

THE VORTEX

AMERICAN CHEMICAL SOCIETY
VOLUME LXXXIII NUMBER 1

CALIFORNIA SECTION
January 2021



Alicia Taylor, Chair CalACS 2021

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Reactivity-Directed Analysis – A novel approach for the identification of toxicants in drinking water

Wednesday – January 13, 2021 – 12:00 to 1:00 PM (Pacific)
Online Zoom Event

Carsten Prasse, an assistant professor of environmental health and engineering, focuses on the occurrence and fate of organic contaminants in the urban water cycle and their impact on environmental and human health. Current projects include developing new technologies to remove contaminants from wastewater and drinking water, methods to assess the impact of chemical exposures to human health, and investigations of the presence of agrochemicals in manure from concentrated animal feeding operations. The presentation will be followed by a Q&A.

[RSVP here!](#)

Zoom link to be shared with attendees the day of the event.

Our Distinguished Panelist:



Carsten Prasse, PhD
Assistant Professor
Johns Hopkins

The event is FREE and open to the community. More information at: calacs.org or email aliciaataylor@gmail.com

CALLING ALL READERS

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

Lou Rigali, Editor

THE VORTEX

Published monthly except July & August by the California Section, American Chemical Society. Opinions expressed by the editors or contributors to THE VORTEX do not necessarily reflect the official position of the Section. The publisher reserves the right to reject copy submitted. Subscription included in the annual dues payment. Nonmember subscription 25.

MAGAZINE OF THE CALIFORNIA SECTION, AMERICAN CHEMICAL SOCIETY

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Printed in USA on recycled paper

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Chair's Message



Welcome 2021!
Words that are uttered by many with a sigh of relief - though we still have much to overcome in 2021. More on that in a bit! I'd first like to introduce myself. I've been an ACS member for close to a decade

and a very active ACS member for the last four years. I'm an environmental toxicologist by training and was lucky enough to move to California ten years ago to complete my graduate education. And I never looked back – what a great place to live!

I am very excited to serve as the Chair of the California section in 2021. 2020 wasn't the year we were all expecting – a pandemic, massive job loss, social protests, and a divisive election. This past year was a big challenge and was felt by our members, our neighbors, and our community. However, our section rose to meet the challenge. We transitioned to Zoom events so that we could continue serving our members. We hosted speakers on systemic racism and diversity in the sciences, and also focused on teaching women and young professionals how to be successful in the workplace. We had professional development and networking events for students, and even initiated a

high school monitoring program. This was all on top on our monthly technical chemistry presentations. I am proud to serve as Chair of the California section because of our volunteers' continued dedication and passion for serving our section, despite the many personal and professional challenges of 2020. In addition, we had many new volunteers reaching out to our executive committee in 2020, eager to donate their time to planning events that help others. Thank you to all of those that stepped up, new and old, to the challenges of 2020 and helped us grow as an organization.

Many challenges are still ahead in 2021 – the months-long vaccine roll-out and systemic racism being two urgent problems.

I also can't say for certain what 2021 will bring in terms of our typical in-person events. However, the California section will continue to offer programming that addresses the core values of ACS – empowering scientists by providing the latest scientific and career information through our education programs, career services, and professional development opportunities, and promoting an environment where we value diversity, inclusion, and respect. Please be sure to check out our event calendar at calacs.org and event flyers on our Facebook and LinkedIn pages. I'm really looking forward to serving the California ACS members in 2021.

Alicia Taylor



THE VORTEX

Green Laboratories in Industry and Academia: Sustainability in Practice

Tuesday – January 26, 2021 – 5:00 to 6:30 PM PDT
Online Zoom Event

Please join us to learn more about green lab programs in industry and academia. Panelists will discuss their approach to starting green labs, actions they have taken, and how they measure success. The event will include a moderated panel discussion with brief presentations from panelists, followed by audience Q&A.

[RSVP here!](#)

Zoom link to be shared with attendees the day of the event.

Our Distinguished Panelists:



Kristi Budzinski, PhD
Genentech
Sustainable Science
Program Lead



Quentin Gilly, MS
Harvard University
Manager, Laboratory
Sustainability & Energy



Wendy Goldsby, MS
Senior Director EH&S
Amyris, Inc.



Rachael Relph, PhD
My Green Lab
Chief Sustainability
Officer
*Panel Moderator

The event is FREE and open to the community. More information at: calacs.org or email aliciaataylor@gmail.com

Metal-Organic Frameworks: From Energy Storage to Drug Delivery

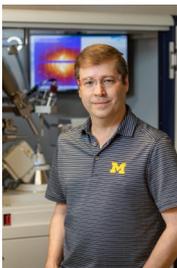
**Wednesday – February 3, 2020 – 12:00 to 1:15 PM (PST)
Online Zoom Event**

Are you fascinated by crystals and porous materials? If this spark your curiosity, please come and join our lunch presentation by Prof. Adam Matzger from University of Michigan, an expert on porous materials and crystallization. In this presentation, Prof. Matzger will guide you through a journey of synthetic and functionalization strategies of metal-organic frameworks (MOFs), as well as exploring the recent advances of MOFs in gas adsorption and their potential in drug encapsulation and delivery. The presentation will be followed by a Q&A.

[RSVP here!](#)

Zoom link to be shared with attendees the day of the event.

Our Distinguished Panelist:



Prof. Adam Matzger, PhD
University of Michigan
Charles G. Overberger Collegiate Professor of Chemistry,
and Macromolecular Science & Engineering

The event is FREE and open to the community. More information at: calacs.org or email sonia.lin@alumni.ubc.ca

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 and find out how your valued contribution can be used. Donations to the California Section are tax deductible.



Digital Dentistry Revisited Part 4 Bill Motzer

In Parts 1 through 3 (October, November, and December 2020) Vortex, we explored the origins of calcium and magnesium in our bones and teeth and determined that human teeth, particularly dental enamel, have an extraordinary chemistry and structure. Rather than elaborate on this topic, an excellent summary can be found in the October 26, 2020 issue of *Chemical & Engineering News (C&EN)* by Leigh K. Boerner (see: <https://cendigitalmagazine.acs.org/2020/10/20/what-is-dental-enamel-and-how-does-it-protect-your-teeth-2/content.html>),

One of the most interesting aspects of Leigh Boerner's article is the formation on our teeth of dental plaque (aka dental calculus). Dental plaque forms from bacterial (and some fungi) biofilms growing on tooth surfaces and between the teeth, generally at and below the gum line. Approximately 30 to 40 percent of plaque is composed of dead bacterial cells and saliva proteins (e.g., polysaccharides and glycoproteins). The remaining 60 to 70 percent is composed of live bacteria such as *Streptococcus sanguinis* and *Streptococcus mutans*. However, about 1,000 different bacterial species have been identified in human plaque and if these bacteria that convert sugars (generally sucrose from candy and other sweets) rather rapidly into acids (e.g., lactic acids) and it's the acids that attack the teeth causing dental caries or cavities. Therefore, bacterial plaque is considered one of the major causes of dental decay and gum disease.

When plaque first forms, it's a sticky whitish- to yellowish-brown substance that rapidly hardens forming dental tartar. Other substances including bacteria and viruses and proteins are also incorporated into the plaque and these reflect foods that we've eaten. Although daily brushing removes some dental plaque, it tends to accumulate

over time and dentists will scrape off the tartar accumulations during semi-annual "cleaning" visits. While we may enjoy the hygienic effects from such modern dentistry, our ancient ancestors did not and such teeth, with associated plaque recovered from ancient skeletal remains, have been used to determine what they ate and where their food came from. This forms the basis of dental bioarcheology and dental paleopathology science, which are the studies of teeth derived from archeological sites.

Analysis of ancestral dietary habits is important in determining ancient human cultures because diet has played such an important role in how ancient populations and cultures evolved. Different techniques are used, ranging from analysis of heavy occlusal tooth wear, in which macroscopic and microscopic wear patterns can determine differences between a hard fibrous diet, typical of hunter-gatherers, or softer plant foods consumed by agriculturists. Additionally, ancient food-web trace element and stable isotope (e.g., carbon and nitrogen) distributions compared with distributions in skeletal remains are useful in determining the spread of agriculture in ancient civilizations. (See "Saluting Stable Isotopes-Parts 3 and 4: Osteochemistry" in the November 2014 and January 2015 Vortex, respectively.)

Most recently, archeologists have also begun using DNA sequencing of ancient dental calculus, particularly bacterial and viral remains. This provides understandings of the oral microbiome's evolution and impacts of major biocultural human health transitions throughout history and prehistory.

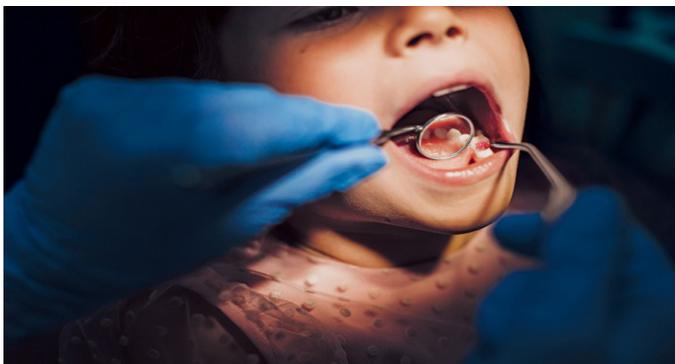
Insights into such ancient ancestral diets can be found in recent research paper by Scott, et al., in the journal *Proceedings of the National Academy of Sciences* or PNAS (see <https://www.pnas.org/content/early/2020/12/16/2014956117>). The authors identified exotic food remain in dental calculus (plaque) from Middle Bronze to Early Iron Age inhabitants in the Southern Levant. Recovery and identification of diverse food

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stuffs was accomplished using molecular and microscopic techniques from more than a dozen skeletons recovered from Tell Erani near Megiddo, Israel. Micro-remains and analysis of dietary plants and proteins indicated importation of exotic foods from South and East Asia during the second millennium BCE (about 3,500 to 3,100 years ago). The research provided the earliest direct evidence of such foods imported to the Mediterranean area, but also included consumption of expected staple foods such as cereals, sesame seeds, and dates. The more exotic foods such as soybeans, probably bananas, and turmeric, when compared to a library of molecular signa-

tures, suggested importation from more distant lands, such as India and Indonesia. The research recognized the complexity of early long distance trade routes, prior to the ancient Roman era. This suggested that some people (perhaps the wealthier) in the Eastern Mediterranean had access to food from these distant lands and such goods were possibly imported and consumed as oils, dried fruits, and spices. Such research requires us to rethink the complexity and intensity of Indo-Mediterranean trade during the Bronze Age and the degree of globalization in early Eastern Mediterranean cuisine. So, the next time you brush your teeth while looking in the mirror, remember that there's more to your teeth than just a smile.



Dental cleaning. Photo from October 26, 2020 issue (pp 24-25) of Chemical & Engineering News (C&EN) by Leigh K. Boerner



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Book Review

The Chalice and The Blade: Our History, Our Future

By Riane Eisler.

This book got a front cover recommendation as the most important book since Darwin's *Origin of The Species*, so writes Ashley Montague. It is not a new book, only published in 1988; It was recommended to me as a must-read. As it turns out it was a very important read for me.

The book starts by looking at the role that females and males play in Western culture. The author introduces two words into our vocabulary: Gylany to denote a culture where women and men have equal status and work in partnership with each other. This should not be confused with matriarchy which implies a dominant role for females in the culture. The other word is Androcracy describing a male-dominant society or culture similar to patriarchy.

In the first 40 pages the author examines and reinterprets the prehistoric archaeological record and finds evidence that supports her hypothesis that prehistoric culture had woman in the center of their society. She goes into detail how she comes to that conclusion.

She continues into historic times starting with the island of Crete, the rise and fall of ancient Greece and works her way to modern times. She describes those times when Gylanic culture was ascending or descending.

Most of recorded history shows a male-

dominant culture, one in which, aggression and competition lead to conflict and war.

In those periods of time when the cultural shifts began to increase partnerships between the sexes, there was resurgence of art and creativity. In each case the established male dominant society, supported by religion and, systemic modes of behavior, held most shifts to a minimum, at least for a time.

The historic record is clear, when males are in control, aggression and war are inevitable. Given the destructive power of nuclear weapons and their accessibility by any nation or small group, the next war, either by accident or purpose, can cause severe damage and annihilation of many species including humans..

The good news is that the women's movement has advanced more than anytime except for prehistoric times. It may not be on the scale to create a cultural shift large enough to peacefully meet the resistance of the current culture. However, cultural changes happen when there are fluctuations or serious disruptions to the culture. This is such a time consisting of many unprecedented changes, world wide changes. It is also a time when the tools and cognitive knowledge on how to address conflicts peacefully are available to all.

The last paragraph was probably more my thoughts than the author's.

Lou Rigali



Both Remote and On-Site Workers are Grappling with Serious Mental Health Consequences of COVID-19 Kaiser Health Foundation Rabah Kamal, Nirmita Panchal, and Rachel Garfield Follow @RachelLGarfield on Twitter, Dec 22, 2020. Facebook Twitter LinkedIn,

While millions have recently lost their jobs or income and face new stresses, many who have been working during the pandemic also face new pressures. Almost overnight, the COVID-19 pandemic presented many workers with a whole host of concurrent risk factors for poor mental health and substance use problems, including generally high levels of uncertainty and fear, an overload of news and information, changes to workplace processes and demands, changes in household dynamics, financial and job security concerns, potential worsening of existing health conditions, and difficulties linked to care giving. People working during the pandemic face unique threats to mental health and well being depending on which sector they work in and their potential exposure to the corona virus. Generally speaking, surveys conducted during the pandemic have found that many workers have been experiencing burnout (which results from chronic workplace stress and can impact an individual's motivation and productivity) and adverse mental health outcomes.

As the pandemic persists, frontline and other essential workers face particular risk of burnout and poor mental health outcomes. Roughly a third of U.S. adults report being essential workers during the pandemic, meaning they are still required to work outside their home during the pandemic, and they are more likely to be Black and low-income than non-essential workers who can work from home. Surveys conducted in June 2020 found that although a substantial share of all adult workers reported symptoms of anxiety or depressive disorder, essential workers reported these adverse effects more often than non-essential workers (42% vs 30%).

Essential workers, compared to non-essential workers, also reported higher rates of substance use (25% vs 11%) and suicidal thoughts (22% vs 8%).

Among Essential and Nonessential Workers, Share of Adults Reporting Mental Distress and Substance Use, June 2020:

Research has found that during pandem-

ics, frontline health care providers are at higher risk of adverse psychological outcomes such as post-traumatic stress, insomnia, and suicidal ideation. During the COVID-19 pandemic, resource and staffing shortages and disrupted work-life balance have contributed to poor mental health outcomes for health care providers. Caregivers face unique risk of burnout and other adverse mental health outcomes as well, including those working in long-term care facilities and those who are unpaid and caring for family members or other loved ones needing support during the pandemic. Surveys from June 2020 found that 31% of unpaid caregivers for adults seriously considered suicide in the past 30 days.

High rates of burnout and adverse mental health impacts are reported among people working remotely during the pandemic. Many workers with the ability to work from home have been doing so during the pandemic. Combined with the closure of schools, daycares, and public spaces, this has left many workers not only newly working from home but also facing new stresses, additional responsibilities at home, and a fading work-life balance. Still many others who live alone shifted to working from home while also socially distancing in isolation, which is linked to poor mental health. Non-probability surveys conducted in summer 2020 found that many people working from home reported experiencing burnout, and nearly half of adults working from home experienced stress, anxiety, or depression. Many of these adults reported that these experiences began or worsened after they started working from home.

The pandemic has been disproportionately wearing on women in the workforce and has likely exacerbated existing gender disparities in career and financial opportunities and stability. Data from the Household Pulse Survey have consistently indicated that among adults who worked in the past seven days, a greater share of women than men reported symptoms of anxiety and/or depressive disorder Other research shows

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that respondents who are women are more often experiencing adverse mental and physical health effects of the pandemic and that women in the workplace are more likely than men to report not feeling supported by leadership. Additionally, among parents who work full-time and have partners, mothers more often than fathers are likely to feel overwhelmed and unable to handle their workload. These disparate experiences could have significant long-term consequences for women in the workplace.

A McKinsey and LeanIn.org analysis during the pandemic found that one in four women say they may either leave their job or cut down on their work, noting that working mothers, Black women, and women in leadership roles are uniquely at

risk of leaving their jobs or cutting back on work.

Among Adults Who Worked in the Past Seven Days, Share of Adults Reporting Symptoms of Anxiety and/or Depressive Disorder, by Gender:

Poor mental health among workers can have serious implications for both worker well being and economic outcomes. Importantly, the pandemic's disparate impact on the mental health and well being of workers of color and working women highlights yet another vulnerability of groups already disproportionately impacted by the pandemic in numerous other ways. Both the human and fiscal impact of the pandemic's toll on worker mental health will be important for employers and legislators to consider in determining the needs of the workforce through the remainder of the pandemic and beyond.



Secrets of COVID-19

Do car emissions make COVID worse? Why do more men die than women? Researchers — including a 14-year-old from Texas — are getting closer to finding answers.

Stateline: Emissions Exposure May Increase COVID-19 Mortality

Researchers say they're seeing indications that the pollutants spewed out of tailpipes are making the people who breathe them at high levels more likely to die from COVID-19. Much of the analysis is still in its early stages, but several studies, some not yet peer-reviewed, show high levels of ni-

trogen dioxide and fine particulate matter correlate with higher mortality rates from the virus. (Brown, 10/19)

Modern Healthcare: Experts Worry Antibiotic Resistance May Be Worsening During COVID-19

Although inroads have been made in combating antibiotic resistance, infection control specialists are worried that misuse of antibiotics on COVID-19 patients—on top of cuts to stewardship programs and burnout of infection control staff—will only worsen the crisis. (Castellucci, 10/17) Reprinted in part from the Kaiser Health on-line Health News, www.Kaiserhealthnews.org



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