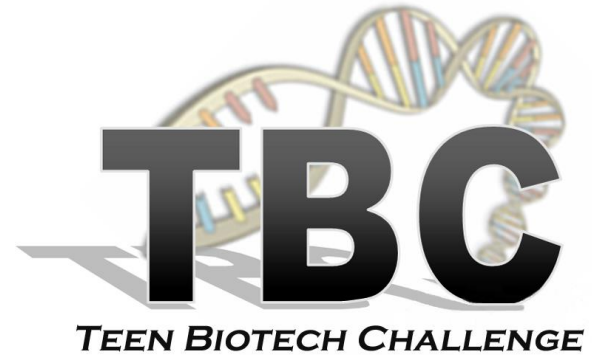




GENOME CENTER, UC DAVIS

2022 Teen Biotech Challenge Awards & Biotech Poster Symposium



***University of California, Davis
Genome Center Patio
May 14, 2022
12:00 – 3:00 pm***



2022 Teen Biotech Challenge Awards & Biotech Poster Symposium

Registration & Lunch: 12:00-12:30pm

Welcome & Remarks: 12:30 – 1:00pm

Poster Viewing: 1:00-2:40pm

1:00-1:50: Agricultural Biotech, Biomanufacturing and Environmental Biotechnology Posters

1:50-2:40: Computational Biology & Genomics, Environmental Biotechnology & Environmental Health and Regenerative Medicine Posters

Closing Remarks: 2:40pm

Group Photo: 2:50pm



Dr. Feng Xu (Novozymes) & Dr. Jamison-McClung with TBC2016 Winners in Environmental Biotechnology.

Which items in the supermarket are bioengineered (BE)?

There are 12 BE crops and one animal currently on the market in the US. Any other food item labeled “non-GMO” is a fear-based marketing strategy. Here are the available BE or “GMO” foods:

Food:

Soybeans/Soybean oil (herbicide tolerant, better oil quality)

Brinjal/Eggplant (Bt – insect resistant)

Field corn and Sweet Corn (Bt – insect resistant)

Canola oil (derived from GMO canola, this oil is chemically identical to oil derived from conventional canola plants)

Sugar (derived from GMO sugar beets, this sugar is chemically identical to sugar derived from other plant sources)

Papaya (virus resistant)

Squash (virus resistant yellow squash & zucchini)

Arctic Apples (PPO gene for browning when sliced “turned off”)

Innate Potatoes (less browning/bruising and lower acrylamide formation when fried – PPO gene “turned off”)

Pink-fleshed pineapple (increased carotenoid pigment)

AquAdvantage Salmon (have a gene from another type of salmon that helps the fish reach adult size more quickly, using less food/energy = sustainable aquaculture)

Feed and Fiber:

Alfalfa (herbicide tolerant)

Cotton (Bt – insect resistant)



Inserting Bt genes allows crops to resist “hungry, hungry caterpillars” (herbivory). Research studies have confirmed that Bt crops improve insect biodiversity through reduction in field applications of insecticide. The first biotech crop, the Flavr’Savr tomato, was invented right here in Davis, CA, at the Monsanto Calgene Campus in the early 1990’s. The Flavr’Savr was a biotech tomato with delayed ripening. Due to price competition and market forces, this particular biotech crop is not currently on the market.

What’s in the works? Scientists are developing useful crops that grow well in drought conditions and saline soils, crops that need much less fertilizer, and biofortified crops that have been engineered to provide essential nutrients and minerals (like Golden Rice, which produces beta carotene). New gene-edited crops do not contain introduced genetic material and are not considered BE by regulators.



Myth-Busting Agriculture!

Consumers are exposed to a ton of misinformation about bioengineered (BE) crops, agricultural production systems and nutrition in the popular press. Here are two of the most common myths:

Myth: *Organic farming is pesticide-free.*

Facts: *Like all farmers, those using organic systems must use pesticides to overcome pests. Organic farmers choose both natural and synthetic pesticides from a USDA approved list.*

Myth: *BE crops are untested, unregulated and/or pose additional risks to health and the environment, compared to conventional crops.*

Facts: *BE crops are the most carefully studied and analyzed plants in the history of mankind, with regulatory oversight by the USDA, EPA and FDA. They have the same nutritional value and safety as similar conventional crop plants and are safe for humans and animals.*

An independent report on BE crops was released by the US National Academies of Sciences, Engineering and Medicine on May 17, 2016. The report reaffirms food and feed safety, as well as environmental safety. #GECropStudy <http://nas-sites.org/ge-crops/2016/04/27/report-release/>

For additional science-based answers to general questions on genetic engineering for crop and animal improvement, see:

- FDA “Feed Your Mind” information page on ag biotech - <https://www.fda.gov/food/consumers/agricultural-biotechnology>
- UCBiotech.org – <http://ucbiotech.org>

For info on humanitarian ag projects for the developing world, see:

- Golden Rice - <https://www.goldenrice.org/>
- Water Efficient Maize for Africa (WEMA) - <https://www.cimmyt.org/projects/water-efficient-maize-for-africa-wema/>

WELCOME TO TBC 2022!

Thank you for joining us at the Teen Biotech Challenge Biotechnology Symposium as we honor the academic excellence and dedication of your winning students. In 2022, 197 middle school and high school students registered to create TBC posters. Your students faced tough competition and all should be proud of their efforts. We appreciate the support that teachers, parents and family members have shown to these exceptional young people and hope that we share a wonderful afternoon together, learning a little about biotechnology along the way.

The Biotech Community Makes TBC Possible

We would like to offer warm thank you to Priscilla Cox for helping to fund the student poster printing and making our celebration possible. Together with the UC Davis Biotechnology Program’s PhD students, staff and faculty, we make the Teen Biotech Challenge possible through fundraising activity and volunteer service.

Sincere Congratulations,

Dr. Denneal Jamison-McClung
Director, UC Davis Biotechnology Program, BioTech SYSTEM, and the Designated Emphasis in Biotechnology (DEB)

Teen Biotech Challenge is the primary outreach activity of the BioTech SYSTEM, a regional Northern California consortium for promoting education in science, technology, engineering and mathematics (STEM). The BioTech SYSTEM is administered by the UC Davis Biotechnology Program.

This year's TBC contest has been made possible by the following generous sponsors:

UC Davis Biotechnology Program

Priscilla Cox and Family

We appreciate all TBC Sponsors' steadfast support of science education over the past ten years.

We would also like to acknowledge Novozymes, UC Davis Innovation Institute for Food & Health, Bio-Rad, Chevron, Genentech (Event Partner 2011-2014), HDR Architecture, Monsanto, Bayer CropScience, Rotary Club of Sacramento and SARTA for significant past support.

Thank you TBC Sponsors!!!



STEM CAREERS (Cont.)

The majority of biotechnology jobs require a **Bachelor of Science (BS) college degree**. In addition to positions requiring a BS degree, there are a significant number of entry-level biotechnician jobs in California with a minimum requirement of an **Associate of Science (AS) degree or Program Certificate**. We have several excellent community college biotechnology programs in our region, including those at City College of San Francisco, Solano Community College and American River College offering AS degrees and certificates.

Average annual entry-level salary for biotech researchers or technical employees varies by region, with higher salaries in the Bay Area and other urban hubs (~\$50K for AS/Certificate, ~\$80K for BS).

For biotechnology professionals, "**soft skills**", such as project management, good oral and written communication, ability to work in teams, and a strong work ethic, are just as important as technical skills. We encourage teens to participate in sports teams, student and community organizations, part-time jobs and other social activities that will help to build soft skills.

Online Resources

For a list of useful resources to find detailed information on careers and training in biotechnology, please see the **BioTech SYSTEM - Biotech Careers & Training** page at:

http://biotechsystem.ucdavis.edu/biotech_training.html



STEM CAREERS

Careers in Science, Technology, Engineering and Math (STEM) will be thriving for years to come and educating students in these fields will allow us to tackle global challenges in healthcare, agriculture and the environment. In addition to helping humanity solve major problems, students choosing STEM career paths are entering a healthy job market. Science and technology are strong drivers of economic growth and we want your students to share in this region's prosperity. **Northern California is the birthplace of biotechnology, also called the life sciences**, and we have a special opportunity to participate in the biotechnology community centered in the San Francisco Bay Area.

When people think of **biotechnology jobs**, most envision a scientist in a laboratory. However, specific jobs requiring biotechnology training may include teaching, sales, government policy analysis, project management, clinical work and practice of law.



Research



Administration



Patent Law



Government
Regulatory Affairs

See the State of California Employment Development Department on Biotechnology jobs for the latest job market projections:
http://www.labormarketinfo.edd.ca.gov/Biotechnology_in_California.html#OCCData

TBC 2022 WINNERS

Focus Area 1: Agricultural Biotechnology - Intermediate

1st (Tie) – Grace Cha, Notre, Dame High School, “MAS in Animal Breeding: Efficient Genetic Choices”

1st (Tie) – Leyna Le, Sheldon High School Biotech Academy, “Sustainably Caffeinating the World by Applying Biotechnology to Coffee”

2nd – Savi Sandhu, Sheldon High School Biotech Academy, “Vertical Farming: The New Future”

Focus Area 1: Agricultural Biotechnology - Senior

1st – Kayla Jew, Quarry Lane School, “The Hidden Vitamin Gummies in Staple Crops”

2nd – Victoria Ojukwu, Pleasant Grove High School, “Animal Cloning and its Impact on the Agricultural Industry”

Focus Area 2: Computational Biology & Genomics - Intermediate

1st – Karla Dang, Sheldon High School Biotech Academy, “Designer Babies: The Children of Our Future”

2nd (Tie) – Kaydance Vang, Sheldon High School Biotech Academy, “The Human Microbiome and Its Effects On Health”

2nd (Tie) – Bahar Zahir, Sheldon High School Biotech Academy, “Human Health and the Microbiome”

Focus Area 2: Computational Biology & Genomics - Senior

1st – Angelique Le, Pleasant Grove High School Biomedical Academy, “Cloning Companions”

2nd – Makenzie Miller, Pleasant Grove High School, “The Reality of Designer Babies”

TBC 2022 WINNERS (Continued)

Focus Area 3: Biomanufacturing: Health Related -

Junior

1st – Samantha Yee, Olympus Junior High School, “Herbal Medicine and its Role in Pharmaceutical Development”

Focus Area 3: Biomanufacturing: Health Related -

Intermediate

1st – Tara Phung, Sheldon High School, “Musical Manufacturing: The Fungal Violin”

2nd (Tie) – Brianna Pham, Sheldon High School, “Vitality Secret: Using Biologic Drugs to Defy the Immune System”

2nd (Tie) – Leyna Thai, Sheldon High Biotechnology Academy, “Leprosy”

Focus Area 3: Biomanufacturing: Health Related -

Senior

1st (Tie) – Muskaan Hayer, Pleasant Grove High School, “Cancer Immunotherapy”

1st (Tie) – Christine Bao, Pleasant Grove High School, “Plant-made Pharmaceuticals”

2nd – Isabella Vasquez, Pleasant Grove High School Biomedical Academy, “Biotechnology Advances in Cancer Drug Discovery”

(Focus Area winners continued on next page)



Biotechnology to Meet Global Challenges



Biotechnology is an applied field of science that uses our knowledge of living systems and engineering principles to create solutions for complex local and global challenges in agriculture, health care and the environment. What are the biggest challenges for most global communities today? In 2015, the United Nations set 17 Sustainable Development Goals (SDGs) to improve the everyday lives of millions of people in developing countries, including:

- Zero Hunger (#2)
- Good Health & Well-Being (#3)
- Clean Water & Sanitation (#6)
- Affordable & Clean Energy (#7)
- Industry, Innovation & Infrastructure (#9)
- Sustainable Cities & Communities (#11)
- Responsible Consumption & Production (#12)
- Climate Action (#13)
- Life Below Water (#14)
- Life on Land (#15)

Biotechnology has a key role to play in meeting many of the UN Sustainable Development Goals, especially those related to human health and food security.

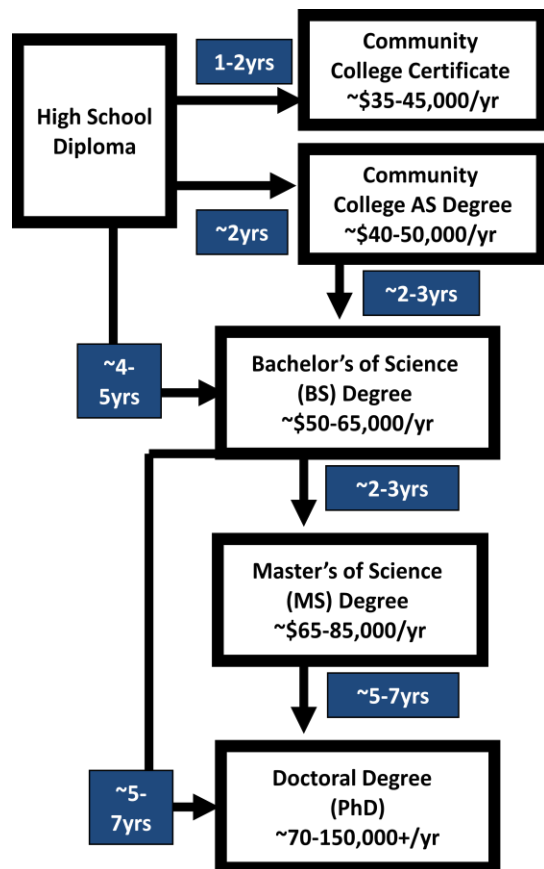
The winning TBC websites are a great educational resource for learning about specific biotechnology research approaches that will help address the SDG's, such as the development of cost-effective vaccines and drug treatments, the use of biotech crops to increase food security and emerging technologies to convert plant biomass into renewable liquid biofuels.

We hope that the Teen Biotech Challenge has opened your eyes to some of the amazing advances we are making through science and engineering!

<https://www.un.org/sustainabledevelopment/>

Academic Paths & Salary Ranges for Biotechnology Careers

STEM career paths in biotechnology are a great option for California students. The diagram below gives a rough outline of STEM educational pathways and approximate earnings at the different levels of expertise. Many of the students we are honoring tonight are fortunate to belong to a high school biotechnology program or multi-year academy, accelerating their knowledge along this career pathway.



TBC 2022 WINNERS (Continued)

Focus Area 3: Biomanufacturing: Food Related - Intermediate

1st (Tie) - Kaitlyn Ly, Sheldon High School Biotech Academy, "Changing the Culture of Meat"

1st (Tie) – Kitty Pan, Sheldon High School Biotech Academy, "Is Your Food Made With Science?"

2nd – Sai Saanvi Dwibhashyam, The Quarry Lane School, "Cellular Agriculture: The Future of Food"

Focus Area 3: Biomanufacturing: Food Related - Senior

1st – Elinor Washington, Pleasant Grove High School Biomedical Academy, "Meatless Meat: How Biotechnology Has Advanced to Provide More Plant Based Alternatives"

2nd – Saanchitha Gurudutt, Pleasant Grove High School, "Meatless Meat"

Focus Area 4: Environmental Biotechnology & Planetary Health - Intermediate

1st – Sonia Shaheen, Sheldon High School, "Artificial Photosynthesis: A Greener World"

2nd (Tie) – Leticia Caban, Sheldon High School Biotech Academy, "They Eat What We Can't: The Application of Anaerobic Digestion in Biotechnology"

2nd (Tie) – Misty Escobar, Sheldon High School Biotech Academy, "Fashion for the Future- Bioplastic in Clothing"



TBC 2022 WINNERS (Continued)

Focus Area 4: Environmental Biotechnology & Planetary Health - Senior

1st (Tie) - Kishore Saravanakumar, Foothill High School, "Inhibiting Ruminant Methane Emissions Using Asparagopsis"

1st (Tie) – Sahil Shelat, Pleasant Grove High School, "Let's Save The Environment"

2nd – Nazneen-Sultana Jawadi, Pleasant Grove High School, "Bioremediation and Its Benefits"

Focus Area 5: Molecular Tools:

Nanobiotechnology, Synthetic Biology & Genetic Engineering - Junior

1st – Ridhan Randeri, The Harker School, "Genetic Engineering in Covid 19"

Focus Area 5: Molecular Tools:

Nanobiotechnology, Synthetic Biology & Genetic Engineering - Intermediate

1st – Maria Josy, Sheldon High School Biotech Academy, "CRISPR: A Promising Solution to Genetic Engineering"

2nd (Tie) – Ashleigh Lecitona, Sheldon High School, "Fighting the Bite — Controlling Disease-Spreading Mosquitoes with Modern Biotechnology"

2nd (Tie) – Jolin Su, Sheldon High School Biotechnology Academy, "Application of Nanotechnology in Nano-Drug Delivery and its Treatment in Cardiovascular Diseases"

Science and Social Media



Have you ever been curious about the latest discoveries in biotechnology? What's new with stem cells? Biofuels? GMOs? The human microbiome? What do the experts think about the latest controversies in biotech?

An excellent way to keep up is by using Twitter as a science newsfeed, taking care to "follow" only reputable sources of scientific information. Some of our winning TBC websites have incorporated a Twitter feed and it is quite a handy tool. One of the best things about Twitter, and other social media platforms, is the ability to connect with like-minded people from around the world.

On Twitter, one can follow posts by governmental bodies (@CIRMnews, @NSF, @CDCgov, @theNASEM), science-based philanthropists (@gatesfoundation, @RockefellerFdn), well known scientific journals (@PLOS, @PNASnews, @NatureNews, @sciencemagazine), popular science magazines and communicators (@neiltyson, @BillNye, @SciAm @NatGeo, @PopSci), and many other recognized experts in science and engineering.

Check out Twitter, if you haven't already...The reward will be a treasure trove of great science information streaming to your mobile device! Our program is @UCDavisBiotech.

-Dr. Jamison-McClung
@yggdrasil13751



Awesome TBC 2022 Sponsor Teachers!

We applaud the following educators for their commitment to science education and for striving to keep their classrooms on the “cutting edge”, through activities like the TBC, student mentorship and on-going professional development through BioTech SYSTEM membership:

- Crescenta Valley High School High School – Kanika Gulia
- Christian Brothers High School – Kevin Scully
- Foothill High School – Rachel Kloos
- Olympus Junior High School – David Yee
- Pleasant Grove High School – Ponciano Cochon
- The Quarry Lane School – Aparajita Ghosh
- Sheldon High School - Jason Brennan, Kelli Kosney



Molecular Tools Focus Area Winners – TBC2018

TBC 2022 WINNERS (Continued)

Focus Area 5: Molecular Tools: Nanobiotechnology, Synthetic Biology & Genetic Engineering - Senior

1st – Jin Zhou, Sheldon High School, Biotech Academy, “Nanobiotechnology: Future of Medicine”

2nd – Cindy Hua, Pleasant Grove High School, “CRISPR: The Key to Eliminating Genetic Disorders”

Focus Area 6: Regenerative Medicine & Biomedical Engineering - Junior

1st – Joseph Zhang, Benicia Middle School, “Stem Cells and Diabetes: Oversimplified”

Focus Area 6: Regenerative Medicine & Biomedical Engineering - Intermediate

1st – Uma Nathan, The Quarry Lane School, “Non-immunogenic Tissue Scaffolds: The Future of Transplant Surgery”

2nd – Luna Osornio, Sheldon High School Biotech Academy, “Insulin Has A Whole New Look”

Focus Area 6: Regenerative Medicine & Biomedical Engineering - Senior

1st – Yenna Dip, Sheldon High School Biotech Academy, “The End of a Shortage: 3D Printed Artificial Organs”

2nd – Arushi Mishra, Vista Del Lago High School, “From Myth to Reality: The Magic of Artificial Limbs”

SPARK Research Scholar Awards

Teens attending high school within 45 miles of the UC Davis Institute for Regenerative Cures were invited to apply for the 2022 SPARK Research Scholar Award. SPARK Research Scholars will spend 8 weeks under the tutelage of leading stem cell scientist, Gerhard Bauer, Director of the GMP Laboratory, and conducting summer research projects in laboratories affiliated with the UC Davis Institute for Regenerative Cures (Director, Dr. Jan Nolta). Congratulations to the 2022 Awardees!

- Priyam Baruah, Vista Del Lago HS
- Mark Davis, Davis Senior HS
- Yenna Dip, Sheldon HS
- Aaron Hidalgo, Sheldon HS
- Momina Jaffar, Sheldon HS
- Vedmanvitha Ketireddy Mira Loma HS
- Jane Okafor, West Campus HS
- Brianna Pham, Sheldon HS
- Brighton Quintana, Marysville HS
- Sonia Shaheen, Sheldon HS

This summer research experience has been made possible by a SPARK Award (PI-Gerhard Bauer) from the California Institute for Regenerative Cures (CIRM). SPARK Research Scholars will present their research posters to members of CIRM at the SPARK Conference to be held in early August. <https://biotech.ucdavis.edu/spark-research-scholar-awards>



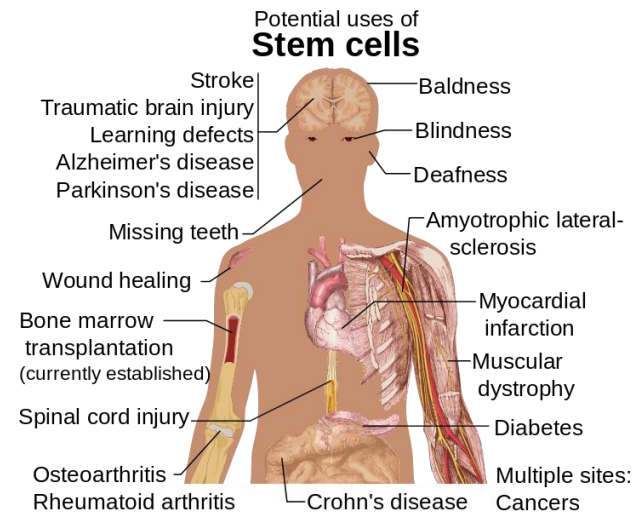
*Dr. Judy Kjelstrom, Dr. Jan Nolta and
SPARK PI – Prof. Gerhard Bauer (TBC2012)*

California Institute for Regenerative Medicine (CIRM)

“California's Stem Cell Agency was created in 2004 when 59% of California voters approved Proposition 71: the California Stem Cell Research and Cures Initiative.” <https://www.cirm.ca.gov/>



The **Summer Program to Accelerate Regenerative Medicine Knowledge (SPARK)** requires student trainees to blog about their experiences and post pictures to Instagram using the hashtag #CIRMSparkLab. Follow the group on Instagram and check out the “SPARK Research Scholars at UC Davis” blog to learn more about the students’ research experiences. <https://cirmsparkucdavis.wordpress.com/>



https://en.wikipedia.org/wiki/File:Stem_cell_treatments.svg