Arijit Ghosh Ph.D.

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EDUCATION

Jawaharlal Nehru Centre for Advanced Scientific Research Bangalore, India
PhD in Chronobiology *August 2016 – June 2022*

National Institute of Science Education and Research Bhubaneswar, India
BSc-MSc dual degree in Life Sciences with focus on bioinformatics and cell biology *August 2011 – June 2016*

EXPERIENCE

Visiting postdoctoral fellow September 2022 – Present
Laboratory of Systems Genetics, National Heart, Lung, and Blood Institute *Bethesda, MD*
- Developed hidden Markov model based frameworks to classify fly sleep into distinct states
- Developed algorithms to extract circadian time series parameters from large datasets
- Conducted multiple genome wide association studies of circadian clock and sleep related traits in the *Drosophila* Genetic Reference Panel
- Contributed to a book chapter on "The genetics of sleep in *Drosophila*", and currently writing multiple research articles on original research work

Graduate research fellow August 2016 – June 2022
Chronobiology and Behavioral Neurogenetics Laboratory, Neuroscience Unit, JNCASR *Bangalore, India*
- Conducted original research on classical chronobiology, sleep, and population genomics of circadian phases and published research articles
- Published open source apps for high throughout automated analysis of circadian rhythms and sleep
- Contributed to organizing multiple academic conference and science outreach activities on and off campus

Masters dissertation research fellow May 2014 – June 2016
Goswami Lab, School of Biological Sciences, NISER *Bhubaneswar, India*
- Established primary bone cell, immune cell, and stem cell cultures in the lab
- Established novel molecular dynamics simulation routines in the lab
- Established novel histological and imaging-focused assays in the lab for bone tissue engineering
- Worked collaboratively with other lab members on different bioinformatics projects

SHORT TRAINING

Summer trainee May 2014 – July 2014
with Professor Naibedya Chattopadhya *CSIR-CDRI, Lucknow, India*
- Osteogenic induction using pharmacological modulators of TRP channels.

Summer trainee May 2013 – July 2013
with Professor Richa Rikhy *IISER Pune, India*
- Investigation of mitochondrial distribution and morphology in developing *Drosophila melanogaster* embryos.

Summer trainee May 2012 – July 2012
with Professor Chandan Goswami *NISER, Bhubaneswar, India*
- Bioinformatic analysis of evolution of TRP channels in vertebrates.

PUBLICATIONS

*(asterisk) : First OR co-first author

- Sara Milojevic, **Arijit Ghosh**, Vedrana Makevic, Maja Stojkovic, Maria Capovilla, Tomislav Tosti, Dejan B. Budimirovic, Dragana Protic. **"Circadian Rhythm and Sleep Analyses in a Fruit Fly Model of Fragile X Syndrome Using a Video-Based Automated Behavioral Research System"**. *International Journal of Molecular Sciences*, 25(14):7949 (2024).
- Narendra Pratap Singh, **Arijit Ghosh**, Susan T. Harbison. **"The Genetics of sleep in *Drosophila*"**. In Philip Gehrman, Alex C. Keene, Struan F. Grant (eds) *Genetics of Sleep and Sleep Disorders*, Springer, Cham (2024).
- Tushar Kanta Acharya, Subhashis Pal, ***Arijit Ghosh**, Shamit Kumar, Naibedya Chattopadhyay, Chandan Goswami. **"TRPV4 regulates osteoblast differentiation and mitochondrial function that are relevant for channelopathy"**. *Frontiers in Cell and Developmental Biology*, 11 (2023).

- *Arijit Ghosh**, Vasu Sheeba. **"VANESSA - Shiny apps for accelerated time-series analysis and visualization of *Drosophila* circadian and sleep data"**. *Journal of Biological Rhythms*, 37, no. 2 (2022): 222-231.

- *Arijit Ghosh**, Pragya Sharma, Shephali Dansana, Vasu Sheeba. **"Evidence for co-evolution of masking and circadian phase in *Drosophila melanogaster*"**. *Journal of Biological Rhythms* 36, no. 3 (2021): 254-270.

- Tushar Kanta Acharya, Satish Kumar, Nikhil Tiwari, ***Arijit Ghosh**, Ankit Tiwari, Subhashis Pal, Rakesh Kumar Majhi, Ashutosh Kumar, Rashmita Das, Abhishek Singh, Pradip K. Majhi, Naibedya Chattopadhyay, Luna Goswami, Chandan Goswami. **"TRPM8 channel inhibitor-encapsulated hydrogel as a tunable surface for bone tissue engineering"**. *Scientific Reports* 11, 3730 (2021).

- Nabanita Roy Chattopadhyay, Koustav Chatterjee, Nikhil Tiwari, Sudipta Chakrabarti, Sushil Kumar Sahu, Sankar Deb Roy, **Arijit Ghosh**, R Rajendra Reddy, Piyanki Das, Sudipa Mal, Basab Bijay Karnar, Ashok Kumar Das, Sam Tsering, Komri Riba, Zoreng puii, Eric Zomawia, Y Indibar Singh, Amol Ratnakar Suryawanshi, Abhishek Kumar, Dipyaman Ganguly, Chandan Goswami, Tathagata Choudhuri. **"TLR9 polymorphisms might contribute to the ethnicity bias for EBV-infected Nasopharyngeal Carcinoma"**. *iScience* 23, no. 3 (2020): 100937.

- Lakshman Abhilash, **Arijit Ghosh**, and Vasu Sheeba. **"Selection for timing of eclosion results in co-evolution of temperature responsiveness in *Drosophila melanogaster*"**. *Journal of Biological Rhythms* 34, no. 6 (2019): 596-609.

- Somdatta Saha, Samikshya Sucharita, Rakesh Kumar Majhi, Ankit Tiwari, **Arijit Ghosh**, Sunil Kumar Pradhan, Bijay Kumar Patra et al. **"TRPA1 is selected as a semi-conserved channel during vertebrate evolution due to its involvement in spermatogenesis"**. *Biochemical and biophysical research communications* 512, no. 2 (2019): 295-302.

- Sridhar Sanyasi, Satish Kumar, **Arijit Ghosh**, Rakesh Kumar Majhi, Navneet Kaur, Priyanka Choudhury, Udai P. Singh, Chandan Goswami, and Luna Goswami. **"A modified polysaccharide-based hydrogel for enhanced osteogenic maturation and mineralization independent of differentiation factors"**. *Macromolecular bioscience* 17, no. 3 (2017): 1600268.

- Somdatta Saha, ***Arijit Ghosh**, Nikhil Tiwari, Ashutosh Kumar, Abhishek Kumar, and Chandan Goswami. **"Preferential selection of Arginine at the lipid-water-interface of TRPV1 during vertebrate evolution correlates with its snorkeling behaviour and cholesterol interaction"**. *Scientific reports* 7, no. 1 (2017): 1-21.

- *Arijit Ghosh**, Navneet Kaur, Abhishek Kumar, and Chandan Goswami. **"Why individual thermo sensation and pain perception varies? Clue of disruptive mutations in TRPVs from 2504 human genome data"**. *Channels* 10, no. 5 (2016): 339-345.

- Rakesh Kumar Majhi, Somdatta Saha, Ashutosh Kumar, **Arijit Ghosh**, Nirlipta Swain, Luna Goswami, Pratyush Mohapatra et al. **"Expression of temperature-sensitive ion channel TRPM8 in sperm cells correlates with vertebrate evolution"**. *PeerJ* 3 (2015): e1310.

TECHNICAL SKILLS

- **Immunostaining and Microscopy**: Cells, tissue; Immunoblotting, Fixed cell fluorescence imaging, live cell calcium imaging, live cell pH measurement, live cell mitochondrial potential dynamics, confocal microscopy

- **Cell line culture and assays**: Various bone cell lines, macrophage and neuronal cell lines; Primary cell culture: Mesenchymal stem cell isolation and culture, Hematopoeitic stem cell isolation and culture, calvarial osteoblast culture, Peritoneal macrophage isolation and culture, MTT assay, ALP assay, Mineralization assay of osteoblasts

- **Fly work**: Maintenance, embryo isolation, staining and imaging, population maintenance, genetic crosses, brain dissection

- **Animal handling**: Rat, mice, and rabbit, dosing, bone marrow isolation, peritoneal macrophage isolation, calvaria isolation

- **Behavioral assays**: Sleep and circadian rhythm assays, eclosion assay, oviposition assay, development time assay, lifespan assay, video tracking and analysis of locomotive behaviors

COMPUTATIONAL SKILLS

- **Programming languages**: R , Python, PERL, MATLAB
- **High Performance Computing**: Pipeline development, SLURM-based job scheduling
- **LINUX/UNIX**: Moderate usage, command line proficiency, bash and awk scripting
- **Sequence analysis, Homology modelling, and Molecular phylogenetic analysis**: Proficient in analysis using MEGA, MODELLER, YASARA, PHYLIP
- **Molecular dynamics, docking**: Proficient in YASARA, VINA, Autodock, VMD

- **NGS analysis**: Standard Omics analysis tools (DNAseq, RNAseq, ATACseq, ChIPseq, pooled sequencing) and developing pielines
- **Statistics**
  - Parametric and non-parametric statistical inference and hypothesis testing
  - Building and implementations of hidden Markov models for various types and classes of data
  - Experimental design, time series analysis, and method development, experience in working with big data, strong proficiency in R, and a love for tidy data
  - Methods and tool development for time series analysis
  - Tools: R, SAS, Python, MATLAB, Statistica
- **Basic ML**: Advanced clustering techniques, experience in analyzing and interpreting data using regression models, basic machine learning algorithms like neural networks, random forest, gradient boosting machines using keras, tensorflow, ranger, and h2o
- **Visualization**: Proficient in R (base, ggplot2 and extensions), GraphPad Prism, Origin Pro, Sigmaplot, CIRCOS
- **App and dashboard development and deployment**: Proficient in Shiny and CSS, low-level Java proficiency
- **General computer skills**: Proficient in Microsoft Office, Adobe Illustrator, Adobe Photoshop, Adobe Lightroom, HTML5
- **Code repository**: `https://github.com/orijitghosh`

Awards, Achievements, and Professional Memberships

- Awarded the L'Enfant fellowship from the National Heart, Lung, and Blood Institute, Bethesda, MD, for postdoctoral training (intramural equivalent to the F32 Ruth L. Kirschstein Postdoctoral Individual National Research Service Award) (2024-Present)
- Awarded Best oral presentation award at the Johns Hopkins Sleep and Circadian Research Day (2024)
- Trainee member of Society for Research on Biological Rhythms (2020-2024)
- Trainee member of Sleep Research Society (2024-2025)
- Awarded the SRBR Merit Award by the Society for Research on Biological Rhythms Awards Committee (2024)
- Awarded a visiting postdoctoral fellowship from the National Heart, Lung, and Blood Institute, NIH (September 2022-Present)
- Awarded the SRBR Merit Award by the Society for Research on Biological Rhythms Awards Committee (2020)
- Awarded the Global Diversity Fellowship from the Society for Research on Biological Rhythms Awards Committee (2020)
- Awarded Bhagwati Devi Memorial Award for best oral presentation at the International Symposium on Biological Rhythms (2019) organized by the Indian Society for Chronobiology
- Awarded CSIR Junior Research Fellowship (2016-2018) and CSIR Senior Research Fellowship (2018-2021) for graduate studies
- Awarded Best poster teaser award at in-house symposium at JNCASR 2017
- Awarded Best Student award at DST-SERB School in Insect Biology 2016
- Qualified in Graduate Aptitude Test in Engineering (GATE) 2016
- Ranked 26th and 32nd in LS category and 59th in JRF category in National Eligibility Test (NET), organized by Council of Scientific and Industrial Research, India (CSIR NET 2015-2016)
- Awarded 2nd prize in 1st International Conference on Translational Research, India
- Received the prestigious DST-INSPIRE scholarship for pursuing BSc and MSc in basic sciences from Department of Science and Technology, Government of India

Talks, Conferences, and Workshops

- Invited for a talk the Johns Hopkins Sleep and Circadian Research Day, 2024
- Invited for a talk at the *Drosophila* Neuroscience Community meeting 2024, NIH
- Presented a poster at the Gordon Research Seminar and Conference at GRC Sleep 2024, Galveston, TX
- Presented a poster at the Gordon Research Seminar and Conference at GRC Chronobiology 2023, Galveston, TX
- Invited for a talk at the Gordon Research Seminar at GRC Chronobiology 2023, Lewiston, ME
- Presented a poster at the Johns Hopkins Sleep and Circadian Research Day, 2023
- Invited for a talk at the *Drosophila* Neuroscience Community meeting 2023, NIH
- Presented a poster at Probabilistic Modelling in Genomics meeting 2023 at CSHL
- Invited for a talk in the 6th meeting of the *Drosophila* Ecology Evolution Supergroup
- Attended, gave an oral presentation, and helped organize the International Conference on Chronobiology 2021, funded by IUSSTF and Indian Society for Chronobiology
- Attended and helped organize the 2020 International Chronobiology Summer School as a Teaching Assistant
- Attended and presented a poster at SRBR 2020, organized by The Society for Research on Biological Rhythms, won Global Diversity fellowship and SRBR Merit Award in the same
- Invited for an oral presentation at International Symposium on Biological Rhythms 2019, organized by the Indian Society for Chronobiology at CCSU, Meerut, India
- Attended and helped in organizing InSearch - Insects in Research symposium, 2018, 2019 and 2020, organized by the Clock Club, JNCASR, Bangalore, India
- Attended the International Symposium on Biological Timing and Health Issues in the 21st Century, February 2017 at University of Delhi, India
- Attended the Workshop on NGS data analysis and curation, 2017 at JNCASR, Bangalore
- Attended DST-SERB school in Insect Biology at Punjabi University, 2016 at Patiala, India
- Attended and helped in organizing 3rd Biennial Meeting of Probiotic Association of India, March 2016 organized by NISER, Bhubaneswar, India
- Attended and presented poster at 1st International Conference on Translational Research: From Basic Science to Clinical Application, February 2015 organized by KIIT, Bhubaneswar, India
- Attended 2nd meeting of Indian Sub-continental Branch of the International Neuropeptide Society, December 2015 organized by NISER, Bhubaneswar, India
- Attended 35th All India Cell Biology Conference (AICBC), December 2011 organized by NISER, Bubaneswar, India
- Attended the national science camp VIJYOSHI (Vigayn Jyoti Shibir) organized by Indian Institue of Science, Bangalore, India in November 2011

Teaching, Mentorship, and Services

- Mentored a summer trainee at NIH in Summer 2024
- Served as a judge at the NIH graduate student symposium 2024
- Mentored a postbac at NIH from 2023-2024
- Regularly mentored junior graduate students throughout 2016-2022
- Mentored 1-year masters dissertation research thesis of trainee (2019-2020) at JNCASR
- Taught the basic chronobiology course at the Neuroscience Unit, JNCASR (3 weeks - 2018, 2019, 2021)
- Teaching assistant at the 2020 International Chronobiology Summer School (May-July 2020)
- Taught chronobiology practical course - timeseries analysis module (3 weeks - 2018, 2019)
- Taught the basic statistics module of the Neurobiology practical courses at the Neuroscience Unit, JNCASR (2 weeks - 2018, 2019)
- Served as the Secretary of the Student Advocacy Group at NISER (2017-2018)
- Mentored 2 summer trainees each in the summers of 2017, 2018, and 2019 at JNCASR, 1 summer trainee in the summer of 2015 at NISER, and one short-term trainee in 2015 at NISER