of structure determination is the most important and fundamental technique for carrying out our research.

7. What is your greatest extravagance in the lab?

GC-MS (Shimadzu QP5050) is the greatest extravagance in my lab, but the spectrometer was installed a decade ago. The NMR spectrometer (Varian INOVA 600) and ESITOFMS (Bruker micrOTOF) are communally owned equipment, but helium gas is mostly unavailable and is an expensive consumption when running the NMR and MS spectrometers in the last six months. ■

Natural products drug discovery and development is very much alive and well...

Fun with Pharmacognosy

Dr. Nicholas Oberlies

Note from the author: *Colleagues. I hope you enjoy this first column of 'Fun with Pharmacognosy.' My goal is to reveal some of the mischievous sides of pharmacognosy. My guess is that some, possibly many, of you have ideas, stories, and examples to share; moreover, I implore you send any suggestions and story ideas to me at nicholas_oberlies@uncg.edu. Think of this column as a way to describe experiments that no one will forget, like the classic demonstration of freezing a banana in liquid nitrogen and smashing it. What is the equivalent for natural products?*

This first installment focuses on syrup of ipecac. I have been teaching a class on natural products for about the past four years. One of the things I go through early in the class is some of the history of our discipline, pointing out many of earliest 'discoveries'. Morphine was likely one of the first isolated natural products (around 1817), but emetine was found soon thereafter, isolated from *Carapichea ipecacuanha*.

In talking about emetine and the botanical taxonomy, I noticed that many of my students have never heard of 'syrup of ipecac,' derived from this same plant, especially those students born after about 1980. If you are like me, born prior to that, you can remember your mother having a bottle of syrup of ipecac handy in case of an accidental poisoning. In fact, in the Oberlies household of the 1970's, I can clearly remember my mom threatening to use it on

in our backyard, often involving daring someone to eat earthworms, pond scum, or bugs.

In doing some cursory research on this, I think syrup of ipecac fell out of favor after about 1980, likely because most poison control centers do not suggest the induction of vomiting any more. I wanted to impress upon my students what syrup of ipecac (emetine) is, how it is used, and what it does. Since I cannot do a demo on this in class, I turned to one of the favorite tools of the youth of today, YouTube. I wondered if there was anything about it there, and I found a bonanza! The below link was shown at the end of class (after excusing those with a weak constitution). While this might be in poor taste, or brilliant from a different perspective, I promise that all of those students who watched it now have a clear understanding of the pharmacological properties of emetine. ■



Video depicting the effects of ipecac, accessible at <http://www.youtube.com/watch?v=M4vS4UWZ0nQ>.

(Sensitive viewers, like our Editor-in-Chief and our Layout Editor, may not wish to view the video. Our Assistant Editor, however, found the video hilarious in a nauseating sort of way.)

Field Notes in Pharmacognosy: Natural Products in the Desert

By Dr. John Berger

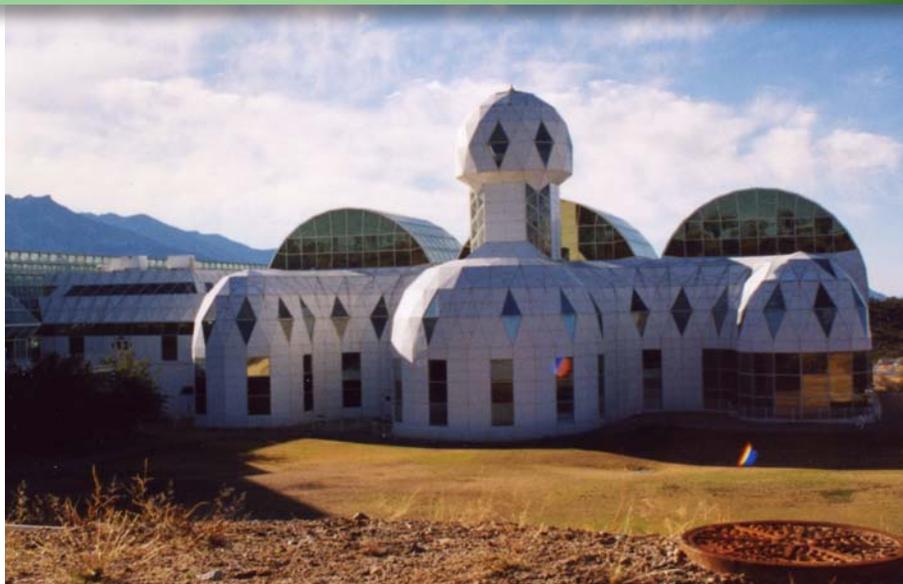
The *New York Times* Retro Report appearing June 10, 2013, entitled, “A Second Act for Biosphere 2” (and its attached Biosphere 2: An American Space Odyssey), looked back on the history of the Biosphere 2 research facility. Most of the report was dedicated to the media hype of the original Biosphere 2 experiments followed by the backlash of the media when the apparent flaws of the experiments came to light. However those two years of experiments were only a small portion of the more than 25-year history of the site. According to *The New York Times* Retro Report, over 150 papers were published since Columbia University took control of it in 1995.

As scientists, we spend so much time asking “why” but rarely have the time to ask ourselves “what if ?” Biosphere 2 was one place where scientists were allowed to do so. Ten years ago, Columbia University severed its relationship to Biosphere 2; but before that happened, I had the opportunity to explore a novel work environment and to meet a number of people who had a significant impact on my professional life. In some respects, Biosphere 2 was also my formal introduction into the American Society of Pharmacognosy.

As scientists, we spend so much time asking “why” but rarely have the time to ask ourselves “what if ?”

In 2001, I was completing my Ph.D. studies with ASP member Dr. David Kingston and was applying for academic and/or post-doctoral employment. At that point, ASP Fellow Dr. Koji Nakanishi and Dr. Leonard Fine of the Department of Chemistry at Columbia University advised me of a unique opportunity. Columbia University had access to the Biosphere 2 site, and Dr. Nakanishi was awarded funds for a postdoctoral student in environmental chemistry. With Drs. Jerrold Meinwald and John Hildebrand they planned a “Natural Products Research Unit” composed of three postdocs working under their auspices; our goals were to set up a working natural products laboratory, publish papers, and eventually secure grants to sustain the research endeavor. My initial research was “something to do with ultraviolet (UV) light and natural products.”

Arizona was full of surprises when I arrived. Tucson is a friendly city that embraces its desert heritage with a robust downtown and a great university, the University of Arizona. My first big surprise was my first night in Arizona; my domicile was a small, one-room A-frame at the only hotel in Oracle, Arizona, where a pack of coyotes yipped and howled outside my door every day



The Biosphere 2.

for a week. I settled down soon enough, made friends, and got started with my work.

The Biosphere dome was constructed out of plate glass which permits visible light to enter the facility but blocks UV light. This can have detrimental effects on plant growth and some species do not do well growing in an enclosed environment. In some respect I became interested in the effects of increased UV light (especially due to the depletion of the ozone layer during that time and the resultant elevated levels of UV light). We became interested in how altered solar or artificial light could impact the biosynthesis of natural products. A previous Biosphere 2 researcher, using thin slices of an *Opuntia wilcoxii* (a local cactus characterized by its thick pads), measured lower levels of UV



Opuntia violacea

continued on page 15

DR. JOHN BERGER.

Field Notes in Pharmacognosy: Natural Products in the Desert

continued from page 14

absorption on cacti grown in the dome compared to outside the dome; he attributed this to lower levels of phenolics and flavonoids in the plants grown in the dome versus outside the dome. I chose to continue on the path of the previous researcher and focus on UV light and *Opuntia* species, especially *Opuntia violacea*, an *Opuntia* cactus with a characteristic purple color.

I developed an extraction process to isolate the flavonoid glycosides from *Opuntia*, an acid-based hydrolysis to convert the glycosides to the free flavonoids, and an HPLC-PDA method to separate and quantify the flavonoids present. While I was developing these methods, I also transplanted *Opuntia* species into the UV-depleted Biosphere desert unit for later comparison to those grown outside the dome. The results showed that only newly grown pads (that were never exposed to UV light) lacked flavonoids, but there was no decrease in flavonoids in pads previously grown outdoors but transplanted inside.¹

There were many other events that summer that just made me say “wow”.

Our research group was not just interested in natural products, but their impact on other species. To that end, Dr. Nakanishi arranged for me to visit the late Dr. Thomas Eisner, a director of the Cornell Institute for Research in Chemical Ecology (CIRCE) and longtime collaborator of Dr. Meinwald. I spent a wonderful afternoon with Dr. Eisner and his wife, and he demonstrated many of his pioneering techniques in the field of ultraviolet (UV) photography and its use as a tool to investigate insect behavior.

Many insects (such as pollinating bees) do not see the color spectrum as we do (and mostly the UV-blue-green spectrum). I did my best to duplicate Dr. Eisner's techniques (Biosphere 2 had a fully equipped photography laboratory) but had great difficulty developing the proper equipment, as modern photography lenses minimize transmission of UV and IR light to avoid false color development. At Dr. Eisner's suggestion, I even manufactured pinhole cameras, which lack the problematic lens. The best I was able to achieve was “blue-light” photography using a color-filter secured to the drilled lens cap of a 35 mm camera with black and white film. Normal and “blue-light” photos of *O. wilcoxii* were clear enough to show that the yellow petals actually appear dark in the blue spectrum whereas the yellow stamens actually remain bright. This is due to the presence of UV-absorbing flavonoids in the petals absent in the stamens.



Opuntia wilcoxii, normal photo.



Javalina

There were many other events that summer that just made me say “wow”. There was a rich diversity of wildlife besides the familiar coyotes and rattlesnakes: scorpions in the laboratory, a number of javalina (a type of peccary which looks like a pig) families visiting the site and a large migration of thousands of six-inch caterpillars moved across the roads to a messy demise when cars drove by. Even black bears exist in the desert. There was a raging wildfire that burned for weeks (even succulents like cacti burn) that probably came within 2 miles of the facility; firefighter helicopters used some pond water from the site to fight the fire. I was even able to observe a perfect lunar eclipse with its “red-like” moon. We were lucky enough to have a number of seminar speakers such as Dr. Nakanishi and noted economist Dr. Jeffrey Sachs (now director of the Earth Institute at Columbia University) visit our site. ■

continued on page 16

It is still the world's largest closed environment system and there are some experiments involving earth science and nature that can only be accomplished there.

continued from page 15

BIOSPHERE 2: A BRIEF HISTORY

Dr. John Berger

The Biosphere 2 was a \$200 million dollar experiment funded by Edward Bass through Space Biospheres Ventures to determine if long-term life was sustainable in artificial environments; it was called “Biosphere 2” because “Biosphere 1” refers to the Earth itself. Located in the Sonoran desert in Oracle, Arizona, and composed of an enormous amount of native desert, the centerpiece was a three-acre “dome” of enclosed artificial environments including desert, rainforest, agriculture, ocean, and a futuristic living facility; a significant portion of it was also underground. Each artificial environment would contribute to maintaining life. For example, the “rainforest” would convert CO₂ to O₂ (and give bananas), and the ocean would provide humidity, etc.

In 1991, eight people sealed themselves in the facility to simulate living in a space colony. The facility was prematurely opened six months later due to fluctuating O₂/CO₂ levels (followed by reports of the use a CO₂ scrubber invalidating the original intent of Biosphere 2’s environment for CO₂ control). The overall rate of “respiration” of the closed system was higher than that of the rate of photosynthesis, due to the respiration of soil bacteria and the absorption of CO₂ by concrete, reducing the overall O₂ availability. In addition, the death of many vertebrates and pollinating insects endangered the food supply while many unforeseen species (such as the “crazy ants” *Paratrechina longicornis*) emerged and competed with the “indigenous” insect species (especially those responsible for pollination). Additional unforeseen phenomena included the “desert” becoming too humid due to the nearby “ocean.”

In 1995, Columbia University took over management of the site for eight years, becoming Columbia University’s Bio-

sphere 2 Center. It was intended to be used as an educational facility with Columbia University students spending a semester “abroad.” Columbia University constructed a number of dormitories to house these students, and the site was also developed into scientific tourist attraction. There was no longer intent to keep the facility perfectly sealed and people, including tourists, entered routinely.

That summer, Mr. Lee Bollinger became the 19th President of Columbia University. The Biosphere 2 community was very concerned with his appointment, as many new university presidents want to change the university to fit their “vision” and to secure a legacy. Within a short time, reports of conflict between the President’s office and schools such as Columbia’s School of Journalism made us wonder if Biosphere 2 was in trouble. As researchers do when they feel anxiety, we focused on grants and publications and hoped for the best. I submitted my CV to a number of universities and secured employment at Montclair State University, Montclair, New Jersey. I left Biosphere 2 in July 2003 and hoped the best for my friends I left behind.

The September 9, 2003, article in *The New York Times* said it succinctly: “Columbia University Ends Its Association with Biosphere 2.” Through the grapevine, I heard many of the student researchers left to continue their studies elsewhere, but those who purchased houses or had children enrolled in school had to struggle to secure stable employments; middle-aged researchers particularly had a tough time. Many researchers found employment at the University of Arizona in Tucson, Arizona. In 2007, the University of Arizona took over management of the facility and in 2011 assumed full ownership. An online search on the Biosphere 2 shows a number of new projects, particularly in environmental science.

I would like to thank the University of Arizona for having the vision and the courage to take over management of the Biosphere 2, as well as the *ASP Newsletter* for the opportunity to tell my story of Biosphere 2. It is still the world’s largest closed environment system and there are some experiments involving earth science and nature that can only be accomplished there. And if you, the reader, are ever in Tucson, take a drive north, stop in Oracle, and see a small piece of science history.

1. Berger J.M., et al. *Chem Biodiv.* **2007**, 4, 1525-1532.

Meet a New ASP Member

ASP is pleased to welcome many new members to the society this summer. One of our recent new members is Dr. Terry Sumpter, a reference standards scientist at the United States Pharmacopeia, Rockville, Maryland. Dr. Sumpter took the time to share his diverse interests in both science and literature, as well as outdoor activities. We heartily welcome him into the ASP.

By Mr. Dan Kulakowski

How did you hear about the ASP?

I came across the ASP website when I was looking for resources after starting my new position at the United States Pharmacopoeial Convention (USP). I found out later that several of my USP colleagues are also ASP members.

Why did you join ASP?

I recently joined USP as a reference standards scientist to support development of USP reference standards for food, dietary supplement, and herbal medicine monographs. I wanted to learn more about “small molecule” natural products and areas of active research. The ASP conference looked like the one-stop spot for doing so, and it was! I gained a great deal of background knowledge on the current status of terrestrial and marine natural products chemistry and associated methods of purification and analysis.

Do you belong to any other scientific societies?

I am also a member of the American Association for the Advancement of Science and the American Association of Pharmaceutical Scientists.

What are your current research interests in pharmacognosy?

In broad terms, pharmacognosy is very relevant to USP in that some monographs, especially in the areas of dietary supplements and herbal medicines, are for natural products such as extracts, oils, and botanicals. A USP monograph contains specifications and tests for critical quality attributes of the particular ingredient(s) and includes analytical test procedures and acceptance criteria for specified tests. The tools and insights of pharmacognosy are important in identifying these key attributes and tests. Many monographs call for the use of USP reference standards. The USP reference standards are highly characterized substances intended for use in conducting the quality control tests



Dr. Terry Sumpter

MELANIE SUMPTER

and analytical procedures associated with documentary standards (i.e., monographs) found in the USP compendia.

On a more personal level, reference standard scientists (like me!) are responsible for the nearly “cradle-to-grave” management of a portfolio of USP reference standards (RS). This involves many activities, including evaluating the results of collaborative testing of RS candidates to ensure that they are suitable for use in USP compendial procedures. Once a monograph requiring a particular RS is developed (in collaboration with expert volunteers worldwide), the next step is to acquire candidate RS material (which may be a single compound or a mixture) through donation, synthesis, or purchase. The candidate RS material is then tested for its performance in the monograph(s) using validated procedures. Additional characterization of the candidate RS in terms of purity, structure, and composition (of mixtures) is also typically carried out. These activities culminate in the public compendial and reference standards of quality that USP provides for medicines, including herbal medicines, food ingredients, and dietary supplements. All USP standards are backed by sound science and modern technologies, and the science often starts with front-line researchers such as those found in ASP.

What is your scientific background?

I have a Ph.D. in chemistry (organic emphasis) from the University of Tennessee, Knoxville, Tennessee, where my dissertation work was studying gas-phase E1cb mechanisms using ICR mass spectrometry. I did postdoctoral work in protein mass spectrometry at the University of Maryland, Baltimore, Maryland. Before coming to USP, I was an analytical biochemist characterizing biopharmaceuticals using primarily mass spectrometry, high-performance liquid chromatography, and capillary electrophoresis. My role at USP is largely working with small molecules; it is nice to return to my scientific roots as an organic chemist.

What would you like to achieve through your membership?

I view ASP as a wonderful portal for monitoring current trends and methodologies in the purification, characterization, and development of natural products for therapeutics and foods/supplements.

What do you like doing in your spare time?

I am an avid scuba diver and former dive instructor, and none too picky about where I dive. I have a “hobby farm” which provides continual entertainment for me and my family. Also, I go backpacking whenever possible, preferably beyond the reach of cell phones and e-mail.

What are you currently reading?

I just finished *After the Quake* by Haruki Murakami and am now working on *Muse of Fire* by Dan Simmons and *Resistance* by Barry Lopez. Having time to read is one upside to a rather long daily commute. I also enjoy reading about decompression theory and hyperbaric medicine. ■



New Members of ASP 2013

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 8 domestic full members, 2 international members, and 5 associate members. We look forward to meeting you and learning more about you and your work.

ACTIVE MEMBERS

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Corvallis, Oregon

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Dr. Nathan D. Gould
Bloomington, Indiana

Dr. Thierry S. Hennebelle
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Barrington, Illinois

Dr. Steven King
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Mr. Michael Mueller
Freiburg, Germany

Mr. Ernie Petit
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Dr. Terry L. Sumpter
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Ms. Aljawharah Alqathama
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Lithia, Florida

Ms. Elizabeth M. Martinez
Chicago, Illinois

ASP Annual Awards

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

Norman R. Farnsworth Research Achievement Award

Dr. Satoshi Omura
Kitasato University, Tokyo, Japan

Tyler Prize for Botanical Research

Dr. Joseph Betz
Food and Drug Administration, Washington D.C.

2012 Arthur E. Schwarting Award

Dr. Rolf Muller
Helmholtz Institute, Saarbrucken, Germany

2012 Jack L. Beal Award

Dr. Dong-ho Lee
Korea University, Seoul, South Korea

Matt Suffness Award

Dr. Kerry McPhail
Oregon State University, Corvallis, Oregon

ASP Student Research Award

Ms. Rana Montaser
University of Florida, Gainesville, Florida

ASP Research Starter Grants

Dr. Stephen Deyrup
Siena College, Newtonville, New York
Dr. Kevin Tidgewell
Duquesne University, Pittsburgh, Pennsylvania
Dr. Kimberly White
Colorado Mesa University, Grand Junction, Colorado

ASP Undergraduate Research Grants

Ms. Cynthia Holland
Henderson State University, Arkadelphia, Arkansas
Mentor: **Dr. Martin Campbell**
Mr. Andrew Osborn
Oregon State University, Corvallis, Oregon
Mentor: **Dr. Taifo Mahmud**

Travel Awards

Lynn Brady Student Travel Award

Ms. Christine Theodore
University of Oklahoma, Norman, Oklahoma
Ms. Rasika Phansalkar
University of Illinois Chicago, Chicago, Illinois
Ms. Vanida Choomuenwai
Griffith University, Brisbane, Australia

ASP David Carew Student Travel Award

Ms. Yixi Liu
Virginia Polytechnic, Blacksburg, Virginia

ASP Waqar Bhatti Student Travel Award

Mr. Navid Adnani
University of Wisconsin, Madison, Wisconsin

ASP Jerry McLaughlin Student Travel Award

Ms. Martha Leyte-Lugo
Universidad Nacional Autonoma de Mexico, Mexico City

ASP Travel Award for Active Members

Dr. Hsiao-Ching Lin
University of California at Los Angeles, Los Angeles, California
Dr. Shengxin Cai
University of Oklahoma, Norman, Oklahoma
Dr. Yanti
Atmajaya Catholic University, Jakarta, Indonesia
Dr. Linfeng Li
University of Colorado Denver, Denver, Colorado

Graduate Student Travel Award

Mr. Lawrence Januar
University of California at San Diego, San Diego, California
Muyuramas Sang-Ngem
University of Hawaii, Hilo, Hawaii
Seong-Hwan Kim
Seoul National University, Seoul, South Korea
Glendy Polanco Hernandez
Universidad de Biotecnologia CICY, Mexico City, Mexico
Mr. Jose Rivera-Chavez
Universidad Nacional Autonoma de Mexico, Mexico City, Mexico
Ms. Skylar Carlson
University of Illinois at Chicago, Chicago, Illinois

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In Memoriam: Yenamandra Venkateswarlu

Mr. Prabhakar S. Achanta

Dr. Yenamandra Venkateswarlu passed away suddenly due to cardiac arrest on July 17, 2013. Dr. Venkateswarlu served as Chief Scientist at the Organic Chemistry Division-I (Natural Products Laboratory) of the Indian Institute of Chemical Technology (IICT), Hyderabad, India.

Dr. Venkateswarlu (affectionately called Dr. Lu by his colleagues and friends) was born on June 10, 1958 in Tanuku, West Godavari district, Andhra Pradesh, India. He obtained a B.S. degree from Sri Kasu Brahmananda Reddy Government College, Macherla, and a Masters in Organic Chemistry in 1979 from Andhra University, Visakhapatnam, both in India. Dr. Lu continued with doctoral studies and obtained his PhD degree in 1985 under the mentorship of Dr. A.S.R. Anjaneyulu. During his doctoral research, Dr. Lu isolated zoanthamines, novel alkaloids of unprecedented biosynthetic origin, from marine zoanthid, collected from the coast of Visakhapatnam. The work in this area forged a collaborative research partnership between Andhra University, Visakhapatnam, India, and Scripps Institution of Oceanography, La Jolla, California. Subsequently, he worked as post-doctoral associate with Dr. P. Balaram, Indian Institute of Science, Bangalore, India, and Dr. G. Mehta, University of Hyderabad, Hyderabad, India, joined IICT in 1988, and continued his research activities in the area of marine natural products until his passing.



Dr. Yenamandra Venkateswarlu

ASP President Dr. Brad Moore told the *Newsletter*, "As a faculty member of the Scripps Institution of Oceanography, my colleagues fondly recall Dr. Venkateswarlu's contributions as a visiting scholar in the early 1990's. Dr. Venkateswarlu joined many other talented Indian researchers in the Scripps laboratory of the late Professor D. John Faulkner and helped contribute to establishing the field of marine natural products back in India. While his contributions will be missed, his legacy will endure."

Dr. Lu was Better Opportunities for Young Scientists in Chosen Areas of Science and Technology (BOYSCAST) Fellow (1990-91) at Scripps Institution of Oceanography, La Jolla, California; Sabbatical Fellow (2000-01) at New Mexico State University, Las Cruces, New Mexico; Senior German Academic Exchange Service (DAAD) Fellow (2004) at Gottingen University, Gottingen, Germany. Dr. Lu was a principal investigator at IICT for an exploratory program 'Drugs from the Sea' launched by Department of Ocean Development, Government of India, during early 1990s. Several compounds isolated during these studies showed significant bio-activities, and several structurally interesting compounds, including zoanthamines, lamellarine alkaloids, mandapamate, rameswaralide and tirchanduramines were also discovered. Total synthesis of several bio-active natural products was accomplished by his research group.

Dr. Lu was a strong advocate of organic chemistry and published more than 200 papers in journals of national and international repute. He was a mentor for 37 PhD students, gave invited lectures at various conferences and symposiums, and was an excellent human, admired by one and all. Dr. Lu leaves behind his wife and two sons (the younger of which is pursuing Chemistry) along with a host of students, friends and admirers. ■

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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.

International Conference and Exhibition on Pharmacognosy, Phytochemistry & Natural Products

Hyderabad, India

October 21-23, 2013

[http://www.omicsgroup.com/conferences/
pharmacognosy-phytochemistry-natural-
products-2013/](http://www.omicsgroup.com/conferences/pharmacognosy-phytochemistry-natural-products-2013/)

Asian Symposium on Medicinal Plants, Spices, and Other Natural Products

December 9-12, 2013

Karachi, Pakistan

[http://www.iccs.edu/news_head.
php?id=Mzl=](http://www.iccs.edu/news_head.php?id=Mzl=)

International Conference on Natural Products Utilization

November 3-6, 2013

Bansko, Bulgaria

<http://icnpu2013.cim.bg/>

ASP 55th Annual Meeting

August 2-6, 2014

Oxford, Mississippi

[http://www.pharmacognosy.us/calendar-
of-events/future-asp-meetings/](http://www.pharmacognosy.us/calendar-of-events/future-asp-meetings/)





Brief News From Washington

By Dr. Georgia Perdue

- **The International Cooperative Biodiversity Groups (ICBG)** are up for renewal (RFA-TW-13-001). **The letter of intent is due October 20, 2013.** The application due date is November 20, 2013. Both the National Institutes of Health (NIH) and the National Science Foundation (NSF) participate.
- **NIH said in late July that sequestration has forced it to cut existing non-competing grants by 5%. NSF will make fewer new awards in 2013, and will fully fund existing continuing grant increments.**
- The NIH Office of Dietary Supplements (ODS) has launched a **Dietary Supplement Label Database**. It is a cooperative effort between ODS and the National Library of Medicine (NLM), and is a detailed database which is constantly updated (see www.dslid.nlm.nih.gov)
- In early August, the National Institute of Allergy and Infectious Diseases (NIAID) announced that **Phase I clinical trials have shown that an investigational malaria vaccine, PfSPZ Vaccine, is safe “to generate an immune system response and offer protection against malaria infection in healthy adults.”** The vaccine, developed by Sanaria, Inc., Rockville, Maryland, consists of live, laboratory grown, weakened, malaria-causing parasites “to trigger immunity,” a challenging feat in itself. Larger trials are planned later this year in Mali and Tanzania. In a statement, NIAID Director Anthony Fauci said ...that while “significant gains in characterizing, treating, and preventing malaria [have been made]... a vaccine has remained an elusive goal. We are encouraged by this important step forward.” (details have been published in *Science*, August 8, 2013).
- In August, the National Science Foundation (NSF) reported that as **part of its sustainable chemistry research**, Dr. Norma Alcantar, an Associate Professor of Engineering at the University of South Florida, Tampa, Florida, her colleagues including those from two Mexican public universities, and the National Institute of Environment in Mexico, have successfully used the **mucilage from the prickly pear cacti, *Opuntia* spp., “to clean up oil and other toxins from water.”** This research is intended to help develop a purification system for rural communities such as those in Central Mexico, Port au Prince, Haiti after its 2010 earthquake, and the oil spill in the Gulf of Mexico in 2011. **“The mucilage [disburses] crude oil more efficiently at lower concentrations than synthetic dispersants.”**
- **Congresswoman Louise M. Slaughter (D-NY), the only microbiologist in Congress, sent a letter to the President “urging him ...as he travels to the G-8 summit, [in June]... to pay close attention to the issues of antibiotic resistance, [an issue] that Britain’s Science Minister, [David Willetts] has raised with his counterparts in the G-8 countries....”** It was reported that Mr. Willetts would push for a consensus for the discovery of new drugs to fight bacteria. “... we should regard the spread of antibiotic **resistance as a global challenge....” said Mr. Willetts.** “We cannot tackle the problem on our own and urgently need coordinated international action,” said Dame Sally Davies, England’s Chief Medical Officer. **According to one of Representative Slaughter’s staff, the issue was raised at the G-8 summit.**

continued on page 24

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continued from page 23

- Ahead of the G-8 summit, the **G-8 science ministers met for the first time in five years at the Royal Society in London**. Mr. Willetts said that their discussions included how the respective governments could work together “to tackle the global challenges like public health ...[particularly] the issue of antibiotic resistance [by developing] and speeding up the introduction of new antibiotics.”
- On June 19, the House passed an amendment to the Agriculture Reform and Risk Management Act, sponsored by Representatives Slaughter and Jared Polis (D-CO), to authorize funding for the study of antibiotic resistant bacteria through 2018. This deals with the overuse of antibiotics in healthy farm animals.
- In June, the National Center for Advancing Translational Sciences (NCATS) awarded \$12.7 million in matching funds to nine academic research groups partnered with the pharmaceutical industry to explore new treatments in various areas. (see www.ncats.nih.gov/therapeutics-projects.html)
- At the June Advisory Committee to the Director (ACD) of NIH, one important topic was discussed again: **the reproducibility of published research results**. NIH Director Francis Collins noted that reproducibility of publications, especially when industry tries to duplicate the research [and runs into problems], is a very serious situation. Comments by NIH staff and ACD members included:
 - A lack of transparent reporting of methodology is evident for preclinical studies; widespread inadequate reporting in preclinical animal studies
 - This seems to be happening because of the **publish or perish** [mentality] in order to get grants
 - We must train a new generation how to do this properly
 - Major high profile journals have decided to support the NIH initiative
 - Editors will make better use of statisticians to work with them
 - Applicants should adhere to the core set of reporting standards for rigorous study design
 - We need to consider ways of modifying peer review to ask: is the premise upon which the work is based valid
 - How we communicate, especially with the private sector, is important because they are the end user of these results and we do not have the money for wild goose chases.
 - **Committee members’ thoughts and questions:**
 - I find all this unbelievable; it is flabbergasting
 - The enemy is us
 - Has the lack of reproductive results gotten worse or has it always been there? [The answer was mixed]
 - Competition can be poisonous and can produce bad behavior, which exists more now
 - We must lay the foundation for clinical trials going forward.

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From the Archives: “Pharmacognosy,” What is in a Name?

By Ms. Devhra BennettJones

The five syllables that compose the term “pharmacognosy” are planted, germinated, and rooted in the most ancient medicinal and scientific traditions across the globe. The Greek word is derived from “pharmakon”, meaning drug, “co” meaning intense, and ‘gnosia” meaning knowledge. It is widely held that a German medical student, C.A. Seydler crafted the term in 1815.¹ Today, the ASP maintains that, “pharmacognosy is the study of natural product molecules (typically secondary metabolites) that are useful for their medicinal, ecological, gustatory, or other functional properties.² The natural species that are the source of the compounds under study span all biological kingdoms, most notably marine invertebrates, plants, fungi, and bacteria.”³

From prehistoric times, the pharmacognosist was the individual that prepared crude drug substances, diagnosed, and dispensed medicines made from plants, fungi, and animals. While archaeological studies have found that Neanderthals used medicinal plants, the earliest written evidence of medicinal plant uses dates to late Sumerian inscriptions listing thirty animal, vegetable, and mineral drugs from around 2100 B.C. The Egyptians documented 70 drugs in the *Ebers Papyrus*, written about 1550 B.C. Eastern medical knowledge was published in China during the third century by the *Shen Nung Pen Tsao*, which listed 365 medicinal herbs. The *Ayurveda*, compiled in India during the Vedic period describes over 2,000 medicines. *De Materia Medica*, chronicled by Dioscorides of Anazarba, during 50-70 A.D., published a listing of 600 medicinal plants. He categorized these drugs based on their physiological actions, as many modern pharmacognosists do today. The historical roots of pharmacognosy demonstrate that the field is an interdisciplinary scientific approach that integrates ethnobotany, ethnopharmacology, phytotherapy, phytochemistry, zoopharmacognosy, and marine pharmacognosy.⁴

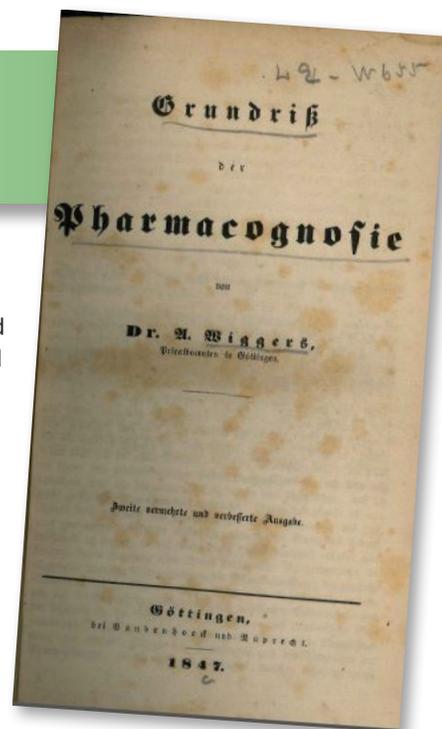
During the modern medical age in the United States, the popular culture credibility of pharmacognosy has been directly related to the medicine industry. In the 1800’s and 1900’s many advertisements made ridiculous and unproven beneficial health claims which alienated physicians. Although the Food and Drug Act of 1906 regulated advertising, prejudices against plant-based drugs had become firmly instilled among practitioners in the medical fields. The American Medical Association’s Council on Pharmacy and Chemistry’s war on echinacea is a good example of this phenomenon. In 1899, Lloyd Brothers Specifics began to market their echinacea tincture. By 1921, ‘Specific Medicine Echinacea’ was the most successful drug in the Lloyd Brother’s pharmaceutical line. During the late nineteenth and early twentieth century’s eclectic medical schools advocated the use of botanical remedies like echinacea. An eclectic

medical education focused on the use of plant-based remedies and non-invasive therapies. The last eclectic matriculated class graduated in 1942 at the Eclectic Medical College in Cincinnati, Ohio. With the continuous opposition from the American Medical Association, and the waning of eclectic medical training, echinacea faded from use until the latter half of the twentieth century.⁵

Patentability, academia, and profitability, have been inextricably linked in the decline and growth of pharmacognosy. Until the mid-twentieth century, it was rare that developers employed clinical studies as pharmacognosists do today. S.B. Penick & Co. was once the world’s largest botanical drug manufacturer. Their challenges associated with patenting plant-based drugs led to the dwindling and eventual sale of the firm.⁶ The botanical science traditions in academia reflected a similar pattern. The textbooks utilized in the early twentieth century, such as *A Textbook of Botany and Pharmacognosy* by Henry Kraemer focused on the taxonomy, morphology, histology, and individual plant segments used as drugs.⁷ Scholarly texts scarcely placed importance on the botanical chemistry and medicinal-therapy benefits.⁸ This lack of emphasis on plant chemical compounds further undermined the legitimacy of pharmacognosy, and served to advance the status of pharmaceuticals manufactured from synthetic chemicals. These trends also held ramifications for competition over research funds in academia. Since many federal and proprietary grant review boards were dominated by chemists that were uneducated in medicinal plant based sciences, the pharmacognosists were at an extreme disadvantage in obtaining funds for research based on the chemistry of active plant-based constituents.⁹

While the majority of the first-half of the twentieth century marked

continued on page 26



The image is the title page of *Grundriss der Pharmacognosie* by Heinrich August Ludwig Wiggers (1803-1880), published in Göttingen by Vandenhoeck und Ruprecht, 1847. The volume is among the oldest held by the Lloyd Library referring to the term ‘pharmacognosy.’

The five syllables that compose the term “pharmacognosy” are planted, germinated, and rooted in the most ancient medicinal and scientific traditions across the globe.

“Pharmacognosy,” What is in a Name?

continued from page 25

the zenith and regression of pharmacognosy in the United States, the beginning of the 1960's infused new vigor and energy in the field.¹⁰ The American Society of Pharmacognosy grew out of the Plant Science Seminar series, and Chairman Dr. Herber W. Youngken Sr. wrote in 1928 that the objective of this Seminar included “...stimulation of research in connection with pharmacognosy and plant chemistry.” The idea to create the ASP was floated at the 1958 Plant Science Seminar in Big Rapids, Michigan, and Chairman Arthur Schwarting led the reorganization of the Seminar to be called the American Society of Pharmacognosists.¹¹ No explanation is provided in the ASP history book as to why Dr. Schwarting selected this name or if it was selected by a committee.

The establishment of the ASP officially in 1959 demonstrated revitalization and a resigned commitment among the scientists to utilize the term—pharmacognosy, rebelling against the designation of “pharmaceutical biology.” These chemists challenged the status quo. Dr. Schwarting was at the forefront of this movement, who advocated that plant drugs should be classified on a chemical compound basis. Dr. Schwarting's editorial expertise in the ASP's journal, *Lloydia* (now *Journal of Natural Products*) gave voice to the impressive scientific research conducted by pharmacognosists.¹² During these shifting years, the National Cancer Institute instigated their research program of plant analysis for potential cancer drugs, in which innovative scientists made an indelible impact on the field.¹³

The historical record is sketchy as to the debate sur-

rounding the inclusion of the term ‘pharmacognosy’ in the newly organized Plant Science Seminar. Cragg, Buetler, and Jones' seminal volume about the history of the ASP described, “At the Seminar's business meeting at UIC on August 10, 1959, after much discussion and some revision, the Constitution and By-Laws organizing the American Society of Pharmacognosy (ASP) were unanimously approved.”¹⁴ The records of the discussion would be most fascinating for today's ASP membership in understanding the origins that shaped the ASP name. The ASP considered a name change in 2004-05 to the “American Society for Natural Products.” Four senior ASP members anonymously drafted “For” and “Against” platforms published in the winter 2004 edition of the *ASP Newsletter*. The “For” case centered on the claim, that a name change would reflect the broad group of scientist members. The “Against” reasoning focused on the all-inclusiveness of the term “pharmacognosy” which led to the successful growth of the membership. A vote was taken to contemplate a name change that did not pass.

Today, under any name, the ASP scientists shape crucial trends in a wide variety of subject matters. For example, members make vital contributions to the study of herb and pharmaceutical interactions. They are the champions of the environmental movement in heralding the ominous effects of biodiversity loss upon the planet. The ASP scientists are the global guardians, calling for sustainable sources of plant and animal products, while diligently conducting scientific research to bring new medicinal drugs for the betterment of humanity ■

¹ Blumenthal, M. The Green Paradox: Pharmacognosy Declines While Herb Interest Rises. *Whole Foods*. **1991**. Varro E. “Tip” Tyler Papers, Box 82, Folder 1, Lloyd Library and Museum, Cincinnati, OH.

² American Society of Pharmacognosy website, 2011, <http://www.pharmacognosy.us/what-is-pharmacognosy/>

³ Blumenthal, M. The Green Paradox: Pharmacognosy Declines While Herb Interest Rises. *Whole Foods*. **1991**.;

Cordell, G. A. Pharmacognosy – New Roots For An Old Science, **1992**, Draft. Varro E. “Tip” Tyler Papers, Box 82, Folder 1, Lloyd Library and Museum, Cincinnati, OH.

⁴ Cordell, 1992.

⁵ Tyler, V. E. Milestones of Pharmaceutical Botany, 1900-1962, Symposium on Milestones of Pharmaceutical Botany, American Institute of the History of Pharmacy. **1995**, Orlando, FL. Varro E. “Tip” Tyler Papers, Box 15, Folder 12, Lloyd Library and Museum, Cincinnati, OH.

⁶ Tyler, V. E. “Milestones of Pharmaceutical Botany, 1900-1962,” **1995**.

⁷ Kraemer, H. *A textbook of botany and pharmacognosy, intended for the use of students of pharmacy, as a reference book for pharmacists, and as a handbook for food and drug analysts*. Philadelphia: J. B. Lippincott, 1910.; Kraemer, H. “Rise and Development of Pharmacognosy”, Historical and Industrial Sections, *The Pharmaceutical Era*. **1912**. Varro E. “Tip” Tyler Papers, Box 81, Folder 17, Lloyd Library and Museum, Cincinnati, OH.

⁸ Tyler, V. E. “Lynn Robert Brady – A Tribute by Varro E. Tyler – his friend”, **2000**, American Society of Pharmacognosy, Seattle, WA. Varro E. “Tip” Tyler Papers, Box 26, Folder 4, Lloyd Library and Museum, Cincinnati, OH.

⁹ Tyler, “Milestones of Pharmaceutical Botany, 1900-1962”, 1995.

¹⁰ Mercer, Frank L. Letter to Lynn R. Brady, 1959. Varro E. “Tip” Tyler Papers, Box 35, Folder 4, Lloyd Library and Museum, Cincinnati, OH. **11** Cragg, G., Beutler, J.A., and Jones, W.P. Eds., *The American Society of Pharmacognosy 50 Years of Progress in Natural Products Research 1959-2009*. Madison: Omnipress, **2009**.

¹² Crane, F. A. General letter to the membership of the American Society of Pharmacognosy, 1960, Chicago, IL. Varro E. “Tip” Tyler Papers, Box 35, Folder 5, Lloyd Library and Museum, Cincinnati, OH.;

Tyler, “Milestones of Pharmaceutical Botany, 1900-1962”, **1995**.

¹³ Cordell, **1992**.

¹⁴ Cragg, Beutler, Jones. **2009**.

American Society of Pharmacognosy Collection (1953-2010), Box 2, Folder 3, Lloyd Library and Museum, Cincinnati, OH.

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Current membership dues and Journal of Natural Products subscription rates can be found at www.pharmacognosy.us.

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

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Honorary members are selected by the Executive Committee of the American Society of Pharmacognosy on the basis of meritorious service to pharmacognosy.

Present Honorary Members are:

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Dr. Gordon C. Cragg, National Institutes of Health · Dr. Harry H.S. Fong, University of Illinois at Chicago

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Additional information about membership may be obtained by writing to the Treasurer of the Society:

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