THE VORTEX

AMERICAN CHEMICAL SOCIETY | CALIFORNIA SECTION
VOLUME LXXX NUMBER 1 | JANUARY 2018

Happy New Year

Greti Sequin, 2018 Chair, California Section

TABLE OF CONTENTS

ACS California Section
January Section Meeting
Thursday, January 25, 2018
Speaker: Dr. Pawel Misztal, UC Berkeley,
Title: Emission of microbial volatile organic compounds by bacteria and fungi.

Location*: USDA 800 Buchanan Street, Albany.*
Time: *Social-6 pm – 6:50 pm; Talk 7: 00 pm to 8:15 pm*
Cost: *$10.00 Members, Students – $5.00: Includes Appetizers and Non-alcoholic beverages during Social Hour. No fee for talk only.*
Reservations: *Please contact the CalACS office by email office@calacs.org or 510-351-9922 by Monday, January 22, 2018.. You may prepay by mailing your check to Cal. Section ACS at 2950 Merced St. #225, San Leandro CA 94577 or with PayPal using our email address office@calacs.org. You may also pay at the door with cash or check (credit/debit not accepted at the door).*

Abstract:
Knowledge of the factors controlling the diverse chemical emissions of common environmental bacteria and fungi is crucial because they are important signal molecules for these microbes that also could influence humans. Not only a high diversity of mVOCs but their abundance can differ greatly in different environmental contexts. Microbial volatiles exhibit dynamic changes across microbial growth phases, resulting in variance of composition and emission rate of species-specific and generic mVOCs. In vitro experiments documented time-resolved emissions of a wide range of mVOCs from diverse microbial species grown alone or co-cultured with other species. Emissions of mVOCs varied not only between microbial species at a given condition but also as a function of life stage and substrate type. Interacting microbes alter their metabolisms resulting in different compositions than when each of those microbes is grown alone. Simultaneous VOC measurements of different microbial taxa indicate that a variety of factors beyond temperature and water activity, such as substrate type, microbial symbiosis, growth phase, and lifecycle affect the magnitude and composition of mVOC emission.

Biography:

Pawel K. Misztal, Ph.D., is currently an associate specialist in the Department of Environmental Science, Policy, and Management, at the University of California, Berkeley. His research focuses on time-resolved measurements of Volatile Organic Compounds (VOCs) in the aspects of air quality and chemical ecology.

Dr. Misztal has published more than 30 peer reviewed papers including research on ground based direct fluxes from tropical oil palm plantations and rainforest ecosystems in Borneo and developed methodologies for enhanced detection of structural isomers for proton transfer reaction mass spectrometry.

Dr.Misztal was responsible for planning, executing and processing the CABERNET airborne VOC flux campaign. He has demonstrated how isoprene emissions are distributed in California and led improvements to biogenic emission models to accurately simulate these emissions in California.

Dr. Misztal has been active in the global chemistry community to discover new compound families from stressed plants and understand the underlying processes as well as the atmospheric fates of biogenic VOCs. He has recently devoted much of his work in collaboration with UC Berkeley

continued on page 10)

THE VORTEX

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Chair's Report

Margareta Séquin

Welcome to the New Year. May it be a good year for you and a good and productive year for our ACS California section.

I want to thank our previous chair, Jim Postma, and our executive committee for generously volunteering their time to keep our California section thriving. Special thanks also to our dedicated Office Manager, Julie Mason.

Here are some of the events and activities that our executive committee and other CalACS members have organized during the past year:

A series of exciting speakers kept our audiences up-to-date on diverse topics during our monthly section meetings, concluding with talks by Richard Zare, Richmond Sarpong, and finally Jennifer Doudna on CRISPR technology. My thanks go to Charlie Gluchowski for helping to organize speakers.

Our section participated regularly at public outreach events, like Earth Day events, Expanding Your Horizon, and Discovery Day at AT&T Park, to demonstrate the excitement of chemistry to people. Alex Madonik, Sheila Kanodia, and Elaine Yamaguchi, supported by other members and by student volunteers, organized and set up fun and interesting hands-on activities for the public. If you are interested in helping us as a volunteer at some of these events, please let us know!

Eight years ago Lou Rigali and a web team set up a website for our ACS section (thank you, Lou!) to keep members informed about our activities and about our section in general. After all these years revisions are in order. The new web team, led by chair-elect Patrick Lee and Stephanie Malone, is beginning work to compose and set up an informative, renovated CalACS Section website. Let us know if there are specific features that you have missed on our former site and would like to find on our new CalACS website.

New plans and projects for this year are well underway:

I hope you can join us at our Jan. Section Meeting on Thurs., Jan. 25, 2018, as noted on page 2. On Sat. Feb. 3 The WCC sponsors a talk by Dr. Gina Solomon, details on page 4.

And on Saturday, February 24, 2018, we'll participate again at the Tri-Valley Expanding Your Horizons (EYH) conference, at Diablo Valley College in San Ramon. Please let us know if you like to volunteer.

I look forward to being chair of our Section this year and to work with you on our diverse section activities. If you can volunteer or have questions or suggestions, you can contact me at msequin@sfsu.edu.

California Section
American Chemical Society

Women CHEMISTS Committee

All are welcome

Saturday, February 3, 2018

USDA Laboratory
800 Buchanan Street, Albany, CA 94710

Title
New and Emerging Issues in Environmental Health

Time
10:30 a.m.-11:00 a.m.
Snacks and coffee

11:00 a.m.
Discussion and lunch

Reservation
Please register (including lunch or for talk only) by email to office@calacs.org or by phone 510.351.9922. If mailing a check in advance, please make payable to: "California Section ACS" and send to Cal Section Office, 2950 Merced Street #225, San Leandro, CA 94577, postmarked no later than January 26, 2018.

Cost
Technical discussion is free
$15 lunch ($7 for students and the unemployed)

GINA M. SOLOMON, M.D., M.P.H.

About the Speaker

Gina Solomon is a Principal Investigator at the Public Health Institute, researching how California's Green Chemistry Laws could be enhanced to better protect the public from chemicals that may cause breast cancer. Dr. Solomon is also a Clinical Professor of Medicine at the University of California San Francisco (UCSF). She served as the Deputy Secretary for Science and Health at the California Environmental Protection Agency (CalEPA) from 2012–2017, and as a senior scientist at the Natural Resources Defense Council from 1996–2012. She was also the director of the occupational and environmental medicine residency program at UCSF and the co-director of the UCSF Pediatric Environmental Health Specialty Unit. Dr. Solomon's work has spanned a wide array of areas, including children's environmental health, reproductive toxicity, cumulative impacts, and the use of novel data streams to screen chemicals for toxicity. She has also done work in exposure science for air pollutants, pesticides, mold, and metals in soil, and on the health effects of climate change. She was involved in the aftermath of Hurricane Katrina, the Gulf oil spill, and the Chevron Richmond explosion and fire, and she successfully spearheaded regulations to improve refinery safety in California. Dr. Solomon has served on multiple boards and committees of the National Academies of Science, the EPA Science Advisory Board, and the National Toxicology Program's Board of Scientific Counselors. She also served as vice-chair of the EPA Board of Scientific Counselors Chemical Safety for Sustainability subcommittee. Dr. Solomon received her bachelor's degree from Brown University, her M.D. from Yale, and did her M.P.H. and her residency and fellowship training in internal medicine and occupational and environmental medicine at Harvard.

Abstract

New potential chemical exposures are emerging in consumer products and in small workplaces. At the same time, new technologies are emerging to identify and screen chemicals for exposure or toxicity. This presentation will focus on emerging issues such as 3D printing, laser cutting, preservatives in personal care products, and chemicals that impart stain and water resistance to products. New technologies include sensor networks and crowdsourcing of environmental monitoring data, non-targeted and semi-targeted biomonitoring, high-throughput and medium-throughput toxicology, and others. The field of risk assessment is also changing to adapt to these new data streams. All these new developments offer opportunities and challenges for discussion.

Directions

From I-80 W:
Take the Albany Exit, and make a left turn onto Cleveland Avenue at the stop sign. Parallel the railroad tracks, and stay on that road until the end, when you must turn left and drive past a USDA gate (on your right). You will reach a signal stop at Pierce and Buchanan; prepare to stop. Stay in the right lane because you will make a right turn very soon into the USDA driveway, where you will be met by a USDA representative for entrance to parking.

From I-80 E:
Take the Albany Exit, and exit toward the right at the top of the off-ramp. You will now be on Buchanan Street. Drive toward the signal stop at Pierce and Buchanan; prepare to stop. Stay in the right lane because you will make a right turn very soon into the USDA driveway, where you will be met by a USDA representative for entrance to parking.

A couple of links to driving directions and public transit options can be found on: https://www.ars.usda.gov/pacific-west-area/albany-ca/wrrc/

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PRESENTS

Science café

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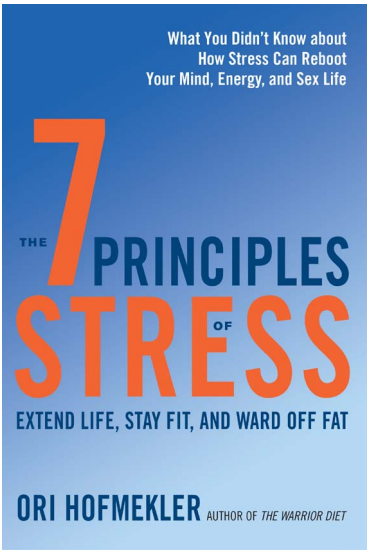
Thursday, January 25, 2018 7PM

Community Hall



Science of Stress

Guest speaker:
Ori Hofmekler

Is there such a thing as beneficial stress?

Ori Hofmekler discusses the Science of Stress and how to put hormesis into powerful practice. Hofmekler's latest book, the *7 Principles of Stress: Extend Life, Stay Fit, and Ward Off Fat* is a call to action--a manifesto of living life to its utmost evolutionary potential, under stress, as nature intended.

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Tickets: $10; Discounted ($5) tickets are available for current LLLCF donors.
Purchase tickets at www.LLLCF.org/science-cafe-tickets or call (925) 283-6513 ext. 102

Proceeds benefit the Lafayette Library and Learning Center

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Gifts & Donations

The Sections has many outreach programs to help support science and chemistry in our community. A gift of $25 to our High School Chemistry Teachers programs helps support the teacher and school with Chemistry supplies and equipment. Call or email and find out how your valued contribution can be used. Donations to the California Section are tax deductible.

Grilling Ghrelin and Loving Leptin (Part 1)

Bill Motzer

At this time of year, many of us are making (or have made) New Year's Resolutions. One of the most popular resolutions is to lose the 5 to 10 (or more) pounds we tend to gain over the year (but may be mostly gained during the December holidays). Many try losing this weight by crash and/or fad diets constantly promoted on radio, TV, and the internet. Several popular diets guarantee a 30-pound loss within a month. The problem is that crash and fad diets seldom work, because once one loses the weight and resumes a "normal" diet, within a year most gain back at least 90-95 percent or more of the lost weight. So, is weight loss more than a function of calories consumed versus calories expended? The answer is yes because weight gain and loss is governed largely by the complex biochemistry of at least three hormones secreted by various body organs. These hormones are known as ghrelin, leptin, and orexin, which when secreted, act or affect the brain's normalizing of the body's food intake and energy output. Because of a growing obesity problem, understanding how these hormones and neurotransmitters influence the body's energy balance has been the subject of intensive research for at least the past decade.

Ghrelin, derived from the term: growth hormone releasing peptide, consists of 28 amino acids. It was discovered in 1996 and identified in 1999 in glandular cells lining the stomach. Ghrelin is also produced in cells in duodenum, and in the jejunum (located in the middle portion of the small intestine) connecting the duodenum and the ileum (lower portion of the small intestines). Additionally, ghrelin production occurs in cells within the lungs, pancreatic islets, gonads, placenta, adrenal cortex and kidneys, and in the pituitary and hypothalamus glands. Recent studies indicate that it is locally produced in some brain cells.

So, what does ghrelin do? It regulates the very complex biochemical process of energy input – by adjusting hunger signals (largely to the brain where ghrelin receptors are located on neurons) – and energy output, which adjusts energy to ATP (adenosine triphosphate) production, fat storage, glycogen storage, and short-term heat loss. Both input and output may be in equilibrium or disequilibrium at any point in time (aka as energy homeostasis). Research suggests that ghrelin also stimulates release of growth hormones, causing an increase in other hormone concentrations, including cortisol, which is produced in the adrenal gland. Cortisol is important in that it is also released in response to stress and low blood-glucose concentrations, which then increases blood sugar through the process of gluconeogenesis (GNG) – the metabolic process resulting in glucose generation from non-carbohydrate carbon substrates, and protein breakdown.

Ghrelin levels tend to fluctuate before and after food intake, increasing prior to consuming food and decreasing afterwards. Therefore, it's been called the hunger hormone, because as bodily ghrelin levels increase you feel hungry. And when a meal is consumed, within about 20 to 30 minutes as ghrelin levels decline, you feel full. Ghrelin also regulates water and fluid intake and when low results in thirst. Drinking a glass of water before a meal causes a satisfaction or weakening of ghrelin levels; this is a straightforward way for controlling hunger. Drinking one eight-ounce glass of water before every meal decreases the amount you will eat by at least eight ounces while suppressing ghrelin production.

Therefore, the problem with fad and crash diets is that the more one diets (i.e. "starves"), the hungrier one gets. Semi-starvation results in large ghrelin level increases, because the body tends to protect itself against starvation. With such spikes in ghrelin, one tends to begin binge eating, which is why we regain the pounds lost plus additional weight. Another problem is that high ghrelin levels may cause increases in stomach acid secretion and how smoothly food moves through the intestines. Thus,

(continued on page 9)

Immediate Past-Chair, Jim Postma, passes the metaphorical gavel to Greti Sequin, 2018 Chair of the California Section.

Linda Wraxall presents her annual Holiday pithy poetry or prose reading.

Past ACS President Marinda Wu presents Jim Postma, Immediate past Chair, The PPP award.

(Motzer Continued from page 6)

increased ghrelin levels may be the cause of irritable bowel syndrome and acid reflux disease (ARD).

So how does one defeat the ghrelin effect? The answer is patience: when weight loss is restricted to one to two pounds per week, ghrelin base levels will adapt and slowly decrease with the weight loss, thereby causing hunger to dissipate. Therefore, in the long term, as you restrict your caloric intake, ghrelin base levels tend to drop. Additionally, most doctors and dietitians recommend decreasing consumption of simple carbohydrates including glucose (e.g., sugary drinks), and saturated fats and increasing complex carbohydrates (e.g., those found in vegetables, whole grains and legumes) and protein (e.g., lean chicken, salmon, beans, and nuts). But more about that when we discuss leptin.

Immune cells aid spread of Alzheimer's protein

Researchers have found many connections between inflammation and Alzheimer's disease. For instance, immune cells, such as microglia, accumulate in parts of the brain with a high density of Aβ plaques. Also, people who take anti-inflammatory drugs to treat rheumatoid arthritis have lower risks of developing Alzheimer's later in life.

A few years ago, Michael T. Heneka of the University of Bonn and coworkers had determined that protein complexes called inflammasomes might be involved in Alzheimer's. When immune cells bump into possible invaders, such as bacteria, the cells form the large protein complexes, which then trigger the release of inflammatory signaling molecules to defend against the possible threat.

Heneka's team removed a gene that codes for a key component of the inflammasome from mice with a propensity to form Aβ plaques. These animals had fewer cognitive deficits and Aβ plaques in their brains than mice with the gene.

The team wondered whether part of the inflammasome could be helping the spread of Aβ in the mice. In particular, they focused on a protein called ASC, which also likes to aggregate. When the inflammasome forms, ASC aggregates into fibers, recruiting the other proteins in the complex. Microglia also release clumps of ASC, called ASC specks, to help propagate inflammatory responses. So these proteins could bump into Aβ floating around outside of cells. In the new study, Heneka's group found that ASC specks accelerated the speed that Aβ aggregates in test tubes. Also the scientists showed that ASC is necessary for the spread of Aβ in mice. The researchers could trigger the formation of Aβ plaques in the brains of young mice by injecting the animals with extracts from the brains of older mice that had developed the protein clumps. But if the young mice lacked the gene for ASC, the injections didn't cause accelerated plaque deposition. Heneka's team thinks that Aβ interacts with regions of ASC that recruit other proteins to the inflammasome. The scientists demonstrated that injecting mice with antibodies that bind to this part of ASC prevents the protein from aiding the spread of Aβ. Whether the damage caused by Aβ is what triggers the inflammatory response that leads to ASC release is still an open question, Heneka says. He points out that many other conditions can trigger a response from microglia, including hyperactive neurons. But he does think targeting the interaction between ASC and Aβ could lead to possible Alzheimer's therapeutics.

The findings could have implications for other neurodegenerative diseases, which also involve inflammation, Town says. "My guess would be that this mechanism isn't limited to Aβ," he says. "You might see something similar with tau and α-synuclein—key proteins that aggregate in other neurodegenerative diseases."

Michael Torrice, Deputy Executive Editor
C&EN, Vol.96, No.1 pg. 7

Is there a way to resolve highly polarized issues?

Most decisions are either dictated by a woman or man in charge or based on majority rule. Neither system works well in a democracy. Even if the margin of vote is large in a majority, those in the minority will not feel heard and will experience conflict in supporting the result.

An alternative decision process is by variations on consensus. The objective is to give validity to everyone's view and a commitment to try and incorporate elements of all views.

A variation that I find works is one where everyone in the group agrees to a set of rules, somewhat like Roberts's rules. One rule is that all issues that come to a vote cannot pass if any one person objects. All objections are recognized as legitimate and have to be resolved if the reason for the objection meets previously defined criteria. Abstentions are not considered objections and one can abstain indicating that they do not endorse the measure but can live with it.

Maybe the process works only for small groups and not large: I only have experience with small groups. Those interested in more detailed information can google it. We all know a notable small group who grapples with important and polarized issues. What if that group agreed amongst themselves to render all decisions by consensus?

We may have to start by defanging the framing of issues that usually accompany the rhetoric of partisan supporters. You know those brief, catchy, but otherwise non informative phrases that are used as media soundbites. Examples are phrases like Pro-Life and Pro-Choice, both very charged and polarizing issues. A more descriptive phrase would be pro and anti-abortion.

"Pro-life" has a great advantage over "anti-abortion," which is that it better fits a position that includes opposition to abortion, euthanasia, and embryo-destructive research. Opposition to embryo-destructive research flows from the same premise as opposition to abortion: that the deliberate killing of peaceable human beings is unjust. and violates the principle of the sanctity of human life. Often anti-abortion positions extend to anti-contraception because the intent is to prevent life hence it is anti-life. It can get more complicated than this. We now get into the subjective area of when does life, human life, starts or how broad a definition should be applied to the "sanctity of life" The term"sanctity of life" is based on theological traditions and subject to various religious beliefs.

Pro-Choice adherents paint the opposition as anti-choice. The fact is that the vast majority of women who have abortions do not do so by choice, at least not entirely. Aborted pregnancies are traumatic events in any woman's life and in the lives of those around her. Circumstances put them in a position where abortion is perceived as the least self-destructive option available.

The Pro-Life position supports celibacy and abstinence because it can frame the argument around the word "intent" in the phrase "intent to prevent life".

Both sides have a foot in a bucket of cement and behave as awkwardly as the metaphor suggests. Both sides will see defeat only as a temporary setback and will do whatever it takes to overturn a contrary decision. What if a judgment was made by consensus engaging each party into the discussion? Would that take the emphasis away from supporting or electing an unqualified Congress Member, Judge or President?

Lou Rigali

continued from page 2)

microbiologists to understand what controls microbial VOC emission rates from different environmental bacteria and fungi.

Dr. Misztal received his BSc and MSc degrees in Chemistry and Physics from Maria Curie-Sklodowska University in Poland, and PhD in Environmental Chemistry from the University of Edinburgh in the UK.

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