Abhilesh **Dhawanjewar**

Bioinformatician · MRC Mitochondrial Biology Unit · University of Cambridge

The Keith Peters Building, Cambridge Biomedical Campus, Hills Road, Cambridge, CB2 0XY, UK

ad2347@cam.ac.uk | abhilesh.github.io | abhilesh | abhilesh-dhawanjewar | abhilesh7 | Date of Birth: 26 May 1992

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 a computational biologist with a strong interest in the molecular mechanisms underlying human disease, particularly disorders of the nervous system. My current work at the MRC Mitochondrial Biology Unit focuses on understanding the pathogenesis of neurodegenerative diseases driven by mitochondrial DNA (mtDNA) mutations. I leverage expertise in bioinformatics, single-cell genomics, and statistical modeling to build computational frameworks that dissect the fundamental processes governing the inheritance and effects of mtDNA mutations in neural tissues.

Building on a PhD in mitochondrial-nuclear coevolution, my research bridges evolutionary biology with clinically relevant questions. I use large-scale, multimodal datasets to investigate how mitochondrial dysfunction affects gene regulation, metabolism, and cell-type specific processes in the nervous system. Through this work, I aim to uncover mechanisms contributing to mitochondrial and neurodegenerative diseases, and to support the development of computational tools for their study.

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

— Developed and applied computational frameworks to analyze multimodal single-cell data, aiming to understand cellular heterogeneity and tissue-specific effects driving mitochondrial neurodegenerative disease pathogenesis.
— Investigated nuclear genome contributions to mitochondrial disease by analyzing CRISPR-based screen data to identify key genetic modifiers.
— Built and implemented robust bioinformatic pipelines for diverse genomic datasets, including single-cell transcriptomics and protein-DNA interaction analysis (DamID-seq).

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