2023 Teen Biotech Challenge Awards & Biotech Poster Symposium

TBC

TEEN BIOTECH CHALLENGE

University of California, Davis
Genome Center Patio
May 13, 2023
12:00 – 3:00 pm

2023 Teen Biotech Challenge Awards & Biotech Poster Symposium

Registration & Lunch: 12:00 – 12:30pm
Welcome & Group Photo: 12:30 – 1:00pm
Poster Viewing: 1:00 – 2:40pm

1:00 – 1:50:

- Agricultural Biotechnology
- Biomanufacturing
- Environmental Biotechnology & Planetary Health

1:50 – 2:40:

- Computational Biology & Genomics
- Molecular Tools Nanobiotechnology, Synthetic Biology & Genetic Engineering
- Regenerative Medicine

Closing Remarks: 2:50pm

2022 TBC Winners with Dr. Denneal Jamison-McClung

WELCOME TO TBC 2023!

We are proud to host the Teen Biotech Challenge Awards and Poster Symposium for the wonderful 2023 contest winners. This year the contest grew, with 244 high school students from 25 schools registered to create TBC posters. There were many excellent entries and everyone who participated should be proud of their efforts.

Biotech Community Makes TBC Possible

Thanks to the teachers, parents and family members who supported their teens in developing the terrific posters on exhibit this afternoon.

Special thanks to our Designated Emphasis in Biotechnology PhD students for their efforts in judging the poster entries and helping to organize our celebration, particularly our project managers, **Clancy Lee** and **Alexander Zerkle**. If you see them today, please thank these volunteers for their support of STEM outreach.

Kind regards,

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 generous funding and in-kind volunteerism of:

UC Davis Biotechnology Program

Designated Emphasis in Biotechnology Volunteers

TBC was launched as a web design competition in 2005, and we appreciate all past TBC Sponsors' steadfast support of science education. Historical acknowledgement for significant past support goes to Novozymes, the UC Davis Innovation Institute for Food & Health, Bio-Rad, Chevron, Genentech (Event Partner 2011-2014), HDR Architecture, Monsanto, Bayer Crop Science, Rotary Club of Sacramento and the Sacramento Area Regional Technology Alliance (SARTA) Board.

TBC 2023 WINNERS

Focus Area 1: Agricultural Biotechnology – Intermediate (Grades 9-10)

1st – Alicia Castellon, Sheldon High School (Elk Grove), "Indoor Vertical Farming"
2nd – Arya Sule, Dougherty Valley High School (San Ramon), "Vertical Farming: The Upwards Evolution of Plants"
3rd – Nhat Ton, Sheldon High School (Elk Grove), "The Prospects of GMO's"

Honorable Mentions

- Brendan Arzaga, Sheldon High School (Elk Grove), "How GMO Corn is Made Step by Step: From the Lab to the Dirt to the Plate"
- Maeja Dahl, Sheldon High School (Elk Grove), "Genetic Engineering Foods"
- Ryan Dinh, Sheldon High School (Elk Grove), "If It Ain't Rice, It Ain't Nice: A Closer Look at Genetically Modified Rice"
- Aadesh Sahoo, Amador Valley High School (Pleasanton), "Epigenomic Analysis: The Creation of Spectacular Fruits"
- Don Yevloyev, Sheldon High School (Elk Grove), "Paving the Future of Agricultural Biotechnology"

Focus Area 1: Agricultural Biotechnology – Senior (Grades 11-12)

1st(Tie) – Christopher Haddad, Christian Brothers High School (Sacramento), "Aquaponics: Are Fish the Future of Farming?"
1st (Tie) – Emma Lam, Pleasant Grove High School (Elk Grove), "Integrating Bees Back into Agricultural Methods"
2nd (Tie) – Bethany Jackson-Russo, Pleasant Grove High School (Elk Grove), "Aquaponics"
2nd (Tie) – Elijah Shabaaz, Christian Brothers High School (Sacramento), "Agricultural Biotechnology: Aquaponics"
3rd – Rocco Edralin, Pleasant Grove High School (Elk Grove), "Aquaponics"

Honorable Mentions

- Jo Jewell-Woodroffe, Christian Brothers High School (Sacramento), "Animal Breeding by Marker Assisted Selection

- Madelyn Lee, Pleasant Grove High School (Elk Grove), "Aquaponics as a Sustainable Agricultural Medium"

Focus Area 2: Biomanufacturing / Subcategory in Biopharma – Intermediate (Grades 9-10)

1st – Dolly Ho, Sheldon High School (Elk Grove), "Vabysmo - To See the Future: A Real-Life Application of Biotechnology in the Eyes"
2nd – Kelly Loi, Sheldon High School (Elk Grove), "Biotechnology & The Endeavor For Human Prion Cures"
3rd –Sadhika Pendyala, The Quarry Lane School (Dublin), "Unraveling the New Future: RNA-Based Therapeutics"

Honorable Mentions

- Keira Farrar, Sheldon High School (Elk Grove), "The Super Cell"
- Allen Song, Sheldon High School (Elk Grove), "Vaccines: Things You Should Know"
- Linh Vo, Sheldon High School (Elk Grove), "The Promising Future of Monoclonal Antibodies"

Category 2: Biomanufacturing / Subcategory in Biopharma – Senior (Grades 11-12)

1st – Nishka Modi, Folsom High School (Folsom), "One Stroke at a Time Cure HIV with ART"
2nd – Michelle Lee, Henry M. Gunn High School (Palo Alto), "Cancer Vaccines: A Promising Step Forward to Curing Cancer"
3rd (Tie) – Arlene Fang, Pleasant Grove High School (Elk Grove), "Penicillin: The World's First Antibiotic and Its Impact Today"
3rd (Tie) – Mayukhi Katragadda, Dougherty Valley High School (San Ramon), "Expanding the Use of mRNA Vaccines to Combat More NTD's"

Honorable Mentions

- Erick Guzman, Grant Community High School (Fox Lake, IL), "The Ever-Lasting Battle Between Viruses and Vaccines"
- Mitchell Ho, Pleasant Grove High School (Elk Grove), "Vaccines 101"
- Trish Ho, Sheldon High School (Elk Grove), "Antibiotics: Battle Against Bacteria"

TBC 2023 WINNERS (Continued)

- Jolene Hoang, Pleasant Grove High School (Elk Grove), "Neglected Tropical Diseases: Battle from the Bottom"
- Sara Mehra, Ryan International School (Elk Grove), "Orphan Drugs: An Overview"
- Grace Nguyen, Pleasant Grove High School (Elk Grove), "Cancer Immunotherapy"
- Juliette Rangel, Grant Community High School (Fox Lake, IL), "Could Vitamin C Solve a Global Crisis?"
- Alicia Romani, Christian Brothers High School (Sacramento), "Biologics for Autoimmune Disease"
- Saachi Sethi, The Quarry Lane School (Dublin), "Botulinum Toxin: Serendipity and Boon"

Focus Area 2: Biomanufacturing / Subcategory in Cellular Agriculture – Intermediate (Grades 9-10)

1st – Kelly Nguyen, Sheldon High School (Elk Grove), "The Likelihood of Cultured Meat in Everyday Life"
2nd – Hoangan Nguyen, Sheldon High School (Elk Grove), "Cellular Fish to Save Fish"

Focus Area 2: Biomanufacturing / Subcategory in Cellular Agriculture – Senior (Grades 11-12)

1st – Ashleigh Lecitona, Sheldon High School (Elk Grove), "Breast Believe: Using Modern Biotechnology to Eliminate the Shortage of Infant Formula"
2nd – Leticia Caban, Sheldon High School (Elk Grove), "'Meat' the Solution: The Beef with Beef"
3rd – Christy Thao, Pleasant Grove High School (Elk Grove), "The Future of Meat"

Honorable Mentions

- Timothy Hawkins, Pleasant Grove High School (Elk Grove), "Lab Grown Meat"
- Ryan Tran, Pleasant Grove High School (Elk Grove), "Lab Grown Meat - Science Fiction to Just Science"
- Toby Trieu, Pleasant Grove High School (Elk Grove), "Nutritional Benefits and the Ecological and Economic Prospects of Insect Proteins"

- Abigail Wan, Pleasant Grove High School (Elk Grove), "The Future of Meat Starts in a Lab"
- Lisa Wang, Pleasant Grove High School (Elk Grove), "Using Cellular Agriculture to Create Cell-Based Food

Focus Area 3: Computational Biology & Genomics – Intermediate (Grades 9-10)

1st – Nouvel Virtusio, Sheldon High School (Elk Grove), "Reviving Our Woolly Friend Using the Power of Genome Sequencing"
2nd – Chigozie Monye, Sheldon High School (Elk Grove), "The 'Perfect' Child"
3rd – Sophia Tran, Sheldon High School (Elk Grove), "Genetic Maps"

Honorable Mentions

- Jed Andrade, Sheldon High School (Elk Grove), "Forensic Proteomes: The Use of Protein Sets to Identify the Unidentifiable"
- Solaris Chanthaboualy, Sheldon High School (Elk Grove), "Precision Medicine: The Blueprint To Recovery"
- Zexuan Guan, Sheldon High School (Elk Grove), "The Use of Biotechnology to Alter Gene Mutations Inside the Stomach"
- Timothy Hwang, Holmes Junior High School (Davis), "Mitochondrial Replacement Therapy for Mitochondrial Diseases"
- Gavin Knyff, Sheldon High School (Elk Grove), "Genetic Chimeras"
- Hannah Laurente, Sheldon High School (Elk Grove), "The Future of Healthcare With Artificial Intelligence"
- Yhali Revis-Wright, Sheldon High School (Elk Grove), "Gene Editing Designer Babies"
- Anaya Smith, Sheldon High School (Elk Grove), "Using AI to Generate Proteins"
- Kailyn Song, Marlborough School, "Diving Deep into Computational Biology and Genomics"
- Brielle Villareal, Sheldon High School (Elk Grove), "DNA Profiling; How DNA Helps Prove Criminals Innocent or Guilty"

TBC 2023 WINNERS (Continued)

Focus Area 3: Computational Biology & Genomics – Senior (Grades 11-12)

1st (Tie) –Sanjana Bajaj, The Quarry Lane School (Dublin), "Predicting mRNA Degradation in Vaccines"

1st (Tie) – Sucheer Maddury, Leland High School (San Jose), "A Signal Processing Procedure for Early Huntington's Disease Prognosis"

2nd – Madeline Fong, Pleasant Grove High School (Elk Grove), "Epigenetics: Cancer, Cancelled"

3rd (Tie) – Mischa Mikami, Pleasant Grove High School (Elk Grove), "The Perfectly Imperfect Creation: Designer Babies"

3rd (Tie) – Alex Thai, Pleasant Grove High School (Elk Grove), "Designer Babies: Designing Your Own"

Honorable Mentions

- James Ho, Sheldon High School (Elk Grove), "Quantum Computers in Biology"
- Jayden Luong, Pleasant Grove High School (Elk Grove), "The Versatility of Epigenetics"
- Isabella Magdaleno, Pleasant Grove High School (Elk Grove), "DNA Methylation in Disease Identification"
- Jolin Su, Sheldon High School (Elk Grove), "Application of Genome Testing to the Home Environment"
- Allyssa Ton, Sheldon High School (Elk Grove), "New Era of Personalized Medicine: Targeting Drugs for Each Unique Genetic Profile"
- Rishi Upadhyay, Mira Loma High School (Sacramento), "Angelman Syndrome: In Search of a Cure for the Happy Puppet"
- Logan Vicochea, Pleasant Grove High School (Elk Grove), "DNA Methylation and Cancer Research"

TBC 2023 WINNERS (Continued)

Focus Area 4: Environmental Biotechnology & Planetary Health – Intermediate (Grades 9-10)

1st (Tie) – Phuc Dang, Sheldon High School, "For a Greener Future: Genetically Modified Trees"
1st (Tie) – Matthew Yang, Sheldon High School Biotech Academy, "Cleaning Up Our Act: Bioremediation for a Cleaner, Healthier Planet"
2nd – Andisha Zahir, Sheldon High School Biotech Academy, "Biodegradable Plastics: The New Wave of Sustainability"
3rd (Tie) – Reiko Ujimori, Sheldon High School (Elk Grove), "Hydrogen Fuel Cell"
3rd (Tie) – Samar Yalda, Pleasant Grove High School (Elk Grove), "Bioplastics: Into the Future"

Honorable Mentions

- Jonathan Floresca, Sheldon High School (Elk Grove), "Seafuel!"
- Lauren Matias, Sheldon High School (Elk Grove), "Affordable, Abundant, Algae"
- Tristan Moua, Sheldon High School (Elk Grove), "Decompostable Degradable Bioplastics"
- Sean Wang, The Quarry Lane School (Dublin), "Cellulose Acetate - The Bioplastic of the Past"

Focus Area 4: Environmental Biotechnology & Planetary Health – Senior (Grades 11-12)

1st (Tie) – Caitlyn Hoang, Pleasant Grove High School (Elk Grove), "Phytoremediation: Engineering Plants to Clean the Environment"
1st (Tie) – Harmoni La, Pleasant Grove High School (Elk Grove), "Phytoremediation and Its Benefits"
2nd (Tie) – Mehvish Mavi, Pleasant Grove High School (Elk Grove), "Rooting for a Cleaner Environment"
2nd (Tie) – Mariam Rafiqzada, Pleasant Grove High School (Elk Grove), "An Overview on Bioplastics"
3rd (Tie) – Evan Lao-Ngo, Pleasant Grove High School (Elk Grove), "Phytoremediation to Remove Hazardous Wastes"
3rd (Tie) – An Nguyen, Pleasant Grove High School (Elk Grove), "Microbial Fuel Cells"

TBC 2023 WINNERS (Continued)

Honorable Mentions

- Mia Gutierrez, Christian Brothers High School (Sacramento), "Bioremediation"
- Rini Khandelwal, Del Norte High School (San Diego), "Got (Salty) Water? Microbial Desalination Cell: A Promising Future for Sustainable Water Desalination, Wastewater Treatment and Energy Production"
- Taylor Pham, Pleasant Grove High School (Elk Grove), "Microbial Fuel Cells"

Focus Area 5: Molecular Tools: Nanobiotechnology, Synthetic Biology & Genetic Engineering – Intermediate (Grades 9-10)

1st (Tie) – Alana Le, Sheldon High School (Elk Grove), "An Allergen-Free Kitty"

1st (Tie) – Princeton Ly, Sheldon High School (Elk Grove), "What's Next with Microbots?"

2nd (Tie) – Ryan Chung, Sheldon High School (Elk Grove), "CRISPR: The Gene Screen"

2nd (Tie) – Lavanya Gnanakumar, Folsom High School (Folsom), "Party with CAR-T!"

3rd (Tie) – Marielle Maniulit, Sheldon High School (Elk Grove), "The Rapid Development of COVID-19 Rapid Antigen Tests"

3rd (Tie) – Dev Mehra, The Quarry Lane School (Dublin), "Lab-on-a-Chip Devices: The Future of Biotechnology Research"

Honorable Mentions

- Logan Brennan, Sheldon High School (Elk Grove), "New Horizons For Drug Delivery"
- Taran Kaur, The Quarry Lane School (Dublin), "Breast MRI"
- James Nguyen, Sheldon High School (Elk Grove), "Nanobiotechnology and Peripheral Nerve Repair"
- Parisha Nigah, Sheldon High School (Elk Grove), "Nanorobotics: The End of Cancer"
- Anushri Srivastava, Vista Del Lago High School (Folsom), "Nanopharmaceuticals and Nanomedicine: Exploring 'The Room at the Bottom'"

- Evelyn Truong, Sheldon High School (Elk Grove), "Using CRISPR to Cure Blindness"

Focus Area 5: Molecular Tools: Nanobiotechnology, Synthetic Biology & Genetic Engineering – Senior (Grades 11-12)

1st (Tie) – Prajanya Kannan, The Quarry Lane School (Dublin), "Nanoparticles for Drug Delivery: The Tiny Wonders Transforming Medicine"
1st (Tie) – Finna Wang, The Quarry Lane School (Dublin), "CAR-T Cell Therapy"
1st (Tie) – Bahar Zahir, Sheldon High School (Elk Grove), "Liposomes: Versatile Drug Delivery Vehicles"
2nd – Madison Ferguson-Goodheart, Sheldon High School (Elk Grove), "Prenatal Gene Therapy: Diagnosing Unborn Babies"
3rd – Angela Le, Sheldon High School (Elk Grove), "The Synthetic Study of Life"

Honorable Mentions

- Savannah Doty, Pleasant Grove High School (Elk Grove), "How Gene Therapy Can Be Used to Treat Genetic Diseases"
- Leyna Le, Sheldon High School (Elk Grove), "Lab-on-a-Chip: a Scientist's Favorite Snack"
- Elaine Leon, Pleasant Grove High School (Elk Grove), "Liposomes: the Future of Nanomedicine"

Focus Area 6: Regenerative Medicine & Biomedical Engineering – Intermediate (Grades 9-10)

1st – Lekha Anand, Amador Valley High School (Pleasanton), "Stem Cells: Repair, Restore, Regenerate"
2nd (Tie) – Jennifer Liu, Sheldon High School (Elk Grove), "Toucan Play at That Game! 3D Printed Prosthetic Bird Beaks"
2nd (Tie) – Angela Sin, Sheldon High School (Elk Grove), "Xenotransplantation: Genetically Modified Pigs Saving Humans
3rd (Tie) – Alana Farve, Sheldon High School (Elk Grove), "The Future of Cryogenics in Preserving Human Life"
3rd (Tie) – Aniket Maharaj, Sheldon High School (Elk Grove), "Brain Computer Interface, The Fix For Paralysis"

TBC 2023 WINNERS (Continued)

Honorable Mentions

- Ashwin Dinh, Sheldon High School (Elk Grove), "Heartificial Intelligence"
- Joedy Mazanilla, Sheldon High School (Elk Grove), "Xenotransplantation: The Future of Organ Transplants"
- Hana Schubert, Sheldon High School (Elk Grove), "Ageing and Vision: Looking to the Future"
- Gurshan Singh, Sheldon High School (Elk Grove), "Visual Neuroprosthetics and Computer Brain Interface"
- Zixuan Tian, Sheldon High School (Elk Grove), "Bioartificial & Synthetic Organs: The Future is in Our Hearts"

Focus Area 6: Regenerative Medicine & Biomedical Engineering – Senior (Grades 11-12)

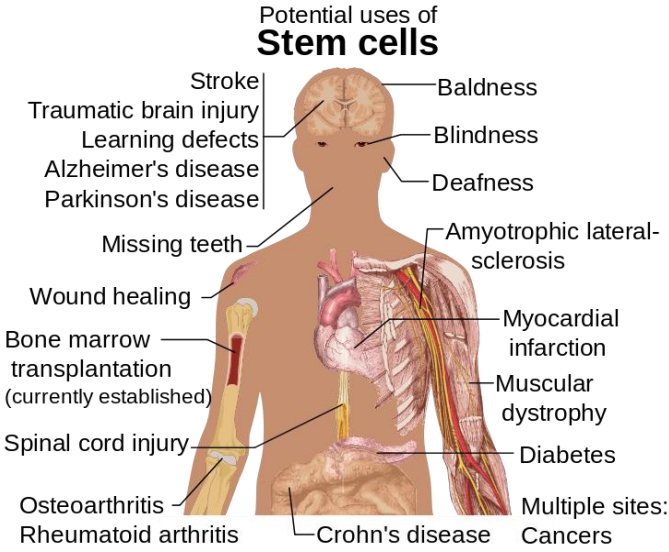
1st (Tie) – Erika Young, Pleasant Grove High School (Elk Grove), "Technologizing Tissue"
1st (Tie) – Jia Li Zhou, Sheldon High School (Elk Grove), "Using Biotechnology to Restore Sight: Bionic Eye and Artificial Lenses"
2nd (Tie) – Jessica Cheng, Foothill High School (Sacramento), "The Development and Future of Artificial Organs"
2nd (Tie) – Srikar Pasala, Amador Valley High School (Pleasanton), "The Future of Medicine: Synthetic Organs"
3rd (Tie) – Brianna Pham, Sheldon High School (Elk Grove), "Stem Cell Therapy: A New Lease on Life"
3rd (Tie) – Emma Piccione, Christian Brothers High School (Sacramento), "Artificial Hearts: The Future of Organ Transplants?"
3rd (Tie) – Ava Schrank, Grant Community High School (Fox Lake, IL), ("Advancements in Biomedical Engineering: Implants and Grafts"

Honorable Mentions

- Christian Ho, Pleasant Grove High School (Elk Grove), "Biomedical Prosthetics: Thinking Action into Action"
- Calista Huang, Carlmont High School (Belmont), "Biocompatibility: Next-Generation Prostheses and Medical Implants"
- Gurleen Kaur, Pleasant Grove High School (Elk Grove), "Skin Regeneration: Skin Cells ↔ Stem Cells"

TBC 2023 WINNERS (Continued)

- Gurshan Singh, Sheldon High School (Elk Grove), “Visual Neuroprosthetics and Computer Brain Interface”
- Alexanderia Moya, Christian Brothers High School (Sacramento), “Mesenchymal Stem Cells with Spina Bifida”
- Audrey Ng, Pleasant Grove High School (Elk Grove), “Synthetic Organs: The Key to Ending Organ Shortage”
- Keilana Jazelle Nonan, Christian Brothers High School (Sacramento), “The Use of Artificial Limbs”
- Sonia Shaheen, Sheldon High School (Elk Grove), “Cord Blood Stem Cells”



2023 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 2023 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 2023 Awardees!

Amre Abumarkhieh (Granite Bay HS)
Venicia Barron (Sheldon HS)
Shaylyn Carthen Sheldon HS)
Krish Kulkarni (Davis HS)
Parisha Nigah (Sheldon HS)
Muhammad Riaz (Sheldon HS)
Marissa Romero (Sheldon HS)
Rylan Rubiono (Mira Loma HS)
Ryan Tran (Sheldon HS)
Rishi Upadhyay (Mira Loma 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

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/

Awesome TBC 2023 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:

- Archbishop Mitty High School – Thuy Anh Nguyen
- Biotechnology High School – Samantha Haughwout
- Christian Brothers High School – Kevin Scully
- Dougherty Valley High School – Katherine Huang
- Grant Community High School – Lori Lev
- iANT Education - Analisa Burke
- Mira Loma High School – Scott Martinez
- Pleasant Grove High School – Ponciano Cochon
- Polygence – Christine Yoon
- The Quarry Lane School – Aparajita Ghosh
- Sheldon High School - Jason Brennan, Robert Fendall, Kelli Kosney

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

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/

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.

Rese
arch

Administr
ation

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

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.

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 webpage:** https://biotech.ucdavis.edu/biotech-system

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

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

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/

Which Items in the Supermarket are Bioengineered (BE)?

There are 13 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:

Alfalfa *(herbicide tolerant, feed for ruminant livestock)*
Arctic Apples *(PPO gene for browning when sliced "turned off")*
Field corn **and** ***Sweet Corn*** *(Bt – insect resistant, food and feed)*
Canola oil *(food, note – though the plant is BE, this oil is chemically identical to oil derived from conventional canola plants)*
Cotton *(Bt – insect resistant, fiber for clothes, seed for oil)*
Eggplant *(Bt – insect resistant, vegetable)*
Papaya *(virus resistant)*
Pink-fleshed pineapple *(increased carotenoid pigment)*
Innate Potatoes *(less browning/bruising and lower acrylamide formation when fried – PPO gene "turned off")*
Purple tomatoes *(higher levels of health-promoting anthocyanins)*
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)*
Squash *(virus resistant yellow squash & zucchini)*
Soybeans/Soybean oil *(herbicide tolerant, better oil quality)*
Sugar *(derived from GMO sugar beets, this sugar is chemically identical to sugar derived from other plant sources)*

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.

GENOME CENTER, UC DAVIS

UCDAVIS Biotechnology Program