The American Society of Pharmacognosy

Discovering Nature's Molecular Potential

The ASP Newsletter: Fall 2018, Volume 54, Issue 3

Dr. Susan Mooberry

ASP President Mooberry Addresses Members

By Dr. Susan Mooberry

It is my honor and privilege to serve as the president of the ASP for the upcoming year. I want to recognize the Executive Committee and especially recent past presidents Drs. Cedric Pierce, Cindy Angerhofer and Ed Kennelly for their successes in revitalizing our public face with the new website, a presence in social media and with outreach to our international colleagues to extend the impact of the ASP. These initiatives have been successful because of the efforts of these individuals, as well as our dedicated chairs and committee members and our efficient business manager, Ms. Laura Stoll. My goal as president is to keep their momentum going with initiatives to increase the diversity of our membership, add content including video to our website, develop stronger international ties, and ensure that our society is inclusive and that everyone's voice is respected.

The ASP Foundation was the recent recipient of its largest gift ever, $402,800, from the estate of Dr. Audrey Bingel. See the article below by Drs. Robert Krueger, Kirk Manfredi and John Cardellina about Dr. Bingel and this extraordinary bequest. This gift highlights the value of the ASP in so many of our lives.

Story continued on page 3

Longtime ASP Member Audrey Bingel Generously Bequeaths Largest Endowment Ever to ASP Foundation

By Drs. Robert Krueger, Kirk P. Manfredi, John H. Cardellina, and Ms. Patricia Carver

The ASP Foundation is pleased to announce the largest gift ever bestowed upon the ASPF, $403,000, in the form of a bequest from the estate of longtime ASP member Dr. Audrey Susanna Bingel. Per Dr. Bingel's request, a sizeable portion of this gift will be used to endow permanently the Norman R. Farnsworth Research Achievement Award.

ASP President Susan Mooberry noted, "The generous bequest by the estate of Dr. Audrey Bingel, the largest ever received by the ASP Foundation, is transformative for our Society. This heartwarming bequest speaks not only of Dr. Bingel's dedication to the memory of her colleague, Dr. Norman Farnsworth, but also of her high regard for the ASP. Her decades-long research commitment to improving

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Dr. Audrey Bingel

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EDITOR'S CORNER

This issue of the *ASP Newsletter* continues to explore the role of women in the ASP from many different perspectives. We are running two lead articles in this issue, and both highlight important contributions from female ASP members. First, as is the tradition in the *Newsletter*, we provide a forum for our new president, Dr. Susan Mooberry, to discuss her vision for the Society. As I read her article, I was struck by many efforts for more inclusion in the Society that have happened over the past year or so, beginning with some difficult conversations at the Portland membership meeting. I am glad to see the many ways that Dr. Mooberry and her colleagues on the Executive Committee have already begun to address these concerns. The Society's new non-discrimination statement and guideline for meeting organizers are two very concrete examples of that.

The second lead article is about the largest-ever donation to the ASP Foundation, provided by the late ASP member, Dr. Audrey Bingel, as part of her estate. Frankly, this bequest was a surprise to many ASP members. Dr. Bingel was a faculty member at the University of Illinois at Chicago, College of Pharmacy, and her long-time professional relationship with Dr. Norman Farnsworth led her to ultimately donate to the ASP Foundation to endow the Norman R. Farnsworth Research Achievement Award, the highest honor the Society bestows. What an incredible gift Dr. Bingel has provided to the ASP! The ASP Foundation leadership has provided us with follow-up articles that describe how members can include the ASP in their wills or make a donation now to support the efforts of the Foundation.

The Matt Suffness award was won by ASP member Dr. Marcy Balunas from the University of Connecticut and is covered in an article written by Dr. Amy Keller, who returned from retirement from this publication to write on behalf of Dr. Balunas' distinction. The organizers of the 2018 ASP Annual Meeting discuss in detail their efforts to expand the representation of female invited speakers, and their efforts were greeted with considerable approval from what I have heard. Dr. Jim Gloer, the Norman R. Farnsworth Research Achievement Award recipient, has been covered in an article by Dr. John Cardellina.

As I consider the pivotal role of women in the ASP currently, my thoughts go back to a photo of the first meeting where there were few women represented in the group photo of all the attendees. I was surprised recently to learn that an important pioneer of the ASP, from the days when it was part of the Plant Sciences Symposium, was a female scientist, Dr. Anna Koffler Wannamker. I knew nothing about her, so I asked Lloyd Library archivist, Ms. Devhra BennettJones, to look into her career. Ms. BennettJones is publishing her interesting and extensive findings in a two-part series in her regular column "From the Archives." I hope you will spend some time reading about an important early female member of the ASP.

This *Newsletter* is especially packed, and I hope you will take time to read about some of the other happenings in the Society. Have a wonderful fall, and I hope you will contact me if you have any ideas for future *Newsletter* stories.

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 President Mooberry Addresses Members

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Many of us had the distinct pleasure of visiting the Lloyd Library and Museum in Cincinnati following the annual meeting in Lexington. The timing was fortuitous, since they had just opened a special exhibit entitled, "Phar'macognosy Illustrated: A History of Natural Pharmaceuticals." ASP member Dr. Mansukh Wani provided a captivating lecture about the history of the discovery of taxol via a live videoconference. As many of you know, the Lloyd Library and Museum hold the archives of the ASP, and we are fortunate to have such a professional partner.

Multiple activities are ongoing and more are planned to make the ASP a fully inclusive and diverse organization. A new inclusion statement was developed by the Constitution and By-Laws Committee. The language was approved by the Executive Committee, and at the annual business meeting will be voted on by the membership this spring. A code of conduct is being developed by the Inclusion and Diversity Committee for ASP meeting attendees to ensure that all are treated with respect and that the meeting is free from intimidating or harassing conduct. Last year we received a wakeup call about lack of representation of women in speaking slots at our annual meetings. Dr. Jürgen Rohr and the Lexington Local Organizing Committee of the 2018 annual ASP meeting were responsive, and they invited numerous truly outstanding female speakers representing all career stages. Drs. Melany Puglisi-Weening and Tim Bugni have already recruited an outstanding, diverse panel of speakers for the 2019 ASP meeting in Madison, WI. Our Society's commitment to diversity is being taken seriously.

I am pleased to announce that the Inclusion and Diversity Task Force, initiated last year by Dr. Cedric Pierce, will continue as an ad hoc committee co-chaired by Drs. Esther Guzman and Nadja Cech. Expanding our efforts in both diversity and inclusion will be critically important for the growth of ASP and its future success. The importance of these initiatives was apparent at the Young Members event in Lexington. Our energetic and enthusiastic young members represent our current and future diversity, highlighting the need to support them for continued growth and success. We need to make sure that these young scientists continue to value and contribute to the ASP as their careers advance so that they become our future leaders.

As we consider diversity, we need to be committed to expanding and solidifying our scientific diversity. One advantage of the name pharmacognosy is that it encompasses a wide range of scientific disciplines. As one of the few pharmacologists elected to lead this organization, I want to help recruit other pharmacologists to our Society. The collaborative partnerships among natural products chemists, synthetic chemists and experts in biosynthesis and the biology of source organisms is extremely powerful when combined with scientists who can evaluate these biologically validated compounds for activities that can positively impact world health including, combating human diseases, improving agriculture, and providing effective and safe options for pest control. As Drs. David Newman and Gordon Cragg remind us in their highly referenced reviews in the *Journal of Natural Products* on natural products as sources for new drugs, these compounds have vastly improved human health. Collaborations among biologists and chemists have the opportunity to identify the drugs of the future. Recruitment of pharmacologists with expertise in infectious disease, neurological, metabolic and cardiovascular disease and cancer, to partner with our chemists will allow our field to retain its relevance.

The collaborative partnerships among natural products chemists, synthetic chemists and experts in biosynthesis, and the biology of source organisms is extremely powerful when combined with scientists who can evaluate these biologically validated compounds for activities that can positively impact world health including, combating human diseases, improving agriculture, and providing effective and safe options for pest control.

Our international outreach efforts continue. A total of 25 countries were represented by participants in the most recent annual meeting in Lexington. This fall the ASP will be co-sponsoring the 30th Annual International Union of Pure and Applied Chemistry (IUPAC) Natural Products meeting in Athens, Greece. A number of ASP members, including Drs. Cedric Pierce, Sandra Loesgen, Christine Solomon, Nadja Cech and Nick Oberlies will be attending and presenting, further developing our international ties. Drs. Roy Okuda, Ed Kennelly and the Scientific Organizing committee are well underway in planning the 12th International Congress of Natural Products Research (ICNPR) meeting that will be held in San Francisco, CA from July 25 to 30, 2020. A total of seven pharmacognosy societies, led by the ASP, are participants in this congress, which will be a truly global event for our field, so please plan to attend.

The annual meetings are highly anticipated not only for the exciting science, but for the opportunities to catch up with old friends and to make new ones. As we grow as a society, we all have the opportunity, and responsibility, to recruit colleagues and collaborators who might not know of the ASP, but who are doing research related to pharmacognosy. I was reminded of the opportunities we have to "get the word out" by two of our Lexington symposium speakers. They commented about how impressed they were with the quality and breadth of the research presented at the meeting, but had never heard of the ASP prior to their invitation to attend. This is a reminder that much needs to be done to grow the ASP and reach the extensive range of science encompassed by pharmacognosy. I encourage us all to recruit new members to enrich our Society and ensure a strong future. Thank you again for the honor and privilege to serve as the president of the ASP. ■

Longtime ASP Member Audrey Bingel Generously Bequeaths Largest Endowment Ever to ASP Foundation

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women's health, and her collaborations with colleagues at UIC and around the world, is a reminder of the value of pharmacognosy. This gift also provides the ASP Foundation the opportunity to recognize her contributions and generosity."

Dr. Bingel's extraordinary gesture will provide a complete endowment of the Norman R. Farnsworth Research Achievement Award and a cushion against market downturns or potential increases in the award itself. The remainder of the funds will be utilized as determined by the ASP Foundation Board.

ASP Foundation board chair Dr. John Cardellina recalled, "Those of us who knew Audrey have missed her at our meetings for some time and regret that we cannot thank her in person for this extraordinarily generous gift. She is yet another ASP member who found collegiality, stimulation and friendship in the growing, always changing family that is this unique scientific society and chose this bequest as her way to thank the ASP for what she gained and enjoyed as a member."

Dr. Bingel was born in the Bronx, NY in 1942, received a BA from Hunter College, City University of New York in 1963, and pursued a graduate degree in reproductive biology under the guidance of Professor Neena B. Schwartz at the University of Illinois Medical Center. She defended her thesis, "The Timing of Cyclic and Postpartum Ovulation in the Mouse," in 1968. She then joined the newly formed Department of Pharmacognosy and Pharmacology in the UIC College of Pharmacy as an Assistant Professor in 1969.

Dr. Bingel's research focused on the biology of reproduction, and she became a member of a multidisciplinary, multicenter collaborative research project at UIC, where she worked with fellow UIC College of Pharmacy Professors Geoffrey Cordell, Djaja Soejarto, Donald Waller and Harry Fong. Dr. Fong stated, "Audrey was a unique research collaborator. She had an encyclopedic knowledge on the subject of reproductive biology, was highly detail-oriented and laser-focused on the task at hand. She was thorough and meticulous in designing the bioassay protocols adopted and mandated by the World Health Organization's Task Force on Plants for Fertility Regulation for its international network of collaborating centers in their research for antifertility agents from plants." This network included: UIC; Chinese University of Hong Kong; Natural Products Research Institute, Korea; City University, London; University of Peradeniya, Sri Lanka; and University of Recife, Brazil. Dr. Fong added that Dr. Bingel "often worked on weekends and over holidays in support of our unique, decade long" project.

Another collaborator on the project, Dr. Geoff Cordell, stated that Dr. Bingel was instrumental in the development of the pharmacognosy program at UIC, including "the pharmacological aspects of what was entered into the NAPRALERT database from the very early beginnings. She reviewed and coded thousands of papers which form the pharmacological background of the database." He continued on to say that Dr. Bingel "was humble. She kept a low profile. She wasn't a global traveler. She was, however, incredibly dedicated to supporting Norm Farnsworth and his efforts to build the program, especially whenever *in vivo* pharmacology was involved. When we first put together (no computers in those days!!) the list of fertility-regulating plants which led to the WHO program, it was her expertise that sorted the biological 'wheat from the chaff' and she recommended the *in vivo* protocols for the whole program with Don Waller."

In 1982, Dr. Bingel became a permanent research faculty member in UIC's Program for Collaborative Research in the Pharmaceutical Sciences. Prior to this, she was a meticulous teacher to the students at the UIC College of Pharmacy, culminating in her being awarded a Golden Apple in recognition of her sterling efforts. ASPF Treasurer Dr. Robert Krueger recalled, "She was very kind to a junior faculty member from a peanut-sized college of pharmacy (me) and had a cool sense of humor." Dr. Bingel retired from UIC in 1998.

Although trained as a reproductive biologist, Dr. Bingel became a pharmacognosist by choice and was a constant fixture at ASP meetings in the 1980s and early 1990s. As part of Professor Farnsworth's UIC entourage, she embodied the spirit of working hard on the science, and then working hard on having fun at conferences, that pervaded the UIC group.

Ms. Carol Lewandowski, who was the Laboratory Manager at UIC and worked with Dr. Bingel when ASP held its annual meeting in Chicago in 1991, recalled that Dr. Bingel "felt pharmacognosy was an underappreciated and misunderstood science. It was important to her to emphasize the value of natural products in coping with problems of the modern world. I know that Audrey relished participation in the ASP meetings, no matter where they were held, and regretted that her declining health prevented her from attending in her later years."

Aside from her love for research, Dr. Bingel also had a life-long love for music and was an accomplished pianist who loved playing all types of songs, from classical to popular. She was an avid fencer, a science fiction fan (especially of *Star Trek*) and a devoted fan of the New York/San Francisco Giants. Additionally, she loved to read and was fluent in several languages, including Portuguese, Italian, and German.

Dr. Bingel, though, will be remembered most for her dedication and long-lasting contributions to science. Dr. Cordell stated, "It is truly wonderful and heartwarming to see that in her passing, her loyalty and support of Farnsworth's ideas of pharmacognosy as a fully integrated area in the pharmaceutical sciences, will continue."

According to Ms. Lewandowski, Dr. Bingel "didn't regard her ASP donation as 'a big deal' and was just glad she could contribute to something that meant so much to her." The ASP Foundation Board of Directors is currently considering ways in which to honor Professor Bingel for her work in pharmacognosy and her commitment to the ASP. ■

Dr. Bingel's extraordinary gesture will provide a complete endowment of the Norman R. Farnsworth Research Achievement Award and a cushion against market downturns or potential increases in the award itself.

Remember the ASPF in Your Will

By Dr. Robert Krueger

It is as easy as writing a simple sentence. Secure the future of your ASP Foundation by including a gift to it in your will. You can support its many grants and awards tomorrow without giving away any assets today.

We have seen, in the past few years, how powerful this giving option is through the gifts of the Brady and Bingel bequests. Naming the ASPF in your will is affordable, since the actual donation occurs after your lifetime, so your current quality of life is not affected.

Your gift is flexible until your will goes into effect, so you are free to alter your plans or change your mind. Including the ASPF in your will is versatile as well in that you can give a set amount of money, stocks or bonds or a percentage of your estate. You can also designate the gift to support one of our many grants and awards (i.e. student travel, active member travel, research starter grants or undergraduate research grants, etc.) or create a new award to honor a cherished colleague, mentor, friend or family member.

If you are interested, please contact your attorney for the proper language to use in your state as well as your financial advisor(s) regarding the best asset(s) to use for your charitable bequest. Also, please let us know of your decision to include the ASPF in your will. Thank you for your consideration. ■

ASP Foundation Annual Campaign Drive

By Dr. Edward J. Kennelly

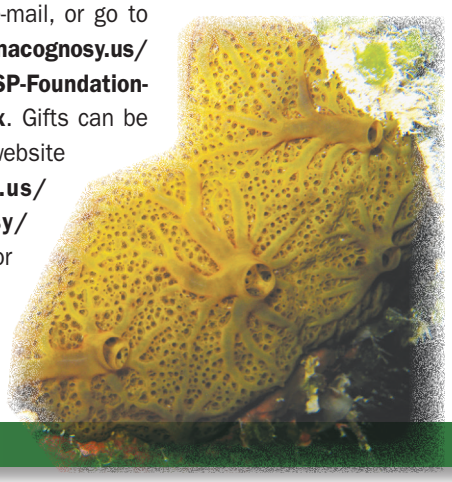
The ASP Foundation is sending out letters to all members as part of its annual campaign drive. Last year the Foundation issued a challenge to grow the corpus of the endowment to $2,200,000. Remarkably, this goal has already been reached with generous gifts from the Bingel estate and others, in conjunction with the investment of revenues the Society generates from the publication of the *Journal of Natural Products*.

ASP Foundation Chair Dr. John Cardellina notes in the letter that the ASP Foundation is in very good shape financially as it celebrates its 25th anniversary this year: "…if donating is in your heart, consider ***'$25 for the 25th.'*** As Chair of the ASPF Board, I would be heartened to see more of our members (100-250 would be extremely heartening) contribute, even in a small way. If you have ever received any grant or award from the ASP, consider 'paying it forward,' so that others can enjoy the benefits you have." Contributions to the ASP Foundation are tax-deductible.

The awards continue to be a robust way that the ASP Foundation assists in bringing members and students to annual meetings. This issue of the *Newsletter* includes a list of all winners of ASP Foundation awards for 2018, and there are over 45 names listed. Since the ASP Foundation was started in 1993, more than a million dollars have been distributed in awards to individuals across the professional spectrum, from undergraduates to senior researchers.

Dr. Cardellina explains in his detailed letter how the ASP Foundation funds are handled. "First, $200,000 of that total is a set aside security blanket for the ASP, to guard against some calamitous event, like an annual meeting cancelled by ASP, leaving the Society financially liable for contractual guarantees to vendors. The remainder is the true corpus of the ASPF holdings, invested in stocks, bonds, certificates of deposit and other interest or dividend paying financial instruments. The guiding philosophy is to hold the corpus intact and fund awards and grants each year from the earnings of those investments; this has the effect of funding such awards in perpetuity."

Please take a moment to read the entire letter signed by Drs. Cardellina and Bob Krueger (ASP Foundation Treasurer) in your e-mail, or go to this website: **www.pharmacognosy.us/wp-content/uploads/ASP-Foundation-ltr-to-member-2018.docx**. Gifts can be made through the ASP website (**www.pharmacognosy.us/what-is-pharmacognosy/the-asp-foundation/**), or by mailing a check to the ASP Foundation treasurer, Dr. Krueger. ■



A Great Blue Grass Gathering

By Drs. Joe Chappell and Jurgen Rohr

The 59th annual ASP meeting was certainly **"Natural Products Riding High"** in Lexington, KY. On July 21 to 25, more than 430 attendees from 25 countries descended upon the idyllic Bluegrass Region of central Kentucky, along with a dozen sponsors and exhibitors, to enjoy true southern hospitality. The speakers, exhibitors, sponsors, workshop presenters, especially ASP business manager Ms. Laura Stoll and all the University of Kentucky student and post-doc volunteers, and, of course, all the meeting attendees helped to make this a very successful meeting. The organizers thank you all for making the annual ASP meeting great!

The attendees had the opportunity to advance their practical skills in five pre-meeting workshops, which included: "Global Natural Product Social Molecular Networking and 3D Visualization" given by Dr. Pieter Dorrestein; "Biological Evaluation of Natural Products with Anticancer Potential " offered by Dr. April Risinger; gaining insights into new analytical methods offered by the CENAPT group or by Mr. Mark O'Neil-Johnson; or learning the secrets to writing successful grants from Dr. Craig Hopp of the National Center for Complementary and Integrative Health of the NIH.

The scientific program included daily plenary sessions featuring outstanding breakthroughs, including: the elucidation of biosynthetic pathways for novel natural products, structural biology of the biochemical wizards catalyzing these fascinating reactions, and the development of all kinds of informatic tools to help find new chemical entities. Plenary speakers were recruited from all five continents, and 35% of the plenary speakers (40% of all speakers) were female. Approximately 20% were talks given by students. While the meeting clearly focused on biosynthesis, other well-covered areas were discovery, plant metabolites, marine natural products, enzymes, symbiosis/

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A Great Blue Grass Gathering

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co-cultures, novel technologies/methods, carbohydrates, synthesis and structural biology, of course, partially overlapping. In two well-attended sessions, 275 posters were presented.

There were also many social events to help folks reconnect with old friends and to make new ones as well. A very entertaining evening at the Keeneland racetrack, organized mostly by Dr. Joe Chappell, was definitely a social highlight, spiked with mock horse races and an open bar for the entire evening. Four hundred participants were there, enjoying what appeared to be the longest open bar in history! On Tuesday afternoon, a bourbon distillery and horse farm tour was offered and well received, as was a challenging hiking tour in the Red River Gorge for adventurers, led by Dr. Jurgen Rohr. The young investigator meeting, attended by 160 (!) and well organized by Drs. Jaclyn Winter and Steven Van Lanen, was a great success. Besides beer, food, and a distillery tour, the meeting also included a career workshop featuring alumni of the natural product researchers of the University of Kentucky. Representatives were from government, industry and academia.

The meeting ended, as always, with an award session, featuring Dr. Marcy Balunas (Suffness awardee) and ASP Fellow Dr. Jim Gloer (Farnsworth awardee), and the banquet, which highlighted the roasting of outgoing ASP President Cedric Pearce by Dr. Barry O'Keefe.

Overall, it was a well-rounded, scientifically top-notch, and, in many aspects, very diverse meeting, spiked with unique social and fun events. ■

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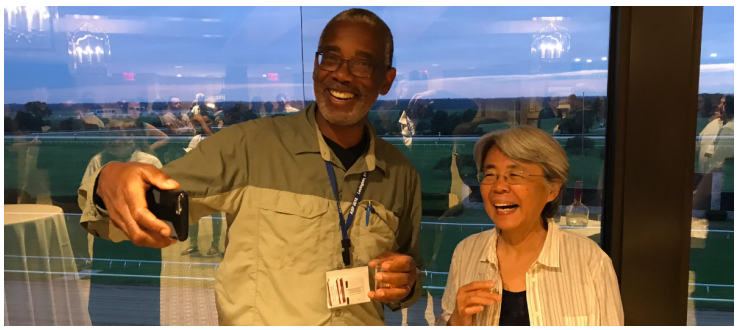

A Great Blue Grass Gathering

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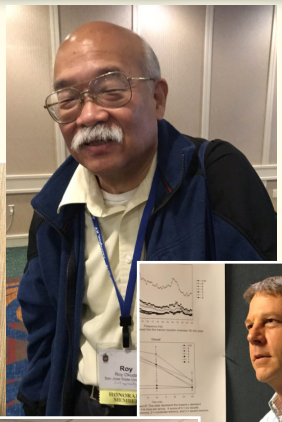
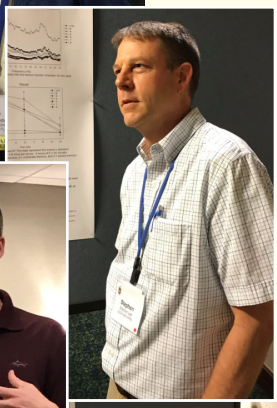
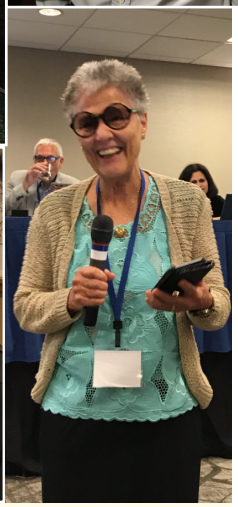
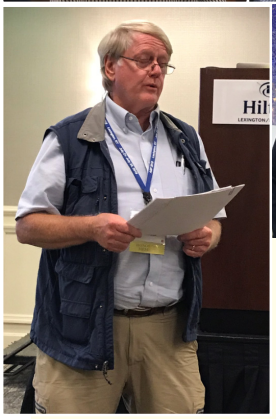








Overall, it was a well-rounded, scientifically top-notch, and, in many aspects, very diverse meeting, spiked with unique social and fun events.

ASP Award Winners 2018

The ASP and ASP Foundation wishes to recognize and congratulate all award winners. Best wishes and congratulations to all!

Norman R. Farnsworth Research Achievement Award

James Gloer, PhD
University of Iowa

Varro E. Tyler Prize

Guido Pauli, PhD
University of Illinois Chicago

Matt Suffness Young Investigator Award

Marcy Balunas, PhD
University of Connecticut

ASP Kilmer Prize

David Gallegos
Oregon State University

Undergraduate Research Award

Mario Augustinovic
University of North Carolina Greensboro

Manead Khin
University of North Carolina Greensboro

Malia L. Moore
University of California Berkeley

Madison Patrick
Auburn University

Sabrina Ton
University of Oklahoma

Research Starter Grant

Ethan Van Arnam, PhD
Claremont McKenna College

Lukasz Ciesla, PhD
University of Alabama

Lynn Brady Student Travel Award

Brian Guo
University of Illinois at Chicago

Paige Mandelare
Oregon State University

Carla Menegatti
University of Sao Paolo

Sara Puckett
University of Connecticut

Robert Tokarski
Ohio State University

Jerry McLaughlin Student Travel Award

Oluwatofunmilayo Diyaolu
University of Aberdeen (United Kingdom)

Anupama Tuladhar
Florida International University

David Carew Student Travel Award

Yilue Zhang
Auburn University

Waqar Bhatti Student Travel Award

Samantha Gromek
University of Connecticut

Student Travel Award

Kelsey Alexander, University of California-San Diego
Anina Buchmann, Eberhard Karls University (Germany)
Maria S. Costa, University of Iceland
Camila M. Crnkovic, University of Illinois, Chicago
Pradeep Dewapriya, University of Queensland (Australia)
Taise T.H. Fukuda, University Sao Paolo/Harvard Medical School
Gabrielle M. Grandchamp, University of North Carolina-Chapel Hill
Riley Kirk, University of Rhode Island
Shamsunnahar Khushi, University of Queensland (Australia)
Sylvia Kunakom, University of Illinois at Chicago
Preston Manwill, Ohio State University
Laizuman Nahar, University Queensland (Australia)
George Neuhaus, Oregon State University
Paul Scesa, Florida Atlantic University
Abu Bakar Siddique, University of Louisiana at Monroe
Hannah Whitmore, University of Surrey (United Kingdom)
Mario Wibowo, Griffith University (Australia)

Travel Grant for Active Members

Asmaa Boufridi, PhD, Griffith University (Australia)
Jana Braesel, PhD, University of Illinois at Chicago
Narayan Chaurisiya, PhD, University of Mississippi
Anne-Claire Limon, University of South Florida
Peng Cheng Wang, PhD, University of Pittsburgh
Chen Zhang, PhD, University of California-San Diego

2018 Arthur E. Schwarting Award

Sang Kook Lee, PhD, Seoul National University (Korea)
Hwa-Jin Chung, Won Kyung Kim, Jedo Oh, Me-riong Kim, Joon-Shik Shin, Jinho Lee, In-Hyuk Ha, and Sang Kook Lee.
* Anti-Osteoporotic Activity of Harpagoside by Upregulation of the BMP2 and Wnt Signaling Pathways in Osteoblasts and Suppression of Differentiation in Osteoclasts. *J. Nat. Prod.* **2017**, 80(2), 434-442. (DOI: 10.1021/acs.jnatprod.6b00964).

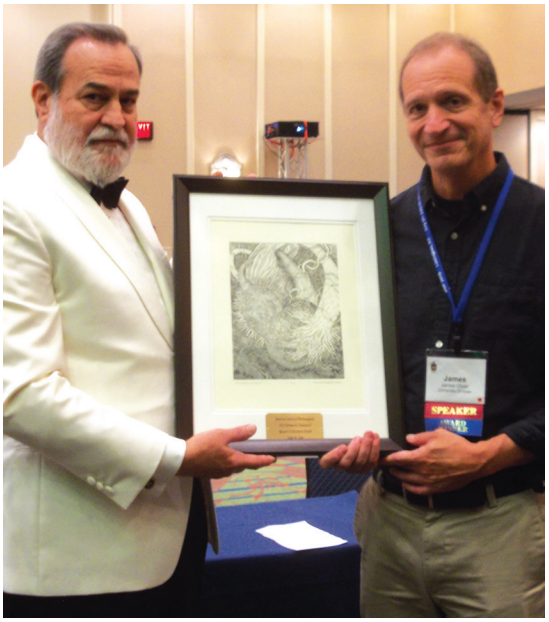
2018 Jack L. Beal Award

Chambers C. Hughes, PhD, University California, San Diego
Daniela Reimer and Chambers C. Hughes.
* Thiol-Based Probe for Electrophilic Natural Products Reveals That Most of the Ammosamides Are Artifacts. *J. Nat. Prod.* **2017,** 80(1), 126–133. (DOI: 10.1021/acs.jnatprod.6b00773).

Gloer Receives 2018 Farnsworth Research Achievement Award

By Dr. John Cardellina

Dr. James B. Gloer, the Roy J. Carver/Ralph L. Shriner Professor in the Department of Chemistry at the University of Iowa, received the 2018 Norman R. Farnsworth Research Achievement Award at the ASP annual meeting in Lexington, KY this past July. His award address was entitled, "Adventures in Fungal Natural Products Chemistry—Fungal Ecology, Biodiversity, and the Search for New Bioactive Metabolites," and what an adventure it has been!



Dr. John Cardellina presents original artwork created for the Farnsworth Award to Dr. James B. Gloer.
PHOTO BY AMY KELLER

In an informative and entertaining lecture, Professor Gloer seamlessly weaved together a message about the importance of forging the right kind of collaborations, developing and applying bioassays relevant to the hypothesis under investigation, and remaining alert to new opportunities, ideas and directions, with multiple examples of identifying unexplored ecological niches, culturing fungi from those niches and finding the chemistry underlying the observed bioactivities.

In 1984, Professor Gloer began his career at the University of Iowa by studying the sclerotial bodies of fungi; these are survival forms for spores, able to withstand extremes of temperature and humidity, as well as predation by insects. Those of us who were at ASP meetings in the 1980s remember all too well the slide of the ear of Iowa corn, grotesquely bulging with an *Aspergillus* infection. Those early studies yielded new chemistry and new uses for known compounds, corroborating the hypothesis that fungi from unique ecological niches would provide new compounds.

Later, the Gloer group and collaborators began an enduring study of coprophilous fungi, a more sophisticated term than dung-colonizing fungi. While surely not as glamorous or as much fun as collecting marine organisms, this project has nonetheless provided a bounty of novel chemistry and new leads to antifungal agents, all initiating from an observation of a succession of fungal species colonizing the same dung pile. Professor Gloer also began an investigation of the largely unstudied fungal species found in freshwater systems, with similar results. These efforts all led to his more recent focus on fungicolous fungi, the battle between fungi for survival and dominance – one might call this the microcosmic cage fight among fungi. True to his graduate school roots, he has even managed to fit in some collaborations to assist other groups on marine natural product work.

The Farnsworth Award nomination letter for Professor Gloer summarized his research accomplishments: "The compounds that have been characterized through his efforts encompass an enormous range of structures. They include terpenoids and prenylated stilbenes, alkaloids and nucleosides, and a bewildering variety of heterocyclics and polyketides. They have been isolated from fungi that grow on important agricultural crops (including corn and peanuts) to the coprophilous fungi found in less obvious places. A sophisticated understanding of fungal ecology runs throughout his research, and these compounds are isolated primarily through activity-guided fractionation sequences that rely upon ecologically relevant bioassays."

A supporting letter offered a glimpse of another aspect of Dr. Gloer, his willingness to share his compound library and help colleagues: "Jim has also been open to new avenues of study related to the compounds his group has identified. For example, when *in silico* screening and confirmatory enzyme assays associated modest inhibition of botulinum neurotoxin A with chaetochromin A, a bis-naphthopyrone polyketide produced by a number of fungi, Jim provided not only the original hit compound, but also a number of related compounds. One of those

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His award address was entitled, "Adventures in Fungal Natural Products Chemistry—Fungal Ecology, Biodiversity, and the Search for New Bioactive Metabolites," and what an adventure it has been!

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additional compounds proved to be the most potent compound yet tested in the currently definitive *ex vivo* tissue-based assay. This finding not only provided an improved lead compound, but also served to counter skepticism in army research funding and management circles about the value of natural products as potential therapeutic agents for botulinum poisoning."

He earned a BS in Chemistry from the University of Florida in 1978 (despite, it is alleged, that he served as the "Gator" mascot for Florida football throughout his undergraduate years) and a PhD in Chemistry (with Professor K. L. Rinehart) from the University of Illinois in 1983. His dissertation work involved the discovery, isolation, and structure elucidation of a family of novel depsipeptide anticancer agents from a marine tunicate (didemnins). He was a postdoctoral associate at Cornell University (with Professor J. Meinwald) from 1983-1984, and joined the faculty at Iowa in 1984.

Farnsworth Award recipient Dr. James Gloer (far right) with current and past students (from left to right) Mr. Chris Knutson, Ms. Dulamini Ekanayake, Ms. Nicole Krausert, Mr. Cody Earp and Drs. Kristina Rogers-Szuma, San Hee Shim, Arlene Sy-Cordero, and Steve Deyrup.

PHOTO BY AMY KELLER

Dr. Gloer has authored or co-authored over 160 journal publications and book chapters and is a co-inventor on 10 patents. His research has been supported since 1989 by various grants from the National Science Foundation (NSF), the National Institutes of Health (NIH), and other sources; he has served as Principal Investigator on grants totaling over $11 million. He has been a recipient of an NIH Research Career Development Award, a Burlington Northern Foundation Faculty Achievement Award, an Alfred P. Sloan Foundation Fellowship, an NSF Grant Extension for Special Creativity, a Regents Award for Faculty Excellence, and an Outstanding Mentor Award from the University of Iowa Graduate College. He was appointed to the unenviable position of Chair of the Chemistry Department at Iowa in 2016. He served as co-chair of the 1997 ASP meeting in Iowa City and as President of the ASP in 1999-2000, and was appointed as a Fellow of the ASP in 2010. He has been a member of the editorial advisory board of the *Journal of Natural Products* since 2002. He has mentored 33 students to completion of PhD studies.

It is not easy to summarize so much accomplishment in a few paragraphs, but one thing I realized so clearly in the process of drafting this article is that Dr. Gloer truly reflects his postdoctoral mentor, Dr. Meinwald, in many ways. He is a creative, inquisitive thinker and researcher; he is committed to the training of development of his student scientists; and he quietly lets his exceptional body of work speak for itself. To be sure, I believe he already had these attributes when he arrived at Cornell, but he left for Iowa with them more firmly reinforced and entrenched. He may feel he does not deserve this award, but those of us who know him and know his work feel that he fits right in to that distinguished group of previous awardees. Congratulations, Professor James B. Gloer. ■

"The compounds that have been characterized through his efforts encompass an enormous range of structures. They include terpenoids and prenylated stilbenes, alkaloids and nucleosides, and a bewildering variety of heterocyclics and polyketides. They have been isolated from fungi that grow on important agricultural crops (including corn and peanuts) to the coprophilous fungi found in less obvious places."

Balunas Receives 2018 Suffness Award

By Dr. Amy Keller

Dr. Marcy Balunas, Associate Professor of Medicinal Chemistry at the University of Connecticut School of Pharmacy, was awarded the 2018 Matt Suffness Award from the ASP at this year's annual meeting in Lexington, KY.

Dr. Balunas described her fascinating work in marine natural products during her award presentation entitled, "Interaction-Driven Molecule Discovery from Host-Microbe Symbioses." Following the presentation, she was awarded a commemorative clock by outgoing ASP President Cedric Pierce and ASP Foundation Chair John Cardellina. "Winning the Suffness is an incredible honor - many fabulous scientists have received this award in the past and I am honored to join their ranks," Dr. Balunas told the *Newsletter*.

Dr. Balunas began her career in natural products in the lab of ASP member and *Journal of Natural Products* editor, Dr. A. Douglas Kinghorn, then at the University of Illinois at Chicago. She was initially inspired to study potential anticancer compounds, as cancer was prevalent in her family. Dr. Balunas switched gears a bit during her postdoctoral position with ASP member Dr. William Gerwick. During that time, she worked on an International Cooperative Biodiversity Group based in Panama and focused on natural products from marine cyanobacteria. Following this postdoctoral position, Dr. Balunas was hired to the faculty of University of Connecticut, Storrs, where she recently received tenure and promotion. Her laboratory's current scientific questions revolve around drug discovery and chemical ecology of host-associated bacteria. Dr. Balunas presented highlights from her laboratory's recent work during her award presentation.

Dr. Balunas is one of many accomplished female ASP members, and she has been instrumental in helping other women in ASP and beyond. At several recent ASP meetings, Dr. Balunas participated in a young members' round table workshop geared towards helping scientists find success in academia. She generously shared her tips on time and personnel management, and how to balance career acceleration while raising a family. Dr. Balunas exemplifies the possibilities of obtaining rarified career accomplishments while also putting family first. As caregiver responsibilities may be among the most significant barriers to women scientists' career success and mobility, Dr. Balunas' service to women ASP members through example and direct leadership is especially prescient and appreciated.

From left to right: Suffness Award recipient Dr. Marcy Balunas with current and former lab members Dr. Karen Tan, Ms. Samantha Gromek, Ms. Sara Puckett and Ms. Heather Winter.

The Matt Suffness Young Investigators Symposium Award is named for Dr. Matt Suffness, a prominent member in the society's history and ASP president from 1989-1990. In addition to major scientific accomplishments in the field of pharmacognosy, Dr. Suffness was especially interested in helping younger ASP scientists to succeed. He started the Young Investigators Symposium as a platform for young ASP members to present their work. The contemporary Matt Suffness Award aims to honor outstanding young ASP investigators. Awardees receive a $2,000 honorarium and travel expenses to present at the annual meeting of the ASP. Since the inception of the award in the year 2000, only three out of eighteen Suffness Award winners have been women. ■

Dr. Balunas (center) with current PhD student Sara Puckett (left) and former research technician and current UNCG PhD student Heather Winter (right). PHOTO BY NICK OBERLIES.

ASP Heads to Madison for 2019 Annual Meeting

By Drs. Melany P. Puglisi and Tim Bugni

2019 marks the 60th Anniversary of the American Society of Pharmacognosy. Next year the annual meeting will be held in Madison, Wisconsin from July 13 to July 17 at the Monona Terrace on Lake Monona - a beautiful venue which was designed by Frank Lloyd Wright. The theme of the conference is, "Innovations in Natural Products Chemistry - An Interdisciplinary Approach to Understanding Nature's Chemical Library." The Madison meeting will include three special sessions. On Sunday there will be a symposium sponsored by the American Chemical Society for the *Journal of Natural Products.* Tuesday morning will include a young members' symposium in memory of our long-time treasurer Dr. David Slatkin, sponsored by the ASP Foundation, and Monday morning will feature a symposium sponsored by the National Institutes of Health National Center for Complementary and Integrative Health.

In each newsletter over the next year we will feature speakers for the 2019 annual meeting in a "Speaker Spotlight." In response to the concerns raised in recent years regarding the changing face of the Society, the program includes a prominent speaker from the Women in Science Leadership Institute speaking on "Breaking the Bias Habit" on Monday.

The 2019 conference will also have a poster competition for students and postdocs with three prizes sponsored by the American Chemical Society. Interested students and postdocs will be required to submit their posters one month prior to the conference for preliminary judging. More information will be available on the website in the upcoming months.

Saturday evening will feature an open-air reception on the roof of the Monona Terrace with live music entertainment (www.mononaterrace.com). Monday evening attendees will gather at the Wisconsin Institutes for Discovery (discovery.wisc.edu). These events will feature local foods and brews. The Younger Members Event will be held at the SETT on the campus of the University of Wisconsin at Madison (union.wisc.edu/visit/union-south/the-sett-at-union-south) featuring bowling, pool and table games.

Two hotel venues have been reserved for attendees: the Madison Concourse Hotel located on the square in downtown Madison (www.concoursehotel.com) and the Hilton adjacent to the Monona Terrace (www3.hilton.com/en/hotels/wisconsin/hilton-madison-monona-terrace-MSNMHHF/index.html). The hotels are located five miles from Dane County Regional Airport. Attendees can also fly into the General Mitchell International Airport in Milwaukee, WI or O'Hare Airport in Chicago, IL. Shuttle service to Madison can be arranged from both airports.

The Wisconsin State Capitol, located in Madison, sits at the center of the city surrounded by top-rated restaurants featuring farm-to-table menus. On Saturdays in the summer the Dane County Farmer's Market hosts Saturday on the Square (www.dcfm.org). We highly encourage you to arrive early to experience the market.

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ASP Heads to Madison for 2019 Annual Meeting

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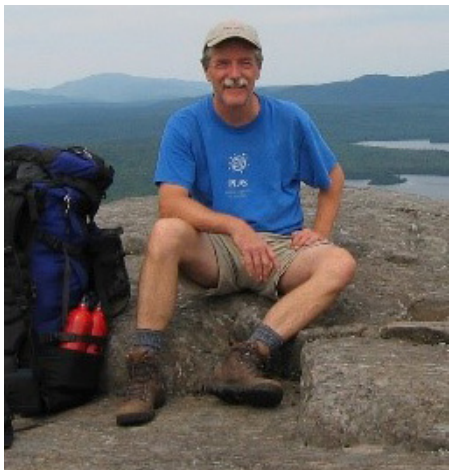
SPEAKER SPOTLIGHTS

Dr. Nadja Cech is the Patricia A. Sullivan Distinguished Professor of Chemistry at University of North Carolina at Greensboro. She joined the faculty at UNCG in 2001 and was awarded the Jack L. Beal Award from the *Journal of Natural Products* for best paper by a young investigator in 2011. Dr. Cech will be giving a plenary lecture titled, "Metabolomics for Natural Products Drug Discovery: Challenges and Opportunities." She will also participate in the *Journal of Natural Products* Symposium.

Dr. Nadja Cech



Dr. John Beutler

Dr. John Beutler is an Associate Scientist and Head of the Chemical Diversity Development Section of the Molecular Targets Program at the National Institutes of Health National Cancer Institute. He has identified the englerins, which are in preclinical development for kidney cancer and Ewing's sarcoma; the schweinfurthins, which are preclinical candidates in glioblastoma and malignant peripheral nerve sheath tumors; and salicylihalamides, of interest in sarcomas. Dr. Beutler will be giving a plenary lecture on the "Development of Englerins as Kidney Cancer Therapeutics." ■

The 12th International Congress on Natural Products Research (ICNPR)

CONGRESS PARTICIPATING SOCIETIES:

Association Francophone pour l'Enseignement et la Recherche en Pharmacognosie: (AFERP)

Society for Plant and Natural Product Research: (GA)

Korean Society of Pharmacognosy: (KSP)

American Society of Pharmacognosy: (ASP, organizing society)

Japanese Society of Pharmacognosy:(JSP)

Phytochemical Society of Europe: (PSE)

Società Italiana di Farmacologia: (SIF)

Meeting Registration, Abstract Submission, and Hotel Registration will open in early 2020.
icnpr2020.org/

The Congress Hotel will be the
HYATT REGENCY SAN FRANCISCO
Embarcadero
sanfrancisco.regency.hyatt.com

July 25 to 30, 2020; San Francisco, California, USA

ASP Addresses Diversity in the Society

By Dr. Susan Mooberry

The American Society of Pharmacognosy is a Society that encompasses a wide range of scientific expertise to promote advancement of the field of natural products research. The membership of ASP is diverse across multiple spectra including, but not limited to: age, gender, race, ethnicity, sexual orientation, culture, geographic location, and profession. The ASP strives to be a welcoming, inclusive Society that recognizes its wide diversity, which seeks to advance all areas of natural products research. Having diverse participation in our Society benefits *all* members by fostering an environment that enables creativity and exposes us to new ideas while challenging us to think in innovative ways.

Published studies document gender bias in science, technology, engineering and mathematics fields. One manifestation of gender bias is lack of leadership and speaker participation in scientific meetings. The annual ASP meeting provides an opportunity for scientists to network, distribute research results and build new collaborations. As was documented in an article in the 2017 Winter *ASP Newsletter*, "The (In)convenience of Gender Blindness" by Dr. Brian Murphy, analysis of invited speakers at past ASP meetings (2013-2017) shows a heavy bias favoring male speakers that is not representative of current ASP membership.

In the spring of 2018, ASP President Cedric Pierce chartered a diversity and inclusion task force to draft guidelines for future organizers to build meetings that are inclusive and representative of the ASP membership. The purpose of these guidelines is to assure that ASP meeting organizers advance the overall goals of our Society by fostering inclusion and diversity when selecting a scientific advisory panel, session chairs, invited speakers, and other presenters. The organizers and scientific advisory panel must assure representation across geographic regions, professions, gender and racial identities, which includes, but is not limited to, other underrepresented groups. To facilitate these goals, a checklist was developed for meeting organizers to guide the process of achieving this equity.

Much more is needed to foster ASP diversity and inclusion, and the task force will now become an ad hoc diversity and inclusion committee. In addition to the document to guide future organizers, the committee recommends addition of a code of conduct and anti-harassment policy to be placed prominently in the meeting program and on registration forms. Such a code and policy is included in some format at many meetings, including the American Chemical Society and American Association for Cancer Research meetings, Keystone Symposia, and Gordon Conferences. Please contact me or any member of the Diversity and Inclusion Committee (listed on the ASP website) with any ideas and thoughts about these policies. The ability of ASP to embrace our diversity will foster our future success. ■

Getting to Know the Korean Society of Pharmacognosy

By Dr. Eun Kyoung Seo

(Editor's note: For the first time ever, The Korean Society of Pharmacognosy (KSP) will be a formal partner at the 12th International Congress on Natural Products Research (ICNPR) in San Francisco, July 25-30, 2020. ASP, along with our five other ICNPR partners, welcome KSP, and look forward to working together.)

The Korean Society of Pharmacognosy was established in 1969. The main goal of the KSP is to promote the advancement of knowledge and research in various fields of pharmacognosy and herbal medicinal products. The KSP has formed a community of over 500 members of pharmacognosists from domestic universities as well as pharmaceutical industries, where the executive board consists of the president, vice-president, executive board members, and auditors.

The KSP has been leading the advancement of natural product research and the industrial promotion of herbal medicine. With the future-oriented goal of modernization of herbal medicine, the KSP has been pursuing disciplines to isolate, identify, characterize, and utilize components from natural sources with the understanding of their physical and chemical properties for drug discovery. The KSP covers diverse research areas as follows: agronomy; analytical chemistry; biochemistry; botany; ethnomedicine; herbal medicine; medicinal chemistry; microbiology; oceanography; organic chemistry; pharmaceutical sciences; pharmacology; and plant sciences.

Members of the Korean Society of Pharmacognosy

Our society has been holding partnership with the Japanese Society of Pharmacognosy and the Chinese Commission of Traditional Chinese and Natural Medicines since its establishment, and this came to fruition through the organization of the Korea-Japan-China Joint Symposium of Pharmacognosy in 2002. Since then, the Joint Symposium was officially held in each country, which has greatly affected us in moving another step forward into the globalization of our research in natural products.

Recently, our endeavor in drug discovery

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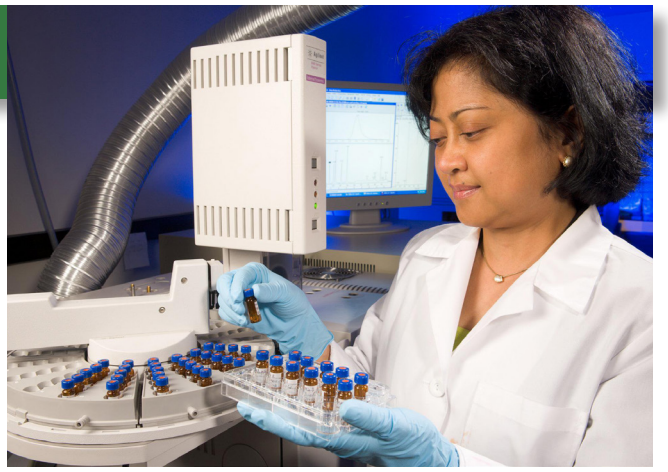
In Memoriam: Agnes Rimando

By Dr. Edward Kennelly

Former ASP member, Dr. Agnes Rimando, died on July 12, 2018 at the age of 60 after a brief illness. Dr. Rimando had been employed as a research chemist for the USDA Agricultural Research Service in Oxford, MS since 1994, and was a world-renowned expert in plant chemistry, especially with regards to the seminal work she conducted on the health benefits of pterostilbenes.

ASP member and Dean of the School of Pharmacy at University of Wisconsin, Professor Steven M. Swanson, remembered, "Agnes and I were graduate students together in Norm Farnsworth's department at the University of Illinois at Chicago College of Pharmacy. Even back then, her work ethic, passion and intellect distinguished her as a rising star. Not only was she a singularly talented natural products chemist, but she was also an excellent collaborator who enjoyed helping others in their projects."

Although Dr. Rimando was not a regular at ASP annual meetings, she was well-known to many members due to her natural products research at UIC and USDA. ASP Vice President Barry O'Keefe recalled, "I have known Agnes since my days as a graduate student at the University of Illinois at Chicago. She was a good friend. Agnes went on to a highly impactful scientific career at the USDA. She always had high standards for herself and others (standards that, at times back at UIC, I found challenging to meet - much to our mutual enjoyment). I will miss her happy smile and her teasing. The ASP and pharmacognosy in general will miss her contributions and her outstanding representation of our field."



World-renowned research chemist, Dr. Agnes Rimando, in her lab at the USDA Agricultural Research Service in Oxford, MS.

Dr. Rimando's research resulted in more than 200 scientific publications. One of her most well-known projects at USDA involved the health benefits of pterostilbenes from blueberries. This research, and the resulting patents, has led to more than 40 commercial pterostilbenes products on the market. The popular press coverage of her research on pterostilbenes has been attributed to a dramatic increase in blueberry sales in the United Kingdom.

Dr. Rimando received many awards and distinctions for her research, including the American Chemical Society Fellow and the Kenneth A. Spencer Award for outstanding achievement in food and agricultural chemistry.

In her free time, she enjoyed singing karaoke, dancing, and traveling. She is survived by her mother, five sisters, and two brothers. ■

Getting to Know the Korean Society of Pharmacognosy

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and modernization of herbal medicine led to a splendid achievement of developing new herbal medicines for the cure of gastritis (Stillen® tab. and Motilitone® tab., DongA Parmaceutical Co.) and arthritis (JOINS® Tab., SK Chemicals). We are currently concentrating our energies to develop new herbal medicines for the treatment of other diverse diseases from natural sources, and some cases are already undergoing clinical testing.

We are confident that these achievements have become realized in accordance with our efforts to not only prove the ethnopharmacological uses of the natural products but also to scientifically demonstrate their potential in regards to the unexplored aspects of these sources.

The KSP's main goals are to:

- pursue original research on Korean medicine in terms of developing novel drugs
- take initiatives for collaborative research with the pharmaceutical industries as well as research institutions
- promote research on Asian herbal medications in order to discover therapeutic drugs
- establish close collaborations with pharmacological societies around the world and exchange results of our research internationally

The KSP published the first issue of the *Korean Journal of Pharmacognosy* in 1970 and published its first international journal, *Natural Product Sciences,* in 1995. This has allowed Korean natural product research to flourish, not only quantitatively but also qualitatively.

We anticipate a brisk academical exchange worldwide, through the Korean-Japan-China Joint Symposium of Pharmacognosy that is to be held in Korea next year, as well as our Joint Symposium with the ASP, along with Association Francophone pour l'Enseignement et la Recherche en Pharmacognosie, Society for Plant and Natural Product Research, Japanese Society of Pharmacognosy, Phytochemical Society of Europe, and Società Italiana di Farmacologia that will be taking place in San Francisco, in 2020 (icnpr2020.org/). ■

Journal of Natural Products Ceremony Honors Horwitz

By Dr. A. Douglas Kinghorn

At the recent annual meeting of the American Society of Pharmacognosy (Lexington, KY; July 21-25, 2018), a special presentation was made at the annual editorial board meeting of the *Journal of Natural Products*. The March 2018 issue of the *Journal* was dedicated to Dr. Susan Band Horwitz, Distinguished Professor and Falkenstein Chair in Cancer Research, Department of Molecular Pharmacology, Albert Einstein College of Medicine, Bronx, NY.

Journal of Natural Products **Honoree Dr. Susan Horwitz (right) with Drs. A. Douglas Kinghorn, David Kingston and ASP President Susan Mooberry.**

At the ASP meeting, Dr. Horwitz was presented with a bound copy of this issue, prepared by the ACS Publications Division, by Drs. Susan Mooberry (current President of ASP; Professor of Pharmacology and Greehey Distinguished Chair, UT Health San Antonio) and David Kingston (University Distinguished Professor, Virginia Tech). Drs. Mooberry and Kingston served as two of the guest editors for this special issue, with the others being Drs. Amos Smith III, Steven Swanson (also Associate Editor of *J. Nat. Prod.*), and Mansukh Wani.

Altogether, there were 28 contributions in the March 2018 issue, inclusive of an editorial by the guest editors, 19 research articles, three research notes, and five reviews. Dr. Douglas Kinghorn (Editor, *J. Nat. Prod.*) said that he was "very pleased at the overall quality of this special issue, and wished to thank the guest editors and the regular journal editors for their role in bringing this about, and, in particular, Steve Swanson, for suggesting initially that the 2018 special issue of the *Journal* be devoted to Dr. Horwitz."

After this presentation, Dr. Horwitz commented, "When Dr. Kinghorn first mentioned to me the idea of having a special issue of the *Journal of Natural Products* in my honor, I did not give it much thought. However, when I actually saw the issue, I was thrilled, particularly because of the beautifully written introduction by the guest editors and the many contributions from my colleagues. Being the first woman to be honored in this manner by the *Journal* made it even more special. Many female scientists have contributed to the study of naturally occurring, bioactive compounds. I hope that young scientists, of both sexes, will continue to explore this diverse area of study that emphasizes the relationships between all living things."

Dr. Mooberry further stated, "This special issue is noteworthy in many regards, but especially because of the exceptional impact of Dr. Horwitz's research. Her discovery of the mechanism of action of taxol was a breakthrough that spurred its clinical development, leading ultimately to the approval of taxol and multiple next-generation microtubule stabilizers. These drugs continue to prolong cancer patients' lives."

Dr. Kingston went on to say, "Susan's work was absolutely crucial for the development of taxol, as it was then known. Before her discovery of its unique mechanism of action it was just one compound (albeit a very promising compound) with good anticancer activity in animal models and an unknown mechanism of action. After her work, it was recognized as a truly exciting lead compound with a new mechanism of action, and this recognition helped to sustain it through the challenges of its Phase I clinical trials."

Those who are interested in cancer research, please take another look at this special issue of *J. Nat. Prod.* for March 2018 (volume 81, pages 449-721), at pubs.acs.org/journal/jnprdf. ■

"Susan's work was absolutely crucial for the development of taxol, as it was then known. Before her discovery of its unique mechanism of action it was just one compound (albeit a very promising compound) with good anticancer activity in animal models and an unknown mechanism of action. After her work, it was recognized as a truly exciting lead compound with a new mechanism of action, and this recognition helped to sustain it through the challenges of its Phase I clinical trials."

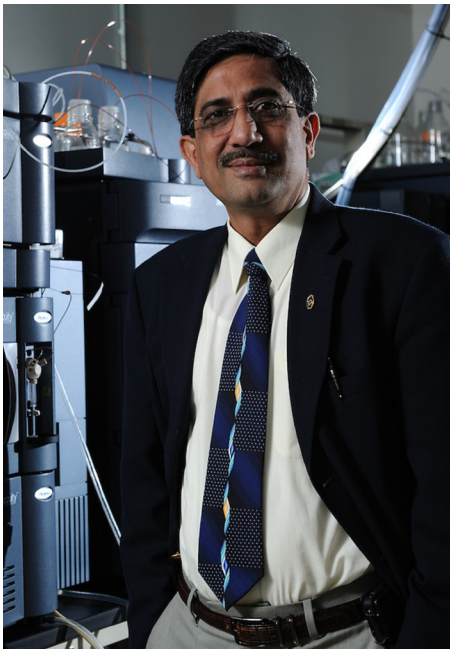
Khan Twice Honored in 2018

"...Dr. Khan is a scientist and a leader who has devoted his life to the creative use of all analytical methods to provide important scientific information about natural products."

By Dr. Edward Kennelly

Dr. Ikhlas Khan, who was made an Honorary ASP Member last year, has recently received two additional significant honors. The AOAC INTERNATIONAL bestowed upon him the Harvey W. Wiley Award, the highest scientific honor for his lifetime achievements in analytical science. Furthermore, the University of Mississippi named Dr. Khan one of their three inaugural distinguished professors.

Dr. Khan is a longtime member of the ASP and is well-known for his cutting edge approach to plant natural products research. He is currently the Director of the National Center for Natural Products Research at the University of Mississippi. He first joined the University of Mississippi in 1988 as a postdoctoral research associate and has spent most of his career since at that institution. Each year for almost two decades, Dr. Khan has organized the International Conference on the Science of Botanicals held in Oxford, Mississippi, and twice hosted ASP annual meetings in Mississippi.



Dr. Ikhlas Khan

ASP President Susan Mooberry commented, "It is wonderful to learn that the significant scientific achievements of Professor Ikhlas Kahn have been recognized by the AOAC, with his receipt of their highest honor, the Harvey W. Wiley Award, and by the University of Mississippi with the award of one of their first Distinguished Professorships. Our congratulations to Professor Kahn on these well-deserved awards."

The Wiley Award is the highest scientific honor given by the AOAC INTERNATIONAL for lifetime achievements in the field of analytical science. Dr. Khan chaired the Wiley Award Symposium that was part of the AOAC's 2018 Annual Meeting in Toronto in August. With regards to the University of Mississippi, Dr. Khan was one of only three inaugural distinguished professors named this year. This a new designation for the University of Mississippi to recognize the best faculty with sustained excellence.

Dr. Khan has published more than 700 scientific papers. His research focuses on medicinal plant authentication using state of the art techniques for analytical fingerprinting. He also works on drug discovery, including the isolation and characterization of active constituents with significant biological activity like the antimalarial drugs of aminoquinoline class.

ASP Fellow and past president, Dr. Alice Clark, noted about his awards, "...Dr. Khan is a scientist and a leader who has devoted his life to the creative use of all analytical methods to provide important scientific information about natural products. A key factor in his success is his exceptional ability to unite people, tools, methods, and information to address important scientific questions for the benefit of human health. He is widely known and respected for creating lasting scientific collaborations across disciplinary and geographic divides — collaborations that frequently have also become friendships that span decades. His leadership, expertise, humor, and warmth are much appreciated, and he is a worthy recipient of these unique and prestigious recognitions."

Dr. Khan has been a devoted member of the ASP for many years, and the Society sincerely congratulates him for his recognitions this year. ■

A key factor in his success is his exceptional ability to unite people, tools, methods, and information to address important scientific questions for the benefit of human health.

How ASP Helped Me Get a Fulbright US Scholar Award

By Dr. Stephen Deyrup

*(**Author's note:** I was recently selected to be a Fulbright US Scholar 2018-2019 to Hong Kong, and Dr. Ed Kennelly, former ASP president, editor of this newsletter, and Fulbright alumnus, suggested that I could write a brief article about how the ASP helped me achieve this decades-long goal. I accepted, and I hope you find the following narrative instructive, encouraging, and at least a little bit entertaining.)*

Fulbright Scholars to Hong Kong Drs. Steve Deyrup and Mitch Sutter (2nd and 3rd from left, respectively) with Fulbright Alumni Drs. Ed Kennelly (left) and Fritz Davis (right) at the pre-departure orientation.

It all started, as much does, in graduate school when my advisor (ASP member Dr. Jim Gloer) encouraged me to present a poster at the 45th annual meeting of the ASP in Phoenix. It was there and at the Corvallis ASP annual meeting the following year that I discovered that the ASP was not only a scholarly organization, but an extremely friendly one. I was welcomed, and even though I felt that I "was just a lowly graduate student," it became rapidly clear that the ASP did not treat anyone that way. I was included in conversations with PIs whose papers I had admired, and I was provided with opportunities to get to know both established and young ASP members. Foremost among those who welcomed me were Drs. John Cardellina, Nick Oberlies, Gil Belofsky, and Phil Proteau.

Fast forward the fall of 2012 when I started my first independent position that had a research component at Siena College, near Albany, NY. Having the ability to travel to conferences again, I chose to go to the 2013 annual ASP meeting in St. Louis. I chose this conference not only due to my continued interest in natural products chemistry, but also because I knew my undergraduate students would be warmly welcomed, as I was.

One of my initial departmental duties at Siena was as the departmental seminar coordinator. I started reaching out to ASP members, and they answered the call magnificently! Using my ASP connections, I was able to provide Siena students with amazing seminars from Drs. Oberlies, Sean Brady, Marcy Balunas, and Liz Nolan. Also, it was in my capacity as seminar coordinator that I reached out to Dr. Kennelly to see if he would be able to give a talk at Siena. He cordially responded (on the same day, I might add) to my e-mail saying that he would be unable to speak for us since he would be out of the country on a Fulbright US Scholar award to Hong Kong.

Well, it has been a dream of mine ever since I met my wife to spend a significant amount of time in Hong Kong. My wife is a native of Hong Kong, and I always knew that I would want our children to experience both parents' cultures. Dr. Kennelly had provided me with inspiration. I now knew it could be done, and I knew someone who had done it!

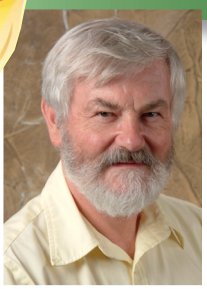
I first met Dr. Kennelly in person at the 2014 annual ASP meeting in Mississippi. He was about to depart on his adventure to Hong Kong, and he promised to give me more information upon his return. He was as good as his word, and at the 2015 meeting in Colorado, he introduced me to Dr. Zhongzhen Zhao (a.k.a. ZZZ) from Hong Kong Baptist University, who in turn connected me to his colleague at HKBU, ASP member Dr. Hongjie Zhang. Dr. Zhang is a prominent natural products chemist who was at UIC for some time before joining the School of Chinese Medicine at HKBU.

After talking to Dr. Zhang for a while, he agreed to meet up with me on my next trip out to Hong Kong and to show me around his department. In the summer of 2016, I visited his lab at HKBU, and he graciously showed me around and talked with me for most of an afternoon. I tentatively floated the idea about spending my sabbatical working in his lab, and he showed preliminary interest. The next year, I applied for the Fulbright grant, and Drs. Zhang and Aiping Lyu, the Dean of the School of Chinese Medicine, were instrumental in helping me put together a competitive application. My proposal was also bolstered by getting to see what a successful application looked like, since Dr. Kennelly shared his proposal with me.

Now, as I sit in my hotel room at the Lexington ASP annual meeting, having just returned from a dinner with the ASP Hong Kongers (Drs. Kennelly, Zhang, Ray Cooper, and Chun-Tao Che), I am reflecting on how pivotal being an ASP member and coming to the annual meetings has been in my early career success. Not only did the friendliness, consideration, and guidance of ASP members help me obtain a Fulbright US Scholar grant, but the ASP has also helped me in other ways. A research starter grant by the society helped me get my first independent research paper, and two members of the ASP served as external reviewers for my tenure and promotion packet.

As I advance in my career, I hope that I am able to live up to the standards set by Drs. Gloer, Oberlies, Kennelly, Cardellina and Zhang as well as all the other members who have been so kind to me. I deeply appreciate the effort and time they have invested in me, and I hope to pay those investments forward to other ASP members in any way that I can. So, my penultimate words of this note are to say if there is a way an ASP member can help you, "Be brave and reach out, you'll be amazed by how kind and generous they can be." My final words of this piece are a simple, "Thank you." ■

Hot Topics in Pharmacognosy: Some Up-to-Date Musings Covering a Variety of Chemical and Molecular Pharmacological Topics



By Dr. David Newman

Rather than concentrate on one aspect of pharmacognosy (using the widest sense of the term), which in the case of the last few columns have been heavily microbial in character, I have selected four up-to-date papers from a number of sources that cover a variety of topics, including drug activities that are unexpected and that may include some aspect of the molecular biology of cells.

CANNABINOIDS AND POTENTIAL PANCREATIC TUMOR TREATMENT

There was great excitement in the lay press a few weeks ago when the FDA announced the approval of the non-hallucinogenic compound cannabidiol (CBD; **1**) from *Cannabis sativa* (Epidiolex® or Nabidiolex®). These reports totally ignored the "fact" that the hallucinogen delta-9-tetrahydrocannabinol (Dronabinol® ; **2**), had been approved by the FDA back in 1986.

A very simple search of the literature would have demonstrated that there are other derivatives such as lenabasum **(3**) in Phase III and cannabidivarin (**4**) in Phase II trials at the moment, all of which gives one cause to wonder about the term "science journalist"!

However, moving on into the scientific arena, a very recent paper in *Oncogene*[1] by a multinational group from the UK, Australia and Italy, demonstrated in mice that a combination of CBD (**1**) and gemcitabine (**5**) increased the lifespan of mice bearing infiltrating pancreatic ductal adenocarcinoma (PADC) cell lines by a factor of close to three. In humans diagnosed with PADC, the five-year survival rate is ~5%. In this paper, using a combination of genetic ablation of the G protein-coupled receptor GPR55 to identify the potential target of the CBD, the authors demonstrated an almost three-fold decrease at the 50% death level for the combined treatment. For those who can gain access to the paper online, the Kaplan-Meier plot of the four different treatments (vehicle, CBD, GEM and CBD/GEM) are quite distinctive with the first three close together and the fourth showing the almost three-fold difference. Unfortunately, copyright restrictions do not allow reproduction of this data. The authors also performed *in vitro* studies to confirm a direct effect upon the cell lines used, and then looked for off-target effects in the cell's kinome in case these were a possible cause of the effect. Another "plus" was the discovery that CBD inhibition of GPR55 affected the pathways that led to acquired resistance to GEM.

Granted, these were studies in mice, not in human patients, but the potential for studies in man, where now one may use two approved drugs in combination, is very high. It should also be pointed out that NCI and pharmaceutical companies have trials running where two different antitumor drugs are used, but this may be the first report of where a non-tumor active agent plus an antitumor agent demonstrated significant synergy where the mechanism (or most of it) has been identified.

INHIBITION OF KINASES AS A TREATMENT FOR VISCERAL LEISHMANIASIS

Leishmaniasis, as the Brazilian and Central American members of ASP can attest to, is a major disease with no particularly effective treatments in the physician's armamentarium, though the disease is not limited to Central and South America but causes between 20,000 and 40,000 deaths per year, with the majority in the Indian subcontinent and related geographic areas. Current treatments use amphotericin B, miltefosine, paromomycin and antimonials, none of which are "nice" treatments for a patient to undergo, and whose mechanisms of action (MoA) are effectively unknown in this disease, so any potential agent with a known MoA may well be preferable.

A very recent paper in *Nature* by the Dundee Drug Discovery group[2] reported on a series of compounds that came from the well-known protein kinase inhibitor base scaffold, pyrazolopyrimidine. The chemistry and molecular pharmacology in this paper, describing the development of a potential pre-clinical lead, is such that it should be an excellent training tool not only for students in pharmacy but also in medicinal chemistry.

By using a series of compounds that commenced with data from a substituted thiazole, the investigators at Dundee, in collaboration with a group at GSK, developed a substituted pyr-

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There was great excitement in the lay press a few weeks ago when the FDA announced the approval of the non-hallucinogenic compound cannabidiol (CBD; 1) from *Cannabis sativa* (Epidiolex® or Nabidiolex®).

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azolopyrimidine (DDD853651; **6**) that demonstrated excellent activity in both free-living and macrophage-enclosed axenic amastigotes, at the nM level in the free-living parasite and at the 1.4 μM level in cells. Using some excellent molecular biological and pharmacological techniques, coupled to state-of-the-art analyses of proteins bound to specific beads (particularly in kinome assays), these investigators demonstrated that the target was the leishmanial kinase CRK12 which was very closely coupled to CRK9. They are very careful to point out that there may also be an element of "polypharmacology" as their proteomic studies also showed binding of compound **6** to CRK3 and CRK6 but with considerably lower affinities. To relate to human "targets," CRK12 is the parasite's cdc-2 kinase.

The authors are very careful to point out that these are initial studies, and due to the lack of knowledge of the leishmanial/human interactions at the molecular level, significant amounts of work will have to be performed to further develop this series at the preclinical level, but this is one of a very few "validated" targets in this parasite.

This type of work falls under the rubric "not enough potential return on investment (RoI) for Big Pharma." Although GSK and Novartis have small groups looking into such diseases, they are not diseases with a good RoI, but are good for publicity.

THE "TRUE" TARGET OF METFORMIN?

The next article that I will comment on is one on a very well-known drug, metformin (**7**). In a very recent paper[3] a multinational group from the US, Australia, Canada, and China, demonstrated that this biguanide has a different MoA from those described in the previous literature, even though it has been the first line treatment for Diabetes 2 for many years. Most of the studies previously reported (perhaps all performed in rodent models), used much higher doses than those used therapeutically in man when adjustments were made for the differences in the animal models.

In this paper, the investigators did not find any inhibition of mitochondrial complex I, which was one of the mechanisms ascribed to its inhibition of gluconeogenesis in humans. These investigators demonstrated in previous work that metformin inhibits glycerol-3-phosphate dehydrogenase (GPD2), an essential enzyme in the α-glycerophosphate shuttle when treated at relevant concentration, "loss of hepatic GPD2 expression phenocopies metformin treatment. Furthermore, we demonstrated that metformin's ability to decrease plasma glucose concentrations and hepatic glucose production is abrogated when hepatic GPD2 protein expression is ablated genetically in GPD2 knockout mice or transiently in rat treated with a GPD2 antisense oligonucleotide."

"Metformin, at clinically relevant plasma concentrations, inhibits hepatic gluconeogenesis in a redox-dependent manner independently of reductions in citrate synthase flux, hepatic nucleotide concentrations, acetyl-CoA carboxylase activity, or gluconeogenic enzyme protein expression."

Using ^{13}C tracer techniques, the authors demonstrated that clinically relevant levels of metformin, when tested in awake normal and diabetic rats, inhibited gluconeogenesis from lactate and glycerol but not from pyruvate or alanine. They used multiple methods of administration with effectively the same results, implicating an increased "cytosolic redox state" as mediating metformin's pharmacological effect. Further studies that altered the redox state by use of methylene blue or non-redox state dependent substrates, confirmed their findings. These were nicely described by the following statement in their abstract: "Metformin, at clinically relevant plasma concentrations, inhibits hepatic gluconeogenesis in a redox-dependent manner independently of reductions in citrate synthase flux, hepatic nucleotide concentrations, acetyl-CoA carboxylase activity, or gluconeogenic enzyme protein expression."

CONSTRAINED PEPTIDES AS NOVEL ANTIBACTERIAL AGENTS

The final compound described in this current column, is from a brief report in the "News and Analysis Section" in the August 2018 issue of *Nature Reviews Drug Discovery*.[4] This article comments on "constrained cyclic peptide drugs" that are not yet approved. The only currently approved constrained peptide drug would be ziconotide, with cyclic peptide drugs and candidates, both "constrained and simply macrocyclic peptides," being described in a review paper published in early 2018.[5]

In 2008, a group in Switzerland associated with the University of Zurich and the biotech company Polyphor published a review article[6] describing the protein epitope mimetic (PEM) approach, in which folded 3D structures of peptides and proteins were used for the design of synthetic molecules that mimicked key epitopes involved in protein-protein and protein-nucleic acid interactions. If one then transfers the epitope from a recombinant to a synthetic scaffold, one may use parallel combinatorial methods, but with the advantage that these are based upon an "active scaffold" rather than "imagination." In 2010 Srinivas et al.,[7] reported in *Science* on a series of peptidomimetic antibiotics derived using the PEM approach that targeted the outer-membrane biogenesis in *P. aeruginosa*. The target of these compounds was found to be a homolog of the β-barrel protein LptD (also known as Imp/OstA) which functions in outer-membrane biogenesis in this microbe as a cellular target. The compound that resulted

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from a series of optimizations is now known as murepavadin (**8**) and appears to be specific for *P. aeruginosa* infections, with activity in murine *in vivo* models of infection.

Over the next few years, this compound went into clinical trials in man and is currently in two Phase III trials NCT03582007 (which is approved but not yet recruiting) and NCT03409679, which is currently recruiting, both against P. *aeruginosa* infections, with another trial also being performed in Europe (2017-003933-27). In addition, the compound was designated in 2014 as both "fast track" and "qualified infectious disease product or QIDP" by the FDA. Thus, this compound and its mechanism may be one worth following. Finally, a current paper covering the compound was published by Thakare et al.,[8] in 2018 which should be consulted for the synthetic schemes involved.

CONCLUSIONS

The results for the four compounds described above, whether old or new, are from very recent (July-August 2018) publications, and it will be very interesting to follow the citation records in the next few years. However, in my opinion, current findings such as these need to be integrated into teaching in professional and graduate schools, as drug design and activities move away from what might be called "classical methods," and also as examples of where some current dogma may be incorrect, particularly in the case of metformin.

I realize that the comment above means that instructors need to be current on their literature searches, rather than relying on outdated textbooks or last year's notes, but that should be par for the course in any teaching operation. ■

...current findings such as these need to be integrated into teaching in professional and graduate schools, as drug design and activities move away from what might be called "classical methods"

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LITERATURE CITED

1 Ferro, R., Adamska, A., Lattanzio, R., Mavrommati, I., Edling, C. E., Arifin, S. A., Fyffe, C. A., Sala, G., Sacchetto, L., Chiorino, G., De Laurenzi, V., Piantelli, M., Sansom, O. J., Maffucci, T. and Falasca, M. GPR55 signaling promotes proliferation of pancreatic cancer cells and tumour growth in mice, and its inhibition increases effects of gemcitabine. *Oncogene*, **2018**, doi 10.1038/s41388-018-0390-1

2 Wyllie, S., Thomas, M., Patterson, S., Crouch, S., De Rycker, M., Lowe, R., Gresham, S., Urbaniak, M. D., Otto, T. D., Stojanovski, L., Simeons, F. R. C., Manthri, S., Maclean, L. M., Zuccotto, F., Homeyer, N., Pflaumer, H., Boesche, M., Sastry, L., Connolly, P., Albrecht, S., Berriman, M.,Drewes, G., Gray, D. W., Ghidelli-Disse, S., Dixon, S., Fiandor, J. M., Wyatt, P. G., Ferguson, M. A. J., Fairlamb, A. H., Miles, T. J., Read, K. D. and Gilbert, I. H. Cyclin-dependent kinase 12 is a drug target for visceral leishmaniasis. *Nature*, **2018**, doi 10.1038/s41586-018-0356-z

3 Madiraju, A. K., Qiu, Y., Perry, R. J., Rahimi, Y., Zhang, X.-M., Zhang, D., Camporez, J.-P. G., Cline, G. W., Butrico, G. M., Kemp, B. L.,Casals, G., Steinberg, G. R., Vatner, D. F., Petersen, K. F. and Shulman, G. I. Metformin inhibits gluconeogenesis via a redox-dependent mechanism *in vivo. Nature Med.,* **2018**, doi 10.1038/s41591-018-0125-4

4 Morrison, C. Constrained peptides' time to shine? *Nature Revs. Drug Discov.,* **2018,** *17,* 531-533.

5 Luther, A., Bisang, C. and Obrecht, D., Advances in macrocyclic peptide-based antibiotics. *Bioorg. Med. Chem.,* **2018,** *26,* 2850-2858.

6 Robinson, J. A., DeMarco, S., Gombert, F., Moehle, K. and Obrecht, D. The design, structures and therapeutic potential of protein epitope mimetics. *Drug Discov. Today,* **2008,** *13,* 944-951.

7 Srinivas, N., Jetter, P., Ueberbacher, B. J., Werneburg, M., Zerbe, K., Steinmann, J., Van der Meijden, B., Bernardini, F., Lederer, A., Dias, R. L. A., Misson, P. E., Henze, H., Zumbrunn, J., Gombert, F. O., Obrecht, D., Hunziker, P., Schauer, S., Ziegler, U., Käch, A., Eberl, L., Riedel, K., DeMarco, S. J. and Robinson, J. A. Peptidomimetic antibiotics target outer-membrane biogenesis in *Pseudomonas aeruginosa. Science,* **2010,** *327,* 1010-1013.

8 Thakare, R., Dasgupta, A. and Chopra, S. Murepavadin, *Drugs Fut.,* **2018,** *43*, 161-173.

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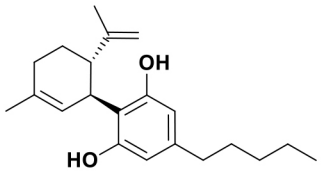
STRUCTURES



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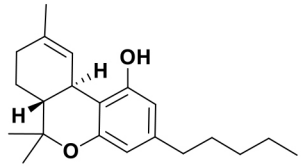

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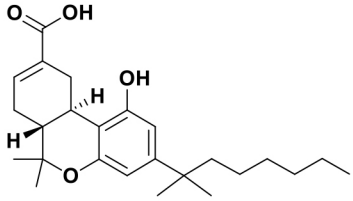

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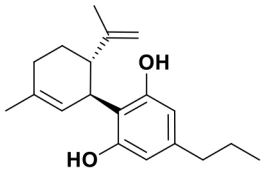

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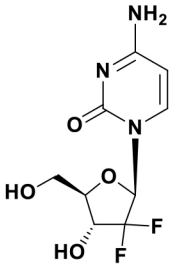

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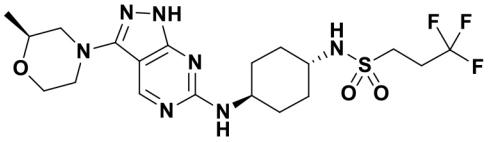

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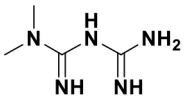
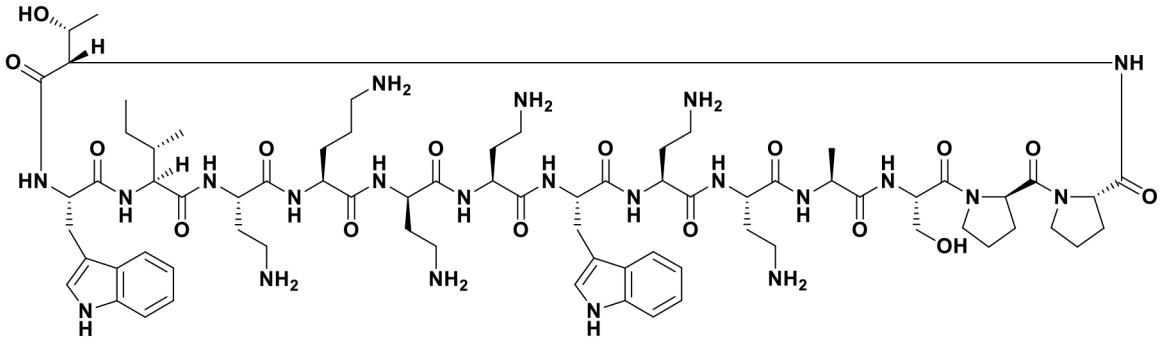


7. Metformin



8. Murepavadin

Behind the Scenes in Pharmacognosy: Bioactivity-Based Molecular Networking

By Ms. Andrea Rague

In April of 2018, the *Journal of Natural Products* published an article entitled, "Bioactivity-Based Molecular Networking for the Discovery of Drug Leads in Natural Product Bioassay-Guided Fractionation," authored by ASP member Dr. Pieter Dorrestein and his postdoctoral research associate Dr. Louis-Félix Nothias, among others, from University of California at San Diego and collaborating research institutes. Dr. Dorrestein is currently a professor at UCSD's Skaggs School of Pharmacy and director of the Collaborative Mass Spectrometry Innovation Center. We thank Drs. Dorrestein and Nothias for taking some of their time to share their work and insights with ASP members. Please read the full article in the *Journal of Natural Products,* **2018,** 81, pp 758-767.

The Dorrestein Lab at University of California, San Diego, Skaggs School of Pharmacy

How did you become interested in new applications of mass spectrometry for natural products chemistry?

Dr. Dorrestein: This dates back to graduate school. In grad school I worked with Dr. Tadgh Begley on how vitamins were biosynthesized by bacteria. During this work I started working with Dr. Fred McLafferty and learned how powerful mass spectrometry is. For example, in grad school I showed that the C-terminal end of ThiS, a protein that structurally looks like ubiquitin, is adenylated on the C-terminal end. This activation makes way for the generation of a thiocarboxylate. This thiocarboxylate was then used as the sulfur source to make thiazole phosphate, the active portion of thiamine. What was most interesting was then ThiG, the thiazole synthesis, formed an imine with deoxy-xylulose-phosphate, a saccharide. This allowed ThiG to hold onto the saccharide until ThiS-thiocarboxylate could transfer the sulfur to the saccharide. Interestingly, during this sulfur transfer the oxygen from the sugar was transferred to the terminal caboxylate of the ThiS protein. Now we have the ThiG-saccharide with a sulfur covalently bound and the final product was made by the oxidation of glycine and cyclization and decarboxylation. All of this was determined by mass spectrometry including a 2Da increase of the protein when the saccharide was labeled with 18O. From then on, I was hooked on mass spec and saw what it can do for the understanding of small molecules biosynthesis, which is what I studied with Drs. Neil Kelleher and Chris Walsh during my postdoc, in particular by looking at new ways to characterize these molecules, along with understanding their functional role.

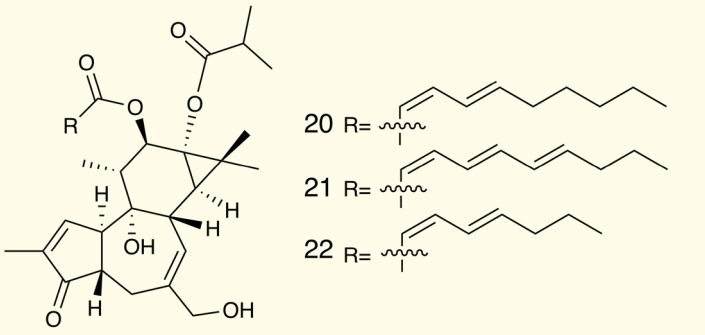
Dr. Nothias: During my PhD in France, I got the chance to be sent by my PhD advisor, Prof. Costa, for training on advanced mass spec techniques at an MS manufacturer in Paris. When I returned to the university, I was really excited to experience the capabilities of the lab's brand new LC-MS instrument, in particular for the analysis of bioactive plant extracts. It came as a shock when I realized that days of hard work were required to interpret a tiny portion of the MS/MS data collected from a few extracts. I found Pieter's paper, "Molecular Networking as a Dereplication Strategy" in *J. Nat. Prod.* (2013), and I quickly realized the potential of this approach in bioassay guided fractionation. After my PhD, I had the chance to join Pieter's lab.

Could you provide a brief explanation of the work and results in your own words?

It is common to lose activity during the purification of the natural products. Some possible reasons for this are: the bioactive molecule is unstable; or that the bioactive molecule(s) is present in extremely low concentration, and thus difficult to purify in the complex extract. We thought up a strategy that allows us to prioritize the molecules that are likely bioactive. Bioassay is performed for each fraction obtained and LC-MS/MS data in untargeted mode is also acquired. With both results, it is possible to compute a bioactive molecular network, where the putative bioactive candidate and spectral relationships are displayed. One of the benefits of that approach is that it limits the need to run additional rounds of bioassay, which is often a limiting step in such a purification procedure. With this approach, the purification can be focused on the bioactive candidates, using mass spectrometry as guide for purification. Once pure, the molecules can be evaluated for bioactivity. In collaboration with our partners (CNRS-University of Corsica in France, and EMBL in Germany), we have applied this procedure for the reinvestigation of previous bioassay-guided fractions that did not succeed in obtaining the bioactive constituents. This bioactive molecular network procedure enabled us to rapidly annotate bioactive candidates from antiviral Euphorbia plant extracts. The targeted isolation and the bioevaluation showed that the predicted bioactive compounds were indeed active. The protocol can be freely employed by anyone, github.com/Dorrestein-Laboratory/Bioactive_Molecular_Networks.

Who in your lab was involved with this research?
Louis Felix Nothias was the lead on the project from our side, while Melissa Esposito (CNRS) performed the isolation and identification of the molecules. Also, it was remarkable that Zheng Zhang and Abinesh Sarvepalli, two of our most talented undergraduates, joined the lab for this specific project and are now working on other computational development.

Were there any new techniques or instrumentation that you learned to use specifically for this research?
The main challenge was to build a robust bridge between semi-quantitative LC-MS capability and MS/MS molecular networks, which did not exist at that time. To do this, we worked with Dr. Theodore Alexandrov (EMBL) on an open source OpenMS-based prototype in 2016 (GNPS-Trinity), and finally incorporated these new features in the MZmine2, a popular open source toolbox. This eventually gave birth to "feature based molecular networking" (ccms-ucsd.github.io/GNPSDocumentation/featurebasedmolecularnetworking/), an advanced version of molecular networking that is already adopted by many in the GNPS community.



Deoxyphorbol ester derivatives isolated from the extract of *Euphorbia dendroides* using bioactive molecular networking. All three compounds had significant bioactivity scores. Compounds 21 and 22 are selective, submicromolar inhibitors of chikungunya virus replication.

In this study you developed a workflow that utilizes tandem mass spectrometry, bioactivity score prediction, and molecular networking to more efficiently determine the active constituents of bioactive extracts. What relevance does this have to other fields of science?
Here we show a drug lead discovery project as example; however, every biological or physical readout can be utilized here and mined with different statistical approaches. Applications for this exist from agriculture, to ocean health, human health, and microbial ecology. For example, it could be possible to find and annotate metabolites induced by pH gradients applied to a microbial community.

What do see as the next evolution of open access databases such as GNPS? (i.e. Will mass specs and AI replace the next generation of grad students?)
I see it evolving into a field that openly shares and disseminates knowledge. It will evolve to an infrastructure that is as useful and widely used as sequencing is today, perhaps even more widely used as small molecules are a functional readout of the system studied. Ultimately this readout will be as easily retrievable as a text search in web search engines. This will only be possible if the natural product community shares their knowledge in a digital format. No, it will not replace grad students. It will make grad students more efficient and allow them to ask bigger and bolder questions.

Have you worked any further on this bioactive molecular networking strategy since the article was published?
Yes, we have applied it to other systems and are already working on a more advanced procedure.

How do you envision routine natural products research methodology changing because of advances in mass spectrometry and molecular networking?
This technique allows the cross comparison of data from different laboratories in a few hours, along with consolidation of knowledge associated with collections, even when the lab that collected them retires or when the student or postdoc moves to a new position. As algorithms improve it will become even better. Soon every signal that is observed will have a structural classification and, perhaps immediately at least, a partial structure associated with it. This will transform the field.

What is a favorite non-scientific activity of your lab?
For most it is spending time with their families.

Does your lab have a motto or slogan?
"If you don't break the instruments … you are not using them." This slogan is there to indicate to not be afraid to run these expensive instruments.

What is your greatest extravagance in the lab?
Maintaining and operating the 14 mass spectrometers.

How do you celebrate accomplishments in your lab?
I let people know when I appreciate them for the amazing work they have done, or if there is a specific task that was accomplished that was particularly hard to do. There are rewards I provide at times and these are person specific. Extra paid time off, a new laptop to use, travel to go to meetings, collection trips, authorship for reviews, etc.

What advice would you give to scientists starting their careers in natural products?
Be creative; share your data and knowledge. The world of natural products is so vast that only a tiny portion of the world's natural products and their functions have been investigated. Working together with others is a great way to improve the speed of discovering natural products and to address the most interesting questions that are still out there. ■

Meet a New ASP Member

Dr. Sang Hee Shim is our featured new member in this fall issue of the Newsletter. *She is an associate professor at the College of Pharmacy, Duksung Women's University in Seoul, South Korea. We are grateful for a chance to officially welcome Dr. Shim to the ASP.*

Dr. Sang Hee Shim/Photo by Aleena Go

How did you hear about the ASP?
I first heard about ASP in 2001 when I started graduate school at the Natural Products Research Institute, Seoul National University, in Professor Sam Sik Kang's lab. After I got a faculty job in Korea, I attended several ASP meetings in Athens (2008), San Diego (2011), New York (2012), Copenhagen (2016), and Lexington (2018).

Why did you join ASP?
I joined ASP because I wanted to be exposed to various aspects of working with natural products, but more importantly, to interact with natural products scientists.

What would you like to achieve through your membership?
I would like to be connected to the natural products community and continue to attend meetings to obtain insight into recent developments in natural products research.

Do you belong to any other scientific societies?
I also belong to the Pharmaceutical Society of Korea, the Korean Society of Pharmacognosy, the Korean Society for Microbiology and Biotechnology, and the Korean Society of Mycology.

What are your current research interests in pharmacognosy?
My current research interests are focused on discovery of bioactive secondary metabolites from endophytes. So far, endophytes have been rich, reliable sources of chemical diversity. A number of bioactive compounds have been discovered from cultures of endophytic fungi and bacteria. In addition, some pharmaceutical agents derived from plants have been found to be produced by endophytes within the host medicinal plants, proving that the host plant and symbiotic endophytes are communicating with each other metabolically. I have been really fascinated by the metabolic interaction between the medicinal plants and their endophytes.

What is your scientific background?
I have an undergraduate degree in pharmacy from Duksung Women's University, Seoul, South Korea. Then I received an MS degree in pharmaceutical analysis from Seoul National University. During my Master's degree, I was involved in a project focused on the discovery of hair growth activating compounds from *Artemisia* sp. under the supervision of the late Prof. Bak-Kwang Kim. I became more interested in the field of natural products chemistry, and I decided to continue my education. I received my PhD in natural products chemistry in 2004, working on the isolation and structure elucidation of compounds from several *Aconitum* sp. in Korea under the supervision of Prof. Sam Sik Kang at the Natural Products Research Institute, Seoul National University, Seoul, Korea. After completing my PhD, my desire to investigate diverse skeletons of secondary metabolites from microorganisms led me to join Prof. James Gloer's group at the University of Iowa, Iowa City, USA as a postdoc with support of the National Research Foundation of Korea. Then I worked with Prof. Jimmy Orjala at the University of Illinois at Chicago, USA for research of cyanobacterial metabolites until I came back to Korea to be a faculty member at Yeungnam University, Gyeongsan, Korea in 2007. From 2007 to 2014, I worked as a faculty member of the Biotechnology department, Yeungnam University until I moved to the College of Pharmacy, Duksung Women's University in Seoul in 2015. Also, in 2012, I joined Dr. William Gerwick's lab at Scripps Institution of Oceanography, UCSD, San Diego, USA as a visiting scholar during sabbatical leave.

What inspires you in your work?
The idea that the projects I am working on could one day be a drug that could help someone is pretty inspiring. Additionally, students who do this research with me are extremely motivating.

What is your favorite organism (to study, or for general interest)?
My favorite organisms are endophytes; they are great sources of chemical diversity. My current projects are mainly identifying novel compounds with strong activities from cultures of endophytic fungi and bacteria.

What do you like doing in your spare time?
I enjoy spending time with my family and playing with my ten-year-old girl. I recently started to play golf. When time allows, I love to travel and explore all around the world.

What are you currently reading?
I am currently reading a book on world history that includes Korean history. Looking at past history, we can predict what will happen in the future. ■

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 14 full members and 10 associate members. We look forward to meeting you and learning more about you and your work

FULL MEMBERS

Dr. Fatma Al-Awadhi
Assistant Professor
Kuwait University
Kuwait City, Kuwait

Dr. Chia-Chuan Chang
Associate Professor
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Taipei, Taiwan

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An Ethnobotanist's Circuitous Route to the Amazon

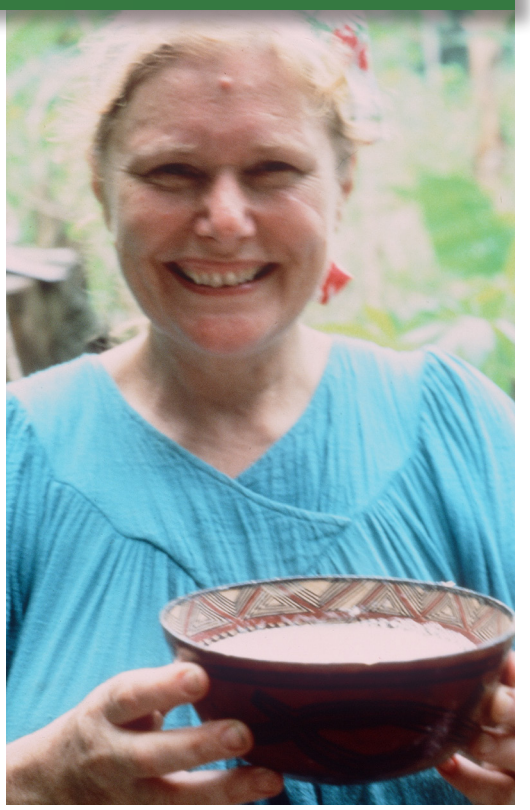
By Dr. Memory Elvin-Lewis

I evolved into an ethnobotanist by a serendipitous event. After my BA in Bacteriology and Genetics, I trained as a medical technologist and worked in that capacity for a number of years. My graduate training was in medical microbiology, virology and epidemiology. As a faculty member at Washington University School of Dental Medicine in the early 1970s, I was studying a couple of local Burkett's Lymphoma cases linked to an outbreak of infectious mononucleosis in a middle school in nearby Granite City. It was known that these diseases were caused by Epstein Barr virus infections, with the latter known to cause jaw and ovarian tumors. However, unlike tropical Africa where this malignancy was known to be more common in children, its occurrence in the Midwest was a rare and unexpected event.

As luck would have it, I was invited to accompany my botanist husband, Dr. Walter Lewis, to Ghana. As head of the herbarium at the Missouri Botanical Garden and a professor at Washington University, he was part of a team from the Academy of Sciences selected to help scientists there establish their research priorities in agriculture. It was an ideal time for me to visit since this country was undertaking clinical trials with vincristine to treat this aggressive B cell lymphoma. It was wonderful to see firsthand how this plant-derived compound was saving the lives of these seriously affected children. This event was my first introduction into how plant-derived compounds had true medicinal and pharmaceutical value.

Since an understanding of the underlying causes of dental disease were evolving at that time, I also inquired as to the general dental health of Ghanaians. I was told it was not considered a major issue since it was their belief that the use of local chew sticks and sponges used to clean teeth possibly possessed preventative properties. To test this hypothesis I began conducting studies in my laboratory to see if this might be true. At first, it was necessary for me to learn techniques used by pharmacognosists to extract these plant specimens and to test these for their antibiotic activities. To my delight, I found that, not only were my African specimens active against organisms causing tooth decay, but many contained sufficient fluoride to inhibit bacterial enzymatic activities related to plaque production as well as protecting tooth enamel.

During that period Walter and I started writing our book *Medical Botany,* which was designed to present data about pharmaceutical discoveries from plants as well as representative plants used worldwide in the context of those which were considered harmful, healing, and psychoactive. Like a book on internal medicine, the chapters were further divided into how these might affect specific human systems. To begin each chapter, we described how each system functioned. We divided the work according to our expertise and also learned from each other along the way. We also took a course in pharmacognosy at a school of pharmacy so as to better understand these aspects. Because of these efforts, we were able to collate a massive amount of data regarding plant uses for a wide variety of purposes which later was applied to our research elsewhere. It was considered the first of its kind, and won many awards for its usefulness as a teaching text and reference book. It was published in 1976, and a much larger second edition evolved in 2003.



Thus this small "back burner" project evolved into studying plants used for oral purposes worldwide. These efforts were funded by the National Geographic Society,

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Above: Dr. Memory Elvin-Lewis (top), who decided to study the effects of chew stick cleansing on teeth (center) after her first visit to Ghana (map, left).

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World Health Organization and Pan American Health Organization as well as commercial entities in Egypt and India. Also, I was fortunate to elicit the expert help of Walter, numerous other botanists, phytochemists, and scientists and the cooperation of local informants to define how careful plant selection was directly related to the oral health of the users. Among others that worked with me at Washington University were: Drs. Kenneth Keudell and Jennifer Gossling who, as microbiologists, studied the antimicrobial effects of chew sticks, Dr. Edward Kennelly who, as a graduate student, identified antibiotic dammarane compounds in the Jamaican chew stick, *Gouania lupuloides*, as did Dr. Adenwole Okunade who isolated bioreactive compounds from the African chew stick, *Garcinia afzelii*, Drs. E. El-Najdawi and H.J. Wedner who investigated essential oil hypersensitivity in aphthous stomatitis patients, Dr. Samuel Rosen at Ohio State University School of Dentistry who collaborated with me in investigating the anticariogenic in rats, and Dr. Robert Stillman, who evaluated the benefits of tea drinking among Chicano school children in an USPH clinic in Dallas, TX. Reference to the chapter on Oral Hygiene in the 2nd edition of *Medical Botany* provides a comprehensive review of the subject, in addition to details of the work done by my students and collaborators.

Noteworthy was an early study conducted in 1975 in collaboration with the botanist J.B. Hall and dental and other students at the University of Ghana. This effort was the first to utilize epidemiological techniques and FORTRAN analysis. It involved surveying 887 individuals in 11 linguistic groups to determine how their chew stick and chew sponge preferences were related to their oral health. It also provided a way to identify the seven favored taxa from the 173 species that were known. Correlating these data with laboratory findings, it was possible to establish the concept that the most favored plants were likely to be the most efficacious and bioreactive. I named the technique ethnodental/medical focusing.

Also, by applying this method as well as identifying other efficacious principles already known in the literature, we were able to establish the cultural and therapeutic rationale behind the plants used for tooth blackening among the Peruvian Jivaro and others in Amazonia with the collaboration of botanists at the Museo Historia Nacional in Lima. While tooth blackening was primarily used to obtund the bitter flavor of ayahuasca when used as a recreational beverage to elicit a communal hallucination, it also had dental benefits. Like *Camellia sinensis* tea, which I had previously studied, it prevented plaque build-up by the presence of its catechins and fluoride in dissociating the adherence, co-aggregation and acid production and formation of the sticky slime layers of glucans or levans of oral bacteria. In Peru, logistical support was graciously provided by Occidental Petroleum. In extending our studies on tooth extraction plants in Columbia, not only did Dr. Jose Perea Sasian from the Universidad Nacional de Colombia, Bogata drive us to our study sites in Cundinamarca, but he also volunteered to extract one of his teeth bloodlessly and painlessly using the sap of the local species, *Maclura tinctoria*. This plant was also found to have cosmopolitan value for the same purpose from Madagascar and throughout tropical Africa.

These studies laid the groundwork for establishing the pharmacopeia of the Achual Jivaro and neighboring localities situated on rivers in Loreto, Peru during the 1980s. This work was funded by NSF with Walter as PI in addition to both Occidental Petroleum and Petro Peru providing us with logistical and other support. We were able to conduct this research through the gracious hospitality of the indigenous people who gave their prior informed consent. We collaborated with ethnolinguists such as Mr. Daniel Fast and Dr. Maurizio Gnerre as well as numerous Peruvian botanists at

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Dr. Elvin-Lewis with her best friend, Julia, who provided her with food from her garden and fish from the river (top). Because of seasonal flooding of the river, homes were built on stilts (center). The raised huts, only seen at rivers edge, were more common in mestizo communities and were cooler and distant from biting river flies. (bottom).

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the Museo Historia Nacional and specialists at the MBG and elsewhere.

During that period from 1982 to 1988 we lived with our hosts for several weeks at a time, travelling to our sites by dug-out canoe, motor boat or oil company helicopter. Every day was full of excitement and adventure and something neither of us will ever forget. We will forever be indebted to these wonderful people who taught us so much about their culture and the uses of their medicinal plants. Examples of some of the plants we found with efficacious properties included Eucharis amazonica bulbs, effective against *Staphylococcus aureus* infections, and *Balansia cyperi* sclerotia containing ergobalansin found on the species *Cyperus prolixus* (known as piri piri). It is used as a common parturition aid throughout Amazonia, not unlike the related European species *Claviceps purpurea* on *Secale cereale* (rye) with its source of ergot alkaloids such as ergometrine and methylergometrine. Sadly, as the decade came to a close, it was evident that much knowledge was being lost as acculturation progressed.

In the 1990s we continued to work in Peru. An observation we made during our earlier work elicited my interest as a virologist when claims were being made that "you do not die of hepatitis if you take the root of this plant." Taking some samples back to our laboratory, I had them extracted and evaluated at Georgetown University Medical Center NIAID Hepatitis Contract Laboratory through the collaboration of Drs. J. Gerin, B. Korba and J. Casey. A number of specimens were found bioreactive against the local strain of Hepatitis B (HBV) and its satellite Hepatitis D virus (HDV) that had been collected at a nearby military base by Dr. Douglas Watts who was affiliated with the NAMRID unit in Lima. Also, through the courtesy of Dr. Gordon Cragg at the National Cancer Institute, it was found that the most bioreactive plant was inhibitory against HIV, possibly because HBV and HIV have reverse transcriptases.

To affirm these mechanistic studies, preliminary clinical evaluations by the Peruvian hepatologist, Dr. Alejandro Colichon, had already shown that the use of an extract of this plant was efficacious in a number of his HBV patients. He was very knowledgeable regarding the need to find solutions to curtail this endemic disease, which was lethal to so many that acquired it or the dual infection. For some time he had been assessing rates of this disease in the region and the response of immunization to the current HBV vaccine. By eliciting his collaboration and using this preliminary data, I was able to obtain a grant from what was then called the Office of Alternative Medicine at NIH. It was the object of this proposal to evaluate the therapeutic value of viral hepatitis remedies known to individuals in our original study locations and to apply ethnomedical focusing techniques, as well as clinical and serological analyses to assess their effect. My medical collaborator who accompanied me to the villages was Dr. Mauricio Navaro who was an affiliate in Dr. Colichon's laboratory. He did the physical examinations on the patients, and I conducted preliminary work on biomarkers found in their blood and urine. Liver function tests and other biomarkers were conducted in Dr. Colichon's laboratory.

It took us five years to complete this investigation, since logistical support from Occidental Petroleum was irregular; floods and low rivers made them impassible at times, and concerns about terrorists groups were always omnipresent. One quarter (523/2015) of the populations of 14 communities on four river systems were surveyed to understand their plant uses to treat hepatitis. Rates of infection on four river systems varied from 0.01-0.08%. Of the 358 individuals tested for their acute carrier status, 34 had been recently infected and four others were identified as chronic carriers.

Twenty-seven species in 14 plant families were identified, with the majority being trees and only a few herbaceous plants represented. Noteworthy was that ten of these taxa were selected for yellow plant parts, suggesting, at least in this disease, that the "Doctrine of Signatures" was frequently a defining factor as it is in other cultures.

At its conclusion, a pattern of favored plants emerged for both populations, with substitutions made when these were unavailable. Overall, when favored bioreactive treatments were applied appro-

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Dr. Elvin-Lewis' husband, Walter, a fellow ethnobotanist and collaborator (top). The couple often traveled to various sites by dug-out canoe (center), helicopter, motor boat, or seaplane (bottom).

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priately, and for an adequate period of time, the duration and severity of disease was significantly reduced as determined by clinical, serological and physiological parameters. Co-infections with HDV were prevented when appropriate treatments were applied at the onset of disease. Again, we were able to affirm that the most popular remedy was the most efficacious, thus verifying the value of the "ethnomedical focusing" technique. Rarely used alone, it was, especially in riverine communities where both mestizo and the Achual lived together, imbibed as decoctions or infusions of its root with other plants sequentially or mixed with plants known in cosmopolitan herbalism. These additions tended to amplify the effects of the remedy because of their anti-inflammatory, antiviral, diuretic, and other efficacious properties. Unfortunately, its popularity indicated it was becoming extirpated where it was needed the most. Choosing secondary, less potent choices was becoming more prevalent, such as when a chronic patient had to select another taxa to control recurrent events seen when reduced liver size and viral load became evident. Another significant finding was that even within family units, the formulae could vary from one person to another. In certain villages, knowledge was sometimes so incomplete as to have little therapeutic value.

Epidemiological studies indicated that transmission differed among indigenous and mestizo villages. The Achual tended to acquire their infection from one or more family members that had been exposed to these viruses through military tattoos, drinking masato contaminated by infectious spittle, or acquiring immunizations through improperly sterilized needles. In mestizo villages infections were related to proximity of an army base (with tattooing and prostitution), biting river flies, carriers with history of disease, etc., or river traffic bringing infectious individuals to their villages.

During this period, I was also a member of one of the survey teams studying the medicinal plants of the Aguaruna in the Alto Marañón basin. This ICBG-Peru project, with Walter as PI, involved a multifaceted approach engaging collaborators at Washington University, Searle and a number of NIAID and NCI testing laboratories in the US, University of Louisville, the Museo Historia Nacional, Universidad Cayetano Heredia and the San Marcos Universidad in Lima. In collaboration with indigenous and university attorneys, a two year negotiation period was necessary to outline the terms of engagement and issues associated with benefit sharing before collection could proceed. These negotiations became the basis for incorporation into the sui generis laws of Peru, and were cited as an appropriate example of how to conduct bioprospecting among indigenous people.

Epicentral to this project was the application of a number of interesting concepts on how to amplify the worth of these medicinal plants by not only targeting those of known value but also conducting phlylogenetic amplification surveys on similar compounds in related plant species or families, by looking for cross sensitivity among known infectious organisms, viruses, fungi or parasites, or identifying similar inhibitory targets associated with cancer or other metabolic diseases. In this way, identification of many bioreactive plants were identified against tuberculosis, malaria, apoplexan protozoa, cancer, etc. Unfortunately none as yet have resulted in a pharmaceutical discovery. Regrettably, this grant was terminated due to an error in the review process before additional studies on this valuable pharmacopeia could proceed.

During the time when negotiations were ongoing, I took a course at our law school in intellectual property so as to be better able to understand the nuances of laws and policies involved in this evolving arena and was the first to write papers targeted to ethnobotanists conducting similar studies. Because of both our efforts, the book *Biodiversity and the Law* was dedicated to us by its editor, Charles McManis.

I would like to close by saying Walter and I became ethnobotanists together since we learned so much from each other. North American wild roses have been Walter's passion from the time he was an honors undergraduate student through his graduate work and he has published 32 papers on this subject. Over the years, I accompanied him on numerous field trips, was cited on these herbarium collections and also recently worked with him on his last *Rosa* papers. Much to my delight, in 2016 he named the first new American wild rose discovered in over a hundred years after me, *Rosa memoryae* Lewis.[1] Our last paper together was truly a collaborative effort and a testimony to this aspect. We combined his initial and current cytological studies related to *Rosa acicularis* L. karyotypic variation with aspects I did on current data associated with its ecology, phytogeography and ethnobotany.[2] ■

Overall, when favored bioreactive treatments were applied appropriately, and for an adequate period of time, the duration and severity of disease was significantly reduced as determined by clinical, serological and physiological parameters.

LITERATURE CITED

1 Lewis, W.H. Nomenclatural novelities in *Rosa* (Rosaceae) subgenus Rosa recognized in North America. *Novon*, **2016,** *25:* 22-46.

2 Lewis. W.H. Elvin-Lewis, M. 2017. The worldwide significance of karyotypic variation in *Rosa acicularis* L. (Rosaceae) *J.Bot.Res.Inst.Texas,* **2017,** *11*:433-454.

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.pharmacognosy.us. 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.

8th International Phytocosmetics and Phytotherapy Congress

November 1 - 3, 2018

Universidad de Belgrano

Buenos Aires, Argentina

argentina2018.phytoessence.org/

30th International Symposium on the Chemistry of Natural Products and the 10th International Congress on Biodiversity (ISCNP30 & ICOB10)

November 25 - 29, 2018

Royal Olympic Hotel

Athens, Greece

www.iscnp30-icob10.org/

Natural Product Discovery and Development in the Genomic Era

Society for Industrial Microbiology and Biotechnology

Clearwater Beach, Florida

January 21-24, 2019

www.simbhq.org/np/

II International Symposium on Chemistry, Biology and Pharmacological Properties of Natural Products; IV Iberoamerican Symposium on Cancer Research; and IX Iberoamerican Symposium on Medicinal Plants

February 6 – 8, 2019

Panama City, Panama

www.npspanama.org/en/home

4th Drug Discovery Re-Invented Conference Emerging Role of Biotechs, Academics and Non-Profits

February 21 – 24, 2019

Melia Nassau Beach

Nassau, Bahamas

www.fusion-conferences.com/conference80.php?utm_medium=email&utm_campaign=April%20update&utm_content=April%20update+CID_cc54f1b9c0767df70f1f6a29eeaa40a5&utmsource=Campaign%2Monitor&utm_term=4th%20Drug%20Discovery%20Re-Invented

6th World Congress on Medicinal and Aromatic Plants for Human and Animal Welfare

May 1-5, 2019

Antalya, Turkey

Wow Kremlin Palace Hotel

wocmap2019.org/

3rd International Conference of Marine Fungal Natural Products (MafNap 2019)

June 26 - 28, 2019

Athens, Greece

docs.wixstatic.com/ugd/a5860a_f0f3102c38294d488621b056b236824e.pdf

60th Annual Meeting of the ASP

July 13-17, 2019

Madison, WI

Monona Terrace Community and Convention Center

aspmeetings.pharmacognosy.us/

Brief News from Washington

By Dr. Georgia Perdue

- **Shortly after his diagnosis in July 2017, Senator John McCain was treated at the NIH Clinical Center under the care of NCI physicians and nurses. On Monday August 27, NCI Director Norman Sharpless issued a statement that noted in part: "Last November in a kind and gracious speech on the Senate floor [the Senator] thanked those at NCI who directly provided [his] care." He also thanked all cancer researchers.**
- Soon we researchers more than likely will have something to celebrate because **Congress proposed a $2 billion increase for the National Institutes of Health budget. On August 23 the Senate passed a spending bill which includes the $2 billion increase for NIH! The final vote for appropriations bills will be in September. At the Advisory Council meetings, prior to Congressional final action, each director was very optimistic that the proposed budget would be the outcome.** At his Council meeting, Dr. Anthony Fauci noted that **Senator Pete Sessions (R-TX) is "deeply interested in NIH…." Senator Roy Blunt (R-MO), Chairman of the Labor, HHS, Education and Related Agencies, was credited for playing a major role in the budget increase.** When NCI Director Dr. Sharpless appeared before Senator Blunt's committee he noted [re: cancer] "this is a great time for optimism."
- At the June meeting of the Advisory Committee to the NIH Director, Dr. Sharpless noted that from **1999-2015 cancer death rates declined**, which he also reported in the Annual Report to the Nation on the Status of Cancer.
- In September 2017, Senator Roy Blunt was awarded the American Cancer Action Network's National Distinguished Advocacy award "for leading efforts to increase federal investments in medical research…."
- **In July the FDA approved tafenoquine, *Krintafel*[R]. It is 8- aminoquinoline, developed by GlaxoSmithKline and Medicines for Malaria Venture (MMV). The drug is the first new medicine in 60 years to prevent relapsing malaria caused by *Plasmodium vivax*.** MMV noted in its press release that "… three discovery teams led by Prof. Dennis Kyle, Prof. Elizabeth Winzeler and Dr. Jetsumon Sattabongkot Prachumsri jointly received the MMV Project of the Year 2016 award…. for…developing new assay platforms to test compounds for activity against … *P. vivax.*" (Note: Interactions with Dr. Winzeler re: information for a past column were most helpful.)
- **On May 1 the Fogarty International Center celebrated its 50th anniversary, thanks to the ground work laid by the late Rep. John E. Fogarty. He was a "champion of NIH and …the value of medical research…."** While Chairman of the Appropriations Subcommittee, the NIH budget grew from $37 million to $1.24 billion in 1967. **Rep. Fogarty wanted to create an international center. Unfortunately, he died suddenly of a heart attack on January 10, 1967. His death became a catalyst for today's Center created in 1968. Since then, it has expanded its research around the world.**
- **The New York Sundial Herbal Products Company is in**

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At the June meeting of the Advisory Committee to the NIH Director, Dr. Sharpless noted that from 1999-2015 cancer death rates declined, which he also reported in the Annual Report to the Nation on the Status of Cancer.

Recently, a humorous article by Joe Queenan in the *Wall Street Journal*, "The Dark Secrets of America's Millennial Plant Lovers," tells the bizarre extreme to which millennials have taken their love of plants.

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trouble. A lawsuit has been filed by the U.S. Attorney for the Southern District of NY **for the unapproved drug claims for its products.** The manufacturers are Rahsan Hakim and Adoniiah A. Rahsan. Stay tuned!

- **The National Center for Complementary and Integrative Health (NCCIH) held an Advisory Council meeting in June.** While the Center remains without a Director, Dr. Partap S. Khalsa, the Center's Director of the Division of Extramural Activities, coordinates and directs the grant review process and the allocation of resources. **Dr. David Shurtleff, NCCIH's Acting Director, noted that the NIH Center for Advancing Research on Botanicals and other Natural Products will have annual meetings going forward and for the first time they will be open to the public.** The meetings will be an opportunity to discuss general topics that affect the natural products community.
- **In June Dr. Norman Sharpless told the combined National Cancer Advisory Board and the Board of Scientific Advisors that "NCI will support the cancer research enterprise … by focusing on the training and funding of cancer investigators.** There will be at least a 21% increase for R01 funding for early stage investigators." Dr. Douglas Lowy noted that generally "NCI has many more Type 1 awards than NIH. Success rate for Type 1 is lower than Type 2."
- Dr. Janet Woodcock, Director of FDA's Center for Drug Evaluation and Research (CDER), is restructuring and reorganizing the following Offices: New Drugs, Compliance, Executive Programs and Communications. And, the Office of New Drugs will also include the Office of Therapeutic Biologics and Biosimilars. Stay tuned!
- In June the Senate Agriculture Committee approved **the Agriculture Improvement Act of 2018** almost unanimously (short one vote). However, the bill **deals with legislation to legalize hemp which contains a large amount of cannabidiol (CBD)**. The Federal Government considers CBD a Schedule 1 drug, i.e., it is illegal to possess hemp. Growing hemp for industrial uses is legal as long as it is for research. Stay tuned for further developments of this slippery slope! **The House is ambivalent whether it will pass the bill. Interestingly, George Washington grew "industrial hemp" at Mt. Vernon for fishing nets.**
- Recently, **a humorous article by Joe Queenan in the *Wall Street Journal*, "The Dark Secrets of America's Millennial Plant Lovers," tells the bizarre extreme to which millennials have taken their love of plants.** Some of them share, name and lend plants; others, "lovingly tend to virtual plants on their smartphones." The journalist quotes one such plant lover: "I can't fly home for Thanksgiving because I don't trust anyone to look after the African violet and the *Spathiphyllum.*" Another has not flown home…since 2007. "It's not that I love my plants more than … my parents…. It's just a lot less annoying."
- Originally known as the Massachusetts College of Pharmacy (MCP), my *Alma Mater*, and renamed in more recent years the **Massachusetts College of Pharmacy and Health Sciences, is rated #1 in *Money Magazine*** (Sept. 2018) among *"The 10 Most Transformative Colleges in the U.S."* **Why is the top rating important? It is the college of renown pharmacognosists.** For example, Dr. Heber Youngken Sr. was author of the first *Textbook of Pharmacognosy,* published in 1921 and updated in 1926, 1930 and 1936. He was the first professor of pharmacognosy at MCP to bring our science to the forefront. And, he read his New Testament Bible in Greek. Knowing my religious heritage, he would visit my lab and brag about his language skill during my graduate school years. Also, in more recent years, ASP member Dr. Ara DerMarderosian received his BS and MS degrees at MCP and his PhD from the University of Rhode Island. He became Professor of Pharmacognosy at Philadelphia College of Pharmacy (a sister institution and the second oldest pharmacy school next to MCP), which subsequently became known as the University of Sciences. There are many more alumni from MCP who received their PhDs in pharmacognosy (too numerous to name here). However, let us not forget the very well-known MCP alumnus, Dr. Norman Farnsworth, who played a major role in the formation of the ASP. Forgive my pride, but the roots of pharmacognosy are very dear to my heart!! (Note: My husband, Dr. Donald J. Evans, flagged the magazine article to me. He has only kudos for this Newsletter!!). ■

From the Archives:
Anna Koffler Wannamaker, Pharmacognosy Pioneer

By Ms. Devhra BennettJones

ASP Charter member Dr. Anna Koffler Wannamaker (1902-1980s) was a dedicated pharmacognosy pioneer and advocate. She served as a role model for women entering the field of pharmacognosy and pharmacy. Dr. Wannamaker believed that pharmacognosy could be a part of everyday life and sought to educate novices about the integral role of plants in human health. Her manuscript *The History of the Plant Science Seminars,* published in 1973, outlined how the organization grew into the dynamic American Society of Pharmacognosy. This article is the first installment of a two-part series tracing her life from Stanislawów, Poland to her enduring impact on the field of pharmacognosy. Part 1 describes Dr. Wannamaker's immigration to the United States and quest to find a pharmacognosy position in academia.

Anna Koffler was born in Stanislawów, Poland (now Ivano-Frankivsk, Ukraine) in 1902. She studied biology, botany, bacteriology and zoology at Maedchen Reolgymnasium in Vienna, Austria, attaining a Bachelor of Arts degree in 1920. She earned a teaching certificate in 1921 at the Teachers Training College in Vienna. By 1926 she merited her PhD from the University of Vienna.[1]

Dr. Wannamaker's history is a narrative of immigration. The documentation is imprecise as to when she married between 1926 and her immigration to the US, 1943-44. The historical record indicates that from September 1939 until the German attack on the Soviet Union in June 1941, Stanislawów was under Soviet occupation. On July 2, 1941, Hungarian troops occupied Stanislawów, and by the end of July Germany had taken control of the city. Less than thirty days later, on the orders of the Gestapo, a Judenrat (Jewish council) was established to organize Jewish life and implement Nazi orders. The 1910 and 1931 census records approximated that 25,000 Jews lived in Stanislawów upon the outbreak of World War II. An estimated 1,500 Jews from Stanislawów survived the war.[2]

Her personal story is undocumented in the archive's records. However, a window is found in the recommendations for her employment at Ohio Northern University. In 1951, the Dean of the College of Arts and Sciences of the University of Kansas City, Dr. Norman N. Royall, Jr. wrote, "Dr. Koffler is a victim of the Nazis; I believe her husband and parents were killed in concentration camps. She came to this country under this handicap and has had difficulty in finding a place to settle permanently. She needs a research job with some teaching. Once settled I believe that she would be valuable; hours mean nothing; often night and Sunday work is routine to complete her tasks."[3]

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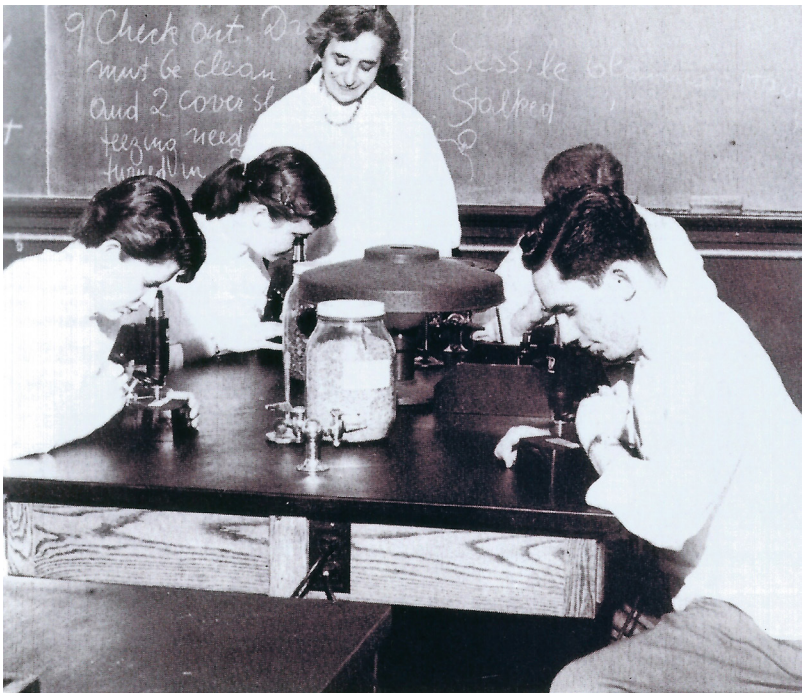

Dr. Anna Koffler Wannamaker patiently instructing students on the use of microscopes at Ohio Northern University, circa 1950.

Although the immigration records are unclear as to the exact dates of Dr. Wannamaker's arrival in the United States, her employment records impart that she held numerous positions between 1944-1948. She worked as a research assistant in bacteriology at Hoffman Laboratory, New York in 1944 and then became a technical assistant at E.R. Squibb & Sons during 1945-47. Following that position, in 1947 she taught biology and was a post-graduate research associate at Rutgers University through 1948. In that year she moved west to serve as an assistant professor of bacteriology, botany, biology, and pharmacognosy at the University of Kansas City until 1953.[4]

Dr. Wannamaker's University of Kansas City colleagues composed highly complementary recommendations in their quest to help her find permanent pharmacognosy employment. Dr. Norman Royall, Jr., Dean of the College, wrote,

> …Dr. Koffler came to us several years ago at the height of the GI enrollment. It was extremely difficult at the time to obtain a competent biologist. Dr. Koffler and the

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University recognized that with the decline of enrollment after a few years, it might be impossible to make a permanent place for her upon our staff. In view of the enrollment situation which we now face, Dr. Koffler will be available for employment after the present academic year. During her period with us, Dr. Koffler has had an opportunity to adjust herself to American ways and to learn something of the points of view which prevail in an American college. Although I have commented in greater detail on specific points on the form which you provided, I wish to express the hope here that you can lend some real assistance to this fine scholar in finding some position in the American academic community. Undoubtedly her life has not been a happy one, but it has not warped or broken her. I hope all of us can help her in her efforts to make a life in a new land.[5]

Dr. Anna Koffler Wannamaker

In addition to the college dean of the University of Kansas City, the vice president extoled high praise for her scholarship and dedication to the field. On February 25, 1952, Robert Mortuedtt, Vice President of the University of Kansas City, wrote,

> Dr. Koffler has been a loyal and indefatigable worker. She has taken the initiative in adding to our curriculum several courses in Serology. These have been added on both the graduate and undergraduate level. She has received many fine letters from her graduates testifying to the affection for her and their gratitude for the excellent preparation she gave them in Botany and Bacteriology.
>
> As you probably know from other records, Mrs. Koffler has had extensive experience in industry as well as in academia. Recently she completed for us a small research project with credit in the School of Pharmacy. Unfortunately, we do not have a continuing research program which would provide a place for her.
>
> You probably realize that Dr. Koffler like many European scholars has had a life saddened by great misfortune. However, this has not undermined her confidence or depleted her energies. Although she is small of stature and unassuming upon first acquaintance, there is a quality of force in her personality which preserves her integrity and lends intensity to her professional efforts. I commend her to any prospective employer.[6]

The winter issue of "From the Archives" will examine Dr. Wannamaker's career as professor of pharmacognosy at Ohio Northern University and her contributions to the development of the ASP. Dr. Wannamaker's female peers in the newly formed ASP were pharmacognosy pioneers in unifying the organization's gender-gap. Dr. Georgia Perdue described the early years:

> I received my three degrees from the conservative, small, at that time, Massachusetts College of Pharmacy. I was the first woman to obtain a PhD, an interesting battle. It was also the time when the ASP was getting off the ground. There were about five women in the ASP (we did reach ten!!), but we women never gave it a second thought. That is how it was. We were treated like ladies!!! That means the mentality about women today in various fields was never in any of the women's thinking in science in that "era." **We were treated as equals.** And, as ladies!! Oh, yes, Norman Farnsworth liked to kid us, but it was harmless. We ladies were proud of the ASP!! Why? Because we loved pharmacognosy!!![7]

(Read Part II of *Anna Koffler Wannamaker: Pharmacognosy Pioneer* in the winter issue of the *ASP Newsletter—From the Archives.*) ■

LITERATURE CITED

1. Human Resources records of Ohio Northern University, December 14, **1951**.
2. United States Holocaust Memorial Museum, Washington, DC. *Encyclopedia of Camps and Ghettos, 1933-1945*, www.ushmm.org/wlc/en/article.php?ModuleId=10007236, **2018.**
3. Human Resources records of Ohio Northern University, December 14, **1951**.
4. Human Resources records of Ohio Northern University, **1951**.
5. Royall, Norman N., Jr., Letter of recommendation, December 17, **1951**.
6. Mortuedtt, Robert, Letter of recommendation, February 25, **1952**.
7. Perdue, Georgia, ASP Memories, correspondence, August 7, **2018**.

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