Abhilesh **Dhawanjewar**

Bioinformatician · MRC Mitochondrial Biology Unit · University of Cambridge

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Education

Ph.D. in Evolutionary Biology *Aug 2015 - Jul 2022*

University of Nebraska-Lincoln, USA

Advisors: Dr. Kristi Montooth & Dr. Colin Meiklejohn

Integrated B.S.-M.S. Dual Degree *Aug 2010 - May 2015*

Indian Institute of Science Education and Research, Pune, India

Advisor: Dr. M.S. Madhusudhan

Summary

I am an Evolutionary Biologist passionate about uncovering the mechanistic processes behind the diversity of life on Earth. By integrating empirical and computational approaches, I aim to achieve a holistic understanding of evolutionary dynamics. My interests center on interactions between mitochondrial and nuclear genomes and their roles in cellular function, especially in the context of mitochondrial diseases in humans. I also explore evolutionary processes shaping genetic conflicts, such as mitochondrial-nuclear incompatibilities, and the evolution of sex-specific traits. My expertise spans experimental evolution, genomics, statistical modeling, and bioinformatics. I have developed statistical methods to analyze protein-protein interaction stability and applied bioinformatics tools to dissect complex biological data. Currently, I integrate large, multimodal datasets—such as genomics and single-cell analyses—to reveal underlying biological patterns and their evolutionary significance. I am dedicated to translating these insights into a deeper understanding of human health and evolution.

Publications

Journal Articles

Burr S., Auckland K., Glynos A.* **Dhawanjewar A.S.***, Wei W., Ryall C., Hynes-Allen A.M., Prater M., Sczaniecka-Clift M., Prudent J., Chinnery P.F., & van den Ameele J. (2025). MitoPerturb-Seq identifies common and gene-specific single-cell responses to mitochondrial DNA depletion and heteroplasmy *bioRxiv, 2025.07.08.663208v1*

Chandrasegaram R., Hynes-Allen A.M., Gao B., **Dhawanjewar A.S.**, Frison M., Petridi S., Chinnery P.F., Ma H. & van den Ameele J.(2025). Single-molecule mitochondrial DNA imaging reveals heteroplasmy dynamics shaped by developmental bottlenecks and selection in different organs in vivo *bioRxiv, 2025.01.24.634671v1*

Dhawanjewar, A.S., Montooth K.L., & Meiklejohn, C.D. Mitochondrial OXPHOS genes exhibit higher levels of molecular compensation of human disease associated mutations relative to nuclear OXPHOS genes in mammals. *In preparation, manuscript available on request*

M. Florencia Camus & **Dhawanjewar, A.S.** (2023). Multilevel selection on mitochondrial genomes. *Current Opinion in Genetics & Development, 80, 102050.*

Dhawanjewar A.S.*, Roy A.A.*, & Madhusudhan M.S. (2020). A knowledge-based scoring function to assess the stability of quaternary protein assemblies. *Oxford Bioinformatics, 36(12), 3739-3748.*

Roy, A.A.*, **Dhawanjewar, A.S.***, Sharma, P., Singh, G., & Madhusudhan, M.S. (2019). Protein Interaction Z Score Assessment (PIZSA): an empirical scoring scheme for evaluation of protein-protein interactions. *Nucleic acids research, 47(W1), W331-W337.*

Montooth, K.L., **Dhawanjewar, A.S.**, & Meiklejohn, C.D. (2019). Temperature-sensitive reproduction and the physiological and evolutionary potential for Mother's Curse. *Integrative and comparative biology, 59(4), 890-899.*

Nelson, T.C., Jones, M.R., Velotta, J.P., **Dhawanjewar, A.S.**, & Schweizer, R.M. (2019). UNVEILing connections between genotype, phenotype, and fitness in natural populations. *Molecular ecology, 28(8), 1866-1876.*

* *Equal contribution*

Web-servers

Prediction of Stable Quaternary Protein Assemblies -
PIZSA (Protein Interaction Z-score Assessment) - http://cospi.iiserpune.ac.in/pizsa/

Research Experience

Cell- and Tissue-specificity of Mitochondrial Disease Mutations

2024-Present

MRC Mitochondrial Biology Unit · University of Cambridge

UK

— Analyse multimodal single-cell data to identify cell- and tissue-specific effects of mitochondrial disease mutations
— Identify nuclear modifiers of mitochondrial disease mutations using CRISPR-based screens
— Develop data processing pipelines for DamID-seq analysis

The Evolution of Sexually Antagonistic Variation in Fruit Flies

2022-Present

University College London

UK

— Designed experiments implementing sex-limited selection in *Drosophila melanogaster* for experimental evolution
— Developed analytical and statistical tools using Approximate Bayesian Computation (ABC) to identify and characterize sexually antagonistic variation from genomic data

Mitochondrial-Nuclear Coevolution in Mammalian Genomes

2021-2022

University of Nebraska-Lincoln

USA

— Compiled datasets and computed evolutionary rate correlations between mitochondrial genes and nuclear genes with different degrees of interaction for mammalian species.
— Nuclear genes interacting with mitochondrial genes exhibit stronger correlations in evolutionary rates, supporting the hypothesis of mito-nuclear coevolution.

Molecular Compensation in the Oxidative Phosphorylation System (OXPHOS)

2019-2021

University of Nebraska-Lincoln

USA

— Curated and analyzed mitochondrial and nuclear protein sequences from 1200 mammalian species to identify potential compensating residues for disease-causing mutations using sequence, structural and phylogenetic analysis
— Mitochondrial genes exhibit a higher degree of compensatory evolution compared to nuclear genes, suggesting a higher degree of functional redundancy in the mitochondrial genome

Mitochondrial-Nuclear Interactions and the Thermal Sensitivity of Male Reproduction

2016-2019

University of Nebraska-Lincoln

USA

— Performed G×G×E×E×E phenotypic assays to characterize the effects of a mitochondrial-nuclear incompatibility between *Drosophila melanogaster* and *Drosophila simulans* hybrid on thermal male sterility.
— Mitochondrial-nuclear incompatibility exacerbates thermal sensitivity of spermatogenesis that is further modulated by environmental cues such as temperature, diet and age of exposure.

Prediction of Stable Quaternary Assemblies Protein Interaction Z Score Assessment (PIZSA)

2013-2015

Indian Institute of Science Education and Research, Pune

India

— Constructed knowledge-based statistical potentials trained over 4900 native three-dimensional protein structures to predict the stability of protein-protein interactions
— Extensively bench-marked across multiple test sets and is among the top 6 methods, outperforming 31 other statistical, physics, based and machine learning scoring schemes and deployed the algorithm as a web-server

Honors & Awards

Registration Waiver and Travel Support , **EMBO Population genomics: Background and tools (€400)** 2024
Blair Paxton Udale Fund for Life Sciences, **The University of Nebraska Foundation ($1900)** 2021
Milton E. Mohr Fellowship, **UNL Center for Biotechnology ($1000)** 2021
Blair Paxton Udale Fund for Life Sciences, **The University of Nebraska Foundation ($500)** 2020
Milton E. Mohr Fellowship, **UNL Center for Biotechnology ($1000)** 2019
Suzanne O. Prather Memorial Fund, **University of Nebraska Foundation ($1500)** 2019
Runner-Up Best Poster Award, **School of Biological Sciences, UNL ($50)** 2019
AAAS/Science Program for Excellence in Science, **American Association for the Advancement of Science** 2019
Jessie A. Lee Fund, **School of Biological Sciences, UNL ($2000)** 2018
Best Poster Award, **School of Biological Sciences, UNL ($100)** 2018
Conference Registration Award, **Society for Molecular Biology and Evolution ($450)** 2018
Travel Grant, **Society for Molecular Biology and Evolution ($250)** 2017
Runner-Up Best Poster Award, **School of Biological Sciences, UNL ($50)** 2017
Mary D. Rogick Memorial Fund, **School of Biological Sciences, UNL ($1300)** 2017
Travel Grant, **Society for the Study of Evolution ($500)** 2016
Blair Paxton Udale Fund for Life Sciences, **The University of Nebraska Foundation ($1500)** 2016
Rosemary Grant Award, **Society for the Study of Evolution ($2500)** 2016
Travel Grant, **The Indian Institute of Science Education and Research, Pune ($1300)** 2014
Travel Grant, **The American Society of Naturalists ($250)** 2014
Working Internship, **Max Planck Institute for Evolutionary Biology ($3500)** 2013
INSPIRE Scholarship, **Department of Science and Technology, India ($8000)** 2010
National Talent Search Examination (NTSE) Scholar, **NCERT, India ($250)** 2006

Conference Presentations

Invited Talks

The Ethics of Using Genetic Tools for Conservation *Jun 2018*
UNVEIL Symposium 2018 *Missoula, Montana, USA*

Population Genomics of the Range-Expanding Populations of *Argiope bruennichi* *Jul 2016*
20TH International Congress of Arachnology *Golden, Colorado, USA*

Oral Presentations

Faster Mitochondrial Evolution Drives Mitochondrial-Nuclear Coevolution *Jan 2025*
Cells within Cells Symposium *Cambridge, UK*

Compensatory Evolution of Disease Associated Residues in the Oxidative Phosphorylation (OXPHOS) pathway * *Jun 2020*
Society for Molecular Biology and Evolution Meeting *Québec City, Canada*

Environmental Modification of Mitochondrial-Nuclear Epistasis in Shaping Thermal Male Sterility in *Drosophila* *Jun 2018*
UNVEIL Symposium 2018 *Missoula, Montana, USA*

Mitochondrial-Nuclear Interactions and the Thermal Sensitivity of Male Reproduction *Sep 2017*
Mitochondrial Genomics and Evolution, an SMBE Satellite Meeting *Ein Gedi, Israel*

Poster Presentations

The Evolution of Sexual Antagonism in Fruit Flies *Jul 2024*
EMBO Popgen - Population Genomics: Background and Tools *Naples, Italy*

Compensatory Evolution of Disease Associated Residues in the Mitochondrial Genome *Oct 2019*
2ND UNVEIL Symposium 2019 *Lincoln, Nebraska, USA*

Structural Compensation of Disease Associated Residues in the Mitochondrial Genome *Aug 2019*
European Society for Evolutionary Biology Meeting *Turku, Finland*

Mitochondrial Diseases and Compensated Pathogenic Deviations *Jan 2019*
Society for Integrative and Comparative Biology Meeting *Tampa, Florida, USA*

Genetic and Environmental Factors Underlying the Thermal Sensitivity of Male Reproduction *Jul 2018*
Society for Molecular Biology and Evolution Meeting *Yokohama, Japan*

Mitochondrial-Nuclear Interactions and the Thermal Sensitivity of Male Reproduction *Apr 2017*
University of Nebraska-Lincoln Spring Research Fair *Lincoln, Nebraska, USA*

Mitochondrial-Nuclear Interactions and the Thermal Sensitivity of Male Reproduction *Mar 2017*
58TH Annual Drosophila Research Conference *San Diego, California, USA*

Prediction of Protein-Protein Interactions through the use of Statistical Potentials *Mar 2015*
BioPhysics Paschim Meeting *Mumbai, India*

Comparative Mitogenomic Analysis in the Range-Expanding Populations of *Argiope bruennichi* *Sep 2014*
QEvolution2014, Workshop on Quantitative Evolutionary Biology *Şirince, Turkey*

** Conference cancelled due to COVID-19 concerns*

Outreach

Panel Member at Imperial Lates: Future Cities, **Imperial College London**	2025
Technology Lead and Ecology Surveyor, **The Ealing Beaver Project**	2022-Present
BioBlitz Organiser and Surveyor, **Ascott Allotments, Ealing, London**	2023
Organiser & Lightning Talks and Film Festival Master of Ceremonies, **SciComm 2020**	2020
My Captain Discover Mentor, **The Climber**	2018
Scientists in Cars Getting Coffee, **Film Festival, SciComm 2018**	2018
Master of Ceremonies, Lighting Talks and Film Festival, **SciComm 2018**	2018
Boys and Girls Science Club, Park Middle School, **Lincoln Community Learning Centers**	2016-2017
Junior Sunday with a Scientist, **Nebraska State Museum**	2017
Sunday with a Scientist: Diversity of Life in Nebraska, **Nebraska State Museum**	2017
Sunday with a Scientist: Darwin Day, **Nebraska State Museum**	2017
Science Night Live Moderator, **SciComm 2016**	2016
Sunday with a Scientist: Evolution on the Wing, **Nebraska State Museum**	2016
Junior Sunday with a Scientist, **Nebraska State Museum**	2016
Investigate: Show-and-tell Amblypygi, **Nebraska State Museum**	2016
Science Tutoring for less-privileged high school students, **Pune, India**	2013-2015

Teaching

Guest Lecture, **BIOL0011 - Evolutionary Genetics**	Spring 2023
Teaching Assistant, **LIFE 120L - Fundamental Biology Lab I**	Fall 2021 - Spring 2022
Guest Lecture, **BIOS 897- Communicating Science Through Outreach**	Spring 2017, 2018
Teaching Assistant, **LIFE 121L - Fundamental Biology Lab II**	Fall 2020
Teaching Assistant, **LIFE 120L - Fundamental Biology Lab I**	Spring 2019
Teaching Assistant, **LIFE 120L - Fundamental Biology Lab I**	Fall 2016 - Fall 2017
Teaching Assistant, **BIOS 101L - General Biology Lab**	Fall 2015 - Spring 2016

Professional Service

Postdoctoral Representative, **Genetics, Evolution and Environment, UCL**	2022-Present
Organizing Committee, **SciComm 2020: A Conference on Effective Science Communication**	2020
Graduate Student Representative, **UNL oSTEM Conference 2020**	2020
Workshop co-organizer: Ethics of Biotechnology Applications to Conservation Biology, **UNVEIL Symposium 2018**	2018
Grad Student Volunteer, Strategic Vision Committee, **School of Biological Sciences, UNL**	2018
Vice President, **Biology Graduate Students Association, UNL**	2017-2019
Undergraduate Poster Judge, **UNL Spring Research Fair**	2018-2021

Peer Review

Ecology and Evolution
Journal of Evolutionary Biology
Genetics
G3: Genes|Genomes|Genetics

Memberships

Society for Molecular Biology and Evolution (SMBE)	2018-2025
European Society for Evolutionary Biology (ESEB)	2019-2020
The Society for Integrative and Comparative Biology (SICB)	2019-2020
American Association for the Advancement of Science (AAAS)	2019-2020
Genetics Society of America (GSA)	2017-2019
Society for the Study of Evolution (SSE)	2016-2019
International Society of Arachnologists (ISA)	2016-2017
American Society of Naturalists (ASN)	2014-2015