THE VORTEX

AMERICAN CHEMICAL SOCIETY CALIFORNIA SECTION
VOLUME LXXXIII NUMBER 4 April 2021

The Section nominated CALACS Alternate Councilor, Atefeh Taheri, as 2020 volunteer
(More on page 11)

California Section
American Chemical Society

Women CHEMISTS Committee

All are welcome

Saturday, May 15, 2021

Title
From Water to Human Dynamics: Taking a Non-traditional path to make chemistry more inclusive

Time
10:30 – 11:00 a.m.
Chatting

11:00 a.m.
Talk and Discussion

Reservation
Please register for this Zoom talk by email to office@calacs.org. We need your email address to send the meeting details no later than May 8, 2021 or, RSVP.

Use the link for reservation and meeting place:

https://www.brownpapertickets.com/event/5089184

Cost:
Free

Questions: Contact eyamaguchi08@gmail.com

Dr. Chrissy Stachl

About the Speaker

Dr. Chrissy Stachl (she/ella) graduated from the University of Washington in 2014 with dual B.S. degrees in Chemistry and Neuroscience. Prior to starting her Ph.D., she spent a post-bac research year at the Fritz Haber Institute in Berlin, where she was funded by the German Academic Exchange Service (DAAD) to study the structure of sugar polymers at ultracold temperatures. She began her graduate studies at the University of California, Berkeley in 2015 as a National Science Foundation and Ford Foundation Fellow, where she began using infrared photodissociation spectroscopy to probe the structure and energetics of hydrated ion clusters in the gas phase. Her desire to improve the quality of mentoring interactions that are so critical to graduate student success led her launch a longitudinal study of the Berkeley Chemistry academic climate. Shortly after, she switched the focus of her research to chemistry education and spent the rest of her Ph.D. working to understand the issues that negatively affect diversity, inclusion, and belonging within graduate communities, and designing interventions to directly combat these disparities. Chrissy earned her Ph.D. in Chemistry in 2020 from UC Berkeley and is now the Director of Education, Outreach, and Diversity at the National Science Foundation Center for Genetically Encoded Materials (C-GEM). Outside of work, Chrissy loves spending time with her dog Rosie, indulging in photography, hiking, and camping. She recently also contributed to a Women in STEM all-ages coloring book, created by ColorMePhD (download it here: http://bit.ly/colormephdvol2 for free!)

Abstract

Dr. Stachl's journey to, and through, the University of California, Berkeley, Department of Chemistry contained many unexpected twists and turns. A trained chemist, she started out working in a physical chemistry lab, doing gas-phase research to understand how water molecules interact with each other and the ions they solvate. As one of only a few Latin women in her department of >400 graduate students, she quickly began to feel isolated and had trouble finding individuals that she could relate with. This motivated her to find ways to diversify her department and dedicate time outside of research to start a DEI (Diversity, Equity, and Inclusion) initiative within Berkeley Chemistry. She eventually fell in love with the work she was doing to help ensure that younger generations of chemistry graduate students would not face the same hardships she had overcome, and switched fields to gain a more rigorous understanding of the issues responsible for the diminishing representation of marginalized individuals at the highest levels of academia. In this presentation, Dr. Stachl will talk about the experiences that ultimately motivated her doctoral research in both physical chemistry and chemistry education, as well as the unique path she paved to pursue a career as both a chemist and an educator.

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Chair's Message

The National ACS Spring 2021 Meeting is from April 5 – 30 and has the theme "Macromolecular chemistry: the second century". Yes, the meeting is entirely virtual and while we all miss our friends and colleagues at these meetings, there are some silver linings worth mentioning. For instance, the technical division networking events are likely less stressful over the computer for introverts. Or, more students can attend since there is no cost for travel. So for some, the national meeting may be more accessible over the computer. The fall 2021 meeting, from August 22 – 26, will be a combination of in-person and digital events, taking place in Atlanta, Georgia with the theme "Resilience in chemistry". It's exciting to see how a national meeting will implement the best features of in-person and digital events. I suspect that this format may be here to stay.

The Cal ACS section has had a lot of success with digital meetings, with some events attracting over 100 people. With our section spread out over the Bay Area, more people can attend with a click of a button, rather than having to sit in rush hour to get to a meeting. Though Cal ACS plans to transition back to in-person events once it is safe to do so, I anticipate that many of our events will stay digital. For example, planning a webinar style technical seminar with a speaker halfway around the country is now possible. Or, co-hosting a speaker with another local section in the Midwest. I hope that many of the lessons we have learned and collaborations we have developed over the past year can continue to help us serve more members in an in-person and digital model. But not to worry! Much of the National Meeting is the same. For example, the overwhelming feeling as you look through hundreds of pages of programming will still be there. So please, enjoy the National Meeting and hope to "see" you there!

2021 CCEW Illustrated Poem Contest
Reducing Our Footprint with Chemistry

The California Section of the American Chemical Society (ACS) is hosting an illustrated poem contest for students in Kindergarten through 12th grade. Entries must be sponsored by a local school or community group for verification purposes.

Contest Deadline: April 25, 2021 at 11:59 PM Eastern
Local Prizes: Gift card from a science store of your choice
Local Contact: Sheila Kanodia, sushila.kanodia@gmail.com Submission: Submit entries online at bit.ly/CCEWpoems
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, "Reducing Our Footprint with 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 the CCEW 2021 theme include:

Life cycles	Clean air and water	Environmental footprints
Reduce	Reuse	Recycle

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:

- All poems must be no more than 40 words, and in one of the following styles to be considered: Haiku, Limerick, Ode, ABC poem, Free verse, End rhyme, and Blank verse.
- Entries are judged based upon relevance to and incorporation of the yearly theme (Reducing Our Footprint with Chemistry), word choice and imagery, colorful artwork, adherence to poem style, originality and creativity, and overall presentation.
- All entries must be original works without aid from others. Physical drawings may be scanned or captured via camera and submitted to the online form. Illustrations may be created using crayons, watercolors, other types of paint, colored pencils, or markers.
- The illustration may also be electronically created by using a digital painting and drawing app on a computer, tablet, or mobile device. If the illustration is created using a digital painting or drawing app, the name of the program must be included on the entry form.
- The text of the poem should be easy to read and may be typed before the hand-drawn or digital illustration is added, or the poem may be written on lined paper, which is cut out and pasted onto the unlined paper with the illustration.
- No clipart or unoriginal images can be used.
- Only one entry per student will be accepted.
- Students must be sponsored by a school or another sponsoring group *(e.g. Homeschool Association, Boys and Girls Club, Scout Troop, 4-H, etc.)*.
- 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.

Attila Pavlath Legacy

Nicki Davis

This is the first in a series of articles about the life, career, and legacy of Attila Pavlath. Many of you know Attila through his service to the ACS, but know little of his life or his scientific career. The information in these articles will help fill that gap.

In this article, we learn about Attila's first experience with chemistry and the obstacles caused by World War II that he had to overcome to finish high school and be admitted to university. At the university Attila faced additional difficulties, both scientific and political.

First chemistry experiment

Attila's very first experience with chemistry illustrates his creativity and his attraction to solving practical problems of everyday life. In Budapest, Hungary, in 1942 during World War II, people needed ration coupons to get sugar, but often sugar was simply not available whether you had a coupon or not. To solve this problem, twelve-year-old Attila consulted a chemistry textbook that his father had used as a student at the Technical University of Budapest. He discovered that you could make so-called "potato sugar" by hydrolyzing the starch in potatoes to get glucose. After doing the reaction, however, he discovered that the glucose that he got was both sweet and acidic. Nevertheless, he recalled, "At that time we weren't very choosy."

High school studies and university admission

In ordinary times, Attila would have started high school in 1944. It would have been easy sailing through high school and university to become a chemist. However, these were no ordinary times. The war was much more difficult for the civilian population of Hungary than it was in the United States. Wading through bombings, military actions, contagious diseases, lack of food, and limited transportation prevented Attila from attending classes. Nevertheless, Attila made good use of his time by self-studying the curriculum for the freshman, sophomore, and junior years, passing the exams for each grade level in succession. By 1947 he had made up all three years in only eighteen months and was able to attend his senior year of high school in person, graduating summa cum laude in May 1948.

While there was no opportunity during those years to do actual chemical experiments, Attila retained an interest in chemistry. After graduating high school, he decided to study chemistry at the Technical University of Budapest, where his father had received a degree in mechanical engineering. To qualify, applicants took a three-hour written exam, put it in an envelope, and put an ID number on the outside of the envelope. Identifying applicants solely by number helped eliminate bias, so admissions were based on scholastic merit. Attila was one of 110 out of 720 applicants who were accepted in 1948.

Attila was lucky to get admitted to the university that year, because the next year the post-war Communist government mandated a new admission system that selected applicants based mostly on social factors. If he had applied a year later, Attila wouldn't have been admitted because his father was an engineer and hence a member of the technical intelligentsia. One of Attila's friends applied in 1949 and didn't get admitted until he had worked in a factory for two years to qualify as having the "right" class background.

Attila was lucky to be accepted to university under the old system based on his high scholastic standing. The next five years were increasingly difficult in countries behind the Iron Curtain until Stalin died. Moreover, admission was not a guarantee that Attila would be able to finish his studies.

University years

Being admitted to university wasn't the end of Attila's difficulties. The Communist administration began looking at the background of

continued on page 8

All That Glitters…?
(Part 2)

Bill Motzner

In Part 1 (March 2021 Vortex), I discussed the history of the 1848-1849 California Gold Rush. Gold was discovered by James W. Marshall on the South Fork of the American River (Figure 1) and identified by Jennie Cloud Wimmer (see "California First Chemist?," November 2011 Vortex and Figure 2). So how did this gold get to where it was found? To answer this question, we need to understand some fundamental characteristics of gold, its geochemistry, and also to go back in time.

Some Gold Characteristics

Gold (Au) is one of the 10 to 11 naturally occurring elements known to, or discovered by, ancient civilizations (see "It's Elementary-Part 1," September 2019 Vortex). It's found in the Earth's crust as a native metal. Gold is both malleable and ductile: 30 g (~one ounce) can be beaten or pounded into a thin sheet only a few molecules thick covering more than 28 m2 (300 ft2) of surface. Pure Au is extremely rare with most Au generally alloyed with silver (Ag) and some copper (Cu): an alloy combination known as electrum. The earliest known use was more than 8000 years ago with the oldest existing sample from Nahal Quana, an intermittent stream in Israel and the West Bank, and the northernmost tributary of the Yarkon River.

Pure Au is chemically nonreactive, although it can be dissolved in aqua regia (HNO_3 + HCl), hot H_2SO_4 and with chlorine and cyanide solutions.. It's considered to be non-toxic (CAS no. 7440-57-5) with no biological role. As indicated, it generally occurs as electrum in quartz veins and alluvial placer deposits. The variable concentrations of Au, Ag, and Cu in electrum can be determined by color (Figure 3). Approximately 1,500 metric tonnes (t) are mined each year with most production from China, Australia, the U.S., and South Africa.

Selected gold properties are summarized in the following table:

Table 1: Some Gold Characteristics

Characteristic	Parameter
Symbol	Au (Latin for aurum)
Periodic table position	Group: 11 Period: 6 Block: d
Number of neutrons	118
Relative atomic mass (amu)	196.96655
Electrons per shell	2,8,18.32, 18, 1
Atomic radius (non-bonded)	2.14 Å
Isotopes	197 stable (6 synthetic radioisotopes (194 to 199)
Oxidation states	-I, I, II, III, IV, V
State at 20°C	Solid
Melting point	1064.18 ^{o}C
Boiling point	2807 ^{o}C
Density at 293 K	19.32 g/cm^3
Liquid density	17.31
Hardness	Mohs: 2

Sources: Elements magazine, October 2009, v.5, n.5, p.278.
Royal Society of Chemistry, 2015, Periodic Table App; www. rsc.org.

(continued on page 7

The Earth's crust and mantle are enriched in gold and I'll explore how this came about in my next article.

Figure 1: Photo looking west downstream on South Fork of the American River from the Mount Murphy Road Bridge at James Marshall State Historical Park in Coloma, California. Arrow points to approximate location of the January 24, 1848 gold discovery. Tourists on beach (mid right) were panning for gold. Photo by W.E. Motzer, August 2011.

Figure 2: The Wimmer Nugget held in hand for scale. The 9.5 g (⅓ oz) nugget is permanently stored and displayed at the Bancroft Library, University of California, Berkeley (https://www.lib.berkeley.edu/libraries/bancroft-library/permanent-exhibits). Photo by San Francisco Chronicle: https://www.sfgate.com/news/article/California-s-Glittering-Past-Nugget-that-3008775.php.

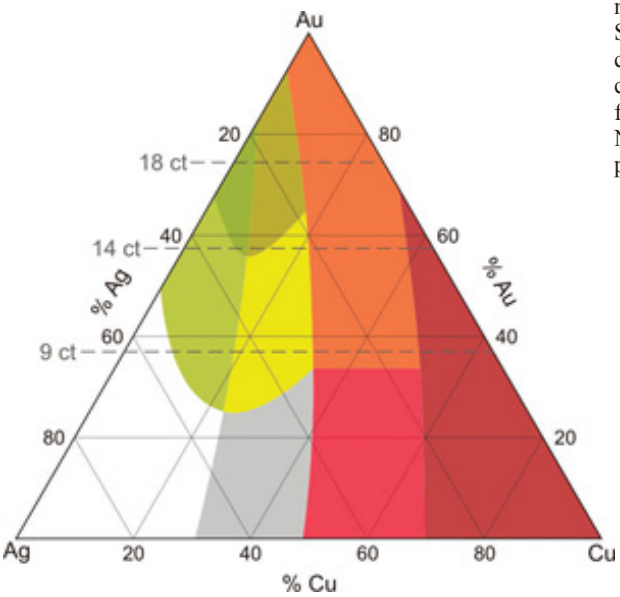


Figure 3: Au-Ag-Cu ternary diagram for electrum showing gold colors. Dashed lines are for gold content in carats (24 carats = pure gold). Modified from October 2009 Elements magazine (v. 5, n. 5, p.299).

Pavlath continued from page 5)

those who had been admitted under the old system, seeking to purge students with the "wrong" background, because admissions were now decided mostly on social factors and membership in the Communist party. Of course, the administration wouldn't give the real reason for trying to get rid of such a person. The students' academic records were scrutinized and used as an excuse to expel them. For example, such students with average grades were ousted because they "weren't doing well." At the same time, the authorities were admitting students who had the "right" social background. For example, a blue-collar worker in a mine with only eight years of elementary school and no high school would be put through a six-week quick education and be admitted to the university with the other students. Fortunately for Attila, he was at the top of the class. He even tutored some of the other students in physical chemistry and mathematics.

At the same time, the authorities were also purging faculty. It didn't matter if you were an outstanding scientist; if your background wasn't suitable, you were out. There was no such thing as academic freedom or tenure. People the authorities didn't like were branded as "enemies of the working class" and simply disappeared. Attila still remembers a morning in the spring of 1950, when the professor of his physics class didn't show up. The administration decreed that the class be divided into four study groups. Since Attila had already demonstrated his talent, he was one of four who were selected to teach physics until a new professor was found. Because he was a straight-A student, Attila survived and finished his university studies in 1952 with a master's degree in chemistry.

Master's thesis and first work on fluorine chemistry

For his master's thesis, Attila chose to work on fluorinated alcohols and their fluorophosphoric acid esters. Attila chose to study these compounds because of their potential as anti-cancer drugs. The compounds were actually a kind of nerve gas, but at the time some research studies indicated that they might stop cancers from growing if used in sub-lethal quantities. He worked to enhance the potency of these compounds in the hope that increasing their potency as a nerve gas would also make them more potent as anti-cancer agents.

These compounds were extremely toxic, whether by inhalation or skin contact. When inhaled, the first effect of these compounds was a narrowing of vision caused by the contraction of the pupil; you would see the world as if through a telescope. "A couple of times I noticed that my vision was getting worse, so I quickly had to stop and take an antidote," he recalls. "It was a very interesting experience."

Attila was quite interested in fluorine chemistry at that time. In his senior year, he was given a teaching assistant job at the university because the authorities recognized his abilities and wanted him to continue his research because it was important. After he graduated in 1952, he was given a faculty

CALLING ALL READERS

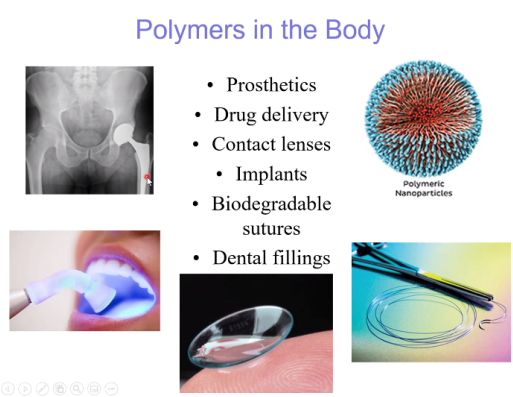
Read a book lately? Share why you liked it with a brief review for *The Vortex.*

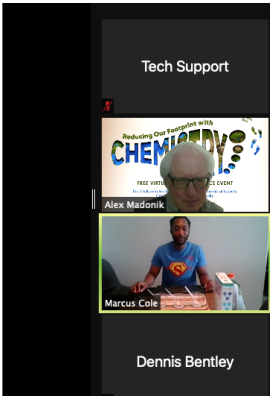
Lou Rigali, Editor

Cal ACS Outreach Goes Virtual – North Bay Science Discovery Day – March 13, 2021

On Saturday, March 13th, 2021, Cal ACS outreach volunteers Alex Madonik and Marcus Cole took to Zoom in two hands-on chemistry sessions hosted by the Bay Area Science Festival's North Bay Science Discovery Day program. Normally scheduled as part of BASF October program, this event was cancelled at the very last moment in 2019 because of the Kincaid Fire (emergency responders pre-empted use of the Santa Rosa County Fairgrounds in Santa Rosa) and was then postposed again in 2020 due to the COVID pandemic. The organizers didn't give up, but recruited teams from 17 different organizations to present over 30 different online activities throughout the day.

Altogether, close to 1000 participants signed up, and nearly 100 joined the Cal ACS presentations at 10 AM and at noon. Our topic was "Sustainable Polymers - Reducing Our Footprint with Chemistry," inspired by the 2021 theme for Chemists Celebrate Earth Week, "Reducing Our Footprint with Chemistry." Marcus is a polymer chemist, and he introduced the audience to polymer chemistry and its many applications:





His slime demonstration was dramatic evidence that the appearance and behavior of a polymer gel depend on the amount of crosslinking, provided by in this case by the interaction of borax with polyvinyl alcohol.

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 LR101898@aol.com, and find out how your valued contribution can be used. Donations to the California Section are tax deductible.

continued on page 10

Alex focused on the need to reduce plastic waste in the environment through recycling and the use of compostable polymers such as “green” plastic bags made with starch, and plastic bottles synthesized from polylactic acid (PLA), a more sustainable raw material than polyester made from petroleum. He then recalled the invention of the Super Ball, another remarkable polymer product that was patented in 1966.

Putting on bright blue safety goggles, he emphasized the importance safety in every chemistry activity, and then showed how adding starch to the slime recipe can turn a jiggly gel into a rubber ball. He demonstrated easy variations of the published recipe that kids can try safely at home – with adult supervision, of course!

How To Make a Bouncing Polymer Ball

By Anne Marie Helmenstine, Ph.D.

We’ll be back on Zoom to celebrate Earth Day on April 24th, please join us then!

Alex Madonik
Cal ACS Outreach Coordinator for National Chemistry Week

Outreach Volunteer of the Year (VOTY)

Outreach Volunteer of the Year (VOTY) awards recognize the immeasurable efforts made by ACS local section and international chapter volunteers who conduct outreach and teach the public about chemistry. ACS presents awardees with a small gift and a certificate during a meeting or event. The awardees are also recognized at the annual ChemLuminary Awards, on social media, and in a special article in C&EN.

The Section nominated Atefeh Taheri, alternate councilor for Cal ACS, as volunteer of the year for 2020. Atefeh spearheaded collaborations between Cal ACS and the East Bay chapter of AWIS. One event, featuring the author Lois Frankel, had over 100 attendees and was a great success as the first joint event between Cal ACS and AWIS. Atefeh has also planned numerous events focusing on diversity in the sciences, featuring local speakers to the Bay Area. Atefeh has also planned a movie screening of "Picture a Scientist" where she raised over $4,000 in donations for a STEM-focused scholarship. She has also planned networking events and technical presentations. Atefeh's contributions to Cal ACS in 2020 were important for continuing to serve our members. We appreciate her hard work.

Atefeh received a BSc in chemistry and MSc in analytical chemistry from Sharif University of Technology in Tehran, Iran, a PhD in chemistry from Johns Hopkins University and postdoctoral research at UC Davis.

She is a Product Lifecycle Specialist at Chevron Corporation, Chevron Lubricant's business.

Since receiving the award, Atefeh has continued to go above and beyond for the Section, and has planned the following:
Technical talk: Lubricants and Glitter: Revolutionizing Sexual Assault Investigation (speaker: Prof. Candice Bridge) International Women's Day celebration, on March 8th. Bimonthly happy hour and career conversations with Barbara Smith, first session focused on Resilience.

Atefeh is on the leadership team of the East Bay chapter of the Association of Women in Science. At Chevron, she is one of the Richmond's PRIDE leaders, a Chevron ERG, aimed at providing
an impactful and inclusive environment for all LGBTQ+ employees. She is also a partner in the FUTURE program at UC Davis aimed to assist PhD students and postdoctoral researchers pursuing non-academic careers.

Thanks to Alicia Taylor and Jim Postma for writing the nominating document.

CALIFORNIA SECTION
AMERICAN CHEMICAL SOCIETY

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