THE VORTEX

AMERICAN CHEMICAL SOCIETY **CALIFORNIA SECTION**
VOLUME LXXIX NUMBER 1 **JANUARY 2017**

Jim Postma, (right) 2017 Chair accepting the gavel from Lou Rigali, (left) 2016 Chair

CALIFORNIA SECTION, ACS JANUARY MEETING

"Can Geochemistry Help Solve our CO_2 Problem?"
Guest Speaker: Greg H. Rau
Senior Research Scientist, Institute of Marine Sciences, Univ. California, Santa Cruz and Visiting Scientist, Lawrence Livermore and Berkeley National Laboratories
Date: Thursday, January 19, 2017
Time: Reception: 5:30 – 6:00 pm, Talk: 6:00-7:00pm.
Place: USDA, 800 Buchanan St., Albany, CA 94706.
Cost: $10 for light refreshments to be served from 5:30-6:00pm.
Reservations: Please register for meal or talk only by email office@calacs.org or 510-351-9922, no later than Monday, January 16, 2017. You may prepay by mailing your check to Cal. Section ACS at 2950 Merced St. #225, San Leandro CA 94577or with PayPal using our email address office@calacs.org.

Abstract: Because the Earth's surface is primarily composed of alkaline minerals, it is their slow chemical reaction with water and acidic CO_2 to form stable (bi) carbonates that largely dictates global atmospheric CO_2 concentrations on geologic time scales. In contrast, through combustion of fossil fuels and disruptive land use, humans have managed to release CO_2 to the atmosphere and increase its global concentration at a rate that has significantly overridden geochemical and other natural CO_2 control mechanisms. Long-term, deleterious climate change and ocean acidification are the consequences unless we can drastically reduce our CO_2 emissions or stabilize or reduce atmospheric CO_2 concentrations by other means. To this end, this talk explores various possibilities in industrial or natural settings for enhancing or accelerating the high capacity but otherwise slow geochemical consumption of CO_2 and the storage or beneficial use of the resulting products. Such approaches might help to cost effectively and safely manage global CO_2 on time scales relevant to humans and the biosphere as we also attempt to rapidly transition to a non-fossil-energy economy.

California Section, ACS February Meeting

Speaker: Taro Amagata, Ph.D. Associate Professor of Chemistry, Dept. of Chemistry and Biochemistry San Francisco State University.
Topic: Exploring Novel Anticancer Lead Compounds from Marine-Derived Actinomycetes Using a Unique Screening Approach
Time and Place: Thursday February 2, 7.00 pm, Chevron Research facility in Richmond CA

Abstract: Actinomycetes separated from marine habitats have received global attention as a prolific source for potent bioactive secondary metabolites with unique structural features, which is proven by Dr. Fenical's discoveries of the anticancer salinosporamide-A and antibiotic anthracimycin. One of the goals of my research activities at San Francisco State University is to identify anticancer lead compounds produced by actinomycetes separated from marine sediment. Recently, my group has launched a unique anticancer screening approach designated as CP-DDA. This screening methodology is comprised of two anticancer whole cell screening systems, cytological profiling (CP) and disk diffusion assay (DDA), which enables rapid identification of cytotoxic compounds with excellent solid tumor selectivity and their molecular targets. In the talk, the concept of CP-DDA and new cytotoxic compounds identified by CP-DDA will be presented.

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THE VORTEX

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Chair's Message

Jim Postma

Resolutions for the New Year:

"Be always at war with your vices, at peace with your neighbors, and let each new year find you a better person." – Benjamin Franklin

If you're inclined to make resolutions this time of year, I'd encourage you to make yourself a better person by getting involved (or increasing your involvement) with the ACS. There's a lot going on locally this year that you should find rewarding. The most obvious event is the spring National Meeting to be held in San Francisco from April 2-6. You could get involved by simply attending the meeting, but because the California and Santa Clara Valley Sections are hosting the meeting, there will be many opportunities to help out. Past Chair Charles Gluchowski is our lead liaison for the meeting; you can contact him at charles.gluchowski@gmail.com.

Our 2017 Section Meetings begin on Thursday, January 19 with Greg Rau from the UC Santa Cruz Institute of Marine Sciences. His talk, Geochemical methods of CO_2 Mitigation and Remediation, will be held at the USDA auditorium in Albany. You can read more about Greg at https://www.researchgate.net/profile/Greg_Rau.

A Section the size of ours has numerous opportunities for involvement. Whether you're interested in environmental issues (e.g., Environmental Improvement Committee, Earth Day), education (Family Science Night, high school and community college awards), outreach (Family Science Nights, Earth Day, Bay Area Science Festival, Science Café, current research (Section Meetings, Women's Chemists Committee presentations, chemical careers; Younger Chemist Committee or Senior Chemist Committee, you're bound to find something to fit your interests and schedule.

Drop me a line (jpostma@csuchico.edu) or join our monthly Executive Committee meeting (First Tuesday of each month.) Check the Vortex newsletter for times and locations.

Family Science Night Report

The California Section's Family Science Night program has expanded greatly over the years since Marinda Li Wu and Janet Schunk launched it back in 1997. We have sponsored these events at over two dozen middle schools in five Bay Area counties. We

continue to reach out to new partners while supporting schools that are ready to organize their own follow-up events. Bancroft Middle School in San Leandro stands out, inviting us back each year since our first visit in 2013. Science Department Chair Clinton Huey and his colleagues are committed to engaging their entire community in science education, raising money for events that feature performances and hands-on activities

by the Lawrence Hall of Science and other educational organizations. We are delighted to bring the "right chemistry" to these events, and Thursday evening, December 8th, 2016 was no exception.

Al Verstuyft and I took over Mr. Huey's classroom, setting up activities based on this year's National Chemistry Week theme, "Solving Mysteries Through Chemistry." One of my College of Alameda students assisted Al in presenting "Mystery Perfumes" – they challenged visitors to recognize commercial perfumes as well as essential oils from plants (lemon, almond, vanilla,

rosemary, and vinegar). Visitors could study the names and structures of key aroma compounds, and then demonstrate their understanding by building molecular models using colorful plastic model kits. Acetic acid is a great starting point, but some students were ready to try terpenes.

Popular thirst-quenching drinks hold their own mysteries, especially their sugar content. Graduate students Erin Creel and Elizabeth Corson from the McCloskey group in the Department of Chemical and Biomolecular Engineering revealed the secret with the help of hydrometers, since solution density is directly related to sugar

concentration. Our display also showed what the equivalent amount of table sugar would look like in the same bottle, a real eye-opener for many visitors.

Next door, a dozen UC Berkeley undergraduates from the co-ed chemistry

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fraternity Alpha Chi Sigma took charge of the pH workshop, the colorful electrolysis activity, and demonstrations of sports drink conductivity using Halloween LED lights. We also set up a constantly changing demonstration of Milk of Magnesia reacting with vinegar in a tall, magnetically stirred vase filled with red cabbage indicator. Once everything was going smoothly, Chief

Master Alchemist Sanum Patel and other experienced volunteers headed down to the cafeteria (site of numerous hands-on

engineering activities from the Lawrence Hall of Science) to prepare and serve mixed berry ice cream. It's always a hit, and no one had to wait very long for it since AirGas of

San Leandro provided the liquid nitrogen to freeze it. The California Section lived up to the ACS motto displayed on our bright blue tablecloths: "Chemistry for Life."

Alex Madonik
National Chemistry Week Coordinator

Toxic Terra (Part 8)

Bill Motzer

In Part 7 (October 2016 Vortex) of this series, I described some of the worldwide occurrences of enriched fluoride in surface water and groundwater particularly those areas having past and current volcanic activity because fluoride is generally enriched in volcanic gases and geothermal fluids (see Volcanic Violence – Part 2, May 2014 Vortex).

One such area is the alkaline volcanic province of The East African Rift Zone (EARZ) or valley, encompassing and extending through Eritrea, Djibouti, Ethiopia, Kenya, Tanzania, Uganda, Rwanda, Burundi and Malawi (Figure 1). The EARZ contains some of the highest recorded world-wide fluoride surface water and groundwater fluoride concentrations with fluoride exceeding the World Health Organization's (WHO) drinking water permissible level of 1.5 mg/L. Because fluoride occurs in hot springs, alkaline lakes, some river systems, and groundwater, it's routinely consumed by the populace resulting in severe dental and skeletal fluorosis (see Toxic Terra – Part 5, February 2016 Vortex).

The source for most of this anomalous fluoride is attributed to the EARZ hyperalkaline volcanic rocks, including sodium and calcium rich magmas and intrusions such as nepheline syenites and carbonatite magmas and their associated volcanic ash deposits. Large fluoride concentrations [e.g., in the minerals villiaumite (NaF) and fluorite (CaF_2)] are often contained in these melts and their associated volatile fractions with water bodies subsequently accumulating fluoride from rock weathering, leaching of fine-grained and friable volcanic ashes, and from high fluoride in geothermal waters. The weathering of fluoride-containing and other silicate minerals in the lavas and ashes by silicate-hydrolysis reactions commonly results in a sodium-bicarbonate-rich groundwater depleted in calcium and magnesium. Therefore, fluoride can occur in high concentrations because fluorite solubility is not a limiting factor.

In geochemical studies in the area surrounding Tanzania's Mount Meru volcano, rivers draining the volcano's slopes have reported fluoride concentrations ranging from 12 to 76 mg/L and 15 to 63 mg/L in surrounding springs. These high concentrations are attributed to weathering of fluorine-rich alkaline igneous rocks, contributions from active fumaroles and gases and the re-dissolution of fluorine-rich trona ($Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$), which seasonally occurs as encrustations in low-lying river valleys and lake margins because of the area's extreme evaporation rates.

One of the most extensive surveys of EARZ water sources was done in Ethiopia, which has an estimated population (as of September 2016) of ~102.4 million people. From analyses of 1,438 surface water and groundwater samples, this study found that 24.2% of all water sources exceeded the WHO permissible level with 50% of deep wells and 90% of hot spring samples exceeding the WHO permissible level. Areas along the Awash River were the most affected where sugar plantations had attracted large settlements. The long-term use of deep groundwater from wells has resulted in high rates of both dental and skeletal fluorosis.

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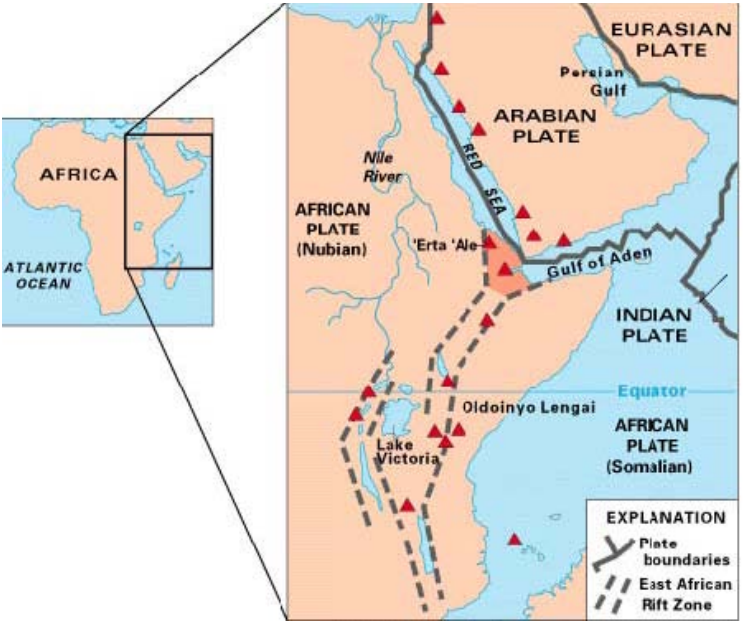

Figure 2:

Map of the East Africa Rift showing some historically active volcanoes (red triangles) and the Afar Triangle (shaded at the center). Source: U.S. Geological Survey at:http://pubs.usgs.gov/gip/dynamic/East_Africa.html.

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Biography: Born in Osaka, Japan. BS, (1993) MS, (1995) PhD, (1998) Osaka University of Pharmaceutical Sciences Postdoctoral experience includes UC Santa Cruz (Advisor: Phil Crews, 1999-2003)

Professional Positions include Cetek Corporation (Marlborough, MA) Scientist (2003-2006) Senior Scientist (2006) UC Santa Cruz Project Scientist (Crews Lab, 2006-2008) San Francisco State University Assistant Professor (2008-2014) Associate Professor (2014-present)

Holiday Social Meeting

Usually at the end of the year, the Executive Committee meets to formally pass the gavel from the previous chair, (now Immediate Past Chair) Lou Rigali to the new Chair for 2017, Jim Postma.

This year in addition to the comfortable and pleasant room provided by Scott's Restaurant in Walnut Creek, we were serenaded all too briefly with both a novel and traditional rendition of holiday songs

courtesy of students at North Gate High school.

The 2016 Chair presented The ACS Salutes to Excellence Award which recognizes the outstanding accomplishments, achievements or service for volunteers and others who have made a positive impact on everyday life. The Section is pleased to recognize and present the awards to Linda Wraxall, Wally Yokoyama, and the Western Regional Research Center, Agricultural Research Service, USDA, Albany, CA.

Linda Wraxall accepting the Salute to Excellence Award

Wally Yokoyama accepting the Salute to Excellence Award

Marinda Wu, Past ACS President presented the P3 (Partners for Progress and Prosperity award) to outgoing Chair, Lou Rigali.

Alex Madonik was recognized by ACS for his years of service in coordinating National Chemistry Week and Family Science Night.

Alex Madonik accepting the ACS Award

Also thanks to Alex Madonik for most of the photos.

The evening ended with Dr. Mircea Gheorghiu wining the raffle drawing of Dr. Marinda Wu's ACS Symposium book.

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Lou Rigali accepting the P3 Award Pin

Paul Vartanian, Treasurer
with wife Joanne

Julie Mason, Office Manager
and her husband Dan

Evaldo Kothy, long time Vortex staff
and feature writer
with wife, Monica, and daughters

Michael Chang, Secretary

Eileen Nottoli, Chair Chemistry
Olympiad Committee

YCC Annual Report

YCC has done several events this year. We started with the joint Motherhood panel, with in depth discussions. It was a successful event, and helped drive forward the plan to make YCC more visible and relevant. We also had a joint panel with the AIChE NorCal section. This resulted in many in-depth conversations after the panel about the relative benefits of professional engineering degrees compared to PhD. I believe it opened the eyes of many students to further training available after an undergraduate degree. Unfortunately, we had to cancel our summer event, a talk focused on adhesives based on biological sources.

YCC has spent the second half of the year focusing on establishing stronger ties with Berkeley.

After the YCC events over the past few years, students were excited to form a club for the chemistry students, as they saw most of the student outreach focused towards chemical engineers rather than chemistry students. Dr. Anne Baranger agreed to be the faculty sponsor of the ACS club. Their first meeting attracted over 100 people. They are working hard at gathering funding and sponsors, and we look forward to working with them in the future.

What's Brewing with YCC and the Senior Chemists

Stephanie Malone

YCC has joined forces with the Santa Clara Valley Section! We hosted our first event in Santa Clara November 15 at the Golden State Brewery. It was the first time we've done a joint event with the Senior Chemist Committee. 35 people came out to network and enjoy the brews. In addition, the lead Brewer, Seth Hendrickson, gave us a tour of the brewing facility, as well as a description of his journey from home brewer to craft brewery. He even offered to host an event YCC has been trying to put on since we started: a home brew competition. Stay tuned for details.

Our next scheduled event is January 30 when Prof. William Moerner has agreed to speak to YCC about his journey to winning the Nobel Prize for his work on Single Molecule Microscopy.

Check the website for details, we are scouting locations in San Francisco now.

Washington University Chemistry Tournament

The Washington University Chemistry Tournament (WUCT) is an annual chemistry competition and will be held on Washington University's campus in St. Louis, MO on April 8, 2017. The competition invites high school students across the nation to participate in a series of individual and team-based chemistry exams, engage with college students and faculty, and earn recognition at an awards ceremony. WUCT emphasizes real world applications of science and promotes fundamental problem-solving and teamwork skills.

The first tournament was held in April 2016 and had 180 high school students across the nation travel to our campus. We are planning to host over 300 participants in our upcoming 2017 competition.

Registration for the Washington University's 2nd annual chemistry tournament is now open and details are available at www.wuct.wustl.edu/. Tournament takes place on campus in St. Louis, MO. For more information e-mail us at wuct@su.wustl.edu.

BUSINESS DIRECTORY

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

- www.mboservices.net
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