CHIRANJIT CHOWDHURY

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EDUCATION

Ph.D. Biotechnology **January 2006 – November 2009**
Indian Institute of Technology Kharagpur, Dept. of Biotechnology, Kharagpur West Bengal , India
Thesis Title: Understanding the Behaviors of Soluble Penicillin-binding proteins 5 and 6 in Escherichia coli
Thesis Advisor: Prof. Anindya Sundar Ghosh

M.Sc. Biochemistry **September 2003 – August 2005**
University of Kalyani, Department of Biochemistry & Biophysics, Kalyani West Bengal, India

B.Sc. Chemistry (Hons.) **July 2000 – July 2003**
University of Kalyani, Berhampore Krishnath College,Berhampore West Bengal, India
Chemistry Honors, with physics, mathematics, bengali, english & environmental Sc.

PROFESSIONAL EXPERIENCE

Senior Scientist **February 2020 – Till date**
Division of Biochemical Sciences, CSIR-National Chemical Laboratory, Dr Homi Bhabha Rd, Pashan, Pune, Maharashtra 411008

Associate Professor & Ramanujan Fellow **September 2018 – February 2020**
Amity Institute of Molecular Medicine and Stem Cell Research, Amity University Uttar Pradesh, Noida 201313

Assistant Scientist III **August 2017 – July 2018**
Iowa State University, Roy J. Carver Department of Biochemistry, Biophysics, and Molecular Biology, Ames Iowa , USA
Topic of Research: Understanding pathogenesis and gut microbiome physiology-insights into development of new methods for pathogen control

Postdoctoral Research Associate **August 2012 – July 2017**
Iowa State University, Roy J. Carver Department of Biochemistry, Biophysics, and Molecular Biology, Ames Iowa , USA
- ➢ Principal Investigator: Prof. Thomas A Bobik
  - ✓ Topic of Research: Understanding physiology and molecular transport in microcompartment of *Salmonella*.
    - Experience gained: Genetic engineering approach to chromosomal deletion, mutation and transduction, Molecular biology, HPLC, Enzymology and Structural biology

Postdoctoral Research Associate **August 2011 – July 2012**
University of Notre Dame, Department of Chemistry and Biochemistry, Notre Dame Indiana , USA
- ➢ Principal Investigator: Prof. Shahriar Mobashery
  - ✓ Topic of Research: Understanding denovo recycling of bacterial cell-wall biosynthesis.
    - Experience gained: Recombinant DNA technology, Protein purification and enzymology, TLC, HPLC, UPLC and high resolution mass-spectrometry

Research Associate **September 2010 – June 2011**
CSIR-Centre for Cellular and Molecular Biology , Hyderabad , India
- ➢ Principal Investigator: Dr. M.V. Jagannadham
  - ✓ Topic of Research: Role of outer membrane vesicles of Gram negative bacteria in virulence and pathogenicity.
    - Experience gained: Proteomics & mass-spectrometry, Gas chromatography and other biochemical assays

Research Associate **December 2009 – September 2010**
Indian Institute of Technology Kharagpur, Dept. of Biotechnology, Kharagpur West Bengal , India
- ➢ Principal Investigator: Dr. Anindya S. Ghosh
  - ✓ Topic of Research: Study of Molecular basis of bacterial cell-wall biosynthesis and drug resistance.
    - Experience gained: Molecular biology and recombinant DNA Technology, Enzyme kinetics, Circular Dichroism and fluorescence assay, Bioinformatics, antimicrobial sensitivity test

ASSOCIATED MEMBERSHIP AND PROFESSIONAL ACTIVITIES

Life Member of Indian Science Congress Association (Membership Number L13305)

Member of American Society of Microbiology (Member id: 43329698)

Member of Microbiology Society, UK (Member id: C029545)

Member of Society for Applied Microbiology, UK

Reviewer of Functional & Integrative Genomics (Springer)

Reviewer of Microbial Biotechnology (Wiley)

Reviewer of mSphere (American Society of Microbiology)

Reviewer of Journal of Agricultural and Food Chemistry (American Chemical Society)

Reviewer of Frontiers in Microbiology

Editorial Board Member, Frontiers in Microbiology

Associate Guest Editor of International Journal of Spectroscopy (Hindawi)

TEACHING INTEREST

Biochemistry (Biomolecules and their metabolism), Molecular Biology, Recombinant DNA Technology, Bacterial Genetics, genome editing, Analytical Biochemistry, Bioseparation Techniques

RESEARCH INTEREST

Bacterial genetics, physiology and pathogenesis, Bacterial Microcompartments and their role in synthetic biology and biotechnology, Bacterial cell wall biosynthesis and antimicrobial agents and chemotherapy

EXPERIENCE IN TEACHING AND MENTORING ABILITY

I am currently mentoring four Ph. D. students and two project associates to decipher their research problems.

I am also engaged in teaching to Ph. D. students with the following courses "Introduction to Chemical Biology (NCL259ID)", "Advanced Techniques in Biology (NCL251AD)" and "Concepts in Microbiology (NCL255AD)".

I have past experiences in teaching while I was remained as Associate Professor at Amity University Uttar Pradesh. In odd semester, I taught "Fundamentals of Molecular Biology" and "Metabolism" to B. Sc. students and "Concepts in Biological Chemistry" and "Microbiology in Human Health" to M. Sc. Students. In even semester, I taught "Genome Engineering & Editing" to M. Sc. Students and "Biomolecules & Function" and "Macromolecules: Structural Aspects" to B. Sc. students at Amity University. I have also successfully served my responsibilities in coordinating the courses "Fundamentals of Molecular Biology", "Biomolecules & Function" and "Microbial Biochemistry" of B. Sc. Biochemistry program both theory and laboratory.

While at Iowa State University, USA as a senior most staff scientist I was actively involved in supervising and guiding four undergraduate students, as well as new Ph. D and postdoctoral fellows to start their research problems, which establish my credential and mentoring capability.

HONORS AND ACCOLADES

- Awarded with prestigious **Ramanujan Fellowship** from Department of Science and Technology, Govt. of India in 2018
- Awarded with prestigious **Ramalingaswami Re-entry Fellowship** from Department of Biotechnology, Govt. of India in 2018 (Not availed)

INVITED TALKS

- Delivered a talk on "Bacterial microcompartments: widespread prokaryotic organelles for the optimization of metabolic processes" at Department of Microbiology, Savitribai Phule Pune University on February 6, 2021
- Delivered a guest lecture on "Microbial Contamination and Food Safety" at School of Biosciences and Technology, Department of Biosciences, Vellore Institute of Technology on November 6, 2021
- Delivered a popular talk to the school children in CSIR-NCL Jigyasa program on "microbes and food" on March 28, 2022

GRANTS

1. Ramanujan Fellowship Research grant (2018-2023)
2. SERB-Core Research Grant (2020-2023)
3. ICMR -Adhoc (Approved)

PUBLICATIONS, POSTERS AND MEETING PRESENTATIONS

Publications in international Journals

1. Agarwal A, Kumar A, Garg P, Chakraborty A, Verma R, Sarwat M, Gupta A, Sasmal PK., Verma YK, **Chowdhury C** and Mukherjee M (2022). Algal Biomass-Loaded Hydrogel Scaffolds as a Biomimetic Platform with Antibacterial and Wound Healing Activities. **ACS Appl Polym Mater** 4(8): 5800–5812
2. Lundin AP, Stewart KI, Stewart AM, Herring TI, **Chowdhury C** and Bobik TA (2020). Genetic characterization of a glycyl radical microcompartment used for 1,2-propanediol fermentation by uropathogenic *Escherichia coli* CFT073. **J Bacteriol** 202(9). pii: e00017-20
3. **Chowdhury C**, Bobik TA (2019). Engineering the PduT shell protein to modify the permeability of the 1,2-propanediol microcompartment of *Salmonella*. **Microbiology** 165(12):1355-1364
4. Herring TI, Harris TN, **Chowdhury C**, Mohanty S, Bobik TA (2018). A bacterial microcompartment is used for choline fermentation by *Escherichia coli* 536. **J Bacteriol**. 200(10). pii: e00764-17.
5. Lehman BP, **Chowdhury C**, Bobik TA (2017). The N-terminus of the PduB protein binds the protein shell of the Pdu microcompartment to its enzymatic core. **J Bacteriol**, Mar;199(8). pii: e00785-16
6. **Chowdhury C**, Chun S, Sawaya MR, Yeates TO, Bobik TA (2016). The function of the PduJ microcompartment shell protein is determined by the genomic position of its encoding gene. **Mol Microbiol** Sep; 101(5):770-783
7. **Chowdhury C**, Chun S, Pang A, Sawaya MR, Sinha S, Yeates TO, Bobik TA (2015). Selective molecular transport through the protein shell of a bacterial microcompartment organelle. **Proc Natl Acad Sci U S A** Mar 10;112(10):2990-2995
8. Bansal A, Kar D, Rajagopal A. M., Mallick S, Dutta M, Pandey SD, **Chowdhury C,** Ghosh AS (2015). A putative low- molecular mass (LMM) penicillin-binding protein (PBP) of *Mycobacterium smegmatis* exhibits prominent physiological characters of DD-Carboxypeptidase and beta-lactamase. **Microbiology** May;161(Pt 5):1081- 1091
9. **Chowdhury C**, Sinha S, Chun S, Yeates TO, Bobik TA (2014). Diverse Bacterial Micro compartment Organelles. **Microbiol Mol Biol Rev**. Sep;78(3):438-468.
10. **Chowdhury C**, Jagannadham MV (2013). Virulence factors are released in association with outer membrane vesicles of *Pseudomonas syringae* pv. tomato T1 during normal growth. **Biochim Biophys Acta**. Jan;1834(1):231-239.
11. **Chowdhury C**, Kar D, Dutta M, Kumar A, Ghosh AS (2012). Moderate deacylation efficiency of DacD explains its ability to partially restore beta-lactam resistance in *Escherichia coli* PBP5 mutant. **FEMS Microbiol Lett**. Dec;337(1):73-80.
12. Jagannadham MV, **Chowdhury C (**2012). Differential expression of membrane proteins helps Antarctic *Pseudomonas syringae* to acclimatize upon temperature variations. **J Proteomics**. Apr 18;75(8):2488-2499.
13. Sarkar SK, Dutta M, **Chowdhury C**, Kumar A, Ghosh AS (2011). PBP5, PBP6 and DacD play different roles in intrinsic β-lactam resistance of *Escherichia coli*. **Microbiology**. Sep;157(Pt 9):2702-2707.
14. **Chowdhury C**, Ghosh AS (2011). Differences in active-site microarchitecture explain the dissimilar behaviors of PBP5 and 6 in *Escherichia coli*. **J Mol Graph Model**. Feb;29(5):650-656.
15. Sarkar SK, **Chowdhury C**, Ghosh AS (2010). Deletion of penicillin-binding protein 5 (PBP5) sensitises *Escherichia coli* cells to beta-lactam agents. **Int J Antimicrob Agents**. Mar; 35(3):244-249.
16. **Chowdhury C**, Nayak TR, Young KD, Ghosh AS (2010). A weak DD-carboxypeptidase activity explains the inability of PBP 6 to substitute for PBP 5 in maintaining normal cell shape in *Escherichia coli*. **FEMS Microbiol Lett**. Feb;303(1):76-83.

17. Ghosh AS, **Chowdhury C**, Nelson DE (2008). Physiological functions of D-alanine carboxypeptidases in *Escherichia coli*. **Trends Microbiol**. Jul;16(7):309-317.

Publications in Book/Book Chapter

Rastogi S, **Chowdhury C***. Industrial Prospect of Bacterial Microcompartment Technologies. In D. K. Verma (Ed.) Microbial Biotechnology in Food Processing and Health Advances, Challenges, and Potential. 2022, (in production press) New York, NY: CRC Press, a Taylor & Francis Group (* Corresponding author)

*Presentation in international Conference and publication***:**

- Bhalerao, MR., **Chowdhury, C***. 2020. Probiotics in mitigating kidney stones: A therapeutic prospect. Oral presentation at International Conference on Emerging Trends in Biotechnology 2020, organized by School of Biosciences and Technology, Vellore Institute of Technology in association with Association of Biotechnology and Pharmacy, held in Vellore Institute of Technology on 14-16 December, 2020. (Abstract published in conference proceedings)
- Shinde, YD., **Chowdhury, C***. 2020. Tailoring Bacterial Microcompartment into Clean Fuel Nanobioreactor. Oral presentation at International Conference on Emerging Trends in Biotechnology 2020, organized by School of Biosciences and Technology, Vellore Institute of Technology in association with Association of Biotechnology and Pharmacy, held in Vellore Institute of Technology on 14-16 December, 2020. (Abstract published in conference proceedings)
- Timane, KS., **Chowdhury, C***. 2020. Engineered Protein Shells as Immobilization Platform. Oral presentation at International Conference on Emerging Trends in Biotechnology 2020, organized by School of Biosciences and Technology, Vellore Institute of Technology in association with Association of Biotechnology and Pharmacy, held in Vellore Institute of Technology on 14-16 December, 2020. (Abstract published in conference proceedings)
- **Chowdhury C**. 2019. Functional characterization of shell proteins of ethanolamine utilization microcompartment in *Salmonella*. Poster presentation at Regional Young Investigators' Meeting held on 6th - 7th August 2019 at NIPGR, New Delhi. (Abstract published in conference proceedings)
- **Chowdhury C**, Bobik TA. 2018. The Gene Location Determines Function of a Microcompartment Shell Protein in *Salmonella*. Oral Presentation at Analytical Genetics Meeting 2018 organized by San Diego State University, held in San Diego, CA, USA on January 5th to January 9th, 2018.
- **Chowdhury C**, Bobik TA. 2017. Engineering Substrate Transport in Bacterial Microcompartment. Oral Presentation at ASM Microbe 2017 organized by American Society of Microbiology, held in New Orleans, LA, USA, June 1-5, 2017 (Published in conference proceedings).
- Chun S, **Chowdhury C**, Park J, Houk KN, Bobik TA, Yeates TO. 2014. Bacterial Microcompartments: Substrate Transport through Shell Pores. The 28th Annual Symposium of the Protein Society, San Diego, CA, USA, July 27–30, 2014. (Published in **PROTEIN SCIENCE** 2014, Volume 23, Issue S1 pp 162-163) (**DOI: 10.1002/pro.2504**) (**IF: 2.7**)
- **Chowdhury C**, Sinha S, Bobik TA. 2013. "Toward Understanding Substrate Selectivity of Microcompartment Pores". Oral Presentation in Analytical Genetics Meeting, organized by University of Utah, held in Alta, Salt Lake City, Utah, USA on October 13th to October 17th, 2013 (Published in conference proceedings).
- Sarkar, S. K., **Chowdhury, C**., Ghosh, A. S., 2008. PBP 5 acts as an intrinsic modulator of beta-lactam sensitivity in *Escherichia coli*. International symposium on "Integrating Physics, Chemistry, Mathematics and Biology to understand living system", organized by DST, Govt. of India held at Bose Institute, Kolkata, December 4–6, 2008 (Presenting author, Published in conference proceedings) (**Presenting author**).