Precision Convergence Webinar Series

The Earth BioGenome Project: Convergence Science at the Nexus of the Global Biodiversity and Climate Crises

By Dr. Harris Lewin

With High-Level Panel of Leaders in Science, Technology, On-the-Ground Action, and Policy

Tuesday, November 16, 2021 | 11 AM to 1 PM EST (2 hours in duration)

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ABSTRACT: Earth is in the midst of global biodiversity crisis, with species disappearing at over 1,000 times the natural extinction rate. Extinction is irreversible, eradicating genetic diversity that has taken millions of years to evolve. This so-called 6th Mass Extinction threatens vital ecosystems on which humans depend. It may not be possible to slow or halt biodiversity loss without a deeper understanding of the origins, evolution, adaptability, and ecological functions of diverse species. In addition, the rapidly growing worldwide bioeconomy and emerging needs in pandemic responsiveness require broadening our understanding of life's biodiversity. The Earth BioGenome Project (EBP) aims to sequence, catalog, and characterize the genomes of all of Earth's plant, animal, and other eukaryotic biodiversity. The ultimate aim is to use these genomes as a foundation for revealing the "rules of life," i.e., how biological complexity arose, the relationship between genotype and phenotype, and how biological systems evolve under changing environmental conditions. Accomplishing these goals requires convergence science that is coordinated at global scale. I will discuss the organization and strategy employed by the EBP, as well as early progress and the critical challenges ahead.



PRESENTER: Harris A. Lewin is the Robert and Rosabel Osborne Endowed Chair and Distinguished Professor of Evolution and Ecology and at the University of California, Davis where he also holds joint appointments in the School of Veterinary Medicine and the John Muir Institute for the Environment. From 2011-2016, he served as the UC Davis Vice Chancellor for Research. Prior to that he spent 27 years at the University of Illinois at Urbana-Champaign, where he held the E.W. and J.M. Gutgsell Endowed Professorship in Immunogenetics, with a primary appointment in the Department of Animal Sciences and was a member of the Center for Advanced Study. Lewin served as Director of the University of Illinois Biotechnology Center, Founding Director of the W.M. Keck Center for Comparative and Functional Genomics, and Founding Director of the Institute for Genomic Biology. Lewin's current research interest is in mammalian genome evolution as it relates to adaptation, speciation, and the origins of cancer. In 2017, Lewin co-founded the Earth BioGenome Project (EBP) and currently serves as the Chair of the EBP Working Group. He is a Fellow of the American Association for the Advancement of Science, and was elected as a foreign member of the Royal Swedish Academy of Agriculture and Forestry. In 2011, Lewin was awarded the Wolf Prize in Agriculture, and in 2013 he was elected to the U.S. National Academy of Sciences.

About the series: The precision convergence series is launched to catalyze unique synergy between, on the one hand, novel partnerships across sciences, sectors and jurisdictions around targeted domains of real-world solutions, and on the other hand, a next generation convergence of AI with advanced research computing and other data and digital architectures such as <u>PSC's Bridges-2</u>, and supporting data sharing frameworks such as <u>HuBMAP</u>, informing in a real time as possible the design, deployment and monitoring of solutions for adaptive real-world behavior and context.

The McGill Centre for the Convergence of Health and Economics (MCCHE) is a virtual world network of scientist, action and policy leaders promoting the weaving of digital-powered interdisciplinary science into person-centered domain-specific solutions at scale to global challenges faced by traditional and modern economy and society worldwide. The MCCHE stimulates lasting collaborations that bridge the many divides in the market, economy, and society that are at the root of these most pressing modern challenges through collaborative of modular convergence innovation platforms.

The Pittsburgh Supercomputing Center is a joint computational research center between Carnegie Mellon University and the University of Pittsburgh. Established in 1986, PSC is supported by several federal agencies, the Commonwealth of Pennsylvania and private industry. PSC provides university, government, and industrial researchers with access to several of the most powerful systems for high-performance computing, communications, and data-handling available to scientists and engineers nationwide for unclassified research. PSC advances the state-of-the-art in high-performance computing, communications and informatics and offers a flexible environment for solving the largest and most challenging problems in computational science.

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Laurette Dubé, PhD is the founding Chair and Scientific Director of the McGill Centre for the Convergence of Health Economics. She holds the James McGill Chair of Consumer and Lifestyle Psychology and Marketing. Her work has been published in top disciplinary journals in Psychology, Management and Medicine as well as in multidisciplinary journals. She holds an MBA in finance, and a PhD in behavioural decision making and consumer psychology. During her 2020-2021 sabbatical, she is a visiting scholar at the National Research Council of Canada and at the Pittsburgh Supercomputing Center, Carnegie Mellon, USA. https://thefutureeconomy.ca/interviews/laurette-dube



Shawn Brown, PhD is Vice Chancellor for Research Computing at the University of Pittsburgh and the Director of Pittsburgh Supercomputing Center at the Carnegie Mellon University/ University of Pittsburgh and. Prior to his appointment, Dr. Brown served as the Associate Director of Research Software Development at the McGill Centre of Integrative Neuroscience at the McGill Neurological Institute. Dr. Brown is an expert on high - performance computing and computational simulation. He has over 25 years of experience in developing software to support the use of high-performance computing for research in areas such as chemistry, bioinformatics, and public health. his research interests are ALSO in how agent-based modeling and other computational techniques can be used to provide decision support in public health and chronic disease.

Panelists:



Dr. James Orbinski is a professor and the inaugural Director of York University's Dahdaleh Institute for Global Health Research. He is a medical doctor, a humanitarian practitioner and advocate, a best-selling author, and a leading scholar in global health. He has worked providing medical humanitarian relief in situations of war, famine, epidemic disease and genocide with Médecins Sans Frontières / Doctors Without Borders (MSF). He was elected International President of MSF from 1998-2001, accepted the Nobel Peace Prize awarded to MSF in 1999, and cochaired the founding of the Drugs for Neglected Diseases Initiative in 2004. Dr. Orbinski is a board Member of Grand Challenges Canada, and has been a member of several bodies committed to improving health equity both in Canada and around the world. He is the author of the award-winning and best-selling book An Imperfect Offering: Humanitarianism in the 21st Century. Dr. Orbinski holds a BSc from Trent University, an MD degree from McMaster University, and an MA in International Relations from the University of Toronto.



Dr. Ping Zhong joined Archer Daniel Midland (ADM) in Jan 2019 as the Vice President of Human Nutri in Science and Technology. In this role, Ping leads multiple cross-disciplinary research platforms and new nutrition and Health & Wellness product development. Prior to ADM, Ping has more than two decades of experi in research and innovation leadership roles with Abbott Laboratories, Givaudan and Firmenich Flavors. Ping has a doctorate in chemistry from the University of Chicago and a bachelor's degree in chemistry from Peking University in Beijing.



Dr. Aled Edwards is the founder and Chief Executive of the Structural Genomics Consortium (SGC), a research organization celebrated for being a pioneer of open science, particularly as it applies to protein science, chemical biology and drug discovery. Aled leads the six SGC laboratories from the SGC headquarters in Canada. Aled is a Professor at the University of Toronto and an Adjunct Professor at McGill University. He has published over 200 papers and his teams have contributed over 4,500 structures into the Protein Data Bank, as of 2021. Aled has also founded many companies, including Affinium Pharmaceuticals, which developed a novel antibiotic currently in late-stage clinical trials, and M4K Pharma, the first pharmaceutical company formed explicitly to invent new, and affordably priced, medicines for pediatric cancers.



Dr Shekhar C. Mande is an Indian Structural and Computational Biologist. He did his M.Sc. in Physics from University of Nagpur and earned Ph.D degree in Molecular Biophysics from Indian Institute of Science. Following his PhD in 1991, he joined Prof. Wim G. J. Hol as Post-Doctoral Fellow at Rijksuniversiteit Groningen in the Netherlands and in 1992 he joined University of Washington, Seattle as Senior fellow. He returned to India in 1995 to serve as Scientist in Institute of Microbial Technology. In 2001 he joined the Centre for DNA Fingerprinting and Diagnostics as senior Staff Scientist. Dr Mande led the National Centre for Cell Science as its Director from 2011 to 2018. Since 2018 he is serving as the Director General of Council of Scientific and Industrial Research (CSIR) and Secretary, Department of Scientific and Industrial Research (DSIR), Govt of India. He has been serving many advisory committees including task forces of many S&T related departments of Govt of India. Dr Mande is a fellow of several professional bodies and has been conferred many awards and honors which includes Shanti Swarup Bhatnagar Prize for Science and Technology, the highest science award in India.



David Easterling is a Supervisory Physical Scientist with the National Oceanic and Atmospheric Administration's National Centers for Environmental Information (NOAA/NCEI) in Asheville, North Carolina. He is currently Director of the Technical Support Unit (TSU) for the U.S. National Climate Assessment. In his career at NOAA, he has developed or enhanced methods to improve the quality of climate data sets, helped guide the development of high-quality climate observing networks, and analyzed climate data and model simulations for evidence of climate variability and change, particularly in extreme events. David received his Ph.D. in 1988 from the University of North Carolina at Chapel Hill and served as an Assistant Professor in the Atmospheric Sciences Program, Department of Geography, Indiana University-Bloomington from 1987 to 1990. In 1990 he moved to NOAA's National Climatic Data Center as a climate scientist, was appointed Principal Scientist in 1999, Chief of the Scientific Services Division in 2002, and Director of the Technical Support Unit in 2013. He has authored or co-authored more than 100 research articles and book chapters on climate science. He is a Fellow of the American Meteorological Society, and has been awarded four NOAA Administrator's Awards, four NOAA Bronze Medals, and one Department of Commerce Silver Medal.



Peter Jan Van Leeuwen is a Professor in Data Assimilation and Physical Oceanography at Colorado State University. He completed his M.S. in Theoretical Physics in 1987, from the University of Amsterdam and his Ph.D. in Fluid Dynamics in 1992, from Delft University of Technology. His research focuses on the use of data assimilation and causality (cause and effect) inference for better understanding geophysical fluids, with emphasis on the atmosphere and the ocean. This includes further development of data-assimilation methodology for highly nonlinear high-dimensional geophysical systems and of causality theory for these systems. He also has a research group at the University of Reading, working on Data assimilation in highly nonlinear systems and CUNDA: Causality Relations using nonlinear Data Assimilation.