THE VORTEX

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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

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Center: Joint EDQM–EPAA hybrid event on the future of pyrogenicity testing – Programme now available, EDQM.

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

Chair Message

Dear Readers,

As you might know, February is Black History Month, an annual celebration of achievements by African Americans and a time for recognizing their central role in U.S. history. Our section is excited to join in this celebration.

At California ACS, we celebrate the incredible achievements and contributions of the Black community. I invite you to read this 2019 article in the C&EN journal, "Black chemists you should know about." You can learn about the achievements and contributions of African Americans who overcame incredible odds to pioneer some of our most important discoveries and developments.

I also invite you to check the website of our collaborating local organization, the Association of Women in Science East Bay chapters, for various valuable resources regarding social justice.

As the current chair of our section, one of my priorities is to increase diversity, equity, and inclusion in every aspect of our section's efforts and activities. A 2021 article in Society for Human Resource Management states that Black individuals comprise 13 percent of the U.S. population but only 8 percent of employees in professional roles. In addition, black professionals hold only 3.2 percent of all executive or senior leadership roles and less than 1 percent of all Fortune 500 CEO positions. I do not think anyone with a few years of experience in industry or academia is surprised by these statistics. We have a long way to go to achieve equality and equity in our society.

I hope you all find some time this month to study the history of Black Americans and reflect on how we can all be more inclusive in every day of our lives.

References:

1. https://cen.acs.org/people/profiles/Six-black-chemists-should-know/97/web/2019/02
2. http://ebawis.org/social-justice
3. https://www.shrm.org/hr-today/news/all-things-work/Pages/racism-corporate-america.aspx

California Section
American Chemical Society

Women CHEMISTS Committee

All are welcome
Saturday, February 25, 2023

Title
Nonlinear Career Path: A New Normal and a Fun One

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, February 23, 2023, 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

Atefeh Taheri, PhD

Atefeh received her B.Sc. and M.Sc. in Analytical Chemistry from the Sharif University of Technology in Tehran, Iran. She earned her Ph.D. in Chemistry from Johns Hopkins University with Prof. Jerry Meyer and then worked as a postdoctoral researcher at UC Davis with Prof. Louise Berben. She started her first industry position as a product developer and formulator for the Clorox company. She then joined Chevron corporation, initially as a fundamental scientist. She has held various roles in Chevron. Currently, Atefeh is the Reliability and Maintenance Team Lead for the Western US plants and terminals of the America Fuels and Lubricants business unit of Chevron. In addition, Atefeh is the 2023 Chair for Cal ACS, on the leadership team of the Association of Women in Science East Bay chapter, and one of the leaders of Chevron PRIDE in Richmond (an Employee Resource Group for LGBTQA+ employees and allies).

Abstract

People ask children what they want to be when they grow up. It took Atefeh some years to realize that she had a broad interest in many topics and wanted to try various roles and responsibilities. Atefeh has embraced what Sheryl Sandberg, former COO of Meta, has said, "Careers are not ladders, those days are long gone, but jungle gyms. Jungle gyms offer more creative exploration". In this talk, Atefeh will share her story and career journey and discuss how nonlinear career paths can be challenging but very rewarding at the same time.

Questions?

Please contact Elaine Yamaguchi at eyamaguchi08@gmail.com

2023 Chemistry Olympiad Participation

By Donald MacLean

The 2023 Chemistry Olympiad National Exam will be held on Saturday April 22, 2023. The California local section test will be held jointly with the Silicon Valley Section at a location in the Silicon Valley coverage area. Participation requires a nomination from your local high school and is limited to 1 or 2 participant(s) per school. The event notice will be sent out to each High school in the California section. If you want to participate in the Chemistry Olympiad you must go through your high school chemistry program. There may be a local test to determine who will be the representative from the school.

The 20 top-scoring students from the National Exam will spend two weeks at a Study Camp June 4-17 at the US Air Force Academy to undergo rigorous training. Based on their performance, four students are chosen to represent the U.S. at the International Chemistry Olympiad July 16-25 at ETH Zürich, Covid 19 withstanding it taking place.

See for eligibility requirement:

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

The coordinators are Julie Mason and Eileen Nottoli.

Summer Project SEED Applications

By Donald MacLean

The Application process for Project SEED (originally “Summer Experiences for the Economically Disadvantaged”) will be opening soon. During Covid 19 on site summer internship did not occur; this year on site experience will resume.

Go to https://www.acs.org/education/students/highschool/seed.html for information and application.

The coordinators are Elaine Yamaguchi and Michael Cheng.

How Sweet It Is!
Part 1
by
Bill Motzer

Introduction: During the October through February holidays and celebrations, some of us may have indulged and perhaps over indulged in consuming too many candies, cookies, cakes, and sweet beverages. Because of this, we may also wish to reduce our sugar consumption, getting back to more healthy diets. Therefore, in this New Year, I thought it appropriate to investigate the different sweeteners that we ingest. Essentially, there are two sweetener classes: (1) natural or agricultural sweeteners, which are those occurring in grown plants (e.g., sugarcane and sugar beets) or farm raised animals (e.g., dairy cows for milk) and (2) artificial sweeteners, which have been discovered or developed in a chemical laboratory and then mass produced on an chemical engineering/industrial level.

Natural or Agricultural Sweeteners: All plants contain some type of sweet substance or "sugar." So what constitutes a sugar? This term refers to a family of related chemical compounds including ordinary refined sugar or sucrose, a disaccharide, or two-part molecule, formed from linking of the monosaccharides glucose and fructose. Typical sugar nomenclature often ends with *-ose*, as in "glucose" and "fructose" often referring to any water soluble carbohydrate. Therefore, the term s*ugar* generally refers to several carbohydrates: monosaccharides, disaccharides, or oligosaccharides. Monosaccharides ($C_nH_{2n}O_n$ with n occurring between 3 and 7, with deoxyribose the exception to the rule) are often classified as "simple sugars", of which, the most important are fructose ($C_6H_{12}O_6$) and glucose ($C_{12}H_{22}O_{11}$). The acyclic mono- and disaccharides contain either an aldehyde (an organic compound containing a functional group with the structure R−CH=O) or ketone (a functional group with the structure R–C(=O)–R', where R and R' form variable carbon-containing substituents). Such carbon-oxygen double bonds (C=O) are reactive centers.

Saccharides with more than one structural ring result from two or more monosaccharides joined by glycosidic bonds (a covalent bond joining a sugar molecule to another group, which may or may not be a carbohydrate), with resulting loss of one water (H_2O) molecule per bond. Monosaccharides in a closed-chain form can form glycosidic bonds with other monosaccharides, creating disaccharides (such as sucrose) and polysaccharides (e.g., starch or cellulose). Digestive enzymes must hydrolyze or break glycosidic bonds before such compounds can be metabolized. After digestion and absorption the principal monosaccharides present in blood and internal tissues include glucose, fructose, and galactose ("milk" sugar). Many pentoses (a monosaccharide with five carbon atoms, generally: $C_5H_{10}O_5$) and hexoses (a monosaccharide with six carbon atoms, generally $C_6H_{12}O_6$) can form ring structures. In these closed-chain forms,

the aldehyde or ketone group remains non-free, so many of the reactions typical of these groups cannot occur. Glucose in solution primarily occurs in ring form at equilibrium, with less than 0.1% of the molecules in the open-chain form.

Sugar Alcohols: also known as polyols, occur naturally in many fruits and vegetables and are manufactured on an industrial scale. Despite the name *sugar alcohols*, they contain neither sugar nor alcohol. They are carbohydrates, with structures similar to sugars and alcohols and are classified as: (1) monosaccharide-derived (e.g., erythritol, sorbitol, mannitol, and xylitol), (2) disaccharide-derived (e.g., isomalt, lactitol, maltitol), and (3) polysaccharide-derived mixtures (e.g., maltitol syrup and hydrogenated starch hydrolysates). These substances are now used as sucrose (sugar) substitutes for sugar-free and low-sugar foods and the polyols summarized below are regulated by the Food and Drug Administration (FDA) as either GRAS (Generally Recognized as Safe) or as approved food additives. However, some people ingesting sugar alcohols may experience digestive distress such as flatulence and diarrhea (Motzer, 2018).

Forms of Sugar Alcohol (Motzer, 2018):

- **Erythritol** ($C_4H_{10}O_4$) occurs in pears, melons, grapes and mushrooms and in yeast-derived foods such as wine, beer, sake, soy sauce, and cheese; also occurs naturally in the human body. Because it essentially has zero calories (Japan and the U.S. label it as a zero-calorie product), erythritol is used in low calories foods providing sweetness, texture and bulk for many sugarless products. When ingested, 60 to 90% is absorbed in the small intestines into the blood to be mostly excreted in urine with minor excretions in feces resulting in much less intestinal colon distress than other sugar alcohols (see below). Industrially, erythritol is produced by the enzymatic hydrolysis of genetically modified corn starch that generates glucose, which is then subsequently fermented with yeast or another fungus.
- **Isomalt** ($C_{12}H_{24}O_{11}$) tends not to lose its sweetness or decompose during heating and it also absorbs little water. It's useful as a sweetener in hard candies, lollipops, toffee, cough drops, and throat lozenges.
- **Maltitol** ($C_{12}H_{24}O_{11}$) is used in sugar-free hard candies, chewing gum, chocolate-flavored desserts, baked goods and ice cream because it gives a creamy texture to foods. It's also used in some medications.
- **Mannitol** ($C_6H_{14}O_6$) occurs naturally in pineapples, olives, asparagus, sweet potatoes, and carrots. It's used as a dusting powder for chewing gum, and as a chocolate-flavored coating agent for ice cream and confections. In food manufacturing, it's extracted from seaweed. Mannitol tends to remain in the lower intestines for extended periods often causing bloating and diarrhea.
- **Lactitol** ($C_{12}H_{24}O_{11}$) has taste and solubility closely resembling sugar; therefore, it's commonly used in sugar-free ice cream, chocolate, hard and soft candies, baked goods, sugar-reduced preserves and chewing gums. Ingestion may cause an increase in bowel movement and because of this, it's used in medication to treat unknown constipation causes.

- **Sorbitol** ($C_6H_{14}O_6$) is a common ingredient in sugar-free chewing gums, candies, frozen desserts, and baked goods. Although, it occurs naturally in fruits and vegetables, for food production, it's manufactured from corn syrup. When compared to mannitol, it has less tendency to cause intestinal problems.
- **Xylitol** ($C_5H_{12}O_5$) has the same sweetness as sugar is also known as "wood or birch sugar," because it occurs naturally in straw, corncobs, fruits, vegetables, cereals, mushrooms, and some cereals. It's used as a sweetener for some chewing gums, gum drops, hard candy, pharmaceuticals and oral health products (i.e. throat lozenges, cough syrups, children's chewable multivitamins, toothpastes, and mouth washes). It's also used in foods requiring special dietary purposes. A major detraction is that it may have a laxative effect causing upset stomach and diarrhea. Also, while unharmful to humans, it's toxic and potentially lethal to dogs because of the different manner in which blood sugar is controlled (Higgs, 2022). It's manufactured on an industrial scale using hydrogenation processes.
- **Hydrogenated starch hydrolysates (HSH)** generally provide 25 to 90% of sugar's sweetness. HSH do not crystallize and therefore are used in confections, baked goods and mouth washes.

Artificial Sweeteners are more accurately called non-nutritive sweeteners (NNS), because they provide no or very few calories and no nutrients. These include acesulfame (Ace-K), aspartame, cyclamate, saccharin, sucralose, steviol glycosides (extracts from stevia plant leaves) (Motzer, 2017), and monk fruit. Although, the latter two are often considered "natural" because they originally come from plants, they're highly processed on an industrial scale. These will be discussed in a future part.

References:

Gafur, A., et al., 2023, *Sucrose: Organic Compound*: Encyclopedia Britannica: www.britanica.com.

Higgs, V., 2022, *Xylitol Poisoning in Dogs*: PETMD. https://www.petmd.com/dog/conditions/endocrine/c_dg_xylitol_toxicity.

Motzer, W.E., 2017, *Studying Stevia – Parts 1, 2, and 3*: The VORTEX, v. LXXIX, n. 8,9, 10, pp. 6-7 and 6 and 9.

Motzer, W,E,, 2018, *Erythritol, et al. – Part 1*: The VORTEX, v. LXXX, n.7., pp. 6 and 10.

Figure 1. The rabbit is used for the pyrogen test.[1]

EP Proposes to Replace Rabbit Pyrogenicity Test with Protein Based Test

By Donald MacLean

Pharmacopeias are used as an informational source, practice guideline, and sometimes as an enforcement tool for keeping drug products safe. In my time reviewing the Pharmacopeia, I have seen 5 potential paradigm changes that I thought worthy of mentioning. Pharmacopeias are broken down into 2 parts, the effective drug information compendium part, and a forum part which is used for information dissemination and public input to proposals, which are not regulatory body enforceable. In the latest European Pharmacopeia (Ph Eur or EP) forum, Pharmeuropa 35.1 (January 2023 to March 2023) published a new proposed chapter on pyrogenicity, 5.1.13. Pyrogenicity. The ultimate goal is to suppress general text chapter 2.6.8. Pyrogens and replace it with *2.6.30.* Monocyte-activation test (Suppression means that the 2.6.8. Pyrogens will be deleted from Ph Eur in the future.).

Pyrogens are chemically heterogeneous compounds from bacteria, viruses, fungi or the host itself, that produce fever in a human or animal. Currently the test can be done in-vivo using healthy rabbits or in-vitro using cells from blood (see section 5 of Ph Eur chapter 2.6.30).

Historically, the Bacterial Endotoxins Test (BET) was quantified endotoxins from Gram-negative bacteria using amoebocyte lysate from the horseshoe crab (Limulus polyphemus or Tachypleus tridentatus) using the gel-clot technique. Today, there are three optional techniques: the gel-clot technique, which is based on gel formation; the turbidimetric technique, based on the development of turbidity after cleavage of an endogenous substrate; and the chromogenic technique, based on the development of color after cleavage of a synthetic peptide-chromogen complex. It is stated in USP <85> Bacterial Endotoxins that the gel-clot limit test has highest priority in case of doubt or conflict unless otherwise indicated in the product monograph. There is no such method priority listed in Ph Eur 2.6.14. Bacterial Endotoxins.

The current Ph Eur 11.0 (effective January 1, 2023) has general texts 5.1.10. Guidelines for Using the Test for Bacterial Endotoxins with both endotoxin and pyrogenicity sections in one general text chapter. It also has general chapter 2.6.14. Bacterial endotoxins, and 2.6.32. Test for bacterial endotoxins using recombinant factor C. PE 35.1 proposes (anything in Pharmeuropa is not the officially final version even if the notification is a heads up) to spin out the Pyrogens portion from 5.1.10 Guidelines for Using the Test for Bacterial Endotoxins into a new chapter 5.1.13. Pyrogenicity.

For comparison USP (United States Pharmacopoeia) has general chapter <85> Bacterial Endotoxins Test informational chapter <1085> Guidelines to Endotoxins Test, and general chapter <151> Pyrogen Test that uses rabbits. USP has not published as a goal to replace the

rabbit model with an in-vitro model. For human and animal drugs, some USP monographs still require a rabbit pyrogen test. Even with such monographs, a firm may substitute an endotoxins test or alternative cell-based test if the firm can demonstrate equivalent pyrogen detection. The appropriate FDA review division will consider alternative methods, such as monocyte activation, on a case-by-case basis. LAL-BET will not be easily replaced by MAT because MAT has certain challenges and because FDA/USP remain critical about it. USP plans implementation of rFC fluorometric/ color reaction as seen under alternative test methods section in PF 44.4, page 126, 2018[11] and is published in the effective USP-NF issue. May a firm use alternative assays to those in the USP [BET] for a compendial article? Yes, two examples of an alternative assay are 1. Recombinant Horseshoe Crab Factor C Assay, and 2. Monocyte Activation Type Pyrogen Test. While Europe seems enthusiastic about rFC and MAT, the US remain cautious.

In Ph Eur there is a clear push to non animal testing with its more forward proposal for both the endotoxin test and pyrogenicity test. EP implemented general chapter *2.6.30.* Monocyte-activation test in July 2017. The monocyte-activation test is primarily intended as a replacement of the rabbit pyrogen test found in Ph Eur 2.6.8. Pyrogens. Guidelines on which methods to use (A, B or C) and on how to validate the monocyte-activation test are described in general chapter *2.6*.30. Monocyte-activation Test. "Potential sources of non-endotoxin pyrogens include, but are not limited to, gram-positive bacteria, fungi, viruses and particles. Such pyrogenic substances will be detected using the procedures described in general chapter *2.6.30*. *Monocyte-activation test*. The monocyte-activation test is able to detect all pyrogenic substances, i.e., both endotoxin and non-endotoxin pyrogens." [10]

EDQM (European Directorate for the Quality of Medicines and HealthCare) in collaboration with the European Partnership for Alternative Approaches to Animal Testing (EPAA) is providing training on pyrogenicity as a three-day hybrid event in Brussels, Belgium & Online, **14 to 16 February 2023**. Registration is required, program is free.[12]

Note: USP chapters number are between brackets, e.g., <85> Bacterial Endotoxin Test. Ph Eur chapters are stated using a heading format scheme, e.g., 2.6.14 Bacterial endotoxins.

References:

1. European Pharmacopoeia to put an end to the rabbit pyrogen test, EDQM, 28/06/2021, https://www.edqm.eu/en/-/european-pharmacopoeia-to-put-an-end-to-the-rabbit-pyrogen-test
2. USP <85> Bacterial Endotoxins Test, USP-NF 2022 Issue 3.
3. USP <1085> Guidelines to Endotoxins Test, USP-NF 2022 Issue 3.
4. USP <151> Pyrogen Test, USP-NF 2022 Issue 3.
5. Ph Eur 5.1.13. Pyrogenicity, PE 35.1 (Jan – Mar 2023).
6. Ph Eur 2.6.8. Pyrogens, Ph Eur 11.0 (Jan – Mar 2023).

7. Ph Eur 5.1.10. Guidelines for Using the Test for Bacterial Endotoxins, Ph Eur 11.0 (Jan – Mar 2023).
8. Ph Eur 2.6.14. Bacterial endotoxins, Ph Eur 11.0 (Jan – Mar 2023).
9. Ph Eur 2.6.32. Test for bacterial endotoxins using recombinant factor C, Ph Eur 11.0 (Jan – Mar 2023).
10. Ph Eur *2.6.30.* Monocyte-activation test, Ph Eur 11.0 (Jan – Mar 2023).
11. Pharamaceutical Forum, [PF 44.4, 2018], <1085> GUIDELINES ON THE ENDOTOXINS TEST [NEW] (USP42-NF37 2S)
12. Joint EDQM–EPAA hybrid event on the future of pyrogenicity testing – Programme now available, EDQM, 15/12/2022, https://www.edqm.eu/en/-/joint-edqm-epaa-hybrid-event-on-the-future-of-pyrogenicity-testing-programme-now-available
13. FDA Guidance for Industry (June 2012) – Pyrogen and Endotoxin Testing [https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-pyrogen-and-endotoxins-testing-questions-and-answers].

Fish Hatcheries

By Donald MacLean

This month's location recommendation is fish hatcheries run by the State and Federal Government. Each location has a slightly different presentation profile, both physical and virtual sites, and each has their fish production emphasis based on location and access to a lake or ocean route.

Much of the science is performed behind the scenes or done during a very short timeframe. Using the Silverado (Napa) site as an example, hatching is done in December, followed by onsite growing, then release in May. Some of the sites have a year-round operation. The Silverado website lists an interesting procedure. It creates fish that are triploids, rather than diploid, so they are not able to reproduce (sterile fish). The reasoning behind creating triploid fish is to conserve native fish genotypes. "Triploid trout are created by forcing the egg to retain a chromosome that is normally ejected during egg development."[1] The California Department of Fish and Wildlife uses the pressure shock treatment method. In fertilized trout eggs, normally a chromosome (N) is kicked out of the egg as a polar body at some stage of development. Using pressure treatment at a specific time in the egg development, the polar body and chromosome is retained. The website describes how this is done (Figure 1).[2]

"Eggs and Milt are collected separately from the respective sexes. The gametes are taken from the spawning building to the fertilization station in groups of approximately 60 ounces of eggs and 10 mL of milt. At timed intervals, each group of eggs is fertilized, rinsed, poured into a metal cylinder, and placed into a holding tank. These eggs will sit in the holding tank for a period of time that is based on water temperature, called a TTU (Time Temperature Unit). This allows the egg sufficient time of development to generate the polar body, but not yet expel it. After this time, the cylinder is placed into a pressure vessel. Once the eggs are in and the vessel lid is on, the pressure inside the vessel is increased to 10,000 psi. Eggs remain in the pressure vessel for 5 minutes. During this time, the polar body cannot be ejected due to pressure. After pressurization eggs are put into vertical-flow incubator stacks for hatching. After the eggs hatch, they are raised like any other trout. Studies have shown that after 3 years of age, triploid trout tend to grow larger than a non-sterile trout due to less energy being expended for mating purposes."[1]

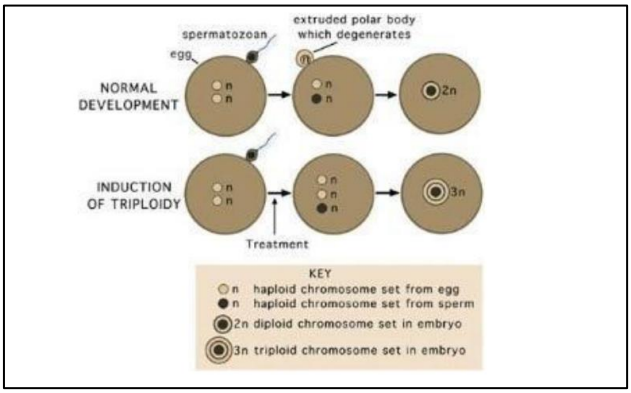
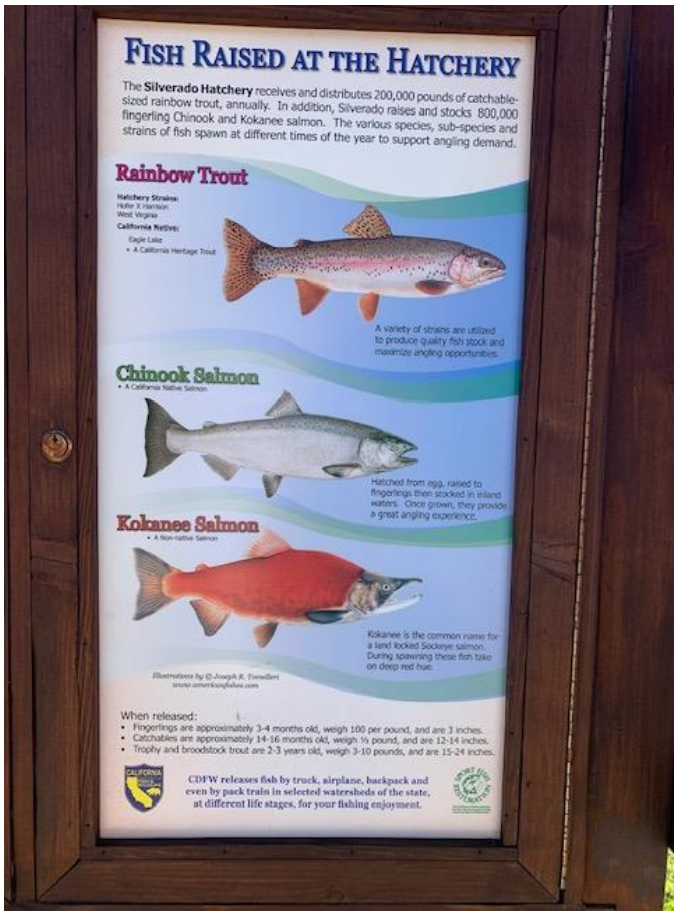


Figure 1. Diploid and Triploid Production.[1]



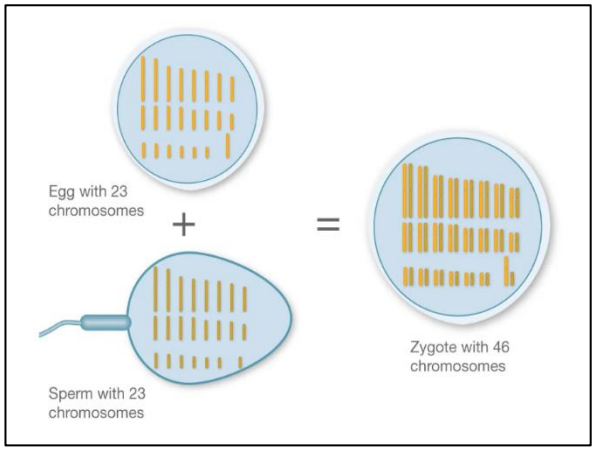


Figure 2. Human egg fertilization has 23 haploid chromosomes combine with 23 haploid chromosomes from the sperm to create a diploid with 46 chromosomes. (23 pairs). [2]

Figure 3. The Silverado site information board shows the fish hatched. Note there is also the location panel on where the fish will eventually be moved to.

In some cases, the fishes are tagged. The Warm Springs Hatchery (Geyserville) place Passive Integrated Transponder (PIT) to the Coho salmon for tracking purposes.

The triploid process is different than what happens in humans.

A regular human cell has 46 chromosomes expressed as 23 pairs. Cells reproduce by going through mitosis, where an exact copy of the 23 pairs are made yielding 46 chromosome pairs. The zygote then divides yielding 2 identical cells with each new cell getting one identical chromosome copy.

When egg and sperm combine, they go through a special type of cell division called meiosis. Meiosis reduces the chromosome number by half. Meiosis begins like mitosis by copying each chromosome. But, unlike in mitosis, homologous chromosome pairs line up and exchange pieces through recombination. Next, the newly recombined homologous chromosomes are divided into two daughter cells. Then the sister chromatids are pulled apart into a total of four reproductive cells. Each of these cells (gamates) has one copy each of 23 chromosomes, all with a unique combination of gene variations. During fertilization, one gamate goes onto to join with the sperm to make a cell with 46 chromosomes (23 pairs), called a zygote (Figure 3).

Below is a selected list of places in the California section that can be visited. The Silverado location is in the heart of Wine Country is too small to make a trip for just the site so should be

combined with some other activity. The Mount Shasta site is next to the city / county museum and is easy to find.

Table 1.	
California Department of Fish and Game	
Name, website, fish species	Location
Silverado[3] Chinook Salmon (as triploid) Eagle Lake Trout Sockeye Salmon (Kokanee) Rainbow Trout (as triploid)	7329 Silverado Trail, Napa, CA 94558 (physical location is east of Yountville)
Warms Springs[4] Coho Salmon (PIT added)[a] Steelhead Trout	3246 Skaggs Springs Road, Geyserville, CA 95441
Nimbus Fish Hatchery[5] Chinook Salmon, Steelhead Trout	2001 Nimbus Rd, Gold River, CA 95670
Mokelumne River Hatchery[6] Chinook Salmon, Steelhead Trout	25800 North McIntire Road, Clements, CA 95227
Mount Shasta Fish Hatchery[7] Eagle Lake Trout (as triploid) Brown Trout (as triploid) Eastern Brook Trout (as triploid) Rainbow Trout (as triploid)	3 North Old Stage Road, Mount Shasta, CA 96067
US Fish and Wildlife Service	
Coleman National Fish Hatchery[8] Chinook Salmon, Steelhead	24411 Coleman Fish Hatchery Road Anderson, CA 96007
Livingston Stone National Fish Hatchery[9] Chinook Salmon, Delta Smelt	Shasta Lake, CA 96019

[a] PIT = Passive Integrated Transponder[4]

References:

1. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=94602&inline
2. https://learn.genetics.utah.edu/content/basics/diagnose#:~:text=Egg%20and%20sperm%20cells%20have,chromosome%20came%20from%20each%20parent.
3. Silverado : https://wildlife.ca.gov/Fishing/Hatcheries/Silverado
4. Warm Springs: https://wildlife.ca.gov/Fishing/Hatcheries/Warm-Springs
5. Nimbus Fish Hatchery: https://wildlife.ca.gov/Fishing/Hatcheries/Nimbus

6. Mokelumne River Hatchery: https://wildlife.ca.gov/Fishing/Hatcheries/Mokelumne-River
7. Mount Shasta: https://wildlife.ca.gov/Fishing/Hatcheries/Mount-Shasta
8. Coleman National Fish Hatchery: https://www.fws.gov/fish-hatchery/coleman
9. Livingston Stone National Fish Hatchery: https://www.fws.gov/fish-hatchery/livingston-stone

“Meet Chemistry Superstars: Creating Tomorrow’s Technologies” at Stanford University – A Successful Collaborative Event between ACS California and Silicon Valley Local Sections and the Chinese American Chemical Society Northern California Chapter

By Dr. Lin Li

CACS Outstanding Achievement Awards Presentation, left to right: Dr. Huping Luo, Dr. Lin Li, Dr.Chu-An Chang, Prof. Zhenan Bao, Dr. Anna Tai, Prof. Peidong Yang, Dr. Marinda Li Wu

CACS (Chinese American Chemical Society) Northern California Chapter (NCC) successfully held its inaugural event, “Meet Chemistry Superstars: Creating Tomorrow’s Technologies”, at Stanford University, CA on January 18th, 2023. Over 60 people attended the event, including several representatives from the ACS California Local Section.

Dr. Marinda Wu, Chair of the National CACS Board of Directors and President of CACS NCC, hosted the event. She gave a brief introduction of CACS, which celebrated a very

successful 40th Anniversary three day Symposium at the National ACS meeting and the National AIChE meeting in 2021. She emphasized the importance and value of networking and collaborations and pointed out that CACS has worked with ACS in an alliance since 2016. Last December, the ACS-CACS CEP (Chemistry Enterprise Partnership) was renewed for 2023-2028. This partnership is based on the United Nations Sustainable Development Goals. CACS plays an active role in the global scientific community. She then introduced the CACS NCC leadership team, including Dr. Huping Luo (President-Elect), Dr. Anna Tai (Membership Chair), Dr. Lin Li (Secretary) and Dr. Chu-An Chang (Treasurer) of the relaunched Northern California Chapter of CACS.

The highlight of the event was two keynote presentations: *"Skin-inspired Organic Electronics"* by Prof. Zhenan Bao, K.K. Lee Professor of Chemical Engineering and Director, Stanford Wearable Electronics Initiative (eWEAR) at Stanford University, and *"Artificial Photosynthesis"* by Prof. Peidong Yang, S.K. and Angela Chan Distinguished Professor of Energy, and Professor of Chemistry at UC Berkeley. Both speakers demonstrated their star power and delivered keynotes that were very inspiring and befitting to the theme of the event.

After the technical presentations, Dr. Marinda Wu, together with Dr. Anna Tai, Membership Chair of CACS NCC, and Dr. Chu-An Chang, CACS Treasurer and Board member, presented the CACS Outstand Achievement Awards to Prof. Bao and Prof. Yang, who were the award winners for 2021 and 2022, respectively.

In the evening, CACS NCC leadership team invited Prof. Bao and Prof. Yang for a celebratory dinner. During the dinner, Dr. Anna Tai and Dr. Chu-An Chang presented an "Extraordinary Service Award" to Dr. Marinda Wu to recognize her tremendous contributions to CACS. Prof. Yi Cui, Fortinet Founders Professor of Materials Science and Engineering and Director of Precourt Institute for Energy at Stanford University, was able to join the group. Over authentic Chinese food and California wines (many thanks to Norm Wu and Prof. Cui for donating the wine), the group shared professional experiences and personal stories, and reached the consensus that working together we can do many things and contribute to the global chemistry community.

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Book Reviews

By Linda Wraxall

V2 by Robert Harris, published 2020

Described as a novel of World War II, this book is a true story about the development of the V2 rocket which the German army, even after they knew they were defeated, used to bomb London, aiming to destroy important historical sites like the Houses of Parliament, the Tower of London, Piccadilly Circus - places that would undermine British confidence. Rudi Graf and Werner von Braun were the masterminds behind the rocket's development but von Baun was really focused on space travel. This is also the story of the British women who plotted the V2's course in order to locate its source on the Belgian/Dutch coast. Their calculations allowed the British Spitfire planes a chance to destroy the launch site which was well hidden and could be dismantled and moved in a matter of minutes after the launch. Not only is this story a page-turner, there is a fair bit of interesting chemistry involved, besides the problem the German engineers had with the Gestapo!

The Ragged Edge of Night by Olivia Hawker published 2018

The true story of one man in a tiny German town who takes a stand against hate and risks everything in defiance of Hitler's regime and his seeming invulnerability to all the plots to get rid of him. Once a Franciscan friar and now the husband in name only to a widow with 3 children, he gets involved in the German Resistance while agonizing over his inability to protect from the SS the mentally disabled children he had taught when he was a monk. The back story is as fascinating as the novel when the author, already an historical novelist, met in the death camps the family of the man she was going to marry. Watching the rise of the white supremacists with their Nazi salutes during the 2016 US election, she finally decided that the time was right to write about this one brave man.