

THE VORTEX

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CALIFORNIA SECTION
FEBRUARY 2016



Moshier Award Ceremony January 2016. left to right, Charlie Gluchowski, Past Chair, CalACS, Eileen Nottoli, Chair High School Teachers Committee, Attila Pavlath, recipient of the award. and Jane Frommer, Chair, Santa Clara Valley Section, sponsor of the Moshier Award.

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February Section Meeting

Title: Wheat flour proteins, food allergies and food intolerances

Speaker: Dr. Susan Altenbach, USDA, Albany, CA

Date: Thursday, February 25, 2016

Location: USDA 800 Buchanan St., Albany CA 94704

Social Hour and Meal: 5:30-6:30; Presentation: 6:30

Meal Choices: Light snacks \$10

Reservations: Please contact the CalACS by email office@calacs.org or 510-351-9922 by Tuesday, February 23, 2016. 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). Note: Everyone attending must register in advance due to security regulations at USDA and bring a picture ID to the event.

SUMMARY

Wheat is one of the major crops grown worldwide for human consumption. The unique viscoelastic properties of wheat flour make it possible to produce a wide range of food products including bread, noodles, tortillas and many types of baked goods. The viscoelastic properties are largely determined by the wheat gluten proteins, a complex group of proteins that accumulate in the endosperm of the developing wheat grain and serve as a reserve of amino acids for germination. Certain proteins in wheat flour also trigger a number of human health problems, including food allergies and food intolerances (celiac disease). This presentation will describe specific wheat flour proteins that are responsible for food allergies and intolerances and the roles of these proteins in grain development and flour quality. Molecular approaches to decrease the levels of immunogenic proteins in the flour also will be discussed.

Biography

Dr. Susan Altenbach is a Research Biologist at the USDA-ARS, Western Regional Research Center in Albany, California. After receiving a B.S. from the University of Wisconsin-Madison and a Ph.D. from the University of California-San Diego, Dr. Altenbach spent eight years in the plant biotechnology industry developing molecular approaches to improve the methionine content of plant seed proteins. She joined ARS in 1992 where her research has focused on understanding how growing conditions affect wheat flour quality and allergenic potential. She was instrumental in the development of a comprehensive map of the wheat flour proteome in which nearly all of the abundant proteins were identified by tandem mass spectrometry and associated with specific gene sequences. She used this proteomic map to determine the precise effects of post-anthesis fertilizer and high temperatures

(Continued on page 8)

*ACS 251st American Chemical Society National Meeting &
Exposition
San Diego, CA
March 13-17, 2016*

Don't forget to make your hotel arrangements by February 19. After this date, reservations will be based on limited availability and hotels may charge a higher rate.

Membership has its benefits! If you're not currently an ACS member, there's no better time than right now to join or rejoin! As a member, you could save more than \$300 on your registration fee for the National Meeting – a benefit that's worth twice the cost of your membership!

THE VORTEX

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Chair's Message

The speaker for this month's meeting, Dr. Susan Altenbach, will be discussing the role of proteins in wheat flour and providing insight into factors affecting allergenic issues. Topics regarding food and nutrition always get my attention, hope to see you there.

Speaking of roles, yours truly is wanting to relinquish one, that of Editor of the *Vortex* and the website. OK maybe those are two roles, you decide. There is lots of room for creative expression. Send an email at lr101898@aol.com and let me know how much or how little you want to do.

Those of us who follow any of the Social Media platforms receive multiple daily updates as to what is "trending" Unfortunately I have not learned how to apply the appropriate subject filters. In a similar manner but in a more relevant universe I am copied on e-mails with questions and topics of concern voiced by Section Members, directed to the Executive Committee. There are usually a half dozen or so replies and a few replies on replies. In the process, I learn a lot even with issues about which I thought I was well informed. I suspect that other recipients also find the exchange informative. I think many of our members in general would likewise find the exchange of information valuable and could contribute ideas and comments. As a CalACS Section member you can request being on an Executive Committee e-mail

distribution list. Simply send a request to me.

The specific subject matter referred to above mainly involved employment issues for chemists and what role the ACS plays or should play. Last year's President-Elect Donna Nelson appointed Attila Pavlath as Chair of a Task Force to investigate employment problems for chemical professionals in the US. Attila plans to have a set of recommendations by the Philadelphia meeting in August 21-25, 2016. To this end, the Task Force wants to interview mid-career chemists (members or not) who are looking for a job, or even if they found jobs but had problems in the process. If you know any 30-45 year old chemists locally or not, let them know of this Task Force. The interview can be conducted anonymously. In fact, Attila extends the invitation to all to share their experience and views. E-mail direct to Attila. atilapavlath@yahoo.com

One of our younger chemists is wanting to form a Chemistry club: for educators, students and professionals to collaborate and share learning experiences to increase the public appreciation of chemistry. Members who are interested and Companies that would like to participate as sponsors are invited to attend the February 2 ExCom meeting at Spats on Shattuck Ave, in Berkeley by e-mailing your reservation to Julie, our office manager, office@calacs.org and tell her if you plan to eat. (See page 2 for details)

(continued on page 4)

(Chair's message continued from page 3)

you can subscribe to the ExCom e-mail distribution list and receive a summary of the meeting.

At the Year End Holiday meeting and dinner, Charlie Gluchowski, Immediate Past Chair presented Will Kuo, previous Section Treasurer and Eileen Nottoli, Chair of High School Teachers Committee with the Section's 2015 Salutes to Excellence award for their substantial contributions. Congratulations to both. Will has taken what we hope is just a temporary leave as he devotes more time to his parenting duties.

The Chem Club at Castro Valley High School through their teacher and sponsor, Dr. Deborah Yager, submitted a tee shirt design for the Chemistry Olympiad T-shirt. These will be given as prizes and also sold to raise money for CalACS educational programs. See page 4 for ordering details.

I encourage all to attend our Feb. 2 ExCom Meeting and find ways to participate in the Section that makes the Section pertinent to you.

Lou Rigali, Chair
lr101898@aol.com 510 868 8788

Tentative Monthly Section Programs 2016

Following is a list of some of the meetings that are being planned. **March**--Xiaoxi Wei, PhD, X-Therma, Inc. A young company located in the Bay Area with the mission to develop potent biomaterials for both medical and industrial applications via Biomimetic Nanoscience.

April 21—Justin Siegel, U Washington—Startups

May--Jyllian Kemsley, Ph.D., C&E News Editor, 1 p.m. – Chemical Careers; possibly with dinner: Laboratory Safety – CSU Chico

May—Awards Luncheon

Other potential Meetings

Torey Arvik, Sonomaceuticals, LLC.
Obesity, inflammation and grape seed prebiotics

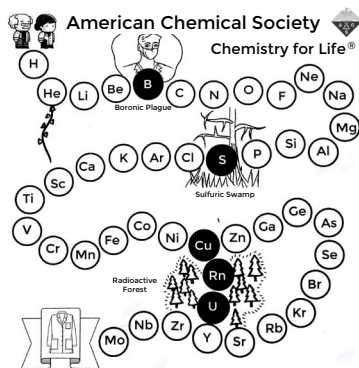
Ruihong Zhang, UC Davis, Recycling waste for energy self sufficiency

Tee Shirts for Sale

Chemistry Olympiad Tee shirt, designed by the students in Dr. Yager's Chem Club at Castro Valley High School.

Preliminary Design on a white shirt

Front



Back

Chemistry Olympiad 2016

How to play:

1. Choose your chemist
2. Roll a die
3. Make your way down the Periodic Path
 - Try not to get caught in any Chemistry Catastrophes, or else you must come up with a chemistry pun to find your way out!
4. First to the end wins the Golden Lab Coat!

Place and order and reserve a shirt or two, at a pre-production discounted price of \$18.00 each. Limited production. Sales and profit from the shirts will benefit the Section Educational Committee activities. Send orders with shipping address and sizes to office@calacs.org. The office will process your payment through PayPal or other methods that you designate.

Family Science Night at Claremont Middle School, 21 January 2016

The California Section continues to build relationships with local schools and science teachers. We met Malia Lehman at a FEAST (Fun Exchanges & Activities for Science Teachers) workshop hosted by Chabot Space and Science Center. She's a seventh grade science teacher at Claremont Middle School in Oakland, which hosted one of our Family Science Nights back in the spring of 2010, and they continue to encourage interest in science by organizing these events on their own. Malia invited us to them on January 21, 2016 for another evening of science fun, and our volunteers responded to the call.

Several experienced volunteers (Alice Rico, Birgit Drews, Janet Schunk, and Lena Trotochaud) were there to reprise the colorful pH activities that were a popular part of last year's NCW celebrations. Red cabbage juice indicator and Milk of Magnesia continue to fascinate visitors as they swirl and react with added vinegar. Kids also investigated the pH of many common household products, as well as their favorite beverages, while Lena had assembled a veritable rainbow of fruits and vegetables that change color in acid or base.

Next-door was the "dark side" where an intrepid team of UC Berkeley students, led by chemistry lecturer Michelle Douskey, revealed the mysteries of light. We distributed diffraction grating slides,

perfect for investigating the spectral properties of light sources. The "white" light from that CFL is really the sum of at least five distinct fluorophores. "Why is the Sky Blue and the Sunset Red" is the question posed by another demonstration. Students discovered that a flashlight beam passes through a bottle of water unchanged, but adding just a few drops of milk produces a haze that scatters blue light and gives the emerging beam a dramatic orange hue. And, just for fun, we invited kids to blow fluorescent bubbles that glowed eerily in UV light.

Hundreds of Claremont MS students and their families participated in this event, collecting stamps on their "Claremont Sciences Knight" passports at the ACS stations as well as seven other organized by Claremont teachers and students. Many also took home NCW Periodic Table wallet cards and copies of the NCW 2015 edition of *Celebrating Chemistry*, ready to continue their scientific investigations at home. Finally, special thanks to photographer James Gardner.

Stay tuned for more outreach opportunities! And, please contact the Section if you need materials for an event at your local school, or want to help host a future Family Science Night event.

Alex Madonik
Councilor and NCW Coordinator



Lena Trotochaud (LBNL) and her vegetable rainbow.



Toxic Terra (Part 5)

Bill Motzer

Fluorine is a naturally occurring (geogenic) element in rocks, soils, water, air, plants and animals. It's the 13th most abundant element in the Earth's crust, the most electronegative, and the most reactive of all the elements. Therefore, elemental fluorine (F^0) by itself, does not occur but is largely found combined with other elements in inorganic minerals such as apatite ($Ca_5(PO_4)_3$) and in its solubilized state as ionic fluoride (F^-).

In low concentrations, fluoride is considered beneficial to human health; however, in higher concentrations it is toxic. The term for fluoride toxicity is fluorosis, initially coined in 1925 to describe vegetation impacts from Swiss aluminum smelter emissions. Fluorosis is damage or deformity to human hard tissues such as teeth and bones. Dental fluorosis is an irregular calcification disorder of the enamel-forming process during childhood leading to pitted, eroded, and brown to black stained teeth. Skeletal fluorosis was first reported in France and Denmark in the early 1930s, from exposure by the mining and processing of the mineral cryolite (Na_3AlF_6). It's a crippling disease caused by over-mineralization of bones and joints resulting from long term or chronic exposure to high fluoride intakes.

Human fluoride exposure can occur via inhalation, dermal contact or ingestion of food, beverages, and dental products. However, fluoride's main exposure route is by water ingestion, largely from geogenic sources to groundwater. Numerous studies have shown that regions with low fluoride groundwater concentrations (~0 to 0.5 mg/L) are often associated with increased dental tooth decay. In areas with fluoride concentrations of ~0.5 to 1.5 mg/L, tooth decay rates are much lower. Therefore, fluoride is now added to dental products, such as toothpaste, and many countries have implemented drinking water fluoridation programs. However, exposure to fluoride

concentrations >1.5 mg/L, commonly results in fluorosis.

Once absorbed in the human body, approximately 60 to 80% of fluoride is retained in the skeleton with human bones typically ranging from 300 to 7,000 mg/kg dry tissue weight depending on exposure. This is because bones are largely composed of calcium compounds, mostly carbonated hydroxyapatite [$Ca_5(PO_4)_3(OH)$]. The process resulting in fluorosis is believed to occur as follows: F^- reacts with the stomach's concentrated HCl forming weak HF, which is then absorbed by the gastrointestinal tract subsequently passing into the liver via the portal vein. F^- is largely immune to phase 1 metabolic reactions. These are generally oxidation reactions, which are the body's first line of defense, biotransforming harmful compounds into more easily excreted hydrophilic substances. The HF now freely passes into the blood stream and is distributed to all tissues including the skeleton and teeth. The reaction of Ca^{2+} and HF forms insoluble CaF_2 that must be cleared by the body, which concurrently leaches some of the calcium composing part of the bone's matrix. This process results in increased bone density, but decreased bone strength.

Fluoride blood levels are generally very low ranging from ~0.04 mg/L in normal populations to 0.5 to 0.8 mg/L in fluorosed populations. Although fluoride is mainly retained in bones there is a balance between blood concentrations versus excretion by the kidneys and partly by the skin through perspiration. A certain amount of fluoride (data from studies estimate 15 to 50 %) remains in an ionic state with the remainder forming albumin bonds with calcium acting as a bond mediator. The lowest fluoride concentrations are found in body soft tissues, which generally contain 0.5 to 1.0 mg/kg, but 3 to 50 mg/kg concentrations are not uncommon in epidermal tissues. Therefore, the main fluoride health issues are associated with bones and teeth.

Recent estimates are that 1.7 million people in China and one million people in India suffer from some type of fluorosis derived

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(Motzer continued from page 6)

disease. Such diseases may affect more than 70 million people worldwide (Figure 2), severely limiting their ability to work and support their families.

In the next part of this series, I'll discuss some of fluoride's sources and geochemistry.

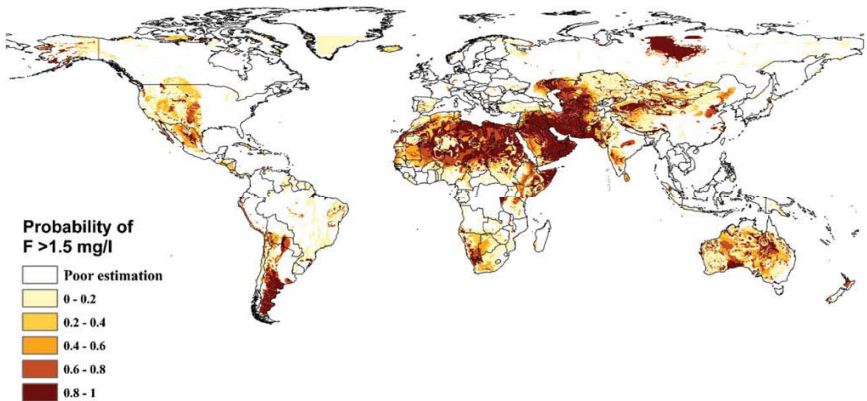


Figure 1: Map of fluoride worldwide probability occurrences in groundwater. This map is a result of modeling accounting for groundwater flow and rock type parameters. Note the high probabilities in arid and desert regions. Source: Amini, et al., 2009, ES&T, v.4, n.10, p. 3665.



Figure 2: Photo of skeletal fluorosis in India. Source: <http://www.inrem.in/fluorosis/about.html>



*Western Regional Meeting (WRM), November 6-8, 2015, held at
California State University at San Marcos (CSUSM)*

Elaine Yamaguchi

Originally, I went to the WRM to accept the first Partners for Progress and Prosperity (P3) Award for the CA Section SEED program. This is the award started by past ACS President, Dr. Marinda Wu. Our CA section SEED program won at the local section level and then was selected for the P3 award at the regional level. Dr. Lee Latimer, a CA Section member and Chair of the WRM Board, presented the medallion and framed certificate to me.

In addition, there was an Industrial Chemists Focus Group, organized by Dr. Tom Barton, immediate past ACS President. Dr. David Harwell of the ACS Industry Member Programs contacted industrial chemists who were attending the WRM, asking them to participate in this event, which was aimed at understanding current issues facing industrial chemists. A total of about 15 chemists attended, including chemists from a small chemical company, an analytical equipment manufacturer, a large chemical company, pharmaceutical companies, and a petroleum company. Two graduate students also attended so they might learn about industrial chemistry. Many challenges and opportunities were noted; here are the major themes gathered from this discussion.

**A Summary of the Focus Group is
provided on page 9**

The big treat was an all-day symposium held in honor of Professor Kendall Houk of the UCLA chemistry department. All speakers were connected with Houk in some way, either as colleagues at different universities, former students, or post-docs,

and wove theory and experiment together. Speakers represented different aspects of organic chemistry: organic synthesis (Amgen's design of GK-GKRP inhibitors as an example), mechanistic organic chemistry studies involving reactive species, and automated mechanism studies of catalytic reactions followed in real time for understanding the details of a reaction and side products, to describe a few. The finale of the day was a talk by Houk himself on his career in chemistry, starting with graduate studies at Harvard with R.B. Woodward. Interestingly he declined the first two projects proposed by Woodward and instead picked the third project that happened to involve the early studies of the HOMO-LUMO interactions that would occupy the minds of many chemists in the '60s and '70s. It was a pleasant trip down memory lane for me. He showed how chemistry has changed to involve more collaborations, and as personal proof, displayed a bar graph with a significant spike in publications in recent years and a map with all his collaborators' locations.

Overall, this was an excellent way to spend time in the Southland.



(Meeting continued from page 2)

on the flour proteome. Dr. Altenbach is now combining transgenic and proteomic approaches to investigate the roles of specific proteins in wheat flour quality and to reduce the immunogenic potential of wheat flour.



NOTES FROM INDUSTRY FOCUS GROUPS
Western Regional Meeting
Saturday, November 7, 2015

Attendees Onsite: Juan Mateo Arbeluez (graduate student from Columbia), Tom Barton (ACS Past-President), Tom Beattie (ret. Merck, chemical consultant), Bonnie Charpentier (Cytokinetics), Tom Gilbert (ACS Board, Northeastern University, formerly Kodak), David Harwell (ACS Staff), Stephen Hobson (Seacoast Science), Duraiswamy Kandaswamy (ret. industry), Valerie Kuck (ACS Board, ret. Bell Labs), Lee Latimer (NeuroOptive), Natalie McClure (regulatory affairs consultant), Dorothy J. Phillips (ACS Board, ret. Waters Corporation), James Phillips (ret. Dow), Ben Shupe (UC Davis graduate student), Linda Wrxall (ret. government), Elaine Yamaguchi (ret. Chevron)

Background: At the request of Tom Barton, a focus group was assembled to discuss the unique challenges/opportunities ACS members working in industry face. Tom Barton facilitated the discussion. The results of the conversation are captured below and categorized by themes.

Challenges:

- Increasing numbers of employers do not value employee participation in ACS; and therefore, do not pay for ACS memberships for employees and discourage them from being involved in ACS activities.

- Greater numbers of chemists are finding employment in small companies. Smaller companies have much tighter constraints of funding and employee development. These companies are not focused on the future. They are focused on surviving tomorrow.

- Industrial chemists do not see ACS advocating on their behalf, or supporting them when they are in need. Examples cited, C&EN (and by extension ACS) takes positions in editorials and stories that are contrary to industry chemists (pro H1B visas; encouraging students to go into STEM even though there is a glut).

- Many industrial chemists see ACS programming at national meetings and its charter as an organization as too broad to address their specific needs compared to more targeted conferences and associations (Gordon Research Conferences, Society for Applied Spectroscopy).

- New/young employees at companies quickly migrate to management, marketing and other positions away from “chemistry” where they have more opportunities to advance. As they move away from “chemistry” they see less relevance in ACS.

Opportunities:

- Encourage and involve students and young professionals early: Almost all members present talked about the importance of becoming a member AND getting engaged with ACS early (as a student or early in their career). In most cases, a mentor or educator reached out to pull the new member into ACS activities within the first 6 months. Long term, this early engagement led to robust professional and personal networks that served them well throughout their careers.

- Reach out to senior and middle management at companies to communicate the value of ACS membership for employees: Involvement in ACS and its activities by industrial chemists is most often limited by middle and senior-level management. Experience, training and networking by industry chemists through ACS programs and services all bring value to companies through enhanced workforce capabilities and through technical/scientific reputation.

continued on page 10)

High School Teachers Committee (HSTC) 2015 Report

Eileen Nottoli, Chair, HSTC

Olympiad

This year, 264 students from 21 high schools participated in the Local exam. Each student was given a certificate and letter congratulating them on taking the exam and the highest scoring student was given a T-shirt.

All 18 students were allowed to participate in the National exam which was held jointly with the Santa Clara Valley Section at Santa Clara University. In addition to the Olympiad pin given to each student, we honored three students with High Honors with \$50 and two students with Honors with \$50.

Outstanding High School Teacher

Each year, our Section solicits nominations for an outstanding high school chemistry teacher. This year, our winner was Julie Hubbard who teaches at Liberty High School in Brentwood. Julie was nominated by her principal who noted that she modifies her instructions to make chemistry available to all her students. She prepared the curriculum for the first Forensic Science course in Contra Costa County. In addition to a busy teaching schedule, she is very active in after-school programs including supervising teaching assistants and student helpers. We honored Julie at our Awards Lunch in May with a check for \$500 for her chemistry department and \$500 for her.

High School Teacher Workshops

This year, we hosted or participated in four high school workshops. The first was held on January 17 at Dominican University of California in San Rafael. We had a talk on careers in the pharmaceutical industry and an exchange of demonstrations. Six teachers attended.

On October 10, we held a workshop at Petaluma High in Petaluma. Eight teachers attended and heard a talk by Torey Arvik with Sonomoceuticals about making various food products from grape skins and seeds. The oils and flour made from these materials have many of the same health benefits as wine. Each attendee received a door prize ranging from a \$25 gift certificate to a beaker with pH strips. On October 17, we participated in a workshop for 25 K-12 science teachers at Chabot Space Center in Oakland. We heard a talk by Becky Milczarek of the USDA on the science behind microwave ovens and the importance of proper heating of frozen food in microwaves. Each attendee received a door prize ranging from a \$25 gift certificate to a beaker with pH strips.

On December 5, we presented a lecture and demonstrations on climate science to 20 K-12 science teachers at Chabot Space Center in Oakland.



WRM continued from page 9)

•Reach out at the local level: Very few industrial chemists become involved with ACS at the national level. The potential for networking, training and volunteering is greatest at the local level. Several examples were given of people becoming involved on a national level after first engaging locally, but no examples were given of people getting involved at the national level first.

•Convene meetings between industry, academics and federal funders to discuss common needs and concerns: As a neutral convener, ACS can facilitate dialog between these three classes of stakeholders. Although all three groups want a vibrant and innovative chemical enterprise, there is little common understanding of issues, and no common goals to achieve a better future.



BUSINESS DIRECTORY

SEARCHING FOR THAT SPECIAL JOB?

There are many companies and organizations searching for chemical and biochemical personnel to fill important jobs in their organizations.

- 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>

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