PSNA News

Phytochemical Society of North America
Sociedad Fitoquímica de América del Norte
Société Phytochimique de L'Amerique du Nord

Volume 55, Number 2 Fall 2017

President's Message

Dear PSNA Members,

It is truly an honor to serve the phytochemical society and work on behalf of its members. I participated in many conferences since I became a PSNA member in 1998 but never ran for an office within the society. Over the course of the last year, while serving as President-Elect, I realized more than before how important it is for individuals to actively engage in society business. We are a volunteer organization that depends on the commitment of its membership. Hopefully, the content of this newsletter gets you excited about PSNA and we can count on you in the future.

I will start this letter by thanking several individuals on the Executive Committee for their service, will then make a few announcements, and end with information about recent developments that are relevant to the membership.

KUDOS

Mark Berhow (Past-President) for his leadership in 2016/2017, for his efforts to maintain and update the PSNA website, and for producing our newsletters.

Lloyd Sumner and his team for organizing a highly successful annual conference 2017 (more on pages 4-7 of this newsletter).

Argelia Lorence (Secretary) for keeping us organized and maintaining our Twitter account (@PSNA2016).

Dhirendra Kumar (Treasurer) being diligent and proactive about ensuring the financial well-being of our society.

Reinhard Jetter (Editor in Chief, Phytochemistry Reviews) for managing manuscripts based on selected presentations given at PSNA annual meetings.

Lloyd Sumner for setting up our Facebook presence. There are now links to Facebook, Twitter and LinkedIn on the PSNA home page.

CONGRATULATIONS

Deyu Xie on his election as president for 2018/2019.

Neish Award Winner - Daniel Owens (University of Hawaii).

Poster Award Winner (Post-Doc category) – Lucas Busta (University of Nebraska).

Poster Award Winner (Doctoral Student Category) – Xiaoyue "April" Chen (Washington State University).

Poster Award Winner (Masters/Undergraduate Student Category) – Saroj Lohani (East Tennessee State University).

ANNOUNCEMENTS

Dhirendra Kumar will serve a second term as Treasurer. Thank you, Dhirendra!

Nominations needed for Executive Committee: President (2019/2020) and Secretary.

PSNA Conference 2018 will be held at Universidad Autonoma de San Luis Potosi (Mexico) (more on page 12 of this newsletter).

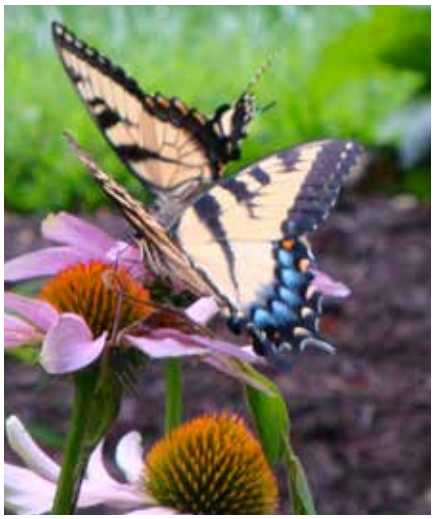
continues on page 3 ...

In this issue: The 2017 Meeting at the University of Missouri at Columbia
The 2018 Meeting in San Luis Polosti, Mexico!

The web PDF version can be downloaded from the website: www.psna-online.org.

PSNA News
Fall 2017

WWW.PSNA-ONLINE.ORG



The Phytochemical Society of North America

The Phytochemical Society of North America (PSNA) is a nonprofit scientific organization whose membership is open to anyone with an interest in phytochemistry and the role of plant substances in related fields. Annual membership dues are U.S. $60 for regular members and $30 for student members. Annual meetings featuring symposium topics of current interest and contributed papers by conference participants are held throughout the United States, Canada, and Mexico. PSNA meetings provide participants with exposure to the cutting-edge research of prominent international scientists, but are still small enough to offer informality and intimacy that are conducive to the exchange of ideas. This newsletter is circulated to members to keep them informed of upcoming meetings and developments within the society, and to provide a forum for the exchange of information and ideas. If you would like additional information about the PSNA, or if you have material that you would like included in the newsletter, please contact the PSNA Secretary or visit our website at www.psna-online.org. Annual dues and changes of address should be sent to the PSNA Treasurer. Also check the PSNA website for regular updates.

The PSNA is an all volunteer organization which depends on its membership to run the organization. We appreciate the time and effort these volunteers are putting in to keep the organization up and running. As a member, please consider volunteering to serve on one of these committees. The PSNA can always use more help!

PSNA EXECUTIVES

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continued from page 1 ...

Eric E. Conn (Professor Emeritus at UC Davis), PSNA president in 1971 and one of the founding fathers of plant biochemistry, passed away on September 2, 2017. More on Eric Conn's life and impact on phytochemistry will follow in the next newsletter.

RECENT DEVELOPMENTS AND FUTURE OUTLOOK

Over the last year, I have been working with Mark Berhow on improving the appeal and content of the PSNA website (www.psna-online.org). You will notice that much of the archival and outdated information has been removed; however, you can still find listings of past officers, award winners and bylaws under the "PSNA Business" tab. The focus is on giving you facile and convenient access to the most important news and announcements. As a service to our membership, we are also posting job advertisements for free. Please do not hesitate to contact us with suggestions and requests (incl. job advertisements) via e-mail to berhow@comcast.net or lange-m@wsu.edu.

Following up on the original suggestion by Mark Berhow and discussions with the PSNA Executive Committee, I have extended invitations to several individuals to join our Advisory Board. The goal is to have representation from across North America (U.S., Canada and Mexico) and by scientists at different career stages (from graduate students to senior faculty). We have also initiated a Past Presidents Club, hoping to harness the wisdom of our most experienced members. As a team, we will continue to strive toward increasing PSNA's visibility and impact, and to provide career development advice to our younger members.

The single most important event for our society is the annual meeting. PSNA conferences have a remarkable history of featuring presentations of exceptional quality covering the diverse fields of plant chemistry, biochemistry and molecular genetics. Our awards go to up-and-coming researchers with great potential for continued innovation in these areas and the conferences are an excellent venue to meet your colleagues and make new friends. I am very excited about the fact that our 2018 conference will be held in Mexico. If you attended the 2017 conference, you saw a video that highlighted the cultural depth and architectural beauty of San Luis Potosi (more information on page 12 of this newsletter). I am looking forward to working with our local organizers (Denisse Atenea de Loera Carrera and her team) and the PSNA Advisory Committee to put on a 2018 conference you do not want to miss. Stay tuned!

Thanks for reading,

Mark Lange,
PSNA President 2017/2018

Current Job Postings on the PSNA Website

http://www.psna-online.org/jobs.html

Assistant Professor Position in Plant Biochemistry, Department of Plant Biology, College of Biological Sciences, University of California, Davis (posting JPF01813) posted October 245, 2017.

Postdoctoral Associate Position in Plant Quantitative Genetics at the University of Nebraska-Lincoln (http://employment.unl.edu, position F_170115), posted October 11, 2017.

Faculty Position in Biological Mass Spectrometry, Michigan State University, Posted Sept 21, 2017 http://careers.msu.edu/ (posting #466964).

Dr. Eric Conn 1923 - 2017

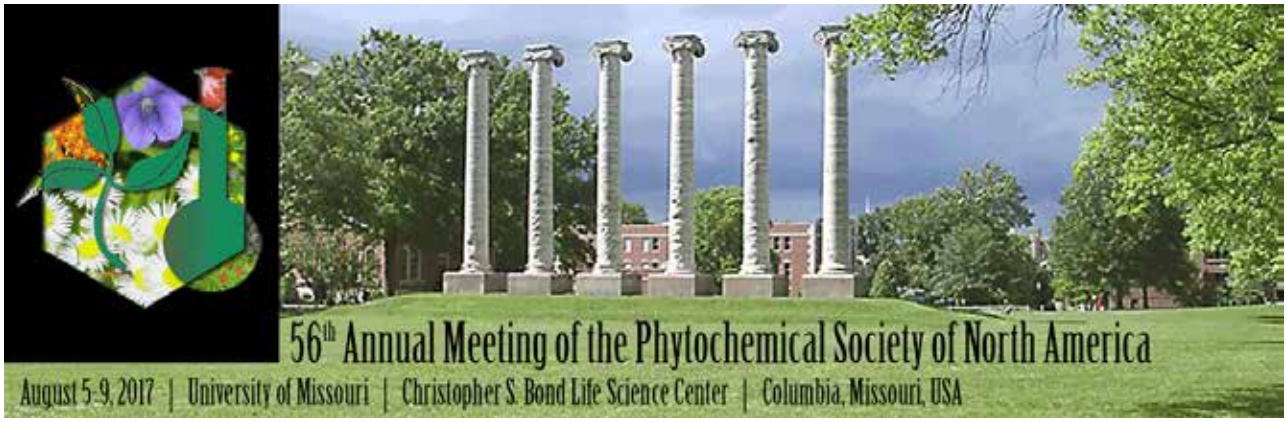
The PSNA would like to note the death of Dr. Eric Conn on Sepatember 2, 2017. Dr. Conn was a pioneer in phytochemical research and an enthusiastic member of the PSNA, serving a term as one of the early PSNA presidents in 1971. He was honored with the PSNA Lieftime Member Award and not one but two Phytochemical Pioneer awards in 2007 and 2011! The next newletter issue will be dedicated to remembering the life and work of Eric Conn.

Assistant Professor, Plant Biochemistry, Department of Plant Biology, University of California, Davis, posted Sept 21, 2017. https://recruit.ucdavis.edu/apply/JPF01813

Tenure track faculty position in the Dept. of Food Science & Human Nutrition at Colorado State University, Ft. Collins, CO, posted Sept 19, 2017 http://www.fshn.chhs.colostate.edu/

A postdoctoral position in plant molecular biology and biotechnology at UBC's Okanagan campus (Kelowna, BC) to investigate molecular aspects of secondary metabolism in Cannabis sativa plants. Posted September 8, 2017. CV and contact information for three referees to: barb.lucente@ubc.ca

Analytical Technologies Center Lead, Chemical Biology and Therapeutics (CBT) department at St. Jude Children's Hospital, Memphis, TN. Posted July 28, 2017.

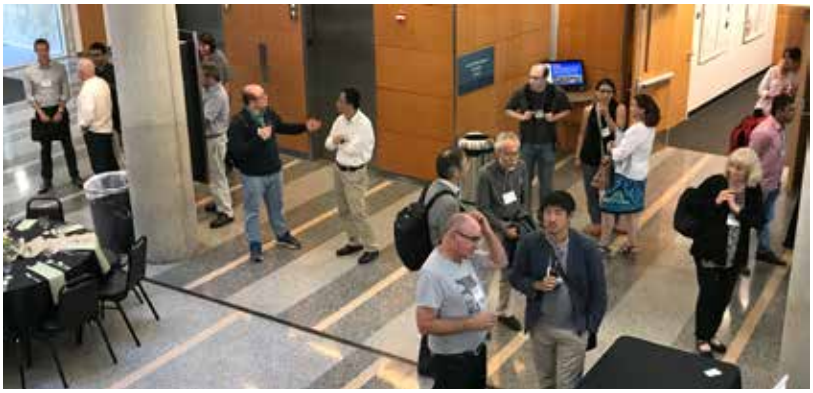


56th Annual Meeting of the PSNA

Another outstanding program, coupled with very nice weather, resulted in a highly productive and informative PSNA meeting. All that attended came away with a renewed perspective on the state of phytochemical research around the world, and no doubt appreciated the opportunity to interact with each other in this unique small group meeting program. The PSNA meetings are simply the best opportunity to learn about current research and build and renew collaborative ties. This meeting continued in this fine tradition.

Photos from the PSNA 2017 meeting can be found on our new PSNA Facebook page and you are invited to join our group (https://www.facebook.com/groups/123656255036110/). Please send us a request to join the group and we'll get you in the loop.

Professor Lloyd W. Sumner was our meeting organizer and he is part of the University of Missouri's Department of Biochemistry and Metablomics Center. He is also a former president of the PSNA. The Society would like to thank him, his staff, and the Conference and Events Services of the University for organizing a fantastic meeting. It is a lot of work and effort to coordinate all the little details that go into running such a show.



The PSNA 2017 Symposiums included: Imaging, Phenotyping & Metabolomics; Terpenoids; Alkaloids and More Terpenoids; Phytochemistry & Ecology; Lipids; Synthetic Biology and Metabolic Engineering; Industrial Phytochemistry; Food & Nutriceuticals; and Phytochemical Signaling.

The PSNA gratefully acknowledges the support of our PSNA 2017 meeting sponsors including:
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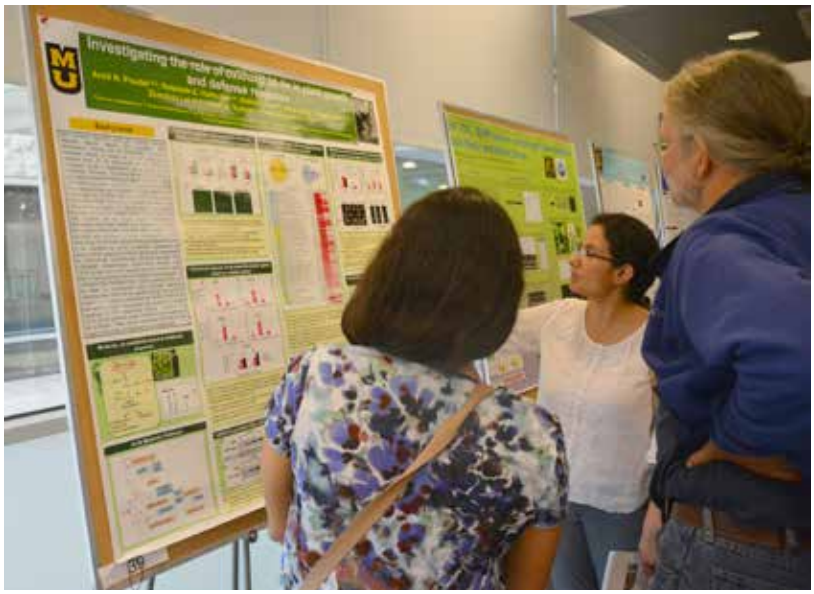
NSF Plant Imaging Consortium
NSF Plant, Algae, and Microbial Metabolomics Research Coordination Network (PAMM-NET)
National Science Foundation
Missouri Wines

The mission of the PSNA is to inspire and foster research and development in the chemistry, molecular biology, biochemistry and systems biology of plant metabolites, their impact upon plant, animal and human physiology and pathology, renewable energy, and their economic utilization and value (www.psna-online.org/). PSNA meetings provide participants with exposure to the cutting-edge research of leading international scientists, but remain small enough to offer an interactive and intimate environment conducive to knowledge exchange and strategic discussion.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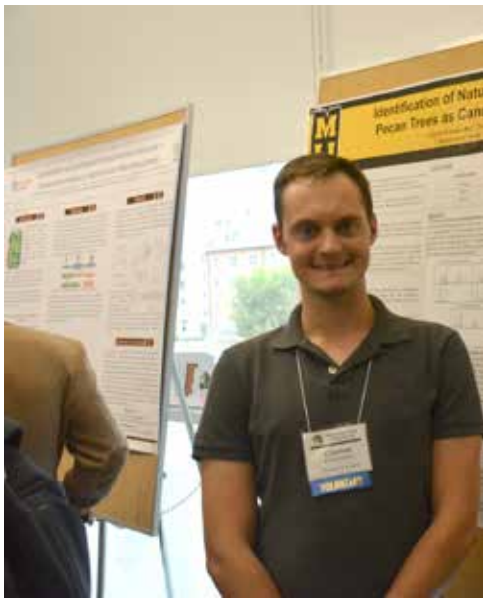



College of Arts and Science
College of Engineering
College of Veterinary Medicine

The **Arthur C. Neish Young Investigator Award** is presented to young scientists who have just started to develop their independent research careers. This year's Neish Awardee was Dr. Daniel K. Owens of the University of Hawaii Manoa. More details about Prof. Owens follows.

Daniel K. Owens earned a BSc

degree with a concentration in biochemistry from East Tennessee State University where he first began research into natural products and flavonoid metabolism by developing a novel assay system for flavanone-3-hydroxylase. He continued working with flavonoids in the lab of Brenda Winkel at Virginia Tech and was awarded his PhD for examining the labile dioxygenase enzymes involved in flavonol biosynthesis in *Arabidopsis thaliana* with a particular focus on the flavonol synthase isozyme family. He then began a postdoctoral position in the lab of Cecilia McIntosh where glucosyltransferase enzymes with the potential to influence flavor chemistry and other aspects of metabolism in Citrus species were identified and thoroughly characterized. Subsequently, he moved to a plant physiologist postdoctoral position with the USDA-ARS Natural Product Utilization Research Unit in Oxford, MS where natural products were investigated as herbicide leads and herbicide resistant crop plants were characterized in the labs of Franck Dayan and Stephen Duke. Daniel is currently an assistant professor in Molecular Biosciences and Bioengineering at the University of Hawaii - Manoa in Honolulu, HI where his lab is investigating the herbicidal potential of natural products from allelopathic tropical and subtropical plants as well as beginning to study the potential of glucosyltransferase enzymes to interact within the flavonoid metabolon.

The Society's effort to stimulate early careers in phytochemistry was also exemplified by the "**Phytochemistry/PSNA Young Investigator Research Grant Award**", which is sponsored by Elsevier and presented biannually to a dynamic young scientist within ten years of receiving their doctoral degree and currently leading an independent research program in the broader areas of phytochemistry at a university, or at a government or not-for-profit research institute. Last year's winner was Dr. Hiroshi Maeda from the University of Wisconsin-Madison. He returned to this year's meeting to give a keynote talk on his research. More information about Prof. Maeda follows.

Hi

sor in the Department of Botany at University of Wisconsin-Madison. He recived BS and MS degree in Biotechnology at Osaka University. He then moved to the US and obtained PhD at Michigan State University in 2006, working with Dr. Dean DellaPenna on tocopherol (vitamin E) functions in photosynthetic organisms. After working as postdoc with Dr. Natalia Dudareva at Purdue University on phenylalanine and benzenoid volatile biosynthesis in petunia flowers, he started his current position at UW-Madison from the fall 2011. Dr. Maeda's laboratory has been investigating evolutionary diversification of the tyrosine biosynthetic pathway in various plant species. Dr. Maeda is the recipient of the 2006 Anton Lang Memorial Graduate Student Award from MSU DOE-Plant Research Laboratory, the 2011 Eric Conn Young Investigator Award from the American Society of Plant Biologists, and the 2016 Arthur Neish Young Investigator Award from PSNA.

A young member's luncheon was held with a panel discussion with Richard Shoemaker of Bruker BioSpin and Vince DeLuca of Brock University, which exposed students and postdocs to various career options.

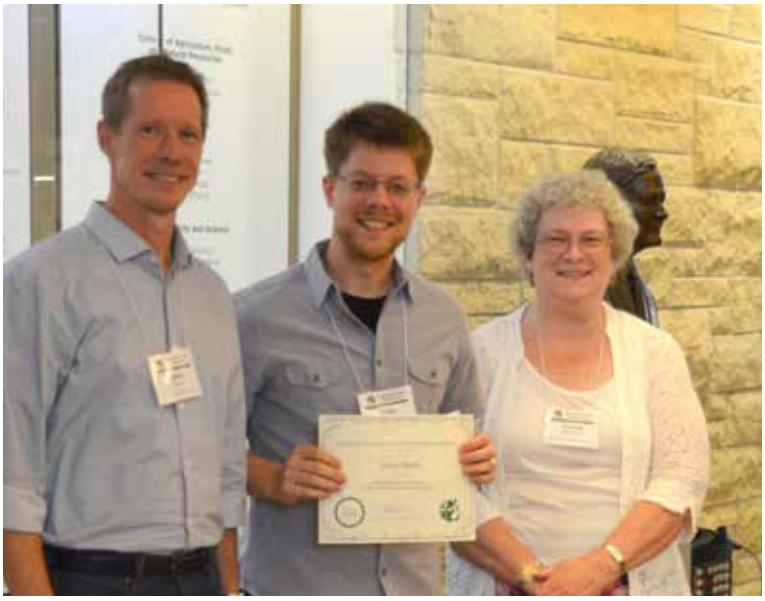
The annual banquet and awards ceremony was held on Tuesday evening. The PSNA gave out 23 student travel awards and three poster awards, continuing the tradition of providing support to student participation in the PSNA.

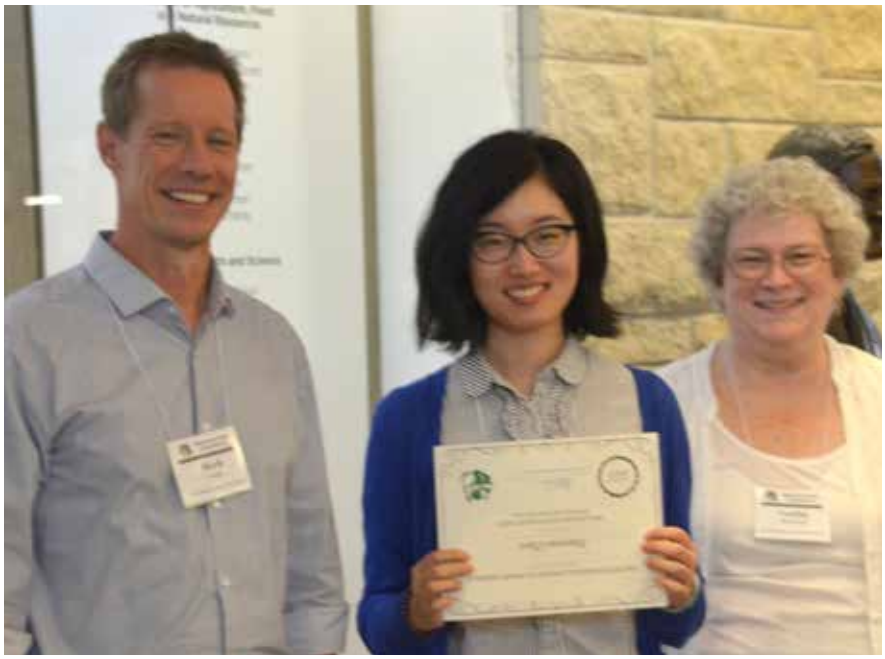
2017 PSNA Best Poster Award Winners were:
Lucas Busta, University of Nebraska-Lincoln, Post Doctoral Poster Award
Xiaoyue Chen, Washington State University, Graduate Student Poster Award
Saraj Lohani, East Tennessee State University, Undergraduate/Master's Poster Award

Characterization of SIP68 for its Role in SA Mediated Stress Signaling in Plant

Saroj Chandra Lohani [1], Abdulkareem Odesina[1] and Dhirendra Kumar[1]

[1] Department of Biological Sciences, East Tennessee State University, Johnson City, TN 37614, USA





SIP68 is an SABP2-interacting protein identified in a yeast two-hybrid screen. SABP2 is an important plant protein which catalyzes the conversion of methyl salicylate to salicylic acid. Salicylic acid is one of the important plant hormones that provides defense at both local as well as distal uninfected plant organs known as systemic acquired resistance. SIP68 was characterized as UDP-glucosyltransferase (UGT). Since SABP2 has a role in plant defense and UGT's are involved in many important plant processes, there is the possibility of a role for SIP68 in plant biotic and abiotic stress signaling. Full length SIP68 was cloned and expressed in *Pichia pastoris*. The recombinant affinity purified SIP68 glucosylates flavonols (kaempferol, quercetin, gossypetin, fisetin), flavanones (hesperetin, naringenin), flavones (apigenin, luteolin), and isoflavones (4-acetone-7 Hydroxy-6-methoxy-isoflavone) with varying degree. The highest activity was detected with kaempferol followed by quercetin. However, SA was not a substrate for glucosyltransferase activity of SIP68. Our aim is to assess the role of SIP68 in abiotic and biotic stress signaling in the plant. One of the approaches is to alter the expression of SIP68 in the plant using CRISPR-Cas9 gene editing system. Transgenic plants with altered SIP68 expression will be analyzed for their response to pathogen infection (biotic) and environmental stresses (abiotic). We also aim to localize SIP68 inside tobacco cells using the enhanced Green Fluorescent

Protein (eGFP) fusion. This research will help us to add another clue in understanding the plant defense as well as localization of our protein of interest inside the plant cell.

A (-)-kolavenyl diphosphate synthase catalyzes the first step of salvinorin A biosynthesis in *Salvia divinorum*

Xiaoyue Chen[1,2], Anna Berim[1], Franck E. Dayan[3], David R. Gang[1,2]

[1]Institute of Biological Chemistry, Washington State University, Pullman, WA 99164 USA [2]Molecular Plant Sciences Program, Washington State University, Pullman, WA 99164 USA
[3]Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO, 80523-1177 USA

Salvia divinorum (Lamiaceae) is a powerful hallucinogenic annual herb used by indigenous cultures of Mexico for medicinal and ritual purposes. It produces an array of bioactive neo-clerodane diterpenoids, with salvinorins A as the major accumulated products of the biosynthetic network. Salvinorin A is a highly selective kappa-opioid receptor agonist. This investigation aimed to identify the enzyme that catalyzes the first reaction of salvinorin A biosynthesis, the formation of (-)-kolavenyl diphosphate ((-)-KPP), which is subsequently dephosphorylated to afford (-)-kolavenol. Peltate glandular trichomes were identified as the major and perhaps exclusive site of salvinorin accumulation in *S. divinorum,* using detection approaches including MALDI-based imaging mass spectrometry (MALDI-IMS). The trichome-specific transcriptome was used to identify candidate diterpene synthases (diTPSs). *In vitro* and *in planta* characterization of a class II diTPS designated as SdKPS confirmed its activity as (-)-KPP synthase and its involvement in salvinorin A biosynthesis. Mutation of a phenylalanine into histidine in the active site of SdKPS completely converts the product from (-)-KPP into *ent*-copalyl diphosphate. Structural elements were identified that mediate the natural formation of the neoclerodane backbone by this enzyme and suggest how SdKPS and other diTPSs may have evolved from *ent*-copalyl diphosphate synthase.

The chemical diversity, activity, and biosynthesis of bioactive carrot polyacetylenes

Lucas Busta[1], Evan LaBrant[1], Patricia Santos[2], Dylan K. Kosma[2], Edgar B. Cahoon[1]

[1]Center for Plant Science Innovation and Department of Biochemistry, University of Nebraska – Lincoln, Lincoln, Nebraska, 68588, USA
[2]Department of Biochemistry and Molecular Biology, University of Nevada, Reno, Nevada 89557, USA

As our climate becomes more variable and unpredictable, phytochemicals that contribute to plant disease resistance become ever more important research targets. A class of lipid compounds called polyacetylenes are produced in various Apiaceae (e.g. carrot, coriander) and Asteraceae (e.g. sunflower, artichoke) species in response to pathogenesis. Accordingly, it has long been suspected that these compounds contribute to pathogen resistance. If this is indeed the case, knowledge of the genes involved in polyacetylene biosynthesis and accumulation could be a valuable resource for creating crops lines with improved pathogen resistance.

The recent publication of a high quality carrot genome and transcriptomes has enabled functional genomics approaches to exploring polyacetylene structure, function, and biosynthesis in this species. We began with a detailed analysis of carrot polyacetylene chemical structures and their distribution in diverse carrot tissues. After TLC purification, we identified five major (two novel) and seven trace polyacetylenes, with falcarindiol and falcarinol being the major constituents of the whole polyacetylene pool. These compounds accumulate primarily in the peel of the carrot root. Next, we purified falcarinol and falcarindiol found that mycelia of the necrotrophic fungus *Sclerotinia sclerotiorum* exhibited a 25% reduction in growth rate on substrate containing just 20µg/ml polyacetylenes. We then prepared carrot cell cultures and elicited then with mycelial protein extracts from the mold *Phytophthora megasperma*. This treatment caused the accumulation of several different polyacetylene species and, based on RNA-seq, the upregulation of several fatty acid acetylenase genes putatively involved in the initial steps of polyacetylene biosynthesis. We are currently in the process of evaluating the activity of these genes in heterologous systems.

2017 PSNA Travel Award Winners were: Kristen Wilbeck, Peiqiang Wang, Danh Cong Vu, Bal Krishna Thakuri, Kate Simmons, Suhas Shinde, Jihyun Park, Marcos de Oliveira, Nirman Nepal, Armando Magana, Saroj Lohani, Sean Johnson, Md Imdadul Haq, Novianus Efrat, Xiaoyue Chen, Lucas Busta, Korey Brownstein, Aaron Birchfield, Wajid Bhat, Aparajita Banerjee, Shantaya Andrews, Beverly Agtuca, and Abbas Abdoli.

This was an outstanding meeting with a great program. The PSNA would like to thank all who attended this meeting as your attendance was a key to a successful program. The PSNA would also like to thank the organizing committee for putting together a great program and line-up of speakers.

The 2017 Scientific Organizing Committee of the PSNA

Scientific Organizing Committee
Lloyd W. Sumner (Chair, Univ. of Missouri, Columbia)
Richard Ferrieri (Univ. of Missouri, Columbia)
William (Bill) Folk (Univ. of Missouri, Columbia)
Abe Koo (Univ. of Missouri, Columbia)
Santosh Kumar (Univ. of Missouri, Columbia)
Toni Kutchan (Danforth Plant Science Center)
Zhentian Lei (Univ. of Missouri, Columbia)
Chung-Ho Lin (Univ. of Missouri, Columbia)
Dennis Lubahn (Univ. of Missouri, Columbia)
David Mendoza-Cózatl (Univ. of Missouri, Columbia)
Basil Nikolau (Iowa State Univ.)
Martin Ruebelt (Monsanto Co.)
Ruth Welti (Kansas State Univ.)

The PSNA poster session featured nearly 50 posters on a wide and interesting ranger of topics.

Next year's meeting will be held August 4-8, 2018 on the campus of the Universidad Autónoma de San Luis Poltosí in San Luis Postosí Mexico. Please mark your calendars now!

The next meeting of the PSNA will be held at the Universidad Autonoma, in San Luis Potosi, Mexico, August 4 – 8, 2018. The meeting will feature the rich phytochemical research of Mexico as well as the great slate of PSNA speakers and presentations. The University has outstanding programs in plant chemistry and biochemistry and is located in historic San Luis Potosi.

"where you can get a glimpse of the past, proudly reincarnated through the finely preserved streets, facades and architecture of our city center"

The PSNA is making a special effort to provide travel awards to encourage the attendanace of students for this meeting. Reserve a spot on your calendar now for this exciting phytochemical-focused meeting. Travel to San Luis Potosi is easy, with direct flights from Mexico City, Houston, and Dallas. Registration, lodging, and abstract information will be posted soon after the new year begins.

We look forward to seeing you in Mexico for 2018!

2018 TENTATIVE CONFERENCE PROGRAM

Saturday, August 4, 2018
Real Plaza Hotel
Conference Registration
Welcome Reception

Sunday, August 5, 2018
Conference Registration, Rogelio Jiménez Auditorium Lobby
Symposiums 1-4
Poster Session with Refreshments, Professional Exams and Council Halls

Monday, August 6, 2018
Plenary Symposiums 5-8
Poster Session with Refreshments, Professional Exams and Council Halls

Tuesday, August 7, 2018
Symposiums 9-11
Presentation PSNA 2019
Traditional "Callejoneada" through historic downtown

Wednesday, August 8, 2018
Symposiums 12 & 13
Tour in Museum Laberinto de las Ciencias y las Artes
Visit to UASLP Botanic Garden
Award Banquet, Edificio Central de la UASLP

Phytochemical Society of North America
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New Member Application Form

Please fill in the following application and return to the Treasurer with your dues payment. Once your application has been processed, you will receive newsletters and special mailings. You are also eligible for PSNA member discounts on the Recent Advances in Phytochemistry series (See Website).

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Return this statement along with your payment to:

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