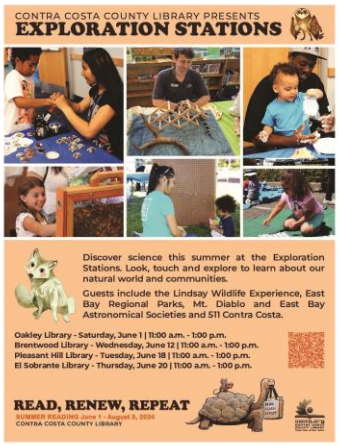
# THE VORTEX

The American Chemical Society - California Section Newsletter www.calacs.org

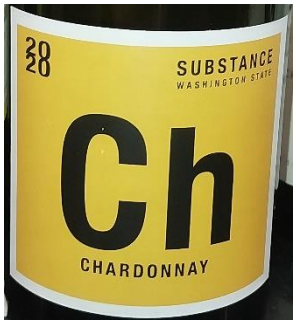
June 2024 Volume 86, Issue 6

**Up Coming Events / News**
**History, Education, Employment, Career**










**Reviews**



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**MAGAZINE OF THE CALIFORNIA SECTION, AMERICAN CHEMICAL SOCIETY**

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Top left: Alex Madonik – Exploration Station
Top center: Donald MacLean – Wine Label
Middle center: Donald MacLean – Collected Rocks
Middle right: Marin / Sonoma Mosquito and Vector Control District – District Logo
Bottom Right: Alex Madonik – 300 L Tank.

If you have material you think is worthy, submit it to donald.maclean.acs@gmail.com.

**Looking for an Author to Write about the Decline in Professional Society Membership.**
Editor Note.

I would like to get someone to write an article on declining membership in professional organizations. In last month's The Vortex, Paul Vartanian put in a statement about paying sectional dues. We had less than 50% members pay voluntary local dues this year. We have suffered a major decline in membership from 2019 to 2022. Some people blame covid and the lack of in-person meetings, but now that the covid pandemic is over and in person / hybrid meetings are back, the membership numbers have not rebounded so this excuse does not seem valid. It could be our focus on DEI, lack of professional networking and continuing education, or just individual (me only) interest coming into play. Two weeks ago, I attended an AAPS social meeting that had 15 people attend with a nominal $5 or $10 cover fee. 15 years ago we would have had 200 people pay $50 to attend. **What do you think is going on?**

# Upcoming Events

Donald MacLean

1. Exploration Stations Are Back And Cal ACS Will Be There**:**

    - Oakley Library – Saturday June 01 | 11 am – 1 pm
    - Brentwood Library – Wednesday June 12 | 11 am – 1 pm
    - Pleasant Hill Library – Tuesday June 18 | 11 am – 1 pm
    - El Sobrante Library – Thursday June 20 | 11 am – 1 pm

See following page for circular.

2. June 11: Second annual Pride-Juneteenth event will be held at Don Castro Regional Recreation Area, located at 22400 Woodroe Avenue, Hayward, CA 94541. We have reserved the Siesta picnic spot for June 15th, Saturday, from 11 am to 2 pm. This is a beautiful, shady spot with a reasonable cost for our section and fits up to 100 people.

See following page for circular.

3. Section Meeting – Join the California Section for a Virtual talk with

    **Guest Speaker:** *Maria Silva Elipe, PhD,* Scientific Associate Director | NMR Technology, Amgen
    **Topic:** "The wonders of a 400 MHz HTS magnet system, how it works and our results at Amgen"
    ***Date:*** *Friday, June 21st, 2024*
    ***Time:*** *10:00 am- 11:00 am (PDT)*
    ***Location:*** *ZOOM*
    **Cost:** Free

CONTRA COSTA COUNTY LIBRARY PRESENTS

# EXPLORATION STATIONS






Discover science this summer at the Exploration Stations. Look, touch and explore to learn about our natural world and communities.

Guests include the Lindsay Wildlife Experience, East Bay Regional Parks, Mt. Diablo and East Bay Astronomical Societies and 511 Contra Costa.

**Oakley Library - Saturday, June 1 | 11:00 a.m. - 1:00 p.m.**
**Brentwood Library - Wednesday, June 12 | 11:00 a.m. - 1:00 p.m.**
**Pleasant Hill Library - Tuesday, June 18 | 11:00 a.m. - 1:00 p.m.**
**El Sobrante Library - Thursday, June 20 | 11:00 a.m. - 1:00 p.m.**

## READ, RENEW, REPEAT

**SUMMER READING June 1 - August 3, 2024**
CONTRA COSTA COUNTY LIBRARY


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ACS Chemistry for Life® | California Section


# Cal ACS Picnic

**Saturday, June 15, 11 am - 2 pm PT**
**Don Castro Regional Recreation Area - Siesta picnic site**
**22400 Woodroe Avenue, Hayward, CA 94541** Activities and Highlights:

- Trivia about Cal ACS, Juneteenth, and PRIDE
- Exciting prizes for trivia winners
- Some other fun games
- Delicious food and refreshments
- Networking opportunities with fellow participants
- Scenic location surrounded by nature

**This is a free event, but registration is required for all participants.**

**RSVP Here!**

Feel free to dress in PRIDE theme attire:

Feel free to express yourself and show your support for PRIDE! Dress in attire that represents PRIDE to you.

**More information at: calacs.org or email Taheri.atefeh@gmail.com**

# The wonders of a 400 MHz HTS magnet system, how it works and our results at Amgen
## Friday – June 21, 2024 – 10:00 to 11:00 AM PST
## Online Zoom Event

María Victoria Silva Elipe, Ph.D., is a Process Development Scientific Associate Director who works at Amgen, Inc., since 2003 as NMR Leader at the Attribute Sciences department supporting drug development from early clinical stages to commercial for small molecules and hybrid modalities. Her work focuses on low and high field NMR on structure characterization, reaction monitoring, and quantitation for synthetic and hybrid modality programs, and TD-NMR applications for small and large molecules. Prior to that, she worked for Merck & Co., Inc., as NMR spectroscopist for the DMPK department on the structure of metabolites by NMR and LC-NMR and supported medicinal chemistry for synthetic small molecules and peptides. She obtained her Ph.D. in Natural Products Chemistry at the University of Málaga, Spain, in 1991, focused on isolation, synthesis, and structure characterization of natural products. After that, she worked in the field of marine natural products for Pharma Mar, S.A., in Madrid, Spain, and for Prof. Kenneth Rinehart at the University of Illinois at Urbana-Champaign. Then she worked on protein and protein-DNA complex structures by NMR for Prof. David Kearns at the University of California, San Diego. Before she moved to industry, she worked as an Assistant Professor of Chemistry at the University of San Diego. Currently she is also a lecturer for the chemistry department at California State University, Channel Islands, since 2014.

RSVP here!

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

**Our Distinguished Panelist:**

**Maria Silva Elipe, Scientific Associate Director | NMR Technology**

**The event is FREE and open to the community. More information at: calacs.org or email mozafari.mina20@gmail.com**

# Directors Select Charles Gluchowski as New Trustee

Paul Vartanian

Charles Gluchowski has been appointed as a Trustee to the Board of Trustees. He will assume the remaining portion of Al Verstuyft's position on the Board of Trustees.

# 2 Receive Honors and 1 Receives High Honors from the Section Olympiad Exam

We distributed the Part 1 exam scores to the 16 students from our Section. Part 1 is a 60-question multiple choice exam and our students had an average score of 29 which was above the national average of 26. Two students from Washington High (their names are not mentioned due to their minor status) made Honors (the top 51-151) students and will be sent $50 for their achievement. One student from Mission San Jose made High Honors (the top 50 students) and will attend Study Camp (the top 20 students) and will receive $150 for her achievement.

Editor Note: Information provided by Eileen Nottoli.

# Anniversary and Service Awards

Organizer Julie Mason, Photographer Alex Madonik, Editor Donald MacLean

| 50 Years | 60 Years | 70 Years |
|---|---|---|
| Susan F. Barquist | Orm Aniline | Charles R. Bertsch |
| Richard Behrens, Jr. | Bruce N. Ames | Elton J. Cairns |
| Michael W. Burgett | Denis J. Bogan | Dennis M. Fahey |
| Alan R. Case | Wayne M. Camirand | Henry Y. Lew |
| David E. Enas | Rosalind P. Clark | Scott Lynn |
| Fred A. Hajduk | Richard P. Cotter | James W. McFarland |
| Frances A. Houle | Michael J. Fluss | |
| W. Douglas Hounshell | Urban S. Kern | |
| Daniel S. Lent | Judith P. Klinman | |
| David S. Lingenfelter * | Ronald E. Leone | |
| William K. Mainquist | William J. McKinney | |
| Rich B. Meyer | Alexander Mihailovski | |
| Gregory P. Morris | Joanne Myers | |
| George H. Robertson | Kenneth E. Osborn * | |
| Charles B. Ungermann | Roger W. Phillips | |
| Do Y. Yoon | Nathaniel S. Prichesky | |
| | Kenneth N. Raymond | |
| | Kenneth K. Rice | |
| | Edward T. Sabourin | |
| | Robert L. Stevenson | |
| | Marvin N. Yudenfreund | |

* Green text with following asterisk means person attended event.


Chair Patrick Lee, Presenter Marinda Wu, and Awardee David Lingenfelter.


Chair Patrick Lee, Presenter Marinda Wu, and Awardee Kenneth Osborn.


Top: Oana and Dino Leonte, Norm Wu, Margareta Séquin, Jim Postma.
Bottom: Dino Leonte, Oana Leonte, Norm Wu, Marinda Wu, Linda Wraxall, Alex Madonik.

***The Walter B. Petersen Award for 2024*** is awarded annually to a California Section member for outstanding service for an extended period to the Section. The recipient for 2024 is Robert "Bob" Bussey. Bob has been a pivotal member of the Board of Trustees for 10 years. He is currently the chair of the Board. During his term of service, he has pushed to have the Trustees think about ways to invest which give the Section's funds a long and robust life. The Trustees try to invest based on the proposition that the Section will live "forever" and that the trust funds should always be able to provide support for its financial needs. This has been difficult over the last few years as the pandemic exposed the flaws of former bedrock investments. The daily gyrations of the investment markets also pose difficulties to the Section's investment strategies. Bob and the other Trustees, however, have overseen the trust funds well and the Section is in good financial shape.


Chair Patrick Lee, Awardee
Bob Bussey, Marinda Wu.

***The 2024 Lloyd Ryland Outstanding Teacher Award*** recipient is Rochelle Morris, PhD of Foothill High School, Pleasanton CA. Rochelle has been teaching chemistry and science for 21 years. She teaches Chemistry, AP Chemistry, and is a USNCO test advisor. Rochelle's has continuously helped her students prepare for the National Chemistry Olympiad (NaCHO) national exam every year, and her students do well in the exam. (Not in attendance)

***The 2024 Outreach Volunteer of the Year*** is presented by the California Section to honor outstanding volunteers. This year's recipient is Vanessa Marx. Vanessa has volunteered her time helping with many Outreach Programs at UC Berkeley and Family Science Nights to name a few. Vanessa is now serving as the Chair for the 2025 Western Regional Meeting. (Not in attendance)

# Chemistry in Action – Wine Label

Donald MacLean

I saw an eye-catching wine label at a high-end store in Santa Barbara. It took me a while to figure out the 20 20 double print in the upper left is the year. This brand has a number of wines that use the periodic table label format.[1] I actually was thinking calcium when I saw the 20 in the upper left. All their wines use a 2-letter symbol with the first letter capitalized, and the second letter lower cased. Under the symbol is the name, in the upper left is the year, and the upper right is the manufacturer. I looked this brand up and found cesium, antimony, rubidium (Cabernet Sauvignon, Sauvignon Blanc, and a red blend). I guess Me is the methyl group (Merlot). It turns out that many wines have been given two letter abbreviations and put into a periodic table format. Sometimes there are 2 wines that have the same abbreviations. In 2 cases a wine has a one letter symbol and 2 label symbol version. Looks like a version of IUPAC is needed. Here are some common wines I found with their real description.[2,3,4]

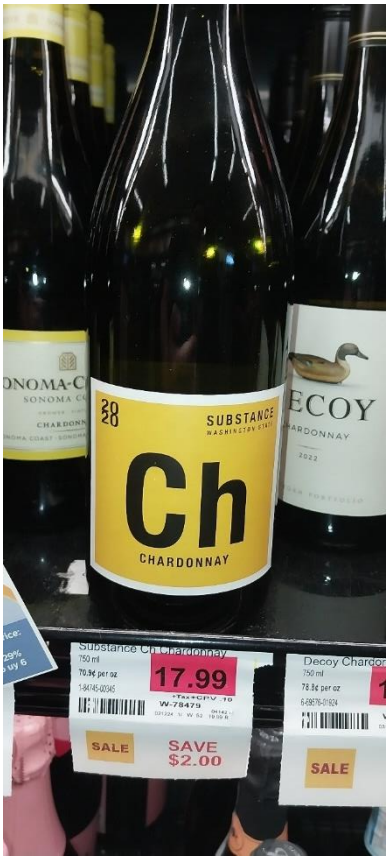


Figure 1. Picture of Wine Label in Periodic Table Appearance.

I also found wine types presented in the form of the periodic table. Unfortunately, there is no consistency with what wines are included in the tables. The clip and snip shown in Figure 2 has 127 wines grouped, organized by their essential color horizontally and, aroma and flavor properties vertically, with sparkling, fortified and sweet wines as a separate property group by color. The "elements" are arranged to offer an overview of how different styles of the world's wines relate to one another. In this table the number starts in the top left and works vertically then moves right one column and repeats the process 14 times for a total of 16 main group columns for a total of 104 wines.

Rows 1 and 2 are fruit and spicy.
Rows 3 and 4 are floral.
Rows 5 and 6 are green and mineral.
The left half (8 wines) of the chart are white wines, the right half (8 wines) of the chart are red wines.
Full left column is full body whites, left center columns are lighter white.
Center right starts at rose, the lighter red, and at the furthest right column full-bodied reds.

After the 104th wine, a supplemental group containing sparkling, sweet and fortified wines are also staged by color [not shown].
Sparkling row: White #105 to #109, Red #110 to #112
Sweet row: White #113 to #115, Red #116 to #118
Fortified row: White #119 to #123, Red #124 to #127

In each box the upper right corner is the type of wine, G= grape variety, R= region / appellation, S = style, in the upper left is wine number. There are other wine periodic versions where the abbreviations are close but sometimes are different for the same wine, or an abbreviation is used for another wine.

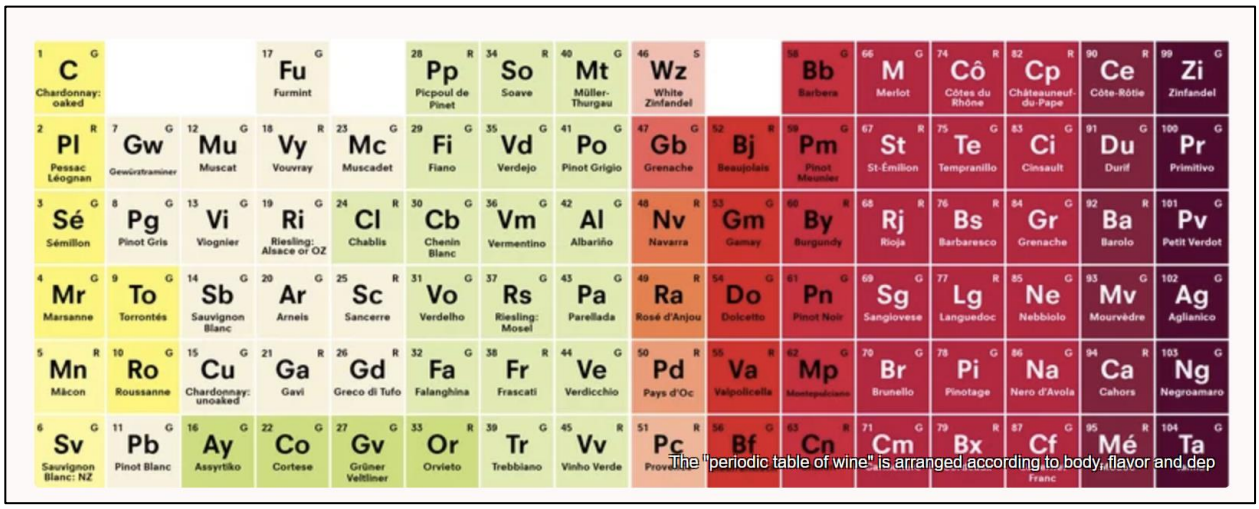


Figure 2. Snip and Clip for the Wine Type Periodic Table main group.[2] The other wines are below in amendment rows.

| Table 1. Wine Symbols.<br>The abbreviations come from multiple sources. | | | |
|---|---|---|---|
| Abbreviation | Name | Color | Element Key (grape, region/appellation, style) unknown |
| Bx | Blend / Bordeaux | red | Style / region |
| Cf | Cabernet Franc | red | grape |
| C | Chardonnay | white | grape |
| Ch | Chardonnay / Champagne | White / sparkling | grape / region |
| Cs | Cabernet Sauvignon | red | grape |
| Co | Counoise / Cortese | rose / white | X / grape |
| Cô | Côtes du Rhône | red | region |
| Cu | Chardonnay unoaked | white | grape |
| Ga | Syrah SuGaSy / Gavi | red / white | grape / region |
| Gw | Gewürztraminer | white | grape |
| Gr | Grenache | red | grape |
| M / Me | Merlot | lighter red | grape |
| Ma / Mb | Malbec | red | grape |
| Mn / Mr | Marsanne | white | grape |
| Mt | Müller-Thurgau | white | grape |
| Pg | Pinot Gris | white | grape |
| Pn | Pinot Noir | red | |
| Rb | Red blend (45% Cabernet Sauvignon, 43% Merlot, 10% Malbec, 2% Sangiovese) | red | style |
| Re / Ri | Reisling | white | grape |
| Rn / Ro | Roussanne | white | grape |
| Ro | Rosé Syrah | rose | grape |
| Sb | Sauvignon Blanc | white | grape |
| Se | Sémillon | white | grape |
| Sy | Syrah | red | grape |
| Te | Tempranillo | red | grape |
| Vg / Vi | Viognier | white | grape |

If you like beer there is another periodic table that classifies vertically by beer type. This one is more like chemistry periodic table with density, alcohol volume, color, bitterness, etc., unlike the wine versions where color and taste are the main classification parameters used to create the periodic table appearance. The snip and clip of the key is below.

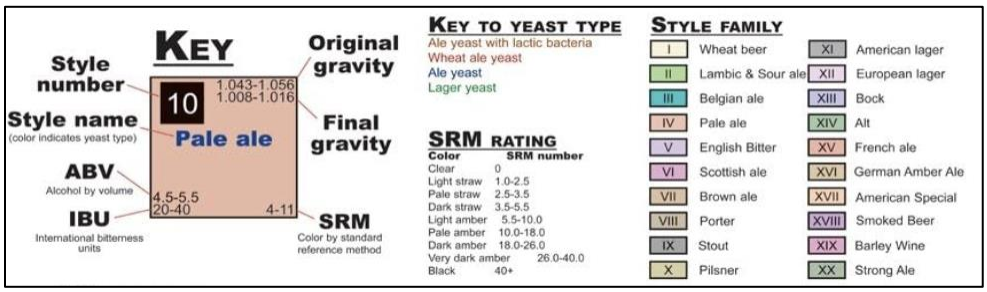


Figure 3. Snip and Clip for the Beer Type Periodic Table. [5]

**References:**


1. Wine data base - https://www.cellartracker.com/list.asp?Table=List&iUserOverride=0&fInStock=0&Producer=Substance&Page=3#selected%3DW951226_25_K072abcf2bc4459712537cdb44c7f55c3
2. Check Out This Periodic Table Of Wine Infographic – via SARAH ROWLANDS - https://www.foodrepublic.com/2017/04/13/wine-table/
3. Pinterest Image. - https://www.pinterest.com/pin/407294360021649385/visual-search/?x=16&y=16&w=532&h=485&surfaceType=flashlight
4. Sarah Rowlands, The Periodic Table of Wine, Ebury Press, 2015. ISBN 978-1-4197-2408-4
5. NMR 24155 Periodic Table of Beer Styles Decorative Poster, Mantis Design, 2006. - https://www.amazon.com/NMR-24155-Periodic-Styles-Decorative/dp/B008MHDENS

# Science Activity Recommendation, Collecting Rocks from the Russian River (Sonoma and Mendocino Counties)

Donald MacLean

This month's science recommendation is rock hunting. One of my favorite places is the lower Russian River (part of the Coastal Ranges). Unlike a lot of places around, the Russian River traverses through a lot of geology with a fast enough current to limit silting. When the river dries up during the summer, the gravel is left exposed.

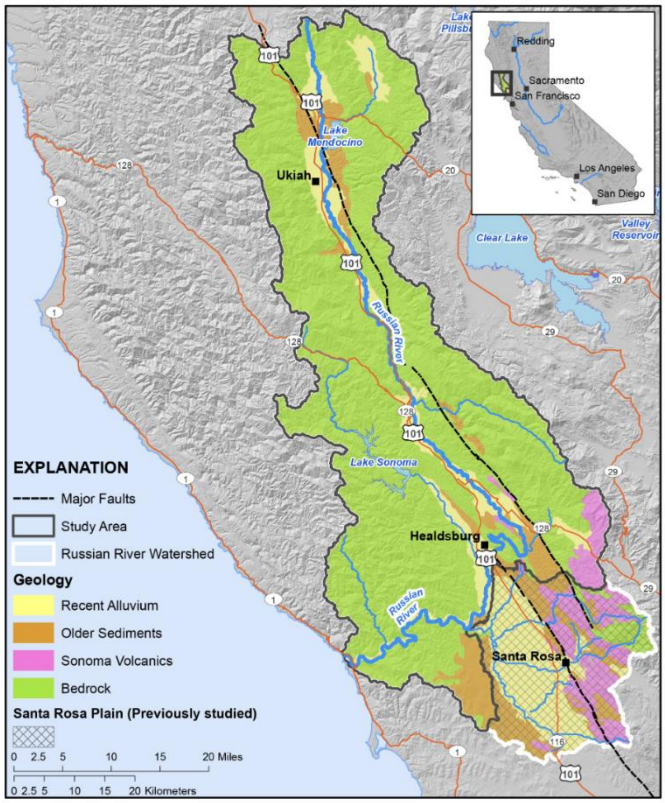


Figure 1. Geological Map of the Russian River Basin.[2]

The Russian River is 110 miles long with headwaters North of Ukiah (Mendocino County) near Willits, which flows southward to Forestville where it then runs West and empties into the Pacific Ocean at Jenner (Sonoma County) [Figure 1].[1] Figure 1 shows that the Russian River watershed has multiple geological formations. The upper Russian River geology and water content is consolidated in Table 1. The source document has a lot of details for a chemist on chemical water quality and for a geologist the rock type derived from multiple well drillings. Table 2 shows the same details but for the Santa Rosa Plain.

East of Santa Rosa are the Sonoma Volcanics. This is where the Petrified Forest (Calistoga) is located, created when Mount St Helena blew up. [3] The 5-million-year basalt is dark gray to black when freshly exposed, but weathers to reddish brown, typically with a thick, red-brown, Fe-rich soil. The age was determined by $^{40}Ar$ / $^{39}Ar$ ratio using fast neutrons irradiation, converting $^{39}K$ to $^{39}Ar$ in potassium-bearing materials.[4] (note this is K-39(n,p)Ar-39 knockout reaction).

In general, Santa Rosa is underlain by volcanic flow deposits known as the Sonoma Volcanics, sedimentary rocks known as the Petaluma Formation, and alluvial deposits.

The Russian River Valley is dominated by the Franciscan Complex. It contains greywacke sandstones, shales, and conglomerates which have experienced low-grade metamorphism. Other important lithologies include chert, basalt, limestone, serpentinite, and high-pressure, low temperature metabasites (blueschists and eclogites) and meta-limestones. Fossils like radiolaria are found in chert beds of the Franciscan Complex. These fossils have been used to provide age constraints on the different terranes (crust piece from one plate sutured onto another plate) that constitute the Franciscan Complex. The mining opportunities within the Franciscan are restricted to deposits of cinnabar (bright scarlet to brick-red form of mercury (II) sulfide (HgS)) and limestone (calcium carbonate ($CaCO_3$) as calcite or aragonite).[5] One former

locally known cinnabar mine is located in north end of Petaluma, ergo the name of school turned into live theater (Cinnabar School District) facility.

| Table 1. Ukiah Valley Area. Consolidated from pages 63 -66, Reference 6. | | |
|---|---|---|
| Type | Age and water content | Present |
| Franciscan and Knoxville Formations (forms bedrock in the valley, low grade metamorphism) | Water storage is dependent upon rock fractures. | Sandstone, mudstone, and shale with lesser amounts of limestone and chert. Serpentine, greenstone, and pillow basalt. |
| Continental deposits | Pliocene and Pleistocene<br>Low permeability | The rocks consist of poorly consolidated and poorly sorted clayey and sandy gravel, clayey sand, and sandy clay. |
| Terrace deposits | Pleistocene<br>Thin layer | red, gravelly clay soil |
| Dissected alluvium | | sand and gravel |
| Alluvium and river-channel deposits | highly permeable and are hydraulically connected with the Russian River | nonconsolidated gravel, sand, silt,<br>and minor amounts of clay, |

| Table 2. Santa Rosa Plain. Consolidated from pages 23 -64, Reference 6. | | |
|---|---|---|
| Type | Age and water content | Present |
| Franciscan and Knoxville Formations | Jurassic and Cretaceous<br>Generally, the rocks are highly fractured and absorb and store water | Sandstone and shale |
| Alluvium and River-Channel Deposits | High water yield<br>unconfined and is hydraulically connected with the Russian River. | sand, gravel, and minor amounts of<br>silt and clay |


Figure 2. Sedimentary Rocks.[9]

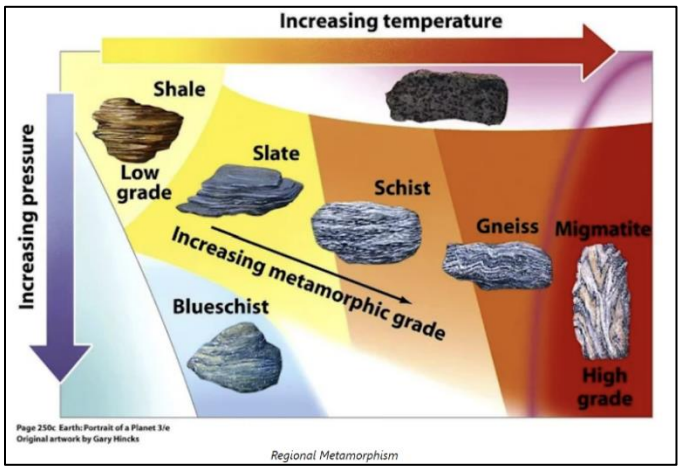


Figure 3. Metamorphic Rocks.[10]

The best time for the Russian River rock collecting is May through July. In August the stones are sun bleached and require water to remove the dust off the stones and to brighten up the stones. Below Monte Rio the river the gravel is mixed with shells.

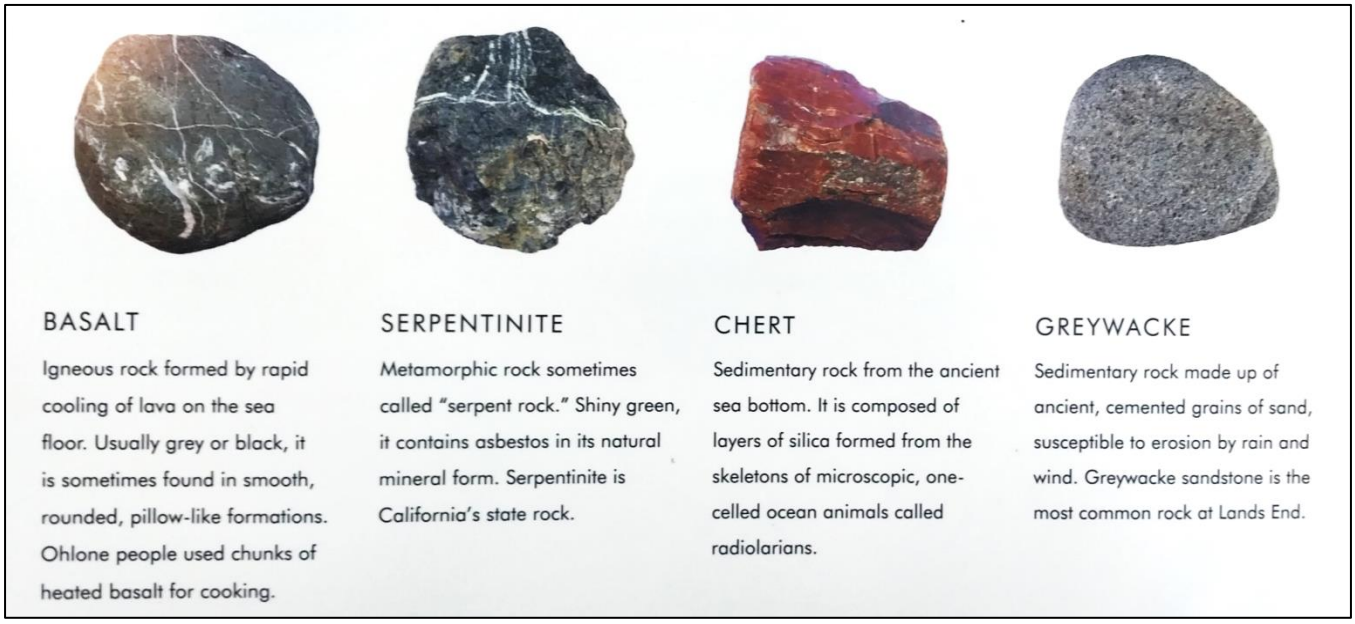


Figure 4. Really Good Display of Four Rocks Found in the Bay Area. Igneous, sedimentary, and metamorphic rocks are present. Information is from Lands End Lookout Visitor Center (Golden Gate National Recreation Area, San Francisco).

Figure 5. Collection of Rocks Collected at Healdsburg.

**References:**


1. Russian River Information - https://en.wikipedia.org/wiki/Russian_River_(California)
2. Determining Water Availability in the Russian River Watershed, by the California Water Science Center, 2018: https://www.usgs.gov/centers/california-water-science-center/science/determining-water-availability-russian-river.
3. Petrified Forest (California) - https://en.wikipedia.org/wiki/Petrified_Forest_(California).
4. R.J. McLaughlin, A.M. Sarna-Wojcicki, R.J. Fleck, W.H. Wright, V.R.G. Levin, and Z.C. Valin, Geology, Tephrochronology, Radiometric Ages, and Cross Sections of the Mark West Springs 7.5' Quadrangle, Sonoma and Napa Counties, California, U.S. Department of the Interior, 2004.
5. Franciscan Complex: https://en.wikipedia.org/wiki/Franciscan_Complex.
6. G.T. Cardwell, Geology and Ground Water in Russian River Valley Areas and in Round, Laytonville and Little Lake Valleys, Sonoma and Mendocino Counties, California; Geological Survey Water-Supply Paper 1548, US Department of Interior, United States Government Printing Office, Washington, 1965.
7. Geologic Map of California, Santa Rosa Sheet, Olaf P. Jenkins Edition, Compilation by James B. Koenig, 1963.
8. California Department of Conservation, Santa Rosa Sheet - https://efaidnbmnnnibpcajpcglclefindmkaj/https://www.conservation.ca.gov/cgs/Documents/Publications/Geologic-Atlas-Maps/GAM_22-SantaRosa-1963-Map.pdf
9. Image of sedimentary rocks- https://geo.libretexts.org/Bookshelves/Oceanography/Oceanography_101_(Miracosta)/01:_Introduction_to_Oceanography/1.35:_Sediments_and_Sedimentary_Rocks
10. Image of Metamorphic Rocks. - https://www.geologyin.com/2017/12/regional-metamorphism.html
11. Gail A. Butler, Shep Koss, Rockhounding California: A Guide To The State's Best Rockhounding Sites (Rockhounding Series), Globe Pequot Press, Guilfold, CT 06437, 2012.
12. Dan R. Lynch, Bob Lynch, Rocks & Minerals of California: Your Way to Easily Identify Rocks & Minerals (Adventure Quick Guides) Spiral-bound, Adventure Publications, Cambridge, MN 55008 – September 12, 2017.

# Women Chemists Join Expanding Your Horizons (EYH) Conference at Santa Rosa Junior College

By Elaine Yamaguchi

On April 20, 2024, women chemists Anne Taylor and Elaine Yamaguchi joined EYH (Expanding Your Horizons) in the new Lindley Center for STEM Education at Santa Rosa Junior College to encourage middle school girls' science interests in the North Bay Area. We held 3 workshops on paper chromatography using black markers. Students learned that black separated into several different colors, and that chromatography of all kinds are used by chemists to separate mixtures. None of the participants seemed to know each other, so the organizing group from Keysight Technologies, Inc. did a good job of advertising widely to get good school representation. There were 9 different workshops on various STEM topics.

Specifically, our workshop, Chemists Have Solutions, conveyed concepts such as mobile vs. stationary phase, adsorption vs. absorption, and design of experiment. In the latter topic, the girls determined the relationship of multiple factors affecting the chromatography experiment, such as strips of paper towels cut lengthwise, crosswise, or diagonally. Anne Taylor led all three workshop sessions in her very official-looking lab coat, while Elaine Yamaguchi assisted as the students attached their paper towel strips properly onto rubber bands using paper clips. The developing tank (plastic tub) was filled with water, about an inch from the bottom, and the rubber bands encircled the tank. Attaching the paper towel strips was tricky; we wanted to promote capillary action, rather than flipping the strips out of the water.

Anne also shared the importance of science literacy via a petition which sought to ban Dihydrogen Monoxide. Both 'pro' and 'con' arguments were listed, but these young students caught on and realized that water was the compound in question. These girls are ready for high school, and many expressed interests in taking a chemistry course, especially if they were thinking of a STEM field, such as medicine or nursing.

We were also joined by a local (Healdsburg) high school student who is interested in chemistry as a career and specifically chose our workshop to assist. While the middle schoolers were concentrating on the chromatography experiment, Anne and Elaine described their chemical lives starting from high school. We gave this student an important fact she did not know; namely, that grad school in chemistry is free. Thus, she learned something that no one in her immediate surroundings had previously conveyed. This was a fact that Anne and I did not learn until college, while working in the labs of our undergraduate chemistry professors.

EYH was advertised to boys too, but we had only girls in our workshops. This program alternates between Santa Rosa Junior College and Sonoma State University each year. In the Bay Area, EYH started in 1976 at the old Mills College. Before Janet Schunk developed the current hands-on workshop, and EYH moved to the North Bay, Cal ACS had a table at the Mills College EYH, attended by hundreds of girls. It was a chance to introduce ACS to the local community. The pandemic shut down EYH conferences nationwide, just like ACS SEED, so rebuilding is occurring now in both programs. This year, there were 66 EYH students, still much smaller than the over 100 students in pre-pandemic days. The Women Chemists Committee (WCC) of the California Section ACS

has been collaborating with EYH for close to two decades, even in the Agilent (pre-Keysight) days.

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# Review of Marin / Sonoma Mosquito and Vector Control District Open House

Donald MacLean

On May 4th the Marin/Sonoma Mosquito and Vector Control District held an open house with the goal to educate the public about vectors (i.e., mosquitos, rats, yellow jackets) and disease prevention. Hamburgers and hotdogs were provided as an inducement to show up. I attended after a good mosquito breeding storm went through.

A vector is an insect / animal that may cause harm or spread disease. The open house concentrated on mosquitos, ticks, yellow jackets, and rats. Fleas, flies, mites, and bees were also mentioned.

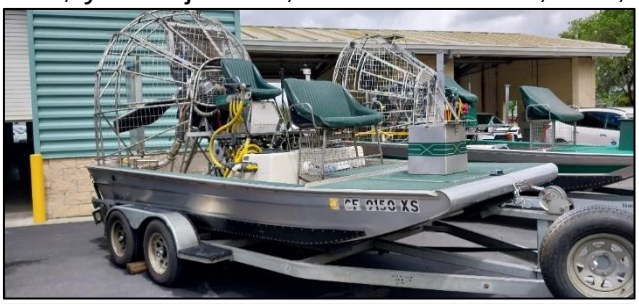


Figure 1. Picture of Fan boat. Note the big white spray tank between the front and rear seats.

The Cotati (Sonoma County) facility displayed their vehicles as you entered. They had ATV, tracked vehicles, and fan boats (Swamp boat) lined up like a military inspection. The boats I saw were fan driven, with no outboard motorboat [Figure 1]. Each displayed vehicle had a spray tank.

The main vehicle shed contained displays with a few hands-on activities.

**Mosquitos**

The first displays were mosquito-driven topics [Figure 2], mosquitos type and activity time, West Nile Disease, and a mosquitofish tank. Their exhibit included live hungry mozzies with warning note, as well as, the pinned specimens to look at. Vector life cycle seemed to be a theme. One of the kid attractive items was the mosquito fish display which the district at one time provided for free. That said, if the pond (aka water feature) has endangered species that breed in the pool, they will not provide the fish. As of this writing it appears there is a contradictory statement about the availability of mosquito fish. The district has information on the fish at https://www.msmosquito.org/mosquitofish.

The district is focused on the mosquito. Their program starts with:

1. Public Information and Education
2. Mosquito and Vector Surveillance
3. Source Reduction
4. Biological Control (e.g. Mosquito fish)
5. Microbial and Chemical Control (larviciding and adulticiding)

**This list contains the most common species of mosquitoes found in Marin and Sonoma counties.**

| MOSQUITOES OF MARIN AND SONOMA COUNTIES BY SPECIES | | COMMON NAME | LARVAL HABITAT(S) | BITING BEHAVIOR | | APPROXIMATE FLIGHT RANGES | MEDICAL IMPORTANCE |
|---|---|---|---|---|---|---|---|
| | | | | HOST(S) | TIME OF DAY | | |
| Aedes | dorsalis | Pale marsh mosquito | Coastal salt marshes, inland alkaline areas | • Large mammals<br>• Humans | Day and night | 20 miles | • Western equine encephalitis<br>• Localized pest |
| | sierrensis | Western treehole mosquito | Treeholes, tires, containers | • Small mammals<br>• Humans | Dusk and day | Less than 1 mile | • Dog heartworm |
| | squamiger | California salt marsh mosquito | Coastal salt marshes | • Humans | Dusk and day | 10–20 miles | • Localized pest |
| | washinoi | Flood water mosquito | Coastal ground pools, inland shaded pools, flooded habitats | • Humans<br>• Large mammals | Dusk and day | Less than 1 mile | • Localized pest |
| Culex | tarsalis | Western encephalitis mosquito | Agricultural, commercial, man-made or natural sources | • Birds<br>• Mammals<br>• Humans | Dusk and dawn | 10–15 miles | • St. Louis encephalitis<br>• Western equine encephalitis<br>• West Nile virus |
| | pipiens | House mosquito | Polluted water, septic tanks, catch basins, residential and commercial sources | • Birds<br>• Mammals<br>• Humans | Night | Less than 1 mile | • St. Louis encephalitis<br>• West Nile virus |
| | erythrothorax | Tule mosquito | Ponds, lakes, and marshes with tules and cattails | • Birds<br>• Humans | Dusk and day (shaded areas) | Less than 2 miles | • West Nile virus |
| | stigmatosoma | Banded foul water mosquito | Polluted water, dairy ponds, sewer ponds, log ponds | • Birds | Night | Less than 10 miles | • St. Louis encephalitis<br>• West Nile virus |
| Anopheles | freeborni | Western malaria mosquito | Irrigation ditches, rain pools, margins of lakes and streams, rice fields | • Large mammals<br>• Humans | Dusk and dawn | 10 miles | • Malaria |
| | punctipennis | Woodland malaria mosquito | Cool, shaded, grassy pools in streams and creeks | • Large mammals<br>• Humans | Dusk and day | More than 1 mile | • Malaria |
| | franciscanus | - none - | Shallow, sunlit pools with algae | • Large mammals | Dusk and dawn | Less than 1 mile | • Occasional pest |
| Culiseta | incidens | Cool-weather mosquito | Shaded, clear, natural or man-made sources | • Large mammals<br>• Humans | Dusk and dawn | Less than 5 miles | • Localized pest |
| | inornata | Large winter mosquito | Sunlit ground pools or man-made sources | • Large mammals<br>• Humans | Dusk and dawn | Less than 5 miles | • Localized pest |
| | particeps | - none - | Freshwater marshes, ponds and creeks, woodland pools | •Large mammals<br>• Humans | Dusk and dawn | Less than 3 miles | • Localized pest |

Figure 2. Name of Mosquitos in Marin and Sonoma Counties. Note that not all mosquitos are out at dusk and dawn.[2] Some mozzies travel a long distance.


Figure 3. Mosquitos Display.

The only mosquito-carrying diseases focused in the area were West Nile Disease and Dog Heartworm [Figure 3]. Mitigation involves dumping out containers, filling in potholes, promoting effective drainage, controlling vegetation and appropriate timing of irrigation. A new preventative issue for me was open septic tanks and screening its air vent. Go to the website for further information. Information about the Dog heartworm is on the link: Treehole Mosquitoes and Dog Heartworm. The best-known local disease is West Nile, Virus while the best known worldwide mosquito-borne disease is Malaria. Throughout the open house event there were Pamphlets available in English and Spanish. The vast majority were focused on the mosquito, some unique to an area such as septic tanks as breeding water for the mosquito.

The Open house had listed 4 repellents shown in Figure 4. The district uses pyrethrins and etofenprox (adulticides) delivered as a fog (micron-sized) particles to control the adult mosquito. Pyrethrins are a group of 6 naturally occurring compounds with insecticidal properties that are extracted from chrysanthemum flowers. They have an ester group and a cyclopropane ring which make the compounds highly reactive. Etofenprox is a low-toxicity pyrethroid; a synthetic version of pyrethrins.


Figure 4. Four Repellants. DEET, Oil of Lemon Eucalyptus, Picaridin, IR3535.

These materials affect the nervous system of insects by causing multiple action potentials in the nerve cells and delaying the closing of the ion channel. These adulticides are extremely photosensitive and break down within hours in the sunlight, ergo the nighttime application. Note for Bees - pyrethrins are applied broadly as nonspecific insecticides. Bees have been shown to be particularly sensitive to pyrethrin, with fatal doses as small as 0.02 micrograms. Due to this sensitivity and pollinator decline, pyrethrins are recommended to be applied at night to avoid typical pollinating hours, and in liquid rather than dust form.[4]

**Etofenprox**

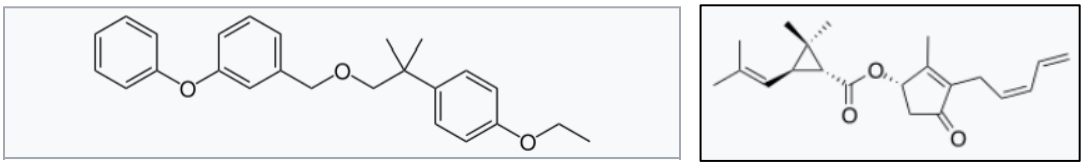


Figure 5. Structure for etofenprox and one pyrethrin.[3,4]

**Yellow Jackets, Wasps, and Bees**

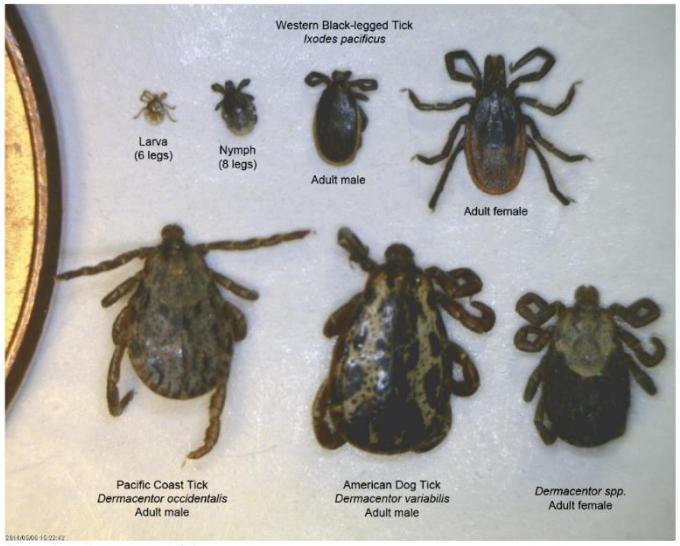
Figure 6 shows a giant paper hive. Yellow jackets / wasps are the next insect of concern, followed by ticks, then by rats. The district open house did not mention any diseases associated with yellow jackets; the sting is what people associate with yellow jackets, wasps, and bees and anaphylactic shock. The district gets involved with ground nests, but not aerial nests.

What you can do to prevent exposure?

- Do not disturb nests.
- Do not go barefoot outdoors.
- Do not attempt to swat yellow jackets with your hands.
- Use lids on sweetened drinks.
- Keep garbage away from eating areas.
- If eating outside, check the food before placing it in your mouth.

Figure 6. This is a wasp nest. The wasps build a nest of paper made from fibers scraped from wood mixed with saliva. Note the rafter joist impression that the wasps used as the support.

What I found interesting is their lifecycle described in a yellow jacket pamphlet. The queen and all workers die, with newly emerged mated queens overwintering in dry protected areas.



*Some locally common ticks*

Figure 7. Ticks. From Marin / Sonoma Mosquito and Vector Control District website.

**Ticks**

The District collects western black-legged ticks, *Ixodes pacificus*, to test for the presence of *Borrelia burgdorferi* (the bacterium that causes Lyme disease) and *Borrelia miyamoto* by their DNA using Real-Time PCR technology. The district also collects *Dermacentor spp*. ticks for collaborative research efforts and disease case follow-ups.

The open house showed ticks in pictures and as pin specimens. Unlike the mosquito, the district does not have a tick chemical program. As a result, ticks were less focused on than mosquitos.

For further information go to their website.

**Rats (Rodents)**

Rats harbor ectoparasites such as fleas and mites. The main focus was on rat proofing and reducing food sources as preventative measures. They had a poster showing how the theoretical rat population can grow. Of course, it left out the fact that 2 rats leading to 46 thousand rats in an area would starve [Figure 8]. But it does make the point rats are prolific at taking over an area. Their vector control technicians do not trap, poison, remove dead rodents, or do exclusion work.

The best-known disease that a rat carries is plague. However, that is not what the district covered. The open house focused on cleanliness and blocking access to buildings.

**Cockroaches**

Surprisingly the district does not list cockroaches, but there were 2 displays put on by a third party. I was told that the area is too cold for cockroach species. The 5 most common cockroaches are:

- German cockroach
- American cockroach
- Oriental cockroach
- Brown-banded cockroach
- Turkestan cockroach

Cockroaches transmit various diseases that are not commonly found here, such as dysentery, cholera, and typhoid fever.

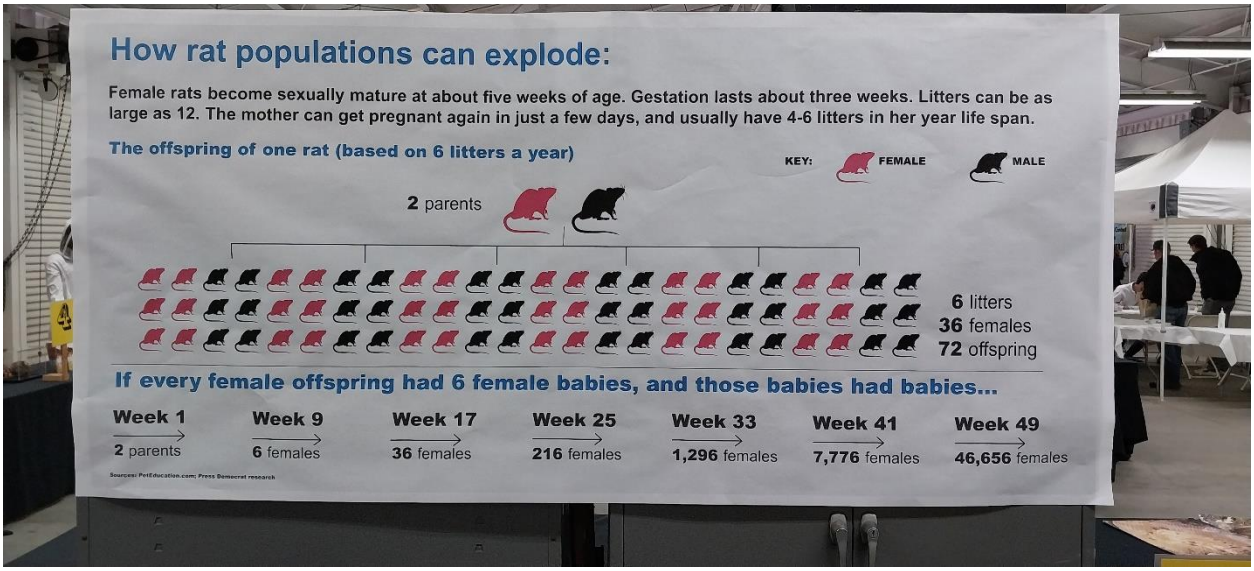



Figure 8. Power of the Rat. This is a theoretical growth of the rat population as cats and owls hunt rats.

**Other items of interest: Food for thought in more than culinary.**

There was an exhibit with Larvae (nutty taste even with coating) and crickets (dry feel) that were coated and were given out. Honestly you must eat a lot of these to fill your hunger.

On the back wall was noted using oil as a control for mosquito control on waterways at what is now the Marin Civic Center (300 gal). The oil in the reeds did not work as well as today's methods as the mosquito problem came back within a week and the oil left a mess.

The open house had games and information on various things throughout the facility. Go to a link for more information and good pamphlet graphics. These are in English and Spanish.

**References:**

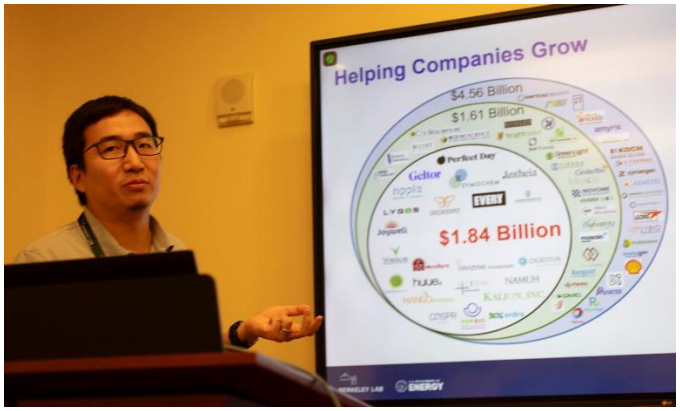

1. Publication link - https://www.msmosquito.org/publications
2. Mosquito diseases – https://www.cdc.gov/mosquitoes/about/diseases.html
3. Structure of etofenprox - https://en.wikipedia.org/wiki/Etofenprox
4. Pyrethrins I structure. https://en.wikipedia.org/wiki/Pyrethrin
5. Cockroaches type - https://pestplaybook.com/cockroaches-california/#:~:text=While%20most%20of%20the%20cockroach%20species%20here%20have,American%20cockroach%20Oriental%20cockroach%20Brown-banded%20cockroach%20Turkestan%20cockroach
6. Tick diseases - https://www.cdc.gov/ticks/diseases/index.html
7. District Seal - https://www.cityofsanrafael.org/marinsonoma-mosquito-vector-control-district-board/

# Cal ACS Tour of the Advanced Biofuels and Bioproducts Process Development Unit (ABPDU-LBNL) in Emeryville

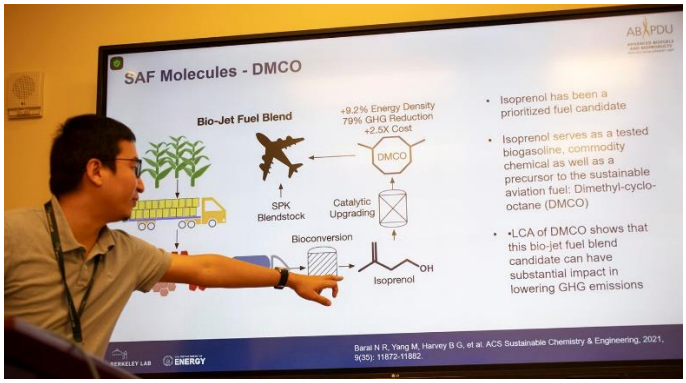
Alex Madonik, Chair-Elect 2024

Cal ACS members and guests participated in a unique tour of LBNL's Advanced Biofuels and Bioproducts Process Development Unit (ABPDU) in Emeryville, CA on Thursday, May 14th, 2024. Two dozen of us met at Summer Summer Thai Eatery for networking, drinks and a delicious buffet dinner. Cal ACS Member-at-Large and ABPDU Senior Process Engineer Dupeng Liu joined us for dinner and then led us next door to the ABPDU facility. We paused for a group photo in the atrium, below a wall featuring the faces of several dozen Nobel laureates associated with the SF Bay Area.

At the ABPDU conference room, Dupeng introduced us to the laboratory's role in helping partners (both small and large businesses) demonstrate new processes for sustainable manufacturing of valuable chemicals. They have worked with over 75 different companies and participated in the successful commercialization of dozens of products.




Dupeng's work is focused on another ambitious project: SAF (Sustainable Jet Fuel) from biomass. Air travel accounts for about 3% of global carbon dioxide emissions, and electrification via batteries or fuel cells is not likely to succeed because of their weight. Corn stover (the remaining corn plant after the corn kernels are removed) can be broken down via fermentation to isoprenol, a key intermediate that can be catalytically converted into dimethylcyclooctane:




We divided into two groups for the laboratory tour, putting on safety glasses before exploring the "Decon" lab with Xihui Kang and the "Fermentation" lab with Laura Fernandez, ABPDU engineers. The Decon lab carries out the initial upstream processing to break down biomass and extract the raw materials for fermentation; the same equipment is later used to purify fermentation products.


The Fermentation lab can optimize processes at both small scale (one or two liters) and at true pilot scale (300 liters) with automated control and sampling throughout each run. Runs in the 300 liter reactor often provide the first samples of potentially commercial products.

Laura also showed us an array of microreactors (0.1 liter) that have been very successful for optimizing processes that could then be transferred directly to pilot production:

Cal ACS is grateful to ABPDU staff for helping us organize this fascinating tour.