Debarun Acharya, M.Sc., Ph.D.

Residential Address:

2/54, Netaji Nagar, Kolkata- 700092, West Bengal, India

Mobile: +91 7980347997

Email: debarunacharya@gmail.com

ORCID: 0000-0001-5609-9888; Researcher ID: I-2470-2016

Website (Personal): debarunacharya.wixsite.com/home

EDUCATION

- Ph.D. Department of Biophysics, Molecular Biology and Bioinformatics, University of Calcutta, Kolkata, India   2012-2018

- M.Sc. Department of Zoology, Maulana Azad College, University of Calcutta, Kolkata, India   2009-2011

- B.Sc. Zoology (Hons), Vijaygarh Jyotish Ray College, University of Calcutta, Kolkata, India   2006-2009

ACADEMIC ACHIVEMENTS

- Nominated for Joint CSIR-UGC Junior Research Fellowship (JRF) and Lectureship (LS) from University Grants Commission according to the National Eligibility Test (NET) in the subject Life Sciences, December 2011. Roll no: 349759, **All India Rank: 0061**.
- **First Class 3rd** in Masters of Zoology, Maulana Azad College, University of Calcutta, Kolkata, India.
- First Division/Class throughout academic career.

RESEARCH AREAS

- Molecular ecology and Microbiome analysis using environmental and clinical data
- Genome and metagenome assembly, annotation and analysis
- Protein-interaction networks in host-pathogen interaction and coevolution
- Comparative genomics and molecular evolution
- Gene and Genome duplication and their relevance on evolution
- Role of protein intrinsic disorder on gene expression and host-pathogen interaction

● Effect of codon usage bias on mRNA structure, gene expression and protein folding

POSTDOCTORAL RESEARCH EXPERIENCE

Institute of Health Sciences, Presidency University, Kolkata, India (2024-Present)
Research Scientist

> Funded by: ICMR (Indian Council of Medical Research)
> Supervisor: Dr. Paulomi Ghosh; Co-supervisor: Dr. Utpal Bakshi
> *Field of Research*
> ● Development of PCL-PMMA nanofiber reinforced composites and profiling of their oral microbiome for dental applications.

Department of Biochemistry, Bose Institute, Kolkata, India (2021-2023)
Senior Project Associate

> Funded by Intramural Project Fund, Bose Institute, Kolkata
> Supervisor: Professor Subrata Sau
> *Field of Research*
> ● Exploration of viral evolution from the perspective of adaptation of SARS-CoV2-2 in its novel human host.
> ● Understanding the functional potential and virulence factors of *Tenualosa ilisha* gut microbiome using whole-metagenome shotgun sequencing.

Department of Microbiology, Bose Institute, Kolkata, India (2018-2021)
Research Associate

> Funded by Bose Institute, Kolkata (Department of Biotechnology, Govt. of India)
> Supervisor: Professor Tapan Kumar Dutta
> *Field of Research*
> ● Understanding the molecular basis of host-pathogen protein interactions using interspecific and intraspecific interactome data of human and pathogenic bacteria.
> ● Gut microbiome analysis of *Tenualosa ilisha* to understand associated bacterial communities using culture-dependent and 16S rRNA metagenomics.

DOCTORAL RESEARCHER

Bioinformatics Centre, Bose Institute, Kolkata, India (2012-2018)
Research Scholar

> Funded by University Grants Commission (UGC), Government of India
> Supervisor: Professor Tapash Chandra Ghosh

Ph.D. Thesis title: "*The importance of human duplicated genes: insights from evolutionary perspective.*"

Ph.D. Awarded on 13th December, 2018

Field of Research

- Gene essentiality, Gene and Genome duplication, Molecular evolution

PEER-REVIEWED PUBLICATIONS IN INTERNATIONAL JOURNALS

As First/ Corresponding Author

1. **Debarun Acharya** and Tapan K. Dutta (2021) Elucidating the network features and evolutionary attributes of intra- and interspecific protein–protein interactions between human and pathogenic bacteria. *Scientific Reports* 11, DOI:10.1038/s41598-020-80549-x.

2. Manish Prakash Victor, **Debarun Acharya***, Sandip Chakraborty, Tapash Chandra Ghosh* (2020) The combined influence of codon composition and tRNA copy number regulates translational efficiency by influencing synonymous nucleotide substitution. *Gene* 745 (2020): 144640. DOI: 10.1016/j.gene.2020.144640.

3. Manish Prakash Victor, **Debarun Acharya***, Tina Begum, Tapash Chandra Ghosh* (2019) The optimization of mRNA expression level by its intrinsic properties — insights from codon usage pattern and structural stability of mRNA. *Genomics* 111(6)/2019:1292-1297; DOI: 10.1016/j.ygeno.2018.08.009.

4. Arup Panda, **Debarun Acharya***, Tapash Chandra Ghosh* (2017) Insights into human intrinsically disordered proteins from their gene expression profile. *Molecular BioSystems* 13 (12) 2521-2530; DOI: 10.1039/C7MB00311K.

5. **Debarun Acharya**, Tapash Chandra Ghosh* (2016) Global analysis of human duplicated genes reveals the relative importance of whole-genome duplicates originated in the early vertebrate evolution. *BMC Genomics* 12/2016; 17(1). DOI:10.1186/s12864-016- 2392-0.

6. **Debarun Acharya**, Dola Mukherjee, Soumita Podder, Tapash Chandra Ghosh* (2015) Investigating different duplication pattern of essential genes in mouse and human. *PLoS ONE* 03/2015; 10(3). DOI: 10.1371/journal.pone.0120784.

As Co-Author

7. Rinita Dhar, Suman Basu, Mousumi Bhattacharyya, **Debarun Acharya**, Tapan K. Dutta (2024) Bacterial catabolism of estrogenic phthalates used in the manufacture of plastic products. Microbial Biotechnnology. 2024 Nov;17(11): e70055. DOI: 10.1111/1751-7915.70055.

8. Megha Chakraborty, **Debarun Acharya**, Tapan K. Dutta* (2023) Diversity analysis of hilsa (*Tenualosa ilisha*) gut microbiota using culture-dependent and

culture-independent approaches. *Journal of Applied Microbiology* (Oxford) 134 (9); DOI: 10.1093/jambio/lxad208.

9. Dola Mukherjee, Deeya Saha, **Debarun Acharya**, Ashutosh Mukherjee*, Tapash Chandra Ghosh* (2022) Interplay between gene expression and gene architecture as a consequence of gene and genome duplications: evidence from metabolic genes of *Arabidopsis thaliana*. *Physiology and Molecular Biology of Plants* 28:1091–1108; DOI: 10.1007/s12298-022-01188-2.

10. Manish Prakash Victor, **Debarun Acharya**, Sandip Chakraborty*, Tapash Chandra Ghosh* (2020) Chaperone client proteins evolve slower than non-client proteins. *Functional & Integrative Genomics* 20: 621–631(2020). DOI: 10.1007/s10142-020-00740-1.

11. Dola Mukherjee, Deeya Saha, **Debarun Acharya**, Ashutosh Mukherjee, Sandip Chakraborty, Tapash Chandra Ghosh (2018) The role of introns in the conservation of the metabolic genes of Arabidopsis thaliana. *Genomics* 110(5)/2018: 310-317; DOI: 10.1016/j.ygeno.2017.12.003.

12. Kakali Biswas, **Debarun Acharya**, Soumita Podder, Tapash Chandra Ghosh (2018) Evolutionary rate heterogeneity between multi- and single-interface hubs across human housekeeping and tissue-specific protein interaction network: insights from proteins' and its partners' properties. *Genomics* 110(5)/2018: 283-290; DOI: 10.1016/j.ygeno.2017.11.006

Under revision

1. **Debarun Acharya*** and Tapan K. Dutta (2024) Studies on Human-Coronavirus protein-protein interaction network from the perspective of viral adaptation in a novel host. bioRxiv 2024.01. 12.575398; DOI: 10.1101/2024.01.12.575398.

TEACHING EXPERIENCE

Ramakrishna Mission Vidyamandira, Belur Math, Howrah, India (2021-Present)

Visiting Faculty

Teaching Undergraduate courses in the Department of Zoology.

Teaching Bioinformatics as the Value-Added Course (VAC).

INDUSTRIAL TRAINING PROGRAM

Trained students on Molecular Docking for their industrial internship organized by 'Chromogen', Kolkata, 2024.

KEY SKILLS

Computational Expertise

- Software Packages used:
  CodonW, BLAST, ClustalW, MSOffice, SPSS, SPADES, QiiME, PICRUSt, MEGA, PyMol, AutoDock, Adobe Photoshop, R-studio etc.
- Bio-databases:
  Ensembl, UCSC Genome Browser, Uniprot, Gene Ontology database (GO), Human protein interaction database (HPRD), Expression database (BioGPS, Human Protein Atlas, EBI- Expression Atlas, Pseudogene database (pseudogene.org), Gene Essentiality Databases (SGD, MGI, OGEE, DEG), Whole-Genome duplication database (ohnologs DB), Disease gene database (HGMD, GAD), Protein Intrinsic Disorder databases (IUPred, D2P2), Protein-protein interaction databases (BioGrid, MINT, Reactome, IntAct), Host-pathogen protein interaction databases (HPI-DB, Mentha, VirHostNet etc.), Virulence factors database (VFDB) etc.
- Tools and Techniques of Bioinformatics:
  Network analysis tool (Cytoscape), Functional enrichment analysis webservers (DAVID, GOrilla, EnrichR, IntermineR etc.), Microbiome analysis tools (QiiME, Mg-RAST, PICRUSt, Tax4Fun etc.), Molecular Docking (Autodock vina), Phylogenetic Analyses (MEGA), Whole-Genome (SPADES) and Metagenome (metaSPADES) assembly, Protein Structure Modeling (ColabFold), Biosynthetic gene cluster identification (Antismash)
- Programming with PERL, Python and R.
- Operating System: Macintosh, Linux and Windows on PC, Workstations and Servers.

Experimental-lab Experience

- Hands-on experience on different techniques in molecular biology like Gel electrophoresis (SDS-PAGE, Native PAGE and Agarose Gel Electrophoresis), Chromatography, Nuclear and Mitochondrial DNA isolation, Polymerase Chain Reaction (PCR) etc.
- Hands-on usage of Sonicator machine, Autoclave, Gel Documentation Instrument, UV-Vis spectrophotometer, centrifuge, PCR & Electrophoretic units.
- Hands-on knowledge of different types of bacterial staining techniques; bacterial culture techniques (such as Streak plate, pour plate, spread plate, and serial dilution), and many types of selective culture techniques.

Ecological sampling techniques

- Transect (point and line/belt) and quadrat sampling techniques, Active and passive sampling of insects and arthropods.

Practical courses of Zoology

- Teaching Bioinformatics as a part of Zoology (Honours) Value-added course (VAC) in the Department of Zoology, Ramakrishna Mission Vidyamandira, Belur Math, affiliated to the University of Calcutta.
- Ecological field works: Hands-on knowledge of ecological sampling techniques, Insect collection and preservation using both active and passive sampling techniques, Biodiversity estimation using software packages and birdwatching.

OTHER SKILLS

- Photography: Nature, birds and other wildlife
- Photo editing: Adobe Photoshop and Adobe Lightroom
- Website building and maintenance
- Management of lab research funds
- Procurement of instruments for laboratory
- Setting up computational facility

SUPERVISION EXPERIENCE

- Dissertation Supervisor to Final Year Students of Zoology, Ramakrishna Mission Vidyamandira, Belur Math, 2021-2023.
- Bioinformatics instructor and demonstrator to Undergraduate Students of Zoology, Ramakrishna Mission Vidyamandira, Belur Math, 2021-Present.

PROFESSIONAL CONTRIBUTION

- Member, *American Society of Microbiology* (Global Outreach - Postdoctoral Membership)
- Journal Reviewer for *BMC Genomics*, Springer Nature.
- Journal Reviewer for *Scientific Reports*, Springer Nature.
- Journal Reviewer for *Microbiology Spectrum*, American Society of Microbiology.

PERSONAL DETAILS

Nationality: Indian

Date of Birth: 9th July, 1989

Marital Status: Married

Name of Spouse: Aditi Dutta Acharya

Kids: None

Personal Website: *debarunacharya.wixsite.com/home*

Contact details: debarunacharya@gmail.com

Mobile no. +91 7980347997

REFEREES

- Prof. Tapash Chandra Ghosh (Ph.D. Supervisor)

  Professor (Retd.), Bioinformatics Centre, Bose Institute, Kolkata

  Email: tapashbic@gmail.com

- Prof. Tapan Kumar Dutta

  Professor (Retd.), Department of Microbiology, Bose Institute, Kolkata

  Email: tapan@jcbose.ac.in

- Prof. Subir Chandra Dasgupta

  Professor (Retd.), Department of Zoology, Maulana Azad College, Kolkata

  Email: subirdgupta@gmail.com

DECLARATION

I hereby declare that all the information furnished in this document is free of errors to the best of my knowledge.

DEBARUN ACHARYA
Date: 02/07/2025
Place: Kolkata