The American Society of Pharmacognosy

Discovering Nature's Molecular Potential

The ASP Newsletter: Volume 54, Issue 2

ASP Annual Meeting: Riding High in Kentucky

Historic buildings in downtown Lexington

By Drs. Jurgen Rohr and Joe Chappell

The 2018 ASP Annual Meeting, **Natural Products Riding High**, will take place in Lexington, KY from July 21-25. Dr. Jurgen Rohr and his organizing committee have worked hard to assemble the final program (asp2018.pharmacognosy.us/wp-content/uploads/2018/06/2018_06-12_Program.pdf) They sent out all the necessary paperwork for participants from around the globe to secure their travel VISAs, made final arrangements for enjoying the hospitality and beauty of the Bluegrass region, and orga-

Story continued on page 3

IN THIS ISSUE: SUMMER 2018

Editor's Corner	2	Lloyd Library Rolls out New Website	12	Pharmacognosy Field Notes: Diving Together to Combat TB in Vietnam	20
ASP Election Results: High Offices, Low Turnouts	3	Hot Topics in Pharmacognosy: Looking for Novel Antibiotics?	14	Conference Calendar	22
The ASP Welcomes Three New Fellows	5	Meet a New ASP Member	18	Brief News from Washington	23
In Memoriam: Jerrold Meinwald	8	ASP Privacy Policy Updated	18	From the Archives: A History of Natural Pharmaceuticals	25
Awards from the *Journal of Natural Products*	10	New Members of ASP 2018	19		

EDITOR'S CORNER

The ASP Annual Meeting in Lexington, Kentucky is just a month away, and in this issue the organizers provide us with some final details about the event. The meeting has significantly evolved over the past year, and organizers have been thoughtful in their approach to be more inclusive, especially with regards to ensuring that there are significant numbers of invited talks by female ASP members. In addition, the organizers have created a special workshop that discusses issues of gender inequality. I hope that many members of the ASP will be able to join us in Lexington for this year's meeting. Additional information about the meeting can be found at asp2018.pharmacognosy.us/.

As a part of the ASP Meeting, members have the opportunity to attend a special event at the Lloyd Library & Museum to celebrate the opening of their new special exhibit, *Phar'-ma-cog-no-sy Illustrated: A History of Natural Pharmaceuticals*. A preview of this event can be found in Ms. Devhra BennettJones' article, "From the Archives." I hope many of you will have an opportunity to learn more about the history of our discipline. In addition, the Lloyd Library & Museum has launched a new website, and a separate article provides some details about the information available. The Lloyd Library & Museum has a long history with the ASP; the Society purchased the journal *Lloydia* from them to serve as a flagship publication, and this eventually became the *Journal of Natural Products*.

I was saddened to learn about the death of ASP Fellow, Dr. Jerry Meinwald. Although Dr. Meinwald did not attend many ASP meetings, I know his work impacted many ASP members, from his former colleague at Cornell, Dr. Jon Clardy, to his former students and postdocs, two of whom (Drs. Jim Gloer and John Cardellina) graciously agreed to write a heartfelt tribute to their former mentor.

One of my important jobs as editor of the *ASP Newsletter* is to be in touch with ASP members and leadership, typically by e-mail or in person at the ASP Annual Meeting. However, especially with some senior members of the ASP, I am delighted when I get a phone call. This was the case with Dr. Ramesh Pandey, a long-time member of the ASP and former CEO of Xechem, when he reached out to me this spring to tell me about his recent talk at FDA-CDER on botanical drug development. It was terrific catching up with him, since I have not seen him in many years. Just the other day, I received a rare US mail large envelop from ASP member emeritus Dr. Ara Der-Marderosian telling me about his work on the *Merck Manual* with regards to dietary supplements.

I hope all ASP members will be in touch with me regarding your professional achievements, and feel free to contact me by e-mail, post, or phone. I do hope to see many of you in person in Lexington.

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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ASP Annual Meeting: Riding High in Kentucky

continued from page 1

nized the oral and poster sessions to satisfy everyone's desire for the latest scientific breakthroughs.

The local organizing committee is also excited to have a terrific line-up of exhibitors coming to profile the latest equipment and technology for natural product chemistry and providing the tools and capabilities to advance your research beyond your wildest dreams. The exhibitors include: ACD/Labs, Advion, Alkemist, AnalytiCon, Biotage, Bruker BioSpin, Cambridge Isotope, Corteva, Gilson, JEOL USA, Mestrelab Research, SCIEX, Teledyne ISCO, Thieme, and Waters.

The meeting begins Saturday, July 21, with workshops designed to give participants first-hand experience with innovative informatic, drug discovery and analytic methods; or you might take in one of the workshops addressing important issues of inclusivity and professional development. Equally important, though, will be the evening's Grand Opening Reception, an event designed for you to meet new and old friends and to strike up relationships that will create lifetime professional networks.

More than 30 plenary talks by internationally acclaimed leaders in our community from more than 7 countries around the globe, more than 35 invited talks from submitted abstracts, and more than 300 scientific posters will certainly provide sufficient intellectual stimulation.

However, it will not be all work and no play. Given the recent excitement over the latest triple crown winner, Justify, you too will not want to miss learning the ropes of horse racing at our evening banquet at the world famous Keeneland Racetrack. You never know, a $2 bet could make you a big winner, too! You will also have an opportunity to join a Horse Farm and Distillery Tour or join the fun of the Young Members Event at Buffalo Trace Distillery.

We look forward to welcoming everyone to the ASP 2018 Annual Meeting in a few short weeks! ■

The meeting begins Saturday, July 21, with workshops designed to give participants first-hand experience with innovative informatic, drug discovery and analytic methods; or you might take in one of the workshops addressing important issues of inclusivity and professional development.

ASP Election Results: High Offices, Low Turnouts

By Dr. Nick Oberlies

The ASP is pleased to announce that Drs. Barry O'Keefe, Melany Puglisi-Weening, and Sandra Loesgen are the new incoming officers for the Society. Dr. O'Keefe will be assuming the role of vice president for 2018-2019, and will then take the role of ASP president in 2019-2020. The current vice president, Dr. Susan Mooberry, will begin her one-year term as ASP president in July.

Dr. Puglisi-Weening has been elected to a three-year term on the ASP Executive Committee, serving her second consecutive term. Dr. Loesgen is assuming a new role on the ASP Executive Committee, which was recently created via updates to the ASP Constitution, where she will be a Younger Member Representative to the Executive Committee.

The ASP Executive Committee congratulates the winners and sincerely thanks all of those who agreed to run for office.

For the past two ASP elections, just over 40% of the membership voted. As a point of reference, in the United States, somewhere between 52% and 62% of eligible voters cast ballots in presidential elections. The ASP Executive Committee continues to strive to get more members to cast ballots. ASP has tried notifying members about elections via mass emails and multiple reminders. Yet, the needle does not move very much. If you have suggestions on ways to improve the process, please contact me. ■

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The ASP Welcomes Three New Fellows

By Ms.Vanessa Nepomuceno

Left: Dr. Alice Clark/Photo by Robert Jordan
Dr. Jim McAlpine/Photo by Anne McAlpine
Dr. Amy Wright/Photo by Brian Cousin

The ASP would like to congratulate and celebrate the addition of three new ASP fellows: Drs. Alice Clark, Jim McAlpine, and Amy Wright. Being selected as an ASP Fellow is one of the highest honors that the ASP can bestow upon a research scientist in the field of pharmacognosy. The fellows are distinguished by their extensive accomplishments and contributions to the field of pharmacognosy. Their role is to help advance natural product sciences by advising on science and professional matters within the ASP and serving as global advocates for our society.

ASP President Dr. Cedric Pearce observes that "the breadth of pharmacognosy as a discipline, and the depth of the society in general, is reflected in this year's nominations for Fellows of the ASP; all are well known contributors to the Society, engaging scientists and deserving nominees – in short, truly outstanding individuals. Each is an expert in their own branch of natural products science." ASP Fellow Chair Dr. Jon Clardy regards the three fellows as representing three different aspects of modern science: discovery (Dr. Wright), development (Dr. McAlpine), and administration/outreach (Dr. Clark).

DR. ALICE CLARK: UNIVERSITY OF MISSISSIPPI

Dr. Alice Clark is the Interim Vice Chancellor for University Relations and an FAP Barnard Distinguished Professor of Pharmacognosy at the University of Mississippi. She also holds a faculty appointment in the School of Pharmacy. Dr. Clark received her BS in Microbiology from Troy State University and her MS as well as her PhD in Pharmacognosy from the University of Mississippi. The focus of her research has been novel antifungal drug lead discovery and development. Her successes are extensive; she has amassed over 100 publications, including the discovery of potent antifungal sampangines. She, along with her late husband and ASP member Dr. Charles Hufford, held one of the longest continually funded antifungal research programs in NIH history.

Dr. Clardy told the *Newsletter* that in addition to a distinguished research career, Dr. Clark has taken on important administrative positions in which she greatly strengthened federal support for natural products and is currently addressing broader issues of the scientific workforce and communicating science to the public.

Dr. Pearce applauds Dr. Clark, stating, "Dr. Alice Clark has enjoyed a highly distinguished career at the University of Mississippi and, often together with the late Dr. Charlie Hufford, published widely on anti-infective and other natural products. Alice was also the first female president of the ASP."

Dr. Clark remarks that the ASP had great influence on her professional life. "Throughout my career, I have observed that the ASP is truly distinctive among professional societies, set apart by the generosity of its membership. For more than 40 years I witnessed and benefitted from that generosity and support." Dr. Clark also told the *Newsletter*, "I am deeply honored to be named an ASP Fellow. I share this and all other successes with my late husband and longtime collaborator, Charles D. Hufford. He was a gifted and patient mentor who introduced me to the ASP, and we shared a deep and abiding commitment to it throughout our life together. It is humbling to be selected among such an outstanding group of creative and dedicated scientists."

DR. JIM MCALPINE: UNIVERSITY OF ILLINOIS AT CHICAGO

Dr. James "Jim" McAlpine obtained a PhD from the University of New England in New South Wales, Australia. He performed postdoctoral work at Northwestern University Medical School and became an assistant professor there, studying the biosynthesis and mode of action of macrolide antibiotics. In 1972, he joined Abbott Laboratories and worked to develop macrolides, aminoglycosides, and quinolone antibiotics. Dr. McAlpine served as Vice President of

continued on page 6

Being selected as an ASP Fellow is one of the highest honors that the ASP can bestow upon a research scientist in the field of pharmacognosy.

"All these candidates clearly are highly meritorious and, with superior achievements, easily qualify as Fellows; it makes me very happy that they were selected during my year as president."

continued from page 5

Chemistry at Phytera Inc., focusing on anti-infectives from manipulated plant cell suspension cultures and marine-derived actinomyces. He also served as Vice President of Chemistry and Discovery at Ecopia Biosciences Inc. His input into the field of natural products discovery has been abundant, including the discovery of several compounds such as tiacumicin B, authorship or co-authorship on numerous papers, and as an inventor on 50 US patents. Since 2011, he has served as Adjunct Professor at the University of Illinois at Chicago.

President Pearce explains, "Jim McAlpine, an organic chemist by training, was involved with: the development of antibiotics at Abbott Laboratories; a number of significant discoveries; and Phytera and Ecopia Biosciences, the latter being one of the early companies adopting applications of molecular biology in the discovery of new drug leads from microbes."

"Jim has promoted natural products in many contexts: large pharmaceutical companies, biotech startups, and universities," Dr. Clardy commends. "He has also worked unstintingly for the ASP, most recently as treasurer."

Dr. McAlpine served as the ASP president from 2004-2005 and still contributes to the ASP as treasurer and a member of the publicity and publications committee. Dr. McAlpine states, "Norm Farnsworth had, for some years, advocated the institution of ASP Fellows, but this came into being during my presidency of ASP, when we initiated the change to the Constitution to establish this honor and induct all previous Norman R. Farnsworth Research Achievement Awardees as the first group of Fellows. Little did I think that I would be so honored as to join this group. Needless to say, I am ecstatic."

DR. AMY WRIGHT: FLORIDA ATLANTIC UNIVERSITY

Dr. Amy Wright received her doctorate in organic chemistry from the University of California Riverside and is currently the Director for the Center of Excellence in Biomedical and Marine Biotechnology and the Principal Investigator of the Natural Products Chemistry Group at the Harbor Branch Oceanographic Institute of Florida Atlantic University. Dr. Wright's research primarily focuses on the discovery of anti-cancer agents, but she maintains active collaborations with partner laboratories to identify marine natural products useful against several other diseases. Dr. Wright, a National Academy of Inventors Fellow, has conducted research for over 30 years and is well published, including the inventor on 29 US patents.

Dr. Clardy praised Dr. Wright's long and fruitful career. "Amy has been a mainstay of marine natural products research since her PhD research. She has collected, characterized, and helped develop some of the most complex and useful marine natural products and has also been a leader in the use of submersibles for field collections." Furthermore, Dr. Wright has been a faithful contributor to the ASP in many ways. According to President Pearce, "Amy has been an active member of the Society and involved with a number of committees, including being current chairperson for the Beal/Schwarting award selection committee."

When asked about becoming an ASP Fellow, Dr. Wright told the *Newsletter,* "I am extremely honored to have been selected as a Fellow of the American Society of Pharmacognosy. As a Fellow I hope to contribute to the ASP's mission of educating people about the significant role natural products play as medicines, supplements, agricultural and other commercial products and the importance of conserving natural habitats as reservoirs of biological and chemical diversity

It is worth noting the addition of two female members to the board. With recent concerns about gender inclusivity, ASP is working toward more representation of female members in different roles in the Society. Fellow Chair Clardy states, "In addition to the impressive individual accomplishments represented by this year's new Fellows, they collectively address our longstanding failure to fully recognize the contributions of women to the ASP and more generally in the field of natural products."

President Pearce congratulates the three new ASP Fellows, along with many thanks for their past and continuing efforts in supporting numerous ASP initiatives. "All these candidates clearly are highly meritorious and, with superior achievements, easily qualify as Fellows; it makes me very happy that they were selected during my year as president." ■

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In Memoriam: Jerrold Meinwald

By Drs. John H. Cardellina II and James B. Gloer

ASP Fellow Dr. Jerrold Meinwald, Goldwin Smith Professor Emeritus of Chemistry and Chemical Biology at Cornell University, passed away on April 23, 2018, at the age of 91 in Ithaca, New York. He leaves an indelible mark on organic chemistry and the hundreds of students, postdocs, and collaborating scientists who worked with him over his more than 65 year career at Cornell.

Born and raised in New York City, Dr. Meinwald attended Brooklyn College and Queens College before being drawn into service in the US Navy in the last year of World War II. He ultimately earned baccalaureate degrees in philosophy (1947) and chemistry (1948) from the University of Chicago before heading to Harvard University, where he earned MS (1950) and PhD (1952) degrees under the mentorship of Robert B. Woodward. Immediately after receipt of his PhD, he joined the faculty at Cornell and launched his illustrious and productive career.

Dr. Jerrold Meinwald/Photo by Cornell University

Like his mentor and most organic chemists in the 1950s, Dr. Meinwald was interested in both the synthesis and structure elucidation of natural products. For much of his career, this was the primary work of his group. One of his early projects was an effort to identify the constituents of catnip (*Nepeta cataria* L., Lamiaceae). He successfully identified nepetalactone, a component of the essential oil of catnip, as a major "bioactive" agent in stimulating cats' play, but then learned a lesson about bioassays. He was giving a seminar on his catnip work and someone in the audience had brought in a cat to test this catnip compound; the feline guest proved to be unaffected by nepetalactone or catnip. It turns out that about one third of all domestic cats are "immune" to the lure of catnip, although many wild cat species are subject to its effects. A debate has continued for decades about whether this trait is Mendelian or not.

He leaves an indelible mark on organic chemistry and the hundreds of students, postdocs, and collaborating scientists who worked with him over his more than 65 year career at Cornell.

Shortly thereafter, Dr. Meinwald met entomologist and ecologist Dr. Thomas Eisner (1929-2011), who had just joined the Cornell faculty. They forged an extraordinary collaboration that established the field of chemical ecology, the science dealing with the ways that organisms of different species (animal, plant, and microorganism) interact or communicate chemically. Dr. Eisner identified organisms, most often insects or arthropods, that attracted others (e.g., for mating) or repelled predators or rivals for food; Dr. Meinwald provided the chemistry expertise to isolate and identify the compounds causing the effects. Their half a century of pioneering, collaborative work helped immensely in developing our understanding of how different organisms employ chemistry for communication or defense. Examples often highlighted include cases where insects exploit chemistry in the environment to aid in their survival by concentrating bioactive chemicals from their diets and utilizing them for defense against predation. A further outgrowth of this collaboration was that Professor Meinwald was a founding research director of the International Centre of Insect Physiology and Ecology in Nairobi, Kenya.

However important this collaborative work was, it was hardly the only project in the Meinwald laboratory. "When I arrived as a newly anointed postdoc in 1979, I found an incredibly diverse array of projects in the lab," said Dr. John Cardellina. "There was a substantial commitment to chemical communication work with the Eisner team. However, there was an equally large group of us working on: the synthesis of pederin, a highly irritating and cytotoxic compound isolated from a beetle, which likely obtained it from its diet; some marine chemical communication work that was in its final stages; and work by one person on organic semiconductors—highly conjugated, thiophene-laden molecules that bore no resemblance to any natural product or anything else in the group."

Dr. Cardellina continued, "One of the great things about working in the Meinwald group was that Jerry encouraged us all to be as curious about different aspects of chemistry as he was, and he backed that up by supporting proposals that we presented to him for new initiatives. In my case, I had read an article on a synthe-

continued on page 9

In Memoriam: Jerrold Meinwald

continued from page 8

sis of a putative alkaloid from wild cranberry plants; the synthesis showed that the proposed structure was wrong. When I looked at the data available, I had a pretty good hypothesis about what the likely structure was. I went to Professor Meinwald and laid out the background story and my idea; he approved and supported a trip to Ocean Spray in Massachusetts to acquire some berries and leaves to permit a search for the mystery compound. That trip and effort imbued me with an interest in Native American medicinal plants that broadened my scientific horizon and career considerably."

Professor Meinwald's extraordinary career resulted in over 400 publications and numerous awards. He was elected to the National Academy of Sciences (1969) and the American Academy of Arts and Sciences (1970). He was awarded the Grand Prix of la Maison de la Chimie (2008), the Benjamin Franklin Medal in Chemistry (2013), and the Nakanishi Prize from the Chemical Society of Japan (2014). Also in 2014, President Obama bestowed upon him the National Medal of Science, the nation's highest honor for achievement in science and engineering. Shortly thereafter, Professor Meinwald was elected a Fellow of the American Society of Pharmacognosy. Many of the researchers he mentored went on to have important research careers in academia and industry.

Professor Meinwald was in great demand as a speaker at conferences and institutions worldwide and served as a champion of natural products chemistry, with an inspiring talent as a storyteller who conveyed the beauty of nature and the importance of chemistry in natural interactions. His gifts also extended to music, as he was an accomplished flutist who was known to accompany speaking visits with musical performances. Notably, his 50-year collaboration with Professor Eisner was also musical in nature, as they often played music together.

Dr. Jerrold Meinwald/Photo by Cornell University

Dr. Cardellina reflected on his postdoctoral advisor, "I will always think of Jerry as an old-school gentleman of science, but blessed with a broad education and view of the world. He was quiet, dignified, and unruffled by almost anything, yet his boundless enthusiasm for chemistry poured out of him in every conversation we ever had. I could not have found a better postdoctoral relationship, one that continues to inspire me even now."

The Chair of the ASP Fellows, Dr. Jon Clardy, was his longtime colleague at Cornell, and noted that Dr. Meinwald was incredibly generous with his praise. "For example, Jerry and I used to ride the elevator to our offices on the fifth floor of the S. T. Olin Research Building after the weekly organic seminar, and on those rides, Jerry would always have something complimentary to say about the seminar. After one especially dismal seminar with no redeeming features, I looked at Jerry expectantly as our ride began, and he smiled and said that the speaker had 'lovely hair.'"

Dr. Jim Gloer is similarly effusive in his praise for Professor Meinwald, for many of the same reasons. "I had the good fortune to work with Jerry as a postdoc. It was a great opportunity and I could not have had a better role model. My experience in his group strongly influenced my perspective on how an academic lab should operate, and colored my career path in many positive ways—not only in encouraging me to enter academia, but also in helping me to formulate general directions and principles that I wanted to follow in my own research program."

As was the case during Dr. Cardellina's time there, Dr. Gloer recalled that the group was involved in a wide array of different projects, often with little or no overlap among them, but camaraderie was still very strong. "Jerry always offered encouragement, good humor, and a genuine, easy smile no matter what sort of results we came up with. He was old-school in a lot of positive ways, but he was also a forward thinker who understood the importance of interdisciplinary collaborations long before they were fashionable—he was always willing to try to help anyone who came to him with a need for chemistry expertise."

"One of the great things about working in the Meinwald group was that Jerry encouraged us all to be as curious about different aspects of chemistry as he was, and he backed that up by supporting proposals that we presented to him for new initiatives."

Dr. Gloer went on to note that "I benefitted personally from his generosity in that sense, as I got to work on no less than four highly diverse projects during my time in his lab, each involving collaboration with a different biology group from a different institution. Yes, one project did, not surprisingly, focus on moth pheromones, but others included exploration of synthetic approaches to optically active anesthetics, efforts to identify chemoattractants produced by schistosomes, and studies of a host-selective toxin produced by a plant-pathogenic fungus. The latter was only a minor side-project he had taken on, but ultimately proved to be a catalyst that led to the main focus of my own academic career."

Professor Meinwald is survived by his wife, Charlotte, and three daughters, Constance, Pamela, and Julia. He will be missed and long appreciated by all who knew him. ■

Awards for Best Papers in the *Journal of Natural Products*

By Drs. Edward Kennelly and A. Douglas Kinghorn

The American Society of Pharmacognosy has announced the winners of the two highest awards for publications in the *Journal of Natural Products*. The 2018 Arthur E. Schwarting Award went to Professor Sang Kook Lee and his collaborators at Seoul National University, while the Jack L. Beal Award went to Professor Chambers C. Hughes and his collaborator at Scripps Institution of Oceanography.

Prof. Sang Kook Lee and his collaborators at Seoul National University in South Korea

"I'd like to extend my congratulations to both Professors Sang Kook Lee and Chambers C. Hughes and their collaborators on this fine achievement, and to thank them for submitting their data for publication in the Society's journal," stated ASP President Cedric Pearce. "Also thanks go to the selection committee; I know that they had a difficult task with a number of highly regarded *J. Nat. Prod.* manuscripts, from which they had to choose the awardees."

These awards were established by the ASP in 2001 and are named in honor of two former distinguished editors of the *J. Nat. Prod.* The Schwarting Award is open to all papers published in the journal within a given year. The Beal Award is awarded to younger investigators. A two-tier process was used to determine the winners of the best papers published in *J. Nat. Prod.* in 2017, with editors Daneel Ferreira, A. Douglas Kinghorn, Cedric J. Pearce, Philip J. Proteau, and Steven M. Swanson having nominated two papers each for the Schwarting Award and one each for the Beal Award. ASP President Cedric Pearce then appointed an ad hoc committee [Drs. Amy E. Wright (Harbor Branch Oceanographic Institution, Florida Atlantic University), Chair; Chun-Tao Che (University of Illinois at Chicago); and Mark T. Hamann (Medical University of South Carolina)] to make the final selections.

Dr. Lee noted it was wonderful news for him and his coauthors to be recognized in this way, and he was "humbled and honored to receive this prestigious award from the premier society in the field of natural products research."

Dr. Lee's paper examined the medicinal plant *Harpagophytum procumbens* var. *sublobatum* (devil's claw) with regards to the bioactive components and the underlying mechanisms related to its anti-osteoporotic effects. They identified the compound harpagoside as a major bioactive compound with a potential anti-osteoporotic activity through the detailed elucidation of the precise regulation of bone formation and resorption.

continued on page 11

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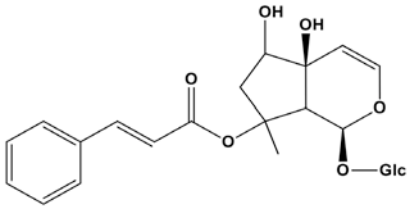
***Harpagophytum procumbens* var. *sublobatum* (devil's claw)**



Harpagoside/Photo by Hwa-Jin Chung

Prof. Chambers C. Hughes and his group at Badwater Basin, the lowest point in North America, Death Valley, California

Dr. Hughes was honored to receive the Beal Award. "It means a lot that my peers consider this article noteworthy. We really appreciate this distinction."

Their paper applied a new method for the discovery of electrophilic natural products to a number of extracts, and

continued from page 10

they noticed that ammosamide C from *Streptomyces* sp. CNR-698 was labeled. Ammosamide C is a minor metabolite previously discovered in the extract that contains an iminium functionality. They observed that a solution of the ammosamide C-thiol probe adduct turned bright blue, which they knew was a salient characteristic of ammosamide A. Finally, they showed that ammosamides can be made by simply adding the appropriate nucleophile to purified ammosamide C, cysteine in the case of ammosamide A, water in the case of ammosamide B, and various amines for the others. Ammosamide E forms when you expose ammosamide B to light and air. So, all of the ammosamides are essentially artifacts derived from ammosamide C that form during cultivation of the bacterium.

These awards will be presented in person at the closing banquet of the 2018 Annual Meeting in Lexington, Kentucky on July 25. ASP congratulates all of the awardees. ■

Streptomyces sp. CNR-698

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Lloyd Library Rolls out New Website

By Ms. Patricia M. Van Skaik

The Lloyd Library and Museum recently released a new website, www.lloydlibrary.org. It stems from the Lloyd's mission of advocating "for education in plant-based science, medicine, conservation, art and history," and providing "resources to engage visitors and researchers from the community and around the globe." Offering easier access to library resources was a crucial part of the redesign. Additionally, the new website meets current technology and web design standards.

Behind the scenes, the Lloyd Library team developed content and site maps that are more intuitive and easy to navigate in both mobile and desktop platforms. With cleaner pages and multiple navigation points, the website easily connects the viewer with the library's resources, as well as exhibit and events information.

Response to the new website has been immediate, positive and worldwide. Analytics show that since January, over 14,000 visitors from 67 countries, representing six continents, have viewed the website. The highest viewership has come from the United States, Canada, the United Kingdom, China and Korea, with those from the United States, Canada, the United Kingdom and France spending the most time once they landed on the site. In the US, top states represented included Ohio as well as Texas, New York and Massachusetts. The average researcher viewed three pages and stayed for more than six minutes.

The new website is a **gateway to the library's research tools**, complete with descriptions of collections, aids to manuscript collections, access to the catalog, research guidelines and forms, and contact information for remote users. The library catalog is available from every screen. Clicking on the "Resources" tab takes researchers directly to fuller descriptions of Lloyd's collections. ASP researchers can locate inventories and guides for the *American Society of Pharmacognosy Archives* and Eclectic medicine, as well as for the papers of Varro E. Tyler and John Thomas Lloyd. The next finding aid scheduled to go live is the first series of the *Norman R. Farnsworth Collection*, the American Society of Pharmacognosy papers.

Digital collections are a growing part of the Lloyd Library's website. The *American Society of Pharmacognosy Newsletters* are available from 1964-present. The Lloyd is also digitizing significant works from our collection in collaboration with the Public Library of Cincinnati and Hamilton County, and making them available through the Lloyd website. Many of these works have also been loaded onto the Biodiversity Heritage Library (www.biodiversitylibrary.org), a free online resource designed to "improve research methodology by collaboratively making biodiversity literature openly available to the world as part of a global biodiversity community." The Lloyd's digital resources will soon

continued on page 13

It stems from the Lloyd's mission of advocating "for education in plant-based science, medicine, conservation, art and history," and providing "resources to engage visitors and researchers from the community and around the globe."

Lloyd Library Rolls out New Website

continued from page 12

be available on a third platform, the Digital Public Library of America (DPLA), as the library recently signed an agreement with DPLA to harvest its digital resources at no cost to the Lloyd, providing even wider reach.

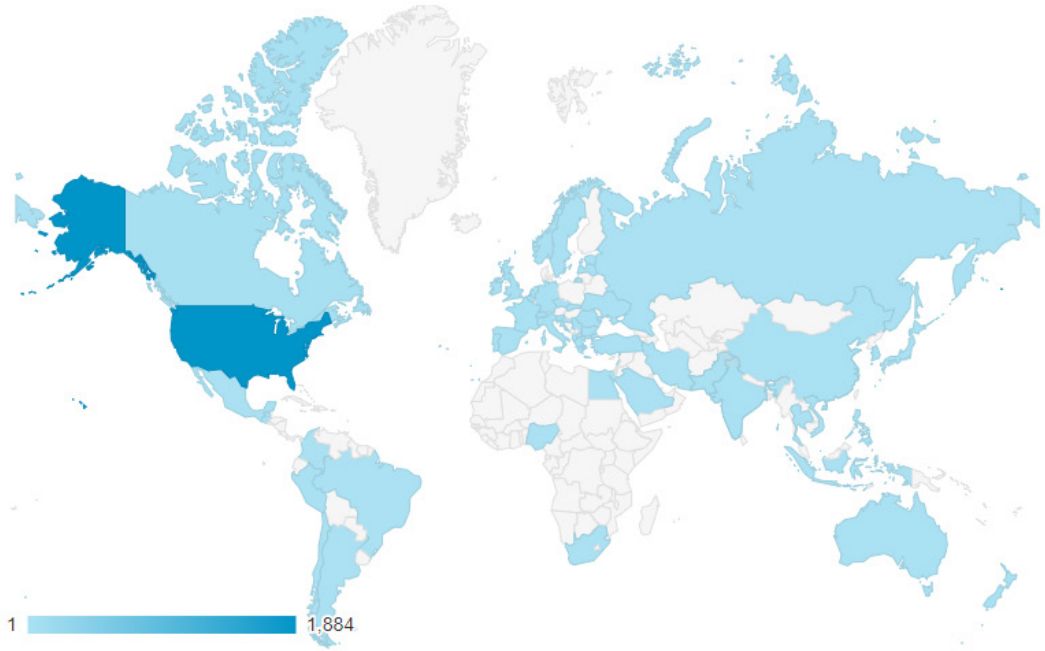
Digital exhibitions round out access to resources. Through the Lloyd's website, visitors can view selections from exhibitions and, coming soon, page through entire works of books that are under glass and on display.

The latest information on the Lloyd's **Curtis Gates Lloyd Fellowship Program** is available on the new site, including the recent recipients and their projects. ASP members are invited to help spread the word and encourage potential candidates to apply for the 2019 class. Applications will be available on the website prior to the ASP conference, where prospective fellows can upload their applications directly from the site.

There is a lot happening at the Lloyd Library and Museum. Rotating banners, press releases and an up-to-date calendar provide the latest information. Notice that the Library is closed on July 26 for a special event, the **ASP Annual Meeting Excursion to the Cincinnati**, where Drs. Mansukh Wani and Nick Oberlies will present a program about their research at the National Cancer Institute. While here, participants can view the Lloyd's exhibition, *Phar'-ma-cog-nos-y Illustrated: A History of Natural Pharmaceuticals*, opening July 13. Curated by the Lloyd and ASP Archivist, Ms. Devhra BennettJones, it focuses on the Lloyd's collections, including: the papers of the Eclectic Medical Institute; the archives of scientist and pioneer, Norman Farnsworth; and medical illustrations. Space is limited and registration is through the ASP site, asp2018.pharmacognosy.us/registration/optional-tours-excursion/.

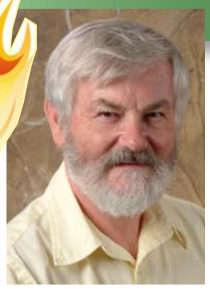
Follow the Lloyd on Facebook, Twitter and Instagram by clicking on the icons on every page of the website, and receive email newsletters by signing up on the www.lloydlibrary.org homepage. Interested in helping to support the Lloyd Library and its work? Donate to the Library by joining the Friends, www.lloydlibrary.org/friends. The Lloyd Library and Museum invites you to visit—in person and/or digitally–and looks forward to your comments and feedback. ■

Patricia M. Van Skaik is the Executive Director of the Lloyd Library. She has a passion for and extensive background in research services, special collections and library technology.



Response to the new website has been immediate, positive and worldwide. Analytics show that since January, over 14,000 visitors from 67 countries, representing six continents, have viewed the website.

Hot Topics in Pharmacognosy: So Where Does One Now Look for Novel Antibiotics?



By Dr. David Newman

If the reader wishes, they may certainly claim that I have been devoting a number of my recent columns to microbes of one "type" or another. To such a charge, I plead guilty.

The major reason is that we are living in a world where it is now becoming quite evident, that microbes, free-living, invertebrate- and vertebrate-related, are recognized as "micro-controllers" (to coin a phrase) that are capable of affecting and effecting significant changes in the way in which one might now look at their influence on other organisms.

To give just one example from humans, an article just published on line in *Nature Reviews: Microbiology* by Johnson and Foster[1] demonstrates how the human gut microbiota produce neurotransmitters, with some examples being:

Bacillus spp.: acetylcholine, dopamine and noradrenaline

Lactobacillus spp.: acetylcholine, dopamine, gamma-aminobutyric acid (GABA), histamine and serotonin

Bifidobacterium spp.: GABA

Enterococcus spp.: histamine and serotonin

Escherichia spp.: dopamine, noradrenaline and serotonin

Lactococcus spp.: dopamine, histamine and serotonin

Streptococcus spp.: dopamine, histamine and serotonin

Now these are generally considered to be of benefit to their host, but if you look at the genera listed, with the possible exception of *Lactobacillus* and *Lactococcus* (though vaginal examples may well produce toxins under specific conditions), all have "cousins" that are major sources of bacterial infections in humans.

However, the number of antibiotics, be they natural products, modified natural products or, as in the case of antifungal agents, predominately synthetic, approved worldwide over the last few years are relatively small in number; and there are now bacterial diseases found to be resistant to even the colicins, which can be considered the current antibiotic series of last resort. The first such report was by Liu et al. in 2016 identifying the MCR-1 plasmid originally from *E. coli* but also now reported in *K. pneumoniae* strains in China.[2] An up-to-date discussion is shown in the CDC URL[3] which can be consulted by interested readers, and there are other reports of death from resistant microbes including one report from *Morbidity and Mortality Weekly Report*[4] in 2017 where the microbe, a *K. pneumoniae* strain, was resistant to 26 antibiotics, including the colistins but here the MCR-1 plasmid was not found.

So where does this leave us? In general, major pharmaceutical houses are not particularly interested in antibiotic drug discovery due to the "perceived lack of Return on Investment (RoI)," when compared to the RoI from a lifestyle drug. It is possible that a major part of that perception may well be the requirement for large Phase III trials with hundreds of patients currently imposed by the FDA, which, as I mentioned in an earlier column, caused the then Schering-Plough to suspend further work at the Phase III level on the Gram +ve active polysaccharidic antibiotic Ziracin (SCH27899) "for business reasons" in the very early 2000s. Although both Sanofi and Roche are collaborating with Warp Drive Bio, one has yet to see "reports of products in the pipeline." Thus, one might ask the question, "Are there others working in this field that are academics or smaller companies in the EU and US, and using novel approaches?" Luckily, the answer is yes.

In the EU and the USA, the "CARB-X" private-public partnership has begun work and, as shown in a report by Mullard in *Nature Reviews Drug Discovery*[5] in late 2017 and expanded upon in the same issue by Theuretzbacher et al.[6], there are now agents targeted against Gram -ve microbes at levels ranging from hit to lead through to Phase I clinical trials, with a 4th generation tetracycline (TP-6076) and the oral penem sudopenem being those in Phase I. Funding has come from the Wellcome Trust and the Biomedical Advanced Research and Development Authority (BARDA) at the level of $455 million over five years to cover studies up through preclinical levels.

Are there academic groups (and their spin-offs), aside from those utilizing very large-scale genomic analyses of isolated microbes to identify nominal biosynthetic gene clusters related

continued on page 15

...we are living in a world where it is now becoming quite evident, that microbes, free-living, invertebrate– and vertebrate-related, are recognized as "micro-controllers" (to coin a phrase) that are capable of affecting and effecting significant changes in the way in which one might now look at their influence on other organisms.

However, the number of antibiotics, be they natural products, modified natural products or, as in the case of antifungal agents, predominately synthetic, approved worldwide over the last few years are relatively small in number; and there are now bacterial diseases found to be resistant to even the colicins, which can be considered the current antibiotic series of last resort.

continued from page 14

to potential antibiotic structures, working in this area? The answer is definitely yes. One group that decided not to follow this route is led by Sean Brady at the Rockefeller University. In 2014, the Brady group published an article on metagenomic discovery methods in *Current Opinion in Microbiology*.[7] In this paper they described the then current methods for using metagenomic studies to obtain information without isolation. Then in 2016, they demonstrated that parks in New York City were a prolific source on natural product biosynthetic diversity,[8] and demonstrated that they could find genes engaged in the biosyntheses of nonribosomal peptides and polyketides, which included a potentially novel calcium-dependent antibiotic (CDA).

This initial discovery of a CDA was followed up by the Brady group in a report in 2018, where they demonstrated the novel natural products, malacidins A and B (**1a, 1b**) following heterologous expression in *S. albus*.[9] These were dissimilar in structure to the known CDA lipopeptide daptomycins and did not contain the Ca-binding motif, ASP-X-ASP_GLY, but still required Ca^{2+} for activity against Gram +ve bacteria.

Using a different approach, this time using data from specific biosynthetic clusters and then using small peptide synthetic techniques, the Brady group reported[10] in 2018 further work from a discovery that they first reported in 2016.[11] In their 2016 report, they reported a process (working from metagenomic data) that they named "syn-BNP"s. This acronym stands for "Synthetic-Bioinformatic Natural Products." Syn-BNPs are not intended to be exact copies of the isolated NPs but are analogues that structurally resemble the original agent, thus, using the lexicon of Newman and Cragg, these would be "NDs." The base humimycin A structure came from a study of the human microbiome and, though not an antibiotic in its own right, it is in fact a "flippase" inhibitor that when co-administered with a β-lactam such as carbenicillin, can overcome to some extent, MRSA and *E. faecalis* (VRE resistant) microbes. When the Brady group modified the N-acylated 7-mer linear peptide (humimycin A, 1S, **2**) by systematically changing the amino acid sequence and "adjusting the N-acyl group," they developed humimycin 17S (**3**) that when co-administered with carbenicillin, inhibited the growth of highly resistant MRSA strains, including some that were also vancomycin resistant.[10]

A second series of compounds, but this time "descended" from studies from a bioinformatic analysis of nonribosomal peptide synthetase gene clusters, led to the "Syn-BNP-derived" paenimucillin A (**4a**) and B (**4b**).[12] Initially these were effectively only Gram +ve active, but by modification of the pair, paenimucillin C (**4c**) was synthesized and, using a rat open cutaneous wound model infected with the ESKAPE pathogen, *Acinetobacter baumannii* showed no reinfection after twice daily treatment.

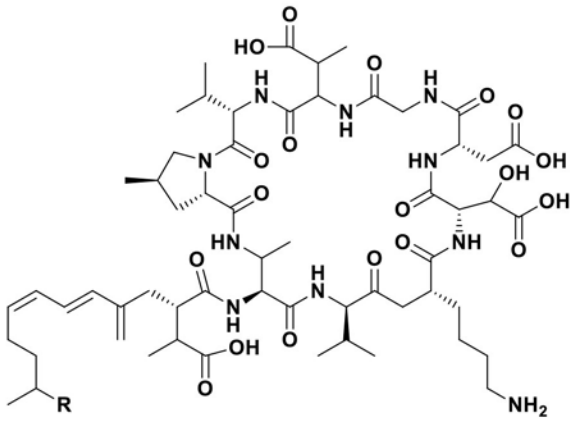
Other recent papers relating to efforts related to "unlocking Mother Nature's Treasure Chest" that should be of interest are the review article by Kenny and Balskus[13] in *Chemical Society Reviews* in 2018, where they discuss the chemical signals between microbes and their associated materials with an emphasis on plant-root related microbiota and the intestinal microbiota in animals (which is relevant to the opening paragraphs in this article). One cannot miss the papers from the excellent work performed by Pupo et al. in Brazil, working with Clardy[14,15] and the excellent work done on "organisms from odd places" by the Cichewicz group in Oklahoma.[16]

However, the other major recent discovery was the peptide (teixobactin; **5**) reported by the Lewis group in 2015[17] obtained from a previously unknown soil microbe obtained by variations on "baiting techniques" and the single cell fermentation systems used by "One Cell" and then by Diversa in the mid-1990s, then brought up to date using miniaturization systems and now known as the "iChip." As of early May 2018, the original paper has over 650 citations in the Scopus database, and has effectively generated "an industry" in synthesizing variations on the initial structure, including agents active both in vitro and in vivo against multiple resistant microbes.[18-20]

From inspection of these results it is obvious that academic groups and related operations (including biotech spin-offs) are actively producing novel leads to antibiotics in areas that are of definitive import. The $64,000 question however is, "Will big pharma realize what is happening?" In spite of the agreements with Warp Drive referred to earlier, it will probably require a major change in their thought processes with respect to RoI, or alternatively, be forced into it by government action in some countries. ■

In general, major pharmaceutical houses are not particularly interested in antibiotic drug discovery due to the "perceived lack of Return on Investment (RoI)," when compared to the RoI from a lifestyle drug.

Structures



1a. Malacidin A; R = CH_3
1b. Malacidin B; R = CH_2CH_3

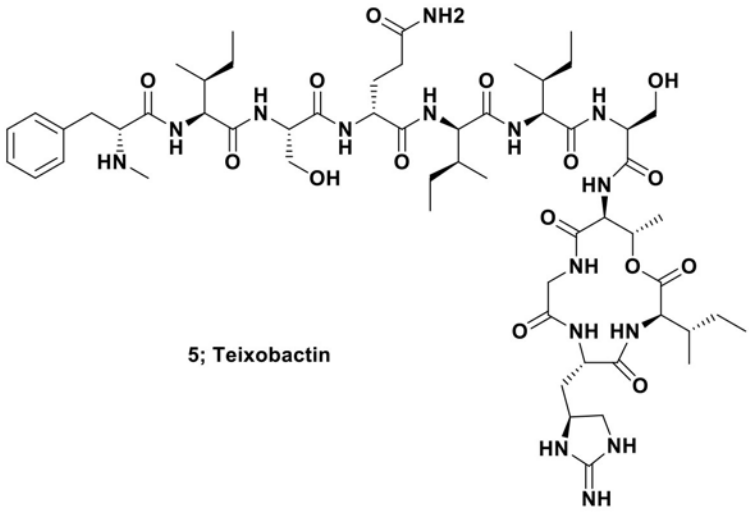
2; Humimycin A (1S) C_{14}3-OH-CO--HN-Tyr-Ser-d-Tyr-Phe-D-Thr-Val-Val-CO_2H

3; Humimycin A variant (17S) C_{14}3-OH-CO-HN-Trp-Ser-d-Trp-Trp-d-Thr-Val-Val-CO_2H

4a; Paenimucillin A (IF) Decanoyl-HN-d-Phe-d-Orn-d-Ile-d-Ser-d-Phe-Ser-Ser-d-Orn-Phe-Ser-Val-d-Ile-Orn-CO_2H

4b; Paenimucillin B (IW) Decanoyl-HN-d-Phe-d-Orn-d-Ile-d-Ser-d-Trp-Ser-Ser-d-Orn-Trp-Ser-Val-d-Ile-Orn-CO_2H

4c; Paenimucillin C (4F) Acetyl-HN-d-Phe-d-Orn-d-Ile-d-Ser-d-Phe-Ser-Ser-d-Orn-Phe-Ser-Val-d-Ile-Orn-CO_2H



5; Teixobactin

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Meet a New ASP Member

Dr. Kathleen Rein is our featured new member in this summer's issue of the Newsletter. *She is a professor with Florida International University's Department of Chemistry and Biochemistry in Miami. Dr. Rein is a former ASP member who recently rejoined the Society. We are grateful for a chance to officially welcome Dr. Rein back to ASP.*

By Dr. Dan Kulakowski

Why did you join ASP?
I have a strong interest in natural products chemistry. The annual ASP meeting is my favorite conference.

What would you like to achieve through your membership?
I would like to network with other members as well as introduce my students to the ASP.

Do you belong to any other scientific societies?
I belong to the American Chemical Society and the American Association for the Advancement of Science.

What are your current research interests in pharmacognosy?
As a Florida resident, my interests are in the pharmacology of algal toxins, including brevetoxins and microcystins: two ongoing threats to public health and aquatic ecosystem health.

Kathleen Rein/Photo by Florida International University

What is your scientific background?
I earned my PhD in synthetic organic chemistry from the University of Miami; and I was a post doc in marine natural products pharmacology at University of Miami Rosenstiel School of Marine and Atmospheric Science.

What inspires you in your work?
I want to contribute a little piece of knowledge to the world before I expire.

What is your favorite organism (to study, or for general interest)?
Karenia brevis.

What do you like doing in your spare time?
Travel, yoga, camping, cooking, training Girl Scout leaders in camping skills, and reading sci-fi.

What are you currently reading?
Ready Player One by Ernest Cline. ■

ASP Privacy Policy Updated

By Dr. Cedric Pearce

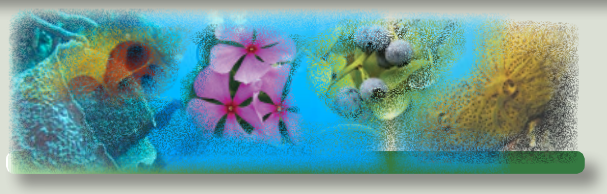
Recently I sent an email to all members of the ASP together with a link that would give options - **THE AMERICAN SOCIETY OF PHARMACOGNOSY PRIVACY POLICY – DATA STORAGE UPDATED 5/25/2018** (www.pharmacognosy.us/wp-content/uploads/Privacy-Policy.pdf). These options. These options clearly describe what the ASP will do with confidential data and gives the members choices regarding the storage of such data. Why did the Society do this? How does it affect ASP members? The simple answer is that the new policy is intended to protect a member's privacy and any personal data that they provide the Society. Hopefully this will be a transparent process that should not inconvenience any member and certainly not impede natural products research productivity.

As explained in our Privacy Policy, organizations that collect data on residents of European Union (EU) countries had to comply with strict new rules adopted to protect the data of customers – in our case ASP members - by May 25, 2018. These new rules are embodied in the General Data Protection Regulation (GDPR). Interpretation of these new rules is complicated, and, although the ASP is comprised of scientists interested in natural products and not international lawyers, we nevertheless have developed guidelines regarding the information provided by our members and how we intend to protect that data in order to comply with these regulations.

The goal and spirit of the GDPR is to set high standards for consumer rights regarding their privacy and data. In looking at the information available about the new law, it is apparent that precise interpretation is causing some concern and in some cases may be a challenge. As the ASP does business in the EU, having members in the majority of the EU countries, the Society needs to take this seriously. ASP wants our EU members to be comfortable providing their data, plus fines will be levied against those organizations that do not comply.

I would like to thank our colleagues on the Executive Committee for being pro-active about this and having the Society in compliance in a timely way. If anyone has any concerns about the new system, we would welcome their comments. ■

New Members of ASP 2018



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 20 full members and 13 associate members. We look forward to meeting you and learning more about you and your work.

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Pharmacognosy Field Notes: Diving Together to Combat TB in Vietnam

Loading equipment on the boat to Dao Co To/Photo by Dr. Brian Murphy

By Dr. Brian Murphy

It was the first few weeks of my Assistant Professor position at the University of Illinois at Chicago (UIC), when the distinguished botanist, long-time adventurer, and ASP member, Professor Doel Soejarto, offered me an opportunity. "Fly with me to Vietnam and meet some of the great scientists there. Shake their hands and talk to them about working together." Though I wondered why I simply could not e-mail them to start a collaboration, I decided to heed his advice. It was this investment in a "handshaking tour" that changed the trajectory of my research program and resulted in a multi-institution partnership that would send us across a stunning Vietnamese marine-scape in search for antibiotics to combat tuberculosis (TB).

Vietnam is located in a region that accounts for over half of the world's TB cases. A marine sciences partnership between UIC and several institutions in Vietnam made perfect sense and was a natural extension of a 20-year collaboration led by Professors Soejarto and Van Hung Nguyen. The newly formed Institute of Marine Biochemistry at the Vietnam Academy of Science and Technology (IMBC-VAST) in Hanoi was beginning a marine microbial natural products discovery program, and they were situated near the National Institute of Hygiene and Epidemiology (NIHE), which was well known for its work in clinical TB research. UIC maintained a strong program in natural product discovery and was home to the basic and translational science-driven Institute for Tuberculosis Research. Working together, we could build a drug discovery pipeline and research training program that linked basic, translational, and clinical sciences to discover and develop marine natural product leads to fight TB.

Before we could build this vision, though, we needed preliminary data to support our joint program, which inevitably required field expeditions. Professor Van Cuong Pham, leader of the natural products discovery program at IMBC, designed several collection expeditions along the north and south coast. These trips were laden with adventurous diving, unpredictably challenging work conditions, welcoming people, and incredibly fresh seafood. On our first expedition, we set up a base of operations in Dao Co To, an island in northeast Vietnam in the Quang Ninh province. I traveled first with Cuong, then graduate student Quyen Vu and a group from the Institute of Marine Environment and Resources. After making our way through a crowded seaside marketplace, we walked hundreds of pounds of gear across a thin wooden ramp that straddled the pier and a small passenger boat. Overcrowded with gear and passengers, our voyage to Co To began.

After setting up our home base in the lobby of a quaint island hotel that was predominantly occupied by us, we set out

continued on page 21

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The group at Dao Co To. Lef to right: Viet Do Hung Dang, Prof. Thung Cong Do, Brian Murphy, Prof. Van Cuong Pham, Toan Van Nguyen, Thuy Thi Nguyen, Dr. Nam Hoai Nguyen, Dr. Quyen Thi Vu, Thanh Van Nguyen, Diep Ngoc Chau, Ha Quang Pham, Dr. Cuong Xuan Nguyen

continued from page 20

to do the first in a series of small boat SCUBA collections. The first dive off of Co To was nerve-racking. Though the water was a comfortable 24° C (75° F) and the maximum depth was only about 35 feet, there were several hazards that made sample collection challenging. The area was heavily fished in the past, and remnants of old fishing nets floated in a maze-like fashion and restricted free movement along the reef. A compounding stress was the bloom of hundreds of large jellyfish that were scattered in a three-dimensional mine field in every direction. Each jelly dragged scores of 10 foot long tentacles. A few years prior, I switched my studies from plant to marine natural products because of my irrational fear of spiders. Unfortunately, the ocean turned out to be no refuge from creepy organisms.

Several dives, hotel sample processing sessions, group dinners, and pho breakfasts later, Cuong, Quyen and I flew with our equipment to the more tropical southern city of Nha Trang where we worked with collaborators from Vietnam's Institute of Oceanography (IO). We performed several dives in marine protected areas collecting soft corals, sponges, and sediment, all while policing illegal fishing practices. There was a stark contrast between some of our dives: most of the locations featured vibrant, thriving reefs that were the source of immense biodiversity, but occasionally we dove on bleached coral reefs that were stark reminders of the effect of changing ocean conditions. After several successful dives documenting sample diversity, avoiding lionfish, and learning to bite the heads off of squid before eating them, we moved on.

We packed our gear in a van and drove north to a small village on Van Phong Bay, a place that did not see many international visitors. We arranged to be taken out on a fishing boat by a retired army captain. Per usual, we planned to eat on the boat and purchased fresh squid from a local fisherman and set out to explore the reefs. Aside from my partner being bit by a large crab, the dives went according to plan. However, most did not see the work that was required to make these dives a reality. There was quite a bit of negotiating with local officials that happened before each dive, and Cuong was a masterful planner. That night, as part of the process, we met the local officials for dinner. After two hours at dinner, Quyen smartly removed me because we had yet to process our samples from the dive. Back at the hotel the power went out, and we worked in a humid 33°C (~90° F), pitch black room for three hours treating, diluting, and plating samples onto hundreds of nutrient agar plates. Our only light was that from a single iPhone.

The work that resulted from this trip and others formed the foundation for the VAST-UIC collaboration. With a talented group of young professors, Cuong helped build a marine bacterial discovery program at IMBC-VAST, and his lab isolated and published several new natural products. These publications and our lasting partnership served as preliminary data for our current NIH D43 Global Infectious Disease Research Training grant, which seeks to train three postdoctoral researchers as new professors (in addition to several predoctoral students in Hanoi) with the intent of linking basic natural products discovery (IMBC, UIC) with translational TB research (NIHE) in Vietnam.

Importantly, Professor Soejarto's advice was critical: meet face to face and build a trusting partnership. It is this important facet of a collaboration that is often lost in the grind and decorative glamour of a collection expedition, but is just as critical toward building, not just a natural products library, but a lasting discovery and training program. ■

Article note: This work was initially supported by a UIC Campus Research Board pilot grant, and currently through a NIH NIAID/FIC D43 "Global Infectious Disease Research Training Program" grant.

Conference Calendar

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

ICP + TC 2018

XXIXth International Conference on Polyphenols, 9th Tannin Conference

July 16-20, 2018

Memorial Union and Shannon Hall on Lake Mendota

Madison, Wisconsin

conferences.union.wisc.edu/icp/

American Society of Pharmacognosy 2018 Annual Meeting

July 21–25, 2018

Hilton Lexington Downtown

Lexington, Kentucky

asp2018.pharmacognosy.us

Gordon Research Conference on Natural Products and Bioactive Compounds

July 29-August 3, 2018

Proctor Academy

Andover, New Hampshire

www.grc.org/natural-products-and-bioactive-compounds-conference/2018/

57th Annual Meeting of the Phytochemical Society of North America (PSNA)

August 4-8, 2018

Universidad Autónoma de San Luis Potosí

San Luis Potosí, México

congresos.uaslp.mx/57psna/Paginas/Home.aspx

International Conference of the Modernization of Chinese Medicine & Health Products

August 16-17, 2018

Hong Kong Convention and Exhibition Centre

Hong Kong, China

m.hktdc.com/fair/icmcm-en/International-Conference-and-Exhibition-of-the-Modernization-of-Chinese-Medicine-and-Health-Products.html#

66th Annual Meeting of the Society for Medicinal Plant and Natural Product Research (GA) jointly with the 11th Shanghai International Conference on Traditional Chinese Medicine and Natural Medicines (S-TCM)

August 26-29, 2018

Shanghai, China

www.ga2018.cn

Emerging Trends in Natural Product Biotechnology Scientific Symposium

September 20-21, 2018

TU Dortmund University

Dortmund, Germany

www.bio.bci.tu-dortmund.de/cms/de/Emerging-Trends-in-Natural-Product-Biotechnology/index.html

The 30th International Symposium on the Chemistry of Natural Products and the 10th International Congress on Biodiversity

November 25 – 29, 2018 Athens, Greece.

https://iupac.org/event/iscnp30-icob10

Brief News from Washington

By Dr. Georgia Perdue

- **The NIH Center for Advancing Translational Sciences (NCATS) issued a press release on May 16 about some very interesting and promising research dealing with stopping cancer metastasis.** A compound, **"metarrestin,"** blocks the spread of pancreatic cancer and "other cancers" in "various animal models." The research was carried out by researchers at Northwestern University and their collaborators at NCI. Metarrestin stopped metastasis in "multiple animal models." The hope is that metarrestin "[will] be effective as a therapy after cancer therapy." They believe it could be added to "standard drug therapy." The scientists plan to file an Investigational New Drug application with the FDA sometime in the fall. Stay tuned!
- The **FDA** may just get a budget increase. The first step was taken by the House Appropriations Committee which **on May 22 approved $3.1 billion, an increase from $2.8 billion. The Senate Committee was more generous, approving $2.97 billion, including $70 million for the 21st Century Cures Act. Stay tuned.**
- Also, on May 22, the ***"Annual Report to the Nation on the Status of Cancer"*** **was released by NCI.** It is a collaborative report including NCI, CDC, and American Society of Cancer. "This year's report is an encouraging indicator of progress we're making in cancer research. Overall death rates continue to decline… The report also highlights areas where more work is needed," stated NCI Director Dr. Ned Sharpless. Dr. Robert Redfield, Director, CDC, noted "[this] report underscores that if cancer is caught early, when it has the best chance of being treated, patients can live longer." (see *Cancer* May 22).
- On May 23, the National Institute of Allergy and Infectious Diseases (NIAID) issued a press release regarding **"a Phase I clinical trial of a single monoclonal antibody, mAb114, developed by NIAID scientists." Dr. Anthony Fauci stated, "We hope this trial will establish the safety of this experimental treatment for Ebola virus disease…. Ebola is highly lethal, and reports of another outbreak in the DRC [Democratic Republic of the Congo] remind us that we urgently need Ebola treatments."**
- **Taxol just keeps on giving!** On April 20, FDA granted Orphan Drug status for an interesting new drug, Oraxol[R] (Athenex), to treat angiosarcoma. What makes it interesting is **paclitaxel** is combined with a "P-glycoprotein pump inhibitor." Athenex hopes to broaden the use of Oraxol[R] to treat both metastatic breast cancer and gastric cancer.
- **In March, FDA approved brentuximab vedotin in combination with chemotherapy for untreated Hodgkin's lymphoma stage 3, or 4 "classic" Hodgkin's lymphoma.** This is considered a "clinically feasible improvement in three decades." **The new drug was compared to doxorubicin, bleomycin, vinblastine and dacarbazine as the preferred treatment. FDA's Dr. Richard Pazdur, director, Oncology Center of Excellence, considers this drug an "improvement in the initial treatment regimens of advanced Hodgkin's lymphoma… in more than 40 years."**! (see *New England Journal of Medicine* or *Medscape Medical News*) (note: I remember well the extreme excitement the drugs in this and the above caused 40 years ago!)
- On May 10, it was reported that FDA granted "priority review" for a cancer drug combination for Roche's Tecentriq[R] atezolizumab, which is used in combination with Avastin[R] (bevacizumab) and **paclitaxel**, for treatment of metastatic non-squamous, non-small cell lung cancer.
- On April 25, **World Malaria Day,** under the slogan **"Ready to Beat Malaria,"** the National Institute of Aller-

continued on page 24

The hope is that metarrestin "[will] be effective as a therapy after cancer therapy." They believe it could be added to "standard drug therapy."

continued from page 23

gy and Infectious Disease (NIAID) released a statement which included the following interesting information:

- Significant global progress has been made since 2000 to reduce the incidence and mortality of malaria. "However, recent evidence suggests the trend toward fewer malaria cases and deaths has stalled." NIAID is still committed to "conducting and supporting innovative research needed to end malaria." Because of drug resistance, NIAID will continue to find "new and effective anti-malaria drugs."
- NIAID is continuing its research on **malaria vaccines**. There are seven malaria vaccines in various stages of clinical testing.
- On May 3, NIAID followed up with another statement entitled: **"Essential Malaria Parasite Genes Revealed!"** Researchers "exploited a quirk in the genetic make-up of the malaria parasite, allowing them to create 38,000 mutant strains… and determined which genes are essential to the growth and survival of the [parasite]." The team is led by Dr. John H. Adams, University of South Florida, and Dr. Julian Rayner, Wellcome Trust Sanger Institute, U.K. Stay tuned!

➢ **On March 26, Dr. Robert Redfield was sworn in as Director of CDC. It was a very short time from his nomination to confirmation.** Dr. Redfield, a virologist and pioneer in HIV-AIDS, was Professor of Medicine at the University of Maryland, Baltimore. "Dr. Redfield's scientific and critical background is peerless….[O]ne example, during his two-decade tenure at Walter Reed Army Institute of Research, [was] the pioneering contributions he made to advance our understanding of HIV-AIDS," said HHS Secretary Alex Azar when he announced the nomination. Dr. Robert Gallo, formerly with NIH, also had laudatory remarks about his colleague.

➢ At the NCI Board of Scientific Advisors (BSA) meeting on March 20, the new NCI Director, Dr Norman Sharpless, dominated the meeting. **He mentioned that the number of grant applications for 2018 increased, "the total is going up," as is the success rate.** Also, regarding **Early Stage Investigators (ESI), "especially for those who face challenges," NCI is announcing its new use of the MERIT AWARD in 2018.** This will give investigators applying for their first R01 an opportunity to obtain up to seven years of grant funding. It will provide critical time for ESIs to launch their careers and become more established before attempting renewal(s). "This experiment will allow NCI to see if the extra two years of funding really works." Dr. Sharpless noted the success rate of the SBIR/STTR program. He outlined the activity of **NCI interacting with other agencies:**

- **More collaborations with FDA**
- **"Vibrant collaborations" with the Department of Defense and the VA are in place: have 95% consent rate for clinical trials; "this is a good fit for NCI."**

➢ The NCI Director discussed the **Partnership for Accelerating Cancer Therapies (PACT).** Twelve companies contributed $5 million each; NCI is matching the funds, all for developing new biomarkers. Included in this "important area" are Dana-Farber, Stanford University, Mt. Sinai and MD Anderson. Companies are providing guidance in areas which need assistance.

➢ Meeting with every one of his lab directors, or chiefs, Dr. Sharpless asked, "What can we stop doing and where can we save money? The key focus areas are to lead the nation's efforts and develop new approaches, technologies and applications to change the meaning of cancer diagnosis."

- **We must always ensure the health of the cancer research enterprise and build our foundational knowledge.**
- **We must continue to leverage** investments, further advancing our understanding and translation of our knowledge.
- **We will lead the nation's efforts** to develop new approaches, technologies and applications to change the meaning of cancer diagnosis.

➢ Dr. Sharpless conducted a "listening, learning tour." **"It was very useful to go to many extramural institutions and internal NCI." "There is no shortage of new things NCI can do [as well as] what we should stop doing…." "NCI is so big some do not know what is going on. It is an area where [we can improve our communication]."** ■

From the Archives:
Phar'-ma-cog-no-sy Illustrated: A History of Natural Pharmaceuticals

By Ms. Devhra BennettJones

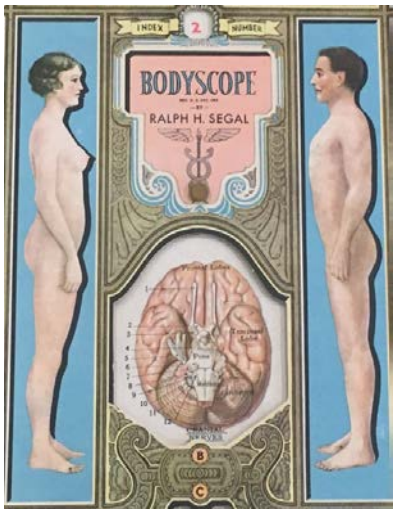
On July 20, 2018, the Lloyd Library & Museum will open a special exhibition entitled, *Phar'-ma-cog-no-sy Illustrated: A History of Natural Pharmaceuticals.* The exhibition will feature a dynamic collection of artifacts, monographs, photographs, and documents showcasing the Lloyd Library & Museum's vast body of pharmacognosy history. As the scientists that make vital contributions to the study of herb and pharmaceutical interactions, the champions of the environmental movement in heralding the effects of biodiversity loss upon earth, and the global guardians calling for sustainable sources of plant and animal products, ASP Annual Meeting attendees will have the opportunity for a private viewing and luncheon hosted by the library on July 26, 2018 (preregistration is required).

The exhibition will feature a dynamic collection of artifacts, monographs, photographs, and documents showcasing the Lloyd Library & Museum's vast body of pharmacognosy history.

Compound pharmacists "Prescription Rod" from the Balz Pharmacy Collection - During the 19th Century, pharmacists were only required to have a physician's prescription to dispense medications deemed poisonous. Patients often visited their pharmacists, without consulting a physician, for the treatment of minor ailments. The artifact consists of 50 years

of prescriptions, dating from the 1880s-1930s. The rod was constructed with a coffee can base attached to an iron rod, approximately 32.5 inches. The artifact is a unique display of pharmaceutical history from the late-nineteenth and early-twentieth centuries. Prescriptions would be skewered on a wire for storage. The round appearance of the prescriptions is the result of bent corners from years of use.

Medical documents and photographs from the Eclectic Medical Institute Collection -



The Bodyscope artifact, composed by Ralph H. Segal, dates from 1936. It is a compositional, mechanical, and informational volvelle about the male and female anatomy. The folio is encased in leatherette-covered boards with a gilt-tooled title and cadaceaus. The contents are printed on full-color lithographed paper, covered with pierced card sleeves. Inside each sleeve is a turning card disc with three pierced sections on each of the pages. The rotating discs have five subjects that display through each pierced window. The five subjects on the disc display through three windows. The main window on each page is the torso of a male body and a female body. Sections of each page concentrate on a different anatomical area, with descriptive and explanatory passages for each subject. The folio contains small drawings of various figures from medical history with their dates, such as Hippocrates, Aristotle, Leonardo da Vinci, etc.

The photograph following on page 26 is of an Eclectic Medical Institute Anatomy Department Autopsy class. The Eclectic Medical Institute received its charter from the state of Ohio in 1845. It was formed from the remnants of the Medical Department of Worthington College. After the closing of Worthington, Thomas Vaughn Morrow, Dean at Worthington, moved to Cincinnati where he built the school as the Reformed Medical School of Cincinnati, staffed by several professors and graduates of Worthington. The college was named the Eclectic Medical Institute under its new charter. The Institute became the leading eclectic medical college in the United States by 1875. The Institute had esteemed faculty such as John and Milton Scudder, John King, John Uri Lloyd, Andrew Jackson Howe and Frederick John Locke. During the 1920s and 1930s, social and political pressures on the Eclectic Medical College (renamed in 1910) led to its demise. These developments included the American Medical Associa-

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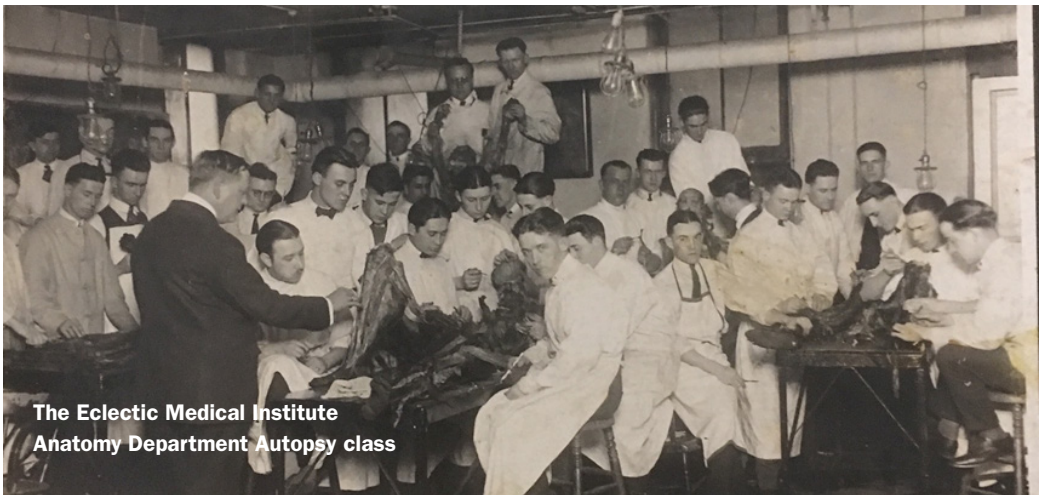
These developments included the American Medical Association's efforts to establish uniform medical college requirements, a surge in popularity of allopathic medicine due in large measure to the discovery of penicillin and other antibiotics, and a general lack of progress in the overall field of eclectic medicine.

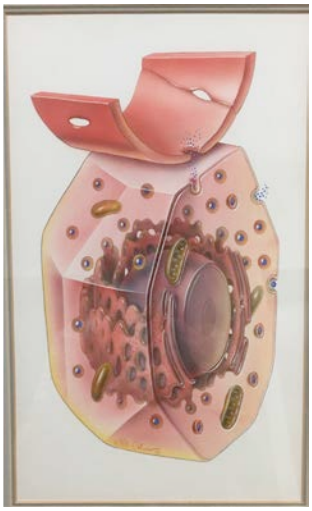


The Eclectic Medical Institute
Anatomy Department Autopsy class

continued from page 25

tion's efforts to establish uniform medical college requirements, a surge in popularity of allopathic medicine due in large measure to the discovery of penicillin and other antibiotics, and a general lack of progress in the overall field of eclectic medicine. This resulted in the college's reduction of admission applications and accreditation problems throughout the 1920s and 1930s. There were no graduating classes between 1929-1933. In 1933 the college reorganized and graduated students until the final class in 1939. The college relinquished its charter in 1942.

Vesalius Trust Pharmaceutical Illustrations - The Lloyd Library and Museum is the institutional repository for the Vesalius Trust organization of professional medical illustrators. The exhibition will feature "Production of Insulin in a Beta Cell" by Lewis E. Calver, which demonstrates insulin production in the pancreas. The Vesalius Trust is named after the pioneering Renaissance anatomist and physician, Andreas Vesalius (1514-1564). Vesalius was zealous about scientific observation and was one of the first anatomists to regularly teach from actual human body dissections. The Vesalius Trust works to promote innovation in visual communication for the health sciences through the Association of Medical Illustrators (AMI). The AMI is a professional society of medically-trained visual artists. They established a public educational foundation to raise and maintain funds to be used for developing and supporting education and research within the field of medical illustration and related professions. The Vesalius Trust for Visual Communication in the Health Sciences was incorporated as a non-profit public foundation in 1988. Since its founding, the Trust has supported scholarships, research grants, continuing professional education, and The Frank Netter Award, an international recognition program for exceptional contributions to medical education.



© L.E. Calver, 1986

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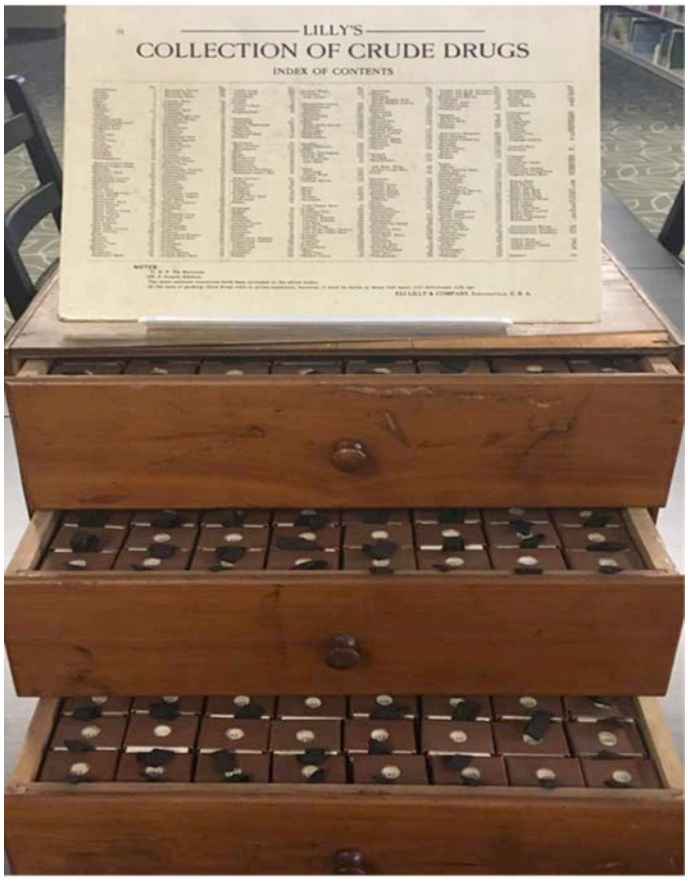
The exhibition will feature "Production of Insulin in a Beta Cell" by Lewis E. Calver, which demonstrates insulin production in the pancreas.

Unlike many pharmacists today, 19th Century practitioners compounded medicines from scratch using plant, mineral, animal and insect ingredients.

continued from page 26

Historical Pharmaceutical Artifacts - Unlike many pharmacists today, 19th Century practitioners compounded medicines from scratch using plant, mineral, animal and insect ingredients. The mortar and pestle, microscope, and scales were used to pulverize and mix dried herbs to be made into pills, cachets (rice-flour wafers that were the predecessor to the gelatin capsule), liquids (including tinctures, syrups, infusions, liquid extracts and infusions), plasters and injectable medications. Many of the medicines contained alcohol and narcotics. The passage of the Pure Food and Drug Act of 1906 required the listing of alcohol and narcotics on labels. This legislation involved the federal government in the consumer protection that controls pharmaceutical purveyors today.

Microscope, an Iron Mortal & Pestle, and time-worn scales.



Eli Lilly's Collection of Crude Drugs - This artifact is a wooden 3-drawer chest from the early 1900s. The chest was a herbarium reference tool for pharmacy students containing certain plants and plant parts used in making medical compounds. It contains 216 different specimens of seeds, roots, bark and leaves of plants commonly used in pharmaceutical medicine. Each specimen is in a labeled box. Crude drugs are considered medications in their natural forms. Prior to the mid-twentieth century, pharmacy students learned about crude drugs in pharmacognosy courses. The collection was specifically marketed to pharmacy students by Eli Lilly and Company in the late-nineteenth and early twentieth centuries. (Donated to the Lloyd Library by ASP Foundation Treasurer, Dr. Robert Krueger.)

The exhibition will also feature rare monographs and images of medicinal plants from the Lloyd's broad collection of resources. ■

continued on page 28

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Jim McAlpine, Ph.D, Treasurer
The American Society of Pharmacognosy
3149 Dundee Road, #260,
Northbrook, Illinois 60062

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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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