



American Society of Pharmacognosy

Spring 2022

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ASP Newsletter: Spring 2022, Volume 58, Issue 1

Pharmacognosy Dispatches from the Ukrainian Frontline

Dominik Popowski is an ASP member and a graduate student in the Department of Pharmacognosy and Molecular Basis of Phytotherapy, Medical University of Warsaw. He is one of two Poland-based ASP members listed in the directory. The ASP Newsletter reached out to him for comments on March 16, and his response is below. In turn, Popowski put us in touch with Professor Oleh Koshovyi from the Department of Pharmacognosy at the National University of Pharmacy, Kharkiv, Ukraine, and we received Koshovyi's detailed comments on March 21. Their personal accounts of the war are stark reminders of the deep impact of international conflicts. Gordon Cragg and Edward Kennelly edited the articles for clarity and content.

Perspective of an ASP Member in Poland

By Dominik Popowski, MSc

I am finishing my PhD at the Medical University of Warsaw in Poland, about 280 kilometers from the Ukrainian border and 400 kilometers from Lviv, a city that has sustained heavy shelling recently. My country is now feverishly trying to accommodate and comfort refugees from Ukraine. We Poles share similar memories of being oppressed and shackled by the Soviet regime.

In the Microbiota Lab where I work, there are three graduate students from Kharkiv, Ukraine. They are constantly looking at their phones, waiting for messages from their families still in Ukraine. It is impossible for us to find the appropriate words to comfort them. Before the Russian invasion on February 24, we lived in a bubble, thinking that wars and totalitarian cruelty were matters relegated to the past, or possible only in distant places. This bubble has burst, and we feel completely helpless.

Despite these feelings of despair, we try our best to help our Ukrainian colleagues. According to my PhD supervisor, Prof. Sebastian Granica, "While facing the Russian invasion, we need to provide as much help as possible to the Ukrai-



Map of Ukraine showing universities with pharmacognosy programs.

MAP PREPARED BY DOMINIK POPOWSKI

nian students and researchers. They have to find the ground under their feet and be able to continue education and re-
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Dominik Popowski



ASP Annual Meeting 2022



Hemp



Editor's Corner

American Society of Pharmacognosy

By Edward J. Kennelly, PhD

As we approached the February 15 submission deadline for the Spring 2022 *ASP Newsletter*, it seemed things were in good order with the articles. We had two strong contributions from the Diversity, Equality and Inclusion Committee as well as moving remembrances of some giants in natural products chemistry who passed away, like Professor K.H. Lee written beautifully by his colleague Dr. Susan Morris-Natschke. The trajectory of the world and our little corner of it suddenly changed on February 24, when Russia invaded Ukraine.

ASP Past President Dr. Nick Oberlies soon informed us that our sister organization, the GA - Society for Medicinal Plant and Natural Product Research, was looking into appropriate responses to the war, and he asked what ASP may do. The *Newsletter* has a tradition of highlighting the impact of national and international events on pharmacognosy research. Articles that we have published in this vein include the Chilean earthquake, the Deepwater Horizon oil spill, the Virginia Tech shootings, and the US federal government shutdowns. I have tried to ensure that the *Newsletter* has a pharmacognosy perspective in all these pieces. Since I have been editor, the *Newsletter* has not featured any articles with regards to the impact of war on ASP members and their research.

I thought I could write a brief article about the impact of the situation for ASP members in the war zone. I did a quick search of the ASP directory and found two ASP members from Poland, Grazyna Lask and Dominik Popowski. I did not see any Ukrainian scientist listed nor could I identify any Ukrainian-born ASP members. I reached out to our Polish members, and very quickly, Dominik, a doctoral student at Medical University of Warsaw, replied. Dominik, who first joined ASP in anticipation of attending the 2020 ICNPR meeting in San Francisco, provided a raw account of the situation in Poland and Ukraine that brought tears to my

eyes. When I shared this with Nick, he told me that we should publish immediately.

Dominik and I went about editing and expanding his email to produce the cover article that he authored, along with his colleague and friend, Dr. Oleh Koshovyi, from the National University of Pharmacy in Kharkiv, Ukraine. With considerable editorial help from ASP Fellow Gordon Cragg, I think the final article is an important look at the impact of war for research scientists in this region of the world. I appreciate the support and encouragement of Nick Oberlies and the members of the ASP Executive Committee in publishing these important accounts. After spending the past three weeks in communication with Oleh and Dominik, I feel I have a greater understanding of the situation. I was surprised and honored when Oleh informed me that he and his colleague Prof. Andriy Grytsyk have now joined the ASP.

The organizers of the 2022 ASP meeting in Charleston, SC announced that participants with Ukrainian citizenship will get discounted registration. I encourage everyone to look into the article about the annual meeting and note the upcoming deadlines in April for abstract submission and early registration. This is the first in-person meeting since the COVID pandemic began in early 2020, and this will be a great opportunity for us to meet each other after some very difficult years.

This *Newsletter* includes many important articles. Two ASP members, Guido Pauli and Richard van Breemen, published separate articles about the potential of cannabidiol and its derivatives to act against SARS-CoV-2. David Newman walks us through his readings of their results in "Hot Topics in Pharmacognosy," and van Breemen's research is featured in "Behind the Scenes in Pharmacognosy." Also, do not miss Barbara Sorkin's news-filled "Capital Communiques." Have a great spring. ■

Before the Russian invasion on February 24, we lived in a bubble, thinking that wars and totalitarian cruelty were matters relegated to the past, or possible only in distant places. This bubble has burst, and we feel completely helpless.

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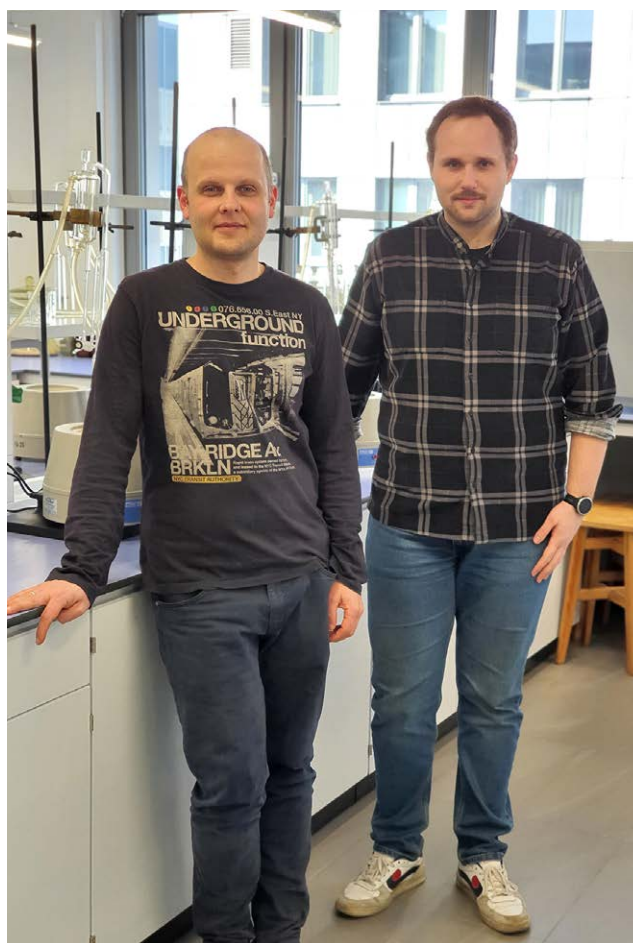
search until the war is over and the situation is clear. However, the destruction of scientific infrastructure in cities like Kharkiv will significantly delay their return to their homeland. A lot of Ukrainian refugees believe that those are 'forced vacations' and they will be able to return soon to revive their country. I think we are obligated to help them and contribute to putting pressure on Russia."

In the past, many Polish people resented that the world did not seem to care when our country was devastated by the Soviets and the Nazis, and some still feel a similar frustration. We see Ukraine today from the vantage point of Poland in 1939. We feel ashamed that history is repeating itself, as children and civilians are dying. We now see how mundane our pandemic and pre-pandemic issues seem to be. I cannot bear to look at happy people on social media because seeing ordinary joys somehow sickens me.

I am still trying to figure out what more I can do. I feel that helping is one thing and stopping the madness is another. We cannot defeat Russia from the outside; we must make the people of Russia share the pain of isolation.

Yet, there are no regulations to stop thousands of trucks passing the Polish-Belarusian border and supplying Russia. The Western world's admiration of Ukrainian President Volodymyr Zelensky is not helping because appreciation alone will not stop the missiles. French President Emmanuel Macron continues to contact Russian President Vladimir Putin, thinking there is still time to talk. Some of the biggest European natural medicines companies have been reported to be manufacturing and selling in Russia. I feel frustrated, as if humanity has failed.

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Popowski (right) with his PhD supervisor Granica in the Microbiota Lab at the Medical University of Warsaw.

In the past, many Polish people resented that the world did not seem to care when our country was devastated by the Soviets and the Nazis, and some still feel a similar frustration. We see Ukraine today from the vantage point of Poland in 1939.

Pharmacognosy Dispatches from the Ukrainian Frontline

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Dear fellow ASP members, I ask that you support the Ukrainian people and scientists in any way you can. I urge our scientific community to join others in sanctions against totalitarianism. I advocate for the following:

- Scientific suppliers should all stop selling to Russia.
- Scientific organizations should end direct and indirect ties with any industrial partners that are operating in Russia.
- Russian scientists invited to conferences and collaborations should denounce the war.
- Consider donating money to help Ukraine.
- Consider hosting Ukrainian researchers in your institution by referring to the #ScienceForUkraine webpage (scienceforukraine.eu/).

I implore all scientists to act immediately in any way we can to help the Ukrainian people.

Professor Oleh Koshovyi, our friend from the Pharmacognosy Department in Kharkiv, Ukraine, left his family at the Polish border and went to help in the resistance. Fortunately, we remain in contact with Prof. Koshovyi so that he can provide an inside story for the ASP community.

First-hand Account of a Ukrainian Pharmacognosy Professor

By Oleh Koshovyi, PhD, DSc (Pharm.)

I would like to begin my story with words of gratitude to our friends from Poland, the European Union, and the United States for their support of Ukraine. We feel that the whole world is supporting us, and this gives us strength in the fight against a very serious enemy. I sincerely thank everyone for this, and the victory will surely be for democracy and freedom.

Last Friday, our friend and colleague Dominik Popowski wrote to me with a proposal to tell the members of the American Society of Pharmacognosy a true story about the Russian invasion of Ukraine. I am deeply grateful to him for this because I am convinced that the world should know as much as possible about the terrible events that are now happening in Ukraine. There is no more terrible word than “war.”

I am not a military expert, so I cannot comment on any mili-



Oleh Koshovyi

tary acts, neither morally nor legally. Therefore I decided to tell my own story, which began on February 24 at about 5:00 AM.

I am a Ukrainian scientist. I have studied medicinal plants all my life, like many of you. At the age of 27, I became a PhD, at the age of 32 a doctor of science in pharmacy, and at the age of 36 a full professor. I felt there was a bright future ahead for me. I have been devoting all my professional life to working at the National University of Pharmacy, one of the best universities in the world. I started my career there as a laboratory assistant and ultimately became the dean and the head of the department. At the end of the war, I invite you to visit our beloved university.

So let's start from the morning of February 24. At exactly 5:00 AM, my wife and I woke up to the terrible sound of explosions. It was as if all the windows were shattering. My first words were, “The war has begun.” We went to my daughter's room and lay down next to her, but it was no longer possible to sleep. Looking out the window, we could see that the whole horizon was filled with black smoke. Soon the water supply to our house stopped, and so, at about 9:00 AM, I decided to go to the nearby well to bring water.

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Most Kharkiv residents were not prepared and did not even know where the bomb shelters were located.

**The news and videos from the city were just awful.
On the second day, there were already problems with food supplies.
The store shelves in the village were already empty.**

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Oleh Koshoyi with his wife and daughter at the arboretum of V.V. Dokuchayev Kharkiv National Agrarian University in 2015. This university, where Koshoyi would conduct pharmacognosy practical field training, was also destroyed in the Russian invasion.

PHOTO: BOHUSLAVSKIY YEVHENII

Once outside, I immediately heard that large-caliber weapons were being fired in the vicinity of the city. Apparently, there was a fight nearby.

Having brought some water for my family and an elderly neighbor, I returned home and told my wife to collect our necessities, and we embarked on a disturbing journey of uncertainty. I had to persuade my parents, who live next door, to leave Kharkiv. At first, they flatly refused. At 3:00 PM, all media channels warned of an air alarm and the need to take shelter. Most Kharkiv residents were not prepared and did not even know where the bomb shelters were located. My family decided to hide in the garage with a cellar. We managed to grab only the most basic necessities. Soon after evacuating the house, we realized that our beloved cat was still inside, so we went back and quickly picked him up. We

left with only our documents, a small suitcase, and the cat in a basket.

At the garage, we joined other people seeking shelter. Many of the residents of the neighboring high-rise buildings were there. We entered the cellar and began waiting; fortunately, nothing happened. After 30 minutes, we decided to get into the car and head towards our summer house, 26 kilometers from Kharkiv in the suburbs.

There we felt relieved, but not for long. We constantly heard explosions from Kharkiv. The news and videos from the city were just awful. On the second day, there were already problems with food supplies. The store shelves in the village were already empty. Those small stocks that had remained from the autumn were running out, but, thanks to the locals, my family was able to get some food. Af-

ter the shelling hit a house in the nearby village, my family decided to move on to the western part of Ukraine.

The distance from Kharkiv to Ivano-Frankivsk is just 1085 kilometers, but the journey took us seven days by car. There were terrible traffic jams everywhere. There was no fuel near Kharkiv, and there were mile-long lines at gas stations. Thanks to the help of relatives, friends and strangers, our trip was successful.

Our relatives helped us in Kropyvnytskyi. In Vinnytsia, we were sheltered at the dormitory of Vinnytsia National Medical University. But the news we were hearing became more and more bleak. When we approached Vinnytsia, their airport had just been bombed on March 6. The feeling of fear, even in central and western Ukraine, was unbearable; at any

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Kharkiv Specialized School of I-III Degrees (No. 134), a high school of about 450 students located less than 10 kilometers from Oleh Koshoyi's home, was destroyed by Russian shelling during street fights on February 27.

TELEGRAM: T.ME/TEAM_MILOV/1134

moment we could be caught in a rocket attack. I decided at that time to move my wife and daughter to Poland.

To cross the border, I took my family to Ivano-Frankivsk, where we met with my friend, Professor Andriy Grytsyk, the head of the Department of Pharmaceutical Management, Drug Technology and Pharmacognosy at the Ivano-Frankivsk National Medical University, who welcomed my family. After a couple of days at his house, we went to the border and stood in the long line. After over six hours waiting, my daughter and wife crossed the border into Poland. I exhaled a sigh of tremendous relief. With my family now safe, I wanted to work for the benefit of Ukraine.

My family eventually made it to Warsaw, and I now have great hope for a better future for them. I must sincerely thank my colleagues and friends from the Medical University of Warsaw, Professor Piotr Lulinski and Professor Sebastian Granica, who warmly received my wife and daughter in Poland and have helped them in so many ways.

It has been almost two weeks since my family separated at the border. I miss them very much, but I am glad that they are at peace, and they are not awakened in the middle of the night by sirens. Since they left, missiles from the Russian

Federation twice reached the Ivano-Frankivsk region. A day has not gone by without the horrible howls of air raid sirens. Even in the west of Ukraine, there is no sense of security. The main issue now today is regarding the airspace in Ukraine, since most of the trouble comes from the air. We are all convinced that with the help of our armed forces, friends, and international partners, Ukraine will definitely win!

SLAVA UKRAINE!!!

Update March 31: I am now in Ivano-Frankivsk, staying at my friend's apartment. Our university is trying to organize online classes for our students, so there is a lot of work preparing these distance learning courses. I am also analyzing some data I gathered previously and planning to publish them in manuscripts. Some school friends are volunteers in Kharkiv, and at times I try to help them find different medicines in other parts of Ukraine. There is a significant problem obtaining medicines in Kharkiv. Yesterday, my colleague and friend, Prof. Andriy Grytsyk, and I became members of the American Society of Pharmacognosy. ■



Taking Action: Supporting ASP Parent Members

By Katharine Watts, PhD and Members of the ASP DEI Committee

Attending a professional meeting is a crucial experience in a scientist's career. For a graduate student, a poster session at a conference may be the first opportunity to present their work to others outside their home institution, as well as to engage in networking within their field of research, which creates pathways toward their desired career. Faculty at all stages of their career benefit greatly from making connections with collaborators and funding agencies and sharing their work with others. While the coronavirus pandemic has disrupted many normal conference proceedings, barriers to attending conferences have existed well before the global onset of COVID-19.

A major barrier is faced by parents of infants, toddlers, and school-aged children. They are forced to strike a balance between the responsibilities of being a caregiver and assigning those duties to someone else, all while giving their undivided attention at a conference, most often far from home. These factors disproportionately affect mothers who are researchers, especially those of infants, adding to inequities women suffer in scientific careers.¹ The ASP DEI committee sought to find out how other professional societies assist their parent members and how the ASP might be able to assist our own parent members in minimizing these barriers to attend important career-advancing meetings.

In 2019, Science Careers examined childcare resources provided at 34 large scientific conferences (>1000 attendees).² Only two societies arranged free childcare for members, one of them being the American Chemical Society. Through a program called "Camp ACS," childcare was offered by a national company called Accent on Children's Arrangements, which focuses on provid-

ing age-appropriate activities for children ages 2-16 at conventions, conferences and meetings. Other societies arranged childcare utilizing similar companies at the expense of the meeting attendee, ranging from \$40 to \$110 a day per child. Five out of the 34 conferences (~15%) provided flexible childcare grants, which could be used towards onsite childcare, towards travel for children or a caretaker, or utilized to help defray costs for care at home. Mini-grants of \$250 and \$325 were reported to cover a grandmother's flight to care for children at home and to mostly cover a child's airfare cost to a meeting. Another interesting finding was that the disciplines that typically have a greater share of women (life sciences and social sciences) needed the most improvement - only half of conferences in these areas offered some sort of childcare support, whereas 85% of conferences in physical sciences, mathematics and computer sciences supplied accommodations for parents. With this information in mind, parent members of ASP were interviewed to find out how they might make use of childcare assistance for conferences.

Alejandra Prieto-Davó is a microbial oceanographer and professor of chemistry at Universidad Nacional Autónoma de México in Yucatán. For a single mom with two school-aged children (6 and 11), Prieto-Davó's family benefits most from hiring a caretaker and her kids staying home while she attends conferences. To attend a conference in Portugal, she paid for a recent college-graduated niece to come stay with her family for a week prior to the conference to get comfortable with the daily routine, and then trusted her niece with the duties while she attended the conference the following week. When asked if childcare provided at conferences would help her, Prieto-Davó responded, "It would definitely make things easier,

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The ASP DEI committee sought to find out how other professional societies assist their parent members and how the ASP might be able to assist our own parent members in minimizing these barriers to attend important career-advancing meetings.

While the age of their children appeared to strongly influence whether or not a parent member would utilize on-site childcare at a conference, all parent members interviewed enthusiastically supported the notion of grants being made available to help defray the costs of childcare.

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but it wouldn't make them cheaper." She said, "I have to arrange all of that. I have to move people around to stay in my house for a week or so." But with a lower cost of in-home care in Mexico, Prieto-Davó expects that hiring someone to help with cooking and cleaning, and arranging for a family member to take care of her kids, would be less expensive than taking her children with her to a conference, considering the cost of travel and childcare rates in the United States and Europe.

Similarly, Kate Sammons, a single parent and PhD student in plant and microbial biology at the University of Minnesota in Twin Cities, who also has two school-aged kids (9 and 12), depends on a family member to travel to their home to care for her children while she attends professional meetings. When asked about childcare being provided at conferences, Sammons brought up several limitations of the proposal. "It's not cost-possible to bring your kids with you to a conference if it's far away. And, if you can, then what do you do with them? Maybe there is childcare during the actual talk hours, but a large part of the conference is to network, and there isn't childcare during most of that."

Another hesitation to utilize on-site childcare was pulling her kids out of school. However, "if there were funds to bring your kids and there was an enriching experience for them, I wouldn't hesitate," Sammons said.

Lindsay Caesar is a postdoctoral scholar at Northwestern University. Her daughter was born on New Year's Day 2021. With most conferences being virtual during her daughter's first year, she has been able to attend more professional meetings than she may have

been able to in-person, with an infant. Prior to having a child, it was common for Caesar's husband to join her at in-person conferences. But now, they "will have to prioritize conferences, based on location and timing, and availability of people to help. The process is a lot more complicated." The availability of childcare at a conference would definitely affect her choice to attend or not. Caesar pictured her husband still joining her for the conference and utilizing hourly/drop-in services or half days of care. The cost of care would definitely be factored into the decision to attend a meeting or not.

Andrew Riley is an assistant professor of pharmaceutical sciences at the University of Illinois at Chicago and is a father of a daughter under the age of two. When working from home with a new infant, it was important to Riley to take into account his shared duties of childcare in the decision to attend a conference. The ability to attend a meeting remotely allowed Riley to listen to talks, while also participating in caring for his daughter. Thinking of future in-person meetings, Riley plans to blend a family vacation with a conference, bringing his wife and daughter with him. "It's all or nothing. The whole family goes or we don't. It's unreasonable to think that Dad can step away for the week and leave Mom all alone." In this model, Riley and his wife would split childcare duties, each caring for their daughter for half a day. On-site childcare would open more doors for Riley's family, allowing him to attend more than half days at the conference and giving his wife more flexibility.

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"These are the people that need to be at these conferences, making the right connections, and don't really have the chance to put it off until the next year. This is pivotal for them."

When asked what other meeting features could be improved to benefit parent attendees, members had input about time and location of networking events, types of hotel rooms available, and lactation rooms.

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While the age of their children appeared to strongly influence whether or not a parent member would utilize on-site childcare at a conference, all parent members interviewed enthusiastically supported the notion of grants being made available to help defray the costs of childcare. Riley viewed this opportunity as being especially important to make conferences inclusive for graduate students and postdocs with children. “These are the people that need to be at these conferences, making the right connections, and don’t really have the chance to put it off until the next year. This is pivotal for them.”

Both Prieto-Davó and Sammons pictured using a flexible childcare grant towards defraying travel and other caretaker costs for their school-aged kids at home. Sammons’s mother is able to travel from 500 miles away to help with the kids, but it isn’t a stress-free situation. Sammons said, “She is leaving behind other responsibilities to come and help me out. For my mom to come, it costs \$300 for her to buy a plane ticket or a full day driving either way, never mind the time of hers that I’m not paying for. This is a direct conference cost, and by far the cheapest solution, but there’s no easy way for me to have it reimbursed currently.”

When asked what other meeting features could be improved to benefit parent attendees, members had input about time and location of networking events, types of hotel rooms available, and lactation rooms. Several parents noted that if meeting events were either moved to hours in which childcare was available or took place in a child-friendly atmosphere, it would make essential networking easier on parents. Making family friendly rooms available in conference hotel packages was also viewed as desirable, for example, a two-room suite. The inclusion of a lactation room in conference site planning was another request from multiple members interviewed.

As ASP begins to plan for the 2023 annual meeting and beyond, we are requesting input from all parent members on which conference practices would be most impactful to enable their participation. We invite all parent members to complete a [five-minute survey](#). Parents of younger children may indicate what will be helpful in the future, and parents of older children may indicate what would have been helpful in the past. The DEI committee will work with future conference organizers to implement conference practices that best serve you. ■

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- ² Langin, K. Are conferences providing enough child care support? We decided to find out. *Science*. **2018**. doi: 10.1126/science.caredit.aaw3741

As ASP begins to plan for the 2023 annual meeting and beyond, we are requesting input from all parent members on which conference practices would be most impactful to enable their participation. We invite all parent members to complete a five-minute survey.

Successful ASP Summer Research Fellowship Program Continues in 2022



LEFT: Victoria Casimir collecting water samples for cyanobacteria in Puerto Rico.



RIGHT: Ama Boamah's first time out in the field in the Great Salt Lake in Utah collecting samples for microbial isolations.

By Brian Murphy, PhD and Christine Salomon, PhD

A highly successful Summer Research Fellowship (SRF) program was launched in 2021 and will be offered again in 2022. This innovative ASP-sponsored program offers a 2.5-month stipend to enable students to engage in research experiences under a mentor in the natural product sciences.

The Diversity, Equity, and Inclusion Committee (DEI) was tasked with identifying and addressing issues of diversity within the ASP. One of the most critical challenges facing STEM fields in the US, which is reflected within the ASP, is a lack of racial and ethnic representation among our membership, leadership, award recipients, and meeting speakers. Structural and systemic inequities, such as inequitable access to education, housing, jobs, government programs and benefits, and treatment under the criminal justice system, have served as barriers to Black, Indigenous and Latinx (BIL) students that wish to advance through the scientific training pipeline. The [data show](#) that there is a significant loss of BIL students who advance from undergraduate to graduate level studies. This has contributed to fewer BIL faculty, senior scientists and mentors.

One inequity that is specific to the physical sciences is the opportunity to engage in volunteer research in a laboratory. Authentic research experiences are a critical currency

for graduate school applications in these fields. Students develop research, writing, and presentation skills, and also establish important relationships with mentors who can provide advice and letters of recommendation. Importantly, they give applicants competitive advantage in the review process and act as a major entryway to a graduate education. Indeed, it is common for committees making admissions decisions for graduate schools in the STEM fields to consider only those applicants who have had sustained participation in undergraduate research.

As a first step to correct for a misrepresentation of BIL students in our field, the ASP DEI Committee, Executive Committee, ASP Foundation, and ASP Fellows collaborated to develop and fund the SRF program for undergraduates. It is designed to recruit BIL students to the natural product sciences and enable their transition from undergraduate education to graduate school.

The ASP SRF program offers a 2.5-month stipend to enable students to engage in research experiences under a mentor in the natural product sciences. The first cohort of students was recruited in the summer of 2021 and included seven trainees from across the country (see table). The student fellows engaged in twelve weekly cohort training

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Successful ASP Summer Research Fellowship Program Continues in 2022

These seminars included instruction for advanced science communication, exposure to careers in natural products, and development of skills needed to be successful in a graduate program.

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meetings led by Dr. Lesley-Ann Giddings (Smith College). As part of this training, several academic faculty, government, and industry leaders led weekly seminars designed to equip undergraduate trainees with a diverse array of skill sets to prepare them for their laboratory experiences, graduate school and/or professional careers in the natural product sciences. These seminars included instruction for advanced science communication, exposure to careers in natural products, and development of skills needed to be successful in a graduate program. To conclude their summer research experience, each student presented their projects to an international audience at the [August 12, 2021 ASP webinar](#).

The first cohort from this pilot SRF program has achieved

remarkable success in just a short period of time. As of February 2022, one eligible student fellow was accepted to a natural products graduate program at the University of Illinois at Chicago. The remaining six fellows are in their final year as undergraduate students. Since completing their summer research, one fellow was awarded a prestigious NIH T34 MARC-USTAR fellowship, while her advisor commented, "She would not have been introduced to NP Chemistry without the ASP fellowship." Another fellow has since been awarded the prestigious NIH RISE fellowship to continue the research she performed over the summer in natural products. A third fellow will be returning to her host's lab to continue the research she performed over the summer.

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SRF Fellow (Home institution)	Mentor (Location of training)	Project
Ama Boamah (Smith College)	Dr. Jaclyn Winter (U. of Utah)	Investigating chemical potential of Great Salt Lake strains via microbial co-culture
Victoria Casimir (U. of Puerto Rico)	Dr. Eduardo Caro (U. of Puerto Rico)	A cyanobacteria extract with SARS-CoV-2 antiviral activity
Mitchelle Katemauswa (U. of Oklahoma)	Dr. Robert Cichewicz (U. of Oklahoma)	Antiplasmodial leads from the fungus <i>Curvularia geniculata</i>
Lorena Valentin (U. of Florida)	Dr. Jeffrey Rudolph (U. of Florida)	Development of a terpene synthase screen in <i>Escherichia coli</i>
Jessia Raheisoanjato (Black Hills State U.)	Dr. Amy Lane (U. of North Florida)	Discovery of diketopiperazines from marine actinomycete strains
Ariel Richards (Grinnell College)	Dr. Erick Leggans (Grinnell College)	Semi-synthesis and biological evaluation of terpene analogs
Nana Oblie (U. of Rhode Island)	Drs. David Rowley and Matt Bertin (U. of Rhode Island)	Detection of anti-MRSA compounds from <i>Liriodendron tulipifera</i>

Successful ASP Summer Research Fellowship Program Continues in 2022

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Student perspectives on their experiences in the ASP SRF program can be viewed [here](#). The students who participated describe the program as being highly impactful for them:



"I applied to this program because I had been interested in natural products for a while and I had also been attending ASP webinars, and I just thought this was a great opportunity for me to get research in that area, and I'm so glad that I applied..."
—Lorena Valentin



"My most meaningful memory from this program was when I was told that I could be a part of the research group post-program, so that was really great."
—Victoria Casimir



"This program impacted me...I got to do hands-on experiments, and so I found out this is something I really like and I want to do in the future, go to grad school for and make a career out of it."
—Jessia Raheisoanjato



"It has given me a voice. Talking about my research this summer at a poster really made me feel like a researcher."
—Nana Oblie

Left to right:
— Ama Boamah
— Michelle Katemauswa
— Ariel Richards



ASP is aiming to accept five students into the summer 2022 cohort. While the ASP DEI Committee is currently pursuing long-term funding for this critical program for 2023 and beyond through grants and industry sponsorship, [private donations](#) are welcome and will have an immediate impact on the professional careers of BIL students. ■

2022 ASP Annual Meeting: Charleston

By Mark Hamann, PhD and Guy Carter, PhD

The plans and organization of the 2022 ASP meeting in Charleston are progressing. We are hopeful that the decline in COVID-19 cases will continue through the summer, providing for a safe and productive face-to-face meeting. Registration is now open, and we would like to encourage attendees to register and submit abstracts early. The deadline for registration has been extended to **April 30, 2022**, and applicants will be informed no later than **May 31, 2022** and must register no later than **June 10, 2022**.

We are delighted to announce that NCCIH has generously provided a grant for \$30,000 to support registration costs for students, postdoctoral fellows and junior investigators with the goal of promoting diversity based on the guidelines established by the NIH [NOT-OD-20-031: Notice of NIH's Interest in Diversity](#). A request for a registration waiver is included on the abstract form and the deadline is rapidly approaching (**April 30**).

ASP Fellow Dr. Jon Clardy and Dr. Ben Naman have kind-



ly agreed to chair the Slatkin Young Members Symposium, and, with the help of NCCIH, we are anticipating a strong turnout of our talented young investigators. The ASP local organizing committee has agreed to provide the same registration waiver to students with a Ukrainian passport as a measure of the ASP's support for the Ukraine's defense against the invasion by Russia.

Rooms at the Embassy Suites by Hilton Charleston Airport Hotel and Convention Center have been secured for just \$159 per night. This facility is conveniently located near Charleston International Airport, which provides direct flights from most major cities in the country and is a short distance to the diverse attractions to be found in this vibrant and historical city. The meeting venue is just a short distance from Striped Pig Distillery, which is the oldest active distillery in Charleston and will provide distillery tours Monday afternoon exclusively to ASP members.

The meeting will begin with a series of informative work-
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The meeting will begin with a series of informative workshops on Saturday, which will include topics focused on NMR databases, DP4+ calculations, grant writing, MS-based proteomics and bioassays as well as a jobs fair.

Embassy Suites courtyard.



Charleston waterfront at night.



In an effort to encourage the presentation of new discoveries from abroad, special sessions have been scheduled for presenters from Africa, Asia, South America and the Caribbean.

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Some of our confirmed speakers include Drs. Alexis Rohou from Genentech, Clemens Anklin from Bruker and Jonathan Goodman from Cambridge who will be speaking about the application of CryoEM and NMR in natural products characterization and drug discovery.

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shops on Saturday, which will include topics focused on NMR databases, DP4+ calculations, grant writing, MS-based proteomics and bioassays as well as a jobs fair. Some of our confirmed speakers include Drs. Alexis Rohou from Genentech, Clemens Anklin from Bruker and Jonathan Goodman from Cambridge who will be speaking about the application of CryoEM and NMR in natural products characterization and drug discovery. Drs. Darren Dixon from Oxford and Yike Zou from UCLA will present recent advances in natural products synthesis in a session chaired by Dr. Amos Smith from UPenn. ASP Fellows Drs. Bradley Moore from Scripps/UCSD and Ben Shen from Scripps/Florida will lead a session featuring recent discoveries in natural products biosynthesis. Dr. Barry O'Keefe from the NCI NP branch will speak about advances in small molecule controls for SARS-CoV2. A session focused on the cannabinoids will be chaired by Dr. Mahmoud ElSohly and includes Dr. Marilyn Huestis from Thomas Jefferson University and Dr. Mary Paine from Washington State University.

In an effort to encourage the presentation of new discoveries from abroad, special sessions have been scheduled for presenters from Africa, Asia, South America and the Caribbean. An evening session has been scheduled for NIH Program Officers and Venture Capital Groups to present on financing for the discovery and development of new drug prototypes from academia and small businesses. Monday afternoon and evening are free to spend



Charleston Civic Center

time with friends, family and colleagues. A couple of local favorites for things to consider include a historical carriage ride around downtown Charleston, which will allow you to see the sights while an expert guide enlightens riders on the rich history of the city. An alternative is to rent a bike in Freshfields Village and spend the afternoon taking in the sites, beaches and wildlife of Kiawah Island as well as sampling the bars, wine-bars and restaurants along the 50 miles of unique bike trails and beaches (count the organizing committee in as personal guides on that excursion).

We are looking forward to welcoming ASP members and friends to the Palmetto State and are working hard to provide an intellectually stimulating meeting responsive to health, wellness and environmental challenges and providing unique opportunities for our field to provide positive solutions. ■

We are looking forward to welcoming ASP members and friends to the Palmetto State and are working hard to provide an intellectually stimulating meeting responsive to health, wellness and environmental challenges and providing unique opportunities for our field to provide positive solutions.

In Memoriam: Kuo-Hsiung Lee

By Susan Morris-Natschke, PhD

ASP Fellow Dr. Kuo-Hsiung (K.H.) Lee passed away suddenly in Chapel Hill, North Carolina from an acute heart attack on October 24, 2021, only a few months after his retirement in July. Dr. Lee's scientific achievements during five decades of research were praised by many, including ASP Fellow Dr. Gordon Cragg. "He was recognized worldwide as a leader in the discovery of novel compounds from plant sources which served as leads to new drugs for the treatment of serious human diseases. He will long be remembered for his amazing scientific legacy, and his contributions to improving the lives of patients worldwide."

Lee was the oldest of four children born to the late Ching-Chung Lee and Chin-Yeh Yang Lee in Kaohsiung, Taiwan. When Lee was young, he was initially exposed to medicinal herbs through his grandfather.¹ Once, Lee saw him treat a woman suffering from water retention. "Her belly was swollen up," Lee said. "My grandfather picked a handful of *Elephantopus mollis* that was growing underneath some banana trees. He suggested that she boil it with water and drink the juice. After a few hours, that water was expelled."

In time, Lee decided to go to pharmacy school and investigate the active ingredients of such herbs – leading to a brilliant and highly productive career in natural products and medicinal chemistry, particularly with respect to traditional Chinese medicine. His research, passion and philosophy culminated in outstanding contributions in new drug discovery and development that will continually benefit both the field of medicinal chemistry and humankind.

Lee was always extremely diligent and highly disciplined, leading him to excel in his academic studies. He obtained his Bachelor of Science in Pharmacy in the first matriculated



Dr. Kuo-Hsiung (K.H.) Lee

"He was recognized worldwide as a leader in the discovery of novel compounds from plant sources which served as leads to new drugs for the treatment of serious human diseases."

class of the Department of Pharmacy, Kaohsiung Medical University (Kaohsiung, Taiwan) in 1961. He then received his Master of Science in Pharmaceutical Chemistry from Kyoto University (Kyoko, Japan) in 1965. Finally, he earned his Doctor of Philosophy in Medicinal Chemistry from the University of Minnesota (Minneapolis, MN, USA) in 1968 in just 2½ years. After a post-doctoral fellowship at UCLA in organic chemistry, Lee joined the faculty at the University of North Carolina's School of Pharmacy (now named UNC Eshelman School of Pharmacy (ESOP)) in 1970. He rose through the academic ranks as assistant professor (1970-74), associate professor (1974-76), full professor (1977-91), Chairman of the Medicinal Chemistry and Natural Products Division (1998-99), and Kenan Distinguished Pro-

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His research, passion and philosophy culminated in outstanding contributions in new drug discovery and development that will continually benefit both the field of medicinal chemistry and humankind.

He combined advanced natural products chemistry and synthetic medicinal chemistry as well as cutting-edge life science technologies to design and discover herbal medicine-based bioactive natural products and their analogs as clinical trial drug candidates.

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fessor of Medicinal Chemistry (1992-2021) combined with Director of the Natural Products Research Laboratories (NPRL) (1983-2021), until his retirement after over 50 years of service to UNC.²

Lee established an exceptional research program in rational drug discovery, particularly in the areas of medicinal chemistry, bioactive natural products, new anti-cancer and anti-AIDS drug discovery and development, and Chinese medicine. He combined advanced natural products chemistry and synthetic medicinal chemistry as well as cutting-edge life science technologies to design and discover herbal medicine-based bioactive natural products and their analogs as clinical trial drug candidates. His efforts led to the discovery of several thousand such compounds, providing leads for a new generation drug design to develop future pharmaceutical agents to fight cancer, AIDS, and other diseases like numerous previously discovered bioactive natural products (including paclitaxel, artemisinin, and others) which were developed as current pharmaceutical agents to treat cancers, malaria, and other ailments. Lee said, “We provide the lead, a structure that pharmacologists can use as a model.” He identified medically active components from various natural products and modified them to provide potential chemotherapeutic drug candidates for the 21st century and beyond.

Lee mentored 38 PhD and 7 MS graduates as well as over 200 doctoral and post-doctoral researchers and visiting professors/scientists who came from around the world, particularly Taiwan, Japan, and China, to study in his highly productive and active NPRL. Many of these scientists went on to achieve significant positions in academia, government, and industry. More than 65 active laboratories and 125 active individual scientists outside UNC-CH continued collaborative research

projects with Lee, leading to phenomenal synergistic team efforts in new drug development. The following example products discovered by the NPRL are currently in clinical uses, clinical trials, or preclinical studies.

Based on Lee’s initial advice, PG-2, composed of polysaccharide immunostimulatory principles from *As-tragalus membranaceus* (Huang Qi), was discovered and developed by Pharmagenesis and PhytoHealth Corporation of Taiwan. The Taiwan Department of Health approved PG-2 for clinical use in treating cancer-related fatigue in 2011, and the US FDA approved PG-2 to treat idiopathic thrombocytopenic purpura in 2012.

JC-9 (or ASC-J9), based on the natural product curcumin from *Curcuma longa* rhizome (Jiang Huang), was discovered and developed in the NPRL and licensed to AndroScience Corp., which merged in 2004 with Lee’s spin-off start-up company Plantaceutica, Inc. (2001-2004). JC-9 succeeded in a Phase II clinical trial against acne, is a clinical trial candidate for prostate and other cancers, and is in development by a Taiwanese biotech company.

In a solid focus of Lee’s anticancer research programs, further syntheses and development of new analogs of neo-tanshinlactone as clinical trials candidates for treating breast cancer were pursued.³ Neo-tanshinlactone, a natural product found in *Salvia miltiorrhiza* (tanshen), is more active and selective than the anti-breast cancer drug tamoxifen. PBTs, novel phenanthrene-based tylophorine analogs discovered and synthesized by Lee’s group based on the natural alkaloid tylophorine isolated from *Tylophora* species, may offer a novel path of drug development to treat lung cancer.⁴

In Lee’s anti-HIV research programs, he had a promi-

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Lee said, “We provide the lead, a structure that pharmacologists can use as a model.” He identified medically active components from various natural products and modified them to provide potential chemotherapeutic drug candidates for the 21st century and beyond.

In Memoriam: Kuo-Hsiung Lee

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ment collaboration with the team of Drs. Chin-Ho Chen and Li Huang, Antiviral Drug Discovery Laboratory, Duke University, who stated, “We are proud and grateful to be teamed up with [Dr. Lee’s] lab for novel drug development against HIV/AIDS and influenza viruses, [for] more than two decades. One notable accomplishment of Lee was the development of bevirimat,⁵ a natural product-derived drug candidate and a first-in-class HIV maturation inhibitor.” This compound was produced in Lee’s NPRL from natural triterpenes found in *Syzygium claviflorum* (pang hua chih nan). After licensure to Panacos Pharmaceuticals, Inc., then to Myriad, Inc., bevirimat succeeded in Phase IIa anti-AIDS clinical trials. Another focus of Lee’s anti-HIV research programs was to assess and develop novel anti-HIV diterpenes, particularly gnidimacrin-related daphnane diterpenes and derivatives, to eliminate the latent HIV-1.⁶ Gnidimacrin is the most potent HIV latency reversing agent and the only single agent that can consistently reduce the frequency of latent HIV-1 infected cells at picomolar level.

Lee delivered more than 457 invited lectures and presentations, obtained more than 121 patents, and published close to 1000 research papers with 100 and 156 in the *Journal of Medicinal Chemistry* and *Journal of Natural Products*, respectively. Dr. A. Douglas Kinghorn, Professor and Jack L. Beal Chair, College of Pharmacy, Ohio State University said, “Over the 26 years I served as Editor-in-Chief of the *Journal of Natural Products*, I was privileged to receive many fine manuscript submissions on a wide variety of bioactive compound types from medicinal plants by K.-H. and his collaborators. His passing marks a very great loss to the international natural products scientific community.”⁷

Lee received his first research grant from the National Institutes of Health in 1971 and held numerous grants, primarily but not exclusively from the NCI and



Dr Lee with the NPRL research group outside of Beard Hall May 2018.

PHOTO: UNC ESHELMAN SCHOOL OF PHARMACY

NIAID, continuously through the end of his research career. Concerning the impact of this research, Dr. Barry O’Keefe, Chief of the Natural Products Branch, NCI, NIH said, “It was my honor to be able to collaborate with Dr. Lee during the latter part of his career at UNC. Dr. Lee was a gifted, brilliant and dedicated researcher but also a gentle, generous and caring person. His legacy of scientific excellence will continue to live long after his passing in the bodies and minds of his many students and colleagues who will carry his love of chemistry and natural products, and his dedication to helping address significant public health challenges, into the future.”

The quality and significance of Lee’s scientific contributions were recognized with numerous awards and honors. He was proud to receive the prestigious Lifu Academic Award for Chinese Medicine in 1994 and be elected as an Academician of Academia Sinica, a foremost academic and research institution of Taiwan, in 1996. Lee received Outstanding Achievement Awards from Kaohsiung Medical University (KMU) in 1992 and the University of Minnesota in 1999, his undergradu-

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“One notable accomplishment of Lee was the development of bevirimat,⁵ a natural product-derived drug candidate and a first-in-class HIV maturation inhibitor.”

In Memoriam: Kuo-Hsiung Lee

Outside of the laboratory and academia, Lee enjoyed Chinese calligraphy and tai chi. He said, “I practice Chinese calligraphy, especially the cursive style. I have developed my own unique style found nowhere else in the world.”

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ate and graduate institutions, respectively. Dr. Gunda Georg, Department Head of Medicinal Chemistry, University of Minnesota College of Pharmacy said, “[Dr. Lee] was an internationally renowned leader in the field of medicinal chemistry who leaves behind an indelible legacy. We are very proud that he, as an alumnus of our department, rose to such prominence in the field of medicinal chemistry.” Later awards included the American Society of Pharmacognosy Norman R. Farnsworth Research Achievement Award (2009),⁸ the Order of the Rising Sun, Gold Rays with Neck Ribbon from the Japanese government (2011), and the Ernest H. Volwiler Research Achievement Award from the American Association of Colleges of Pharmacy (2015). He was an elected Fellow of the American Association of Pharmaceutical Scientists (1986), American Association for the Advancement of Science (1994), and American Society of Pharmacognosy (2010). In Taiwan, Lee was appointed as Chair Professor and Honorary Director, Chinese Medicine Research & Development Center, China Medical University & Hospital as well as Chair Professor, College of Pharmacy, KMU with an honorary doctoral degree in 2019 from KMU. Dr. Yuh-Jyh Jong, Chair Professor and Former KMU President (2019-2021), stated, “[Dr. Lee] devoted his whole life to the research of Chinese herbal medicine. His enthusiasm, dedication and discipline for research set a role model for us.”

Professionally, Lee was a recognized authority on Chinese

Nature is the Best Guide

道法自然
李國雄



Original Calligraphy by Dr. Kuo-Hsiung Lee



Best wishes for a happy & prosperous
New Year, and for safety
during this pandemic.

K H & L H Lee
December 2020

禪心托科研，書道觀古今



When engaging in scientific research,
The Zen mind discovers new truths.
When practicing the art of calligraphy,
Past and present days reveal their
beauty.

ABOVE: A sample of Dr. Lee's personal calligraphy.

BELOW: A Dr. Lee sample holiday card.

herbal medicine with a highly regarded research program; however, his family always took first place in his life. He went home nearly every workday to have lunch with his wife Lan-Huei (Amy) Chen, whom he married in 1968. Their two children, a daughter Catherine and son Thomas, who both became physicians, were always in his thoughts. He was a beloved grandfather to four grandsons. As Rachel Thimke, Lee's last executive associate from March 2021 to June 2021, emphasized, “One thing that particularly stuck out to me was how incredibly proud he was of his family. Nearly every day he came into the office with a new story praising his wife, children, or grandchildren.”

Outside of the laboratory and academia, Lee enjoyed Chinese calligraphy and tai chi. He said, “I practice Chinese calligraphy, especially the cursive style. I have developed my own unique style found nowhere else in the world. I think this is one of the most

enjoyable things in my life, as this art is quite abstract, and you can express your own style. I learned Tai Chi from Mr. Hong-Bing Ji, one of the best masters in Taiwan. [He] taught me the secret of true meditation and relaxation.”² Lee's calligraphy was featured each year on his holiday greeting cards sent to hundreds of friends, colleagues, and associates. Dr. Ching-Kuan Liu, Chair Professor of Neurology and Former KMU President (2012-2018) said, “Dr. Lee also made the most impressive greeting cards,

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In Memoriam: Kuo-Hsiung Lee

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combin[ing] photography, traditional Chinese calligraphy, and chemical formula. We always enjoyed reading his greeting cards every year over and over again to immerse in his academic spirit and his philosophy of life.”

Dr. Susan L. Morris-Natschke, retired professor, UNC ESOP: “I worked with Dr. K.H. Lee for over 25 years in his NPRL. He was an exceptional scientist whose drive and dedication led to many significant scientific accomplishments that will give him a sustained legacy in the fields of natural products and medicinal chemistry. Dr. Lee was also a kind, personable gentleman.

While at times he could seem over-exacting, he always had a sound reason. For example, why did he prefer to staple papers together with the staple on an angle rather than straight to either edge? The angled method forms a strong(er) triangle! He supported and helped his students, colleagues, and associates and always had a recollection or story of people and events. His efficiency, organization, and industry were spiced with humor at times as well. I can hardly believe that I will never again hear his voice on the phone saying, ‘This is K.H. Lee.’ I and so many others will miss him greatly.” ■

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In Memoriam: Kuo-Hsiung Lee

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ADDITIONAL REMEMBRANCES FROM STUDENTS, COLLEAGUES, AND ASSOCIATES

Dr. Hsin-Yi Hung, Assistant Professor, National Cheng-Kung University: *"In my memory, Dr. Lee is always full of energy. Dr. Lee has a strong mind so that he can accomplish amazing achievements in his research career. Now I am also a teacher in Taiwan. I think I would pass on this spirit in memory of my teacher, Dr. Lee."*

Dr. Kyoko Nakagawa-Goto, Associate Professor, Kanazawa University: *"I am writing on behalf of the Japanese who have studied in Dr. Lee's lab from 1971 to 2021. [Totally,] 81 Japanese joined Dr. Lee's research group either as scholars or students. The time we spent with him was a great memory and an honor for us."*

Dr. Donglei Yu, Senior Review Chemist, US FDA: *"I miss the days [Dr. Lee] helped me to solve problems and discussed research plans. I miss the life lessons he taught me through humorous stories. His legacy of scientific achievement and excellence will continue to live long."*

Dr. Keduo Qian, Senior Review Chemist, US FDA: *"Prof. Lee was one of the most esteemed natural product chemists. However, to his hundreds of graduate and postdoc students, he was not only a brilliant scientist, a devoted researcher, and an inspirational figure, he was also just like an elder friend, who loved to share stories and jokes, life experience, and calligraphy. The experience and opportunities he provided have deeply touched so many lives that he will always be remembered."*

Dr. Yizhou Dong, Associate Professor, Ohio State University College of Pharmacy: *"When I first met Prof. Lee, I was so impressed by his passion, optimism, and persistence. He is an outstanding mentor – instructing, guiding, and taking care of each trainee. This mentorship has been and will forever be a major contributor to my achievements, which I will continue to pass to the trainees in my lab. Professor Lee, your vision is unmatched, and your legacy continues to soar! Your smile, voice, and spirit will be in our memories forever!"*

Katie Musgrove, Dr. Lee's Executive Associate 2015–19: *"I had so much respect for Dr. Lee and his research and was honored to get to work with that team. I will miss Dr. Lee's funny anecdotes, his frequent generosity with delicious group luncheons at the Carolina Club and sweets brought back from his trips to Taiwan (many a pineapple and cranberry cake were enjoyed by our entire team at NPRL). Rest well, Dr. Lee."*

Dean Angela Kashuba, UNC ESOP: *"We will always remember Dr. Lee with great fondness and admiration. He has left a legacy of relentlessly pursuing science for discoveries that improve people's lives. We are better for knowing him."*

Dr. Alexander Tropsha, K.H. Lee Distinguished Professor, Division of Chemical Biology & Medicinal Chemistry, UNC ESOP: *"I have known K.H. as a senior colleague and collaborator since I joined the school and the division in 1991, and for me (and many of us who worked with K.H. side by side for decades) his name has been inseparable from the name of our school where he served for more than 50 years. As it sadly turned out, K.H. could not live long without coming to the office and working on new compounds daily. [W]e should remain inspired to work toward achieving and maintaining the same level of dedication to research and professionalism as was embodied by K.H."*

Dr. Yung-Yi Cheng, Research Collaborator, UNC ESOP: *"Dr. Lee told me, 'The greatest gift you leave to the world is what you have dedicated and shared.' Today, I have seen and learned that. As a poet, Dr. Lee believed in 'Writing good poetry and learning from masters.' Today, I write this poem for you, Dr. Lee:*

***The Star had dedicated its whole life to lighting up space.
The falling Star brings light to the night again.
People look up and appreciate the light it brought.
The warmth stays in their hearts now and forever."***

In Memoriam: Daisuke Uemura

By Hirokazu Arimoto, PhD, Bill Baker, PhD and Bruce Littlefield, PhD

Last year, the world of science lost an exceptional natural products chemist, teacher, mentor, leader and human being, Professor Daisuke Uemura of Kanagawa University. A friend and colleague to many around the world, Uemura passed away on April 13, 2021 in Japan. Although perhaps best known for his work on the structural elucidation of palytoxin and the discovery of halichondrin B, the latter leading to development of the cancer drug eribulin, Uemura also made signal contributions to the identification of shellfish toxins, insect toxins and chemical ecology, among other achievements. He maintained a strong interest in science in general throughout his career and used that interest to expand methods that went beyond the boundaries of traditional natural products chemistry.

Uemura received his PhD at Nagoya University under Professor Yoshimasa Hirata. He then started his faculty career as an assistant professor at Nagoya before moving to Shizuoka University where he was later promoted to full professor. Following additional professorships first at Nagoya University then Keio University, in 2011 he moved to his final academic appointment at Kanagawa University where he founded the Research Institute of Natural Drug-Leads. His achievements have been recognized by innumerable awards including two national honors from the government of Japan, the Medal with Purple Ribbon and the Order of the Sacred Treasure, as well as awards from scientific and cultural organizations, such as the Naito Memorial Prize for the Promotion of Science, the Chunichi Cultural Award, the Chemical Society of Japan Award, and the Nakanishi Prize.

Among his professional activities, Uemura established the Hirata Memorial Lecture, which evolved into the Hirata Award, in honor of his sensei. The award is now well regarded for recognizing the up-and-coming leaders in organic and bioorganic chemistry. In a memorial to Uemura on the Institute of Transformative Bio-Molecules (ITBM)



Dr. Daisuke Uemura

home page, Kenichiro Itami, from Nagoya University and Director of ITBM, recognizes him as "...a visionary leader who built the foundation of today's organic chemistry community in Nagoya...", a powerhouse of bioorganic chemistry in Japan. Similarly, Jeffrey Bode, ETH-Zürich, the 2009 Hirata Memorial Lecture awardee and current Hirata Award Committee member, remembers Daisuke "...as part of the fearless team from Nagoya University who had elucidated the planar structure of palytoxin, a feat that to
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Although perhaps best known for his work on the structural elucidation of palytoxin and the discovery of halichondrin B, the latter leading to development of the cancer drug eribulin, Uemura also made signal contributions to the identification of shellfish toxins, insect toxins and chemical ecology, among other achievements.

In Memoriam: Daisuke Uemura

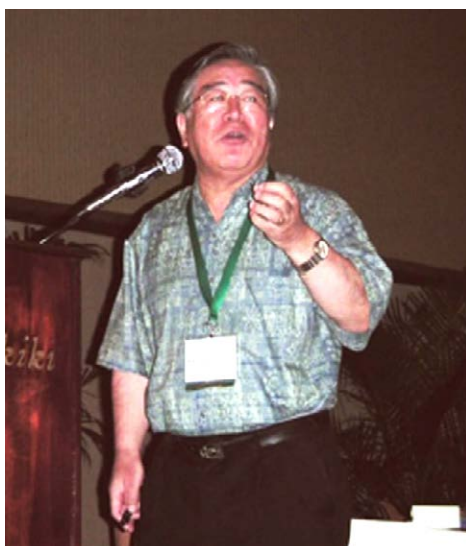
Throughout his career, Uemura placed highest value on the training of graduate students and postdocs, many of whom have gone on to their own successful careers.

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this day stands as one of the greatest achievements of organic and analytical chemistry..."

Throughout his career, Uemura placed highest value on the training of graduate students and postdocs, many of whom have gone on to their own successful careers. Hirokazu Arimoto, Tohoku University, fondly remembers that Uemura "... used to say that we need to be 'strong-legged' researchers, in the sense that he was not defeated by the constraints of the research environment. When he talked about promising young researchers in his field, 'strong legs and feet' was a frequent keyword..." and that encouraging graduate students during poster sessions at professional meetings was more important to Uemura than socializing with his colleagues. Mentoring the next generation(s) was clearly among his greatest achievements.

Uemura's scientific enthusiasm was infectious, and his warmth and kindness as a human being was unsurpassed. None who have written remembrances of Uemura fail to mention his contagiously happy demeanor. Cathleen Crudden, a Hirata Award Committee member from Queen's University, wrote on the ITBM memorial, "...what I will remember about him most is his joyful and inclusive attitudes. He was always happy to spend time with students and young faculty and was rarely without a smile." Phil Baran, a recipient of the Hirata Memorial Lecture award, posted to the ITBM memorial, "He was also a generous, warm, and kind



Uemura in 2009 speaking at the 50th ASP Annual Meeting in Hawaii.

person with an infectious laugh and great sense of humor."

His scholarly activities led to hundreds of publications and patents, lectures and international speaking engagements. Ever the educator, his works included elements meant to advance our understanding. He often used his lectures to tell stories, adventure stories, with researchers at the center. In his later years he prepared two books (in Japanese) where the scientific discoveries of his lab were described with the same adventure themes as these lectures.

He was a tireless champion of natural products as starting points for drug discovery, and it was in that role that he organized the highly successful natural products subsymposia at both Pacifichem 2015 and

2021 that the three of us were honored to co-chair with him. Sadly, he passed away before the 2021 meeting was held in December. Although the field has lost his clear and inspirational voice, Uemura's legacy lives on in the great work being done by natural products scientists around the globe, including those in the ASP ■

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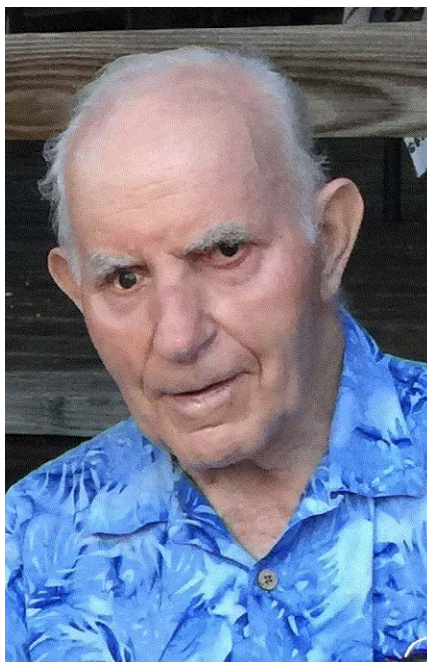
In Memoriam: Francis “Fritz” Schmitz

By George Richter-Addo, PhD and Robert Cichewicz, PhD

It is with a heavy heart that we share with you that our beloved and retired University of Oklahoma colleague Professor Francis (Fritz) Schmitz passed away on March 7, 2022 in Norman, Oklahoma at the age of 90. Schmitz was a former member of ASP and played a critical role in the society as the first *Journal of Natural Products* associate editor specializing in marine natural products. He is fondly remembered as a gentleman, scholar, family man, joker, and trail blazer in the field of marine natural products, despite spending the majority of his career in a landlocked state.

Schmitz was born in Raymond, Iowa to Helen and Frank Schmitz, and had five siblings. After graduating from Our Lady of Victory Academy in Waterloo, Iowa, Schmitz joined the US Army and served in Germany for two years. Following his military service, Schmitz received his BA from Maryknoll College in 1954, his BS from Loras College in 1956, and his PhD in organic chemistry from University of California, Berkeley in 1961 under the supervision of Prof. James Carson. He then joined the research group of Prof. William S. Johnson at Stanford University as a post-doctoral fellow for two years, then joined the faculty at the University of Oklahoma (OU) in 1963. He was promoted to associate professor in 1967 and then professor in 1971 where he taught and conducted marine natural products research until his retirement in 1999.

Schmitz was considered the bedrock of the OU bioorganic program for many years. Soon after coming to OU,



Professor Francis (Fritz) Schmitz,
1932-2022

he joined with two other faculty members, Drs. Leon Cieresko and A. J. Weinheimer, to develop OU's very strong reputation in marine natural products. He and the marine natural products team members went on many expeditions all over the world using SCUBA and snorkeling for samples of invertebrate marine organisms.

He worked on determining the molecular structures of several important natural products of medicinal value, and he was always on the search for new ones. His research generated over 160 publications and a large amount of external funding from the original Sea Grant and from the National Heart Institute and the National Cancer Institute. Schmitz was widely and internationally recognized as a leader in the field of marine natural product chemistry. Those skills and accomplishments played an important role in Schmitz being named the first “ma-

rine” associate editor for the *Journal of Natural Products*, which was a position he held from 1999-2002. Schmitz was a real team player who was instrumental in his department's successful efforts to acquire several high-end instruments through grants from federal agencies.

In recognition of his outstanding research accomplishments, Schmitz was named a George Lynn Cross Research Professor at OU in 1985. In addition, he was awarded the Regents Award for Superior Teaching (1969), the Regents Award for Superior Research Activity (1981), the Glen Couch Scholars Teaching Award (1968), and the Oklahoma Chemist of the Year Award (1987).

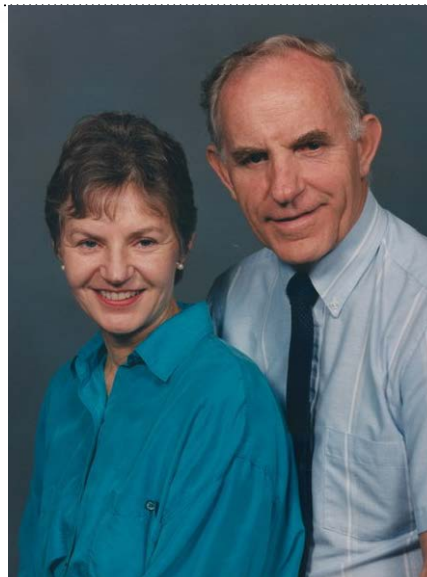
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He is fondly remembered as a gentleman, scholar, family man, joker, and trail blazer in the field of marine natural products, despite spending the majority of his career in a landlocked state.

In Memoriam: Francis “Fritz” Schmitz

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Knowing the history of a person who led a life in science (e.g., important dates, accomplishments, and awards) can only tell us so much about that individual. To provide a better sense of who Schmitz was, we looked to several different sources to help us understand this wonderful man and his life. We hope that the following vignettes will serve to capture portions of Schmitz’s life through the words of his colleagues, family, and even from the man himself. We are grateful for the many stories people shared, and while we have striven to attribute each one to an individual, we found that many people’s favorite stories had grown to become part of the collective legend of Schmitz.



Fritz and Phoebe (Chapman) Schmitz

- **Devoted Family Man.** While working on his PhD at UC Berkeley, Schmitz met his life-long collaborator, friend, and one true love, Phoebe Chapman. Phoebe and Fritz were married for 61 years and had three children (Michael, Kathy, and Steven), 10 grandchildren, and 21 great-grandchildren! We thank Kathy (Schmitz) Ong for providing many of the photos shared in this tribute with the ASP

—Contributed by the Schmitz family

- **Terrific Teacher.** Schmitz loved teaching students. He considered his first two teaching awards given during his first six years at OU to be among the most outstanding “high points” of his professional career. But life as an instructor during those early years was not always easy. Schmitz recalled working in the hot Oklahoma summers and falls on the fourth floor of the original OU chemistry building. He recounted that the unvented space would get “quite hot” in the afternoons as the sun beat down on the metal roof. But the worst came when the full complement of ~80 undergraduate students would arrive for their afternoon labs and fire up their Bunsen burners for that day’s lessons. While working in those sauna-like conditions for four-hour stretches should have automatically qualified him for a teaching award, it was Schmitz’s genuine love of chemistry and his ability to communicate that passion to others that truly endeared him to his students.

—Contributed in part by Schmitz via email circa 2008

- **Unstoppable Force.** Already during his first semester as an assistant professor, Schmitz built a thriving lab of graduate and undergraduate students. One evening, an undergraduate student was conducting an experiment using a glass distillation apparatus. Noticing something did not seem quite right, the student located Schmitz and asked him to check on the setup. Regrettably, as he peered closer to see what was amiss, an explosion occurred sending glass shards into his right eye. Despite heroic attempts, the eye was lost. In true form, Schmitz did not let that event deter him from the career that lay ahead. He called this a “lesson learned the hard way,” and he

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He had a brilliance and sharp sense of humor that kept those around him on their toes. Schmitz was a fantastic person and very helpful colleague who took time to mentor junior colleagues, staff, and students/postdocs.

In Memoriam: Francis “Fritz” Schmitz

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and his students always wore safety glasses from that point onward. It is because of that incident that new members to the OU Department of Chemistry and Biochemistry sign a contract agreeing to wear safety glasses/goggles while stationed in a lab environment.

—Contributed in part by Schmitz via email circa 2008

- **Landlocked Marine Chemist.** Given Oklahoma’s landlocked position in the US heartland, it is somewhat surprising that Schmitz would make marine natural products the focus of his career. In what ASP Fellow Phil Crews describes as Schmitz’s “Sooner Strategy” (the Sooner is the OU mascot and a rich part of Oklahoma history), Oklahoma was ideally positioned for marine natural products. In Schmitz’s words, “Oklahoma is the preferred state for US natural product research...It is about equidistant to all coral reef zones,” thus giving him a competitive advantage over his coastally located colleagues.

—Contributed by Phil Crews

- **Good Neighbor.** Anyone who knew Schmitz for even the briefest period came to appreciate his cordial manner and instinct to make everyone around him feel at home. Murray Munro shared one beautiful example: in 1979, Munro scheduled a trip to visit OU, but it was not until he arrived in the US from New Zealand that he realized he had landed in Oklahoma just days before the Thanksgiving holiday. Undeterred, Schmitz summoned every faculty member, staff, and student who had not yet left, providing Munro with a “better than predicted audience” for his chemistry seminar on the eve of Thanksgiving. Schmitz insisted that Munro stay at his home, and he described the “incredible time” he had as everyone made him “feel like a member of the Schmitz family.” Munro noted that even though those events occurred a “long time ago now...the memory of Fritz’s kindness to a young, unknown, foreign marine natural product chemist still remains large” in his memory.

—Contributed by Murray Munro

- **Legendary Leader.** In the words of ASP Fellow Gordon Cragg, Schmitz was “regarded as one of the pioneers and leaders in the field of marine natural products chemistry.” Schmitz was honored by the opportunity to serve as chair for the Marine Natural Products Gordon Research Conference in 1979 and co-chair of a joint US-Japan Seminar on Marine Natural Products in 1990. He published many of his reports about unusual natural products and their biological activities in the *Journal of Natural Products* for which he served as the first “marine” associate editor. ASP Fellow A. Douglas Kinghorn recalled that for “the three-years between 1999-2001, Fritz Schmitz very graciously agreed to be the Associate Editor...having earlier been on the Editorial Advisory Board since 1995. This crucial editorial appointment gave the journal greater credence with the marine natural products community than previously.” Kinghorn went on to say, “I am also very grateful to Schmitz for suggesting that Bill Gerwick might be willing to succeed him as ‘marine’ Associate Editor of *J. Nat. Prod.*,” thus transitioning the position to another leader in the field.

—Contributed by Gordon Cragg and A. Douglas Kinghorn

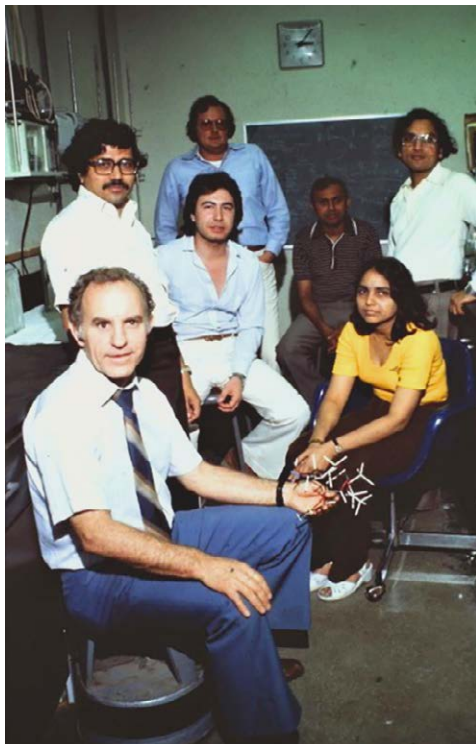


Schmitz preparing to collect research samples.

- **Extraordinary Human Being.** After looking at all the remembrances and listening to the many stories told by his family, friends, and colleagues, there is no doubt that Schmitz was a most extraordinary human being. Despite his remarkable accomplishments, Schmitz loved many of the unique and/or simple pleasures that he was gifted during his life. He lived a life filled with unmitigated love for his family, and he tutored his grandchildren through high school and college chemistry. He helped provide free tax filing services for needy families in his community, and he volunteered with Meals on Wheel for over 15 years.

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In Memoriam: Francis “Fritz” Schmitz



Schmitz in his lab with some of his students.

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He also loved the adventure of travel, visiting places such as Australia, New Zealand, Korea, Japan, China, Italy, Belgium, Germany, Brazil, Puerto Rico, Indonesia, and more. He enjoyed potluck dinners at his home with international foods brought by his students, and he embraced the adventure of his field work [being robbed, held-up at gun point, being arrested (don't worry, it was a mistake!), eating dinner with iguanas as guests, and more], learning to SCUBA dive and see the wonders of the seas (although he really disliked sharks). He was proud of the structures he and his group identified like polyether antibiotics, and he could not resist poking fun at colleagues during departmental banquets. And he liked backpacking with friends and colleagues, plus so much more.

—Contributed in part by Schmitz via email circa 2008 and recollections from a memorial dinner held March 15, 2022

He lived life by example and always made time to listen to what you had to say. In short, he was everything that we aspire to be, but, unlike many, he succeeded in doing it all.

While the world has lost a legend, we hope that through these accounts everyone can share in the lessons he taught us, and, perhaps, be fortunate enough to enjoy a life well-lived like our friend Fritz.

Across the Pacific Six Times in Half a Year: The Memory of My First ASP Annual Meeting

by Kyo Bin Kang, PhD

The year 2018 was and will always be the most eventful year of my academic life. It was the year when I joined ASP and participated in my first annual meeting, and I needed to travel across the Pacific six times during six months from February to August, due to unexpected events.

That January I was excitedly preparing for a second postdoc, this time in the Dorrestein lab at UC San Diego. This came after spending 12 years at Seoul National University, Korea, for my BA, MA, PhD, and first postdoc. It was my dream position since I began working on LC-MS/MS analysis of natural products. However, a few days after New Year's Day I got bad news that my PhD advisor, Prof. Sang Hyun Sung, who was only 49 years old, was diagnosed with blood cancer. I was deeply concerned about his health, so I found it hard to leave and start living abroad for the first time in my life.

San Diego is a truly wonderful place, not only to live but to study natural products and mass spectrometry, and I enjoyed every day there. Prof. Pieter Dorrestein let me join the laboratory mailing list six months before my arrival so I could become familiar with the computational mass spectrometry tools being developed in the lab and get involved in a project applying computational metabolomics and genomics approaches for natural product discovery, which was a collaborative project with Prof. Bill Gerwick's laboratory. Up until this point, I had only worked in a wet laboratory, so the heavy application of informatics with bench science in the Dorrestein laboratory was a strange and awesome change. Every day, lab members with different backgrounds had discussions on various topics, mostly related to mass spectrometry, in an open-minded atmosphere. I could sense immediately that this environment would have a profound influence on my scientific interests. Fortunately, I had some experience in scripting with Matlab during my master's thesis

One of the "Happy Hour" days in the Dorrestein lab. We loved this place named Rock Bottom, but it closed in 2020. From left to right: Drs. Andrés Mauricio Caraballo-Rodríguez, Ricardo da Silva, Carlos Molina-Santiago, Louis-Félix Nothias, Kyo Bin Kang and Francesca Di Ottavio.

PHOTO: DR. JUSTIN VAN DER HOOFT



My wife Sun Inn visited San Diego in May 2018 for a week's vacation. We took this photo at Scripps Beach, which is adjacent to the Scripps Institution of Oceanography.

project, so it was not very difficult for me to become familiar with the informatics approach within the Dorrestein group.

Although I enjoyed a rich academic life in San Diego, I was sad to have to live apart from my wife, Sun Inn, after only 11 months of marriage. This long-distance relationship was nothing new to us, as Sun Inn had recently spent five years getting her PhD in London. Still, we both became quite depressed during yet another extended time apart. I was very



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Across the Pacific Six Times in Half a Year: The Memory of My First ASP Annual Meeting



The Sung Lab photo in February 2016, when Kyo Bin Kang got his PhD.

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pleased to find an available faculty position at the College of Pharmacy, Sookmyung Women's University in Seoul, and Pieter encouraged me to apply even though it was only my second month as a postdoc in his lab. I flew back and forth to Seoul for the job interview in June, and a few weeks later, when I got the final job offer from the university, I called Prof. Sung, now six months into his fight against cancer, to let him know I landed the faculty position. He was experiencing a difficult phase of chemotherapy and could barely speak, but I could tell how happy he was to hear the news. It was so painful to hear the difficulties he was having in communicating over the phone, but I was glad to be able to deliver some good news and hoped it would energize him a little bit.

Soon after accepting the job offer, I attended my first ASP annual meeting in Lexington, Kentucky since joining the society. The Dorrestein lab was invited to lead a hands-on workshop on our Global Natural Product Social Molecular Networking (GNPS) platform, so I had prepared the workshop together with Pieter and two other postdocs, Ming Wang and Mauricio Caraballo. The workshop was a great success. Participants learned how to build and explore molecular networks via GNPS, and we got wonderful questions and feedback. Overall the conference

was amazing; there were a lot of great talks and posters, and I could meet and talk with some of the “big name” authors of papers I had read. Above all, what I most liked about the conference was the friendly atmosphere. ASP conferences are full of social events, and there are also unofficial events at places around the venue, especially after conference hours.

On the night of July 23, I fell asleep after hanging out with some new friends in a bar near my conference hotel. My phone rang several times, and when I finally answered, I was informed that my PhD advisor had passed away. It was about 4:00 am, but I could not be more awake and sober. Immediately I got up from the bed, grabbed my baggage, and left my hotel room. I gathered with the other Korean alumni from the Sung lab that were also at the conference and searched for any flight to Seoul. There were several planes departing

from Lexington at around 8:00 am. I immediately booked a flight and arrived at Seoul about 16 hours later. In Korea, funerals last for three calendar days from the day of passing, so I was able to make it to the afternoon of the second day of the funeral to bid farewell to my advisor. My other lab alumni friends and I carried the coffin at the funeral. I took the opportunity to spend a few extra days with my wife in Korea, then flew back to San Diego. At the time, only five weeks remained until my first day as a PI. I packed all my things in the lab and my apartment and gave thanks to all my new colleagues and friends there, especially Pieter and Bill, for helping me to have such a wonderful time in San Diego.

I returned to Seoul in August and started my own lab as an assistant professor at the College of Pharmacy, Sookmyung Women's University. Since it was established in 2018, my lab has been growing rapidly. My six-month experience in San Diego inspired me to shift and expand my research approach, from classical natural product discovery to computational metabolomics and its applications to chemical ecology, evolutionary biology, drug discovery, and drug metabolism, which are now the foci of my lab. Currently five graduate students

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Across the Pacific Six Times in Half a Year: The Memory of My First ASP Annual Meeting



The Korean natural product chemists' gathering during the 2019 ASP meeting in Madison, Wisconsin.

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are working on their own MS/MS-based metabolomics and integrated multi-omics projects in fungal and plant specialized metabolites. I still keep in touch with the friends I met in San Diego and also maintain collaborative projects with them. Maybe soon you can “e-visit” my laboratory via lab takeover, which is an ASP social media project coming soon. I am serving as a social media committee member of ASP, so I hope everybody will enjoy it.

In addition to the many impactful events that defined the year, 2018 was also the year I became an ASP member. I was invited to contribute this article as a part of the society's interest in being more inclusive toward researchers and labs from outside the US. As an international member, I feel ASP is already quite welcoming but could improve in the area of inclusivity. I have participated in ASP conferences only twice, in 2018 and 2019, and both conferences were incredible. They provided me with the opportunity to interact with many natural product chemists from the US and around the globe. Koreans may be one of the largest groups of nationalities among the international attendees; I could find 117 Korean names from the abstract book of the 2019 annual meeting. Many researchers in the Korean natural products community did their PhD or postdoc in the US, and they have remained active ASP members and bring their students to these meetings. It is great, but sometimes I find that many among them do not feel a sense of belonging to ASP even after participation.

In my opinion, the best way for international attendees to integrate more quickly with other attendees and keep being active in ASP would be to provide more oral presentation slots to them. This would enable and encourage international members to be more involved in personal interactions. I could interact with many others at the 2018 ASP meeting easily because I was among the leaders of the GNPS workshop; everyone who participated became familiar with my research area. Imagine

you are an international participant of an ASP meeting; you do not know anyone there, and nobody knows who you are. Talking about your research is obviously the best icebreaker for casual interaction later during conferences, and, if you are a presenter, it is much easier to introduce yourself to everyone. International participants, especially junior members who want to belong to the society, should also be encouraged to submit abstracts for oral presentations.

It is unfortunate that ASP could not hold in-person annual meetings for two years; I was especially looking forward to IC-NPR2020, in which the Korean Society of Pharmacognosy (KSP) was to be one of the organizing societies for the very first time. Nevertheless, I have still been able to keep in touch with the community remotely. I appreciate the webinar committee for organizing the great seminar series, although I could not participate in real time frequently due to the time difference. And when I want to communicate with society members, I can reach out to many of them through social media, especially Twitter. I strongly recommend everyone make an account now, if you do not already have one. You can get news on amazing science projects as soon as they are published as well as when they are in development, and you can ask anything to the authors directly, without waiting until they find your email from their busy inbox. However, I really miss the friendly atmosphere of the ASP conference and am looking forward to meeting everyone at the 2022 annual meeting. Starting this year, I will serve as a chair on the international relationship committee for the KSP, and I hope the forthcoming ASP meeting will provide the opportunity for more Korean natural products scientists to become active members of the ASP.

In closing, I would like to dedicate this article to the memory of my PhD advisor, the late Prof. Sang Hyun Sung. He may not have been well known to ASP members or other researchers outside Korea, but he was a great natural products chemist, friend, and mentor. ■

Brown Awarded AOAC International 2022 Wiley Award

By Joseph M. Betz, PhD

ASP member Dr. Paula N. Brown has been awarded the 2022 Harvey W. Wiley Award by AOAC International. The Wiley Award is AOAC International's most prestigious scientific award and is presented to a scientist who has made an outstanding contribution to analytical method development in an area of interest to AOAC. Past ASP awardees include Drs. Joseph Betz, Ikhlas Khan, and Richard van Breemen.

Brown, a long-time member of AOAC International, earned a Master of Science degree in organic synthesis at Simon Fraser University and a PhD in Natural Products Chemistry at the University of British Columbia. She is the Director of Applied Research for Natural Health and Food Products at the British Columbia Institute of Technology in Burnaby, BC, Canada and a Tier II Canada Research Chair in Phytoanalytics.

"Dr. Brown is one of the most innovative researchers in the field of natural products and a leading voice for excellence in the field," says Dr. Susan Murch of the University of British Columbia. She did pioneering work on the application of metabolomics and chemometrics to dietary supplements and natural health products, according to Dr. John Arnason of the University of Ottawa. ASP President Dr. Kerry McPhail noted that Brown's many scientific accomplishments, leadership in service and dedication to promoting the responsible use of botanical medicines serve as an inspiration for future generations of natural products researchers.

Brown is an internationally recognized natural products chemist with a diverse and extensive research portfolio that



Dr. Paula N. Brown

ranges from the use of chemometric techniques for the authentication of botanical raw materials to the development and validation of analytical methods for the characterization of medicinal plants and for evaluation of the quality of finished natural health products. She has authored more than 85 peer-reviewed publications, book chapters, and monographs on aspects of analytical method development, quality assurance, and the chemical constituents of commercially important botanicals.

"Paula has amassed a remarkable record of accomplishment in two decades, and her rate of productive output has only increased in the past five years," said ASP Fellow and past ASP President Dr. John H. Cardellina II, Brown's colleague in the field. "She is resourceful and adaptable to challenges and changing circumstances. In every respect, she represents the very best characteristics of the Wiley awardees."

An active volunteer, Brown currently serves as co-chair of Health Canada's Scientific Advisory Committee on Health Products Containing Cannabis. She also is a member of NSF International's Joint Committee on Dietary Supplements, which she chaired from 2007-2018, and serves as an advisor to the American Botanical Council, the Cannabis Expert Panel of the United States Pharmacopeia and the American Herbal Pharmacopeia. She previously served as president of the Natural Health Products Research Society of Canada (NHPRS) and was an inaugural member of the NCCAM/NIH Product Integrity Working Group. She was a member of the USP Botanical Dietary Supplements and Herbal Medicines Expert Committee, a

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ASP President Dr. Kerry McPhail noted that Brown's many scientific accomplishments, leadership in service and dedication to promoting the responsible use of botanical medicines serve as an inspiration for future generations of natural products researchers.

Brown Awarded AOAC International 2022 Wiley Award



Natural Health & Food Product Research Group at BCIT (left to right): Conall Cooney, Rebecca Robertson, Mohamed Albadry, Hong Sy, Michael Chan, Hazrah Moothoo, Ronan Yu, Anika Singh, Jamie Finley, and Xiaohui Zhang (missing Ying Liu).

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policy advisor on the NHP Program Advisory Committee for Health Canada, and chair of Health Canada's Working group on Standards of Evidence for the Quality of Natural Health Products. Her volunteer activities at AOAC include chairing or serving on 12 AOAC Expert Review Panels and service as General Referee of the AOAC Official Methods Committee for Dietary Supplements. She has also contributed to various AOAC task forces, working groups, and committees for dietary supplements, served on the editorial board of the *Journal of AOAC INTERNATIONAL*, and is the journal's current section editor for dietary supplements and natural products. Dr. Brown was named an AOAC Fellow in 2009 and was the study director for nine AOAC Official Methods of Analysis.

ASP Honorary Member Dr. Ikhlas Khan, Director of the National Center for Natural Products Research and Wiley awardee, stated, "Dr Brown is a dedicated researcher who made herself available to serve the natural products community, and this recognition is well-deserved." ASP member Dr. Richard Van Breemen of the Linus Pauling Institute at Oregon State University and another Wiley awardee observed that "Dr. Paula Brown is an accomplished natural product chemist and a leader in the chemical standardization of botanical dietary supplements. Her application of analytical chemistry to natural product integrity has made a significant impact on the quality of consumer products based on botanicals."

Brown has twice earned the Thieme Award for *Planta Medica's* Most Innovative Original Paper (2013 and 2020), received the 2021 [American Botanical Council \(ABC\)](#) Norman R. Farnsworth Excellence in Botanical Research Award, the 2019 American Society of Pharmacognosy Waters Award for Innovations in Natural Product Research, a 2017 Award in Recognition of Technical and Scientific Excellence from the AOAC Stakeholder Panel on Strategic Food Analytical Methods (SPSFAM) Working Group on Cannabis Potency, the 2016 NHP Research Society of Canada Neil Towers Award, the 2016 American Herbal Products Association Herbal Insight Award, and the 2011 Richard E. Schultes Research Award from the Society for Economic Botany.

"Dr. Brown is an outstanding scientist and valued colleague. She recognized early in her career that analytically derived data that were not reliable, accurate, and precise led to irreproducible and contradictory research results," said ASP member Dr. Joseph M. Betz, Acting Director of the Office of Dietary Supplements, National Institutes of Health. "Her long association with AOAC and her volunteer activities in the organization reflect her dedication to the creation and validation of the tools required for the conduct of the basic scientific research that she does so well. It is a real pleasure to see Paula recognized by her peers for the excellence of her research and her contributions to AOAC." ■

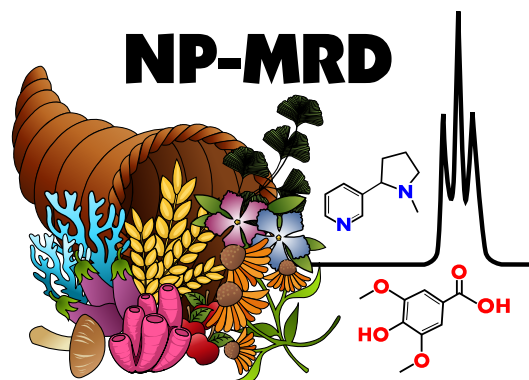
"Dr. Brown is an outstanding scientist and valued colleague. She recognized early in her career that analytically derived data that were not reliable, accurate, and precise led to irreproducible and contradictory research results..."

The Natural Products Magnetic Resonance Database: A New Resource for the Community

By Roger Linington, PhD

In recent years the field of natural products has been transformed by the development of open access databases containing a wide array of data types including biosynthetic gene clusters (MiBIG¹), structure databases (COCONUT,² LOTUS,³ NP Atlas⁴), bioactivity databases (NPASS⁵), and spectral databases (GNPS,⁶ HMDB⁷). The ready availability of well-curated data repositories changes the landscape of natural products discovery by enabling new methods for discovery, identification, and biological characterization. However, until recently there has been no database for natural products-derived nuclear magnetic resonance (NMR) data, arguably the most valuable data type for identifying natural product structures.

Now, a multi-institution consortium, led by Dr. John Cort at the Pacific Northwest National Laboratory and also including investigators from the University of Alberta, Simon Fraser University, and the University of Missouri, has initiated the Natural Products Magnetic Resonance Database (NP-MRD, www.np-mrd.org).⁸ The NP-MRD is a FAIR-compliant⁹ (Findable, Accessible, Interoperable, Reusable) open access database and repository specifically addressing natural products NMR. With support from the National Institutes of Health CARBON program, this initiative is building a comprehensive resource that aspires to include both experimental and theoretically calculated NMR data for all natural products.

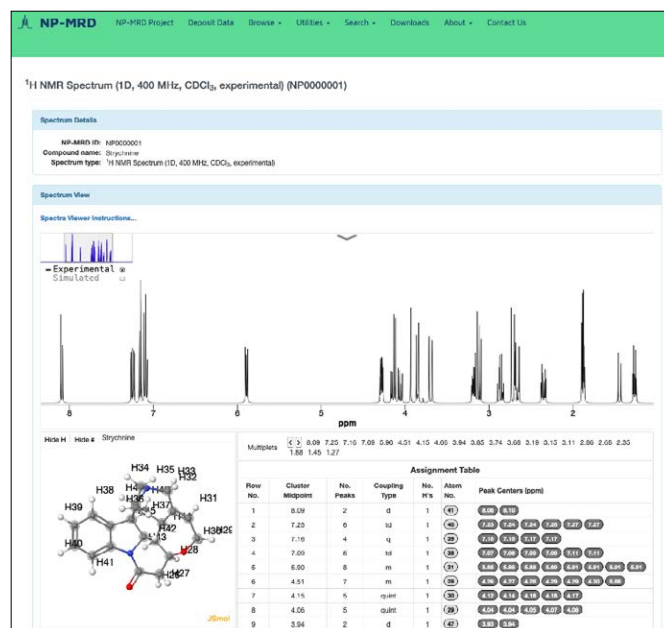


The NP-MRD is not only a database of tabulated chemical shift and coupling constant data extracted from the published literature, but also a *repository* for raw free induction decay (FID), chemical shift and coupling constant data curated from the literature. Predicted NMR data from artificial intelligence or density functional theory-based methods, as well as simulated spectra, will also be available, eventually for all natural products. Each entry in the NP-MRD is supported by an "NP Card" that contains a wealth of information including structure representations, chemical taxonomy, source organisms, a text-based description, links to other databases, calculated NMR spectra and, when available, experimental NMR data (Figure 1).

The NP-MRD includes tools for browsing, searching, depositing, and validating NMR data. Searches can be text-based, structure-based, or chemical shift-based. Currently the database contains ~41,000 natural products of which ~20,000 have experimental assignments and just over 1,000 have experimental NMR data. The database is actively curated and developed and is expanding, with new compounds and spectra being added daily.

NP-MRD welcomes and encourages involvement from the community. Interested users are encouraged to explore this new platform and where possible to contribute compounds, assignments, and spectra. Feedback, suggestions or ideas about the website or database content are welcome at np-mrd@wishartlab.com. ■

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LEFT: Screenshot of spectrum viewing page for strychnine [NP0000001](https://www.np-mrd.org/entry/NP0000001)

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Hot Topics in Pharmacognosy

Some Current Ramblings on CBD and SARS-CoV-2

By David J. Newman, DPhil



In this current column I will be commenting on two very recent papers, each including ASP members' work on CBD and SARS-CoV-2. One is from an investigator at Oregon State University with collaborators at Oregon Health Sciences University (Oregon group).¹ The other was led by an investigator from the University of Chicago (UC) and included UC-associated labs at the University of Louisville and the Argonne National Laboratory, together with the Pharmacognosy group at UIC (Chicago group).² In both cases, the groups were investigating the potential of CBD and metabolites as sources of agents to act against SARS-CoV-2. Dr. Edward Kennelly, *ASP Newsletter* editor in chief, asked me to consider these two papers for comment in my next column and, after reading them, I agreed.

In both cases, due to the potential for conflation by non-scientists (as these columns are now available on websites) after reading the papers in their original form, I did pass my comments through both groups but the resultant below is mine.

CANNABINOIDS AND COV-2 INFECTION

There are both congruences and differences between the results that were reported by each group, and these are further discussed below.

In both cases, cannabidiol (CBD) and its derivatives inhibited replication of the CoV-2 virus, though the Oregon group only used *in vitro* testing, whereas the Chicago group also ran experimental *in vivo* studies in mice. Those experiments were done to avoid the possibility of false results due to the onset of phospholipidosis (*cf* report by Tummino et al.³ (Shokat and Soichet groups)) that I had mentioned in a recent *ASP Newsletter* article discussing aberrant drug repurposing results with cell lines, which effectively eliminated most of their potential repurposed agents.

I should point out that CBD-related molecules that the Oregon group identified were negatively charged rather than the positively charged compounds reported in the Shokat and Soichet report on lipid interference in *in cellulo* studies. However, I could not find "current data (pro or con)" of the effect of negatively charged molecules on any membrane effects of virus transport into cell lines.

However, delving back into my past, I remembered significant problems with the *in cellulo* assays in the middle 1990s at NCI when sulfated steroidal molecules from marine sources were tested in the NCI's cell-based assays for inhibition of HIV replication in CEMM (human leukemia) cell lines. NIAID also tested dextran sulfate *in vivo* in a small clinical trial in that time frame and did not continue.

Both groups used different but sophisticated physicochemical techniques to determine the potential mechanisms of action of CBD and/or derivatives. The Oregon group reported that their CBD-related materials would bind to the spike protein in CoV-2 that is directed against the ACE2 target in mammals, thus blocking it from binding to the receptor in the cell. A quite different mechanism was reported by the Chicago group. They demonstrated that CBD worked by preventing entry of the virus by activating one of the host's early response pathways. That effect was related to the unfolded protein response which led to induction of interferons that suppress viral infection. They proved this mechanistic route by blocking interferon production using specific antibodies.

Both groups determined that there were metabolites in hemp cannabinoids that would inhibit CoV-2 *in cellulo*, but there were significant differences between them. The Chicago group specifically stated that (and I quote): "No or very limited antiviral activity was exhibited by these structurally closely related congeners that share biosynthesis pathways and form the biogenetically determined residual complexity of CBD purified from *C. sativa*: THC, cannabidiolic acid (CBDA), cannabidiol (CBD), cannabidivarin (CBDV), cannabichromene (CBC), or cannabigerol (CBG)."

In contrast, the Oregon group stated, "Cannabigerolic acid and cannabidiolic acid prevented infection of human epithelial cells by a pseudovirus expressing the SARS-CoV-2 spike protein and prevented entry of live SARS-CoV-2 into cells." Thus, though of definite interest, the data from the Oregon group has to be confirmed by suitable *in vivo* assays, preferably in comparable models to the Chicago group's report.

What is very significant is that the human blood levels of CBD and 7-OH-CBD (active metabolite of CBD Epidiolex),

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In both cases, the groups were investigating the potential of CBD and metabolites as sources of agents to act against SARS-CoV-2.

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where the dose/patient for epilepsy is 1500 mgs orally (using a 100mg/ml oral suspension), are 1.7 μM for CBD and 0.56 μM for 7-OH-CBD. These figures fitted very well with the data from the Chicago groups *in vitro/cellulo* and *in vivo* results. I could not find (on a relatively rapid search), any information as to the blood levels achievable (in human or mouse) for any of the Oregon group's active agents on oral or, for that matter, other routes of administration.

Though both groups demonstrated that CBD and at least one human metabolite have activity against CoV-2, to me, the data from the Chicago group is quite persuasive as to what might be the optimal methodology, particularly as they also performed a careful meta-analysis of the potential CoV-2 infection rates of patients who were taking oral Epidiolex at the doses that would maintain the required levels versus probable matched groups that were not. I inserted "probable" because concomitant use of other cannabinoids by the non-Epidiolex group was not classifiable.

However, and this needs to be emphasized in any other commentary on the observed indications from the meta-analysis, though persuasive at first blush, it does not substitute in any way for properly conducted clinical trial(s) of the potential of these negatively charged molecules as oral treatments for CoV-2 infections.

What does significantly concern me, however, is that there will be non-scientific (read the "Popular Press of All Persuasions") conflation of the results from each of these papers

without any understanding of the scientific caveats that have been mentioned in them.

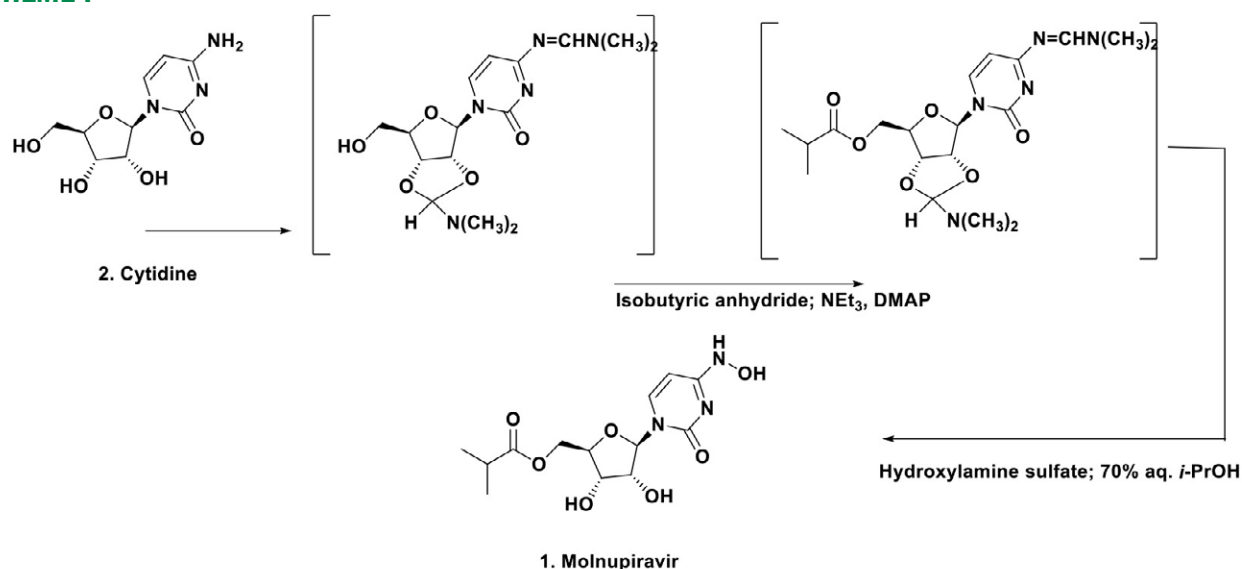
What is not needed is a recurrence of the "hysteria around ivermectin and chloroquine" following dubious *in vitro* and *in vivo* testing. **One lucky piece of evidence in this regard, however, is that THC appears to block the activity of CBD.**

The next paper that I will discuss now moves to some nice synthetic chemistry and demonstrates how a Chinese group were able to use a very nice, one-pot synthetic method commencing with cytidine to produce the recently approved anti-CoV-2 drug molnupiravir.

ONE-POT SYNTHESIS OF MOLNUPIRAVIR (ANTI COV-2)

Moving on from CBD and its metabolites, there is another paper of interest⁴ as a source of treatment for CoV-2, and it is an example of how to optimize a "one-pot synthetic route" to molnupiravir (**1**) which was recently (~3 months ago) approved under an EUA by the FDA. A Chinese group devised the one-pot synthesis (**Scheme 1**) whereby the desired compound (**1**) was isolated on a 63% yield from 100 grams of cytidine (**2**), with a 99.7% purity and an overall yield of 63% following crystallization. The use of crystallization in place of large-scale HPLC is also very well known in the cGMP production of eribulin where only one large-scale HPLC system was used, all other isolation steps being crystallization.

SCHEME I



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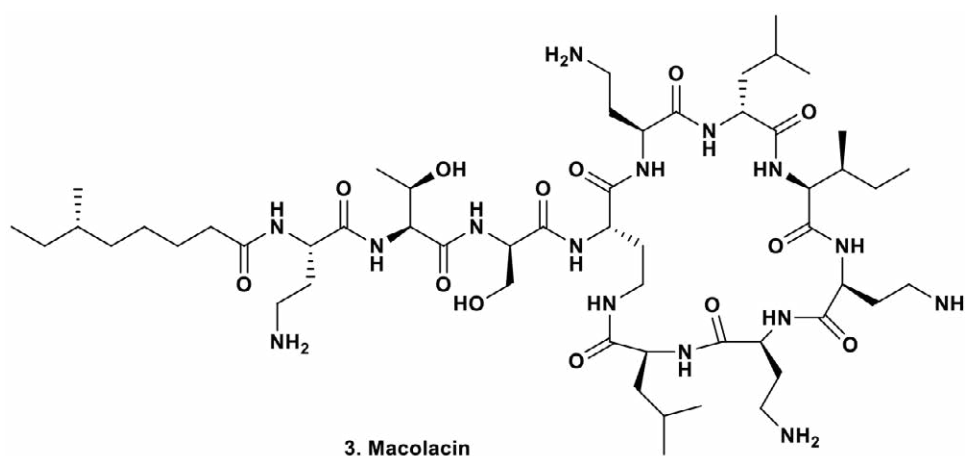
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The final paper in this column comes from the Brady group at Rockefeller who, in a paper in *Nature* published in early 2022,⁵ described how they were able to search almost 11,000 bacterial genomes to identify naturally occurring polymyxins. Polymyxins have now come to the forefront of potential human use antibiotics, though for many years, once such a compound was a possibility in the days of large-scale searching for antibiotics from microbes, they would be thrown away as too toxic. Members of ASP who worked in the heyday of such searching

will remember “disposing of them with prejudice” once suspected in an isolate. However, today, these molecules are finding that they are now “wanted for use.”

From this large-scale search, the Brady group used BGC-guided chemical synthesis to identify a naturally occurring analogue of colistin that is active against microbes containing the *mcr-1* gene that endows resistance to colistin in the current, highly resistant microbiome. First identified in China in 2015, this gene is now a worldwide problem. The structure of macolacin (**3**) is shown below. ■



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Behind the Scenes in Pharmacognosy: Hemp Extract Cannabinoids Stop SARS-CoV-2 Cellular Entry

By Daniel S. May, PhD

On January 10, 2022, the *Journal of Natural Products* published an article by ASP member Dr. Richard van Breemen and colleagues entitled, “Cannabinoids Block Cellular Entry of SARS-CoV-2 and the Emerging Variants.” The article quickly drew much attention. As of this interview, the article has over 350,000 views on the *Journal's* website, it has become the second most viewed article from the *Journal* according to Altmetric, and it has been featured by over 400 other news and media outlets. Van Breemen and colleagues used an affinity selection method called MagMASS to identify two cannabinoid acids, cannabidiolic acid (CBDA) and cannabigerolic acid (CBGA), that could bind to the SARS-CoV-2 spike protein. They then showed that the two cannabinoids could prevent the SARS-CoV-2 virus and two variants of concern from entering human cells. Van Breemen is a professor of medicinal chemistry in the Department of Pharmaceutical Sciences and a principal investigator at the Linus Pauling Institute at Oregon State University. I met with him remotely to discuss the research behind this article, his lab at Oregon State University, and the media interest in their research. The transcript of this discussion has been edited for clarity and length.

What initially led you and your research group to look to hemp as a source of anti-SARS-CoV-2 compounds?

Hemp was one of an assortment of botanical dietary supplements that we analyzed for potential compounds that first could bind to the spike protein of the coronavirus that causes COVID-19, and then, could maybe prevent cell entry. Additionally, I belong to a group at Oregon State University called the Global Hemp Innovation Center. That center was founded just as the USDA decriminalized growing hemp. It has been a long time from when growing hemp was illegal until now. So now we are catching up on the pharmaceutical applications and potential benefits of some of the unique compounds that are in hemp.



You used a method called MagMASS to identify these ligands that bound to the viral spike protein. Could you briefly describe how this method works?

Could you briefly describe how this method works?

In the 1990s, there was this big change in the way that drug discovery was carried out in the pharmaceutical industry. They adopted combinatorial chemistry approaches to synthesize multiple compounds in parallel, and they created combinatorial libraries numbering in the hundreds of thousands to millions of compounds. We started looking towards mass spectrometry at that time when new methods were needed for high throughput screening of these libraries. We reasoned that the selectivity of the mass spectrometer might be able to make possible the testing of not just one compound at a time, but pools of compounds and libraries. So, we invented an affinity selection mass spectrometry tool that we called pulsed ultrafiltration. A couple years later we realized that the selectivity of mass spectrometer wasn't limited to a combinatorial library pool where all the compounds are known, but that it could be applied to a group of unknowns. Plant extracts, microbial fermentation broth extracts, and marine organism extracts were as appropriate as a combinatorial library pool. We invented MagMASS in 2008 as an alternative affinity selection approach. We immobilized a receptor on a magnetic microparticle, incubated the magnetic particles with an extract in 96 well plates, and with one big magnet could pull all the beads to the bottom of the wells. Then we washed the beads and added a dissociation

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solution like an organic solvent or a pH change to release the ligands. Finally, we injected the samples into the mass spectrometer for characterization. That is what we call MagMASS for Magnetic Microbead Affinity Selection Screening. This approach is faster than the ultrafiltration separation method, which makes it more sensitive. In pharmacology we have this equilibrium between the ligands binding and the ligands being released from the receptor. Once that equilibrium is disturbed, the bound ligands start to dissociate. The faster we can separate the bound from the free and make that mass spectrometry measurement, the more sensitive the analytical step becomes.

What was the most surprising or interesting finding that you took away from these experiments?

First, these experiments prove the principle that a ligand, even if it is a small molecule, can bind to a viral surface protein, like the spike protein of the SARS-CoV-2 virus, and can prevent cell entry. Second, the experiments show that hemp contains bioavailable compounds about which we know a lot already. There is not a lot in the literature about the pharmacokinetics of CBDA and CBGA,

First, these experiments prove the principle that a ligand, even if it is a small molecule, can bind to a viral surface protein, like the spike protein of the SARS-CoV-2 virus, and can prevent cell entry.

Second, the experiments show that hemp contains bioavailable compounds about which we know a lot already.



Left to right, Laboratory Manager Ruth Muchiri, PhD, Richard van Breemen, PhD, and graduate student Alan Wong.

PROVIDED BY RICHARD VAN BREEMEN

but there's enough to know that they are orally absorbable and that blood levels have been measured, so we can move very quickly to the next phase of developing the optimal dosage and showing safety and efficacy.

In the manuscript, you mention that these compounds could be used together with the vaccines to prevent entry. How do you envision the cannabinoid acids being used specifically?

In the paper, we show that CBDA and CBGA bind to the spike protein of the coronavirus. One of them has two binding orientations. CBGA binds in an orthosteric site, which is the site that interacts with the ACE2 receptor of the human cell, as well as an allosteric site. CBDA also binds to the orthosteric site but nowhere else with high affinity. These two compounds can compete for the orthosteric site, while CBGA can also bind to a more preferred allosteric site. This means they can bind simultaneously. We didn't show that in the paper, but we did show that they have two binding sites. Therefore, one can envision that the sum of the parts could be better than one or the other compound individually. We certainly want to continue with our experiments to characterize these binding sites.

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Behind the Scenes in Pharmacognosy: Hemp Extract Cannabinoids Stop SARS-CoV-2 Cellular Entry

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Was this research impacted by work-from-home or laboratory shutdowns that happened across the country?

In part, it was inspired by the shutdowns. Initially, when we went to remote learning, most of the laboratories at Oregon State University shut down. Those doing COVID-19 related research were allowed to continue working. We specifically initiated this project to keep the lab open. We had social distancing and a very small crew at any one time, so the work has been progressing slowly. We did what we could when we could, and we were fortunate to get some very exciting results.

Who else was working on this project and doing the experiments?

The lead person on this project for my lab is Ruth Muchiri. She is a very talented biochemist who was trained at Michigan State University, was a postdoc with the lab when we were at University of Illinois at Chicago, and moved with the lab to Oregon State University where we are now. She designed and performed the experiments that were carried out in our lab and performed the MagMASS assay. Once we had the data for binding, measured the dissociation constants, and identified the compounds, we needed a functional assay group who could test the live virus. I was pointed to a colleague, Fikadu Tafesse, up at Oregon Health and Science University in Portland, Oregon, who was just setting up a lab and was ready to test some compounds. We were delighted to see that there was activity, and that's when we knew we had something.

With the COVID-19 pandemic and marijuana legalization being hot topics in the news in recent years, I imagine you may have anticipated some media interest in this paper. What ways did you prepare to discuss this work with news organizations?

We all thought there might be some attention, but no one could anticipate what happened. I'm my own press manager, so I didn't really have anyone to help me prepare for this. I was just talking as fast as I could and responding to messages when I could.

How accurately do you think news organizations have communicated your lab's findings?

Most of the reporters and writers for the articles that appeared in newspapers and science journals were pretty accurate. A few of them tried to play up the marijuana side, but we didn't test marijuana; we tested a hemp extract. None of the compounds that we tested were psychoactive. So, the only problem with the way that some media outlets reported the data was they focused on compounds we didn't test.

Are there any lab traditions that you have in the van Breen Lab?

We make lab t-shirts. Our latest lab t-shirt was put together last fall and was made to commemorate the 25th anniversary of the invention of pulsed ultrafiltration mass spectrometry, one of the early affinity selection mass spectrometry tools. Soon we will have one to commemorate the magnetic bead approach. Its 20th anniversary will be in 2028.

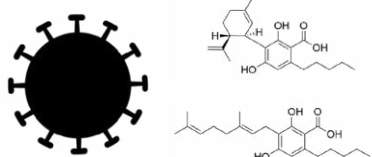
Is there anything else you want to say about the research or your research group?

I just want to say I've been in faculty positions for a long time. My first job was in 1996, so I just want to thank all the students and postdocs, visiting scholars, and collaborators who have made this work and all the other research projects over the years very successful, and I'm really delighted to have met everybody, and I owe it all to them. ■

In the paper, we show that CBDA and CBGA bind to the spike protein of the coronavirus. One of them has two binding orientations.

CBGA binds in an orthosteric site, which is the site that interacts with the ACE2 receptor of the human cell, as well as an allosteric site.

CBDA also binds to the orthosteric site but nowhere else with high affinity.



Meet a New ASP Member

Dr. Sanem Hosbas Coskun



Dr. Sanem Hosbas Coskun is our featured new member in this issue of the ASP Newsletter.

Dr. Hosbas Coskun works as a scientific consultant in the Office of Dietary Supplements at the National Institutes of Health in the Analytical Methods and Reference Materials Program (AMRM) where she focuses on quantitative and qualitative measurements of secondary metabolites in dietary supplements.

We are pleased to officially welcome Dr. Hosbas Coskun to the ASP!

By Wendy Strangman, PhD

What is your scientific background and what are your interests related to pharmacognosy?

I earned my BSc degree in pharmacy at the University of Ankara, School of Pharmacy. I did not start my academic career immediately. First, I owned a private pharmacy for four years, and during this practice, I explored the increasing popularity of dietary supplements. I applied for a master's program in phytotherapy at Gazi University. I completed my MSc on pharmacognostic studies on *Urtica dioica* L. using macroscopic and microscopic identification techniques, TLC and HPLC. After completing my master's degree, I was offered a PhD fellowship from Gazi University. I ended my pharmacy practice to focus on my academic development. For my PhD studies, I performed bioactivity-guided fractionation on some *Achillea* species using phytochemical analysis such as TLC, analytic and preparative HPLC, LC-MS/MS, and NMR, followed by *in vivo* and *in vitro* bioactivity studies (antidiabetic, hepatoprotective, antioxidant and cytotoxicity).

Meanwhile, I conducted research on another project at Ankara University, Biotechnology Institute (AUBI), concerning the development and use of the nematode *Caenorhabditis elegans* as a model organism. I moved to the United States in June 2014 to work as a guest researcher for a project on the evaluation of cellular toxicity of engineered nanomaterials utilizing *C. elegans* at the National Institute of Standards and Technology. While I was working on the analytical analysis of my doctoral research at NIST, I met with Dr. Catherine Rimmer and got included in the Standard Reference Materials development program for the botanical dietary supplement community. After I decided to stay in the United States, I met with Dr. Adam Kuszak and became a part of the team at ODS, NIH.

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Dr. Sanem Hosbas Coskun attending the ICSB conference.

PHOTO: DR. SOPHIE FADIME AYDOGAN

Meet a New ASP Member

For my PhD studies, I performed bioactivity-guided fractionation on some *Achillea* species using phytochemical analysis such as TLC, analytic and preparative HPLC, LC-MS/MS, and NMR, followed by *in vivo* and *in vitro* bioactivity studies (antidiabetic, hepatoprotective, antioxidant and cytotoxicity).

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How did you hear about the ASP?

I attended the 8th International Congress on Natural Products Research (ICNPR) in New York City in 2012. This is how I learned about ASP and had a chance to meet several people at the conference. That meeting impacted my interest in moving to the United States and doing research here.

Why did you decide to join ASP?

I really enjoy following the ASP webinars and other events to learn more about new topics and developments in my area of expertise. I kept following ASP after the meeting I attended in 2012 and have wanted to be a member ever since, but due to the limited funding resources (a common problem of developing countries), I wasn't able to join at that time.

What would you like to achieve through your membership?

I would like to attend the webinars as much as I can. I want to meet new researchers in my area to upsurge my network, communications, and collaborations, and inform them about my research on botanical reference materials, as well as discuss how they can be helpful in scientific research.

What other scientific societies do you belong to?

Besides ASP, I am a member of the Society for Medicinal Plant and Natural Product Research and the Society of Pharmacognosy and Phytotherapy; also, I'm a board member of the Washington Chromatography Discussion Group.

What do you like doing in your spare time – movies, activities etc?

I like visiting second-hand book stores and thrift stores. I feel like I'm on a treasure hunt in those stores and you never know what valuable things you can find. I also love spending time with my family.

Is there anything else you would like other ASP members to know about yourself?

Actually, there is one recent success that I would like to mention, which is related to ASP activities. One year ago, I met with Dr. Stefan Gafner after one of the American Botanical Council's webinars. A few months later, I started writing a bulletin on the adulteration of eleuthero for ABC's Botanical Adulterants Prevention Program, which was published recently. I believe in the importance of BAPP publications for the community and am happy to be a part of the program. ■

I really enjoy following the ASP webinars and other events to learn more about new topics and developments in my area of expertise.

**I would like to attend the webinars as much as I can.
I want to meet new researchers in my area to upsurge my network,
communications, and collaborations, and inform them
about my research on botanical reference materials,
as well as discuss how they can be helpful in scientific research.**

New Members of ASP Spring 2022

ASP would like to welcome our 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 19 full members and 30 associate members. We look forward to meeting you and learning more about you and your work.



American Society of Pharmacognosy

FULL MEMBERS

Dr. Raphael Aolga

China Pharmaceutical University
China
Assistant Professor

Dr. Mark Bohlke

Massachusetts College of Pharmacy
and Health Sciences
United States
Faculty Associate

Dr. Christopher Cartmell

University of Prince Edward Island
Canada
Postdoc

Dr. Ogechukwu Chukwuemerie

Nnamdi Azikiwe University Awka
Anambra State
Nigeria
Lecturer

Prof. Jean Paul Dzoyem

University of Dschang
Cameroon
Researcher / Lecturer

Dr. Ibukun Famuyide

University of Pretoria
South Africa
Postdoctoral Fellow

Dr. Jorge Ferreira

USDA-ARS
United States
Research Plant Physiologist

Dr. Anthony Fontana

Alkemist Labs
United States
Laboratory Director

Dr. Vikas Jaitak

Central University of Punjab
India
Assistant Professor

Dr. Shabana Khan

University of Mississippi
United States
Principal Research Scientist

Dr. Min Lee

NIH
United States
Chemist – Staff Scientist

Dr. Miaomiao Liu

Griffith University
Australia
Research Fellow

Mr. Christopher O'Neal

BIOENCE LLC
United States
Managing Member

Dr. Claudia Ospina

Inter American University of
Puerto Rico
Puerto Rico
Assistant Professor

Dr. Charlotte Simmler

Mediterranean Institute for
Biodiversity and Ecology (IMBE)
French National Center for
Scientific Research (CNRS)
France
Senior Researcher

Dr. Sidney Sudberg

Alkemist Labs
United States
President & CSO

Prof. Robert Williamson

Applied Chemistry Solutions, LLC
United States
Distinguished Professor

Mr. Jared Wood

University of North Carolina at
Wilmington
United States
Graduate Student

Dr. Dan Xue

University of South Carolina
United States
Research Scientist

ASSOCIATE MEMBERS

Ms. Angeliki Barouti

University of Bergen
Norway
PhD Candidate

Ms. Zoie Bunch

UNC Greensboro
United States
PhD Student

Prof. Taicia Fill

Universidade Estadual de Campinas
Brazil
Assistant Professor

Ms. Margaret Hill

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Ms. Kelli McDonald

Auburn University
United States
PhD Student

Ms. Margaret Redick

Oregon State University
United States
Graduate Student

Ms. Abigail Scott

University of Utah
United States
PhD Student

Mr. Chris Taylor

USDA-APHIS and UFL-AGR
United States
Student

Mr. Musharraf Abdullateef

Federal University Dutsin-Ma,
Katsina State
Nigeria
Postgraduate Student

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New Members of ASP Spring 2022



American Society of Pharmacognosy

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Mr. Timilehin Adegboyega
Ladoke Akintola University of
Technology, Ogbomosho
Nigeria
Student

Dr. Christiana Bolanle Adeniyi
University of Ibadan
Nigeria

Dr. Ukpe Ajima
University of Jos
Nigeria
Postdoc

Dr. Oluwasesan Bello
Federal University Dutsinma,
Katsina State
Nigeria
Postdoc Student

Mr. Aminu Bello Riji
Federal University Dutsinma,
Katsina State
Nigeria
Postgraduate Student

Mr. Konstantinos Gaitanis
National and Kapodistrian
University of Athens
Greece

Dr. Obulkasim Hasan
Peking University
China
Postdoc

Dr. Amal Helali
Abou Bekr Belkaid University
Algeria
Assistant Professor

Mr. Abhishek Joshi
Mohanlal Sukhadia University
India
Graduate Student

Ms. Sasha Kovacs
University of Hawaii,
Hilo
United States
Graduate Student

Mr. Jordan Lew Joon Yip
Universiti Tunku Abdul Rahman
Malaysia
Undergraduate Student

Dr. Alex Mabou Tagne
University of California, Irvine
United States
Postdoc

Ms. Smruti Mukadam
Poona College of Pharmacy
India
PhD Scholar

Ms. Sara Naqvi
Iqra University
Pakistan
Lecturer & PhD Fellow

Dr. Geovannie Ojeda-Torres
Back of the Yards Algae
Sciences
United States
Director – Analytical Chemistry

Ms. Aminat Oyawalaja
University of Lagos
Nigeria
Exchange Scholar

Mr. Hem Raj Paudel
National Herbarium and
Plant Laboratories
Nepal
Scientific Officer

Dr. Farah Saeed
Dow University of Health
Sciences
Pakistan
Associate Professor

Dr. Maxwell Mamfe Sakyiamah
Centre for Plant Medicine
Research
Ghana
Research Scientist

Mr. Orr Shahar
Hebrew University of Jerusalem
Israel
Student

Dr. Pradeep Singh
Debre Tabor University
Ethiopia
Assistant Professor

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, at asp.newsletter@lehman.cuny.edu.

A number of scientific conferences have been delayed or canceled due to the COVID-19 pandemic.

Please check with conference organizers about the status of any in-person conferences.

2022 ASP Annual Meeting

July 23-28, 2022

Charleston, South Carolina

aspmeetings.pharmacognosy.us

6th International Conference on Natural Products and Traditional Medicine

May 2-3, 2022

Barcelona, Spain

<https://naturalproducts.pulsusconference.com>

ASP Natural Product Sciences Webinar

Bimonthly Zoom Seminars

Thursdays 4 PM ET / 1 PM PT

www.pharmacognosy.us/natural-product-sciences-webinar/

Gordon Research Conference: Natural Products and Bioactive Compounds

The Function of Natural Products at the Interface of Chemistry and Biology

July 31-August 5, 2022

Andover, New Hampshire

<https://www.grc.org/natural-products-and-bioactive-compounds-conference/2022/>

ACS Webinars

Every weekday 2 PM ET / 11 AM PT

<https://www.acs.org/content/acs/en/acs-webinars.html>

C&EN Webinars

Various Days and Times

<https://cen.acs.org/collections/webinars.html>

2022 AOAC International Annual Meeting and Exposition

August 26-September 1, 2022

Scottsdale, Arizona

<https://www.aoac.org/annual-meeting-exposition/>

Society for Economic Botany

May 29-June 2, 2022

Kingston, Jamaica

www.econbot.org/home/meetings/economic-botany-2022.html

70th International Congress and Annual Meeting of the Society for Medicinal Plant and Natural Product Research (GA)

August 28-31, 2022

Thessaloniki, Greece

www.ga-congress.org



Capital Communiqués

Natural Product-related News from NIH and Beyond



By *Barbara C. Sorkin, PhD*

- ◆ Federal Budget: On February 18, 2022 President Biden signed the third continuing resolution of the 2022 Federal fiscal year (FY22), extending funding of the Federal government through March 11, and on March 11 he signed a \$1.5 trillion spending bill for the remainder of FY22 (through September 30). The FY22 budget includes increases of 5.3% for the National Institutes of Health, 4.1% for the National Science Foundation, and 2.3% for the competitive Agriculture and Food Research Initiative in the US Department of Agriculture.¹
- ◆ On January 21, 2022, the [White House announced](#) a number of visa policy changes intended to strengthen the ability of the US to attract and retain foreign STEM students. Included are changes in the way eligibility for certain nonimmigrant visas in STEM fields is evaluated, and announcements from the State Department, including an “Early Career STEM Research Initiative” and guidance expanding academic training for J-1 visa students to up to 36 months.
- ◆ For those doing research in animal models:
Citing the impact on animal care of past disasters such as hurricanes and wildfires, the US Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) now requires that housing facilities develop contingency plans that consider common local emergencies and develop reporting structures and actions needed to ensure that animal care is safeguarded during a disaster. The final rule, which took effect on January 3, 2022, amends the regulatory activities of APHIS as mandated by the Animal Welfare Act (AWA) and will impact all AWA facilities, including those that conduct research.
- ◆ The National Institute of Standards and Technology (NIST) recently announced the revitalization of their laboratory quality assurance programs (QAPs) with areas of focus including:
 - [dietary supplement characterization](#) and
 - [food nutrition and safety measurements](#).
 - Interested in learning about [NIST's plans for future QAP exercises?](#)
- ◆ **New reference materials available from NIST:**
 - [Clinical reference materials](#) containing:
 1. A high level of 25-hydroxyvitamin D2 in serum and
 2. Low levels of total 25-hydroxyvitamin D in serum
 - [A suite of three new Panax ginseng reference materials](#) representing different types of preparation
 - For new certified reference materials for ginger and kava constituents developed under a contract with the NIH Office of Dietary Supplements, please see below.



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NEWS FROM NIH



Dr. Lawrence A. Tabak

◆ Dr. Lawrence A. Tabak, DDS, PhD, stepped in as the [NIH acting director](#) on December 20, 2021, when Dr. Francis Collins stepped down from the directorship. Dr. Collins will continue to lead his lab in the NIH's National Human Genome Research Institute.

◆ A revised NIH Grants Policy Statement (NIHGPS, rev. 12/17/2021) was published in December.

NOTABLE UPDATES include:



- A new section on the allowability of childcare costs for full-time National Research Service Award Fellows,
- Additional requirements for describing plans for enhancing diversity in conference grant (R13 or U13) application submissions and reporting on the outcomes of those plans in conference award final reports and
- Updated disclosure forms and instructions.

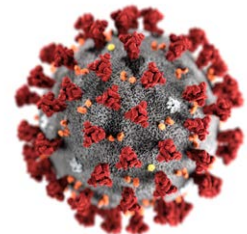
◆ These two COVID-19-related NIH notices extend prior pandemic accommodations:

- [NOT-OD-22-046](#) — Clarification and Guidance for Applicants Preparing Applications for the Spring 2022 Due Dates During the COVID-19 Pandemic

Grant applications should **not** include contingency or recovery plans for matters resulting from the COVID-19 pandemic; however, the NIH has clarified that investigators may, in the personal statement of the biosketch, address effects due to the pandemic on productivity or other scoreable issues.

- [NOT-OD-22-047](#) — Extending the Special Exception to the NIH/AHRQ/NIOSH Post-Submission Material Policy During the COVID-19 Pandemic: August/October 2022 Councils

The NIH will allow applicants to submit a one-page update with preliminary data as post-submission materials for applications submitted for August/October 2022 Council rounds (beginning with applications submitted for the January 25, 2022 due date), provided the funding opportunity announcement allows preliminary data. Because applications for emergency competitive revisions and urgent competitive revisions undergo expedited review, post-submission materials will not be accepted for those applications.



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- ◆ Some ongoing and some new NIH funding opportunities (FOAs) that may be of interest:



- The next due date for the NIH Office of Dietary Supplements (ODS) Pilot Project [PAR 20-228](#) R03 awards supporting collaborations with the [NIH Consortium](#) Advancing Research on Botanicals and Other Natural Products (CARBON) is September 30, 2022.

- **Identification and Characterization of Bioactive Microbial Metabolites for Advancing Research on [Microbe-Diet-Host Interactions](#).**

- Certain NIH awards may be eligible for supplemental awards through one of the ODS FOAs with receipt dates in April 2022:

- Validation Studies of Analytical Methods for Dietary Supplement Constituents [PA 20-252](#), and
- Administrative Supplements for Research on Dietary Supplements [PA 20-227](#). There are additional receipt dates for this FOA in October 2022 and in 2023.

- ◆ The NIH Office of Extramural Research notes that applicants and awardees should consider alternatives to the use of animals in their research, per applicable [laws, policies](#) and [ethical principles](#). The NIH Office of Laboratory Animal Welfare recently released a webinar (and additional resources): **Best Practices for Conducting a Search for Alternatives and Finding [Animal Model/Model Organism Information](#)** . The webinar includes information on finding:



- 3Rs methods (replacement, reduction, and refinement) and animal use alternative information in bibliographic databases,
- Journal articles, patents, NIH-funded research projects, and genetic information related to animal models and model organisms, and
- Requirements and resources for the [NIH Model Organism Sharing Policy](#).

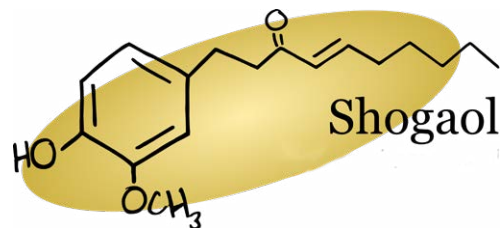
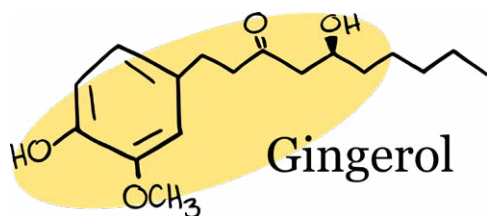
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◆ New certified reference materials developed via a contract supported by the NIH Office of Dietary Supplements:

- [Flavokavains and kavalactones](#) from *Piper methysticum*
- [Gingerols and shogaols](#) from *Zingiber officinale*



- ◆ You won't want to miss the upcoming [ODS webinars](#).
- ◆ Last year's send-off for outgoing NIH Director Francis Collins was virtual. The outcome is over [100 brief video farewells](#) from former and current national leaders, famous scientists, comedians and musicians – and many of his NIH colleagues. Enjoy!

Highlighted recently in *Smithsonian* magazine online, a [story](#) about ASP members Bill Fenical and Paul Jensen and early phase clinical trials of a potential glioblastoma treatment from a marine microorganism. Hat tip: Dr. Flora Katz, NIH's Fogarty International Center.

LITERATURE CITED

¹ <https://www.aaas.org/news/omnibus-review-saga-ends-broad-smaller-increases>

From the Archives: Processing the Farnsworth Collection



Processing the ASP archives is time consuming because of the care and focus it involves. As the adage goes “many hands make light work,” so having an additional person reviewing and organizing multiple materials for series certainly helps with our progress to ensure information is available for all. Here is an update on the processing of the Norman R. Farnsworth Papers at the Lloyd Library & Museum.

By Christine Jankowski, MA

In the fall of 2021, the Lloyd welcomed a new student, Jonathon Howell, to work on the continued processing of the Norman R. Farnsworth Papers. Farnsworth (1930-2011) was a cofounder of the American Society of Pharmacognosy, serving many roles including as a past president and a member of the Executive Committee. He also created NAPRAAlert, a relational database of natural products. Jonathon Howell, a master’s candidate in public history from Northern Kentucky University, started by processing materials related to symposiums and conferences that Farnsworth attended around the world between the 1980s and the early 2000s. Topics of these events ranged from HIV/AIDS research to African medicinal plants to natural health products. Howell fully processed these materials, and they are now available for researchers.

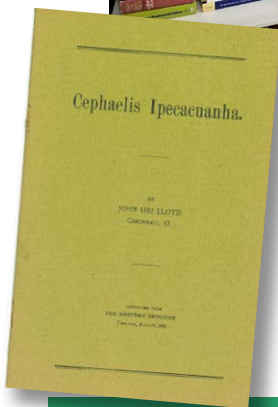
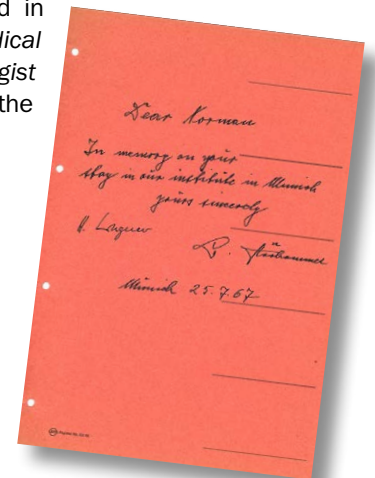
The next phase of Howell’s project was taking an inventory of the books from Farnsworth’s personal and academic library and comparing them against our library’s holdings. So far, he has created a list of 520 titles, identifying 386 of them that are not part of the Lloyd collection. Much like the conferences that Farnsworth attended, these books have a large scope of topics ranging from biochemistry to fertility. To our delight, some of these titles include ones written by our founder John Uri Lloyd! Farnsworth owned copies of the articles *Cephaelis Ipecacuanha* (1897) and *Croton Tiglium* (1898) written by Lloyd. Articles like these were published in journals like *The Eclectic Medical Journal* and *The Western Druggist* and were often republished by the library for further distribution.



TOP LEFT: Farnsworth’s books organized by Jonathon Howell in the archives of the Lloyd Library.

BOTTOM LEFT: A copy of Lloyd’s *Cephaelis Ipecacuanha* owned by Farnsworth. This article was originally published in *The Western Druggist* in 1897.

RIGHT: A note to Farnsworth inside the binder of photographs gifted from Professor Hildebert Wagner and Professor Ludwig Hörhammer, 1967. It reads, “Dear Norman, In memory on your stay in our institute in Munich. Yours sincerely” signed by the professors and dated July 25, 1967 in Munich.



To our delight, some of these titles include ones written by our founder John Uri Lloyd! Farnsworth owned copies of the articles *Cephaelis Ipecacuanha* (1897) and *Croton Tiglium* (1898) written by Lloyd. Articles like these were published in journals like *The Eclectic Medical Journal* and *The Western Druggist* and were often republished by the library for further distribution.



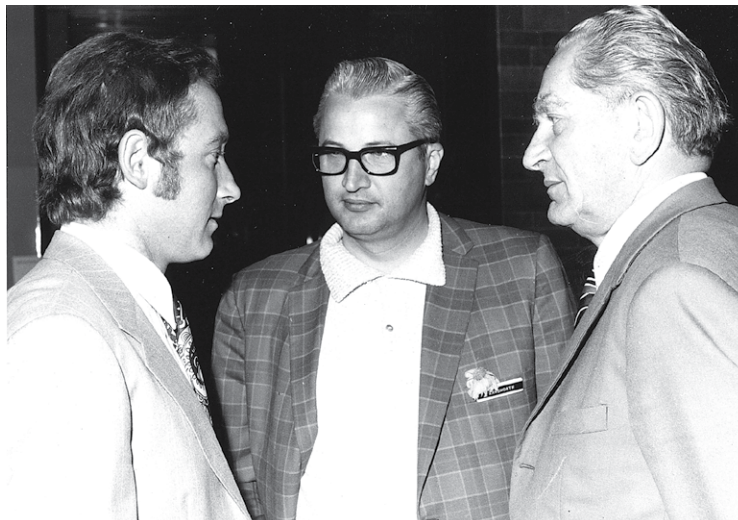
From the Archives: Processing the Farnsworth Collection

As the processing of the Farnsworth's books continues, we will add those that fit our scope to our shelves and online catalog.

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Another exciting find we came across in a box of books was a slim red binder of photographs, taken during Farnsworth's six-month sabbatical to Munich, Germany in 1967. He conducted research at the Ludwig Maximilian University of Munich and was hosted by Professor Ludwig Hörhammer, who was a professor of pharmaceutical biology. While there, Farnsworth worked with Professor Hildebert Wagner, a professor of pharmacognosy. Together, they would spend mornings talking with the students about their projects and research and giving advice. The photographs in the album show Farnsworth's morning rounds with the students, a lecture being conducted by Farnsworth, a laboratory tour, and scenes from various parties and dinners. Farnsworth and Hörhammer are featured throughout the photos. Also found inside this binder were two chapters of a typewritten memoir by Farnsworth in which he describes his first few days in Munich, exploring the city and university, and a ski trip in the Alps.

We are certainly grateful for the work Howell has done and for what he will continue to work on through this spring. As the processing of the Farnsworth's books continues, we will add those that fit our scope to our shelves and online catalog. Notes in the catalog records will indicate that the books came from the Farnsworth collection. With each processed series of

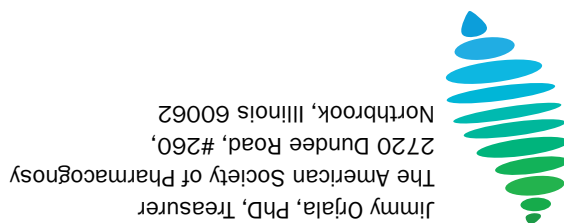


Farnsworth (center) and Professor Ludwig Hörhammer (right) with his son Hans Peter.

the manuscript collection, the Norman R. Farnsworth [finding aid](#) will be updated on the Lloyd Library website.

For more information about accessing the Lloyd book and manuscript collection, search the [catalog](#) and the research section (lloydlibrary.org/research/) of the Lloyd's website. Consider donating your records to the Lloyd, a destination for pharmacognosy scholars. It is a great way to preserve the past and lead the way for future researchers. To donate materials or financial support to the Lloyd Library & Museum, visit [Support the Lloyd](#) on our website. ■

Consider donating your records to the Lloyd, a destination for pharmacognosy scholars. It is a great way to preserve the past and lead the way for future researchers. To donate materials or financial support to the Lloyd Library & Museum, visit [Support the Lloyd](#) on our website.



Full Membership

Full membership is open to any scientist interested in the study of natural products.

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

Associate Membership

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

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

Emeritus Membership

Emeritus membership is open to retired members of the Society who maintained membership in the Society for at least five years.

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

Honorary Membership

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

Present Honorary Members are:

Dr. John H. Cardellina • Dr. Alice M. Clark, University of Mississippi
Dr. Geoffrey A. Cordell, University of Illinois at Chicago • Dr. Gordon C. Cragg, National Institutes of Health
Dr. Harry H.S. Fong, University of Illinois at Chicago • Dr. Ikhlas Khan, University of Mississippi
Dr. A. Douglas Kinghorn, Ohio State University • Dr. Robert J. Krueger, Ferris State University
Dr. Roy Okuda, San Jose State University • Dr. James E. Robbers, Purdue University
Dr. E. John Staba, University of Minnesota • Dr. Barbara Timmermann, University of Kansas

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

Jimmy Orjala, PhD, Treasurer, The American Society of Pharmacognosy,
2720 Dundee Road, #260, Northbrook, Illinois 60062. Email: asphcog@gmail.com