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Happy Valentine's day

Table of Contents

CHAIR'S MESSAGE	PAGE 3
IUPAC SAN FRANCISCO MEETING	PAGE 4
SCIENCE CAFE, FEBRUARY MEETING	PAGE 5
METHYLATING MERCURY PART I (W. MOTZER)	PAGE 6
NATIONAL ACS MEETING SAN FRANCISCO	PAGE 8
WCC MEETING REPORT (IYUN LAZIK)	PAGE 9
EDUCATION GRANTS	PAGE 9
LLOYD RYLAND TEACHER AWARD	PAGE 10
US CHEMISTRY OLYMPIAD	PAGE 10
BUSINESS DIRECTORY	PAGE 11
INDEX OF ADVERTISERS	PAGE 11

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EDITOR:

Louis A. Rigali
255 4th St. Ste #101 Oakland 94607

510-268-9933

ADVERTISING MANAGER:

Vince Gale, MBO Services
Box 1150 Marshfield MA 02050-1150

781-837-0424

OFFICE ADMINISTRATIVE MANAGER

Julie Mason
2950 Merced St. # 225 San Leandro CA 94577

510-351-9922

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CONTRIBUTING EDITORS:

Evaldo Kothny
William Motzer

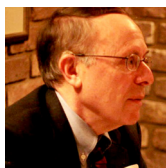
EDITORIAL STAFF:

Evaldo Kothny
Alex Madonik
Mark Frishberg
Margareta Sequin
Linda Wraxall

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Chair's Message

Mark Frishberg

Out of our approximately 3400 members, CAL-ACS has a core of 30-40 highly committed

members that take the responsibility for making things happen at the local and national levels to serve our members and our community. Please consider this to be an invitation to help us grow that number and become a local section volunteer.

Something that I have had a hard time understanding recently is that ACS Local Sections are not being inundated with young and mid-career members looking to volunteer – especially those members in the midst of seeking employment or considering a career transition. With the fall-off of employment stability across most sectors of the economy, and ever tightening budgets limiting employer supported professional development training courses, participation in ACS activities presents a great avenue for a member to take responsibility for their own professional development. ACS also presents the opportunity to develop a global network, so important in keeping tabs on what is happening in our field, as well as acting as an insurance policy of ready contacts should a future job disruption occur – something that is happening with much too much regularity.

From my own experience, even though I spent the majority of my career at a company

that was at the forefront of offering in-house training courses, my participation in all positions in ACS local section governance and as a member and then Chair of the ACS Younger Chemists Committee at the National level afforded me many professional growth experiences before I encountered them at work. Making presentations to the ACS Council and Board of Directors, being responsible for budgets and selecting committee members, presenting chemical demonstration shows at schools and for the general public, and organizing career counseling conferences on college campuses around the country, all made me better prepared when I encountered similar situations at work. I was also introduced to a wide range of people, from students to Nobel Prize winners, and had the chance to observe a variety of management styles from which I could draw on to develop my own.

The California Local Section presents many professional development opportunities from which our volunteers can take advantage and contribute. Depending on your personal situation and interests, I invite you to get involved in our many public outreach programs, give a presentation or identify speakers for our section meetings, help us publicize our events, help us identify and carry out new fund raising ideas, help proofread our publications, help find meeting venues with reasonable prices, set up a symposium, help

(continued on page 9)



13th IUPAC INTERNATIONAL CONGRESS OF PESTICIDE CHEMISTRY

Crop, Environment, and Public Health Protection: Technologies for a Changing World

August 10-14, 2014 San Francisco, California
Call for Papers and Educational Award Applicants!

The international scientific and regulatory community gathers every four years to share latest research findings and discuss emerging issues of global significance in agriculture. The 13th IUPAC International Congress of Pesticide Chemistry will be held in San Francisco, CA, during August 10-14, 2014, and submitted abstracts are due by 10 March.

For the first time, an IUPAC Congress will be held in conjunction with an American Chemical Society (ACS) National meeting. Between 1000 and 1500 delegates are expected to attend the Pesticide Congress in addition to 12-13,000 chemists who will be involved in technical programming organized by other ACS divisions. In addition to Congress sessions, registrants will enjoy full access to sessions organized by all ACS divisions as well as the ACS exhibition.

The AGRO division of ACS, in collaboration with many national and international partner organizations, is developing an outstanding scientific program for the Pesticide Congress that will attract top scientists, regulators, academicians, and industry leaders from around the world. The technical program is being organized around nine main scientific topics and more than 40 scientific symposia, each of which will include lectures, panel discussions, and posters. Examples of some of the symposia topics include:

- Agriculture's Response to Climate Change and Population Growth
- Pollinator Health: Safety Assessment and Sustainable Management
- New Approaches to the Discovery of Crop Protection Products
- Agroecosystems: Sustaining Biodiversity and Key Ecosystem Services
- Fate, Effects, and Risks of Nano-Pesticides
- Global Approaches to Assessment of Bystander and Worker Exposure and Risk
- Improved and Novel Methods to Estimate Pesticide Degradation Patterns
- Formulation and Application Technologies for Sustainable Crop Protection
- Progress in global Harmonization of MRLs
- Common Global Goals in Pesticide Stewardship

Abstract Submission and Student Travel Award Applications" has gone out and abstracts for presented papers are due by March 10. Congress registration will open during early May. To encourage student participation, a special travel grant program has been organized, and Student Travel Award Applications are due March 1. Early career scientists are also encouraged to apply for the New Investigator Award by March 10. Details regarding the Congress, including scientific program topics, abstract submission instructions, student travel award applications, and sponsorship opportunities are available at the Congress website.

www.IUPAC2014.org



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SCIENCE CAFE:
The Art & Science of 3D Printing
Tuesday, February 25, 2014



3D Printing, also known as additive manufacturing, is an emerging technology that creates a three-dimensional solid object, of virtually any shape, from a digital model. Brian Palacios, co-founder of Fabricastl, Inc. will present an overview of the technology and how it is becoming a mainstream movement with widespread commercial applications. Attendees will walk away with a broad-spectrum understanding of this science-fiction-like technology and a greater sense of the positive impacts this new era of printing will bring.

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Methylating Mercury (Revisited) (Part I)

Bill Motzer

Two papers published in 2013 prompted me to search back to the article that I wrote in the December 2006 issue of the *Vortex*, about how mercury (Hg) in the environment is converted to methylmercury (MeHg⁺), one of the most toxic Hg compounds. Since that article was written, additional research has occurred on the generation and sources of MeHg⁺.

Hg was once mined from numerous Hg deposits occurring throughout California's Coast Ranges: e.g., New Idria (the largest producer), New Almaden (west of San Jose), and Clear Lake in the Mayacamas Mining District (the second largest). The major Hg ore from these deposits was red cinnabar (mercury sulfide or Hg(II)S) although a black variety, metacinnabar, also occurred. Ores were typically deposited from hydrothermal "hot spring" activity, generally occurring along active faults and associated extension fractures in rocks ranging in age from Jurassic to Cretaceous [~100-200 million year old (Ma)]. These host rocks were altered by the circulating hot waters producing a silica carbonate rock. This hydrothermal activity was younger than the host rocks, ranging from Miocene (~23 Ma) to Pleistocene (~2.6 Ma). Ore deposits typically occurred as masses, veins, and disseminations ranging from ≤1,300 to ≥600,000 tonnes, grading from ≤0.23 to ≥0.65% Hg.

Except for the Almaden Quicksilver Historic County Park and its historic trail, few old Coast Range Hg mines are readily accessible or open to the public. Prior to European discovery and mining, the New Almaden Hg deposits were used by the Ohlone Indians as a source of the deep red cinnabar for pigment and paint. It subsequently became a busy mining center for more than 125 years, from 1845 until 1976, with seven mines producing nearly 38.1 million kg of valuable liquid Hg used for amalgamating fine placer and lode gold, Civil War explosives, Victorian glass, and 20th century battery cells and thermometers. Amalgamation (see September 2007

Vortex) is one of the one of oldest methods for recovering fine Au particles (i.e., placer gold); it was used by the Romans. Hg amalgamation occurs when Hg combines with fine metallic particles such as Au and Ag, a process that works because Hg is liquid at room temperature allowing it to readily combine with these metals as a stable form. Amalgams are relatively nontoxic unless heated, but they do slowly degrade in the environment forming ionic Hg(II), which is then converted to MeHg⁺. Hg-Au amalgam residuals mostly occur in the Mother Lode gold belt in the Sierra Nevada and its western foothills, resulting in stream pollution from amalgam sources.

However, a somewhat different source of methylation occurs in the old Hg mines of the Coast Ranges. Cinnabar and metacinnabar are essentially insoluble in water (1.04 x 10⁻²³ mg/L). Therefore, the problem is not with the ores, but with the processed or roasted ores that produced both elemental mercury and calcine mine wastes. In the New Almaden mining district, these wastes were commonly discarded in dumps with mine wastes impacting local drainages. Mine wastes subsequently contaminated the Guadalupe River and San Francisco Bay with elemental mercury that over time has been biologically converted to toxic monomethylmercury(II) cation where a methyl group (CH₃ is bonded to Hg(II) ion forming a cation. The MeHg⁺ will combine with other anions forming complex compounds. The general formula for this is written as:

H₃C-Hg⁺X⁻ where: X⁻ = Cl⁻, OH⁻, NO₃⁻ and/or sulfur-containing anions, e.g., thiol (-SH) groups.

Methylation may be abiotic; however under reducing conditions it is largely biotic. Most recently the bacterium *Desulfovibrio desulfuricans*, strain ND132 has been identified as one form that can convert Hg(II) to MeHg⁺ (see April 2011 *Journal of Bacteriology*; 2013 ES&T, v. 47, pp. 11810-11820).

In the Guadalupe River basin, streams draining from the New Almaden mine areas had surface water total Hg ranging to 6,667 ng/L. Four reservoir outlets had total Hg ranging to 49.2 ng/L. Total Hg subsequently converted to MeHg⁺ in the

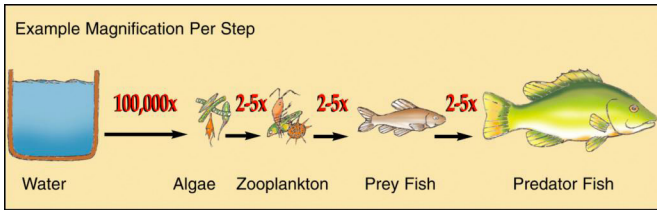
(Continued on page 7)

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reservoirs hypolimnion, largely by reducing bacteria: For example, MeHg⁺ has been measured in Almaden Reservoir at 7.2 ng/L and in Guadalupe Reservoir at 12.8 ng/L. Although these concentrations appear low, biomagnification of MeHg⁺ results in high

concentrations in fish tissues, often into mg/L ranges. This occurs through the process of MeHg⁺ biomagnification upward from the food chain:

In a subsequent article, I will discuss additional Hg sources and how these can be determined or fingerprinted.



Ruins of the rotary furnace and condensing system (retorts) in the New Almaden Quicksilver Park. A 100 ton furnace was originally installed 1940; however, it was too large and subsequently replaced by 50 ton furnace that was used until 1976. Photo by W.E. Motzer (April 2012).



Meet with more than 15,000 chemists, academics, students, and other professionals in San Francisco as we explore the Fall 2014 ACS National Meeting theme: “Chemistry & Global Stewardship”, August 10-14, 2014

This theme is focused on global aspects of the chemical enterprise related to sustainability of world resources, including green chemistry, the globalization of chemistry, and the responsibilities and opportunities chemists have to serve the broader public. In particular, divisional programming and special themed symposia will cover and discuss the role and interplay of science, technology, innovation, and economic development in world stewardship of precious, limited resources while providing physical and economic security for all world citizens. Special attention will be given to providing international perspectives related to both areas of critical need, such as the supply of clean water and energy to all citizens of the world, and to overcoming the limitations or restrictions of raw materials for products which lead to improved quality of life.

Theme-related symposia and workshops:

Alternatives to Chemicals Facing Critical Sustainability Constraints, organized by avid Constable, ACS Green Chemistry Institute

Communicating to the Public and the Role of Social Media, organized Maureen Rouhi, Editor-in-Chief Chemical & Engineering News

Global Stewardship by Increasing Climate Science Literacy, organized Keith Peterman and Gregory Foy, York College of Pennsylvania

Global Stewardship of Critical Materials, organized by Bruce Moyer and Sheng Dai, Oak Ridge National Laboratories

Graduate Student Symposium: International Collaborations with International Impact: Chemistry for Global Change, organized by the Women in Chemical Sciences at the University of Washington

100th Anniversary of the ENVR Division, organized by Tracy Williamson, Environmental Protection Agency

The Role of Entrepreneurship, Innovation, and Economic Development in Sustainability, organized Dan Daly, The University of Alabama

13th IUPAC International Congress of Pesticide Chemistry, organized by Cathleen Hapeman, USDA-Agricultural Research Service; Laura McConnell, USDA-Agricultural Research Service; Ken Racke, Dow AgroSciences

International Undergraduate Summit on Global Climate Change, Keith Peterman and Gregory Foy, York College of Pennsylvania

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WCC Meeting Report: Walking Among Monarch Butterflies

Iyun Lazik

On January 25, 2014 the California Section of Women Chemist Committee held a meeting at the Ardenwood Historic Farm in Fremont. This meeting was led by one of the Ardenwood Historic Farm docents, who guided our group through a tour of the life cycle and habitat of the monarch butterfly. After the guided tour, we had a picnic lunch and free time to explore the historic farm.

A colony of monarch butterflies has wintered at Ardenwood for about thirty years. They arrive in early November and usually stay for three months before migrating to the Rockies for the summer. More than one thousand monarch butterflies arrived last November but the early cold winter spell of December drove many butterflies away so that only one hundred of them are still at Ardenwood Historic Farm. It takes several generations of butterflies to complete one cycle of migration, yet, for some unknown reason, the monarchs know to return to Ardenwood Historic Farm during winter. The butterflies are attracted by the mild Californian winter and the large grove of

Eucalyptus trees of the farm.

There are four life cycles for the butterfly: egg, larvae (caterpillar), pupa (chrysalis) and butterfly. Eggs of the first generation of butterflies are usually laid around March – April on milkweed plants. Most butterflies live for two to four weeks. The mild winter of California and the availability of several species of milkweed plants around Ardenwood can induce some butterflies to lay their eggs too early during the winter months. This is undesirable as it could affect the overall number of the population in the colony. Fortunately this has not been a problem at Ardenwood.

The monarch larvae feed exclusively off milkweed plants while the butterflies feed on various flowers. The bright colors of both caterpillar and butterfly warn off potential predators advertising the poisonous danger of eating them. Our docent mentioned that birds have been observed to eat a butterfly and it appears that a casual ingestion of one butterfly does not seem dangerous to the bird. If you are interested in seeing the monarch butterflies, visit Ardenwood Historic Farm; they winter there from November to February. We did not see them cascade (cluster of butterflies taking flight



EDUCATIONAL GRANT APPLICATIONS FOR 2014-2015 ACADEMIC YEAR

The California Section of the American Chemical Society is continuing its funding of educational grants for the 2014 to 2015 school year. Last year the Educational Grants Committee selected seven applicants to receive a total of \$3,000. The grants are offered to high school, college and university chemistry programs within the geographical boundaries of the California Section (check website www.calacs.org) for list of counties) In addition, these grants are now offered to middle schools as well. The purpose of these grants is to supplement current chemistry programs and increase educational facilities within this field; they are not meant to provide salary or stipend income for either teachers or students. The intention of this program is to provide funding for school programs that have limited sources of traditional funding within the chemistry field. For more information on the scope and restrictions of the educational grants, please refer to the “Selection Rules for Grant Applicants” on the website or call the Section office (510-351-9922)

The deadline for applications for the upcoming academic year is July 1, 2014. The Educational Grants Committee (appointed by the Executive Committee of the California Section) will review the grant applications over the course of the summer, with final decisions for funding to be announced around September 1st.

Bryan Balazs, Chair
Educational Grants Committee

Chair from page 3

renew our contacts at our local high schools, colleges, and universities, or suggest a new activity and use our resources to support it.

With the ACS National meeting coming to San Francisco August 10-14, 2014 there will be many volunteer opportunities. If you can devote only a few hours, please help us interact with visitors at our Hospitality Booth in the Convention Center. If you have more time please get involved with the more intensive preparation needed for the major projects we are developing for this meeting. Whether behind the scenes or interacting with the public, any participation will be appreciated, and rewarding.

I invite you to check our local section website (www.calacs.org) for our activities, look over our list of committees and contact me, our local section office (www.office@calacs.org), or a committee chair to express your interest. Give yourself a chance to gain by giving, as our core group of members continue to do.



US National Chemistry Olympiad

As California Section local coordinator for the US National Chemistry Olympiad (USNCO) for the American Chemical Society, I am pleased to announce that we will be participating in this year's Chemistry Olympiad competition, to be held on Saturday, April 26, 2014 at Las Positas College in Livermore, CA. The main goals of this program are to stimulate interest and achievement in high school chemistry students throughout the United States and to provide recognition of outstanding young chemistry students, teachers, and schools.

Students competing in the USNCO are eligible to be selected as members of the United States team for the International Chemistry Olympiad (IChO). For the past twenty two years, the United States has sent a team of 4 students to compete with nations around the world at the IChO. The students participate in both theoretical and laboratory examinations over several days. Gold, silver, and bronze medals are awarded to the best performers and the students are able to interact with their peers from other countries. The 2014 international event will be held in Hanoi, Vietnam on July 20-29, 2014.

Please publicize this event and encourage your able and interested students to register for participation. It is a wonderful opportunity for them. Please send the forms by March 15, 2014. Criteria for selection of students will be left to your discretion. A two registrant maximum is allowed per school. If we exceed our ACS section limit of 18 students, one from each school will be allowed. If desired, we have a local section exam (developed by USNCO) which may be used as a selection criterion for participants. The local exam would be administered by you. If we have more students than can be accommodated electing to take the National Exam, we may use the local exam results for selection.

Forms and additional details can be downloaded from the website (www.calacs.org) listed under the "For Students" tab or call the office at 510-351-9922

Donald MacLean Section Coordinator (510) 705-6761 Donald.maclean@bayer.com

Lloyd Ryland Outstanding High School Chemistry Teacher Award

The California Section of the American Chemical Society is soliciting nominations for the Lloyd Ryland Outstanding High School Chemistry Teacher for teachers within the California Section. The winner will receive a certificate and a check for \$500 and winner's chemistry department will receive a check for \$500 for supplies. More information is found on our website at www.calacs.org under the "Grants & Awards" tab or call the office at 510-351-9922

Nominations must be received by March 31, 2014.

Eileen Nottoli
Chair, High School Chemistry Committee,



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