THE FUTURE OF MICROBIAL BIOTECHNOLOGY: FROM RESEARCH TO REGULATION

Panelists and Speakers

Co-organizers

ANASTASIA BODNAR

Dr. Anastasia Bodnar is the Biotechnology Coordinator for the United States Department of Agriculture (USDA). She has served in multiple roles across USDA, including working on agricultural trade policy at the Foreign Agricultural Service and on biotechnology regulation at the Animal and Plant Health Inspection Service. Anastasia began her federal career in the U.S. Army, focusing on public health, pest management, and environmental safety. Her PhD in genetics with a minor in sustainable agriculture is from Iowa State University.

MELINDA KLIEGMAN

Dr. Melinda Kliegman is the Public Impact Director at the Innovative Genomics Institute (IGI). Prior to joining the IGI, she worked at the Bill & Melinda Gates Foundation, where she developed the Foundation's policy and advocacy strategy for use of genome editing technology in Agriculture. She specifically focused on the role of genome editing in helping small-scale producers adapt to climate change. Before the Foundation she worked at the U.S. Department of Agriculture, first as an American Association for the Advancement of Science and Technology (AAAS) Fellow at the Animal and Plant Health Inspection Service where she regulated genetically engineered plants and then at Foreign Agricultural Service (FAS) as a Science Advisor specializing in trade and market access for innovative agricultural products. Melinda has a PhD in Ecology and Evolution from Stanford University.

KELLYE EVERSOLE

Kellye Eversole is an expert in agricultural genomics, biotechnology, and information technology research and a leader in the development of international, pre-competitive multidisciplinary, industry-academic research consortia. She is the Executive Director of the International Alliance for Phytobiomes Research, which is pioneering a holistic, systems approach to understanding the complex interactions between the biological and geophysical components of agricultural production systems and support the development of novel, site specific products for enhanced sustainability. In addition to her work in genomics and convergent systems, Kellye advises public and private entities on regulations related to agricultural biotechnology/genetic engineering, microbial products, and plant protection products. Kellye also leads the Specialty Crop Regulatory Assistance initiative.

DAY ONE

Regulatory Overview - What is the Coordinated Framework?

SALLY MCCAMMON

As Science Advisor, Dr. Sally McCammon is part of the Office of the Deputy Administrator for Biotechnology Regulatory Services (BRS) within the Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA). She has been involved with regulatory review, biosafety operational and policy issues and international biotechnology regulatory harmonization for thirty years. She currently heads the U.S. delegation to the Organization for Economic Cooperation and Development's (OECD) Working Group on Harmonization of Regulatory Oversight in Biotechnology, focusing on environmental risk assessment of agricultural organisms. Within BRS, Sally works to assure the appropriate scientific basis for policies, regulations, and assessment decisions for biotechnology products, coordinating with US research agencies and a variety of non-governmental organizations. She has a PhD in plant pathology from the University of Kentucky.

Panel - GEMs in Food and Agriculture

JENNY SPLITTER

Moderator

Dr. Jenny Splitter is an award-winning independent journalist and science writer covering food systems, climate change, biodiversity, health and technology. Her work has been published in a wide range of media outlets including Vox, Everyday Health, Forbes, Civil Eats, Observer, OneZero, Undark, The Washington Post, Popular Mechanics, New York Magazine and Mental Floss. Passionate about science communication and storytelling, Jenny is a co-founder and contributing editor to the science communication project SciMoms. Her newsletter, FutureFeed, chronicles the future of food, especially livestock production and alternative proteins.

KATE KRUEGER

Dr. Kate Krueger is Managing Partner of Helikon Consulting, a boutique firm that specializes in synthetic biology, alternative proteins, and high-tech food. She works with foundations, corporations, and investors to bring 21st century biotechnology to food innovation. As former Research Director at New Harvest, Kate led all scientific initiatives and served as the organization's chief technical expert on fermentation for protein production and cell-based meat. Before New Harvest, she worked at Perfect Day Foods, contributing to their foundational patent on novel milk proteins. Kate holds a PhD in Cell Biology from Yale University and an A.B. in Biochemistry from Mount Holyoke College. She has been quoted by journals including Nature, the Anthropocene, and the New Yorker, and has shared her work through numerous lectures, articles, and podcasts.

BRUCE FRIEDRICH

Bruce is founder & CEO of the Good Food Institute, a global nonprofit organization that works on alternative protein policy, science, and corporate engagement. Learn more at gfi.org.

BJORN TRAAG

Dr. Bjorn Traag is the Chief Scientific Officer at Andes. Andes uses its proprietary seed treatment technology, Microprime, to deliver enhanced microbes to plant roots in order to fight climate change. Prior to joining Andes, Bjorn was a Program Director at synthetic biology company Zymergen, delivering strains for commercial scale up of products in various verticals including agriculture. Before this Bjorn worked in the agtech industry at Bayer CropScience and Joyn Bio. Bjorn has PhD in Microbial Genetics from Leiden University in the Netherlands, and did his postdoctoral studies at Harvard University studying gene regulation during sporulation in Gram-positive Bacillus.

GUILLAUME BARBIER

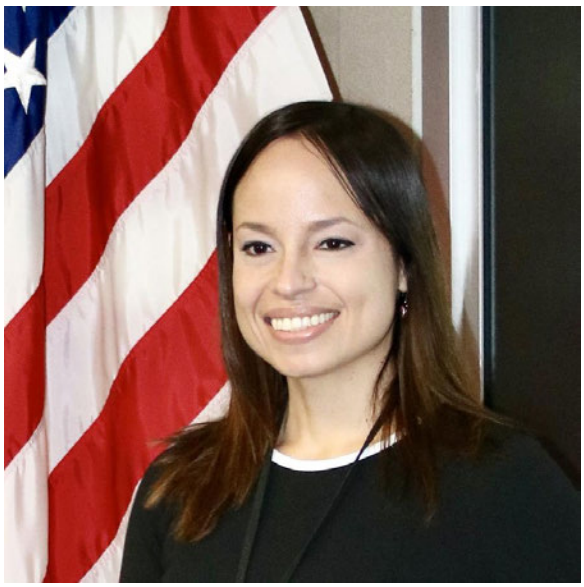
Dr. Guillaume Barbier is the Program Director of the nitrogen fixation program at Joyn Bio. He started working in the metabolic engineering field in 2006 at Metabolic Explorer as the enzymologist group lead on the methionine microbial production project. He then joined the Nitrate Elimination Company to work on protein production for analytical biochemistry and on metabolic engineering projects for commodity chemical production in Pichia pastoris. In 2011, Gui went to Novozymes to work and lead different metabolic engineering projects (e.g., farnesene, ethanol, 3-hydroxypropionic acid). At Novozymes, Gui also worked on the identification of the mode of action of beneficial microbes identified by the BioAg Alliance, an entity formed by Novozymes and Monsanto for the discovery of new microbial inoculants. He joined JoynBio in 2018 to start the Nitrogen Fixation program. Gui got his PhD in Biochemistry from Michigan Technological University in 2003, and his M. Eng. from Marseille Polytechnical school of Engineering in 2000.

SHAYLA WEST-BARNETTE

Dr. Shayla West-Barnette has worked for the U.S. Food and Drug Administration/Center for Food Safety and Applied Nutrition/Office of Food Additive Safety since 2008. As a Consumer Safety Officer, she led multidisciplinary teams in evaluations of premarket submissions describing the safety of food ingredients and new plant varieties. She also served as a Microbiology Technical Reviewer, evaluating data in industry submissions describing the safety of microbes used as food ingredients, as well as food ingredients produced using microbes. She has served as a Supervisory Consumer Safety Officer since 2013, leading a team of Regulatory Reviewsers in evaluations of industry submissions for food ingredients. Shayla earned her PhD in Microbiology and Immunology from Wake Forest University and her bachelor's degree in Biology from Bennett College.

DIEGO PAIVA

Dr. Diego Paiva (DVM, MSc, PhD) is a scientific reviewer specialized in animal nutrition and physiopathology at the Food and Drug Administration, Center for Veterinary Medicine (CVM). Diego joined CVM in 2014, and he reviews the functionality and target animal safety information for food additives, GRAS substances, and feed ingredients. Diego's pre-market work focuses on reviewing enzymes and other fermentation products for use in animal food and assessing the potential for immunogenicity of different substances intended for use in animal food. Additionally, Diego reviews labels, responds to regulatory inquiries from state feed control officials and stakeholders concerning the acceptability of different substances for use in animal food. He received his degrees from Auburn University and Virginia Tech. He completed his residency in anatomic pathology of food producing animals, and his postdoctoral work focused on the intersection between nutrition and gastroenteritis in swine and poultry.



MARTHA MALAPI-WIGHT

Dr. Martha Malapi-Wight is a plant pathologist by training with extensive experience working with regulated pathosystems relevant to U.S. agriculture. Martha currently serves as a Branch Chief in the USDA-APHIS-BRS Biotechnology Risk Analysis Programs. In BRS, she supports and serves as a subject matter expert on biotechnology regulations, especially regarding the molecular characterization of plants and microbes developed by genetic engineering using genomics tools. Before joining BRS, she was the Lead Scientist and Program Manager of a Federal Plant Quarantine Program. In this role, she was responsible for protecting several industries from importing and establishing foreign and exotic pathogens not present in the U.S. Here, she implemented a Genomics Program and validated using this technology to identify novel and quarantine pathogens. Martha holds a M.Sc. and PhD in Plant Pathology from the University of Tennessee and Texas A&M, respectively.

JOHN HICKS

Dr. John Hicks serves as the Scientific Advisor on the Risk Management and Innovations Staff (RMIS) within the Office of Policy and Program Development (OPPD), USDA/Food Safety and Inspection Service. John received degrees in Doctor of Veterinary Medicine and Bachelor of Science (Animal Science) from Tuskegee University, and a Master of Public Health (including Certificate – The Risk Sciences and Public Policy) from The Johns Hopkins University's Bloomberg School of Public Health. John's post-doctoral education includes a fellowship in laboratory animal medicine at Stanford University Medical Center, and a residency in laboratory animal medicine at the School of Veterinary Medicine at the University of California at Davis. John's expertise includes food safety policy, risk analysis, public health (emphasis on environmental health), bioterrorism, and laboratory animal medicine.

Panel - GEMs in the Environment and Biomanufacturing

JULIE SHAPIRO
Moderator

Julie Shapiro, Senior Policy Director and Center for Natural Resources Director, Keystone Policy Center. Julie has 18 years of experience in the natural resources field. At Keystone Policy Center, Julie creates, facilitates, and sustains strategic partnerships and collaborations, enabling common understanding and forging shared solutions to complex problems for people, land, water, and wildlife. Julie works with diverse government, business, academic, NGO, and community leaders through stakeholder dialogues, advisory groups, public engagement processes, strategy development, and summits on international, national, regional, state and local scales in areas of natural resource management, agriculture, and emerging technologies. Julie holds a Master's degree in environmental studies from the University of Colorado at Boulder and Bachelor's degrees in geosciences and English from Williams College.

KENT SMITH

Kent Smith is an industrial microbiologist and current Director of Contracts R&D at Biomason. Kent serves as principal lead on Biomason's government contracting efforts with DARPA and the USAF, with projects ranging from development of Engineered Living Materials (Engineered Living Marine cement - ELMc) and Project MEDUSA (field applications for biocementation processes - dust abatement, soil stabilization, erosion control, etc.).

SPENCER DIAMOND

Dr. Spencer Diamond is an associate project scientist at the University of California, Berkeley in the laboratory of Jill Banfield with 7 years of post-graduate experience in genome resolved metagenomics and computational microbial community analysis. Part of his work focuses on understanding how microbial metabolism and interaction networks result in collective community behavior. He also co-leads a collaborative effort between the Jill Banfield and Jennifer Doudna labs that has designed and successfully implemented a generalized strategy for targeted genome editing within microbial communities.

JAY FITZGERALD

Dr. Jay Fitzgerald is the Chief Scientist for the Bioenergy Technologies Office (BETO) at the U.S. Department of Energy (DOE) as well as the Program Manager for the BETO Data, Modeling, and Analysis subprogram. As BETO's Chief Scientist, Jay helps guide scientific program direction for overcoming challenges in the conversion of biomass and wastes into low-carbon fuels, chemicals, and materials. He specifically focuses on sustainable aviation fuel, synthetic biology, performance-advantaged bioproducts, and chemical and biological conversion of plastics. As Program Manager for BETO's Data, Modeling, and Analysis subprogram, Jay oversees programmatic direction for a portfolio of cross-cutting projects focused on strategic analysis and sustainability benefits of biofuels, bioproducts, and bioenergy. Jay was previously a Technology Manager for the Conversion subprogram in BETO where he managed the Agile BioFoundry consortium and bioconversion work. Jay was also an American Association for the Advancement of Science, Science and Technology Policy Fellow at the DOE Office of Science Office of Biological & Environmental Research. Jay holds a B.A. in biochemistry and a minor in economics from Middlebury College. He completed his PhD in organic chemistry at Stanford University with Professor Chaitan Khosla, focusing on the biosynthesis of medicinally useful polyketides.

KARA WELCH

Kara Welch is an entomologist with the Environmental Protection Agency's Emerging Technologies Branch (ETB) in the Office of Pesticide Programs. ETB has oversight over the risk assessment of products of biotechnology for pesticidal applications including plant-incorporated protectants, modified mosquitoes, genetically modified microbes, and other new technologies. Kara specializes in resistance management as well as risk management for products of biotechnology.

GWEN MCCLUNG

Dr. Gwendolyn McClung is a microbiologist with more than 30 years of experience in the Biotechnology Program in EPA's Office of Pollution Prevention and Toxics (OPPT) conducting ecological hazard assessments, construct hazard analyses, and risk assessments of genetically engineered (GE) microorganisms reviewed under the Toxic Substances Control Act (TSCA). GE microorganisms reviewed under TSCA include bacteria, fungi, protozoa, viruses, green and red algae, and others used in a variety of applications such as biofuel production, bioremediation agents, biofertilizers, biosensors, and for production of enzymes, specialty chemicals, and commodity chemicals. Gwen received her Bachelor's and Master's degrees in Agronomy (Soil Science) from the University of Maryland, College Park, and her PhD in Soil Science (Soil Microbiology) from the University of California, Riverside.

ANDREA HODGSON
Moderator

Dr. Andrea Hodgson is a Fellow at Schmidt Futures developing and co-leading the Bioeconomy Program, an effort focused on maximizing the potential of biotechnology toward a circular bioeconomy. Previously, she was a senior program officer on the Board of Life Sciences at the U.S. National Academies of Sciences, Engineering, and Medicine. She joined the Academies as a Christine Mirzayan Science & Technology Policy Fellow in 2016. During her tenure, her portfolio included work on biotechnology regulations, biosecurity, the microbiome, environmental health and risk assessment. Most notably, she was the study director for the 2020 consensus study report, Safeguarding the Bioeconomy. Andrea conducted postdoctoral training in Biochemistry and Molecular Biology at the Johns Hopkins Bloomberg School of Public Health where she also obtained her PhD in Molecular Microbiology & Immunology. She has a BS in Microbiology from the University of Rhode Island.

MEGAN PALMER

Dr. Megan J. Palmer is the Executive Director of Bio Policy & Leadership Initiatives at Stanford University. Based in the Department of Bioengineering, where she is also an Adjunct Professor, she works closely both with groups across the university and with stakeholders in academia, government, industry and civil society around the world. Dr. Palmer leads a focus area in biosecurity in partnership with the Freeman Spogli Institute for International Studies (FSI) at Stanford. She currently co-chairs the World Economic Forum Global Future Council on Synthetic Biology and is a member of the Council of the Engineering Biology Research Consortium (EBRC). For the last ten years she has led programs in safety, security and social responsibility for the international Genetically Engineered Machine (iGEM) competition. She also founded and serves as Executive Director of the Synthetic Biology Leadership Excellence Accelerator Program (LEAP), an international fellowship program in biotechnology leadership. She serves on the board of directors of Revive & Restore, a nonprofit organization advancing biotechnologies for conservation. Previously, Megan was a Senior Research Scholar and William J. Perry Fellow in International Security at the Center for International Security and Cooperation

(CISAC), part of FSI, where she is now an affiliated researcher. She also spent five years as Deputy Director of Policy and Practices for the multi-university NSF Synthetic Biology Engineering Research Center (Synberc). She has previously held positions as a project scientist at the California Center for Quantitative Bioscience at the University of California Berkeley (where she was an affiliate of Lawrence Berkeley National Labs), and a postdoctoral scholar in the Bioengineering Department at Stanford University. Dr. Palmer received her PhD in Biological Engineering from M.I.T. and a B.Sc.E. in Engineering Chemistry from Queen's University, Canada.

DAVID SAVAGE

Dr. David F. Savage is an Associate Professor of Biochemistry, Biophysics, and Structural Biology in the Department of Molecular & Cell Biology at the University of California, Berkeley and was recently selected to be an Investigator in the Howard Hughes Medical Institute. Dave was born and raised in rural Iowa. He continues to help manage his family's farm, which was recognized in 2010 as an Iowa Heritage Farm. Dave attended Gustavus Adolphus College, where he earned a B.A. in Chemistry and minored in Computer Science. He received his PhD in 2007 from UCSF for his work on membrane protein structure determination with Robert Stroud. From 2007 to 2011, Dave was a Life Sciences Research Foundation fellow with Pamela Silver in the Department of Systems Biology at Harvard Medical School. Research in the Savage Lab focuses on understanding and engineering two of the most compelling biochemical systems found in nature: genome editing and carbon fixing enzyme machineries. Ultimately, this work seeks to develop enabling genome editing technology and apply it for improving photosynthetic CO2 fixation in plants. For this work, Dave's research has been recognized with the DOE Early Career Program Award, an NIH Director's New Innovator Award, an Alfred P. Sloan Research Fellowship, and he was selected for the 2018 "Future of Biochemistry" issue by ACS-Biochemistry. In addition to this research, Dave is a co-creator of the Cold Spring Harbor Laboratory course on synthetic biology, a founding member of the Engineering Biology Research Consortium, and a co-founder of Scribe Therapeutics.

RODOLPHE BARRANGOU

Dr. Rodolphe Barrangou is the T. R. Klaenhammer Distinguished Professor at North Carolina State University. Rodolphe is focusing on the characterization of CRISPR-Cas systems, and their applications in bacteria, especially their use for the study and development of probiotics, including for genotyping, phage resistance, screening, genome editing and antimicrobials. Rodolphe spent 9 years in R&D and M&A at Danisco and DuPont and has been at NC State since 2013. For his CRISPR work, Rodolphe received several international awards, and was elected to the National Academy of Sciences, the National Academy of Engineering, the National Academy of Inventors and the American Academy of Microbiology. He earned a BS in Biological Sciences from Rene Descartes University in Paris, a MS in Biological Engineering from the University of Technology in Compiegne, France, a MS in Food Science from NC State, a PhD in Genomics from NC State and an MBA from the University of Wisconsin-Madison. He is the former Chairman of the Board of Caribou Biosciences, a co-founder of Intellia Therapeutics, Locus Biosciences, TreeCo, Ancilia Biosciences and CRISPR Biotechnologies, an advisor to Inari Ag, Invaio, Provaxus and Felix Biotech, and the Editor in Chief of the CRISPR Journal.

ANNE CHEEVER

Dr. Anne Cheever joined DARPA as a program manager in August 2020. She is interested in novel approaches to biosecurity, as well as the use of bioengineering, bioinformatics, and genome editing technologies for innovative biotechnological applications. Prior to joining DARPA, Dr. Cheever was a lead biotechnologist at MITRE Corporation, where she provided scientific and strategic support to multiple federal institutions in the areas of biodefense, biosecurity, disruptive technologies, and emerging infectious disease. She also led a team focused on COVID-19 vaccine acceleration, communications, security, and data analytics in support of Operation Warp Speed (OWS) and the Department of Defense (DoD). Previously, Dr. Cheever was a senior lead scientist at Booz Allen Hamilton, where she contributed to the development of capabilities in synthetic biology and biosecurity for intrinsic and extrinsic control of genome editors and gene drives. Cheever is a former fellow of the Johns Hopkins Center for Health Security Emerging Leaders in Biosecurity Initiative and an alumni of the American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellowship. Cheever received her Doctor of Philosophy degree in cell and developmental biology, Bachelor of Science degree in ecology, ethology, and evolution; and certificate in business administration from the University of Illinois at Urbana-Champaign.

DAY TWO

Regulatory Overview - GEMs in the Bioengineered Food Disclosure Standard

ALEX FISCHER

Dr. Alexandria Fischer is a Presidential Management Fellow in the Food Disclosure and Labeling Division (FDLD), Research and Rulemaking Branch in the Agricultural Marketing Service at the U.S. Department of Agriculture. Alex is from Denver, Colorado and received her undergraduate degree in Chemical Engineering from the Colorado School of Mines in 2015. She then earned a PhD in Biological Sciences from Rensselaer Polytechnic Institute in 2020. Alex's focus in FDLD includes interpretation, implementation, and compliance of the National Bioengineered Food Disclosure Standard.

Trade & Markets Overview - GEMs in International Trade

JEN ROWLAND

Dr. Jennifer Rowland earned a PhD in microbiology in 2014 from the University of Alabama at Birmingham, studying Mycobacterium tuberculosis. She then pursued postdoctoral research on Salmonella enterica Typhimurium pathogenesis at the University of British Columbia. After many years at the lab bench Jennifer turned to a career in science policy, first as an American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellow. During her fellowship, Jennifer worked on the regulatory side of science at the USDA Animal and Plant Health Inspection Service in the Pests, Pathogens and Biocontrol Permits unit. Currently, Jennifer serves as a science advisor at the USDA Foreign Agricultural Service in the New Technologies and Production Methods division.

Panel - Societal Engagement and Public Education

BRITTANY ANDERTON
Moderator

Dr. Brittany Anderton, Associate Director, iBiology, Science Communication Lab. Brittany Anderton is Associate Director of iBiology at the Science Communication Lab, where she produces educational videos that highlight the process of scientific discovery and supports the needs of STEM higher education by developing and evaluating curricular resources with educators. Brittany obtained her PhD in biomedicine from UCSF in 2015. After that, she did a non-traditional postdoc at UC Davis where she studied the teaching and communication of biotechnology. Ultimately, she wants to help improve the teaching and communication of science using evidence from the learning and social sciences.

JENNIFER KUZMA

Dr. Jennifer Kuzma is the Goodnight-NCGSK Foundation Distinguished Professor in the School of Public and International Affairs, and co-founder and co-director of the Genetic Engineering and Society (GES) Center at NC State University. Prior to her current position, she was associate professor at the Humphrey School of Public Affairs, University of Minnesota (2003-2013); study director at the National Academies of Science, Engineering, and Medicine (NASEM); and an AAAS Risk Policy Fellow at the USDA. She has over 150 scholarly publications on emerging technologies, their societal and ethical implications, and governance systems and has been studying these areas for over 25 years. Kuzma has held several national and international leadership positions, including a member of the World Economic Forum Council on Technology, Values and Policy; the NASEM Committee on Preparing for Future Biotechnology, Society for Risk Analysis (SRA) Council Member and Secretary, FAO Expert Group on Food and Nanotechnology, Council of Agricultural Science and Technology Committee on Gene Editing, and the AAAS-ABA National Council of Scientists and Lawyers. In 2014, she received the SRA Sigma Xi Distinguished Lecturer Award for her contributions to the field of risk analysis and in 2017-2018 she was awarded the Fulbright Canada Research Chair in Science Policy. In 2019 she was elected a lifetime Fellow of AAAS for her

distinguished work in anticipatory governance of new technologies, and methods for oversight policy analysis. She has given over 200 invited talks and is interviewed frequently in the media for her expertise in biotechnology policy, including the New York Times, Science, The Scientist, Nature, NPR, Washington Post, Scientific American, BBC, PBS Nova, Wired, and ABC & NBC News. Prior to becoming a social scientist and policy scholar, she earned her PhD in biochemistry at UC-Boulder and did a postdoc in plant molecular biology at Rockefeller University.

CHARLES DENBY

Dr. Charles Denby is the CEO and co-founder of Berkeley Yeast, a technology startup that uses genetic engineering to create the next generation of industrial yeast strains for the fermented beverage industry. BY obtained the first no questions GRAS letter for a GE brewer's yeast strain from the FDA, brought the first GE brewer's yeast to commercialization in 2018, and now sells manufactured brewer's yeast to hundreds of breweries across the country. BY has been awarded SBIR grants from NSF, NIH, and USDA, and is backed by venture capital investors with expertise in agriculture technology. Before starting Berkeley Yeast, Charles trained as a scientist, with a PhD from UC Berkeley department of MCB, and a bioengineering postdoc in Jay Keasling's lab.

CHARLIE ARNOT

Charlie Arnot is recognized as a thought leader in food and agriculture. He is highly regarded as both a writer and sought-after speaker who engages audiences across the globe. Charlie has more than 25 years of experience working in communications, public relations and issues management within the food system. He is the founder and president of Look East, an employee-owned consulting firm. He also serves as CEO of the Center for Food Integrity, a international non-profit organization dedicated to building consumer trust and confidence in today's food system. One client said of Charlie's work, "others help us talk about our business, you help us think differently about who we are and what we do." His commitment to excellence, innovation and integrity have positioned him as a trusted counselor to CEOs, government leaders and executives, and a respected industry advisor on critical issues within the food system. Clients and food and farm industry leaders seek his unique expertise in applying the peer reviewed trust model to help them build trust in their processes, products, people and

brands. Charlie is frequently sought out by the media for his insight on food and agriculture issues and has been quoted in the Wall Street Journal, Forbes, Fortune, Time, NPR, CNBC, The National Journal, Entrepreneur, Yahoo! Health, Huffington Post, Grist and dozens of trade publications globally. Charlie is the author of, “Size Matters, Why We Love to Hate Big Food,” which was named the top ag book of 2018 by noted DC journalist Jerry Hagstrom who said, “Charlie Arnot is the only consumer analyst who can explain to agribusiness executives why consumers distrust them – and not make the executives angry.” Charlie spent ten years as a corporate officer for a leading food company; he worked for a public relations agency, was an award-winning radio journalist and worked in video and film. Charlie grew up in southeast Nebraska and graduated from the University of Nebraska with a Bachelor of Journalism degree.

Overview of Technology

TIM SCHNABEL

Dr. Tim Schnabel is half German, half Namibian and came to the US to study Chemical Engineering at Stanford University. Under the guidance of Professor James Swartz, he wrote his honors thesis on "Biological Hydrogen Fuel from Sunlight", receiving Stanford's Kennedy Thesis Prize, the highest University recognition for undergraduate research. Tim then pursued an MS and PhD in Bioengineering at Stanford, advised by Professor Elizabeth Sattely. His doctoral thesis titled "Engineering Ammonia Production in Free-Living Diazotrophs for Plant Fertilization" is patented and published in two peer reviewed papers including a feature on the cover of ACS Synthetic Biology. Tim is currently working as an Entrepreneur in Residence to translate his ammonia producing strains into the field. In his free time, Tim is a beekeeper, homebrewer, and author of "Wake Up! A Young Person's Guide to Spirituality."

MYLES HERBERT

Dr. Myles Herbert is a Senior Manager on the Product Management & Licensing team at Indigo Ag where he leads partnership discussions and supports R&D and Commercial teams on the Biological Products business unit. He received his PhD in Inorganic Chemistry from Caltech and performed a postdoctoral fellowship at MIT studying material science and sensor development.

CARLY ODYNSKY

Carly Odynsky received her master's degree in biotechnology from Marywood University and then worked at Ginkgo Bioworks for a little over two years as an Operations Engineer. She then started working for Joyn Bio as a Research Associate for a year and a half until she moved to the Regulatory Team at Joyn Bio as a Regulatory Compliance Associate.

SUBRAY HEGDE

Dr. Subray Hegde is the Director of Biotechnology Risk Analysis Programs within Biotechnology Regulatory Services (BRS) in the Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA). His program is responsible for authorizing permits for interstate movement, importation and field testing of organisms developed using genetic engineering and for approving petitions for deregulation (unconfined field release or commercial cultivation). Subray is actively involved in national and international capacity building activities in biotechnology regulations. Subray obtained his BSc in Agriculture and PhD in Plant Breeding & Genetics from the University of Agricultural Sciences, Bangalore.