THE VORTEX

AMERICAN CHEMICAL SOCIETY **CALIFORNIA SECTION**
VOLUME LXXX NUMBER 3 **MARCH 2018**

Dr. Eva Nogales, March Section Speaker

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March 2018 Section Meeting

Speaker: Dr. Eva Nogales
Date of Talk: March 29, 2018
Time: 6-7 pm social with light refreshments;
Talk: 7-8:15pm
Cost: $10 per person, $5 for Students
Place: Chevron Research auditorium, Richmond
Title of Talk: Cryo-EM to visualize the molecular machinery involved in regulation of gene expression

Abstract:

Assemblies of biological macromolecules (proteins, DNA, RNA) are the functional units of cells and ultimately the whole organism. Visualizing these macromolecules, in different functional states, provides unique information on how they work and how they fail in the diseased state, and therefore can guide us in the design and improvement of therapies. But their extremely small size makes visualization of biological molecules challenging and requires of highly specialized instruments and computational tools. Technological developments in the field of electron microscopy are now allowing the fast turn around of structural information on critical cellular components. I will talk about what we have learned through the visualization, at atomic resolution, using electron microscopy, of critical protein complexes essential for the regulation of gene expression in eukaryotic organisms.

Biography:

Eva Nogales received her bachelor's degree in physics from the Universidad Autónoma de Madrid in Spain. She did her graduate work at the Synchrotron Radiation Source and earned her doctorate in biophysics from the University of Keele in England. She came to the United States for postdoctoral work at the Lawrence Berkeley National Laboratory in 1993 and she worked with Kenneth H. Downing on the structure determination of tubulin by electron crystallography. She joined the University of California, Berkeley faculty in 1998 and is a Howard Hughes Medical Institute Investigator since 2000. Nogales is a member of the National Academy of Sciences and the American Academy of Arts & Sciences.

April Section Meeting

Speakers: Prof. Ricardo San Martin and Aaron Hall

Date: Thursday, April 26, 2018. Social with refreshments 6-7 pm; talks: 7-8:15pm

Title: (Ricardo San Martin) The quest for plant based meat alternatives/ Lessons learned at UC Berkeley

Title: (Aaron Hall): The Lack of Fat: Better Fat Incorporation through Adipose Analogs.

THE VORTEX

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Chair's Message

March is the month of the ACS National Spring Meeting 2018 which will be held in New Orleans, from March 18-22. The general theme of this meeting is: "Nexus of Food, Energy & Water". Our California Section will, as always, be represented by our section councilors.

As for more Local Section news, our series of monthly lectures continues with diverse themes. On Thursday, March 29, Prof. Eva Nogales, LBL and UC Berkeley, will talk about "Visualizing Biomolecules using cryo-electronic microscopy". The event, as part of our March Section Meeting, will take place at the Chevron Auditorium in Richmond. Please see the ad in this *Vortex*.

Our programs in public outreach events continue as well: Next is Math and Science Family Night at Thornton Junior High School, Fremont, CA 94536, on Tuesday, March 13, (6 PM to 8 PM) where ACS volunteers will do hands-on activities with the school's students. More helpers are always welcome. Please contact Alex Madonik at alexmadonik@sonic.net if you would like to be a volunteer.

The 15th anniversary of "Chemists Celebrate Earth Week (CCEW)", organized by ACS, will be celebrated this year from April 22-28. The main theme is "Dive into Marine Chemistry". Thus, CCEW activities will focus on the chemistry of seashells and seaweed, bioluminescence, ocean acidification, oil spills, and more. Our California Section participates again in their Illustrated Poem Contest. This contest is a great way to engage K-12 grade students in science in general and in chemistry in particular.

There are prizes, like admission tickets for two to a local aquarium or a science museum! Winners of the California Local Section's Illustrated Poem Contest will advance to the National Illustrated Poem Contest for a chance to be featured on the ACS website and to win cash prizes in each grade category. The Contest Deadline is April 18, 2018. Please help us spread the word about this exciting and very educational contest. The website to find details to participate is at: https://www.acs.org/content/acs/en/education/outreach/ccew/illustrated-poem-contest.html For more information contact: Sushila.kanodia@gmail.com or our Section Office at 510-351-9922.

We hope that you can join some of our Section activities!

WCC February 3 Meeting Report

As co-Chairs of the Women Chemists Committee (WCC), we welcomed Dr. Gina Solomon to speak to us about health risks from 3-D printing, laser cutting engraving, PFAS/fluorinated telomers, and topics in personal care products, as well as some of the modern tools being used in the environmental chemistry area.

Gina's background is solidly grounded in chemistry, having started with earning a bachelor's degree from Brown, followed by medical school at Yale, then further residency and fellowship training at Harvard in internal medicine and occupational and environmental medicine. She also earned her M.P.H. degree there. She served as the Deputy Secretary for Science and Health at CA EPA and has recently become Principal Investigator at the Public Health Institute. She also serves as a Clinical Professor at UC San Francisco.

Gina described the case of a 28-year-old male, who had asthma as a child, and was successfully treated; however, as an adult, he owned a business with 10 3-D printers making widgets of some sort. An asthma-type condition followed. The emission of nanoparticles from the printers resulted in deep penetration in the patient's air sacs. The culprit was the acrylonitrile-butadiene-styrene filament. By changing the filament to polylactic acid-based filament, the patient recovered. Today, 3-D printers are present in nearly every middle and high school science class and even in the library. NIOSH recommends turning off the printer if the nozzle jams and allowing ventilation to a safe place prior to removing the cover.

Laser engraving or cutting devices are now readily available at prices hobbyists can afford, and this may lead to trouble. In early 2017, there was the mysterious death of a perfectly healthy Berkeley young couple. Autopsy was inconclusive as to the cause; however, a semi-completed hobby product piece was found in the same room as the male subject, and the device was not properly vented to the outside. In this case, the chemical constitution of the object being cut is important; for example, if epoxy is the object, possible contaminants could be isocyanates or amines.

A woman with "Hill Walkers' Lung" from the U.K. was an example of a consumer product case. Patient was diagnosed with acute interstitial pneumonitis and was gravely sick for 15 weeks. Her condition was traced to the treatment (by fluorochemical-based water repellent) she gave to her boots, indoors, prior to her hike. Although extremely effective, these perfluoroalkyl substances (PFAS) have resulted in large populations of folks' blood showing the presence of PFAS. Remember 3M's old formulation of Scotchgard?

Gina described the prevalence of contact dermatitis (about 11%) resulting from preservatives methylchloroisothiazolinone and the unchlorinated analog. These two compounds are in more than 1000 products, such as cosmetics, soaps, and hair care liquids. Not much is known about what happens when they go down the drain.

Although there are about 90,000 chemicals on the TSCA registry, the number for which there is complete toxicological data is relatively small, about 10,000. It is difficult to close the gap because toxicological testing on humans is time-consuming and expensive. By running tests for specific biochemical pathways, the testing time decreases, and the number of tests increases, with significant cost reduction. However, the meaning of the data becomes an issue. And, that is not considering the various governmental agencies and the laws that need to be enacted to maintain the public's safety.

There are tools available for purchase to measure the indoor air quality. Gina told of Google's installation of these devices in all their work sites, and how a company holiday party resulted in a large uptick in the concentration of carbon dioxide. Approximately 30 folks, including students, took this fascinating tour through the field of environmental health.

E.S. Yamaguchi, T. Miao, and S.W. Yeh

P3 Awards for CALACS: a Brief History and Update

P3 (Partners for Progress and Prosperity) Salutes to Excellence Awards have been awarded each year by our local California Section (CALACS) since 2015. Local section winners are automatically considered for Regional ACS Meeting P3 Awards The regional winners receive monetary prizes funded by my Presidential budget.

Visit www.acs.org/regional awards for a description of the P3 Awards and how to submit a nomination for a P3 Salutes to Excellence. The first P3 Salutes to Excellence for CALACS was awarded to Dr. Elaine Yamaguchi for her outstanding partnerships to enable her Project SEED accomplishments over the years. Elaine has partnered with high schools, teachers and students to find her Project SEED students and then with various companies and organizations like the USDA for mentors for the SEED students.

Elaine then went on to win the P3 Award at the Fall Western Regional meeting in November 2015 in San Marcos, CA where she was awarded $1,000 plus a big silver and gold plated P3 medal.

In 2016, Dr. Alex Madonik won the P3 Salutes to Excellence for his outstanding work in public outreach for CALACS—countless National Chemistry Week events involving lots of schools, teachers, and students as well as hundreds of volunteers for Family Science Nights and other public outreach events such as the Solano Stroll.

In 2017, Dr. Eileen Nottoli was awarded the P3 Salutes to Excellence for her exemplary partnering with students, teachers, schools, and parents to run the Olympiad for CALACS so well in recent years. CALACS also wants to recognize and express deep appreciation and thanks to Dr. Al Verstuyft for all his work running the Olympiad in previous years!

This year, longtime CALACS member Dr. Oana Leonte will be honored with the P3 Salutes to Excellence at our annual Awards Luncheon on Sunday May 6, 2018 at Scotts Seafood Restaurant in Walnut Creek.

Oana deserves this recognition for her outstanding partnering between the California Section of ACS and the Romanian Chemical Society to initiate formation of the ACS International Chemical Sciences Chapter in Romania, as well as for setting up many joint programs with the Electrochemical Society (ECS) over the years.

When I was first elected ACS President-Elect in November of 2011, Oana immediately wrote to me asking if it were possible to establish a new chapter in her homeland Romania which has many wonderful chemists. At that time, one of my presidential initiatives was to help the ACS to become more global. My presidential theme was "Partners for Progress and Prosperity" as described in some of my ACS Comments (C&EN, March 11, 2013 and Dec. 8, 2014).

The ACS International Chemical Sciences chapter was established in Romania by Dr. Raluca van Staden (a friend and electrochemist colleague of Oana Leonte) who came to give a couple of talks here for CALACS. Raluca is also an excellent pianist. You may recall that CALACS asked her not only to present on her research in electrochemistry for our local ACS program, but to give a piano recital as well at Grace Lutheran Church in El Cerrito. Electrochemical Society (ECS) organized two very well attended Short Courses on Sensors presented by Dr. Van Staden, which were hosted by USDA with the kind support of Dr. Wally Yokohama, the Chair of ACS California Section at that time.

Oana played a critical role in linking CALACS and ACS with the Romanian Chemical Society. Its President, Professor Sorin Rosca (Oana's former organic chemistry professor), was also invited to present his research at Lawrence Berkeley Laboratory, including some of his more recent work on the chemistry of wines, in a joint meeting of the ACS-ECS California Local Sections.

I invited Professor Sorin Rosca, along with ten other Presidents of Chemical Societies from around the world, to present a talk at the 2013 National ACS Spring Meeting in New Orleans. Professor Rosca's talk on

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Grilling Ghrelin and Loving Leptin (Part 3)

Bill Motzer

In Part 2 (February 2018 Vortex) I discussed the problem of leptin resistance (aka leptin-insensitivity), which can occur in overweight/obese people because their high leptin level fails in stopping their food consumption (i.e., when full, they don't stop eating). Further complications are from parallel increases in ghrelin levels (see Part 1, January 2018 Vortex), an opposing hormone, which increases appetite resulting in the consumption of even more food. Leptin blood levels vary depending on numerous other complex hormonal factors and interactions, including when you ate last and your sleep patterns (e.g., less sleeps increases leptin levels).

Leptin and insulin resistance both seem to have common hormone signaling pathways. One theory is that leptin resistance occurs because it can't get to the hypothalamus via proteins transporting it across the blood-brain barrier. Such proteins may either not be working or are absent because of leptin buildup in the cerebral spinal fluid bathing the brain. Insulin resistance occurs when there's an abundance of produced insulin resulting from diets high in sucrose and other simple carbohydrates. In such cases, the body and brain stop reacting to insulin's effects. Both resistance types occur together in obese people; however, obese men, with more internal belly (visceral) fat, have higher insulin levels, and obese women, with more fat under their skin, have higher leptin levels. High fructose consumption also seems to induce leptin resistance.

Leptin is produced by a specific gene found in adipose (fat) cells known as the obese (ob) gene. Leptin levels increase as body fat increases. There's also a higher concentration of messenger RNA (mRNA) in fat from obese compared to thin subjects.

Research shows that leptin works on the body by:

- Suppressing a liver enzyme that converts unsaturated fats into monounsaturated fats, which burns fat as energy. It also directly acts on liver cells and skeletal muscles, stimulating fatty acid oxidation in mitochondria resulting in food intake inhibition, thereby reducing storage of fat in those tissues (but not in adipose tissue).
- Counteracting neuropeptide Y (NPY) effects, a 36 amino-acid neuropeptide and neurotransmitter, considered to be a feeding stimulant secreted by intestinal wall cells and in the hypothalamus. Research with mice and monkeys indicates that repeated stress and diets high in fat and sugar stimulate NPY release, causing abdominal fat accumulation.
- Counteracting effects of anandamide (aka: N-arachidonoylethanolamine or AEA) another fatty acid neurotransmitter and feeding stimulant. Recent research suggests anandamide influences human behavior, such as eating and sleep patterns, and pain relief.
- Promoting effects of alpha-MSH (α-Melanocyte-stimulating hormone or α-MSH) an endogenous peptide hormone and neuropeptide of the melanocortin family an appetite suppressant. Some synthetic melanocortin compounds have been investigated as potential anti-obesity drugs.
- Stimulating secretion of reproductive hormones such as gonadotrophin-releasing hormone and thus leutenizing (LH) and follicle stimulating hormone (FSH) from the anterior pituitary gland.
- Raising a person's temperature to increase energy expenditure.
- Directly acting on liver cells and skeletal muscles, stimulating fatty acid oxidation in mitochondria resulting in food intake inhibition, thereby reducing fat storage in those tissues, but not in adipose tissue.

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" Chemical Education – A Key Factor in Facing the Challenges of the Future" was later converted to a book chapter in my ACS Symposium Series 1157 book entitled "Vision 2025: How to Succeed in the Global Chemistry Enterprise"—the first of three ACS Symposium Books resulting from my presidential initiatives.

Thanks are also due to another local CALACS Romanian chemist who played a big part in all of this partnering with the Romanian Chemical Society—Dr. Mircea Gheorghiu (a good friend of Sorin Rosca from Romania) as well as to Dr. Brad Miller (Director of International Activities, External Affairs & Communications at ACS) and to Dr. H.N. Cheng (Chair of the International Activities Committee) when I was ACS President. Oana is also sponsoring two awards in Romania: one for the ACS Romanian Chapter in honor of Professor Constantin Luca, A Professor of Analytical Chemistry at the Univ. of Bucharest and the Polytechnic Univ. of Bucharest and the Director of the Center, today the Institute of Physical Chemistry of Romanian Academy; another one for the Romanian Chemical Society honoring Professor Constatin Nenitescu, the famous Romanian organic chemistry savant.

Oana's work fully embraces and represents the spirit of the Partners for Progress and Prosperity program. Her partnering efforts have truly helped build friendship and peace across the globe through science! In 2013, Romania became the 8th ACS international chapter. I am thrilled that ACS now has 19 international chapters.

Marinda Li Wu, 2013 ACS President

CalACS Upcoming Outreach events need Volunteers

March 13, Math and Science Family Night (6 PM to 8 PM) Thornton Junior High School, Please contact Alex Madonik alexmadonik@sonic.net or 510-872-0528.

March 21, (Wednesday) Glorietta Elementary School Science Faire- – (5 PM – 7 PM) 15 Martha Rd, Orinda, CA 94563. ACS volunteers will present hands-on activities.

April 18, Earth Week at Chabot College will feature hands-on activities presented by ACS volunteers in the Event Center (Building 700) from 11:30 AM to 1:30 PM.

April 19, Laney College EcoFest (10 AM – 2 PM) 900 Fallon Street; Oakland, CA 94607. Cal ACS volunteers will present hands-on activities at our booth. Please contact Alex Madonik alexmadonik@sonic.net or 510-872-0528 on these three events .

April 21, John Muir House, Martinez, CA, 10 AM – 4 PM. Volunteers needed, starting with set up at 8:30 AM until 4:30 PM to pack up. Contact: Sushila.kanodia@cbp.dhs.gov

2018 CCEW Illustrated Poem Contest
Dive into Marine Chemistry

The **California Local Section** of the American Chemical Society (ACS) is sponsoring an illustrated poem contest for students in Kindergarten through 12th grade.

Contest Deadline: 18th April, 2018

Prizes: Admission tickets for two to a local aquarium or a science museum

Contact: Sushila.kanodia@gmail.com/510-351-9922 (section office)
2950 Merced St #225, San Leandro, CA 94577

Winners of the California Local Section's Illustrated Poem Contest will advance to the National Illustrated Poem Contest for a chance to be featured on the ACS website and to win prizes!

Write and illustrate a poem using the CCEW theme, "Dive into Marine Chemistry." Your poem must be **no more** than 40 words and in the following styles to be considered:

HAIKU - LIMERICK - ODE - ABC POEM - FREE VERSE - END RHYME - BLANK VERSE

Possible topics related to marine chemistry include:

Alginate	Coral	Bioluminescence	Brine
Salinity	Seaweed	Thermal Vents	Oil Spill

Entries will be judged based upon:

Artistic Merit - use of color, quality of drawing, design & layout
Poem Message - fun, motivational, inspiring about yearly theme
Originality Creativity - unique, clever and/or creative design
Neatness - free of spelling and grammatical errors

Contest rules:

- Poems must conform to a particular style. No poem may be longer than 40 words.
- The topic of the poem and the illustration must be related to the yearly CCEW theme.
- All entries must be original works without aid from others.
- Each poem must be submitted and illustrated on an unlined sheet of paper (of any type) not larger than 11" x 14". The illustration must be created by hand using crayons, watercolors, other types of paint, colored pencils, or markers. The text of the poem added, or the poem may be written on lined paper which is cut out and pasted onto the unlined paper with the illustration.
- Only one enter per student will be accepted.
- All entries must include an entry form.
- All illustrated poems and/or digital representations of the poems become the property of the American Chemical Society.
- Acceptance of prizes constitutes consent to use winners' names, likenesses, and entries for editorial, advertising, and publicity purposes.

Entry forms and complete rules will be on the Section website: www.calacs.org

Court rejects Trump administration secrecy in GM salmon case

Federal Appeals Court orders government to produce documents on approval of first GM fish.

The Ninth Circuit Court of Appeals has denied the FDA attempt to hide thousands of pages of key government documents revealing how the agency arrived at its controversial approval of the first-ever genetically modified (GM) animal for human consumption, a GM salmon. The court order rejected the Trump Administration's position that it can unilaterally decide which documents to provide and which to withhold from public and court review.

"Dictatorial secrecy is antithetical to democracy. This is a safeguarding win for government transparency, accountability, and meaningful judicial review of government decisions," said George Kimbrell, of Center for Food Safety and counsel in the case. "We look forward to the next stages of this case."

A broad coalition of commercial and recreational fisheries interests, environmentalists, and tribes challenged the GM salmon approval in 2016. Although FDA considered the application for the GM salmon for nearly two decades, the agency's record for court review was paltry, including mostly documents already publicly available on their website and only four agency emails. FDA refused to provide thousands of critical documents about how and why it approved the GM salmon.

The plaintiffs demanded that FDA provide all of the documents the agency considered in its decision and last January, the lower court agreed. Several months later, FDA sought to overturn that decision by seeking a writ of mandamus from the appeals court, an extraordinary mechanism that is hardly ever used for routine document disputes. In its mandamus petition, the Trump Administration raised a dangerous argument, with severe ramifications for effective court review of government actions — that defendant agencies can determine unilaterally what information to give to courts reviewing their decisions, and do not have to disclose any internal materials, even if the agency considered those materials in its decision. If adopted, this view would have far-reaching consequences for public review of agency decisions that have major impacts on everyday life.

"Our courts provide a level playing field where not even the federal government is above the law," said Steve Mashuda, managing attorney for Oceans at Earthjustice and counsel in the case. "Federal agencies cannot avoid accountability by omitting inconvenient facts and presenting a fictional account of their decisions."

Last summer, the plaintiffs opposed FDA's appeal, as did two dozen law professors who are experts on administrative and environmental law. In the new ruling, the Ninth Circuit agreed, issuing a short order denying the appeal. FDA will now have to produce the rest of the GM salmon documents.

The case is Institute for Fisheries Resources v. Burwell, Case No. 3:16-cv-01574-VC. CFS and Earthjustice are co-counselling the case on behalf of the following organizations: Institute for Fisheries Resources, Pacific Coast Federation of Fishermen's Associations, Golden Gate Salmon Association, Kennebec Reborn, Friends of Merrymeeting Bay, Cascadia Wildlands, Ecology Action Center, Friends of the Earth, Center for Biological Diversity, Food and Water Watch, the Quinault Indian Nation, and the Center for Food Safety.

Source: Center for Food Safety
https://www.centerforfoodsafety.org/press-releases/5222/court-rejects-trump-administration-secrecy-in-genetically-engineered-salmon-case

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- Based on such research, leptin is now known as an important and useful hormone in regulating body fat. If so, wouldn't leptin inoculations be useful for controlling weight? A study on leptin injected into rats showed that they ate less, but this effect lasted only two weeks because the rats soon developed resistance to leptin's appetite-depressing effects. However, in mice lacking fat tissue (a condition called lipodystrophy), leptin seems to correct insulin resistance or diabetes and leptin replacement therapy also seems to work in lipodystrophic humans.

So how can one overcome leptin resistance? Most research points toward decreasing saccharide (i.e., sucrose or table sugar) consumption and products containing high fructose corn syrup (HFCS). Current evidence is that overconsumption of added sugar in any form, including HFCS, is a major health problem, especially for onset obesity. Consuming added sugars in many processed foods (i.e., sweetened soft drinks) has been strongly linked to weight gain. The World Health Organization has recommended that people limit their consumption of added sugars to 10% of daily calories, but experts report that typical empty calorie consumption in the United States is nearly twice that level.

Note: In the February 5, 2018 C&EN, a report of "Food as Medicine" indicates that certain foods high in saccharides known by the acronym FODMAP (for Fermentable Oligosaccharides, Disaccharides, Monosaccharides and Polyols) are responsible for irritable bowel syndrome (IBS). In Part 1 (January 2018 Vortex), I suggested that increased ghrelin levels could also cause IBS. The connection between FODMAPS and ghrelin is intriguing warranting further investigation.

January Section Meeting Report Jan. 25, 2018.

Dr. Pawel Misztal, an associate specialist at the Department of Environmental Science, Policy, and Management, at UC Berkeley, presented a captivating talk on the topic of "Emission of microbial volatile organic compounds by bacteria and fungi" and on detection methods of the respective microbial volatiles (mVOC's). Microorganisms emit a great diversity of volatile metabolites to their surrounding environments. Many different volatiles are emitted by common bacteria and fungi that grow on indoor surfaces. Examples are molds producing musty smells. These volatiles are of special interest as they can affect human health.

To learn more about the microbes' emissions, "environment chambers" were incubated, in which test materials were inoculated with various microbes. Real-time high resolution mass spectral data of the emitted compounds were gathered via proton attachment ionization under ambient conditions. From the mass of the ions, empirical formulas and structural assignments were obtained.

The experimental results show that the emissions of microbial volatiles exhibit great dynamic changes across the growth phases of the microorganisms. The compositions and quantities of volatiles vary in different environments. In addition, microorganisms that are co-cultured with other species can produce compositions of mVOC's that are different from their single species volatiles.

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- Companies for laboratory and management positions
- Universities & Colleges for teaching positions and laboratory personnel
- Hospitals for technical and research personnel

There are several web sites that may help you search for these open positions.

- www.mboservices.net
- http://www.calacs.org/page.asp?id=22

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.

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