

Parul Sharma

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Education

- 2018 – 2023 📖 **Ph.D.** Genetics, Bioinformatics and Computational Biology
Virginia Tech Blacksburg, USA
Thesis: *Development of Bioinformatic pipelines to improve sequence-based pathogen classification and identification*
- 2015 – 2017 📖 **M.Tech.** Computational Biology
Indraprastha Institute of Information Technology Delhi, India
Thesis: *Clinical Genomics and Personalized Medicine initiatives for Arabian Countries*
- 2011 – 2015 📖 **B.Tech.** Biotechnology
Jaypee Institute of Information Technology Noida, India
Thesis: *Studying the effects of bacteriocin-like-inhibitory substances on bacterial biofilms*




Research Experience

- Sept'23 – present 📖 **Assistant Scientist, Bioinformatics** Emory University Atlanta, USA.
Project - Detecting the spread of antimicrobial resistant strains in infectious diseases
Advisor: Dr Timothy Read
- May'22 – Aug'22 📖 **Research Intern**, Vertex Pharmaceuticals Boston, USA.
Project - Validating and benchmarking clinical pipeline for gene-editing-based disease therapies
Advisor: Dr Rebecca Fine
- 2018 – present 📖 **Graduate Research Assistant**, Virginia Tech Blacksburg, USA.
Project - Improving pathogen identification and characterization using long- read sequencing methods
Advisor: Dr Boris Vinatzer
- Aug'17 – Dec'17 📖 **Graduate Research Assistant**, Indraprastha Institute of Information Technology Delhi, India.
Project - Post mitochondrial apoptotic pathway study using Monte Carlo Modelling
Advisor: Dr Subhadip Raychaudhuri
- May'16 – Dec'17 📖 **Thesis Student**, Institute for Genomics and Integrative Biology Delhi, India.
Project - Clinical Genomics and Personalized Medicine initiatives for Arabian Countries
Advisor: Dr Vinod Scaria
- May'14 – Aug'14 📖 **Intern**, Centre for Genetic Manipulation of Crop Plants Delhi, India.
Project - Analyzing the protein content in different *Brassica* species for improving the quality of mustard seeds
Advisor: Dr Yaspal Singh Sodhi
- Dec'13 – Jan'14 📖 **Intern**, Rajiv Gandhi Cancer Hospital And Research Center Delhi, India.
Learning to perform pathological testing in Biochemistry, Microbiology, and Hematology departments

Teaching Experience

- Spring 2017  **Probability and Statistics** Undergraduate Level
Graduate Teaching Assistant, IIIT-Delhi
Responsibilities: Weekly tutorials, Grading assignments, Regular Office hours
- Fall 2016  **Introduction to Mathematical Biology** Graduate Level
Graduate Teaching Assistant, IIIT-Delhi
Responsibilities: Designing homework assignments, Grading, Regular Office hours
- Spring 2016  **Critical Thinking** Undergraduate Level
Graduate Teaching Assistant, IIIT-Delhi
Responsibilities: Preparing lecture material, Facilitating classroom discussions, Grading, Regular Office hours


Mentoring Experience

- 2024-present  **Students/Researchers Advised** Emergent Lab, Emory University
Joshua Joseph, M.S. Bioinformatics, Georgia Tech.
- 2019-2023  **Peer-mentor** Vinatzer Lab, Virginia Tech
Give training sessions/workshops for new bioinformatic tools and pipelines
Provide support and advice on software/pipeline selection and installation
Assistance in troubleshooting computational problems through meetings
- 2016-2017  **Project manager** Institute for Genomics and Integrative Biology
Managed and mentored a team of 20+ student interns
Prepared teaching materials and organized training sessions
Assisted in timely progress of tasks

Awards and Honors

- 2023  **Outstanding PhD Student Award in Basic Research**, School of Plant and Environmental Sciences, Virginia Tech.
- 2022  **Travel Grant**, School of Plant and Environmental Sciences, Virginia Tech.
 **Research Grant**, Pacbio Genomics Day, Atlanta.
- 2021  **Travel Grant**, Graduate Student Association Travel Fund Program, Virginia Tech.
- 2020  **Travel Grant**, Plant Health 2020.
 **1st prize for Oral Presentation**, American Phytopathological Society Potomac Division Meeting.
 **1st Prize for Flash Talk**, Graduate Student Association Research Symposium, Virginia Tech.
- 2019  **Best Poster**, School of Plant and Environmental Sciences, Graduate Student Poster Showcase.
- 2015  **Complete Tuition Waiver for Master's degree**, Department of Biotechnology, India.
 **Scholarship for qualifying the Graduate Aptitude Test in Engineering**, Ministry of Human Resource Development, Government of India.

Publications

- 1 Abdelrazek, S., Bush, E., Oliver, C., Liu, H., **Sharma, P.**, Johnson, M. A., ... Vinatzer, B. A. (2024). A survey of xylella fastidiosa in the us state of virginia reveals wide distribution of both subspecies fastidiosa and multiplex in grapevine. *Phytopathology*[®].  doi:10.1094/PHYTO-06-23-0212-R
- 2 Dewberry*, R. J., **Sharma, P.***, Prom, J. L., Kinscherf, N. A., Lowe-Power, T., Mazloom, R., ... Stulberg, M. et al. (2024). Genotypic and phenotypic analyses show ralstonia solanacearum cool

virulence is a quantitative trait not restricted to “race 3 biovar 2”. *Phytopathology*.

doi:10.1094/PHYTO-06-24-0187-R

- 3 Mazloom, R., Pierce-Ward, T., **Sharma, P.**, Pritchard, L., Brown, C. T., Vinatzer, B. A., & Heath, L. S. (2024). Lingroups as a principled approach to compare and integrate multiple bacterial taxonomies. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*.
- 4 Crosby, K. C., Rojas, M., **Sharma, P.**, Johnson, M. A., Mazloom, R., Kvitko, B. H., ... Heath, L. S. et al. (2023). Genomic delineation and description of species and within-species lineages in the genus *pantoea*. *Frontiers in Microbiology*. doi:10.3389/fmicb.2023.1254999
- 5 Lowe-Power*, T., **Sharma, P.***, Alfenas-Zerbini, P., Álvarez, B., Arif, M., Baroukh, C., ... Cellier, G. et al. (2023). The ralstonia research community rejects the proposal to classify phylotype i ralstonia into the new species ralstonia nicotianae. *PhytoFrontiers™*. doi:10.1094/PHYTOFR-06-23-0071-LE
- 6 Failor, K. C., Liu, H., Llontop, M. E., LeBlanc, S., Eckshtain-Levi, N., **Sharma, P.**, ... Lefevre, C. et al. (2022). Ice nucleation in a gram-positive bacterium isolated from precipitation depends on a polyketide synthase and non-ribosomal peptide synthetase. *The ISME Journal*. doi:10.1038/s41396-021-01140-4
- 7 Johnson, M. A., Liu, H., Bush, E., **Sharma, P.**, Yang, S., Mazloom, R., ... Vinatzer, B. A. (2022). Investigating plant disease outbreaks with long-read metagenomics: Sensitive detection and highly resolved phylogenetic reconstruction applied to xylella fastidiosa. *Microbial Genomics*. doi:10.1099/mgen.0.000822
- 8 **Sharma, P.**, Johnson, M., Mazloom, R., Allen, C., Heath, L., Lowe-Power, T., & Vinatzer, B. (2022). Meta analysis of the ralstonia solanacearum species complex (rssc) based on comparative evolutionary genomics and reverse ecology. *Microbial Genomics*. doi:10.1099/mgen.0.000791
- 9 Mechan Llontop, M. E., Tian, L., **Sharma, P.**, Heflin, L., Bernal Galeano, V. A., Haak, D., ... Vinatzer, B. (2021). Experimental evidence pointing to rain as a reservoir of tomato phyllosphere microbiota. *Phytobiomes Journal*. doi:10.1094/PBIOMES-04-21-0025-R
- 10 **Sharma, P.**, Jain, A., & Scaria, V. (2021). Genetic landscape of rare autoimmune disease variants in qatar and middle eastern populations through the integration of whole-genome and exome datasets. *Frontiers in Genetics-Applied Genetic Epidemiology*. doi:10.3389/fgene.2021.631340
- 11 Vatsyayan*, A., **Sharma, P.***, Gupta, S., Sandhu, S., Venu, S. L., Sharma, V., ... Rajab, A. et al. (2021). Dalia-a comprehensive resource of disease alleles in arab population. *PloS one*. doi:10.1371/journal.pone.0244567
- 12 Mechan Llontop*, M. E., **Sharma, P.***, Aguilera Flores*, M., Yang, S., Pollok, J., Tian, L., ... Li, S. et al. (2020). Strain-level identification of bacterial tomato pathogens directly from metagenomic sequences. *Phytopathology*. doi:10.1094/PHYTO-09-19-0351-R
- 13 Roman-Reyna, V., Truchon, A., **Sharma, P.**, Hand, F. P., Mazloom, R., Vinatzer, B. A., ... Allen, C. (2020). Genome resource: Ralstonia solanacearum phylotype ii sequevar 1 (race 3 biovar 2) strain uw848 from the 2020 us geranium introduction. *Plant disease*. doi:10.1094/PDIS-06-20-1269-A
- 14 Sharma, G., Sharma, S., **Sharma, P.**, Chandola, D., Dang, S., Gupta, S., & Gabrani, R. (2016). Escherichia coli biofilm: Development and therapeutic strategies. *Journal of applied microbiology*. doi:10.1111/jam.13078
- 15 Sivadas, A., **Sharma, P.**, & Scaria, V. (2016). Landscape of warfarin and clopidogrel pharmacogenetic variants in qatari population from whole exome datasets. *Pharmacogenomics*. doi:10.2217/pgs-2016-0130
- 16 Dangayach, S., **Sharma, P.**, Singhai, P., & Gupta, N. (2014). Microbial removal of arsenic: Mechanisms and applications. *As. J. Multidis. Stud.* Retrieved from <https://parul-sharma.github.io/parul-sharma.github.io/793-2281-1-PB.pdf>

Computational Skills

- Coding Languages : Python, R, Linux, HTML/CSS, \LaTeX .
- Experience with High Performance and cloud computing platforms: Slurm, PBS, AWS, Google cloud.
- Familiarity with applications of machine learning and deep learning methods in genomics and survival data analysis.
- Proficiency in data analysis of Next Generation Sequencing data including Illumina, Pacbio and Nanopore sequencing data.
- Experience with building custom bioinformatics tools and pipelines.
- Proficiency in using tools and pipelines for outbreak analysis, pathogen detection, SNP analysis, variant calling, phylogenetic analysis, recombination study, GWAS, and other comparative genomic methods.
- Experience with handling Metagenomics, RNA-seq, Multi-omics data for bacterial genomics and Whole genome and Exome sequencing data for clinical/population genomics studies.
- Experience with analysing gene editing data in clinical settings.

Oral Presentations

- Deciphering self-resistance genes in microbial biosynthetic gene clusters to combat AMR, **NIH and NIAID hosted Resistance is Futile: A codeathon to combat antimicrobial resistance**, 2024, *Virtual*.
- Adapting a metagenomic classification tool to reach the resolution required for biosecurity-relevant identification of plant-associated bacteria, **International Phytobiomes Conference**, 2022, *Denver-Colorado*.
- Rapid and precise metagenomics classification for pathogen detection using an exclusively genome-similarity-based approach, **International Conference on Plant Pathogenic Bacteria**, 2022, *Assisi-Italy*.
- Rapid and precise metagenomics classification for pathogen detection using an exclusively genome-similarity-based approach, **American Phytopathological Society Potomac Division Meeting**, 2022, *Online*.
- Genome-based circumscription of cool-virulent *Ralstonia solanacearum* strains in an attempt to improve their regulation, **Plant Health 2020**, *Online*.
- Genome-based circumscription of cool-virulent *Ralstonia solanacearum* strains in an attempt to improve their regulation, **American Phytopathological Society Potomac Division Meeting**, 2020, *Online*.
- Strain-level identification of tomato pathogens from metagenomic sequences obtained with the ONT MinION **Graduate Student Association Research Symposium, Virginia Tech**, 2020, *Online*.
- Strain-level identification of tomato pathogens from metagenomic sequences obtained with the ONT MinION **Translational Plant Science Symposium**, 2020, *Virginia Tech*.
- Strain-level identification of tomato pathogens from metagenomic sequences obtained with the ONT MinION **Nanopore Community Meeting 2019**, *New York*.
- Hi Alexa! What's wrong with my tomato plant?**Nutshell Games 2019**, *Virginia Tech*.

Poster Presentations

- Whole-Genome Classification and Detection of Chlamydia trachomatis Strains Using the MetaChlam Pipeline, **ASM Conference on Rapid Applied Microbial Next-Generation Sequencing and Bioinformatic Pipelines**, 2024, *Washington, DC*.
- LINTax: Replacing taxonomy with ANI similarity thresholds in Kraken2 for pathogen detection to the strain-level, **International Conference on Plant Pathogenic Bacteria**, 2024, *Blacksburg-Virginia*.

Poster Presentations (continued)

- Characterization of *Chlamydia trachomatis* strains using an ANI-based approach for improved detection, **ASM Microbe**, 2024, *Atlanta-Georgia*.
- Adapting a metagenomic classification tool to reach the resolution required for biosecurity-relevant identification of plant-associated bacteria, **International Phytobiomes Conference**, 2022, *Denver-Colorado*.
- Cool virulence: Catch me if you can, **School of Plant and Environmental Sciences Graduate Student Poster Showcase**, 2021, *Virginia Tech, USA*.
- A comparative genomics investigation into cool-virulence in *Ralstonia solanacearum* to improve its phytosanitary regulation, **Plant Health 2021**, *Online*.
- Classification of the *Ralstonia solanacearum* species complex based on population and comparative genomics, **World Microbe Forum**, 2021, *Online*.
- Strain-level identification of tomato pathogens from metagenomic sequences obtained with the ONT MinION, **School of Plant and Environmental Sciences Graduate Student Poster Showcase**, 2019, *Virginia Tech, USA*.
- Strain-level identification of tomato pathogens from metagenomic sequences obtained with the ONT MinION **Nanopore Community Meeting 2019**, *New York, USA*.
- Pharmacogenetic variant analysis In Arab Populations from Exome Data, **Research Showcase**, 2017, *Delhi-India*.
- Antimicrobial peptides as potential therapeutics against bacteria, **National Conference on "Recent Advances in Biological Sciences" organized by Society of young scientists**, 2014, *Delhi-India*.

Workshops

- Organized and conducted a workshop on "(Meta)Genome based pathogen identification" at the **International Conference on Plant Pathogenic Bacteria**, Blacksburg-Virginia, 2024.
- Hands-on workshop on "LINtax: A tool to identify biosecurity pathogens from metagenomic data." at the **USDA-APHIS**, Laurel-Maryland, 2023.
- Hands-on workshop on "Metagenomics and Microbial Sequencing for Diagnostics " at the **International Phytobiomes Conference**, Denver-Colorado, 2022.
- Co-organized the Panel Discussion on "Plant Disease Pandemic Prevention" at the **Transnational Plant Science Symposium**, Virginia Tech, 2022.
- Hands-on workshop on "Using metagenomic sequencing for Pathogen identification" at **Translational Plant Sciences Discussion Group meeting**, Virginia Tech, 2021.

Volunteer and Outreach Activities

- Served as a Judge for Oral Presentations at DSAC Graduate Research Symposium at Emory University *March, 2024*.
- Served as a Judge for Poster Presentations at DSAC Graduate Research Symposium at Emory University *March, 2024*.
- Co-organized the Panel Discussion on "Plant Disease Pandemic Prevention" at the Transnational Plant Science Symposium *April, 2022*.
- Senator Representative for Genetics, Bioinformatics and Computational Biology Program in Graduate and Professional Student Services 2021-2023.
- Committee Member of the Graduate Honor Society at Virginia Tech 2020-2023.
- Served as a Judge for the Western Virginia Regional Science Fair 2020 at Hollins University *Mar 21, 2020*.
- Served as a Judge for the Roanoke County Science Fair 2020 at William Byrd Middle School *Feb 22, 2020*.

Volunteer and Outreach Activities (continued)

- Volunteer teacher for low-income schools in Delhi to encourage underprivileged kids towards STEM careers. Taught Math, Science and Computers to 7th Grade students through interactive learning to develop critical thinking *2015-2016*