



# PSNA News

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

Volume 58, Number 2

Fall 2020

## Message from Argelia Lorence, PSNA President



Dear PSNA members,

I hope you and yours are safe and healthy. I would like to send a brief message to update you on upcoming events:

- 1) Virtual poster meeting happening December 5th (see flyer for details)
- 2) Elections of new officers. Current candidates are as follows:

President  
Li Tian  
Dhirendra Kumar

Secretary  
Armando Alcazar Magana

Treasurer  
We are seeking candidates

We will conduct elections as soon as we have at least one candidate for treasurer.

3) The 2021 PSNA meeting will be online. Make plans to register and participate.

Happy Thanksgiving  
Argelia Lorence, PhD  
President PSNA

I write this message wishing you and your loved ones are healthy and safe.

In early March the PSNA leadership and I had to make a difficult decision, postponing the PSNA meeting in Kelowna, Canada until 2021.

As you can imagine this was not an easy decision to make, but we are convinced it was the best course of action at this time for the health of our members and our extended communities.

In early April I consulted with members of the Executive and Advisory

Committees regarding the best way to transfer responsibilities between me and Dorothea Tholl, our Elected President. Several of the past PSNA presidents including Fred Stevens, Mark Berhow, and Deyu Xie advised Dorothea and I to continue serving in our current positions for the coming months to make sure all operations continue as planned. We will do the official transfer of responsibilities between the current and elected president at the 2021 meeting in Kelowna. As soon as we have a final date for the annual meeting, we will widely announce it.

I am honored to report that Prof. Danel Ferreira, an Emeritus Professor of Pharmacognosy from the University of Mississippi will receive the Phytochemical Pioneer Award at the 2021 meeting. We look forward to honoring a giant in our field.

As you may know the Plant Journal is sponsoring the PSNA Early Career Award for postdocs/research scientists who are ready to start an independent position in an academic/research institute or government laboratory. The awards committee has submitted their suggestion far earlier this year and is ready to



In this issue:

2020 PSNA Pytochemical Pioneer Award  
2020 PSNA Virtual Poster Session December 5, 2020, Deadline NOW  
2020 Meeting in Kelowna, BC Canada rescheduled to July 26-30, 2021

The web PDF version can be downloaded from the website: [www.psna-online.org](http://www.psna-online.org).

PSNA News  
Spring 2020



WWW.PSNA-ONLINE.ORG



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Past PSNA Presidents

# 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.pсна-online.org](http://www.pсна-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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make the announcement as soon as the awardees are approved by the committee. The winners will give an oral presentation at the 2021 meeting and will contribute a paper to be published in the Plant Journal.

I look forward to see all of you at the 2021 meeting in Kelowna. For the ones of you who like to plan in advance please make plans to travel to Blacksburg, VA in 2022 and to East Lansing, MI in 2023.

I want to close wishing you the best for the coming months. Paraphrasing a quote I love I wish each of us choses to plant seeds of happiness, hope, success, and love as that usually comes back in abundance as a law of nature.

Stay safe friends

Argelia

## DANEEL FERREIRA 2020 Phytochemistry Pioneer Award.

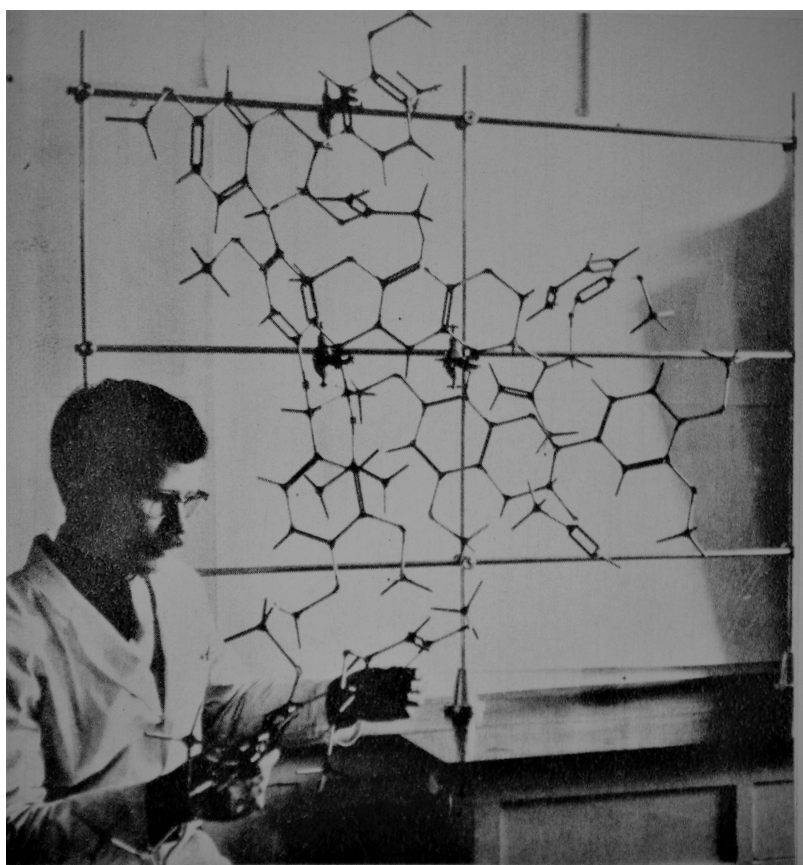


I was born and grew up between the beautiful Kouga Mountains in the Eastern Cape Province of South Africa and attended the McLachlan High School in the small rural town of Joubertina in the same province. My undergraduate training was done at the University of Pretoria where I received a B.Sc. degree, majoring in Chemistry and Mathematics, and a Higher Education Diploma (1961-1964). These enabled me to teach Chemistry, Physics, and Mathemat-

ics at a High School in Bloemfontein while simultaneously enrolling for part time studies towards a B.Sc. (Hons.) degree in Chemistry and an M.Sc. in Organic Chemistry, at the University of the Orange Free State, Bloemfontein, both eventually obtained *cum laude* (1965-1968). The research done towards the M.Sc. degree led to my very first published paper, Synthesis of Pterocarpan Analogues: 6a, 11a-Dehydropterocarpan-Coumestan Conversion, *Phytochemistry*, **1971**, *10*, 1141-1444.

Having completed the M.Sc. degree, I was offered a Technical Assistant position in the Chemistry Department, University of the Free State, Bloemfontein, an offer that I duly accepted (1969) to begin a 30-year career at that institution. That also

offered an opportunity to commence with research towards a Ph.D. degree that was awarded at the end of 1972. In 1971 I was lucky to be appointed as lecturer in Organic Chemistry and was promoted to the ranks of senior lecturer in 1975. The highlight of my Ph. D. research entailed the first purification and structure elucidation of a profisetinidin-type tetraflavonoid, (*Chemical Communications*, **1971**, 1257-1259). It needs to be emphasized that, at the time, we only had access to an in house Varian T60 NMR spectrometer and, as a personal favor to my supervisor Prof David G. Roux by Dr. Lewis Carey, a 220 MHz Varian at Palo Alto, California. Meticulous application of degradation methods and comprehension of the co-occurring biosynthetic precursors permitted assignment of a



*Dr D. Ferreira of the CSIR's Flavonoid Chemistry Research Unit at the University of the Orange Free State, Bloemfontein, examines a molecular model of an  $\alpha$ -hydroxychalcone against the background of the structure of the tannin molecule*

structure with the correct flavanyl constituent units but incorrect regio-chemistry. This was subsequently corrected via an extensive synthesis program that we developed in the late 1970's (*J. Chem. Soc., Perkin Trans 1*, **1985**, 2537-2544). The synthesis program was published in a series of manuscripts, *Synthesis of Condensed Tannins. Parts 1-20*, in *J. Chem. Soc., Perkin Trans.1*, over a six-year period.

The year 1977 was special and highly significant as far as my development and vision of research are concerned. I was privileged to be accepted as a "Visiting Lecturer" to work under the supervision of the 1969 Nobel Laureate in Chemistry, Sir Derek Barton, at the Imperial College of Science, Technology, and Medicine, London. Sir Derek was an undisputed scientific giant and an incredible hard worker that expected the same dedication of each of his postdoctoral research associates. I was fortunate to co-author with him a research paper based on the synthesis of aminoglycoside antibiotics, and to be nominated by him to compile a thesis for the prestigious Diploma of Imperial College. How fortunate I was to maintain a professional and personal relationship with this great human being and incredible scientist until his untimely passing in March 1998.

Upon returning to the UOFS in 1978, and being promoted to Associate Professor in 1979, I was given "free-range" by Professor Roux as far as the research program was concerned. A large effort was devoted to the synthesis program to unequivocally assign the structures of the profisetinidin- and prorobinetinidin-type condensed tannins up to the tetraflavanoid level and to develop an electronic circular dichroism (ECD) method to assign the absolute configuration at C-4 of the interflavanyl

bonds. During this time, we also discovered the presence of a novel class of oligomeric proanthocyanidins that we dubbed, phlobatannins. These compounds are derived from the regular di- and trimeric proanthocyanidins via rearrangement of the pyran C-ring of the chain-extender units.

In 1985 I was promoted to the "Full Professor" level and after the retirement of Professor Roux at the end of 1985, I was appointed as Head of the Division of Organic Chemistry. This heralded a period of financial suffering as far as research funding was concerned, an obstacle that lasted until 1989 when I was honored to receive an A-evaluation from the then Foundation for Research Development (FRD) of the Council for Scientific and Industrial Research, Pretoria (A-rating: researchers regarded by national and international peers as undisputed leaders in their field of study). In 1990 I was appointed by the FRD as Director of a Research Unit for Polyphenol and Synthetic Chemistry, that abruptly ended the financial constraints and permitted us to pursue several different research avenues in order to also satisfy the interest of every member of a growing research group.

Continuation of the research dealing with the identification of the phlobatannins and the design of effective semi-synthesis routes, as well as the discovery of a multitude of new proanthocyanidin structural classes like proguibourtinidins, promopanidins, and propeltogynidins, led to a series, *Oligomeric Flavanoids*, of 36 papers. We also published extensively on the structures and synthesis of the biflavonoids, the stereoselective synthesis of a variety of flavonoid monomers, and oligomeric isoflavanoids. These efforts also permitted us to record, interpret, and publish a significant amount of ECD

data that form the foundation of absolute configuration assignment of a significant array of representative flavonoid classes.

We were also active in several industrial research programs, e.g., the large-scale synthesis of aliphatic ethers for the SASOL group of companies, to replace methyl-*t*-butyl ether (MTBE) as an octane booster in "lead-free" automotive fuels. Research into the chemical profiles of the traditional South African herbal teas, Rooibos and Honeybush was aimed at providing the individual industries with a scientific foundation to support their marketing claims of the potential human health benefits of their products.

At the end of 1998 my family and I relocated to the United States to take up a position as Visiting Scholar at the National Center for Natural Products Research (NCNPR), The University of Mississippi, Mississippi. I was promoted to Principal Scientist in 2000 and held that position until March 2004 when I was offered the Chair position of the Department of Pharmacognosy, a position that I held until retirement on January 15, 2015

Leaving a productive South African career of 30 years and adapting to a whole new system at the age of 56 was not easy. However, the support of the senior personnel at the NCNPR and the School of Pharmacy made the adaptation relatively smooth. This time around I was quickly invited to enter into research contracts with Ocean Spray Cranberries, Inc. and the POM Wonderful (pomegranate) company that enabled me to fund several M.S., Ph.D., and postdoctoral research scientists. We also collaborated with the Noble Research Foundation of Oklahoma on the biosynthesis of proanthocyanidins, a project that led





and the ecosystem. These questions include the study of flower metabolism through development, the biochemistry of nectar and its relevance to promoting plant-pollinator interaction, recycling of metabolic resources after flowers whither and die, as well as the manipulation of flower metabolism by pathogens.



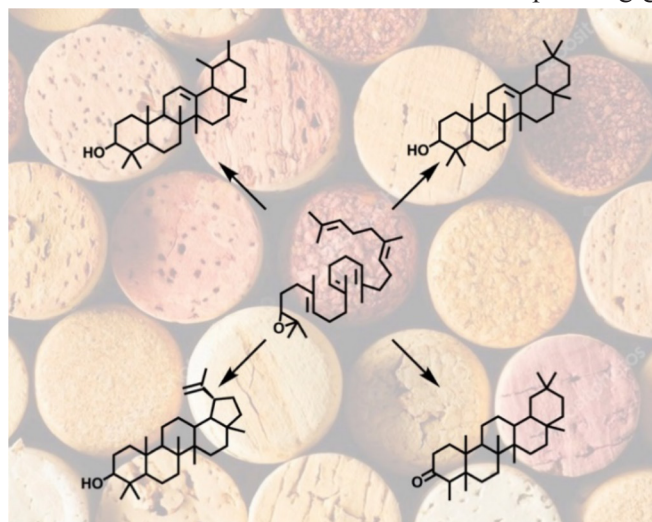
**Monica Borghi**

Flowers have evolved an organ-specific type of metabolism where primary and specialized metabolites contribute to bolstering reproduction, the ultimate physiological function of flowers. Flower primary metabolites sustain development and the initial phases of fruit and seed set, and they also serve as precursors for the synthesis of pigments, scents, and nectar. For my research, I utilize a metabolomic approach to measure the whole spectrum of primary and specialized metabolites of flowers, which I further integrate with transcriptomics and genomics and experiments with animal pollinators. My research aims at understanding how the metabolism of flowers changes during development and in response to climate change, and ultimately drives pollination of selfing and outcrossing species.

Monica has recently been appointed an Assistant Professor position in the Biology Department at Utah State

University. Due to Covid-19, she is currently working as a guest researcher at the Max Planck Institute of Molecular Plant Physiology, in Potsdam-Golm, Germany. E-mail: monica.borghi@usu.edu

### **Oxidosqualene cyclases involved in the biosynthesis of triterpenoids in *Quercus suber* cork**



Lucas Busta, Olga Serra, Ok Tae Kim, Marisa Molinas, Irene Peré-Fossoul, Mercè Figueras & Reinhard Jetter (2020) *Scientific Reports*, 10: 8011

<https://doi.org/10.1038/s41598-020-64913-5>

<https://www.nature.com/articles/s41598-020-64913-5>

Cork is a naturally occurring, renewable, sustainable biological material found in the outer bark of diverse tree species. Commercial cork, harvested from the cork oak (*Quercus suber* L.) is a material that is flame-resistant, buoyant, elastic, and impermeable to water. These remarkable properties have led to the widespread use of cork in the creation of, for example, building materials, floats, and bottle stoppers. The diverse industrial uses of cork highlight the importance of understanding the biochemical

and genetic basis for the material's physical properties. Cork consists of two chemical components: a polymeric component and a monomeric component. The objective of this project was to identify and functionally characterize genes involved in the biosynthesis of *Q. suber* triterpenoids - the most abundant class compounds in the monomeric component of cork. We used a chemical profiling-guided, PCR-based strategy to clone candidate genes and then tested their functions via heterologous expression. We also took advantage of the transcriptomic and genomic resources available for *Q. suber* to analyze the functionally characterized genes in a genomic context,

and to shed further light on the biosynthetic processes leading to cork triterpenoids.



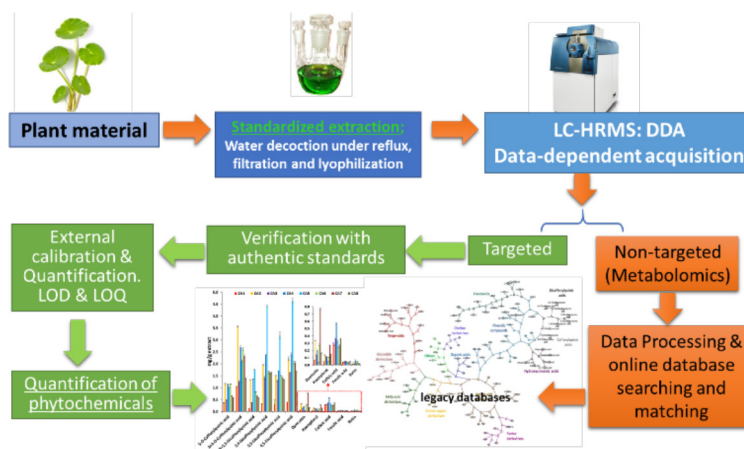
**Lucas Busta**

Dr. Busta is a new Assistant Professor at the University of Minnesota Duluth (UMD) in the Swenson College of Science and Engineering, Department of Chemistry and Biochemistry. He completed his

undergraduate studies at UMD, earned a Ph.D. in chemistry from the University of British Columbia under Reinhard Jetter, then was a postdoctoral fellow at University of Nebraska sponsored by the National Science Foundation's Plant Genome Research Program. He is fascinated by the unique chemistries that biological systems use to survive harsh environments. His research uses informatics to unite classical analytical and organic chemistry with emerging high-throughput DNA sequencing technologies to understand the molecular structures and biosynthesis of plant chemicals, polymers, and composites. His goal is to use this approach to develop and apply new knowledge about chemical biology to sustaining and improving human life while protecting the planet. You can read more about plant chemicals and the important roles they play in both our daily lives and the global economy on his phytochemistry blog ([plantsarechemists.blogspot.com](http://plantsarechemists.blogspot.com)) or Twitter feed (@PlantsRChemists) and you can even participate in his research as a citizen scientist through project #ChemicalBlooms ([lucasbusta.github.io/citizen\\_science](https://github.com/citizen_science)). Email: [lucasbustal@gmail.com](mailto:lucasbustal@gmail.com)

**Integration of mass spectral fingerprinting analysis with precursor ion (MS1) quantification for the characterization of botanical extracts: application to extracts of *Centella asiatica* (L.) Urban**

Armando Alcazar Magana, Kirsten Wright, Ashish Vaswani, Maya Caruso, Ralph L. Reed, Conner F. Bailey, Thuan Nguyen, Nora E. Gray, Amala Soumyanath, Joseph Quinn, Jan F. Stevens, Claudia S Maier (2020) *Phytochemical Analysis*, 31:722–738.



<https://onlinelibrary.wiley.com/doi/full/10.1002/pca.2936>

Plants are extraordinary factories of specialized metabolites that produce more than 200,000 distinct compounds across the plant kingdom. These phytochemicals are the primary source of medicine in many countries. As many as 80% of indigenous communities use plants for medicinal purposes, and these plants are becoming increasingly popular in Western countries. The phytochemical composition of plant material governs the bioactivity and potential health benefits as well as its reproducibility in laboratory studies and clinical trials.

The objective of this project was to develop an efficient method for the in-depth characterization of plant extracts and quantify marker compounds that could potentially be used for subsequent product integrity studies. This integrated workflow allowed the identification or tentative identification of 117 compounds in *C. asiatica*, which were chemically interconnected based on Tanimoto chemical similarity, and the accurate quantification of 24 phytochemicals commonly found in *C. asiatica* extracts.



**Armando Alcázar**

Armando is a Postdoctoral Research Associate at Oregon State University's Mass Spectrometry Center and The Linus Pauling Institute under the mentoring of Professors Claudia Maier and Fred Stevens. His research focuses on the development of analytical methods for in-depth chemical characterization of plant extracts, botanicals, and other biological samples using mass spectrometry in conjunction with separation and enrichment techniques. In 2019, Armando received the Young Investigator Award for recognition in scientific excellence presented at the Linus Pauling Institute International Conference and the OSU Postdoctoral Association's Professional Development Award; in the same year he was honored to serve as PSNA's Chair of the Young Members Committee. Email: [alcazara@oregonstate.edu](mailto:alcazara@oregonstate.edu)



## Your Publication Highlights in the PSNA Newsletter

Dear PSNA Members,  
We hope that this message finds you healthy and well. During these challenging times, we would like to stay in contact and hear about your exciting work. The PSNA newsletter (also shared on Twitter and Face-

book) highlights your recent publications and features first authors that are current PSNA members. Interested? Then, please send us a brief non-technical summary of your paper including the title and authors, and a publication link and graphical abstract or image, if possible. In addition, provide a photo and a brief statement including the first author's affiliation and research interests. Please send your contributions (text as word document; images as pdf or

jpg files) by email to Dorothea Tholl (tholl@vt.edu) or Armando Alcazar Magana (alcazara@oregonstate.edu).

We look forward to hearing from you!

Dorothea Tholl (PSNA President Elect)

Armando Alcazar Magana (Chair, PSNA Young Members Committee)



The banner features a background of green laboratory glassware and chemical structures. A central white box contains the text "7<sup>th</sup> Virtual poster Session" in green, with an illustration of a person at a laptop. Below this, it says "PHYTOCHEMICAL SOCIETY OF NORTH AMERICA (PSNA)". A dark blue bar below the box contains the text "Date: December 5th 2020" and "Register now" with a URL. A red line with a green circle at the end indicates a "Deadline: november 14th 25th". A purple bar at the bottom contains a Twitter handle "@PSNAOfficial" and a trophy icon with the text "Top presenter Award!!!".

**7<sup>th</sup> Virtual poster Session**

PHYTOCHEMICAL SOCIETY OF NORTH AMERICA (PSNA)

**Date: December 5th 2020**

**Register now**

[https://forms.office.com/Pages/ResponsePage.aspx?id=WBZoYCOPTkq8W\\_V8tujP0\\_B5FIIWNNrS3D8aaIdBUQ1o0SVdUMUYwUkQxTzVPNFpaMINCTEMySC4u](https://forms.office.com/Pages/ResponsePage.aspx?id=WBZoYCOPTkq8W_V8tujP0_B5FIIWNNrS3D8aaIdBUQ1o0SVdUMUYwUkQxTzVPNFpaMINCTEMySC4u)

**Deadline: november 14th 25th**

**@PSNAOfficial**

**Top presenter Award!!!**





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KELOWNA  
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July 26-30, 2021

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SOCIÉTÉ PHYTOCHIMIQUE DE L'AMÉRIQUE DU NORD  
SOCIEDAD FITOQUÍMICA DE AMÉRICA DEL NORTE

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