

WHAT'S INSIDE



Join UC Berkeley's American Chemical Society for Berkeley's inaugural Science Bowl Invitational Tournament! Compete head-to-head in this fast paced trivia competition to become the first ever Berkeley Scibowl champ!

Join us: **January 21st, 2023**
from **8:30 am - 6:00 pm**



Featuring **Nobel Laureate**
Speaker Professor
Randy Schekman



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Meetings, Activities, and News

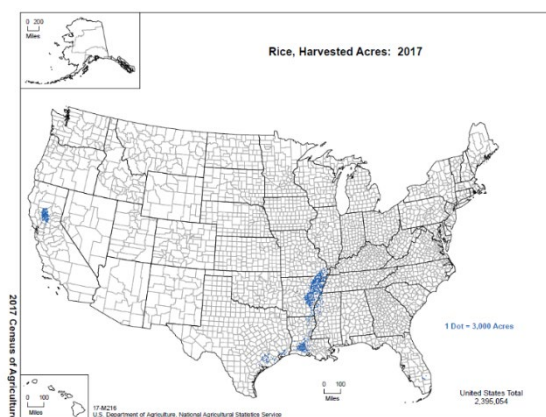
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MAGAZINE OF THE CALIFORNIA SECTION, AMERICAN CHEMICAL SOCIETY

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Cover Photo Credits: Top Left: Berkeley Science Bowl - Raina Kasera, Jordan Rasiah

Middle Left: 2017 Rice Harvest Acreage -

https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Ag_Atlas_Maps/index.php

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

Editor Notes for the 2023 year



1. Atefeh Taheri has taken over as 2023 section Chair. She will provide a monthly message.
2. Bill Motzer has informed me that the last issue of "Irony of Iron" was the December issue. Next month he will start "How Sweet it Is!" It's about the chemistry of "sugars."
3. Nicki Davis has written the life story of Atilla Pavlath part 7. After part 7 the focus will be on Atilla's ACS contribution.
4. Donald MacLean will continue to provide a recommended travel / activity based on science article. He will also alternate between an agriculture topic and a pharmaceutical topic article.

Chair Message



Dear Readers,

I hope you had a relaxing holiday break. I am thrilled to start my term as the 2023 Chair of Cal ACS. I am very grateful to the members of our executive committee who have already helped me through this past year and taught me a lot about Cal ACS. I look forward to working with you even more closely this year.

I want to thank our past Chair, Dr. Fanny Frausto, for her outstanding leadership. Also, I would like to congratulate our newly elected officers: Chair-Elect - Patrick Lee, Secretary - Michael Cheng, Director At Large - Attila Pavlath, Members At Large - Sarah Bronner, Alicia Taylor, and Linda Wraxall, Councilor (1-year term) - Fanny Frausto, Councilor (3-year term) - Bryan

Balazs, Alex Madonik, and Vanessa Marx, Alternate Councilor (3-year term) - Neal Byington, Romit Chakraborty, Patrick Lee, and Donald MacLean. I am excited to collaborate with all of you!

We had a few challenging years with the pandemic. Still, after a few years of only online events, I was excited to attend a few in-person events during 2022, including our award luncheon. We celebrated several members of our section, especially our 50, 60, and 70 years of ACS service awardees. I look forward to more in-person connections during 2023. However, many of our community members would like to continue with virtual events, so we do our best to have both virtual sessions and hybrid meetings as much as possible.

I encourage you to please consider volunteering with Cal ACS. In our section, we always look for fresh ideas and volunteers who are passionate about our values and mission and want to contribute to our community's success. If you are a younger professional, volunteering with Cal ACS provides numerous opportunities to develop your leadership skills. If you are an experienced professional, we would appreciate your mentoring and guidance. We hope you find working with our section a rewarding experience.

Finally, I wish you all an excellent 2023 and hope to meet you at our in-person or online events and activities this year!

Atefeh



華美化學與化工學會

Chinese American Chemical Society

Northern California Chapter

Meet Chemistry Superstars

Creating Tomorrow's Technologies



Prof. Zhenan Bao

Stanford University

Skin-inspired Organic Electronics



Prof. Peidong Yang

UC Berkeley

Artificial Photosynthesis

Please register and join us for the inaugural program of the new Northern California Chapter of the **Chinese American Chemical Society (CACS)**

- CACS overview and awards
- Talks from awardees Profs. Zhenan Bao and Peidong Yang
- Great networking & light refreshments

Everyone is welcome, limited seating

Register now for free www.cacshq.org/superstars or scan QR code



Wednesday, January 18, 2023

4:15 pm Check-In

4:30 pm Program

5:30 pm Reception



Stanford University, Paul G. Allen Building (Allen 101X Auditorium, 330 Jane Stanford Way)

*Parking: Via Ortega Garage, 498 Via Ortega or Parking Structure 5, 295 Campus Drive
(Free campus parking after 4 pm)*

This is rescheduled from November 17, 2022.

Berkeley Science Bowl Invitational

By: Raina Kasera, and Jordan Rasiah



Join UC Berkeley's American Chemical Society for Berkeley's inaugural Science Bowl Invitational Tournament! Compete head-to-head in this fast paced trivia competition to become the first ever Berkeley Scibowl champ!

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Speaker **Professor**
Randy Schekman



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 sites.google.com/berkeley.edu/berkeley-scibowl/

On behalf of the American Chemical Society at UC Berkeley, I would like to formally extend an invitation to the inaugural **Berkeley Science Bowl Invitational (BSB)** on **Jan. 21st, 2023**. National Science Bowl (NSB) is a fast-paced academic buzzer competition in science and math traditionally hosted by the US Department of Energy. This tournament will provide an amazing opportunity to compete against some of the best schools across the country in preparation for the official competition, although teams are not required to be official NSB participants to compete in BSB. The competition will also feature a guest lecture by **Nobel Laureate Randy Schekman!**

For more information and to register, please visit our [website](#). We cannot wait to see you there!

Pavlath Legacy – 7: Edible and Biodegradable Films

By Nicki Davis

This is the seventh installment 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 the previous two articles, we examined the research that Attila conducted at the US Department of Agriculture (USDA) Western Regional Research Center in Albany, California. Attila met many challenges, not the least of which were the shifting research priorities at the USDA that compelled him to move into new areas. In this article, we describe his contributions when the USDA shifted its concerns from fabrics and biofuels to preserving produce, keeping dairy cattle healthy, and finding substitutes for petroleum-based wrapping materials.

Keeping produce fresh and tasty

The skin of an apple keeps it fresh by preventing it from losing moisture and protecting it from oxygen in the air. If you cut an apple open, the exposed surface oxidizes and turns brown in a matter of minutes, and the fruit dries out as water escapes into the atmosphere. Consequently, if you want to make a fruit salad that includes apple slices, you need to prepare the apples immediately before serving. The same applies to many other fruits and vegetables with a protective skin. Refrigeration can slow the deterioration, but only for a few hours. This creates problems for food preparation in industrial, hospital, and school cafeterias, where the cleaning, paring, coring, and slicing of fruits and vegetables is very labor-intensive if done on-site.

Yet today, you can go to the supermarket and buy refrigerated apple slices, fruits, and vegetables that remain fresh, nutritious, and tasty for as long as two weeks. Institutions can now provide more fresh fruits and vegetables in their cafeterias because these items, like the salads you buy in the supermarket, can be processed at a central location and shipped to the site without spoilage. All of this is a direct result of Attila's work on edible films at the USDA.

Attila's challenge was to find a replacement for the fruit's natural protective skin that would keep oxygen out, keep moisture in, and be indistinguishable from fresh fruit in taste, aroma, and appearance. Studies had shown that human taste buds could detect anything above 0.2% added to the food, so the amount of preservative had to be below that threshold.

For safety, the coating had to adhere to the FDA's strict requirements for food additives. For example, Attila did not investigate using chitosan, an organic carbohydrate found in the skin of shrimp and lobsters. You consume chitosan when you eat shrimp, but the FDA forbids its use as a food additive when extracted from seafood.

Eventually, Attila came up with a preservative that consisted of water, calcium ions, and ascorbate ions, where the ratio of calcium ions to ascorbate ions ranges from 1.5:1 to 2.5:1. When dipped into a solution of this preservative, an edible coating forms on the fruit. The coated fruit can be stored at temperatures from -7° C to room temperature (20° C), with an optimum temperature range of 2° C to 5° C.¹

Attila's discovery started an entire industry of edible films. The first companies to use this technology paid the USDA millions in royalties through the 17-year life of the patent. Attila recalls, "The USDA in its kind heartedness, gave me a very small percentage of the royalty -- a couple thousand. I didn't do it for money, but because it was a challenge. Like many other things in my life, when a problem appeared and I had to develop new ideas and new ways to solve the problem."

Disease prevention in dairy cattle

Dairy cattle are vulnerable to mastitis, an infection of the mammary glands, because the milk channel in the teat remains open for up to 90 minutes after the milking machine is removed. With microbes ubiquitous in the stables and pastures where cattle live, infection of the udder via the milk channel is a serious problem, because microbes can feed on leftover milk within the duct.

To prevent infection, dairy farmers apply an iodine-containing pre-milking teat-dip solution and wipe the teats dry before applying the milking machine. After milking, the teats are cleaned to remove growth media for bacteria, and a teat-dip solution is applied to act as a disinfectant and a barrier to the entry of bacteria from the air.

Attila addressed the problem by formulating germicidal liquid teat-dip solutions. These solutions are applied immediately after milking and dry to provide a continuous protective film. The films persist between milkings, but can be easily removed by typical pre-milking udder preparation such as washing with water. Attila's formulations also included skin conditioning and moisturizing agents to help maintain a healthy teat skin and counteract irritation from formulation ingredients or from the environment.²

Biodegradable packaging from ionomeric carbohydrates

Biodegradation is the breakdown of a substance resulting from the action of cells, typically microorganisms, without human intervention.³ Petroleum-based single-use food packaging such as polyethylene causes problems for the environment because these films can require up to 200 years to biodegrade.

In contrast, films made out of agricultural products are organic matter that can be quickly degraded by microorganisms. The big challenge with making biodegradable films is how to form the material into the desired shape. Polyethylene can be made into films quite readily by melting, but if you try to melt most organic starting materials such as carbohydrates and peptides to make them pliable, they simply decompose. On the other hand, carbohydrates such as pectin can be cast into film, but as soon as the film gets wet, it dissolves. The challenge Attila faced was to find a way to treat the film to make it insoluble.

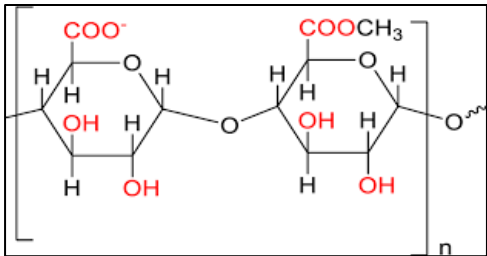


Figure 1. Chemical Structure of Pectin

Pectin is an ionomer, that is, a polymer whose repeating units comprise a mixture of both electrically neutral and charged groups along the polymer backbone. In the case of pectin, the ionized units are the carboxyl groups of galacturonic acid (Figure 1).

If you immerse pectin film in a solution that contains multivalent salts such as calcium, the film not only becomes insoluble, but the tensile strength of the film increases to levels comparable to and sometimes greater than that of commercial wrapping materials. Although the idea of ionomers was known at the time, Attila was the first to apply this principle to make films.

A key insight from a visit to the hairdresser

In addition to developing water-soluble films that could be made insoluble, Attila also looked for agricultural starting materials that could be formed into films without destroying them. A visit to his wife's hairdresser showed the way.

Mammal hair consists of proteins called keratins. These proteins contain large amounts of an amino acid called cysteine, which can form sulfur-sulfur (disulfide) bonds with other cysteine molecules. A single hair contains thousands of keratin fibers held together by disulfide bonds between the fibers. The disulfide bonds maintain the shape of the hair, so that when straight hair is curled, it soon returns to its original shape. To create a permanent wave, a reducing agent is used to break the bonds between the sulfur atoms, creating sulfhydryl (-SH) groups on the surface of the fibers. Breaking the disulfide bonds allows the keratin fibers to slide against one another and adapt to the new shape. After allowing the curls to develop, an oxidizing agent is applied to the hair so that the disulfide bonds re-form, but at different locations on the fibers, leaving the hair permanently curled (Figure 2).

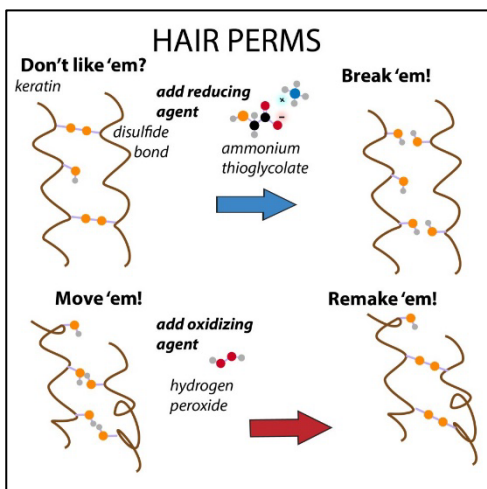


Figure 2. Chemistry of Hair Perms.⁴

Attila realized that proteins with disulfide bonds could be used to create biodegradable films that were as strong as petroleum-based films. With this in mind, Attila devised methods for making films from agricultural waste products such as wool keratin and feather keratin. In a search for less expensive starting materials, Attila looked for proteins that were cheaper than keratin, and that contained smaller amounts of cysteine. He discovered that wheat gluten, which contains about 0.6% cysteine, is a suitable material for this purpose. After the gluten is extracted from wheat flour, it can be mixed with a simple reducing agent like sodium bisulfite, made into dough, and then placed under hydraulic pressure at 90°C for two minutes.

The result is a transparent film that is strong and that biodegrades in the ground in about two weeks.

The future of biodegradable packaging

Unlike his research on edible films and teat-dip solutions, Attila's work on biodegradable food packaging did not result in any patents. Biodegradable substitutes need to have the same tensile strength, flexibility, and durability to successfully compete with products manufactured from fossil fuels, and while some of the materials that Attila developed met those criteria, they were not commercially viable. The search for an inexpensive, biodegradable substitute for polyethylene packaging continues, but the goal remains elusive.

Moving on

This concludes the account of Attila's research career. In the next article, we will focus Attila's service to the ACS and its members.

References:

- 1 Chen, C., Trezza, T.A., Wong, D.W.S., Camirand, W.M., and Pavlath, A.E. Methods for Preserving Fresh Fruit and Product Thereof. U.S. Patent 5,939,117 (1999)
- 2 Pallos, F.M., Hemling, T.C., Wong, D.W.S. and Pavlath, A.E. Stable, germicidal film forming teat-dip solutions. U.S. Patent 5,776,479 (1998)
- 3 Vert, M, Yoshiharu Doi, Y., Hellwich, K-H., Hess, M., Hodge, P., Kubisa, P., Rinaudo, M., and Schué, F. Terminology for biorelated polymers and applications (IUPAC Recommendations 2012). Pure Appl. Chem., Vol. 84, No. 2, pp. 377–410, 2012.
- 4 [Pretty PhD: The Science Behind the Hair](https://prettyphdblog.com/the-science-behind-the-hair) <https://prettyphdblog.com/the-science-behind-the-hair>.

Interesting Statistical Information from Agricultural Census

By Donald MacLean

The US census counts people every ten years in the year that ends in zero. It is highly political and the outcome determines voting power, and program and infrastructure funding. There is another census, Census of Agriculture that occurs in the US every 5 years that ends in 2 or 7 under the auspices of the USDA. Its reference date is December 31, 2022. You can fill ahead of time and adjust response after that date. The agriculture census is an information treasure trove about cover crops, fertilizer, forest land acreage, etc. I received my notice in December. It reads the same as the normal people census, **required by law** in bold.

| Table 1. Census Comparison | | |
|--------------------------------|--|--|
| | Census of Agriculture | USA 2020 Census |
| When | 5 years apart in years that end in 7 and 2 | 10 years in years that end in 0 |
| Reference Date | December 31 | April 1 |
| Sponsor | US Department of Agriculture | US Census Bureau, Department Commerce |
| How do you qualify for inquiry | Min \$1000 sales in a year | Reside in USA |
| Short form Covers | Crops, animals, employment, sales, leases, operation size, equipment, location | Number of people, name, age, gender, race, relationship to primary responder, type of housing and is it rented or owned, address |
| Website | www.agcounts.usda.gov | www.census.gov/ |
| Respond Method | Online, Phone, and Paper | Online, Phone, and Paper In person visit |

The survey is tedious to fill out. However, the information breakdown that comes about from all that data is very interesting. The information is broken down by country (USA), state, county, and watershed. There are reports on Production and Acreage, prices, animal on feed, farm labor, storage, and stocks. Maps that are categorized by crops and activities.

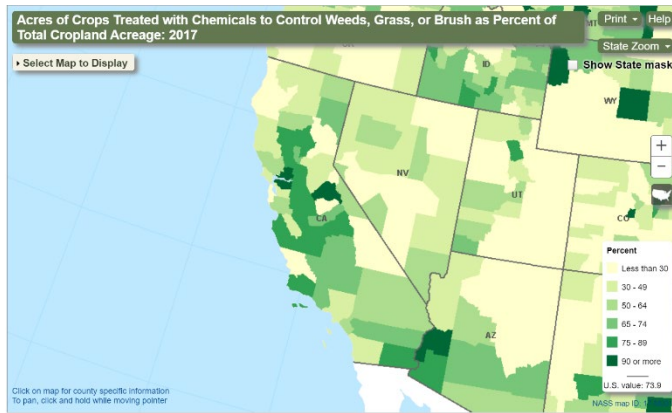


Figure 1. Ag Census Web Map. Topic specific map displayed by county.

https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Ag_Census_Web_Maps/Overview/

For overall visualization, the Atlas are better than the web maps. However, both serve a direct purpose. Figure 1 shows an example of the web map at the county level showing the percent of some specific item, in this case use of chemical as a percentage of total cropland acreage.

One of the interesting ways to look at items is by watershed. Figure 2 shows the multiple watershed regions for California, known as water region 18 for the 2017 census hydrologic report. Once the watershed is identified, a report table follows that has items such land use and practices, fertilizer and chemicals, specialty crops, and livestock and poultry sections with numbers.



Figure 2. Snip and clip of the Watershed Atlas. The Bay Area is code H180500. A table follows with a summary by Hydrologic Unit Code: 2017 and 2012 for the USA, California, then each watershed under the code shown on the map.
https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Watersheds/c18.pdf

Figure 3 has 4 selected atlas items. What is interesting is the location of some of these topics and how over time these are changing. Tobacco is concentrated in the South, but its production is declining and by 2017 being limited to Kentucky, North Carolina, and Southern Virginia. Rice is water intensive, and production follows the Mississippi River, with a patch in the northern Sacramento Valley. The last item shown is grapes. Here grapes are shown in California, New York, and Eastern Washington. They are not separated on the end use. Cattle seem to be universally spread out (not shown), while chickens are concentrated in the South, Hogs and Pigs centered in Iowa / Southern Minnesota and North Carolina (not shown); sheep are not dense in

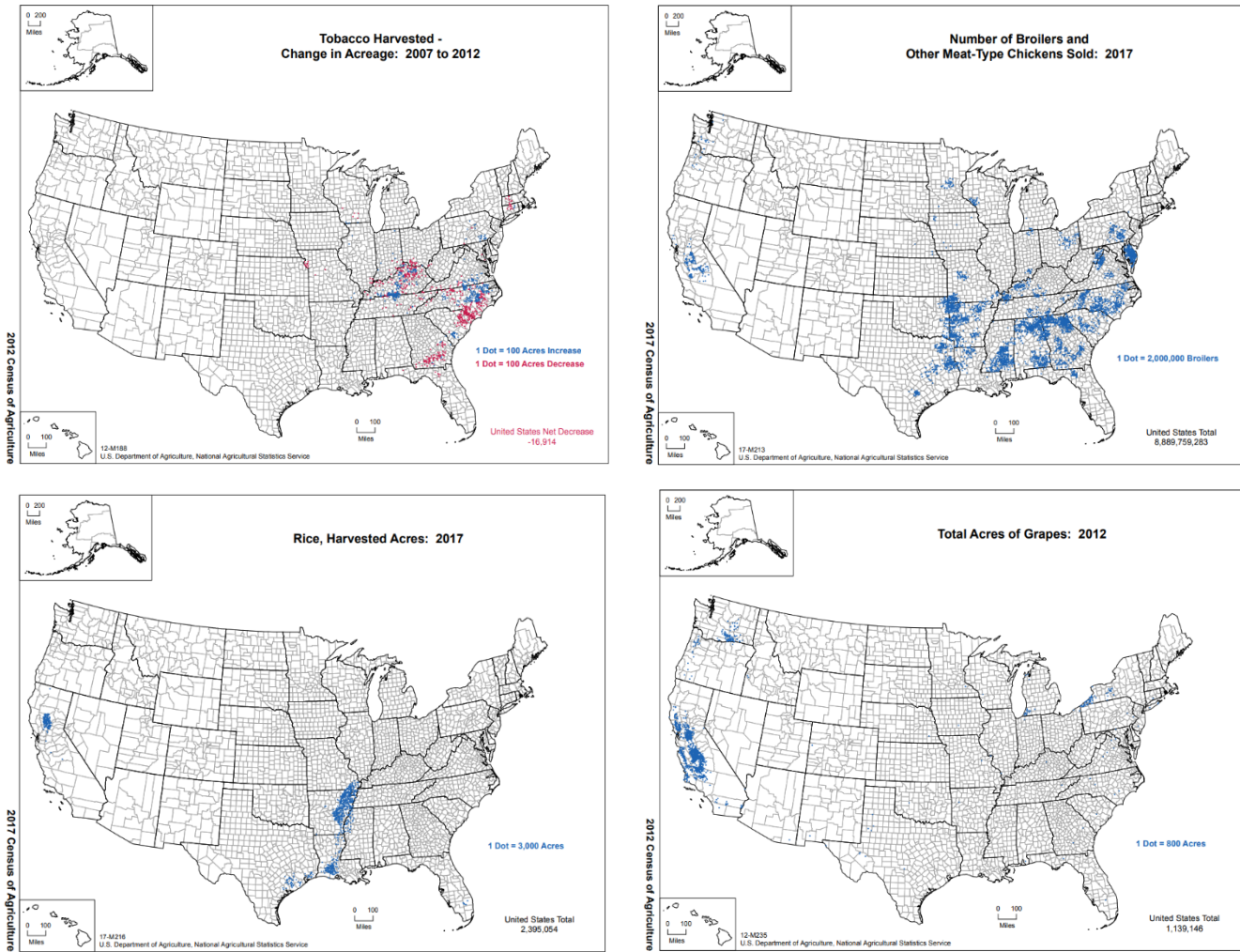


Figure 3.

Upper Left: 2012 Census for Change in Tobacco. In the 2017 growing tobacco is only shown in Kentucky, North Carolina, and Virginia. This is one crop that has seen steep production decline.

Upper Right: 2017 Meat Chicken Sold. Note the chickens are predominately located in the Southern USA.

Lower Left: 2017 Rice Harvest Acreage. Rice is predominately grown along the Miss. River. It is also grown in the Sacramento Valley and along the Texas Gulf Coast.

Lower Right: 2012 Map for Grapes Acreage. Grapes are predominately grown in California. Grapes grown for wine, raisins, or juice are not differentiated here.

Source:

https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Ag_Atlas_Maps/index.php

https://agcensus.library.cornell.edu/census_parts/2012-agricultural-atlas/

the Southeast, but are spread throughout the USA, with clusters in the Central Valley CA, the

Hill country of TX, UT, Western OR, ID, Colorado, SD, and WY.

Web interactive maps go back 10 years. Thereafter data summary or a graphic approach is used for showing items such as Potatoes (Irish Potatoes). Interesting is how items move or change in popularity. Additionally, there are surveys related to irrigation and water management, organics, etc. that might be of interest.

Recommended Activity: Mushroom Hunting

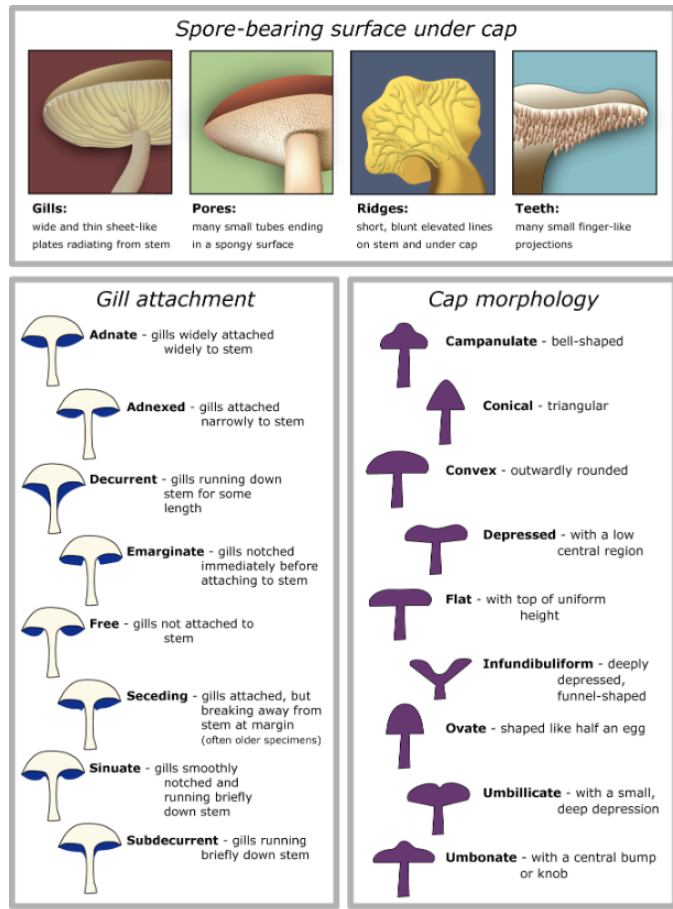
By Donald MacLean

The December rains were sufficient for mushrooms to pop up. The best viewing is now, as the life of a mushroom is short. What is visible is the fruiting body of the fungus. This is January's recommended travel activity.

Mushrooms look like plants but lack chlorophyll and obtain nutrients from other materials. They can be seen growing on rotting wood or popping out of the ground. Around here Oak woodlands create the best mushroom diversity. The best places are where the ground has not been cleared up, as there has to be something rotting on the ground.

There are 3 types of mushrooms. 1. Soft rot, Brown rot, and White rot. Soft-rot fungi secrete [cellulase](#), an [enzyme](#) that breaks down [cellulose](#) in the wood. Brown-rot fungi break down [hemicellulose](#) and [cellulose](#) that form the wood structure. White-rot fungi are characterized by their ability to break down the lignin, cellulose, and hemicellulose of wood.²

Field identification has been through morphological characteristics. Figure 1 shows the diversity of cap shapes and gill location.



Mushroom Morphology *1

location.



Recent Mushrooms seen in a regional park in Petaluma. Photos by Caroline Bothroyd.
This is our attempt to identify
Top Left: Jelly Fungus, Yellow Brain, Witch's Butter (class *Heterobasidiomycetes*)
Top Right: *Phloeomana speirea*? We did not look underneath.
Bottom Left: Turkey Tail?

Good locations – Regional Parks Botanic Garden (Tilden Park, Berkeley), woodlands with undisturbed fallen vegetation.

Bring a guide to help identify.

References:

- 1 debivort - http://en.wikipedia.org/wiki/File:Mushroom_cap_morphology2.png#filehistory
- 2 https://en.wikipedia.org/wiki/Wood-decay_fungus

2022 The Vortex Index

Donald MacLean

Each year The Vortex has 10 issues, January to June (1 to 6), then September to December (7 to 10). This year the front page on the September issue was volume 84 issue 9 when it should have been volume 84 issue 7. That error will be carried forward to keep continuity.

| Meetings | |
|----------|--|
| Jan. | The Fungus Among Us- Fusarium Mycotoxins in Water and Food - Professor Daniel Snow University of Nebraska – Lincoln |
| Feb. | The Stories We Tell as Women in Chemistry - Fanny Frausto, PhD |
| | Zoom Meeting with IUPAC Global Women’s Breakfast |
| | Getting Your First Job: How To Become “Business-Ready” To Stand Out Against Your Competition - Randall Ribaud, Ph.D. President, CEO Human Workflows,LLC Co-founder, SciPhD.com |
| Mar. | Tri-Valley Science Fair – March 19th – Alex Madonik |
| | Symposium Honoring the Legacy of Mark D. Frishberg – March 21st - Lee Latimer, Marinda Wu, and Alex Madonik |
| | Chemistry Olympiad Exam - March 27th - Eileen Nottoli |
| | Glorietta Elementary School Science Fair - March 29th - Greti Sequin and Alex Madonik |
| | Planning for our Virtual Earth Day Event on April 23rd - Prepared by Alex Madonik and Sushila Kanodia |
| Apr. | How to Thrive (Not Just Survive) as a Woman in Today’s World – May 21st - Keda Edwards Pierre |
| May | George C. Pimentel Centenary - Zoom – May 15th - Jeanne Pimentel |
| | North Bay Area Science Discovery Day - Santa Rosa - May 15th – Alex Madonik |
| | WCC - How to Thrive (Not Just Survive) as a Woman in Today’s World - Zoom - May 21st - Keda Edwards Pierre |
| Jun. | WCC – Chemistry, ACS and YOU: The value of getting involved - J Giordan Virtual Presentation – June 21st |
| Sep. | Sept 10 – WCC - Moving the Needle: How key interventions can increase diversity, equity, and inclusion in STEM - Malika Jeffries-EL, PhD (Zoom) |
| | The Solano Stroll is Back – Sunday, September 11th, 10 AM to 5 PM! |
| | Science in the Park (Hayward) October 1, 2022 - Alex Madonik |

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| | Oct 3 - Social Networking - LA Angels Vs A's Baseball Game (Oakland) - Organizer: Fanny Frausto |
| Oct. | Oct 3 - Social Networking - LA Angels Vs A's Baseball Game (Oakland) - Organizer: Fanny Frausto |
| | Nov 10 - 2022 Bay Area Chemistry Symposium (BAC) (Berkeley - Hybrid) - Organizer: Patrick Lee |
| Nov. | Awards Luncheon (Skates by the Bay, Nov 6) - Donald MacLean |
| | 2022 Bay Area Chemistry Symposium (BAC) (Berkeley – Hybrid, Nov 10) - Organizer: Patrick Lee |
| | Empowering Women Scientists: In Your Past, Present, And Future (Zoom, Nov 12) - Lucinda Jackson, PhD |
| | Meet Chemistry Superstars Creating Tomorrow's Technologies (Stanford, Nov 17) – Postponed to January |
| Dec. | December Social (Zoom, Dec 4) |
| | Meet Chemistry Superstars Creating Tomorrow's Technologies (Stanford, Jan 18) – Rescheduled from November |

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| News and announcements | |
| Feb. | Section Trustee - Al Verstuyft |
| | CALACS Student Award |
| | What Form Will SEED Take in 2022? - E.S. Yamaguchi |
| Mar. | Alex Bruefach Has Been Named the California Section Recipient of the 2022 Outreach Volunteers of the Year Award |
| | Planning for our Virtual Earth Day Event on April 23rd |
| Apr. | National Chemistry Olympiad Test – April 30 |
| | Planning for our Virtual Earth Day Event on April 23rd - Prepared by Alex Madonik and Sushila Kanodia |
| | Bay Area Science Festival - SF April 24th |
| | Cal State East Bay – April 30th |
| | North Bay Area Science Discovery Day - Santa Rosa – May 15th |
| May | Cal ACS Honors its 2022 50-Year Members - Compiled by Al Verstuyft |
| | Section Gives Award in the 2022 Golden Gate STEM Fair - Paul Vartanian |
| | Educational Activities Review - Eileen Nottoli |
| | Olympiad April 30th - Eileen Nottoli |
| | High School Teacher Award - Eileen Nottoli |
| | Exceptional High School Student - Eileen Nottoli |
| | Bay Area Science Fair April 24th - Alex Madonik |

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| Jun. | Presentation of the 2020 Walter Petersen Award to Gary Martin - Paul Vartanian |
| | 2022 Shirley B. Radding Award to Dr. Marinda Li Wu - SVACS Section Newsletter |
| | 6 Participants Receive Honors and High Honors for the 2022 National Chemistry Olympiad Exam - Eileen Nottoli |
| Sep. | ChemLuminary Award for Senior Chemists Committee |
| | Jim Postma ACS Fellow - Fanny Frausto |
| | Society Membership Restructure – Donald MacLean |
| Oct. | CalACS Local Section Wins P3 Award |
| | Solano Stroll Thank You - For Alex Madonik |
| | Section Officers Nominees Election Call - For Michael Cheng |
| | Aug 2022 Cal ACS Membership Breakdown – Donald MacLean |
| Nov. | Seeking Volunteer(s) for Washington Elementary (Berkeley) - Alex Madonik |
| | Lincoln Science Night (Lincoln Elementary School, Richmond, Nov. 17) - Created by Alex Madonik |
| | This Year's Nobel Prizes Include Some Local Connections – Donald MacLean |
| | P3 Award Awarded to Lauren Holder (Novartis) for Bay Area |
| | Chemistry Symposium (BACS) - Text by Donald MacLean |
| | Calling all Candidates! Section Offices - By Alicia Taylor and Michael Cheng |
| Dec. | Cal ACS Section Voting Results – Michael Cheng and Donald MacLean |
| | Section Awards |

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| Profiles and Obituary | |
| Jan. | NA |
| Feb. | Pavlath Legacy – 4 - Nicki Davis |
| | As I remember Sandi Tillin - E.S. Yamaguchi In Memory of Sandy Tillin Marinda Wu Sandi Tillin – in Memoriam – Linda Wraxall |
| Apr. | In Memory of Professor Andrew Streitwieser, Jr. |
| May | Trudy Lionel – Donald MacLean |
| Jun. | Trudy Lionel, former WCC Co-Chair 1952 – 2022 - Elaine Yamaguchi and Margareta Sequin |
| Sep. | UC Berkeley Chemistry Professor Phillip Geissler |
| Nov. | Pavlath Legacy – 5: Textiles – Nicki Davis |
| Dec. | Pavlath Legacy – 6: Biomass, Energy, and Popped Corn – Nicki Davis |

| Education | |
|-----------|--|
| Jan. | The Irony of Iron Part 1 - Bill Motzer |
| | Expansion of “What are the Risks of Radon” shown in CEN Issue – Donald MacLean |
| Feb. | The Irony of Iron Part 2 - Bill Motzer |
| | Nomenclature for Covid-19 Variants is not Just Greek Letters – Donald MacLean |
| Mar. | Irony of Iron Part 3 - Bill Motzer |
| Apr. | Irony of Iron Part 4 - Bill Motzer |
| May | Irony of Iron Part 5 - Bill Motzer |
| Jun. | Irony of Iron Part 6 - Bill Motzer |
| | More on Leavening Agents – Donald MacLean |
| Sep. | The Irony of Iron Part 7 - Bill Motzer |
| | More Air Quality Maps– Donald MacLean |
| Oct. | The Irony of Iron Part 8 - Bill Motzer |
| | More Details on Textile Fibers – Donald MacLean |
| Nov. | The Irony of Iron Part 9 - Bill Motzer |
| Dec. | The Irony of Iron Part 10 - Bill Motzer Further Explanation, Periodic Graphics: Berries – Donald MacLean |

| Agriculture | |
|-------------|---|
| Feb. | Farm Scene: Polio in Sheep is not the Same Polio in Humans – Donald MacLean |
| May | Earth Day - Ground Water Management – Filings, Fees Coming – Donald MacLean |
| Sep. | What is the Beef on Feeding CBD to Horses and Companion Animals? – Donald MacLean |
| Oct. | Red Flesh Apples – Donald MacLean |

| Pharmaceutical | |
|----------------|---|
| Feb. | USP’s Plastic Component Extractables and Leachables Requirement – Donald MacLean |
| Mar. | Q3D (R2) Elemental Impurities – Donald MacLean |
| Apr. | EP 11.0 Symmetry Factor Default will be 1.8 – Donald MacLean |
| | JP in English now available – Donald MacLean |
| Jun. | Radionuclides are Back in Vogue – Donald MacLean |
| Sep. | Monkeypox (Mpox) Vaccines– Donald MacLean |
| Nov. | Drop Point Explanation – Donald MacLean |
| Dec. | Potential Game Changer in Particulates for Drug Products Discussed by Pharmaceutical Forum Stimuli Article – Donald MacLean |

| Recommend Location Reviews – Donald MacLean | |
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| Jan. | Monarch Butterfly Viewing (Santa Cruz, Santa Cruz County/ Pacific Grove, Monterey County) |
| Feb. | Rural Settings within the Metro Spawning Fish Viewing (Various locations) |
| Mar. | Albany Bulb (Albany, Alameda County) |
| Apr. | Reuse, Recycle, Repurpose – Former Hamilton Army Air Field, Novato (Marin County) |
| May | Petrified Forest (Calistoga, Napa County) |
| Jun. | Miller / Knox – Brickyard Cove Brick Kiln– Point Richmond |
| Sep. | California Academy of Science (San Francisco) |
| Oct. | Marine Mammal Center (Sausalito, Marin County) |
| Nov. | Lake Temescal as Urban Oasis (Oakland) |
| Dec. | San Francisco Zoo (SF) |

| Meeting / Book / Event Reviews | |
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| Jan. | A CAREER JOURNEY – Linda Wraxall |
| Mar. | Fanny Frausto WCC Talk - Greti Sequin |
| Apr. | ACS Spring 2022 Council Report - Jim Postma |
| | Cal ACS at the Tri-Valley Innovation Fair on Saturday, March 19th, 2022 - Charlie Gluchowski |
| | Past Events That Did Not Make into The Vortex – Donald MacLean |
| Jun. | How to Thrive (Not Just Survive) as a Woman in Today’s World – WCC Meeting - E. S. Yamaguchi |
| | Earth Week Continues - Alex Madonik |
| Sep. | American Chemical Society Fall 2022 Hybrid Meeting Chicago, Illinois - By Jim Postma with additions from Alex Madonik, Bryan Balazs, and Sushila Kanodia |
| Oct. | Malika Jeffries-EL and the WCC, Sept. 10, 2022 - Linda Wraxall |
| Nov. | Section Social: CALACS Recognition at A’s Game - Photo provided by Patrick Lee |
| | Section Activity: Hayward Science in the Park – Alex Madonik |
| Dec. | WCC Meeting Held on 11/12/2022: Empowering Women Scientists: In Your Past, Present, and Future - Abigail Gyamfi |
| | Family Science Night – Nov 17 th – Alex Madonik |