

## ABOUT DR. ARCHANA RATH

Dr. Archana Rath is a doctorate in Reproductive Immunology and Molecular Biology from the prestigious National Institute of Immunology, New Delhi. She has experience of working in diverse reputed research organization like Quest Institute of Life Sciences, Nicholas Piramal Ltd and Advanced Centre for Treatment, Research and Education in Cancer (ACTREC). She has been working as a full time faculty in the Department of Biotechnology, University of Mumbai, since October 2008. She was instrumental in establishing the Anti-Microbial Research (AMR) Lab in the Department and is the Principal Investigator of the lab. The lab is generously funded by several Major Research Project Grants from various government agencies like DST-SERB & DAE-BRNS. Currently she is working on analysing antimicrobial resistance (AMR) associated with food and environment at the molecular level in microbial population using conventional techniques as well as metagenomics. In the last few years, more than 35 M.Sc. and M.Phil. students have taken up this challenging area of research as their project/ thesis topic. Dr. Rath is a recognized Ph.D. guide in the subject of Biotechnology.

### Academic & Administrative roles (past and present, partial list)

1. Chairperson, Ad-hoc Board of Studies in Biotechnology, University of Mumbai.
2. Former Head of the Department of Biotechnology, University of Mumbai (January 2017- January 2020).
3. Hon'ble Vice Chancellor's Nominee in the Purchase Committee, University of Mumbai.
4. University of Mumbai Nominee, Board of Studies in Biotechnology, Thakur College of Science & Commerce, Mumbai.
5. University appointed Chairperson for Ph.D. Viva.
6. Ph.D. Thesis/ Dissertation Examiner/ Evaluator/ Moderator for IIT-Mumbai, ICAR-CIFE, MGM Institute of Health Sciences, St. Xavier's College, Mumbai, etc.
7. Acted as a Member of the Syllabus Committee for development of semester and credit based Syllabus of PG & UG programme of Life Sciences.
8. Internal and External Evaluator for various PG Examinations, University of Mumbai.
9. Life Member of Indian Science Congress Association (ISCA), Indian Society of Cell Biology (ISCB) and Indian Women Scientist Association (IWSA)

### Ongoing/ Recent Completed Research Projects:

Title of the Project	Funding Agency	Duration
A study on the prevalence and molecular profiling of virulence genes in multiple antibiotic resistant <i>Escherichia coli</i> isolated from retail food	SERB, DST *	May 2019- May 2022
Isolation and molecular characterization of antibiotic resistance in non-pathogenic organisms from food	BRNS, DAE	April 2013- December 2016

Isolation and Molecular Characterization of Antibiotic Resistant Microorganisms from Different Water Bodies	DST-PURSE Scheme, UoM	April 2017- March 2020
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*\*Includes financial provision for SSR & Lab Visit (details provided below)*

### **Opportunities for Under-Graduate/ Post-Graduate Students:**

- Scientific Social Responsibility (SSR)** under DST-SERB Project – Financial Provision for one dissertation student to work under the project who will be provided a fellowship of Rs. 5,000 per month under this scheme.  
Students wishing to work under this scheme can contact Dr. Rath on her email ID [arath09@gmail.com](mailto:arath09@gmail.com).
- Lab Visit for college/ school students** in the PI's institution – Financial Provision for college/school students to come for a one-day visit to see the research facility available in the lab.
- Antimicrobial Resistance Database (FEAMR)** – Dr. Rath's lab is in the process of developing a surveillance-based database for Antimicrobial Resistance in the environment. Students pursuing/completed B.Sc./ M.Sc. in Bioinformatics/Biotechnology/Life Sciences & allied fields interested to be part of the project can contact her via e-mail.

### **Ph. D. Students Guided/ Guiding:**

Sr. No.	Name of Student	Fellowship availed	Title of Thesis	Status
1.	Onkar A. Naik	JRF & SRF (BRNS-DAE)	A study on prevalence of antibiotic resistant microorganisms in food and molecular characterization of their antibiotic resistant traits	Degree awarded (2019)
2.	Amruta A. Dhawale	UGC Non-Net	A study on Oxidative Stress Adaptations in <i>Escherichia coli</i>	Ph.D. awarded (provisional, 2021)
3.	Maitri Mishra	JRF & SRF (DBT)	Elucidation of Size and Structural Dependence of Silver Nano and Microstructures on their Interaction with Antibiotics for Antimicrobial Activity	Work ongoing
4.	Devika M. Ghadigaonkar	PF (DST-PURSE) (till March 2020)	A Study on the Assessment of Anti-Microbial Resistant Bacteria from coastal waters of Mumbai, India and Molecular Characterization of their Antibiotic Resistance Genes	Work ongoing
5.	Harshali A. Shinde	JRF (DST-SERB)	A study on the correlation between Antibiotic Resistance Genes and Virulence Factors in Multiple Antibiotic Resistant <i>Escherichia coli</i> isolated from retail food	Work ongoing

### Recent Publications:

Sr. No.	Paper Title	Authors	Journal
1.	DNA repair pathways important for the survival of Escherichia coli to hydrogen peroxide mediated killing.	Dhawale, A., Bindal, G., Rath, D., & <b>Rath, A.</b>	<i>Gene</i> , 768, 145297.
2.	Characterization of multiple antibiotic resistance of culturable microorganisms and metagenomic analysis of total microbial diversity of marine fish sold in retail shops in Mumbai, India.	Naik O, Shashidhar R, Rath D, Bandekar JR, <b>Rath A</b>	<i>Environ. Sci. Pollut. Res.</i> DOI: 10.1007/s11356-017-0945-7
3.	Metagenomic analysis of total microbial diversity and antibiotic resistance of culturable microorganisms in raw chicken meat and mung sprouts ( <i>Phaseolus aureus</i> ) sold in retail markets of Mumbai, India.	Naik O, Shashidhar R, Rath D, Bandekar JR, <b>Rath A</b>	<i>Curr. Sci.</i> 113(1):71-79
4.	The CRISPR-Cas immune system: biology, mechanisms and applications.	Rath D, Amlinger L, <b>Rath A</b> , Lundgren M.	<i>Biochimie.</i> 2015 Oct; 117:119-28
5.	Nucleotide excision repair is important for survival of hydrogen peroxide mediated killing in Escherichia coli	Amruta Dhawale, <b>Archana Rath</b>	<i>Int. J. Life Sci. Res</i> 7(2), 407-411

### Special Article:

Popular article in VANARAI's Special Edition "Health and Environment" on December 2020

### Special Reviews on research publications from the lab:

1. The research work appeared as a short story in a televised show, "Science Monitor" on "Rajya Sabha TV", Vigyan Prasar, an autonomous Institute of the Department of Science & Technology, aired on 5<sup>th</sup> August 2017. <https://www.youtube.com/watch?v=SPnSDrVqACc>
2. "Hindustan Times" <https://www.hindustantimes.com/cities/fish-bacteria-can-resist-drugs-used-to-treat-tb-malaria-reveals-mumbai-university-study/story-RKEezTi65fzchtZA2YQieN.html> published on 23<sup>rd</sup> April 2018.
3. "The Hindu" <http://www.thehindu.com/todays-paper/tp-national/tp-other-states/mumbai-study-shows-drug-resistant-bacteria-in-chicken-moong-beans/article19213505.ece> published on 5<sup>th</sup> July, 2017.
4. "Outlook" <https://www.outlookindia.com/website/story/scientists-discover-antibiotic-resistant-bugs-in-raw-chicken-sprouts/299659> published on 20<sup>th</sup> July, 2017.
5. "Biotech Times" <https://biotechtimes.org/2017/07/20/study-finds-antibiotics-bugs-chicken-sprouts/> published on 20<sup>th</sup> July, 2017.
6. "Indian Science Journal" <http://www.indiansciencejournal.in/health-news/raw-chicken-and-sprouted-beans-in-mumbai-unhealthy-206806> published on 20<sup>th</sup> July, 2017.

7. “India Science Wire” [http://vigyanprasar.gov.in/isw/antibiotic\\_sea\\_fishes\\_story.html](http://vigyanprasar.gov.in/isw/antibiotic_sea_fishes_story.html) published on 20<sup>th</sup> December, 2017.
8. “India Water Portal” <http://hindi.indiawaterportal.org/node/66772> published on 20<sup>th</sup> December, 2017.
9. “Mongabay” <https://india.mongabay.com/2018/01/11/mumbai-fish-harbour-high-levels-of-antibiotic-resistant-bacteria/> published on 11<sup>th</sup> January, 2018.

**Recent Invited/ Oral Talks** (*partial list*)

1. Received **First prize** for Oral presentation at **National Conference on Climate Change** (NCCC) organized by Utkal University, Bhubaneswar, on March 2020.
2. **Metagenomics in Clinical Microbiology** - PG Assembly (Western Region) of IAMM at Seth G.S. Medical College & K.E.M. Hospital, Mumbai – 29<sup>th</sup> July 2019.
3. **A study on antibiotic resistant *Escherichia coli* isolated from retail food in Mumbai, India** – World Congress on Infectious Diseases and Antibiotics, Bangalore – 28<sup>th</sup> November 2018.
4. **Food Associated Antibiotic Resistance and Its Implications to Human Health** - International Conference (IAETS- 2018), Chhatrapati Shivaji Maharaj University, Panvel, Mumbai (India) – 17<sup>th</sup> November 2018.

**Conferences/ Events organized:** (*partial list*)

1. National Seminar-cum-Event on Biotechnology Entrepreneurship (NSBTE) in India: Recent Trends and Challenges held on 26<sup>th</sup> March 2018.
2. **BIOINNOVA** National Conference in collaboration with Thakur College, Kandivali held on 10<sup>th</sup> February 2018.
3. **National Science Day** held on 28<sup>th</sup> February 2017 & 2018.

**Gene Bank Submissions:**

There are a total of **214** submissions from our lab till date.

The NCBI BioProject Accession no: PRJNA639905 contains all submissions done by the AMR Lab to NCBI (<https://www.ncbi.nlm.nih.gov/>) till date, which can be accessed at <https://www.ncbi.nlm.nih.gov/bioproject/PRJNA639905>

1. Gene sequences of Antibiotic Resistant microorganism isolated from food samples:

Sr. No.	Food source	No. of isolates	Accession Numbers	Publication date on NCBI
1	Chicken	50	KX355642 – KX355691	26-JUNE-2016
2	Mung sprout	50	KX355692 – KX355741	26-JUNE-2016
3	Marine fish	50	KX300038 – KX300086 KY432753	26-JUNE-2016 14-JULY-2017

2. Antibiotic Resistant gene sequences amplified from metagenomic DNA:

No. of genes	Accession Numbers	Publication date on NCBI
13	KY798891-KY798897 KU573047-KU573052	09-MAY-2017 09-FEB-2017

3. Antibiotic Resistant gene sequences amplified from transconjugants:

No. of genes	Accession Numbers	Publication date on NCBI
3	KY924468-KY924470	12-JUN-2017

4. Antibiotic Resistant gene sequences amplified from isolates:

No. of genes	Accession Numbers	Publication date on NCBI
11	KY867437-KY867447	19-APR-2017

**Details of Patent Applications submitted:**

Title	Name of Applicant(s)	Application No.	Agency/ Country
Biological Synthesis Process of Silver Nanoparticles and Application as Antimicrobial Agent against Multiple Antibiotic Resistant Bacteria	Dr. Archana Rath, Maitri Mishra	202021052612	India

**Details of Registered Copyrights:**

Title of work	Name of Author(s)	Application No.	Nature of Work
FEAMR: Food and Environment associated Antimicrobial Resistance Database	Dr. Archana Rath, Maitri Mishra	L-99624/2020	Literary

For any queries, please contact Dr. Archana Rath via email:

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**Useful Links:**

AMR Lab Website: <https://sites.google.com/view/amrlabudbtuom>

FEAMR DB: <https://feamrudbt-amrlab.mu.ac.in/home.aspx>