WARREN AND LETA GIEDT HALL, UC DAVIS

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UCDAVIS Innovation Institute for Food and Health

UCDAVIS Biotechnology Program

2019 Teen Biotech Challenge Awards Reception

TBC

TEEN BIOTECH CHALLENGE

University of California, Davis
Giedt Hall
May 17, 2019
6:30 – 9:00 pm

2019 Teen Biotech Challenge Awards Reception Program

Registration: 6:30 - 7:00pm
Welcome, Raffle & Keynotes: 7:00 – 7:30pm

Welcome: Dr. Jamison-McClung, UC Davis Biotech Program

"STEMTalk" Keynotes: Hannah Brinkman & Angel Cobos, PhD Students in the DEB (Designated Emphasis in Biotechnology) Program

TBC Awards & First Place Winner Presentations: 7:30 – 9:00pm

Agricultural Biotechnology
Presenter: Kyeema Zerbe, Innovation Institute for Food & Health

Computational Biology & Genomics
Presenter: Dr. Feng Xu - Novozymes, Inc., Davis, CA

Drug Discovery & Biomanufacturing
Presenter: Dr. Jamison-McClung, UC Davis Biotech Program

Environmental Biotechnology
Presenter: Dr. Feng Xu - Novozymes, Inc., Davis, CA

Molecular Tools
Presenter: Dr. Jamison-McClung, UC Davis Biotech Program

Regenerative Medicine & Biomedical Engineering
Presenter: Dr. Jan Nolta, UCD Institute for Regenerative Cures

SPARK Research Scholar Awards
Presenter: Dr. Jan Nolta, UCD Institute for Regenerative Cures

Teacher Appreciation & Grand Prize Winner
Presenter: Dr. Jamison-McClung, UC Davis Biotech Program

Closing Remarks: 8:55 – 9:00pm
Photos & Congratulations (optional): 9:00-9:15pm

Which items in the supermarket contain GMOs?

There are ten GMO 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 GMO foods:

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

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")*

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)*

Two additional biotech crops are herbicide tolerant alfalfa for livestock feed and Bt cotton for textiles and some cotton seed oil. The Bt gene 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 and sold well in town. 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). Many new gene-edited crops do not contain introduced genetic material and are not considered "GMO" by regulators.

Myth-Busting Agriculture!

Consumers are exposed to a ton of misinformation about genetically engineered (GE) 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*: GE crops are untested, unregulated and/or pose additional risks to health and the environment, compared to conventional crops.*

Facts*: GE 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 GE crops was released by the US National Academies of Sciences, Engineering and Medicine on May 17, 2016, after a two year study group with a panel of 20 expert reviewers analyzing ~900 research studies. 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:

- UCBiotech.org – http://ucbiotech.org
- Best Food Facts – http://www.bestfoodfacts.org
- Biology Fortified – http://www.biofortified.org
- GMOAnswers – http://gmoanswers.com

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

- Golden Rice - http://www.goldenrice.org/
- Water Efficient Maize for Africa (WEMA) - http://wema.aatf-africa.org/about-wema-project

WELCOME TO TBC2019!

Thank you for joining us at the Teen Biotech Challenge Symposium and Awards Reception as we honor the academic excellence and dedication of your winning students. In 2019, **255 Northern California students** from 16 high schools registered to build 167 TBC websites. After a preliminary round of school site judging, 70 websites by 125 students at 15 high schools were entered in the final judging round, so 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 evening together, learning a little about biotechnology along the way.

The Biotech Community Makes TBC Possible

We would like to offer warm thanks to our 2019 Industry Sponsors, Novozymes and the UC Davis Innovation Institute for Food and Health, as well as acknowledging Genentech, Monsanto and Bayer CropScience for on-going support and encouragement. 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, BioTech SYSTEM
Associate Director, UC Davis Biotechnology Program
Program Coordinator, UC Davis ADVANCE

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.

TBC 2019 is 100% sponsor supported, including student prizes and the awards event. TBC 2019 has been made possible by the following generous sponsors:

- **UC Davis Biotechnology Program**
- **Novozymes, Inc.**
- **UC Davis Innovation Institute for Food and Health**

We appreciate all TBC Sponsors' steadfast support of science education over the past ten years. Special thanks to Novozymes and the UC Davis Innovation Institute for Food and Health for funding TBC2019.

We would also like to acknowledge 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).

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. Look around at the informational booths here this evening and ask booth participants about their career journeys in biotechnology.

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.

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 2019 WINNERS

Focus Area 1: Agricultural Biotechnology

1st – Marissa Joe, Elena Ochoa, and Tony Vallescas, "Cellular Agriculture: Meat the Future" (Elk Grove HS)
2nd – Adelene Leung and Aileen Kim, "Mission for Nutrition" (Vista Del Lago HS)
3rd – Nam Doan, "Modification of Crops to Save the World" (Sheldon HS)
Honorable Mention – Joycee Cruz and Matthew Rico, "Post-Harvest Food Safety" (American Canyon)
Honorable Mention – Grant Huez and Sophia Waxman, "Food for Thought" (Da Vinci Charter Academy HS)
Honorable Mention – Hartej Dhillon, "Genetically Engineered Crops" (Sheldon HS)
Honorable Mention – Belle Botelho, "The Food Evolution" (Sheldon HS)

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

TBC 2019 WINNERS (Continued)

Focus Area 2: Computational Biology & Genomics

1st – Shevali Kadakia, "Epigenetics" (Archbishop Mitty HS)
2nd – Estella Wong and Selena Wong, "Precision Medicine: The Next Step for Computational Biology" (Vista Del Lago HS)
3rd TIE – Jamie Nguyen, "Epigenetics: The Influence of Gene Expression" (Sheldon HS)
3rd TIE – Sarah Wolff, "Pharmacogenomics: Using DNA to Save Lives" (Sheldon HS)
Honorable Mention – Kenzie Ballinger and Brenna Higdon, "Alzheimer's: Living One Day at a Time" (Antelope HS)
Honorable Mention – Kimberly Chavez Gonzalez, "Cloning in Biotechnology: The Future Impact on Human Life" (Sheldon HS)
Honorable Mention – Catherine Chavez, "The Human Microbiome: The Invisible Network" (Sheldon HS)
Honorable Mention – Vy Pham, "Epigenetics: Alzheimer's Disease Applications" (Sheldon HS)

Focus Area 3: Drug Discovery & Biomanufacturing

1st – Jayla Taylor, "HIV and Aids: A Journey of Biological Discovery" (Sheldon HS)
2nd – Avery Kruse, "Superbugs: Stopping the Drug-resistance Epidemic" (Sheldon HS)
3rd TIE – Audrey Sam, "Biopharming" (Sheldon HS)
3rd TIE – Bao Khuyen Nguyen, "Conflict with the Resistance: The Antimicrobial Resistance" (Sheldon HS)
Honorable Mention – Andi Lui and Shay Nair Sharma, "Precise Medicine of Tomorrow: Immunotherapy" (Franklin HS)
Honorable Mention – Julia Nguyen, "Virotherapy" (Sheldon HS)
Honorable Mention – David Nam, "Orphan Drugs" (Sheldon HS)

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.

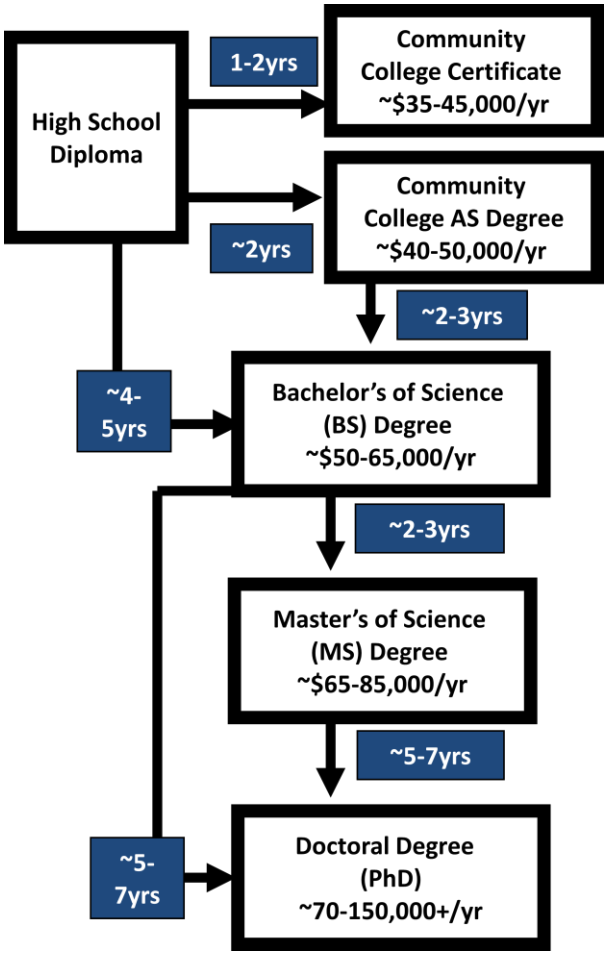
The winning TBC websites are a great educational resource for learning about specific biotechnology research approaches that will help address the SDG's, such as the development of cost-effective vaccines and drug treatments, the use of biotech crops to increase food security and emerging technologies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

http://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 2019 WINNERS (Continued)

Focus Area 3: Drug Discovery & Biomanufacturing (Continued)

Honorable Mention – Martha Rangel, "Cancer Immunotherapy" (Sheldon HS)
Honorable Mention – Kim Pham, "Edible Vaccines" (Vista Del Lago HS)
Honorable Mention – Suchita Balaga, Jazzlyn Haque, and Shaina Rahman, "Aimovig: The Migraine Drug" (Vista Del Lago HS)

Focus Area 4: Environmental Biotechnology

1st – Kaley Xiong, "A Biofriendly World" (Sheldon HS)
2nd – Victoria Derebenskiy, "The New Beginning: Bioplastic" (Sheldon HS)
3rd TIE – Tuan Dinh, "Bioplastics" (Sheldon HS)
3rd TIE – Breeann Tran, "Bioremediation" (Sheldon HS)
Honorable Mention –Aiperi Aruueva, Nadiya Shchur, and Arlette Valdez-Sandoval, "Innovative Future of Microbial Fuel Cells" (Antelope HS)
Honorable Mention – Cameron McGinnis, "Fueling the Future" (Davis Senior HS)
Honorable Mention – Kidest Zekarias, "Biotechnology in Fashion" (Sheldon HS)
Honorable Mention –Emily Leung, Emily Guo, and Mikaela Paracuelles, "Biomass: the Fuel-ture" (Vista Del Lago HS)

TBC 2019 WINNERS (Continued)

Focus Area 5: Molecular Tools

1st – Amy Nguyen, "Gene Editing: The Future of Biology" (Sheldon HS)
2nd – Naomi Ferrer, "CRISPR: Strengthening our Future" (Sheldon HS)
3rd – Katie Yang, "Microbubbles: The Illuminated Future" (Sheldon HS)
Honorable Mention – Christian Inglish and Natalie Ritter, "Synthetic Biology" (American Canyon HS)
Honorable Mention – Samhita Nittala and Sharanya Sriram, "Science on a Chip" (Mira Loma HS)
Honorable Mention – Brandon Pham, "CRISPR: The Scalpel for Geneticists" (Sheldon HS)
Honorable Mention – Laine Weis, "Cryobiology: A Chilling Look into the Future" (Vista Del Lago HS)

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 Sponsor Teachers!

We applaud the following California 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:

- American Canyon High School – Brian Ginnever, Elizabeth Hawkins & Dan Rosales
- Antelope High School –Vanessa Tucker & Kristen Williams
- Archbishop Mitty High School – Thomas Motroni
- Da Vinci Charter Academy – Nathan Kwan
- Davis Sr. High School - Ann Moriarty
- Elk Grove High School - Tony White
- Evergreen Valley High School – Adam Cheadle
- Franklin High School - Clayton Dagler
- Inderkum High School – Robert Patrick
- Jesuit High School - Amy Becker
- Laguna Creek High School - Michael Frei
- Mira Loma High School – Amy Pare, Rochelle Jacks, & Scott Martinez
- Rocklin High School – Paul Werner
- Sheldon High School - Jason Brennan, Justin Cecil, Robert Fendall, Kelli Kosney & Laura Ziegenhirt
- Vista Del Lago High School – Miranda Ayad, Sue Baker, & Daria Muller

TBC 2019 WINNERS (Continued)

Focus Area 6: Regenerative Medicine & Biomedical Engineering

1st –Jonathan Narita, Alan Nguyen, and Mridini Vijay, "Synthetic Tissues: Where Technology Meets Medicine" (Rocklin HS)

2nd – Kaitlyn Anderson & Daniele Roberts, "Regenerative Medicine & Biomedical Engineering: Synthetic Organs" (Antelope HS)

3rd – Alex Cherry, Ady Schwarz, and John Thompson, "Bioprinting" (Davis HS)

Honorable Mention – Molleigh Garduce, Karina Saavedra, and Nicholas Seah, "Artificial Limbs and Biocompatible Prostheses" (American Canyon HS)

Honorable Mention – Chanell Hudson, Emily Jackson, and Mya Rishworth, "Tissue Engineering" (American Canyon HS)

Honorable Mention – Jordan Goodwin, Celina Keirsey, and Kasey Nguyen, "Inside: Pulsed Electromagnetic Field Therapy'" (Antelope HS)

Honorable Mention – Simrithaa Karunakaran, "Synthetic Organs: A Bionic Brilliance" (Evergreen Valley HS)

Honorable Mention – Dayita Biswas, "Stem Cells to Organoids: March towards Precision Medicine" (Mira Loma HS)

Honorable Mention – Abigail Paras, "Rebuilding the Human Body" (Sheldon HS)

Honorable Mention – Allison Fox, "Regenerating Organs Using Stem Cells" (Sheldon HS)

Honorable Mention – Manvir Dhillon, "Synthetic Organs" (Sheldon HS)

SPARK Research Scholar Awards

TBC Winners meeting minimum eligibility requirements for the UCDMC Volunteer Services program were invited to apply for a Research Scholar Award. Based on a competitive application process, the following students have been chosen to participate as SPARK Research Scholars under the tutelage of leading stem cell scientist, Gerhard Bauer, Director of the GMP Laboratory. Students will conduct research in laboratories affiliated with the UC Davis Institute for Regenerative Cures (Director, Dr. Jan Nolta).

- Dayita Biswas, Mira Loma High School
- Catherine Chavez, Sheldon High School
- Victoria Derebenskiy, Sheldon High School
- Avery Kruse, Sheldon High School
- Jonathan Narita, Rocklin High School
- Julia Nguyen, Sheldon High School
- Brandon Pham, Sheldon High School
- Shay Nair Sharma, Franklin High School
- Mridini Vijay, Rocklin High School
- Katie Yang, Sheldon High School

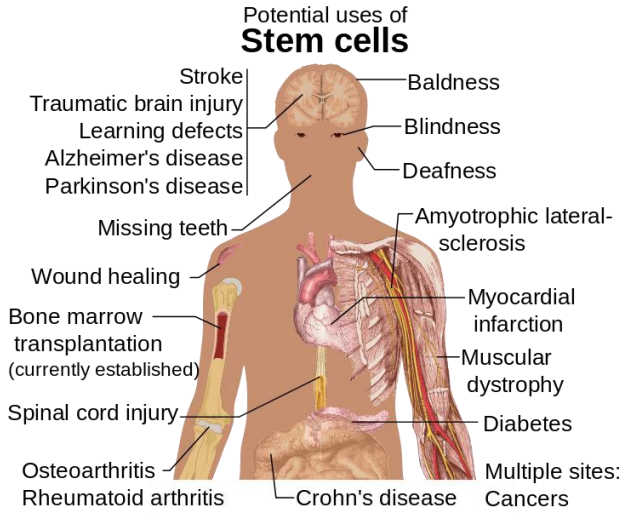
This summer research experience has been made possible by a SPARK Award (PI-Gerhard Bauer) from the California Institute for Regenerative Cures (CIRM). SPARK Research Scholars will present their research posters to members of CIRM at the SPARK Conference to be held in early August.

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