

Silicon Valley Chemist

Santa Clara Valley Section

American Chemical Society

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FEBRUARY 2012 NEWSLETTER TOPICS

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Reminder

Februray Dinner Meeting A Cubic Mile of Oil

Reminder

Realities and Options for Averting the Looming Global Energy Crisis

Abstract

A Cubic Mile of Oil is a call for an informed public debate on energy, arguably the biggest challenge we face. The talk will be for an interested layperson and makes all the technical discussion accessible and relatable by dispensing with mind numbing multipliers like billions, and trillions or unfamiliar units, like Watts, barrels and Btu. The book describes how much energy we use and from what sources, where we are headed, and what it would take to

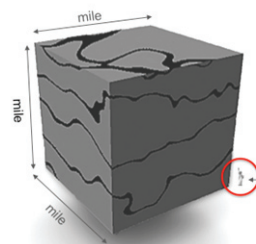


utilize alternate sources. It uses a cubic mile of oil (CMO) as the metric for comparing global energy flows from all sources.

The current global consumption of oil (ca. 80 million barrels a day) amounts to 1 cubic mile over one year. Additionally, each year the world uses 0.8

CMO of energy from coal, 0.6 from natural gas, roughly 0.2 from each of hydro, nuclear,

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February Dinner Meeting

Date: Thursday, February 16, 2012

Time: 6:00 Social Hour

7:00 Dinner

8:00 Presentation

Speaker: Dr. Ripudaman Malhotra
"A Cubic Mile of Oil"
Associate Director of the
Chemical Science and
Technology Laboratory
SRI International

Location: Biltmore Hotel & Suites
2151 Laurelwood Boulevard
Santa Clara, CA

Cost: \$26.00, Tereyaki Steak
or Pasta Primavera

Reservations: www.scvacs.org
Sally Peters 650-812-4994

Reservations should be made by February 13th stating your name, address, company/school affiliation, number of people in party. Watch the web site for more information. If you are unable to honor your reservation and do not cancel by Wednesday, February 15th, you will be invoiced following the dinner meeting.

Chair's Message

For this month's meeting, we will discuss the looming energy crisis. Dr. Ripudaman Malhotra, Associate Director of Chemical Science and Technology Laboratory in SRI's Physical Sciences Division, and his colleagues have defined a new unit of energy, the cubic mile of oil, to help frame the magnitude of the issue. A cubic mile of oil represents about the current global annual amount of oil used today. It provides an understandable representation of the magnitude of the challenge for alternate energy sources. In order to make a significant contribution to the energy needs, any alternative source will have to approach the energy contained within one cubic mile of oil.

On a lighter note, February is also the



month for Valentine's celebrations. Many people celebrate with one of Western civilization's favorite aphrodisiacs: chocolate. Chocolate contains caffeine, theobromine and tryptophan, all neuroactive chemicals. Theobromine – a weak stimulant found in chocolate – in concert with other chemicals such as caffeine, may be responsible for the characteristic 'buzz' experienced when eating chocolate. Scientists at the Neurosciences Institute in San Diego suggest that chocolate contains pharmacologically active substances that produce a cannabis-like effect on the brain, such as anandamide, a cannabinoid neurotransmitter (Di Tomaso E, Beltramo M, Piomelli D (1996) Brain cannabinoids

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Dinner Meeting, continued from front page

and wood for a grand total of 3 CMO. By the middle of this century, the global energy demand is expected to rise to somewhere between 6 and 9 CMO. Where are we going to get the energy from? The talk will go on to describe the different energy sources, their potential, and the requirements for developing any of them to a level approaching 1 CMO/yr. Unless our solutions scale to the level of a CMO/yr, we would be just nibbling at the edges.

The talk will attempt to reframe the debate about energy supply, which has often been portrayed as a tension between the moral imperative of protecting the environment on the one hand and preserving the economic interests of the energy industry. This simplistic view misses the more difficult challenge that we face: namely, balancing the tension between protecting the environment—which would require us to turn off the use of fossil-fuels—against the equally important call for social justice of providing people around the world with sufficient affordable energy so they can live a healthy productive life. There are choices to be made, and the public at large must get engaged in making them.

Biography

Ripudaman Malhotra is Associate Director of Chemical Science and Technology Laboratory in SRI's Physical Sciences Division. He is an organic chemist, and during his tenure at SRI he has worked extensively, though not exclusively, in the area of energy. Most of his studies have focused on the chemistry of processing fossil fuels. His detailed mechanistic studies of these systems

have resulted in innovative processes that achieve desired product selectivity and increased efficiency. As someone deeply engaged in energy research, he was acutely aware of the looming energy crisis, which was being exacerbated by the potential of global climate change. He broadened his research interests into studying alternate resources such as biomass and application of biotechnology in the areas of energy, chemicals, and the environment. In 2005 he joined Hew and Ed to co-author "A Cubic Mile of Oil: The Looming Energy Crisis and Options for Averting It," which was published by the Oxford University press in 2010. He has spoken extensively on the subject at various technical and business fora. Among his technical works are over 90 papers in archival literature, co-authorship of a book on nitrations, the editing of a book on combinatorial materials development, and co-editorship of a book on advanced materials. He is a section editor for a soon to be published Encyclopedia of Sustainable Science and Technology, and an active member of the Petroleum and Fuels Chemistry Divisions of the American Chemical Society. In 2005, he was named an SRI Fellow, the highest award SRI bestows on its employees for excellence in research.

Education: Ph.D., in Chemistry, 1979, University of Southern California; MSc Chemistry, 1973, and BSc Chemistry, 1971, Delhi University

Employment: Joined SRI International in 1979 as a post-doctoral fellow, and has been there ever since.



Chair's Message, continued from front page

in chocolate. Nature 382: 677-678). Chocolate also contains N-oleoylethanolamine and N-linoleoylethanolamine, which inhibit the breakdown of anandamide, and thus may prolong its effects. In addition, elevated levels of the neurotransmitter can intensify the sensory properties of chocolate (texture and smell), thought to be essential in inducing cravings.

The chemicals in chocolate help contribute to chocolate's appeal. But other more subtle aspects of chocolate are also very important to consider when you are picking out that special collection for your Valentine, including the appearance and the mouth feel. These are

influenced by the crystalline structure, the fat content and the melting point. For more information, and some fun kitchen chemistry, NSF has prepared an interesting video on the Chemistry of Chocolate that you can find at <http://science360.gov/obj/video/27d931d9-c33c-45c6-adac-aa0a-42f04ad6>.

I hope to meet you at the upcoming dinner meeting. It should be thought provoking and informative.



Teach the Teachers "Water: A Chemical Solution"

Bay area teachers gained new skills and celebrated the International Year of Chemistry at the "Teach the Teachers" workshop on Saturday, November 5, 2011. The theme of this year's workshop was "Water: A Chemical Solution".

The workshop was made possible by a generous grant from Gilead Sciences, which provided funds for materials to carry out hands-on experiments, publications and materials for the teachers to take back to their classrooms. One of the most successful characteristics of the annual workshop is to enable teachers to learn and practice experiments, and then have all the materials needed to carry out the experiments with their students.

The workshop was held at the Resource Area for Teaching (RAFT) in Redwood City. RAFT partnered with us again to manage the registration for the workshop, and provide the space for the presentations and for lunch. The grant from Gilead also allowed us to provide breakfast and lunch for the teachers and volunteers at the site. Special thanks go to Mayu Yamamura who arranged for all of the food, with the assistance of her colleagues from the Women in Science and Engineering (WISE) group at Cañada College.

The lead instructor for the workshop, Juanita Ryan, and her team, Laura Randall, Susan Sakaguchi, and Josefa Arruiza put together and led activities including a "Solar Still Challenge" and testing of local water sources for salinity and pH. Students from Santa Clara University provided assistance with the set up and running of the experiments. Thank you to Linda Brunauer for encouraging her students to volunteer, and for obtaining materials for the raffle at the

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end of the workshop.

With the able assistance of Natalie McClure, experimental results were posted to the web site for the Global Experiment for the International Year of Chemistry. The teachers were shown how to access the web site so they and their students could be participants in the global experiment and see the results posted by students all over the world. Other topics included phase transitions of water, the structure of the water molecule, and the water cycle. Each teacher was provided a binder with experimental details, teacher notes and background information. Classroom sets of "WonderScience", "ChemMatters", and special issues of "Celebrating Chemistry – Health" (in both English and Spanish) were also provided. A special feature of this year's workshop was a presentation by Kathy Machado, Education Outreach Director

from the San Jose Water District, who provided an entertaining set of teaching resources, including books, demonstrations and music.

The teachers who attended came from a variety of public and private schools; about half were first time attendees. We were happy to also welcome back several teachers who have attended the workshop many times since it began in 1996. The repeat attendance reflects the usefulness of having a new topic every year, as well as the continuing appreciation of the teachers of the value of the workshop. The feedback from the teachers was overwhelmingly positive. They expressed particular appreciation for the hands-on aspect of the workshop, and for the involvement of the many volunteers who work to make the workshop a success.

In addition to Gilead, RAFT, and the workshop instructors, the workshop

depends on the hard work and time commitments of our dedicated volunteers. Volunteers prepare many of the materials, help with room set up, obtain and organize refreshments, obtain and organize materials for the raffle of laboratory supplies, and clean up after an exhausting day. We particularly appreciate the energy and participation of the students from WISE at Canada College and from Santa Clara University. Thanks go to our other amazing ACS volunteers who jumped in wherever needed and made the workshop run smoothly: Linda Brunauer, Hugh Dubb, Lois Durham, Lee Latimer, Natalie McClure, Jeanette Medina, Susan Oldham-Fritts, Howard Peters, and Ean Warren.

This award-winning workshop is a great partnership which provides a wonderful service for teachers and students in the bay area. We hope to keep it going for many years to come.

Bonnie Charpentier
Workshop Organizer

Welcome to the Santa Clara Valley Section of ACS

Each month the section receives a spreadsheet from national ACS with the names of members new to our section. The members are either new to ACS, have transferred in from other areas, or are the newest members -- students. To welcome you to the section and get to know you, the Executive Committee offers new members a free dinner!! To encourage you to attend a monthly section dinner meeting, we would like you to be our guest. When you register, make certain to mention that you are a new member and you and a spouse (or friend) will be our

guests. The dinner meetings are often the 3rd Thursday of the month at a local spot, somewhat convenient to the entire section. If you are unable to attend in the evening, perhaps you would join us for an outreach event, like judging a science fair, participating in the Chemistry Olympiad, or a National Chemistry Week event in October. Then, there is our annual wine tasting and awards picnic in July. The local section is a volunteer organization. Please attend an event, volunteer to help, and get to know your local fellow chemists. Welcome!!

New Members List for January

Dr. Shibu Abraham	Ngan Hong	Dr. Stephen H. Reaney
Dr. Paolo Actis	Nizar Kheraj	Connor Rosen
Jyothirmai Ambati	Daniel Kimm	Oscar Sanchez
Olegario Avalos	Dr. Alan Kleiman	Evan A. Sarina
Maliheh Bakhshi	Dr. Daniel Witold Krassowski	Ariella Simke
Gediminas Jonas Brizgys	Tom Lam	Leah Simke
Jennifer Brousseau	Dr. Kristopher Lavery	Travis Allen Smalley
Dr. Kristi Burns	Jay Levine	Steven John Spencer
G Chu	Dr. Zhe Lu	Dr. Zheng Sun
Justin Dreling	Kazimiera Luce	Clarissa Tadeus
Athena Ford	Michael Jeffrey McCarthy	Dr. James Robert Trudell
Gregory Freeman	Dr. Lorenza Moro	Patricia Walters
Dr. Dmitri Gremyachinskiy	Vivek Narsimhan	James Michael Warner
Rachel Guerrero	Huy Nguyen	David Zarale
Rong He	Tuan Nguyen	Elizabeth Zarate
Dr. Craig Hill	Cristine Quiason	

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The Iron Lady

Baroness Margaret Thatcher, From Chemist to Prime Minister

The recent film "The Iron Lady" is the story of the life of Baroness Margaret Thatcher of the United Kingdom. Themes for this film were apparently drawn from her daughter Carol's memoir "A Swim-On Part in the Goldfish Bowl" (2008). Carol was the first to make public in detail the serious nature of the indomitable Margaret Thatcher's late-in-life decline into dementia. Overall, the film is a masterpiece and is highly recommended.

Meryl Streep provides an unforgettable portrayal of The Iron Lady. However, to the taste and background of these reviewers, the film would be improved by an additional five minutes delving into the class relations, the religious views and the scientific class distinctions in the UK of the time. We need to appreciate how remarkable it was that in the 1940's a shop keeper's daughter from Grantham would receive a scholarship to



Oxford University in chemistry, that she would next challenge the system by studying law at night and finally, not be ashamed of her strong Methodist views. Some better suited story materials might easily have been drawn from The Iron Lady's own words from her speeches, and from her two memoirs: "Margaret Thatcher: In Her Own Words" (2011, 256 pages), "The Path to Power" (1996, 672 pages) and "The Downing Street Years" (1995, 928 pages). All are available from Amazon.com.

The Chemist

While Baroness Thatcher earned her degree in chemistry at Oxfords she did research in the laboratory of the late Dr. Dorothy Crowfoot Hodgkin, who later received the Nobel Prize (1964) in Chemistry for her work in crystallography. After graduating, Thatcher's first chemistry job, in 1946,



was in an ice cream plant studying the crystallization of ice cream. Recent articles suggest that it was the only position available for a woman chemist. Before we get too riled up, consider the fact that those were different times for women. In fact, the only legal position available to Sandra Day O'Conner, now retired US Supreme Court Justice, was that of legal secretary, despite the fact that she graduated top of her class from the Stanford University School of Law in the 1950's, and took her only offered local legal position, a legal secretary in Menlo Park.

The Prime Minister

Thatcher, who continued her studies in law at night, was initially drawn to patent law and then to tax law. She passed the exams, and then went on to a spectacular career in politics. She was soon elected a Member of Parliament and later served as Prime Minister of the UK from 1979 to 1990, the first woman and longest serving Prime Minister of the UK in the 20th Century. After leaving 10 Downing Street, she was in demand for her writings and consultations, and she enjoyed a lucrative lecturing career. She became, and relished being the Honorary Chancellor of the College of William & Mary, America's only royally chartered college (1693). Justice O'Conner now holds the position.

The American Chemical Society

In 2007 Baroness Thatcher was elected an Honorary Member of the ACS Division of Chemistry and the Law. Long term Santa Clara Valley Section Members and Division of Chemistry and the Law members, Howard and Sally Peters, presented the ACS plaque and other documents to Andrew Riley, the

archivist for the Thatcher Collection at Churchill College, Cambridge, on July 10, 2007. Churchill College officials were thrilled with the ACS plaque and planned to use it to attract more scientists' papers and archive materials. Howard and Sally saw an original high school analytical chemistry notebook of Baroness Thatcher's dated 1941. Her father was a lay minister in the local Methodist Church, and because of the wartime paper shortage he used the second half of the notebook for his sermon notes.

Howard and Sally share with Baroness Thatcher undergraduate degrees in chemistry, a law degree earned at night, a wedding in a Methodist Church, a love of chocolate and...a birthday!

Howard and Sally Peters

2012 Science Fairs

In addition to Sciencepalooza and the San Mateo, San Francisco, and Monterey County Science Fairs we discussed in this space last month, there are two more local competitions that need our expertise as judges:

Synopsys Championship (aka Santa Clara Valley Science and Engineering Fair)

Date: Wednesday, March 7, 2012

Location: San Jose Convention Center, San Jose

For more information on category award judging, visit www.outreach-foundation.org/judges.html

Santa Cruz Science Fair

Sixth through twelfth grade Santa Cruz County students

Date: Saturday, March 10, 2012

Location: Santa Cruz County Fairgrounds, Santa Cruz

For more information, visit <http://science.santacruz.k12.ca.us/>

For more information on participating in the SCV-ACS judging team, contact Susan Oldham-Fritts, sfritts@garlic.com, or Mark Kent, markkent@yahoo.com

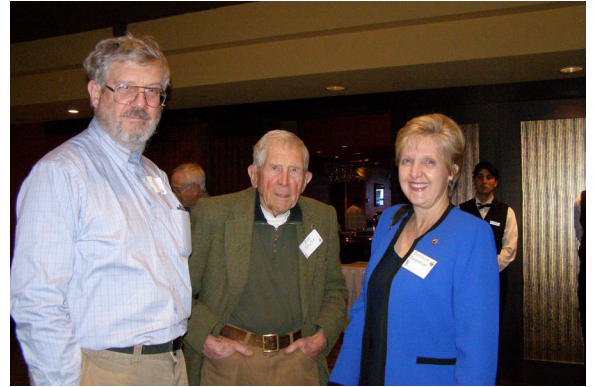
See you at the fair!

Highlights of the January 19th Harry and Carol Mosher Award Presentation

Photos Courtesy of Lois Durham



William Carroll and Natalie McClure



John and Bob Stutz, Bonnie Charpentier



Karl and Randa Marhenke



Mary and William Carroll, Howard and Sally Peters



Natalie McClure



Sally Peters and Susan Oldham-Fritts



William Carroll and Natalie McClure



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SANTA CLARA VALLEY SECTION

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ChemPloyment Abstracts

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FUTURE MEETINGS

- Feb 16** Dr. Ripudaman Malhotra, SRI
A Cubic Mile of Oil
Biltmore Hotel & Suites
Santa Clara, CA
- Mar 15** Dr. Peter Rusch
New Definition of the Kilogram
Venue to be announced
- Mar 25-29** Spring National Meeting
San Diego, CA
- Mar-Apr** Santa Clara Valley
Chemistry Olympiad
- Apr 4-6** 16th Annual John Stauffer Lectures
Stanford University Chemistry
Department
www.stanford.edu/dept/chemistry/events/conf/jstauffer/index.html
- Apr 18** James Sabry, MD, Ph.D.
Vice President Genentech
BioScience Forum
www.biosf.org
- Apr 19** Monthly Section Meeting