URVASHI THOPTE

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EDUCATION

Master of Arts in Biotechnology September 2019 – December 2020
Columbia University, Graduate School of Arts and Sciences New York, NY

- **GPA:** 4.10/4.33
- **Supervised Research: '**Developing an *in vitro* experimental system to determine the effects of exposure to polycyclic aromatic hydrocarbons (PAHs) during early development'
- **Thesis:** '*De novo* somatic mutations caused by exposure to environmental agents may contribute to amyotrophic lateral sclerosis (ALS)'

Master of Science in Microbiology July 2017 – May 2019
Fergusson College Pune, India

- **GPA:** 4.00/4.00
- **Independent Research Project: '**Isolation of gluten degrading microorganisms as a potential digestive aid for gluten metabolism'
- **Thesis:** 'Gluten, its implication in gluten intolerance, and strategies using microbes for developing therapeutic solutions for its detoxification'

Bachelor of Science in Microbiology June 2014 – May 2017
Fergusson College Pune, India

- **GPA:** 3.91/4.00

AWARDS & HONORS

First Prize Pune, India
Dabke Trust Grant April 2019

First Class – Exemplary, Class Rank: 1 Pune, India
M.Sc. Microbiology, Fergusson College 2017 – 2019

First Class – Distinction Pune, India
B.Sc. in Microbiology, Fergusson College 2014 – 2017

RELEVANT RESEARCH & PROFESSIONAL EXPERIENCE

Associate Researcher under Dr. Matthew Lalli & Dr. Joseph Buxbaum July 2021 – June 2023
The Seaver Autism Center at the Icahn School of Medicine at Mount Sinai New York, NY

Developing high-throughput functional genomic technologies in induced pluripotent stem cell (iPSC)-derived neuronal cells to elucidate the molecular and cellular roles of autism spectrum disorder (ASD) risk genes

- Analyzing the transcriptional signatures of 77 autism-associated risk genes utilizing high-throughput single-cell CRISPRi perturbations and single-cell RNA sequencing (scRNA-seq) in iPSC-derived neural progenitor cells to identify convergent mechanisms
- Developing POINT-MAP, a high-throughput platform that uses optically recoverable barcodes to study the effects of multiple perturbations of neurodevelopmental disorder (NDD) risk genes on neuronal and synaptic morphology in induced neurons (iNeurons) using high-content imaging
- Optimizing and utilizing the 'Calling Cards' technology that employs barcoded self-reporting transposons to identify the binding sites of ASD-associated transcription factors and simultaneously analyze their effect on gene expression using RNA sequencing in bulk populations
- Creating 'Pork-Chop', a technology to interrogate the binding sites of large ASD-associated transcriptional factors and determine their effects on gene expression by utilizing an inducible split intein system coupled with a *piggyBac* transposase
- Designing a tRNA therapy for stop codon readthrough for nonsense mutation-associated diseases and validating its therapeutic potential in reporter systems and ASD patient-derived iNeurons

Research Technician under Dr. Erika Bach February – July 2021
NYU Langone Health – Department of Biochemistry & Molecular Pharmacology New York, NY

Elucidating the cellular, molecular, and biochemical mechanisms of JAK/STAT signaling-based cell competition during development in the *Drosophila* wing imaginal disc

- Investigated the local target receptor of a ligand that is upregulated in the JAK/STAT signaling model of super-competition that is responsible for mediating the elimination of neighboring wild type cells
- Researched oxidative stress as a mechanism of super-competition and investigated potential mediators
- Determined whether JAK/STAT super-competitors share similar pathways and mechanisms of cell competition with other super-competitors

Graduate Student Researcher under Dr. Andres Bendesky and Dr. David Ng October – December 2020
Zuckerman Mind Brain Behavior Institute – Transgenics Core New York, NY

Developing and optimizing an at-home Loop-mediated Isothermal Amplification (LAMP)-based COVID-19 diagnostic test

- Streamlined the COVID-19 diagnostic test for easy at-home use by simplifying the protocol of the test and reducing the time required for it
- Optimized the test to increase its sensitivity and validated it using clinical samples

Graduate Student Researcher under Dr. Brandon Pearson January – December 2020
Mailman School of Public Health, Columbia University New York, NY

Developing experimental systems and molecular strategies to study the role of genetic and environmental factors in development and neurological disorders

- Performed bioinformatic analysis of whole exome sequencing data from the prefrontal cortex cells of mice with prenatal exposure to polycyclic aromatic hydrocarbons (PAHs) to identify mutational signatures and evaluate the deleterious effects of these mosaic mutations
- Developed an *in vitro* experimental system using mouse pre-implantation embryos to determine the mutagenic effects of PAH exposure on neurological development
- Determined the susceptibility of ALS genes to *de novo* mutations caused by mutagenic agents and aging using R programming
- Researched and designed an economical and efficient protocol for the detection of somatic *de novo* mutations occurring during DNA repair-associated DNA synthesis
- Set-up, optimized and troubleshooted a microinjection system to inject killifish embryos to create a Huntington's disease model using CRISPR-Cas9

Independent Research Project under Dr. Gauri Bhawkar August 2018 – June 2019
Fergusson College Pune, India

Isolation of gluten-degrading microorganisms to formulate a potential digestive aid for gluten metabolism

- Designed a novel growth medium for the isolation and screening of gluten-degrading microorganisms
- Identified the isolated gluten-degraders and analyzed their efficiency using zymography and an in-solution gluten degradation assay
- Investigated the potential of these organisms to formulate a digestive aid to enhance gluten metabolism by studying their synergistic activity, and determining their viability and enzyme degrading activity in conditions resembling those of the human gut

PUBLICATIONS

- Lalli MA, Yen A, **Thopte U**, Dong F, Moudgil A, Chen X, Milbrandt J, Dougherty JD, Mitra RD. Measuring transcription factor binding and gene expression using barcoded self-reporting transposon calling cards and transcriptomes. NAR Genomics and Bioinformatics, Volume 4, Issue 3, September 2022, lqac061
- Lalli MA, **Thopte U**, Moudgil A, Wilkinson M, Chen X, Mitra RD. Barcoded Calling Cards and Transcriptomes: Library Preparation. protocols.io., 2022, dx.doi.org/10.17504/protocols.io.bp2l6nqokgqe/v1

- Ng D, Pinharanda A, Vogt MC, Litwin-Kumar A, Stearns K, **Thopte U,** Cannavo E, Enikolopov A, Fiederling F, Kosmidis S, Noro B, Rodrigues-Vaz I, Shayya H, Andolfatto P, Peterka D, Tabachnik T, D'Armiento J, Goldklang M, Bendesky A. WHotLAMP: A simple, inexpensive, and sensitive molecular test for the detection of SARS-CoV-2 in saliva. PLOS ONE 2021 September, 16(9): e0257464

MANUSCRIPTS IN PREPARATION

- **Thopte U,** Buxbaum JD, Brown BD and Lalli MA. POINT-MAP – A novel optical imaging platform enabling high-throughput analysis of pooled genetic perturbations on neuronal morphology
- **Thopte U**, Buxbaum JD, Mitra RD and Lalli MA. An inducible split intein system to facilitate the analysis of transcription factor binding of large autism spectrum disorder (ASD)-risk genes and their effect on gene expression
- Lalli MA, **Thopte U** and Buxbaum JD. Identifying convergent mechanisms of autism spectrum disorder (ASD) risk genes in fate specification, neuronal differentiation, and gene expression in human neurons
- Lalli MA*, **Thopte U*,** de Anda MR*, Kostic A and Buxbaum JD. Stop codon readthrough of autism spectrum disorder (ASD)-associated nonsense mutations using a suppressor-tRNA therapy in patient-derived neurons

SKILLS & TECHNIQUES

Laboratory Techniques:

Molecular Biology

- PCR, Reverse transcription-PCR, LAMP
- Molecular cloning (In-Fusion Assembly, Golden Gate Assembly, NEBuilder HiFi DNA Assembly)
- Plasmid transformation
- Plasmid, DNA, and RNA isolation
- Gel electrophoresis (Agarose, Polyacrylamide, SDS-PAGE, Zymography)
- Sequencing library preparation
- Western blot

Cell and animal culture

- Mammalian cell culture (iPSCs, 293T cells, Astrocytes, Neuro2a cells, LUHMES)
- iPSC differentiation (into iNeurons and neural progenitor cells)
- Transfection
- Virus production and transduction (Lentivirus, AAV)
- Mouse pre-implantation embryo extraction and culture
- *Drosophila* handling, maintenance, crosses, and dissection

Microscopy and Imaging

- Confocal and epifluorescence microscopy
- Immunofluorescence staining
- Flow Cytometry

Microbiology, Biochemistry, and Immunology

- Microbiological laboratory techniques – microbial cell culture, staining and characterization
- Applied microbiology assays (clinical, food and environmental)
- Analysis of enzyme kinetics
- Biochemical and analytical testing
- Immunological techniques (hematological tests, antigen-antibody precipitation, hemagglutination assay, and titer determination assays)

Technical Skills: R (intermediate), Python (beginner), ImageJ, CellProfiler, GraphPad Prism, Adobe Illustrator, Bioinformatics, Biostatistics, Microsoft Office Suite

TEACHING & MENTORING EXPERIENCE

Research mentor June – July 2022

Seaver Summer 2022 Undergraduate Research Scholars Program New York, NY

- Trained an undergraduate student in lab techniques for the Seaver Undergraduate Research Scholars Program aimed at students from historically marginalized populations

Tutor April 2021 – January 2022
Ivy Tutor Network New York, NY

Student-Athlete Tutor February – May 2020
Columbia University New York, NY

Tutor May – September 2019
Chegg.com (online)

VOLUNTEERING & OUTREACH

Scientist on the Subway (SciSub) blog September 2020 – July 2022

- Interviewed scientists from underrepresented groups, and wrote and edited articles highlighting their journey to inspire individuals from all walks of life to pursue a career in science

CARE for Kids Research Initiative, Columbia University Irving Medical Center January – April 2020

- Identified strategies to spread awareness and improve engagement to recruit more families for a research initiative aimed at identifying the genetic causes of birth defects under Dr. Wendy Chung
- Created content for their social media and webpage to explain complex scientific information in a simpler manner so that it can be understood by individuals from non-scientific backgrounds

Columbia University Neuroscience Outreach (CUNO) August 2019 – December 2021

- Member of a student organization aimed at fostering an interest in neuroscience in children in New York City and creating a diverse and inclusive scientific community

Idhant June 2018 – December 2021

- Designed the curriculum, organized classes, and taught English, basic computer skills and personality development skills to children from underprivileged communities
- Organized medical awareness campaigns in government schools

'Microbiomics' College Fest at Fergusson College December 2015 – December 2019

- Responsible for supervising and coordinating the activities of the Microbiology College Fest

Boddhisattva May 2016 – January 2018

- Organized adoption drives, donation drives, and helped look after the health and well-being of stray animals in the community

PRESENTATIONS & WORKSHOPS

Poster Presentations

- **Thopte U**, Buxbaum JD and Lalli MA (2022). Elucidating neurodevelopmental disorder risk gene mechanisms through Pooled Optical Imaging, Neurite Tracing, and Morphometry Across Perturbations (POINT-MAP). International Society for Autism Research (INSAR) 2023.

Presentations & Invited Talks

- Panel Speaker (2022). Discussed my academic and professional journey in the field of Molecular Biology with undergraduate and master's students at Fergusson College in Pune, India
- **Thopte U** and Jayanti S (2019). "Gluten degrading microorganisms as a potential digestive aid for gluten metabolism," oral presentation for the Dabke Trust Grant competition in Pune, India

Scientific Communication & Skill Development Seminars 2016 – 2019

- Presented biannually at seminars held by the Graduate Department of Microbiology where students critique and present the approach, methods, and findings from contemporary research papers

Workshops attended 2016 – 2018

- DBT workshop series on 'Immunological Techniques', 'Pharmaceutical Techniques' and 'Scientific Communication'