Sanjiv Kumar

Ph.D. Biotechnology

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Molecular Biology, Biotechnology, Protein Biochemistry, Bacteriology, Bioinformatics

Research Interests

Highly efficient molecular biologist, with focus on Protein Biochemistry and Infection Biology • Adept at *in-silico* characterization of proteins (phylogenetic analysis, homology modeling, drug discovery, molecular docking and simulations etc.) • Knowledge and experience of Genomics, metagenomics and RNA-Seq data analyses tools and software • Efficient at the techniques in the context of drug discovery against infectious pathogens

Technical Skills

Molecular biology techniques, Microbiology techniques, Protein biochemistry, Protein crystallography, Drug discovery, Bioinformatics (Pharmaceutical Bioinformatics, Genomic and Metagenomics data analysis), `R`[Intermediate], `Python`[Intermediate], `bash`. Adept user of `UNIX`.

Research Experience

Torbjörn Group, Faculty of Medicine and Health, Örebro University, Sweden. ***Örebro, Sweden***
Researcher, Bioinformatics and Microbial Proteogenomics *August 2021 - Present*

As a researcher with the Torbjörn Group, I am responsible for the understanding of the mechanism of action of anti-microbial peptides (AMPs) against bacterial and viral pathogens. Including following roles:

- Understanding interactions of Plantaricin NC8 αβ with lipid bilayer model using MD simulations.
- Identification of interaction of AMPs with the proteins of viral proteins using docking and simulations.

Srivastava Lab, Glycoscience, Dept. of Chemistry, KTH Royal Institute of Technology ***Stockholm, Sweden***
Researcher, Oomycetes Biology *August 2017 - August 2021*

As a researcher with the Vaibhav Srivastava's Lab, I was responsible for the development and implementation of research strategy towards novel anti-infectives against Oomycete pathogens. Including following roles:

- Expression, purification and biochemical characterization of proteins involved in cell-wall biogenesis from Oomycete pathogens, Horizon 2020 project
- Cell wall linkage analysis of various Oomycete pathogens, Horizon 2020 project
- Identification and characterization of protein targets and inhibitors important for disease control strategies against *Saprolegnia parasitica* and their *in-vitro* assessment.

Justin Radolf Lab at University of Connecticut Health Center ***Connecticut, USA***
Post-Doctoral Fellow, Infectious Biology *April 2015 - August 2017*

As a Post-Doctoral Fellow at UConn Health, I was involved with the characterization of rare Outer Membrane Proteins (OMPs) in *Treponema pallidum*. Including following roles:

- Consensus computational framework to identify rare OMPs in *T. pallidum*
- Biophysical and experimental characterization of BAM – complex in *T. pallidum*
- Identification and analysis of sequence variations in *T. pallidum* from clinical samples

Vineet Sharma Lab at Indian Institute of Science Education and Research, Bhopal (IISER-B) ***Bhopal, India***
Post-Doctoral Fellow, Metagenomics and Systems Biology *December 2013 - February 2015*

As a Post-Doctoral Fellow at MetaBioSys lab, I was responsible for the Metagenomic analysis of human gut and polluted river microbiomes. Including following roles:

- Reconstruction of bacterial and viral genomes from multiple human gut metagenomes
- Development of prediction tool for peptidoglycan hydrolases from bacterial genomes
- De novo assembly of genomes from human gut metagenomic data

S. Ramachandran Lab, Institute of Genomics and Integrative Biology ***New Delhi, India***
Junior Research Fellow, Genomics and Integrative Biology *December 2007 - February 2015*

As a Junior Research Fellow, I was responsible for the identification of novel adhesins from *Mycobacterium tuberculosis*, including • Identification of novel potential adhesins of *M. tuberculosis* H37RV and their experimental validation • Characterization of a novel N-acetylmuramoyl-L-alanine amidase Rv3717 from *M. tuberculosis* H37Rv

Patent Filed

- Vaibhav Srivastava, **Sanjiv Kumar**, and Vincent Bulone (2020). "Treatment of saprolegniasis." International Patent Application No.PCT/SE2020/050468, Filing date: May 7, 2020. [Link]

Awards

KTH Innovation Challenge Tech for the Global Goals award of 50000 SEK, jointly shared with Vaibhav Srivastava, awarded by KTH Royal Institute of Technology, Stockholm, Sweden (May 2018) • Senior Research Fellowship from CSIR, New Delhi, India (March 2009 – February 2012) • Junior Research Fellowship from CSIR, New Delhi, India, (March 2007 – February 2009) • Defense Scholarship during graduation (B. V. Sc. & A. H.) (1998-2003)

Education

Institute of Genomics and Integrative Biology (CSIR-IGIB) *Delhi, India*
Ph.D. in Biotechnology *2014*

Lala Lajpat Rai University of Veterinary and Animal Sciences *Haryana, India*
Masters in Veterinary Sciences (M.V.Sc.), Veterinary Microbiology *2007*

Veterinary College, KVAFS University *Bangalore, Karnataka, India*
Bachelor of Veterinary Sciences & Animal Husbandry (B.V.Sc. & A.H.) *2004*

Training

Pharmaceutical Bioinformatics, Grade: **VG**, Uppsala University, *Uppsala, Sweden*, *Aug. 31 - Nov. 01, 2020* [Credential] • **Applied Pharmaceutical Structural Bioinformatics**, Grade: **VG**, Uppsala University, *Uppsala, Sweden*, *Aug. 31 - Oct.r 15, 2020* [Credential] • **RNA-Seq Data Analysis**, Workshop by National Bioinformatics Infrastructure Sweden (**NBIS**) and **SciLifeLab**, *Uppsala, Sweden*, *May 13 - 15, 2019* [Credential].

Independent Coursework

Intro to Machine Learning, Kaggle, *Mar. 2021* [Credential] • **Python**, Kaggle, *Mar. 2021* [Credential] • **Automate the Boring Stuff with Python Programming**, Udemy, *Jun. 2019* [Credential] • **Python Programming Bootcamp**, Udemy, *Jun. 2019* [Credential] • **Python for Absolute Beginners**, Udemy, *Jun. 2019* [Credential] • **Introduction to Python**, DataCamp, *April 2019* [Credential] • **Introduction to R Course**, DataCamp, *Nov. 2017* [Credential].

Publications

For the complete list of publications please visit *My Google Scholar Profile*.

First Author Peer-Reviewed Publications – **6** • Total Peer-Reviewed Publications – **21** • Popular Science Articles – **1**.

21. Kumar R, **Kumar S**, Bulone V, Srivastava V. (**2022**). Biochemical characterization and molecular insights into substrate recognition of pectin methylesterase from *Phytophthora infestans*. ***Computational and Structural Biotechnology Journal*** 20:6023-32. [ScienceDirect]
20. Srivastava, A., Biswas, S., Yadav, S., **Kumar, S**., Srivastava, V., & Mishra, Y. (**2021**). Acute cadmium toxicity and post-stress recovery: Insights into coordinated and integrated response/ recovery strategies of *Anabaena sp.* PCC 7120. ***Journal of Hazardous Materials*** 411:124822. [ScienceDirect]
19. **Kumar S**, Mandal RS, Bulone V, Srivastava V. (2020). Identification of growth inhibitors of the fish pathogen *Saprolegnia parasitica* using in silico subtractive proteomics, computational modelling, and biochemical validation. ***Frontiers in Microbiology*** 11, 2533. [PubMed]
18. Murugan NA, **Kumar S**, Jeyakanthan J, Srivastava V. (2020). Searching for target-specific and multi-targeting organics for COVID-19 in the Drugbank database with a double scoring approach. ***Scientific Reports*** 10(1), 19125. doi: 10.1038/s41598-020-75762-7. [Scientific Reports]
17. Srivastava A, Biswas S, Yadav S, **Kumar S**, Srivastava V, Mishra Y. (2020). Acute cadmium toxicity and post-stress recovery: Insights into coordinated and integrated response/ recovery strategies of *Anabaena sp.* PCC 7120. ***Journal of Hazardous Materials***. [ScienceDirect]
16. Yadav S, Srivastava A, Biswas S, Chaurasia N, Singh SK, **Kumar S**, Srivastava V, Mishra Y. (2020) Comparison and

optimization of protein extraction and two-dimensional gel electrophoresis protocols for liverworts. ***BMC Research Notes*** 13, 60. https://doi.org/10.1186/s13104-020-4929-1. [PubMed]

15. Mittal P, Prasoodanan PK V, Dhakan DB, **Kumar S**, Sharma VK. (2019) Metagenome of a polluted river reveals a reservoir of metabolic and antibiotic resistance genes. ***Environmental Microbiome***, 14: 5. [BioMed Central]

14. Kaur, S., Srivastava, A., **Kumar, S.**, Srivastava, V., Ahluwalia, A.S. and Mishra, Y., (2019). Biochemical and proteomic analysis reveals oxidative stress tolerance strategies of *Scenedesmus abundans* against allelochemicals released by *Microcystis aeruginosa*. ***Algal Research***, 41, p.101525. [ScienceDirect]

13. **Kumar, S.**, Caimano, M. J., Anand, A., Dey, A., Hawley, K. L., LeDoyt, M., La Vake, C., Cruz, A. R., Ramirez, L. G., Pastekova, L., Bezsonova I, Smajs D, Salazar J. C., Radolf J. D. (2018) Sequence variation of rare outer membrane protein β-barrel domains in clinical strains provides insights into the evolution of *Treponema pallidum* subsp. pallidum, the syphilis spirochete. ***mBio*** 9(3): e01006-18.[PubMed]

12. Radolf J., **Kumar S.**, Smajs, D., Dey, A., Anand, A., Ledoyt, M., Karanian, C., Cruz, A., Ramirez, L., and Caimano, M. (2017). Insights into the evolution of syphilis spirochetes within at-risk populations: sequence variation of outer membrane protein β-barrel domains in clinical samples. ***Sexually Transmitted Infections*** 93:A41. [BMJ]

11. Puthenveetil, R., **Kumar S.**, Caimano, M. J., Dey, A., Anand, A., Vinogradova, O., and Radolf, J. D. (2017) The major outer sheath protein forms distinct conformers and multimeric complexes in the outer membrane and periplasm of *Treponema denticola*. ***Scientific Reports*** 7, 13260. [Scientific Reports]

10. Radolf J.D., **Kumar S**. The *Treponema pallidum* Outer Membrane. In: ***Current Topics in Microbiology and Immunology***, 2017. Springer, Berlin, Heidelberg. doi:10.1007/82_2017_44. [PubMed]

9. Gupta A+, **Kumar S+**, Prasoodanan VP, Harish K, Sharma AK, Sharma VK. (2016) Reconstruction of bacterial and viral genomes from multiple metagenomes. (+equal contribution). ***Frontiers in Microbiology***.[Frontiers]

8. Sharma AK, **Kumar S**, Harish K, Dhakan DB, Sharma VK. (2016) Prediction of peptidoglycan hydrolases-a new class of antibacterial proteins. ***BMC Genomics***. 17(1):411. [PubMed]

7. Sharma AK, Gupta A, **Kumar S**, Dhakan DB, Sharma VK. (2015) Woods: A fast and accurate functional annotator and classifier of genomic and metagenomic sequences. ***Genomics***.106(1):1-6. [ScienceDirect]

6. Puniya BL, Kulshreshtha D, Verma SP, **Kumar S**, Ramachandran S. (2013) Integrated gene co-expression network analysis in the growth phase of *Mycobacterium tuberculosis* reveals new potential drug targets. ***Molecular BioSystems***. 9(11):2798-815. [PubMed]

5. **Kumar S**, Puniya BL, Parween S, Nahar P, Ramachandran S. (2013) Identification of novel adhesins of *M. tuberculosis* H37Rv using integrated approach of multiple computational algorithms and experimental analysis. ***PloS One***. 8(7): e69790.[PubMed]

4. Kumar A+, **Kumar S+**, Kumar D, Mishra A, Dewangan RP, Shrivastava P, et al. (2013) The structure of Rv3717 reveals a novel amidase from *Mycobacterium tuberculosis*. (+equal contribution). ***Acta Crystallographica Section D***: Biological Crystallography. 69(12):2543-54. PDB ID: **4LQ6**. [PubMed]

3. Kumar N, Shukla S, **Kumar S**, Suryawanshi A, Chaudhry U, Ramachandran S, et al. (2008) Intrinsically disordered protein from a pathogenic mesophile *M. tuberculosis* adopts structured conformation at high temperature. ***Proteins****: Structure, Function, and Bioinformatics*. 71(3):1123-33. [PubMed]

2. Sindhu N, Sharma A, **Kumar S**, Jain V. (2007) Polymerase chain reaction assay for detection of *Staphylococcus aureus* in buffalo milk. ***Italian Journal of Animal Science***. 6(sup2):862-4. [TandFonline]

1. **Sanjiv K**, Puran C. (2006) Molecular diagnosis of brucellosis using polymerase chain reaction. ***Journal of Immunology and Immunopathology***. 8(2):0972-561. [IndianJournals]

References

References Available Upon Request.