

# Abhilesh Dhawanjewar, Ph.D.

EVOLUTIONARY BIOLOGIST · UNIVERSITY COLLEGE LONDON, UK

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## Education

### Ph.D. in Evolutionary Biology

UNIVERSITY OF NEBRASKA-LINCOLN, USA

Advisors: Dr. Kristi Montooth & Dr. Colin Meiklejohn

Aug 2015 - Jul 2022

### Integrated B.S.-M.S. Dual Degree

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH, PUNE, INDIA

Advisor: Dr. M.S. Madhusudhan

Aug 2010 - May 2015

## Skills

### Programming

Python, R, Bash, slurm, LaTeX

### DevOps

Docker, Kubernetes, NGINX

### Analysis

Mixed-model regressions, Sequence Analysis, Protein Structure, Phylogenetics, Pipeline Development

## Publications

### JOURNAL ARTICLES

**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.

**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*

**Dhawanjewar, A.S.**, Montooth, K.L., & Meiklejohn, C.D. Evidence of mito-nuclear molecular coevolution in mammalian genomes *In preparation, manuscript available on request*

\* Equal contribution

### WEB-SERVERS

Prediction of Stable Quaternary Protein Assemblies -

PIZSA (Protein Interaction Z-score Assessment) - <http://cospi.iiserpune.ac.in/pizsa/>

## Experience

### Evolution of sexually antagonistic variation in fruit flies

UNIVERSITY COLLEGE LONDON

2022-Present

UK

- Integrate the experimental and computational aspects of investigating sexual antagonistic variation
- Experimental evolution to identify sexually antagonistic loci through sex-limited selection in fruit flies
- Genome-wide Pool-seq approach to track allele frequencies over time combined with Approximate Bayesian Computation (ABC) to estimate evolutionary parameters for sexually antagonistic loci

## Estimating levels of molecular compensation in the oxidative phosphorylation system

2019-2022

UNIVERSITY OF NEBRASKA-LINCOLN

USA

- Constructed computational pipeline to identify instances where mitochondrial disease-causing mutations are present as native residues in 1200 mammalian species
- Performed sequence correlation analysis using corrected mutual information to characterize inter- and intra-genomic correlations
- Constructed phylogenies and performed ancestral state reconstruction to identify potential compensating residues
- Built protein structural models using homology modelling to identify nature of structural compensation
- Ran protein stability estimations for characterizing the effect of disease-causing mutations on overall protein stability

## Mitochondrial-Nuclear interactions and the thermal sensitivity of male reproduction

2016-2019

UNIVERSITY OF NEBRASKA-LINCOLN

USA

- Characterized thermal male sterility for a panel of six hybrid Mitochondrial-Nuclear genotypes combining mitochondrial and nuclear DNA from *Drosophila melanogaster* and *Drosophila simulans*
- Assayed male fertility in a factorial design across three different temperatures and with males raised on three different diets to identify environmental effects on male fertility
- Ran mixed-model linear regressions to analyse the variance of genetic as well as environmental effects on male fertility results
- Found significant GxGxExExE interactions shaping sharp thermal sterility thresholds in *Drosophila*

## 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
- Derived a scoring scheme based on the statistical potentials and a binary classification scheme for identification of native protein quaternary structures
- 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
- Deployed the algorithm as a web-server

## Honors & Awards

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

## Conference Presentations

### INVITED TALKS

#### The Ethics of Using Genetic Tools for Conservation

UNVEIL SYMPOSIUM 2018

Jun 2018

Missoula, Montana, USA

#### Population Genomics of the Range-Expanding Populations of *Argiope bruennichi*

20<sup>TH</sup> INTERNATIONAL CONGRESS OF ARACHNOLOGY

Jul 2016

Golden, Colorado, USA

### ORAL PRESENTATIONS

#### Compensatory Evolution of Disease Associated Residues in the Oxidative Phosphorylation (OXPHOS) pathway \*

SOCIETY FOR MOLECULAR BIOLOGY AND EVOLUTION MEETING

Jun 2020

Québec City, Canada

#### Environmental Modification of Mitochondrial-Nuclear Epistasis in Shaping Thermal Male Sterility in *Drosophila*

UNVEIL SYMPOSIUM 2018

Jun 2018

Missoula, Montana, USA

#### Mitochondrial-Nuclear Interactions and the Thermal Sensitivity of Male Reproduction

MITOCHONDRIAL GENOMICS AND EVOLUTION, AN SMBE SATELLITE MEETING

Sep 2017

Ein Gedi, Israel

### POSTER PRESENTATIONS

#### Compensatory Evolution of Disease Associated Residues in the Mitochondrial Genome

2<sup>ND</sup> UNVEIL SYMPOSIUM 2019

Oct 2019

Lincoln, Nebraska, USA

#### Structural Compensation of Disease Associated Residues in the Mitochondrial Genome

EUROPEAN SOCIETY FOR EVOLUTIONARY BIOLOGY MEETING

Aug 2019

Turku, Finland

#### Mitochondrial Diseases and Compensated Pathogenic Deviations

SOCIETY FOR INTEGRATIVE AND COMPARATIVE BIOLOGY MEETING

Jan 2019

Tampa, Florida, USA

#### Genetic and Environmental Factors Underlying the Thermal Sensitivity of Male Reproduction

SOCIETY FOR MOLECULAR BIOLOGY AND EVOLUTION MEETING

Jul 2018

Yokohama, Japan

#### Mitochondrial-Nuclear Interactions and the Thermal Sensitivity of Male Reproduction

UNIVERSITY OF NEBRASKA-LINCOLN SPRING RESEARCH FAIR

Apr 2017

Lincoln, Nebraska, USA

#### Mitochondrial-Nuclear Interactions and the Thermal Sensitivity of Male Reproduction

58<sup>TH</sup> ANNUAL DROSOPHILA RESEARCH CONFERENCE

Mar 2017

San Diego, California, USA

#### Prediction of Protein-Protein Interactions through the use of Statistical Potentials

BIOPHYSICS PASCHIM MEETING

Mar 2015

Mumbai, India

#### Comparative Mitogenomic Analysis in the Range-Expanding Populations of *Argiope bruennichi*

QEVOLUTION2014, WORKSHOP ON QUANTITATIVE EVOLUTIONARY BIOLOGY

Sep 2014

Şirince, Turkey

\* Conference cancelled due to COVID-19 concerns

## Outreach

Organiser & Lightning Talks and Film Festival Master of Ceremonies, <b>SciComm 2020</b>	2020
My Captain Discover Mentor, <b>The Climber</b>	2018
Scientists in Cars Getting Coffee, <b>Film Festival, SciComm 2018</b>	2018
Master of Ceremonies, Lightning Talks and Film Festival, <b>SciComm 2018</b>	2018
Boys and Girls Science Club, Park Middle School, <b>Lincoln Community Learning Centers</b>	2016-2017
Junior Sunday with a Scientist, <b>Nebraska State Museum</b>	2017
Sunday with a Scientist: Diversity of Life in Nebraska, <b>Nebraska State Museum</b>	2017
Sunday with a Scientist: Darwin Day, <b>Nebraska State Museum</b>	2017
Science Night Live Moderator, <b>SciComm 2016</b>	2016
Sunday with a Scientist: Evolution on the Wing, <b>Nebraska State Museum</b>	2016
Junior Sunday with a Scientist, <b>Nebraska State Museum</b>	2016
Investigate: Show-and-tell Amblypygi, <b>Nebraska State Museum</b>	2016
Science Tutoring for less-privileged high school students, <b>Pune, India</b>	2013-2015