

ARIJIT PAL, Ph.D.

Assistant Professor

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Residence: 11/A, Purbachal, Old Calcutta Rd.,
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Educational Qualifications

- 2013-2020** **Ph.D. (Sc.)**, Department of Life Sciences and Biotechnology, **Jadavpur University**, Kolkata
Thesis title: Molecular understanding of carbapenem resistance development among Gram-negative bacteria and identification of inhibitory compounds against them
Supervisor: **Dr. Anusri Tripathi**, Assistant Professor, School of Tropical Medicine
- 2013-2014** **Post Graduate Diploma** (Cheminformatics), **Institute of Cheminformatics Studies**, Noida
- 2009-2011** **Master of Sciences (Zoology)**, **Banaras Hindu University**, Varanasi
M.Sc.thesis title: Biomonitoring of water striders (*Gerris spinolae*, Order: Hemiptera; Fam. Gerridae) to assess the physico-chemical qualities of waters from different ponds of Varanasi, Supervisor: **Prof. Neelkamal Rastogi**, Professor, Department of Zoology
- 2006-2009** **Bachelor of Sciences (Zoology)**, **Presidency College, Calcutta University**, Kolkata

Teaching/Research experiences

2024 – till date **Assistant Professor, Department of Zoology, Raiganj Surendranath Mahavidyalaya**

Took theory and laboratory classes of students of B.Sc. in Zoology under CBCS and NEP system

2021 - 2023 **Institute Postdoctoral Fellow, IIT Delhi**

- Evaluated the underlying molecular basis of evolutionary rescue and adaptive-evolution of *E. coli* under antibiotic/non-antibiotic challenge (with Prof. Vivekanandan P Group)
- Evaluated antibiofilm activity of superhydrophobic PDMS catheter surfaces with UTI-pathogens (with Prof. A. Sivanandam Group)
- Developed surface-enhanced Raman spectra-based rapid detection and accurate identification technique for UTI-pathogens (with Prof. DS Mehta Group)
- Contributing in PCR-based rapid detection of hypervirulent *Klebsiella pneumoniae* (hvKp) (with Dr. Dylan Tsai Group)

2021 (4 mo) **Assistant Professor, Department of Microbiology & Biotechnology, JIS University**

Took theory and laboratory classes of UG & PG Semester-I, III & V Microbiology and Biotechnology students

2013 - 2020 **Doctoral Fellow, Indian Council of Medical Research**

- Evaluated the underlying molecular basis of carbapenem resistance development among clinical isolates of *E. coli*, *K. pneumoniae*, *P. aeruginosa* and *A. baumannii*
- Evaluated synergistic interactions of quercetin with meropenem
- Assessed toxicological and behavioural impact of quercetin on Swiss-albino mice

2011 - 2012 Pre-Ph.D. research training, Chittaranjan National Cancer Institute

Elucidated the role of vitronectin in Matrix-Metalloproteinase-mediated integrin signaling in MCF-7 and B6F10 cell lines

2010 - 2011 Master's Dissertation, Banaras Hindu University

Identified water strider as potential bio-indicator of potable water from ponds of Varanasi

Skill sets developed

a. Expertise in Clinical Microbiology and Evolution of antimicrobial resistance:

Over seven years of experience in pure bacterial culture maintenance, handling clinical isolates and BSL2 pathogens, basic microbiological and cell culture techniques, different adaptive-evolution experiments, antibiotic susceptibility testing, combination and synergistic interaction studies, biofilm assays, microscopy (confocal, fluorescence and SEM), and Raman spectroscopy

b. Expertise in Molecular Biology:

Well acquainted with: Plasmid & bacterial chromosomal DNA isolation, singleplex PCR, molecular cloning (TA cloning), Sanger sequencing, Whole genome sequencing (Nanopore platform), RNA isolation, cDNA synthesis, qPCR, porin isolation, SDS-PAGE, Western blotting, densitometric scanning, periplasmic extract preparation, carbapenemase inhibition assay & ethidium bromide accumulation assay

c. Exposure to Bioinformatics, omics and statistical analyses:

Have exposure to basics of structural bioinformatics (modelling, phylogenetic analyses, structure-function predictions, molecular docking, molecule visualizations), genomics and epigenomics analyses (base calling, demultiplexing, barcode trimming, mapping, mutation and modified base identification). Can use Graph Pad prism, Biostat, SPSS and run basics in R studio, and python (colab) for data analyses and presentation

d. Exposure to Toxicology and behavior Biology:

Handled Swiss-albino mice and *Artemia salina* nauplii. Have knowledge in LC₅₀ determination, behavioural and toxicological evaluations, such as, standard opponent test, tail suspension test, novelty suppressive feeding test, novel object recognition test, liver and renal function test from serum, autopsy, paraffin block preparation, microtomy & H-E staining

Honours and awards

- November 2021** Institute Postdoctoral Fellowship, Indian Institute of Technology Delhi
- February 2015** 2nd Prize in Poster presentation, 7th National Symposium cum workshop on Recent Trends in Structural Bioinformatics and Computer Aided Drug Design, 2015, organized by Alagappa University, Department of Biotechnology, GoI and Schrödinger, at Alagappa University, Tamil Nadu, India
- August 2014** Senior Research Fellowship, awarded by Indian Council of Medical Research Government of India (GoI)
- December 2012** National Eligibility Test-Lectureship in Life Sciences, awarded by Council of Scientific and Industrial Research (CSIR)-University Grant Commission (UGC), GoI
- August 2012** Junior Research Fellowship, awarded by ICMR, GoI
- November 2011** Junior Research Fellowship, awarded by Chittaranjan National Cancer Institute, Kolkata, India
- July 2010** State Eligibility Test-Lectureship in Life Sciences, awarded by West Bengal College Service Commission, accredited by UGC, GoI

Publications

Number of Publication: 15 (excluding conference papers)
As on 1st Feb 2024

Citations: 143

h-index: 07

1. **Pal A**, Ghosh D, Nagpal P, Irulappan M, Maruthan K., Mukherjee S., Patil NG, Vivekandan P. Elucidating the underlying genomic basis of evolutionary rescue and adaptive evolution in *Escherichia coli* under ciprofloxacin challenge. **Nucleic Acid Research** (under revision)
2. Ghosh D, **Pal A**, Raj S, Mahapatra S, Vivekandan P. Distinct epigenetic signatures of classical and hypervirulent *Klebsiella pneumoniae*. **mSphere**, 2023, <https://doi.org/10.1128/msphere.00464-23>
3. Das S, Saxena K, Tinguely JC, **Pal A**, Wickramasinghe N, Khezri A, Dubey V, Ahmad A, Vivekanandan P, Ahmad R, Wadduwage D, Ahluwalia BS; Mehta DS. SERS nanowire chip and machine learning enable instant identification and classification of clinically relevant wild-type and antibiotic resistant bacteria at species and strain level. **ACS Applied Materials & Interface**, 2023,15, 20, 24047-24058
4. Patil D, Sivanandam A, **Pal A**, Khan WH, Yadav M, Pragya P, Pundir S, Xess I, Mohapatra S, Vivekanandan P, Rao PV. Microtopographic Superhydrophobic Polymer Surface to Prevent Urinary Tract Infections causing Nosocomial Drug-Resistant Bacterial Adhesion. **Surfaces and interfaces**, 2023, 4: 103239
5. **Pal A**, Tripathi A. Toxicological and behavioral study of two potential antibacterial agents: 4-chloromercuribenzoic acid and quercetin on Swiss-albino mice. **Drug & Chemical Toxicology**, 2020, 43(6): 645-655.
6. **Pal A**, Bhattacharyya I, Tripathi A. Structure-based functional fitness analyses of carbapenemase variants identified among pathogenic carbapenem-resistant Gram-negative bacteria. **World Journal of Microbiology & Biotechnology**, 2020, 36:129.
7. **Pal A**, Tripathi A. Demonstration of bactericidal and synergistic activity of quercetin with meropenem among pathogenic carbapenem resistant *Escherichia coli* and *Klebsiella pneumoniae*. **Microbial Pathogenesis**, 2020, 143: 104120.
8. **Pal A**, Tripathi A. Quercetin inhibits carbapenemase and efflux pump activities among carbapenem-resistant Gram-negative bacteria. **Acta Pathologica, Microbiologica, et Immunologica Scandinavica**, 2020, 128: 251-259.
9. **Pal A**, Tripathi A. 4-Chloromercuribenzoic acid enhances carbapenem sensitivity among pathogenic Gram negative bacteria by altering *bla_{VIM}*, *adeB* and *ompC* expression. **Journal of Infection and Public Health**, 2020, 13: 806-814.
10. **Pal A**, Tripathi A. Quercetin potentiates meropenem activity among pathogenic carbapenem-resistant *Pseudomonas aeruginosa* and *Acinetobacter baumannii*. **Journal of Applied**

Microbiology, 2019, 127:1038-1047.

11. **Pal A**, Dhara L, Tripathi A. Contribution of *acrB* upregulation and OmpC/Ompk36 loss over the presence of *bla*_{NDM} towards carbapenem resistance development among pathogenic *Escherichia coli* and *Klebsiella* spp. **Indian Journal Medical Research**, 2019; 149(4): 528-538.
12. **Pal A**, Tripathi A. An *in-silico* approach to elucidate structure based functional evolution of oxacillinase. **Computational Biology and Chemistry**, 2016; 64:145-153.
13. **Pal A**, Tripathi A. An *in-silico* approach for understanding the molecular evolution of clinically important metallo-beta-lactamases. **Infection Genetics and Evolution**, 2013; 20: 39-47.
14. Dhara L, Tripathi A, **Pal A**. Molecular characterization and *in-silico* analysis of naturally occurring TEM beta-lactamase variants among pathogenic Enterobacteriaceae infecting Indian patients. **BioMed Research International**, 2013; 2013: 1-11.
15. **Pal A**, Sinha DC, Rastogi NK. *Gerris spinolae* Lethierry and *Severin* (Hemiptera: Gerridae) and *Brachydeutera longipes* Hendel (Diptera: Ephydriidae): Two Effective Insect Bioindicators to Monitor Pollution in Some Tropical Freshwater Ponds under Anthropogenic Stress. **Psyche**, 2012; 2012:1-11.

Teaching & leadership ability

- a. Help faculties of Kusuma School of Biological Sciences in conducting SBL100 (Introductory Biology for Engineers) Practical classes.
- b. As a spearhead, conducted research work with various research groups
- c. Assisted young researchers and graduate students in miscellaneous project work and drafting project reports
- d. Tutor of Biochemistry and Molecular Biology at PRACTICO, a private educational center for graduate students

Presentations & workshops

PRESENTATIONS

1. **Pal A.**, Ghosh D, Vivekanandan P. Identification of mutations associated with adaptive evolution of ciprofloxacin resistance in *Escherichia coli* K12 strain. European Congress of Clinical Microbiology and Infectious Diseases 2023, Copenhagen, Denmark 15th -18th April, **2023**
2. **Pal A**, Tripathi A. Role of OMPK36 and *acrB* among NDM-1 harbouring carbapenem resistant pathogenic *Escherichia coli* and *Klebsiella* spp. International Conference on Contemporary Antimicrobial Research 2016, Silchar, Assam 14th-17th November, **2016**
3. **Pal A**, Tripathi A “Evolutionary trade-off among OXA variants from carbapenem resistant pathogenic bacteria” National Symposium on modern approaches of Biotechnology in Globalization, Burdwan University, West Bengal 18th March, **2016**
4. **Pal A**, Tripathi A “Molecular evolution of NDM and OXA carbapenemases” National Symposium on Recent Trends in Structural bioinformatics and Computer Aided drug Design 2015, Alagappa University, Tamil Nadu 24th -27th February, **2015 (2nd Prize winning Poster)**
5. **Pal A**, Tripathi A “Structure-based functional fitness of NDM type carbapenemases”, Symposium on Current Trends in structural biology in multi-drug resistant bacterial therapeutics and thrombosis, Department of Biophysics, All India Institute of Medical Sciences, New Delhi 27th-28th February, **2014**

WORKSHOPS

1. “Workshops and hands on training on **Biomedical techniques**” Department of Biochemistry and Medical Biotechnology, Calcutta School of Tropical Medicine, Kolkata, sponsored by Department of Biotechnology, Govt. of West Bengal 13th-15th February, **2017**
2. “Workshop on Recent Trends in **Structural bioinformatics and Computer Aided drug Design**” Alagappa University, Tamil Nadu, sponsored by Department of Biotechnology, GoI & Schrödinger 24th-27th February, **2015**
3. “Workshops on frequently used **Databases in Biomedical Research**” Biomedical Informatics Centre, National Institute of Cholera and Enteric Diseases, Kolkata, sponsored by Indian Council of Medical Research, New Delhi 31st January, **2014**
4. “**In house training program**”, Department of Zoology, Presidency College, University of Calcutta, sponsored by Department of Biotechnology, GoI 24th-25th January, **2009**

REFERENCES

1. **Professor Vivekanandan Perumal**, Professor, Kusuma School of Biological Sciences, Indian Institute of Technology Delhi, Hauz Khas, New Delhi. E-mail: Vivekanandan.Perumal@bioschool.iitd.ac.in
2. **Professor Dalip Singh Mehta**, Professor, Biophotonics Lab, Department of Physics, Indian Institute of Technology Delhi, Hauz Khas, New Delhi. E-mail: mehtads@physics.iitd.ac.in
3. **Dr Anusri Tripathi**, Assistant Professor, School of Tropical Medicine, Jadavpur University, Kolkata. E-mail: anusri.stm@gmail.com

Declaration:

I hereby certify that information given above is correct and true to best of my knowledge

Place: Raiganj, U/D, West Bengal

Date: 1st Feb 2024.

ARIJIT PAL