THE VORTEX

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

May 2025 Volume 87, Issue 5

3 Advertisement

4 Chair's Message

5 Upcoming Events

6 Passing of Alexander Mihailovski

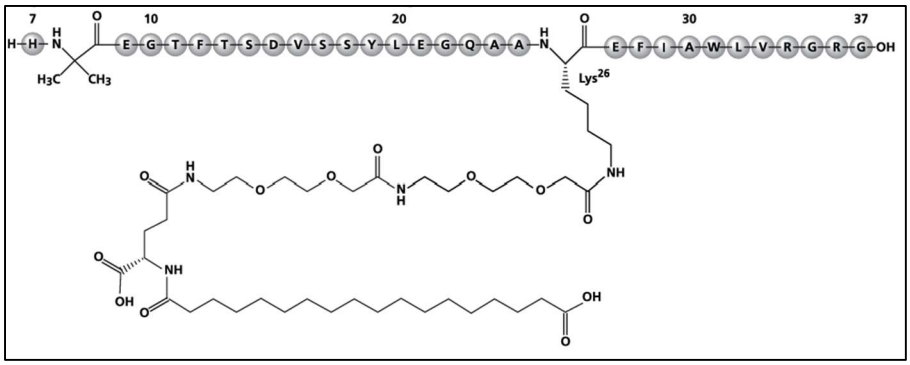
7 News from the Chemistry Olympiad

8 From the Laboratory to the Market Place: The Development of a New Drug – May 10, 2025

9 Annual Awards Luncheon & Presentation

11 Nomenclature for GLP-1

18 Pavlath Legacy: ACS Career Part 1 – Alan C. Nixon



21 California Section's Women Chemists Support Sonoma County's Expanding Your Horizons Conference

23 Celebrating Earth Day 2025 at the John Muir Historic Site in Martinez, CA on April 26th.

25 Tri-Valley Innovation Fair 2025

The Vortex is published monthly except July and 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.

MAGAZINE OF THE CALIFORNIA SECTION, AMERICAN CHEMICAL SOCIETY

Editor:
Donald MacLean
donald.maclean.acs@gmail.com

Article Contributors:
Nicki Davis
William Motzer

Office Administrator Manager:
Julie Mason
2950 Merced St. #225
San Leandro, CA 94577
510-351-9922
office@calacs.org
web site: http://www.calacs.org

Editorial Staff:
Outreach: Alex Madonik
Editorial Assistants: Jim Postma and Linda Wraxall
Web Page Posting and Editor: Donald MacLean or Alex Madonik

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

Cover Image Credits:
Upper Right: Speaker, Natalie McClure – WCC Poster
Top Left: Alex Mihailovski – Tamara Mihailovski
Middle: Chemical Structure for Semaglutide - Wikipedia
Bottom: Salt Melting Temperature Effect – Alex Madonik

This issue will start a series of articles honoring Attila Pavlath's ACS career. Attila Pavlath and Alan Nixon joined together as California section activists from the 1970s. The ACS at that time had a strictly scientific and academic orientation of publishing journals, sponsoring conferences, and performing other educational activities. Activists like Attila and Alan were leaders of the "professionalism movement," which put forward the idea that the ACS should also look out for the professional interests of its members.

The series is written by Nicki Davis using interviews and research in *The Vortex* archives.

Cal ACS Chair's Message

Alex Madonik

April and May are busy months in the California Section, but right now, the question I keep hearing is, how do we respond to the daily policy changes coming out of Washington, DC?

It's clear that the Trump administration wants to redirect Federally funded scientific research, while making enormous cuts to the budgets of key funding agencies (NOAA, NASA, NIH, NSF, etc.). There is no question that these cuts would have a devasting, long-term effect on scientific research in the U.S. They would drive tens of thousands of young scientists out of the field, or force them to take their talents abroad, besides stopping most university research programs in their tracks. Furthermore, the politicization of funding decisions would mark the end of U.S. innovation and leadership in science. Arbitrary political tests are completely incompatible with scientific creativity and discovery – just look at the USSR in the 1930s. Here's what Nature magazine has to say about NSF funding:

https://www.nature.com/articles/d41586-025-01396-2

As scientists, we must make our voices heard so that everyone knows just how destructive these policy changes would be. At the same time, ACS is advising us to speak cautiously to safeguard our status as a non-profit organization. The ACS invited comments from Local Section leaders, and has just posted a set of guidelines in Q&A format. This document includes links to key ACS policy positions supporting scientific research and education funding, while reminding us to avoid supporting specific candidates or legislation.

We are further advised to replace the terms, "diversity, equity, inclusion, and respect" with "**inclusion and belonging**" when speaking about ACS efforts to welcome people from every culture and background. In general, ACS programs and activities should be open to all, without limitations of race, age, gender, etc. Inclusion DOES mean assisting anyone who lacks resources in their community or because of their personal situation.

In this issue of the Vortex, check out the reports on our successful Earth Week outreach events. Looking ahead, we will recognize outstanding Cal ACS volunteers, as well as our 50-, 60-, and 70-year members, at the Awards luncheon on May 18th. Reservations are required! Watch our web site for upcoming in-person events and webinars, including the next WCC talk on May 7th by Natalie McClure of the Silicon Valley Section. And, we're still looking for volunteers to help with STEAM Night (Science, Technology, Engineering, Art, and Math) at Lincoln Elementary School on May 13th.

Finally, a big shout-out to Vanessa Marx and the amazing organizing team for the 2025 Western Regional Meeting in San Jose (October 25th – 28th). The Call for Papers is live and abstracts are already coming in. We hope to see you there!

Alex Madonik

Upcoming Events

- **Topic:** From the Laboratory to the Market Place: The Development of a New Drug
  Date: Saturday May 10, 2025
  Time: 10:30 am
  Location: Zoom
  Contact Person: Elaine Yamaguchi at eyamaguchi08@gmail.com
  Cost: Free

- **Topic:** Annual Awards Luncheon & Presentation
  Date: Sunday May 18, 2025
  Time: 11:30 -12:15, no-host social; 12:15 – 1:45 pm, lunch; 1:45 pm, award presentations
  Location: Skates on the Bay, 100 Seawall Drive, Berkeley CA
  Contact Person: office@calacs.org.
  Cost: Cost $50 per person (**award recipients no charge**)

- **Topic:** Outreach in May: STEAM Night at Lincoln Elementary School
  Date: Tuesday May 13, 2025
  Time: 5 - 6:30 pm
  Location: 29 6th St, Richmond, CA 94801
  Lead: Michael Cheng

- **Topic**: Outreach in June: Exploration Stations at the Contra Costa County Library:

Location	Date	Time
Dougherty Station Library	Friday, June 6	11:00- 1:00
Walnut Creek Library	Wednesday, June 11	11:00- 1:00
Brentwood Library	Wednesday, June 18	11:00- 1:00
Hercules Library	Wednesday, June 25	11:00- 1:00

  Lead: Charlie Gluchowski for June 6 ,11.

ALEXANDER MIHAILOVSKI OBITUARY

Alexander Mihailovski (Nov 8, 1937 - May 2, 2025) Kensington resident of 53 years, passed away in his home from complications of Alzheimer's. Alex was born in Sofia, Bulgaria. His family immigrated first to Germany then, after WWII, to Pennsylvania. Alex received his Bachelor's degree from Penn State. After postings overseas with the USAF, Alex graduated from UCLA with a PhD in Organic Chemistry. There, he met his future wife, Tamara. Since 1972, they have lived in their Kensington Home while Alex was working at Stauffer Chemical Company (later ICI, then Syngenta) in Richmond.

As a chemist, Alex was very interactive with his professional colleagues and the scientific community at large, obtained many patents for his work, served as the Chair of the California section of the American Chemical Society, and later, Chair of its Board of Trustees. In 2009, he was honored with the distinguished Walter Petersen Award.

Alex was very dedicated to his family and enjoyed many hobbies with joie de vivre: hiking, skiing, opera, music, literature, film, cooking, and social celebrations. He particularly loved traveling both for work and with his family, sharing his adventures via entertaining photo presentations for friends. He was a regular participant and volunteer for our local committees for disaster preparedness and enjoyed many pleasant hours in the Kensington Library perusing their periodicals.

Alex is survived by his wife of 55 years, Tamara, son Nick, daughter-in-law Brandi, granddaughter Sasha, brother Peyo, and sister-in-law Jan.
He will be dearly missed by his family and friends.

News from the Chemistry Olympiad

Donald MacLean

The following is a message that I received from Eileen Nottoli regarding the Chemistry Olympiad. Some editing is included for explanation.

We held the National Olympiad on April 5 at Las Positas College in Livermore along with the Silicon Valley Section (Counties include San Mateo, Santa Clara, Santa Cruz). We (the California section [counties: San Francisco, Alameda, Contra Costa, Marin, Sonoma, Napa, Solano, etc.]) had 17 students from 12 high schools that competed in the National exam. ACS has announced the twenty students who are eligible for Study Camp based on the National Exam and sadly, no student in the California Section will be going to Study Camp this year. ACS has not as yet released the names of the top 50 students who made High Honors and top 51-200 who made Honors.

This year, ACS required that all students who wanted to participate in the Olympiad be registered by a parent or guardian and offered an online exam in addition to a paper exam. We had 35 high schools that participated in the Local exam in March including a first-time school in Merced as well as eight other first-time or infrequently participating schools. Over 350 students had registered with ACS to take the exam. Two students took the online (a result of a confusing rollout) and the rest took the exam on paper.

To encourage teachers to participate in the Olympiad, we initiated a scholarship for Olympiad teachers. The scholarship will reimburse teachers for up to $2,500 to attend one of two conferences held during the summer that are focused on chemical education. We use a "weighing" factor of additional name slips depending on how long the teacher has been participating in the Olympiad. Our first winner is Dr. Patricia Theodosopoulos who teaches at St. Mary's College High School in Albany.

On a related note, Dr. Zeynep Araci, who teaches at Basis Independent in Fremont, won our Outstanding High School Chemistry Teacher Award. Her students always perform well on the Olympiad.

Editor's note: If you want to participate in the Chemistry Olympiad, the section sends notices to each high school in the California section in the January time frame. Each year has a different procedure so look for the procedure at that time. You must be sponsored by your physical school. The student will represent the USA so the student must be a US Citizen or legal permanent legal resident under 20 years and have a Passport by July of that year. Currently the process starts with a screen exam (local exam) that reduces the 350ish students to 17 primary and a few alternates. 17 Cal ACS section students take the National Exam. Of the 1000 + (1089 in the last year I did this) students who take the USA National Exam, 20 are selected for a 1-month summer camp. 4 of the 20 are then selected to represent the USA at the International Chemistry Olympiad at varying locations each year. See the link below for direct information.

https://www.acs.org/education/olympiad.html

If you are outside of the California section, see the link to determine your coordinator, if you have one. The number of students that a section can move forward with is based on a member size that is not linear. The range keeps changing as in 2014 we had 3500+ members yet had 17 student slots. If we had 3500 members today, we would have 22 slots.

California Section
American Chemical Society

Women CHEMISTS Committee

All are welcome
Saturday, May 10, 2025

Title

From the Laboratory to the Market Place: The Development of a New Drug

Time
10:30 – 11:00 am
Chatting

11:00 am
Talk and Discussion

Reservation
Please visit the CalACS website www.calacs.org to register for this meeting or use Brown Paper Tickets.

RSVP here!

Please register before Thursday, May 8, 2025, 12 noon. Your email address is needed to send the ZOOM link, which will be shared with attendees on or before the day of the event via Brown Paper Tickets.

Cost
Free!

About the Speaker

Natalie McClure, PhD

Natalie McClure is a regulatory affairs consultant with extensive experience in drug development, regulatory affairs and quality assurance. She obtained a BS in Chemistry from the University of Michigan in 1974 followed by a PhD in Organic Chemistry from Stanford University in 1979. She started her career at Syntex Research, working in the process development laboratories on new synthetic approaches to prostaglandin and large-scale peptide synthesis and then changed career direction to drug regulatory affairs. Over the past 40 years, she has worked at several different companies, big and small, as an individual contributor and executive, and helped get over 6 drugs approved for marketing. She has filed more than 50 INDs (Investigational New Drugs), orphan drug applications and conducted many pre-IND meetings with the FDA. Natalie is an instructor at St Mary's University and the UC Berkeley Extension program offering several courses in drug development and regulatory affairs. Natalie is also very active in the American Chemical Society serving as chair and councilor of the Silicon Valley local section.

Abstract

Drug development requires a delicate balance between innovation, efficacy, safety, and regulatory compliance. This talk will explore the multifaceted process of bringing a new drug from the laboratory to the market, focusing on the critical role of regulatory affairs in ensuring patient safety and product quality. We will examine the key stages of drug development, including pre-clinical studies, clinical trials, and risk-benefit analysis. We will also discuss how to interpret the package insert. We will discuss how drug developers can work with the FDA to bring the new drug to the market.

Questions?

Please contact Elaine Yamaguchi at eyamaguchi08@gmail.com

Congratulations It's Time for the
California Section American Chemical Society
Annual Awards Luncheon & Presentation

Honoring 50-, 60- and 70-Year Members of the American Chemical Society, Recognize our Walter B. Petersen Award Presentation and Lloyd Ryland Award recipients

Date: Sunday, May 18, 2025
Time: 11:30 -12:15, no-host social; 12:15 – 1:45 pm, lunch; 1:45 pm, award presentations
Place: Skates on the Bay, 100 Seawall Drive, Berkeley CA

Lunch: Cost $50 per person (**award recipients no charge**); Lunch will include entrees, dessert and coffee or tea. Your choice of entrées is American Wagyu Sirlion, Grilled Salmon, Roasted Rosemary Chicken or Grilled New Orleans BBQ Prawns, Veg. Select one: soup (clam chowder) or salad (Hearst of Romaine Caesar), one entrée, and one dessert (Crème Brûlée, Molten Chocolate Cake or Key Lime Pie).

Reservations are required due to limited seating:
Please let us know if you will be able to attend no later than **Wednesday, May 7th, 2025**, by emailing office@calacs.org.

To pre-pay: Please mail checks made out to "California Section ACS" to the California Section office, 2950 Merced St. #225, San Leandro CA 94577, or you may pay by PayPal by going to http://www.paypal.com > Send Money > Send Money Online > To: office@calacs.org and follow the instructions.

Abstract (for awards):

The American Chemical Society honors those members who attain 50, 60 and 70 years of membership. The list of those in the California Section who have attained these honors this year includes:

50 Years	60 Years	70 + Years
Bendict G. Archer	John A. Budny	Douglas W. Fuerstenau
Geoffrey J. Brooks	Robert J. Bussey	Edward L. Kean
James L. Brunk	Tony Man Kuen Chiu	Sheldon N. Lewis
Ross W. Fisher	Ta Sen Chou	William H. Reusch
David E. Garfin	Michael H. Coan	Igor Sobolev
Benjamin U. Giang	David E. Earls	Richard F. Sullivan
Diana G. Graham	Carl D. Eben	Hessy L. Taft
Karl R Grose	Douglas L. Eisner	
Ronald Poonke Ko	Sandra C. Greer	
Clay Larson	Hamid S. Kasmal	
Michael A. Marletta	Larry L. Kirk	
Elizabeth H. Mei	Gerald T. Lisowski	
Barbara Oviedo Mejia	Kent E. Matsumoto	
Charles E. Middleton	Paul R. Ortiz De Montellano	
Christopher A. Pohl	Chai Fu Pan	
David W. Pointon	Jerry L. Sarquis	
Philip N. Ross	L. Donald Shields	
Harvey S. Trop	Gerald T Taylor	
Mark M. Wegner	John J. Vollmer	
Gordon J. Wozniak		
Simon M. Yeh		

The Lloyd Ryland Award will be presented by the California Section to honor outstanding high school chemistry teachers within the California Section of ACS. The 2025 Lloyd Ryland Award recipient is **Zeynep Araci** from Basis Independent School-Fremont.

The Walter B. Petersen Award is given annually to a California Section member for outstanding service for an extended period to the Section. The 2025 winner is **Atefeh Taheri**.

New Nomenclature for GLP-1 Drugs Tells You How It Works

Donald MacLean

It is no surprise that Americans have diabetes and obesity problems, sometimes both. Reduce caloric intake and do exercise?! The American solution, take drugs, preferably orally. Anti obesity drugs are all the rage of tv advertisements with their catchy tunes and showing people doing an exercise activity. With huge chunks of people with diabetes and even the teenagers are now more than the 1970s "husky", GLP-1 drugs have become more famous than the front-line treatment Metformin (antihyperglycaemics, phenformin derivative) and Glipizide (a sulfonamide derivative, drug class sulfonylurea). Today (April 25th) on the news I saw a new candidate from Amgen in Phase III trial, Maritide (INN maridebart cafraglutide) for obesity.[3] Maritide is the brand name while maridebart cafraglutide is the nonproprietary name. For small molecules the INN (or

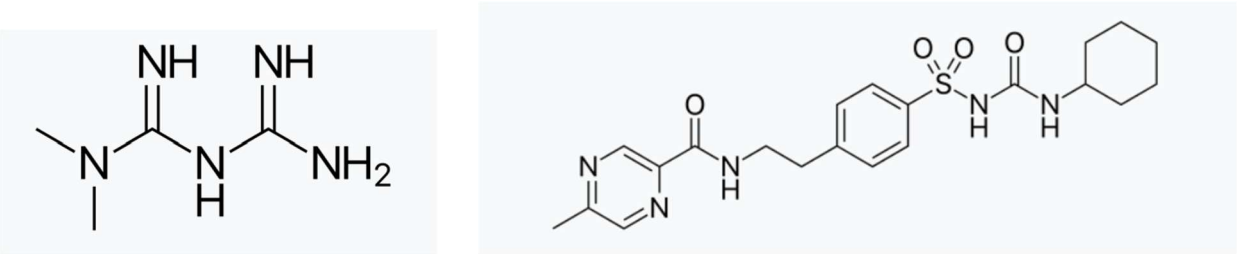


Figure 1. Chemical Structure for Metformin and Glipizide. [1, 2]

its equivalent) name is the same for everyone producing the same active ingredient in a country or region, but the brand name usually changes. In the US we use USAN (United States Adopted Name) or scientific names instead of INN for nonproprietary drug names. The wording that follows the INN / USAN nonproprietary name is the dosage form, route, and if any special precautions or preparations are required.

INN

INN (International Nonproprietary Name) is part of the WHO (World Health Organization). Two other comparable organizations are USAN (United States Adopted Names) and JAN (Japanese Accepted Names). In most cases the INN, USAN, and JAN names are the same, but there are exceptions such as acetaminophen and paracetamol for the brand names Tylenol, Panadol, and Excedrin. Nonproprietary names consist of a randomized prefix (es) and a set suffix indicating the drug's mode of action or physical property. The name may be singular or have two names when cell, virus, liposome, or antibody are also involved for delivery or targeting.

In 2022 four new suffixes for monoclonal antibodies were published. The four new stems are -tug, -bart, -ment, and -mig. The following was taken from the WHO publication which has more details if you are interested:[4]

-tug for "unmodified immunoglobulins" is used for monospecific full-length immunoglobulins with unmodified constant regions and identical sets of CDRs that recognize the same epitope.

-bart for "artificial immunoglobulins" for monospecific full-length immunoglobulins with engineered amino acid changes in the constant regions and identical sets of CDRs that recognize the same epitope.

-ment for "immunoglobulin fragments" for monospecific fragments of any kind that do not fall under stem -tug or -bart, containing at least one immunoglobulin variable domain that contributes to binding, and feature a complete, partial or absent constant region (e.g., monospecific immunoglobulin-derived constructs without an Fc domain, scFv-Fc constructs).

-mig for “multi-specific immunoglobulins” is used for bispecific and multispecific immunoglobulins, regardless of the format (conventional or engineered), type (full-length or fragments) or shape (extensions or not).

This means that maridebart cafraglutide is an antibody product, but not a monoclonal antibody that is typically noted with -mab suffix ending nonproprietary name. The second name now tells us more about the active ingredient. Using the 2024 INN Stem Selection, here are the nonproprietary name meanings for the -tide suffix stem. They indicate the mechanism and molecule type.

-tide = peptide and glycopeptides
-enatide = glucagon-like peptide-1 receptor (GLP1R) agonists and analogues
-glutide = Glucagon-Like Peptide (GLP) analogues

So what is maridebart cafraglutide? The -glutide suffix stem indicates that it is GLP analogue. The -bart suffix stem indicates a monospecific full-length immunoglobulin with engineered amino acid changes in the constant regions and identical sets of CDRs that recognize the same epitope. Whether the Amgen drug makes it to commercial status is unknown, but there is another issue that is not thought about too often, the reimbursement scheme controlled by insurance, which is in turn controlled by a formulary or a series of formularies building on one another. At this moment Amgen used a 1 month arm in its Phase II study so the drug appears to be going for longer duration than the daily and weekly injection / oral route of current commercially available products. Because the product is an antibody, it is likely to be a solution and injected. The anticipated nonproprietary name would be maridebart cafraglutide injection. The prefixes are random selected sequences picked for sound.

Table 1 shows the Commercial GLP-1 products available in the USA. Note that the manufacturers have a diabetes drug version and weight loss drug version that seems to have the same formulation, but the concentration or delivery device is different. Why create two products that appear to be equivalent? See the comment below about Medicare Part D restriction on weight loss. The delivery device is different but that in itself would not warrant a different name. Products are routinely sold with different devices and reconstitution methods using the same brand name drug due to IP (intellectual property) issues and regional cost acceptance. This has to be due to reimbursement issues.

Table 1. Commercial GLP-1 Drugs. PFS = prefilled syringe.

[5] Also FDA approved for reduce heart attacks and Cardio Vascular Disease (CVD).

Brand Name Manufacturer Use Approval Year	INN / USAN / JAN Dose / concentration Device	Formulation	Frequency Route
Ozempic ® Novo Nordisk Diabetes 2017	Semaglutide injection 2, 4, 8 mg in 3 mL PFS Multi dose pen, single use needle	Semaglutide $Na_2PO_4 \cdot 2H_2O$ (1.42 mg/mL) Propylene glycol (14 mg/mL) Phenol (5.5 mg/mL) Water for injection HCl or NaOH for pH 7.4.	Weekly Injection
Wegovy ® Novo Nordisk Obesity[5] 2017	Semaglutide injection 0.25, 0.50, 1, 1.7, 2.4 mg At 0.5 mL or 0.75 mL PFS 4 Single dose pens	Semaglutide $Na_2PO_4 \cdot 2H_2O$ (1.42 mg/mL) NaCl (8.25 mg/mL) Water for injection HCl or NaOH for pH approx. 7.4.	Weekly Injection
Trulicity ® Eli Lilly Diabetes 2014	Dulaglutide injection 0.75, 1.5, 3.0 and 4.5 mg / 0.5 mL PFS single dose	Dulaglutide Citric acid anhydrous (0.14 mg/mL) Mannitol (46.4 mg/mL) Polysorbate 80 (200 ppm for 0.75 mg and 1.5 mg) 250 ppm for 3 mg and 4.5 mg) Trisodium citrate dihydrate (2.74 mg/mL) Water for injection.	Weekly Injection
Victoza ® Novo Nordisk Diabetes 2010	Liraglutide injection 1.2 and 1.8 mg at 6 mg/mL in 3mL multidose PFS.	Liraglutide (3751.2 Da) $Na_2PO_4 \cdot 2H_2O$ (1.42 mg/mL) Propylene glycol (14 mg/mL) Phenol (5.5 mg/mL) Water for injection HCl or NaOH for pH approx. 8.15.	Once daily
Saxenda ® Novo Nordisk Obesity 2010	Liraglutide injection 0.6, 1.2, 1.8, 2.4, 3 mg at 6 mg/mL in 3mL PFS multidose pen with dose dial	Liraglutide (3751.2 Da) $Na_2PO_4 \cdot 2H_2O$ (1.42 mg/mL) Propylene glycol (14 mg/mL) Phenol (5.5 mg/mL) Water for injection HCl or NaOH for pH approx. 8.15.	Injection more often than weekly
Mounjaro ® Eli Lilly Diabetes 2022	tirzepatide injection, solution 2.5 mg, 5 mg, 7.5 mg, 10 mg, 12.5 mg, or 15 mg per 0.5 mL injection Single dose pen	Tirzepatide (4813.53 Da peptide) NaCl (4.1 mg) $Na_2PO_4 \cdot 7H_2O$ (0.7 mg) water for injection. HCl or NaOH for pH of 6.5 – 7.5.	Weekly Injection
Zepbound ® Eli Lilly	tirzepatide injection, solution	Tirzepatide (4813.53 Da peptide) NaCl (4.1 mg) $Na_2PO_4 \cdot 7H_2O$ (0.7 mg)	Weekly Injection

Weight Management 2022	2.5 mg, 5 mg, 7.5 mg, 10 mg, 12.5 mg, or 15 mg per 0.5 mL injection Single dose pen or vial	water for injection. HCl or NaOH for pH of 6.5 – 7.5.	
Byetta ® Generic AstraZeneca Approved 2005 Discontinued 2024	Exenatide injection 5 or 10 mcg / dose from 0.25 mg / 1.2 mL 0.50 mg / 2.4 mL Multiple dose pen	0.250 mg/mL Exenatide Acetic acid Mannitol 2.2 mg/mL Metacresol Sodium acetate pH 4.5	Twice a day around meals
Bydureon BCise ® Generic AstraZeneca Approved 2005 Discontinued 2024	Exenatide injection extended-release suspension autoinjector 2 mg in 0.85 mL Single dose pen	Exenatide 37.2 mg / dose DL-Lactide and Glycolide (50:50) Copolymer 63000 Acid 0.8 mg / dose Sucrose 774.4 mg / dose Medium-Chain Triglycerides	Weekly Same drug as above
Brand Name Manufacturer	INN / USAN / JAN Dose / concentration	Status Formulation	Frequency Route
Rybelsus ® Novo Nordisk Diabetes 2017	Semaglutide tablets R1: 3 mg, 7 mg or 14 mg R2: 1.5 mg, 4 mg or 9 mg	formulation R1: Semaglutide Magnesium stearate Microcrystalline cellulose Povidone Salcaprozate sodium (SNAC) formulation R2: Semaglutide Magnesium stearate SNAC	Daily Oral

GLP-1 Chemical Structures

Peptide and protein primary sequence is expressed with amino acid as single letters for each amino acid, or 3 letters for each amino acid starting at the amino terminal and ending at the carboxyl terminal.

Semaglutide is a peptide with modification of position 26 lysine with a hydrophilic spacer and a C18 fatty di-acid, modification at position 8 to provide stabilization against degradation by the enzyme dipeptidyl-peptidase 4 (DPP-4) and a minor modification at position 34 (Lysine {I get Arg}) to ensure the attachment of only one fatty di-acid. The amino acid sequence is shown in Figure 2.

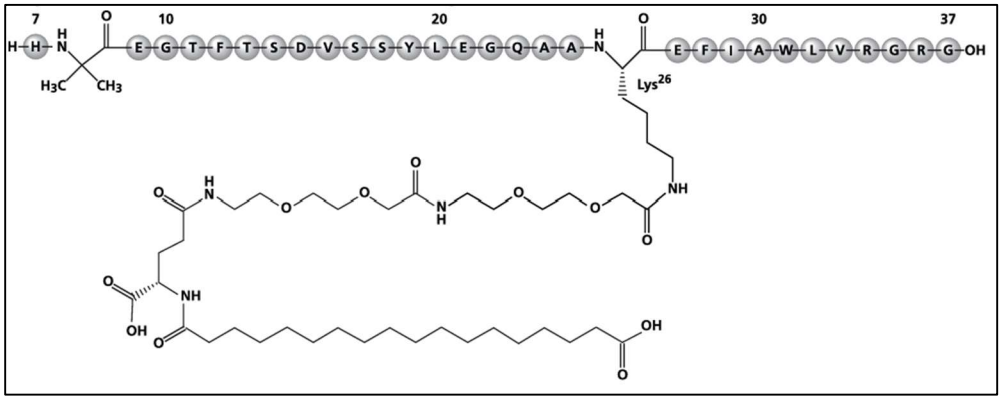


Figure 2. Chemical Structure of Semaglutide.

Liraglutide is 97% homologous to native human GLP-1 by substituting arginine for lysine at position 34, attaching a C-16 fatty acid (palmitic acid) with a glutamic acid spacer on the remaining lysine residue at position 26 of the peptide precursor. The amino acid sequence is shown in Figure 3.

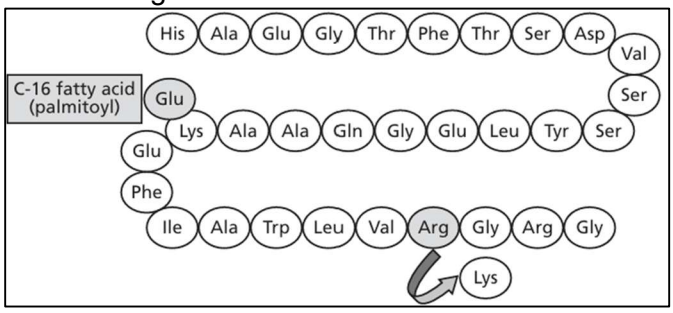


Figure 3. Chemical Structure of Liraglutide. Note in the structure copied from the patient insert has the first 6 amino acids missing.

Tirzepatide contains aminoisobutyric acid (Aib) in positions 2 and 13, a C-terminal amide, and Lys residue at position 20 that is attached to 1,20-eicosanedioic acid via a linker. The amino acid sequence is shown in figure 4.

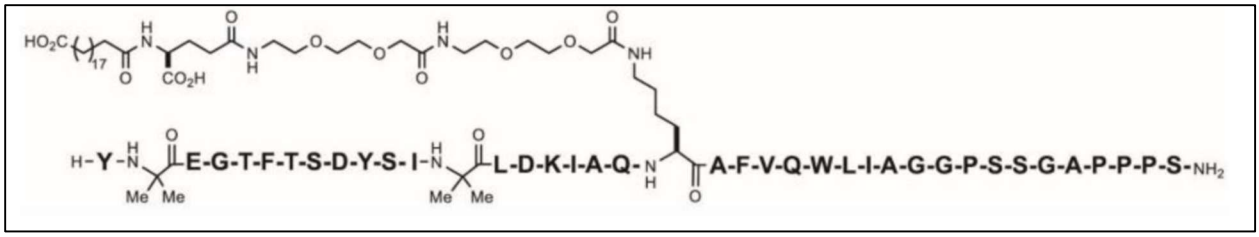


Figure 4. Chemical Structure of Tirzepatide.

Exenatide is a 39-amino acid peptide amide with MW 4186.6 Da:
H-His-Gly-Glu-Gly-Thr-Phe-Thr-Ser-Asp-Leu-Ser-Lys-Gln-Met-Glu-Glu-Glu-Ala-Val-ArgLeu-Phe-Ile-Glu-Trp-Leu-Lys-Asn-Gly-Gly-Pro-Ser-Ser-Gly-Ala-Pro-Pro-Pro-Ser-NH2

Approval, Discontinuance, and Withdrawal Years

The first GLP-1 drug, exenatide (brand name Byetta®), was approved by the Food and Drug Administration (FDA) for the treatment of T2DM (Type II Diabetes Mellitus) in 2005. In 2014, Saxendra® (Liraglutide) was the first GLP-1 drug approved by the FDA for weight loss. In 2021, the FDA approved Novo Nordisk's application to market a GLP-1 drug for weight loss under the brand name Wegovy ®. In 2023, the FDA approved another GLP-1 drug for weight loss, tirzepatide, under the brand name Zepbound ®. In 2024 AstraZeneca discontinued their two GLP-1 products. No safety reason was given, rather a business decision was provided in the press release.

Payment Coverage

Which would you get? This depends upon prescription and insurance. Clinics and Insurance also depend upon their formulary (ies). If it is not on the formulary, you will not get it. If you are on Medicare (USA drug program for 65 years and older person who qualify) then there is Medicare Part D formulary, which has multiple versions. The Medicare formulary is limited to no more than 2 drugs per drug class the last time I was involved with it. Therefore, the USAN / INN name is very important as if there are 8 drugs in a class and you want Manufacture A, but only B and C are on the formulary, then B and C are your only choices. One thing that is interesting is that the retail price is not what the government or insurance pays. There are discounts and rebates. The US government must get the lowest overall price of any customer by law. The government gets back an average of 62% of the gross sales price. The USAN / INN name is how the US government groups drugs that are to be price negotiated.

Here is the kicker about GLP-1 drugs. Part D-covered drugs are generally defined as FDA-approved drugs and vaccines that are on the formulary of a Part D plan and are not covered under Medicare Parts A or B. Part D plans must offer a formulary that covers substantially all drugs available in the six protected drug classes: immune-suppressant, antidepressant, antipsychotic, anticonvulsant, antiretroviral, and antineoplastic (cancer). Outside of the six protected classes, Part D drug plans are required to operate formularies that cover at least two drugs in each drug class and category but have flexibility over which drugs to offer. Certain types of drugs are prohibited from being considered covered Part D drugs under the standard plan. The Medicare Prescription Drug, Improvement, and Modernization Act of 2003, which created Part D, excluded drugs used for anorexia, weight loss, or weight gain. The restrictions were based on the existing definition of drugs or classes of drugs that may be excluded from Medicaid coverage under the Social Security Act Section 1927 (d)(2). Therefore, GLP-1 drugs, even if they have received FDA approval for weight loss, are not covered under Part D drugs when used for that purpose.
If you are interested in this topic see https://www.congress.gov/crs-product/IF12758 (Medicare Coverage of GLP-1 Drugs).

There is more than just getting the drug through regulatory approval, you have to get it on the formulary. That is another topic.

Table 2. GLP-1 Drug Use, Retail Price, and if Covered by Medicare. Medicare price cannot be determined as too many variables. Medicare does not cover obesity use.

Drug	Use	Association	List Price	Medicare Cost Cost dependent on plan and area
Wegovy ®	Obesity	Novo Nordisk	$1349 for 28 days	Not covered
Ozempic ®	Diabetes		$998	$7.40 to $318
Trulicity ®	Diabetes	Eli Lilly	$1100	$0 to $100 for majority
Victoza ®	Diabetes	Novo Nordisk	$924	$864
Saxenda ®	Obesity		$1628	Not covered
Mounjaro ®	Diabetes	Eli Lilly	$1271	$0 - $1242
Zepbound ®	Obesity		$1281	Not covered

References:

1. Metformin: https://en.wikipedia.org/wiki/Metformin
2. Glipizide: https://en.wikipedia.org/wiki/Glipizide
3. Amgen Announces Robust Weight Loss with Maritide in People Living with Obesity or Overweight at 52 Weeks in a Phase 2 Study: https://www.amgen.com/newsroom/press-releases/2024/11/amgen-announces-robust-weight-loss-with-maritide-in-people-living-with-obesity-or-overweight-at-52-weeks-in-a-phase-2-study
4. Use of stems in the selection of International Nonproprietary Names (INN) for pharmaceutical substances, 2024, World Health Organization, ISBN 978-92-4-009938-8 (electronic version)
5. Novo Nordisk Inc. (NNI) Products: https://www.scientific-exchange.com/product-information/novonordisk.html
6. Comparing Ozempic, Wegovy and Other GLP-1 Drugs – GoodRx: www.goodrx.com › glp-1-drugs-comparison
7. How Much Does Wegovy Cost?: https://www.goodrx.com/wegovy/wegovy-for-weight-loss-cost-coverage
8. How much should I expect to pay for Trulicity® (dulaglutide)?: https://pricinginfo.lilly.com/trulicity
9. https://www.goodrx.com/mounjaro/medicare-coverage
10. Medicare will negotiate Novo's GLP-1 drug price. Here's what that means for Ozempic, Wegovy: https://www.biopharmadive.com/news/medicare-novo-glp-1-drug-price-ozempic-wegovy/737620/
11. Medicare Coverage of GLP-1 Drugs: https://www.congress.gov/crs-product/IF12758

Pavlath Legacy: ACS Career Part 1

By Nicki Davis

Alan C. Nixon and the Professionalism Movement (1969-1971)

The previous articles in this series described Attila's scientific career and his contributions to the field of chemistry. With this article, we begin a series that describes Attila's 55 years of service to the ACS and to its members.

In this article, we show how Attila became active in the California section of ACS (CalACS). Attila had joined ACS in 1959, but described himself as "an ordinary dues-paying member until 1969," when he got joined the Executive Committee of the California Section of ACS (CalACS) and began working with the late Alan C. Nixon on what became known as the professionalism movement.

Employment crisis of the 1960's and early 1970's

The ACS faced many challenges in the late 1960's and early 1970's. All three major constituencies of the ACS – the chemical industry, academic journal publishing, and dues-paying members -- were struggling:

- The chemical industry was in recession, had reduced its work force, and had cut its advertising budgets.
- ACS Publications, the Society's main source of revenue, was barely breaking even by 1971, driven by the decline in advertising revenue. *Chemical & Engineering News* was in particular trouble: It had laid off 30% of its staff and cut back 20% of its content, but still faced a deficit of $650,000.
- After America put a man on the moon in July of 1969, the employment boom for scientists and engineers that had begun with the launch of Sputnik in 1957 was over. The resulting recession in the chemical industry not only cost thousands of scientists and engineers their jobs, but recent chemistry graduates also faced the challenge of oversupply (15,000 available jobs vs 23,000 graduates). Companies' termination practices could be brutal: a person could simply be told on Friday afternoon to clean out his or her desk and to not come in on Monday.

Opinions differed on how to address the employment crisis. Like every scientific society, the ACS needs to balance its "scientific" responsibilities (like academic journal publication) with its "professional" role. The professional role comprises tasks such as educating the public on the importance of science and of attracting bright students. Alan C. Nixon wanted to expand the Society's professional role by making it more responsive to the needs of its members: "I want to build a system in the ACS to take care of chemists' professional needs-a system that concerns itself with the human problems of chemists as employees,[1]" he said. "The first responsibility of the ACS is to its members."

[1] "ACS: Disgruntled Chemists Seek New Activism from an Old Society," R. Gillette, *Science* **173,** 1218-1220 (1971).

In his monthly “Employment” column for *The Vortex*, the CalACS newsletter, Alan addressed the employment crisis in no uncertain terms: “The ratio of applicants to employer representatives at the New York Employment Clearing House was about 3 to 1 in striking contrast to an almost reverse ratio of two years ago.” (November 1969). Alan continued to write about the issue in *The Vortex*, but was ignored by the national leadership. Clearly, someone needed to get the attention of the ACS national leadership, but how? This is where Attila stepped in to help Alan Nixon “shake up the ACS.”

Alan C. Nixon’s runs for ACS President-Elect

At a meeting of the CalACS Executive Committee in May 1970, someone suggested that Alan run for ACS President-Elect. At that time, Alan was one of several hundred members of the ACS Council, so it was difficult for his individual voice to be heard. As President-Elect, President, and Immediate Past President of the Society, however, he would automatically become a member of the Board of Directors, the governing body of the ACS. But how to get him elected?

Each year the nominating committee of the ACS Council presents the names of four members as candidates for president-elect for the following year. The ACS Council then selects two of these candidates and places their names on the ballot for the presidential election. At that time, the Council would nominate only high-profile scientists for president, so voting members were limited to a choice between (say) a prominent organic chemist and a prominent inorganic chemist. Under these conditions, there was no way a bench chemist like Alan could be nominated.

As a member of the CalACS Executive Committee, Attila was determined to find a way to get Alan’s name on the ballot. He did some research and discovered that it was also possible to nominate a presidential candidate through petition. If 300 members from different sections around the country signed a member’s petition for nomination, that member’s name would be put on the ballot. Attila took the bull by the horns and led the petition drive. He sent out letters to people around the country, people he knew would help to nominate Alan. Despite the fact that only six weeks were available to collect signatures, the effort succeeded in getting Alan nominated.

The ACS presidential election of 1970 pitted Alan C. Nixon against two famous scientists. As usual, the ballot contained a statement from each candidate explaining why members should vote for them. The two scientists wrote only about their scientific achievements, but in an unprecedented move, Alan Nixon added a statement on what he wanted to do for members. It was a big surprise to the ACS leadership when Alan almost won the 1970 election.

In 1971, with more time to collect petition signatures and run a campaign, Attila succeeded in getting Alan nominated and subsequently elected as ACS President-Elect for 1972. Moreover, that election had the highest participation of members who voted. In most years, only about 10% of members voted. In the 1971 election, however, 39% of the members voted, a record of participation that still stands.

Moving forward with professionalism

As the 1972 ACS President-Elect, Alan was now on the ACS Board of Directors and would remain there for three years: as President-Elect, President, and Immediate Past President. But what would happen after that? Alan was only one person on a board comprised of 15 members, many of whom passionately opposed his ideas, so there were limits on what he could do. Moreover, a future president could undo whatever changes Alan had instituted. Clearly, the solution was to elect people to the ACS Board of Directors who backed – or at least didn't oppose – Alan's ideas on professionalism, namely, his slogan, "The first obligation of the ACS is to its members." This would require a long-term commitment to change the composition of the board. The next article will describe how Attila worked to solve that problem.

More About Alan C Nixon

For those who did not know Alan C Nixon, a short summary of his career is in order. Alan Nixon received his PhD in physical organic chemistry from the University of California, Berkeley in 1934. He went on to a 33-year career at Shell Research in Emeryville, California working on motor and aviation fuels.

Alan's service in the California Section and his leadership of the professionalism movement not only showed that he cared deeply about the problems of his fellow chemists, but that he was willing to take action to improve conditions. This character was further reflected in two other projects he initiated that exist to this day: Project SEED and the Council of Scientific Society Presidents (CSSP).

Project SEED (Summer Experiences for the Economically Disadvantaged) grew out of the social unrest of the mid-1960's. Alan was well aware of the problem of urban poverty; at his home in Berkeley, CA he could smell the tear gas being hurled at demonstrators, and wondered if there was something he and other chemical professionals could do to address the problem. He teamed up with fellow ACS Councilor William V. Johnston to cosponsor a resolution "to take the appropriate steps to ease the problems of underprivileged segments of the nation's population, particularly in relation to lack of education and unemployment," which the ACS Council adopted on April 4, 1968. This resolution eventually evolved into Project SEED. Project SEED continues to support high school students from economically disadvantaged backgrounds to learn about chemistry careers and receive mentoring in a paid summer internship program.

The Council of Scientific Society Presidents was founded in 1973. Alan Nixon, who was ACS President that year, contacted the presidents of a number of scientific societies with the idea of discussing common problems and taking positions on public policy on behalf of scientists and the nation. CSSP has provided leadership training to help scientists to influence public policy by more effective communication with lawmakers.

Incidentally, the activities of Alan Nixon, Attila, the others in the California Section of ACS in the professionalism movement and Project SEED gave them something of a reputation as "radicals" with members of other Sections.

California Section's Women Chemists Support Sonoma County's Expanding Your Horizons Conference

By: Janet Schunk

Spring has arrived . . . the hills are vibrant green and the cattle and sheep are out grazing with their new offspring! It also means it is time to journey to Sonoma County, as I take the backroads and enjoy the signs of spring during my drive from Solano County to Sonoma County, to present at this year's Expanding Your Horizon (EYH) conference.

On Saturday, 12 April 2025, the Sonoma chapter of Expanding Your Horizon hosted girls (and boys were welcome too) in the seventh and eighth grades at Sonoma State University. This year, the conference offered three sessions of eight workshops that allowed the participants to experience fun hands-on activities related to careers in STEM fields. The Sonoma's chapter objectives for the conference were:

- Allow young women to gain experience in STEM topics of their choosing,
- Have the opportunity to interact with positive women role models, and
- Develop a deeper understanding of the need for STEM education and early career exploration.

The ACS California Section Women Chemists team consisted of Anne Taylor, Elaine Yamaguchi, and Janet Schunk. We presented three, 50-minute workshops, Chemists Have Solutions, where paper chromatography and design of experiments were used to explore techniques used by chemists. The questions we explored were:

1) What color is black? And what color is brown?
2) Does the amount of marker applied (i.e. sample size) make a difference in how well the color components separate?
3) Does the age of the marker make a difference?
4) Does the stationary phase (i.e. brand of paper towel) impact separation?

The design matrix/worksheet that was used looked something like this.

Q:·Does·the·amount·of·sample·impact·how·well·the·ink·separates?¶

¤	Collaborator·#1¤		Collaborator·#2¤	
VARIABLES¤	Design·1A¤	Design·1B¤	Design·2A¤	Design·2B¤
	¤	¤	¤	¤
Marker·Color¤	¤	¤	¤	¤
Paper·Towel·1¤	Yes¤	Yes¤	Yes¤	Yes¤
Old·Marker¤	Yes¤	Yes¤	¤	¤
New·Marker¤	¤	¤	Yes¤	Yes¤
Sample·=·*small·dot*¤	Yes¤	¤	Yes¤	¤
Sample·=·*large·dot*¤	¤	Yes¤	¤	Yes¤

¶

Design·A¤	Design·B¤
¤	¤

The experiment was designed to use one brand of paper towel as the stationary phase, water as the mobile phase, and a consistent separation run time of 5-minutes. The participants were allowed to use their discretion as to what a 'small dot' and 'large dot' for sample size application looked like.

Now, I had to confess to the participants, that the terms "old" marker and "new" marker have become relative. As the "old" markers are probably now 20+ years old; and the "new" markers are probably approaching 10 years. However, the age of the markers did lend itself to additional discussion. Even though the marker brand was "Mr. Sketch" for both old and new, we noted there has been a change in the design in the logo on the new markers. A question that we pondered in our discussion was: could the change in logo mean that there might have been a change in formula, or even if the same manufacturer was making the markers after all these years? Another question we discussed was whether the storage

temperature of the markers could impact performance. Meaning, for many years the markers were kept in El Cerrito, a city near the San Francisco Bay, where seasonal temperatures are pretty mild. For those years, when the markers were in Solano County, where summer temperatures can get quite toasty, (perhaps 115°F or more in my garage), I deliberately kept the materials inside, in a more temperature control environment, because I did wonder what would be the impact of temperature on the markers.

We used our two 5-minute separation run times to continue our discussions. During the first experiment, we used the time to discuss what might not be obvious career paths for chemists. For example, chemists can be found working in museums where they explore minerals in space rock samples (Museum of Natural History, astro-chemists) or supporting art restoration (art museums, analytical chemists). They can be found in the agriculture field looking at ways to grow rice that cut methane emissions, or discovering ways to make ammonia production for fertilizer less energy intensive. They can be found in exploring new ways to make building materials to be more environmentally friendly by taking lessons from the natural world like fungi, as alternative ways to make concrete.

During our second 5-minute separation run time, we used the time to explore arguments “To Ban” or “Not to Ban” Dihydrogen Monoxide (or hydrogen hydroxide). After going through the points in each argument, I asked the participants what we were trying to ban. They had no idea. So, we worked our way through understanding the terminology used by the proponents of what they wanted to ban, by using comparison terminology of carbon dioxide (CO_2). And once the participants could sort out what mono-, di-, and oxide meant, it clicked! We were talking about water (H_2O). The point of this discussion was to emphasize don’t take things at face value, especially if you are not sure what is being discussed. Take the time to ask questions about the data before drawing conclusions. It was a fun example that I hope they will remember for years to come as they read through social media posts, news stories, and hopefully, scientific papers.

After our 5-minute separation run times were up, the participants compared their results – looking at impact of sample size as well as age of the markers on performance. Thinking what next experiments could be done.

In summary, the workshop not only introduced the girls to a technique used by chemists, but it also introduced the girls to being collaborators. One scientist cannot run every possible experiment or answer all possible questions, but by sharing and discussing data with other scientists, they can get to a “solution” faster.

The California Section Women Chemists have been supporting Sonoma’s chapter of Expanding Your Horizons conference for over 15 years. This outreach activity has been part of the Women Chemists Committee contribution to the California Section’s Strategic Plan Goal 3, fostering excellence in chemical education.

Celebrating Earth Day 2025 at the John Muir Historic Site in Martinez, CA on April 26th.

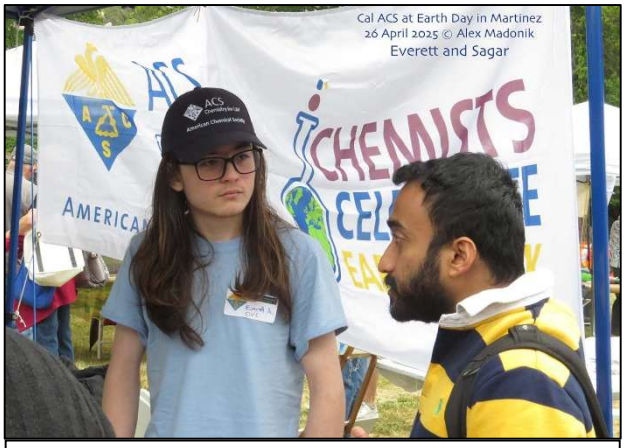
Alex Madonik

Earth Week would not be complete without the annual celebration of John Muir's birthday at the site of his historic home, now a National Park in Martinez, CA. Earth Week Coordinator Sheila Kanodia was the first to arrive on site, where canopies, tables, and chairs were ready and waiting for dozens of community groups and local agencies that participate each year. Sheila and I set up displays and activities relating to this years CCEW theme, "Glaciers: Hot Topic, Cool Chemistry," while Greti Séquin arranged her plant display, mystery scent samples, and molecular models. We also brought out the ever-popular UV-color-changing beads, and despite the gray skies and occasional threatening clouds, there was plenty of UV light to change the white beads to vivid colors.

Aparna and Sheila.

By 10 AM we were joined by our first wave of volunteers, including Sheila's friends Aparna and Reshma, Branden and Ajay from the Sigma Chapter of Alpha Chi Sigma at UC Berkeley, UCSF postdoc Sagar Bhattacharya, Dan Phillips of Saint Mary's College, and several students from Diablo Valley College. The festival opened with the traditional procession, led by John Muir himself and a Scottish piper from the Piedmont Highlanders. Despite the threatening weather, we soon had a crowd of visitors who were ready to learn about glaciers, ice bergs, and sea level rise. They could compare the rate of ice-melting in warm or cold water, and observe that ice-water (dyed blue) sinks in warmer, fresh water (dyed yellow) but floats on top of sea water (3.5% salt, dyed red).

Kids were eager to make UV-detecting bracelets and necklaces, and many tried to identify the mysterious plant fragrances, and then learned about the molecular structure of



Everett and Sagar.

terpene essential oils. Using plastic molecular models, they could build any structure, from simple ones such as acetic acid to complex terpenes such as vanillin or limonene.

Branden, Sky, and Ajay.

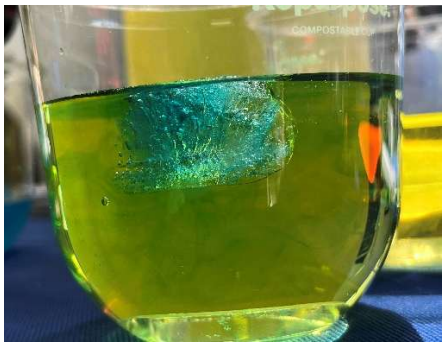
The chilly weather may have discouraged some, but it was a full day of hands-on science for Cal ACS and hundreds of visitors. We couldn't have done it without our enthusiastic volunteers -- special thanks to Dr. Laura Burns at DVC for sending so many of her students to join us

Amelia, Sheila, Rebecca, Rosa, and Elizabeth – Plant Scents and UV-Detecting Beads

Tri-Valley Innovation Fair 2025

After missing this festival a couple times due to schedule conflicts, Cal ACS returned to the Alameda County Fairgrounds in Pleasanton on Saturday, April 12th for a fun-filled day of hands-on science. Charlie Gluchowski and I arrived early for setup, assisted by Angi, one of his students at Las Positas College. We were soon joined by Dan Calef, another outreach veteran. By the time the crowds started to arrive at 10 AM, we were ready with several activities related to this year's Chemists Celebrate Earth Week theme, "Glaciers: Hot Topic, Cool Chemistry."

Kids had fun exploring the aquarium tanks with model glaciers and ice bergs; as the glacier melted, sea-level rise was unmistakable. By placing blue-dyed ice cubes in either fresh water (dyed yellow) or salt water (3.5% salt by weight, dyed red) they could observe what happens when ice bergs melt — the cold, fresh water floats on the denser seawater, but sinks in the less dense fresh water.



Meanwhile, Charlie and Angi were introducing visitors to the ever-popular UV-detecting beads. These beads are white when stored in the dark, but turn vivid colors when exposed to UV light. Every young scientist was eager to make a necklace or bracelet with these beads (combined with other colorful pony beads):

Using a digital thermometer, we could also demonstrate freezing point depression when we added salt to ice:

I had to leave at lunch time, but Charlie and Dan stuck it out until closing time at 5 PM, giving away our entire stock of CCEW 2025 edition of Celebrating Chemistry in the process, along with hundreds of Periodic Table wallets cards and other CCEW souvenirs. Another great day for science outreach!

Alex Madonik