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2018 Teen Biotech Challenge Awards Reception

TBC

TEEN BIOTECH CHALLENGE

University of California, Davis
Giedt Hall
May 18, 2018
6:00 – 8:30 pm

2018 Teen Biotech Challenge
Awards Reception Program

Registration, Networking & Pizza Dinner: 6:00 - 6:30pm
Welcome & Keynotes: 6:30 – 7:00pm

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

Powerhouse Science Center Update: Dr. Judy Kjelstrom, UC Davis Biotech Program

"STEMTalk" Keynote: Amir Bolandparvaz

TBC Awards & First Place Winner Presentations: 7:00 – 8:30pm

Agricultural Biotechnology
Presenter: Dr. Jamison-McClung, UC Davis Biotech Program

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

Drug Discovery & Biomanufacturing
Presenter: Dr. Judy Kjelstrom, 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: Eliza Cocker, UCD Institute for Regenerative Cures

SPARK Research Scholar Awards
Presenter: Eliza Cocker, UCD Institute for Regenerative Cures

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

Closing Remarks: 8:25 – 8:30pm
Photos & Congratulations (optional): 8:30-8:45pm

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 TBC2018!

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 2018, **305 Northern California students** from 24 high schools registered to build 184 TBC websites. After a preliminary round of school site judging, 85 websites by 140 students at 20 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 2018 Industry Sponsor, Novozymes, 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 2018 is 100% sponsor supported, including student prizes and the awards event. TBC 2018 has been made possible by the following generous sponsors:

Event Partners: $3,000-$10,000

- UC Davis Biotechnology Program

Platinum Sponsors: $1,000 - $2,999

- Novozymes, Inc.

Silver Sponsors: $250 - $499

- ValoreBooks

We appreciate all TBC Sponsors' steadfast support of science education over the past ten years. Special thanks to Novozymes and ValoreBooks for funding TBC2018.

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.

For a list of recent contributors, please see our website:
http://teenbiotechchallenge.ucdavis.edu/Sponsors.html

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 2018 WINNERS

Focus Area 1: Agricultural Biotechnology

1st – Vivian Nguyen, "Planting a Better Future" (Sheldon HS)
2nd – Katie Yang, "Genetic Engineering in Agriculture: The Restoration of Food" (Sheldon HS)
3rd TIE – Brandon Pham, "GM Crops: Fighting Hunger with Science" (Sheldon HS)
3rd TIE – Noah Dutra, "GM Foods: Feeding the World" (Laguna Creek HS)
Honorable Mention – Dominique Barrera, Anthony Nguyen and Santiago Vazquez, "Make GMOs Great Again" (American Canyon)
Honorable Mention – Caleb Coates & Dharma Jensen, "Agricultural Biotechnology: Clean Eating (Antelope HS)
Honorable Mention – Julia Nguyen, "Reproductive Cloning" (Sheldon HS)
Honorable Mention – Jazmine Minhaz, "Genetically Modified Crops" (Sheldon HS)

Dr. Judy Kjelstrom &
Research Scholar Fatima Fierros (2016)

TBC 2018 WINNERS (Continued)

Focus Area 2: Computational Biology & Genomics

1st – Anna Guzman, "Computational Genomics: The 'How' of Science" (Sheldon HS)
2nd – Kaylee Dahley & Lauren Evans, "Epigenetics: Genomics of the Future" (Antelope HS)
3rd TIE – Emily Blackwell, Sue Bin Park and Grace Hickerson, "Epi-gene-edits: Controlling Gene Expression" (Davis HS)
3rd TIE – Jasmeen Randhawa, "Human Cellular Aging: Extending your Legacy" (Sheldon HS)
3rd TIE – Yen Nguyen, "Bioinformatics: Where biology meets computer science" (Sheldon HS)
Honorable Mention – Ramya Chandrasekaran, Victoria Elayda, and Christian Inglish, "Artificial Life Algorithms" (American Canyon HS)
Honorable Mention – Catherine DeGuzman, Shanling Lei and Darya Petrov, "Genetic Testing: Unraveling the Human Genome" (Dublin HS)

Focus Area 3: Drug Discovery & Biomanufacturing

1st – Pearl Thuan-Huong Doan & Scott Yuki, "Microneedle Patch: Background" (Antelope HS)
2nd – Alexandra Huynh, "Lupus: The Search for a Cure" (Mira Loma HS)
3rd – Lelian Pham, "Drug Discovery: HIV and AIDS" (Sheldon HS)
Honorable Mention – Simran Ram & Sidrah Sharif, "HIV & Aids" (Antelope HS)
Honorable Mention – Saajn Hundal, Tobin Le & Eric Yakuta, "Orphan Drugs" (Antelope HS)
Honorable Mention – Kelly (Huyen) Tran, "Cancer Immunotherapy" (Sheldon HS)
Honorable Mention – Jenny Luu, "Cancer Immunotherapy: The Hopes of Countless Millions" (Sheldon)

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.

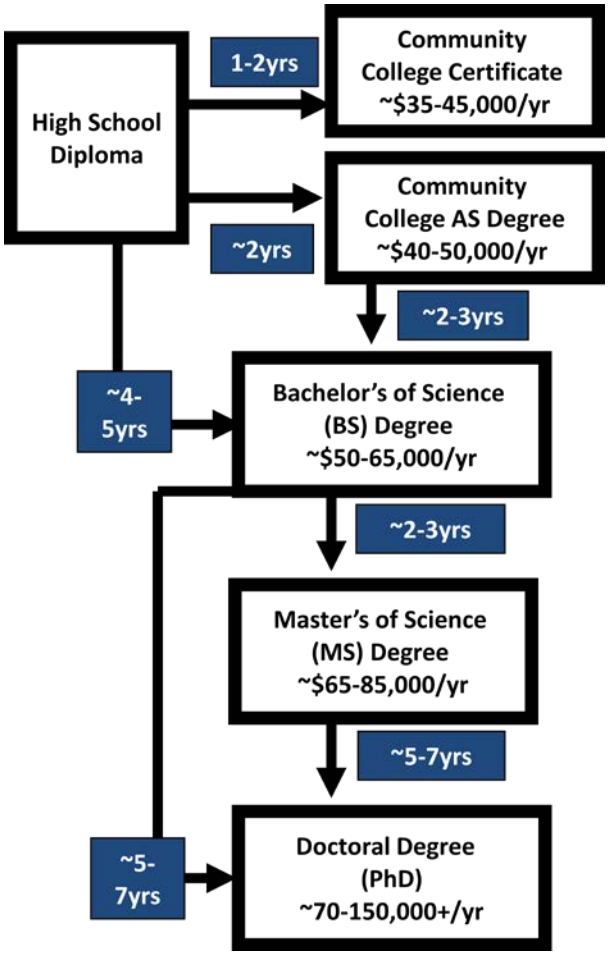
The winning TBC websites are a great educational resource for learning about specific biotechnology research approaches that will help address the SDG's, such as the development of cost-effective vaccines and drug treatments, the use of biotech crops to increase food security and emerging technologies 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 2018 WINNERS (Continued)

Focus Area 4: Environmental Biotechnology

1st – Reinier Bautista, "Bioremediation: Saving Our Environment, One Microorganism at a Time" (Sheldon HS)
2nd – Jasneet Bajwa, Manveen Bal, & Kiranjoth Kaur, "Algaculture: The Energy of our Future" (Antelope HS)
3rd TIE – Shannia DeLeon, Michael Lopez, and Natalie Ritter, "Biofuelds: The Future of Sustainability" (American Canyon HS)
3rd TIE – Bernadette Carillo, Marian Casas and Simran Kailey, "Biofuels" (Antelope HS)
Honorable Mention – Pattama Floyd, Sarah Roberts, and Emmy Tkach, "Cleansing the World" (Antelope HS)
Honorable Mention – Annika Tamaki, "Cool It, Earth!" (Sheldon HS)
Honorable Mention – Janell Phung, "Bioplastics: The Gateway to Bettering Earth Day by Day" (Sheldon HS)

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

TBC 2018 WINNERS (Continued)

Focus Area 5: Molecular Tools

1st – Matthew Huh, "Nanoparticles: The Miracle Antimicrobial?" (Mira Loma HS)
2nd – Nicole Hoang, "Advances in Gene Knockout Technologies" (Sheldon HS)
3rd TIE – Purvaja Balaji, "Nanobiopharmaceuticals: The Future of Medicine" (San Marino HS)
3rd TIE – Mai Lam, "Gene Therapy: The Future of Modern Medine" (Sheldon HS)
3rd TIE – Michele Truong, "Peeling the Banana Genome: Harnessing the Power of Genomic Research" (Sheldon HS)
Honorable Mention – Jakob Franco, "Created with the Building Blocks of Life: Synthetic Visuses & Microbes" (Natomas Pacific Pathways Prep HS)
Honorable Mention – Tiffany Situ, "CRISPR: The Future of Gene-Editing" (Sheldon HS)
Honorable Mention – Kamille Maningding, "Pathogen Detection: Identification of the Microscopic Killers" (Sheldon HS)
Honorable Mention – Skyler Wong, "Biohacking: The Forefront to Evolution" (Sheldon 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 - Elizabeth Hawkins & Dan Rosales
- Antelope High School - Angela Anderson, Darran Hudson, Heidi McKeen, Kristen Williams
- Chino Hills High School - Chirichan Tasanont
- Davis Sr. High School - Ann Moriarty, Timothy Peevyhouse, David Van Muyden
- Dublin High School - Katherine Hermens
- Elk Grove High School - Tony White
- Franklin High School - Ronald Siemens
- Inderkum High School - Alicia Morgan-Hecht
- Jesuit High School - Amy Becker
- Laguna Creek High School - Michael Frei
- Mira Loma High School - Phe Bach & Rochelle Jacks
- Mission San Jose High School - Lisa Ishimine
- Monta Vista High School - Kenneth Gan
- Natomas Pacific Pathways Prep- Daisy Vallesfino
- Saint Francis High School -Teri Stone
- San Marino High School - Suzanne Hobbie
- Sheldon High School - Jason Brennan, Justin Cecil, Robert Fendall, Kelli Kosney & Laura Ziegenhirt
- The College Preparatory High School - Katy Yan
- Vallejo High School - Diosa Bande
- Vista Del Lago High School - Sue Baker

TBC 2018 WINNERS (Continued)

Focus Area 6: Regenerative Medicine & Biomedical Engineering

1st – Duncan Applegarth and Sebastian Diolola, "Neural Engineering in Biotechnology" (American Canyon HS)
2nd – Tala Abboushi, "Tissue Engineering: Creating Tissues & Saving Lives" (Sheldon HS)
3rd TIE – Edwil Bisnar, Leslie Cardona and Sheena Ragadio, "Synthetic Organs" (American Canyon HS)
3rd TIE – Hannah Saephanh, "Building an Empire with the Artificial Womb" (Sheldon HS)
Honorable Mention – Marius Fajardo & Kristopher Yu, "Stem Cells, how they will change the future?" (American Canyon HS)
Honorable Mention – Bolarin Lawrence, "Body Building: The Future of Tissue Engineering" (Antelope HS)
Honorable Mention – Ana Gu & Rashi Jeeda, "Engineered Cells: Uncovering Treatments for the 'Incurable'" (Chino Hills HS)
Honorable Mention – Paulina Ngo, "Synthetic Organs: Building the Bridge between Technology & Life" (Davis HS)
Honorable Mention – Manan Chopra, "Prosthetics in Biotechnology" (Dublin HS)
Honorable Mention – Mark Mislang & Diena Salman, "Stem Cells: The Revolutionary Cure" (Franklin HS)
Honorable Mention – Soleil Gonzalez, "The Future of Organ Transplants" (Sheldon HS)
Honorable Mention – Nicholas Cusick, "Stem Cell Therapy: The Future of Regenerative Medicine" (Vista Del Lago 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).

- Manveen Bal, Antelope High School
- Nicholas Cusick, Vista Del Lago High School
- Noah Dutra, Laguna Creek High School
- Adam Yusuf Ford, Jesuit High School
- Jakob Franco, Natomas Pacific Pathways Prep High School
- Anna Guzman, Sheldon High School
- Nicole Hoang, Sheldon High School
- Ashlin Pannu, Inderkum High School
- Sue Bin Park, Davis High School
- Skyler Wong, Sheldon High School

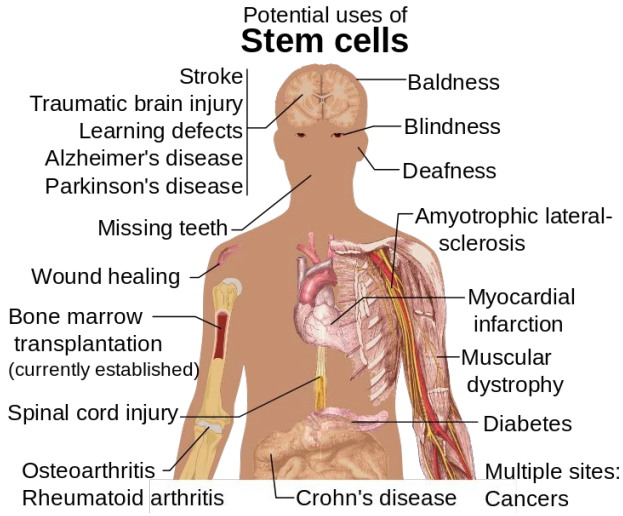
This summer research experience has been made possible by a SPARK Award (PI-Gerhard Bauer) from the California Institute for Regenerative Cures (CIRM). SPARK Research Scholars will present their research posters to members of CIRM at the SPARK Conference to be held in early August.

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