SUMMARY

- 8 Years of experience of working in the probiotic area to elucidate the mechanism of action of various probiotic strains.
- 4 Years of experience of research in the field of nanotechnology mainly focused on peptide delivery to immune cells through nanoparticles.
- Guided 10 M.Sc. dissertation projects related to probiotics.
- Developed an algorithm to design species specific primers.
- Co-developed an algorithm to annotate the OTUs generated from the 16S rDNA sequencing.
- Over 90 microarray datasets deposited in NCBI-GEO.
- Over 60 NGS datasets deposited in NCBI-SRA.
- Gave free consultancy to over 200 farmers involved in aquaculture in the costal belts of Odisha.

CONTACTS

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EDUCATIONS

Degree	College/ University	Subjects	Year of Completion
Research Associate (Probiotics)	Indian Institute of Technology, Bhubaneswar	Development of probiotics formulations, Development of microbial composition to combat eutrophication in aquaculture	July 2017 to present

Ph.D. (Systems Biology)	National Institute of Science Education and Research Bhubaneswar	Systems Biology, Immunology, Cell Biology, Transcriptomics.	02/2017
M.Sc, (Biochemistry)	University of Hyderabad, Hyderabad	Biochemistry, Molecular Biology, Microbiology, Immunology, Bioinformatics	05/2010
B.Sc, (Chemistry)	Utkal University, Odisha	Chemistry (H), Physics, Mathematics and Biology	05/2008

RESEARCH EXPERIENCES

- 2017/7 to present (**1 Year and 9 Months**) – Screening various potential probiotic strains for their probiotic property and development of different probiotics formulations for human consumption.
- 2011/1 to 2017/02 (**6 Years and 2 Months**) – Worked in the project "**Peptides and probiotics as alternative to Antibiotics; Reports from *in-vitro* and *in-vivo* studies**". Supervisor: **Dr. Palok Aich**, National Institute of Science Education and Research Bhubaneswar. In the first part of this project, I covalently conjugated two host defence peptides LL-37 and Indolicidin to carbon nanotubes and gold nanoparticles, thereby enhancing the immune modulatory capacity of the conjugated peptides by 1000 times with respect to their free form. The experiment was being done *in-vitro* in mouse and human macrophage cell lines in transcriptome level through expression microarray. I have two publications from this part of the project.

  The second part of the project aimed at finding immune modulatory role of a few select probiotics *Lactobacillus acidophilus, Bacillus clausii, Bifidobacterium bifidum* and *Saccharomyces cerevisiae*. The experiments were being done *in-vitro* in mouse and human macrophage cell lines as well as *in-vivo* in BALB/c and C57BL/6 mouse models. *Lactobacillus acidophilus* was found to be recovering the Salmonella infected dysbiosed mouse gut microbiota and inflammation in gut wall tissue. The major experiments done to find the above conclusion was **expression microarray** and **gut microbiota profiling through 16S rDNA sequencing by llumine miseq**. I have 4 publications from this part of the project.

- 2009/12 to 2010/5 (**6 Months**) – Worked in the project "***Toxoplasma gondii* Rad51 & Rad54 interaction using yeast two hybrid system**". Supervisor: **Dr. Mrinal Kanti Bhattacharya**, University of Hyderabad. This project aimed to elucidate whether *Toxoplasma gondii* Rad51 and Rad54 interact during DNA double strand break repair. I learned most of the genetic engineering techniques during this project.

TECHNICAL SKILLS

- Gene expression profiling through **Microarray** (Agilent platform). Expertise the microarray techniques from experiment to analysis. I have 92 NCBI-GEO submissions in 10 series having series accession numbers GSE98353, GSE98503, GSE98616, GSE98630, GSE98701, GSE98796, GSE98798, GSE98803, GSE98978 and GSE98982.
- 16S rDNA based microbiota profiling through **Next generation sequencing** (Illumina MiSeq platform). I have 64 data sets submitted in NCBI-SRA having BioProject accession numbers PRJNA388784 and PRJNA392028.
- **Mammalian cell culture and experimentation** (Experienced in primary and secondary mammalian cell culture).
- **Mice handling and Experimentation** (Experimented with over 400 BALB/c and C57BL/6 mice).
- **Bacterial cell culture** (Experienced in culturing BSL1 and BSL2 bacteria).
- **Microscopy** (Experienced in using Scanning electron microscope, Confocal microscope, high resolution microscope, florescence microscope and inverted compound microscope).
- **Spectroscopy** (Experienced in using UV-Vis, florescence, FT-IR, Nanodrop and Raman spectroscope).
- **Molecular biology techniques** (Transformation, Isolation of Plasmid DNA, Isolation of gDNA & RNA from bacteria, mammalian cells, Tissues and faecal samples, Restriction digestion analysis of vectors & gDNA, SDS-PAGE, Western blot, PCR, Agarose gel electrophoresis, qRTPCR).
- **Primer designing** against various targets (Around 300 probe set submissions in NCBI, developed a novel method to design species specific primer against 16S rRNA gene to detect specific bacterial presence in microbiota and quantify its copy number).
- Analysis of macromolecular interaction and its thermodynamic parameters through **ITC**.

- Experienced in doing **ELISA and FACS**.
- Experienced in using different centrifuges, speed vac and lyophilizer.
- Experienced in covalent conjugation of peptides to CNT and GNP to increase their immune modulatory efficacy.

PUBLICATIONS

1. Sur A*, **Pradhan B***, Banerjee A, Aich P (**2015**) Immune activation efficacy of indolicidin is enhanced upon conjugation with carbon nanotubes and gold nanoparticles. ***PLoS ONE*** 10(4):e0123905.
2. **Pradhan B**, Guha D, Ray P, Das D, Aich P (**2016**) Comparative Analysis of the Effects of Two Probiotic Bacterial Strains on Metabolism and Innate immunity in the Raw264.7 Murine Macrophage Cell Line. ***Probiotics and Antimicrobial Proteins*** 8(25): PMID: 27038159.
3. **Pradhan B,** Datzkiw D. A and Aich P **(2017**) Gut microbiota and health: a review with focus on metabolic and immunological disorders and microbial remediation, ***Biomedical review***, 27, 1-17.
4. **Pradhan, B**., Guha, D., Murmu, K. C., Sur, A., Ray, P., Das, D., & Aich, P. (**2017**). Comparative efficacy analysis of anti-microbial peptides, LL-37 and indolicidin upon conjugation with CNT, in human monocytes. ***Journal of nanobiotechnology***, *15*(1), 44.
5. **Pradhan, B**., Guha, D., Naik, A.K., Banerjee, A., Tambat, S., Chawla, S., Senapati, S. and Aich, P., (**2018**). Probiotics L. acidophilus and B. clausii Modulate Gut Microbiota in Th1-and Th2-Biased Mice to Ameliorate Salmonella Typhimurium-Induced Diarrhea. ***Probiotics and antimicrobial proteins***, pp.1-18.
6. Priyadarshini, S., **Pradhan, B**., Griebel, P. and Aich, P.,(**2018**). Cortisol regulates immune and metabolic processes in murine adipocytes and macrophages through HTR2c and HTR5a serotonin receptors. ***European journal of cell biology***.
7. Priyadarshini, S., **Pradhan, B**. and Aich, P., (**2018**). Role of murine macrophage in temporal regulation of cortisol and serotonin induced adipogenesis in pre-adipocytes when grown together. ***Biology open***, pp.bio-034629.
8. **Pradhan B**, Guha D, Banerjee A, Naik A, Datzkiw D and Aich P. A new approach in making bacterial species specific primers for qRT-PCR against 16S rRNA. (Manuscript in Preparation)

9. Guha, D., Banerjee, A., Mukherjee, R., **Pradhan, B**., Peneva, M., Aleksandrov, G., ... & Aich, P. (**2019**). A probiotic formulation containing Lactobacillus bulgaricus DWT1 inhibits tumor growth by activating pro-inflammatory responses in macrophages. *Journal of Functional Foods*, *56*, 232-245.

*Authors contributed equally

CONFERENCES AND WORKSHOPS ATTENDED

1. XXXV All India Cell Biology Conference and symposium on membrane dynamics and disease, Dec 16-18, 2011.
2. 2nd Annual Conference of Probiotic Association of India and International Symposium on "Probiotics and Microbiome: Gut and Beyond", Nov 3-4, 2014. **Presented a poster** with the title "Probiotic *Bacillus clausii*, can inhibit *Salmonella typhimurium* infection: an *in-vitro* study".
3. 3rd Biennial PAi Conference & International Symposium on Stress, Microbiome & Probiotics, Mar 11-13, 2016. **Participated with an oral presentation** as a young researcher with the title "A mechanistic study of probiotics for immune modulation and dysbiosis amelioration in mice".
4. The International Workshop on Application of systems and mathematical biology in stress, microbiome and probiotics, Mar 7-10, 2016. **Demonstrated the hands on training in microarray experiment and analysis**.
5. International workshop on applications of systems and mathematical biology in public health, Feb 23-24, 2015.
6. Workshop on Next generation sequence data analysis conducted by Bionivid, May 5-7, 2015.
7. Workshop on science communication organized by Welcome trust DBT India alliance, Sept 11, 2014.
8. 83rd annual meeting of society of biological chemistry (India) and Haldane memorial symposium on evolutionary biology, Dec 17, 2014.
9. An orientation workshop on laboratory animal sciences, July 13-15, 2015.
10. A symposium on microbiome and Health held at NISER Bhubaneswar in August 2018. An oral presentation on the topic "peptides and probiotics as alternative to antibiotics".

SCHOLARSHIPS AND AWARDS

1. 2008/8 – Achievers award for UoH Toppers (Biochemistry), (All India Rank 1/18)

2. 2009/12 – CSIR JRF (Life Sciences), (All India Rank 320/918)
3. 2010/2 – GATE (Life Sciences), (All India Rank 18)
4. 2010/6 - CSIR JRF (Life Sciences), (All India Rank 40/888)
5. 2010/12 - UGC JRF (Life Sciences), (All India Rank 227/778)
6. 2011/6 - CSIR JRF (Life Sciences), (All India Rank 16/720)

DECLARATION

The above-mentioned details are true and I can produce relevant certificates as proof.

BISWARANJAN PRADHAN