



# Ayon Pal, M. Sc., Ph. D.

**Associate Professor**

**Department of Botany, Raiganj University**

**Microbiology & Computational Biology Laboratory [MCBL]**

## CONTACT DETAILS

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## ACADEMIC QUALIFICATIONS

**Ph. D. (Science) in Biophysics, Molecular Biology and Bioinformatics, 2016**

University of Calcutta

Department of Biophysics, Molecular Biology and Bioinformatics

**M. Sc. in Botany, 2003**

University of Calcutta

Department of Botany

**B. Sc. (Hons.) in Botany, 2001**

University of North Bengal

1<sup>st</sup> Class 1<sup>st</sup> position holder (Gold Medalist)

## WORK EXPERIENCE

**Raiganj University [Associate Professor in Botany]**

February 2019–To present

**Raiganj University [Assistant Professor in Botany]**

February 2015–February 2019

**Raiganj College (University College) [Assistant Professor in Botany]**

November 2006–February 2015

**A. C. College, Jalpaiguri [Lecturer in Microbiology, Contractual]**

July 2005–November 2006

## RESEARCH AREA

The Microbiology & Computational Biology Lab of the Department of Botany is involved in active research in the area of bacterial genomics and metabolomics. The core research area of the lab is the study of mechanisms shaping genome structure and evolution in microorganisms. Our lab is presently carrying out research, determining the presence and mechanisms in the proliferation of metal resistance in natural environments among microorganisms, particularly bacteria. We are also actively engaged in unraveling the microbial biodiversity of the region and exploring its impact on man and environment using modern age biology.

## RESEARCH TEAM MEMBERS

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**Sri Barnan Kumar Saha**, Ph. D. research scholar

**Ms. Jayanti Saha**, Ph. D. research scholar (Thesis submitted)

**Sri Hriday Basak**, Ph. D. research scholar (Thesis submitted)

**Sri Vivek Roy**, Ph. D. research scholar

**Ms. Samarpita Adhikary**, Ph. D. research scholar

**Sri Prajesh Dutta**, Ph. D. research scholar

## RESEARCH GUIDANCE

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Ph. D. theses – 02 (submitted); 04 (ongoing)

P. G. dissertations – 08 (completed); 04 (ongoing)

### Ph.D. Theses Supervised/Co-supervised:

1. **Supervised thesis** - Screening, characterization and comparative genomic analysis of heavy metal resistant bacteria from arable land – by Jayanti Saha (2022) [Submitted].
2. **Co-supervised thesis** - Characterisation of the inhibitors related to quorum sensing by quantum chemical methods and study of their interactions with their receptor proteins – by Hriday Kr. Basak (2021) [Principal Supervisor – Dr. Abhik Chatterjee, Department of Chemistry, Raiganj University] [Submitted].

### P.G. Dissertations Supervised:

1. Isolation and characterization of bacteria from Kulik River adjacent to Raiganj Wildlife Sanctuary – by Dipankar Halder (2018).
2. Screening and characterization of heavy metal resistant bacteria from soil adjacent to Raiganj Wildlife Sanctuary – by Mallika Mazumder (2018).
3. Isolation and characterization of mercury and antibiotic resistant bacteria from avian excreta – by Alapan Sarkar (2019).
4. Exploring lipolytic activity of different bacterial isolates and their relative quantification – by Madhumita G. Chaki (2019).
5. Exploiting some common and easily available vegetarian sources for the formulation of general bacteriological media – by Sthitadhi Dutta (2019).
6. Determination of resistance to cobalt, copper and iron in bacterial isolates from paddy fields and their physiological characterization – by Sukanya Bhattacharjee (2019).
7. Comparative codon usage bias (CUB) analysis of *cadA* gene with reference to *infB* and *rpoB* gene in selected soil-dwelling bacteria – by Sourav Dey (2021).
8. Comparative codon usage bias analysis of gene *cadB* and *cadC* in soil dwelling bacteria with reference to *rpoB* and *infB* housekeeping genes – by Bishnupriya Chakraborty (2021).

## SELECTED PUBLICATIONS

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1. Saha J, Dey S, **Pal A\*** (2022): Whole genome sequencing and comparative genomic analyses of *Pseudomonas aeruginosa* strain isolated from arable soil reveal novel insights into heavy metal resistance and codon biology. *Current Genetics*, DOI: doi.org/10.1007/s00294-022-01245-z.
2. Saha J, Adhikary S, **Pal A\*** (2022): Analyses of the heavy metal resistance pattern and biosorption potential of an indigenous *Bacillus tropicus* strain isolated from arable soil. *Geomicrobiology Journal*, DOI: 10.1080/01490451.2022.2089781.
3. Sarkar M, Tiru Z, **Pal A**, Chakraborty AP, Mandal P (2022): Screening of heavy metal stress tolerant fungal isolates for bioremediation and restoration of soil health. *Vegetos*, DOI: 10.1007/s42535-022-00417-z.
4. Saha J, Sarkar M, Mandal P, **Pal A\*** (2021): Comparative study of heavy metal uptake and analysis of plant growth promotion potential of multiple heavy metal-resistant bacteria isolated from arable land. *Current Microbiology*, 79(01) Article No. 07: DOI: 10.1007/s00284-021-02704-5.
5. **Pal A\***, Bhattacharjee S, Saha J, Sarkar M, Mandal P (2021): Bacterial survival strategies and responses under heavy metal stress: a comprehensive overview. *Critical Reviews in Microbiology*: DOI: 10.1080/1040841X.2021.1970512.
6. Saha J, Bhattacharjee S, Pal Sarkar M, Saha BK, Basak HK, Adhikary S, Roy V, Mandal P, Chatterjee A, **Pal A\*** (2021): A comparative genomics-based study of positive strand RNA viruses emphasizing on SARS-CoV-2 utilizing dinucleotide signature, codon usage and codon context analyses. *Gene Reports*, 23 (2021): 101055. doi.org/10.1016/j.genrep.2021.101055.
7. Basak HK, Saha S, Ghosh J, Paswan U, Karmakar U, **Pal A**, Chatterjee A (2021): Sequence analysis, structure prediction of receptor proteins and In silico study of potential inhibitors for management of life threatening COVID-19. *Letters in Drug Design and Discovery*, (2021): DOI: 10.2174/1570180818666210804141613.
8. Basak HK, Paswan U, Pal A, Chatterjee A (2021): In silico study of some natural quorum sensing inhibitors with AgrA proteins: molecular docking study and normal mode analysis. *Journal of Scientific Research*, 65(5): 62-71. doi: 10.37398/JSR.2021.650509.
9. Tiru Z, Sarkar M, Chakraborty AP, **Pal A**, Mandal P (2021): In vitro antagonistic study of maize root colonizing fungal isolates against *Fusarium moniliforme* causing ear rot disease of maize. *Journal of Tropical Life Science*, 11(2): 133-139. doi.org/10.11594/jtls.11.02.02.
10. Tiru Z, Sarkar M, Chakraborty AP, **Pal A**, Mandal P (2021): Effect of different vegetable-grains media on variability in mycelial growth pattern and sclerotia formation of *Rhizoctonia solani*. *Journal of Advanced Scientific Research*, 12(1) Suppl 1:295-300.
11. Tiru Z, Sarkar M, **Pal A**, Chakraborty AP, Mandal P (2021): Three dimensional plant growth promoting activity of *Trichoderma*

*asperellum* in maize (*Zea mays* L.) against *Fusarium moniliforme*. *Archives of Phytopathology and Plant Protection*, 54(13-14): 764-781, doi: 10.1080/03235408.2020.1860420.

12. Nandi PS, Roy S, Bhattacharya S, **Pal A**, Chakraborty K (2020): Biochemical factors associated with mango mealy bug (*Drosicha mangiferae* G.) infestation in different mango cultivars at Malda, West Bengal (India). *Journal of Applied Horticulture*, 22(3): 230-239.
13. Nandi PS, Mandal P, **Pal A**, Chakraborty K (2020): Morphological and molecular characterization of fungi associated with mango mealy bug secreted honey dew in mango tree leaves and twigs. *International Journal of Scientific & Technology Research*, 9(3): 5887-5891.
14. Basak HK, Chatterjee A, **Pal A\*** (2020): Relative Structural Analysis of LytTR Domain of AgrA Protein Involved in Bacterial Quorum Sensing: *International Journal of Pharmaceutical Sciences and Research*, 11(6): 2828-2839.
15. Saha J, Saha BK, Pal Sarkar M, Roy V, Mandal P, **Pal A\*** (2019): Comparative Genomic Analysis of Soil Dwelling Bacteria Utilizing a Combinational Codon Usage and Molecular Phylogenetic Approach Accentuating on Key Housekeeping Genes. *Frontiers in Microbiology*, 10:2896. doi: 10.3389/fmicb.2019.02896.
16. **Pal A\***, Saha BK, Saha J (2019): Comparative *in silico* analysis of *ftsZ* gene from different bacteria reveals the preference for core set of codons in coding sequence structuring and secondary structural elements determination. *PLOS ONE* 14(12): e0219231. <https://doi.org/10.1371/journal.pone.0219231>.
17. **Pal A**, Bothra AK, Mukhopadhyay S (2016): Glycolysis as a determinant of genome and proteome composition of different extremophilic archaea species. Published in: Bioinformatics and Systems Biology (BSB), International Conference on, held on 4-6 March 2016. *IEEE Xplore Digital Library*. DOI: 10.1109/BSB.2016.7552130.
18. **Pal A**, Bothra AK, Mandal UK, Mukhopadhyay S (2016): Evolutionary divergence and comparative homology modeling analysis of LpxC enzyme from human pathogenic bacteria. Published in: Bioinformatics and Systems Biology (BSB), International Conference on, held on 4-6 March 2016. *IEEE Xplore Digital Library*. DOI: 10.1109/BSB.2016.7552129.
19. **Pal A\***, Banerjee R, Mondal UK, Mukhopadhyay S, Bothra AK (2015): Deconstruction of archaeal genome depict strategic consensus in core pathways coding sequence assembly. *PLoS ONE*, 10(2): e0118245.
20. **Pal A**, Mondal UK, Mukhopadhyay S, Sen A, Bothra AK (2014): The Implication of Codon Usage Design and Expression Level in Determining the Nature of Selection and Functionality amongst the Amino Acid Biosynthetic Pathway coding sequences of *Arthrobacter* sp. FB24. *Current Bioinformatics*, 9(5): 470-480.
21. **Pal A**, Mukhopadhyay S, Bothra AK (2013): Statistical analysis of pentose phosphate pathway genes from eubacteria and eukarya

reveals translational selection as a major force in shaping codon usage pattern. *Bioinformation*, 9(7): 349–356.

22. Mondal UK, **Pal A**, Sen A, and Bothra AK (2011): Bioinformatic Study of Pathogenicity Related Genes of Three Species of *Helicobacter*. *International Journal of Applied Biotechnology and Biochemistry*, 1(2): 193-200.
23. **Pal A**, Mondal UK, Mukhopadhyay S, Bothra AK (2011): Genomic heterogeneity within conserved metabolic pathways of *Arthrobacter* species - a bioinformatic approach. *Bioinformation*, 15;5(10):446-54.

\* = Corresponding author

### BOOKS/BOOK CHAPTERS PUBLISHED

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1. Mushroom Culture Techniques and Applications (2020): by P Mandal, Z Tiru, M Pal Sarkar, AP Chakraborty, and **A Pal**. 1<sup>st</sup> ed., KD Publications, Pune, ISBN: 978-81-949998-6-7.
2. Mushroom Culture Technology (2020): by P Mandal, Z Tiru, M Pal Sarkar, AP Chakraborty, **A Pal** and S Sadhukhan. 1<sup>st</sup> ed., HSRA Publications, Bangalore, ISBN: 978-93-90415-03-8.
3. **Pal A** (2016): Rare but precious: Implications of rare codons in prokaryotes In. Advances in Biology: Eastern Himalayan Perspective edited by M. Bhattacharya, ML Acharjee and J Pradhan. NL Publishers, ISBN: 978-93-85375-05-7.
4. Sen A, **Pal A**, and Bose D (2007): Economic uses of Seabuckthorn (*Hippophae* L.) In. Advances in Ethnobotany edited by A. P. Das and A. K. Pandey. 1<sup>st</sup> ed., Dehra Dun, Bishen Singh Mahendra Pal Singh, ISBN: 8121106139.

### SELECTED CONFERENCES/SEMINARS/WEBINARS/WORKSHOPS ATTENDED

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- NCBI Virtual Workshops: Identifying Clinically Relevant Genes in Bacterial Genomes, organized by NCBI, USA. 19<sup>th</sup> May 2022.
- Galaxy Training Network (GTN) Smörgåsbord 2022: Tapas Edition, organized by The Gallantries Project, The CINECA Project, Erasmus Medical Center, ELIXIR Europe, The Galaxy Training Network, Seq4AMR. 14-18 March 2022 (Online).
- Two weeks International Workshop on Data Science and Machine Learning in Biology, organized by Dollar Education, Hisar, India, 14 to 24 February, 2022.
- International Webinar Series-Season II on Research and Technological Advancements in Bioinformatics (Webinar 4: Containersation & DevOps Practices for Bioinformaticians) organized by Centre of Excellence in Health Care Technologies and Informatics (CEHTI), Department of Biotechnology and Bioinformatics, JUIT on December 18, 2021.

- Online Skill Development Program on *in silico* Drug Designing and Molecular Dynamics Simulations, organized by CytoGene Research & Development, Lucknow, India, 01 to 07 December, 2021.
- Webinar on Using NCBI Datasets: A one stop service for downloading sequence and annotation for genomes, organized by NCBI, USA. 30-06-2021.
- Three Day Webinar entitled “Plantation Crop Genomics: An Overview of Current Research” organized by Indian Society for Plantation Crops in collaboration with Bionivid Technology Pvt. Ltd. from 18<sup>th</sup> to 20<sup>th</sup> January 2021.
- National Webinar entitled 'Current Scenario and Future Challenges with Emphasis on Awareness about COVID-19 Pandemic', organized by The National Academy of Sciences, India (NASI)-Rajasthan Chapter on 22nd December, 2020.
- 60th Annual Conference of Association of Microbiologists of India (AMI-2019) and International Symposium on “Microbial Technologies in Sustainable Development of Energy, Environment Agriculture and Health”, organized by Association of Microbiologists of India and Central University of Haryana, Mahendergarh, 2019.
- DBT, India Sponsored Three Day Workshop cum Seminar on Bioinformatics, organized by Bioinformatics Facility, University of North Bengal, 2018.
- 3rd International Conference on Biotechnology and Bioinformatics, organized by International Center for Stem Cells, Cancer and Biotechnology (ICSCCB), Pune, India, 2016.
- National Symposium on Exploring Biological Systems: Cell to Organisms, organized by Department of Biophysics, Molecular Biology and Bioinformatics, University of Calcutta, 2016.
- International Conference on Bioinformatics and Systems Biology & Workshop on Systems Biology, organized by Department of Applied Sciences, Indian Institute of Information Technology, Allahabad, India, 2016.
- Asia-Pacific Bioinformatics Conference (APBC-2010), Indian Institute of Science, Bangalore, India, 2010.

#### **MEMBERSHIPS OF SOCIETY/ASSOCIATIONS**

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- Association of Microbiologists of India (AMI) – Life Member (Life Membership ID 5146-2021)
- Bioinformatics Club for Experimenting Scientists (BIOCLUES) – Life Member (Membership No. Bio\_LM\_2019\_004)
- Microbiology Society, UK – Associate Member



## PEER REVIEWER OF JOURNALS

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- Meta Gene – Elsevier, ISSN 2214-5400
- Immunogenetics – Springer Nature, EISSN 1432-1211, ISSN 0093-7711
- Frontiers in Agronomy – Frontiers Media SA, ISSN 2673-3218

## SEMINARS ORGANIZED

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- Acted as Convener - Two days National Level Seminar entitled “Current Trends in Plant and Microbial Research (CTiPMR) – 2016” organized by Department of Botany, Raiganj University and Department of Higher Education, Govt. of West Bengal.
- Acted as Convener - Two days National Level Seminar entitled “Current Trends in Plant and Microbial Research (CTiPMR) – 2017” organized by Department of Botany, Raiganj University and Department of Higher Education, Govt. of West Bengal.
- Acted as Joint Convener – “Sir J. C. Bose Memorial Lecture Series – 2021” (03 episodes) organized by Department of Botany, Raiganj University

## ADMINISTRATIVE EXPERIENCES

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- Chairman, PG Board of Studies for Environmental Studies (AECC for PG), Raiganj University (2021- continuing).
- Member, DAIP, Department of Zoology, Raiganj University (2021-continuing).
- Member, Board of Studies in Botany, Raiganj University (2021-continuing).
- Acted as Head of the Department of Botany, Raiganj University (2016-2018; 2019-2021).
- Acted as Chairman of Board of Studies in Botany of Raiganj University.
- Acted as Member of UG Board of Studies in Botany of University of North Bengal.
- Acted as member of Examination Committee of Raiganj University.
- Acted as Secretary of Raiganj University Employees’ Cooperative Credit Society Limited (2015-2022).
- Acted as Head of the Department of Botany, Raiganj College (University College) (2012-2014).
- Acted as Secretary of AASM Medicinal Plant Garden of Raiganj College (University College) for more than 08 years.
- Acted as Coordinator of UGC-Network Resource Centre (UGC-NRC) of Raiganj College (University College).