Dr. Umesh Varshney, *FNA, FASc, FNASc, FTWAS*
J. N. Tata Chair Professor
Department of Microbiology and Cell Biology,
Indian Institute of Science, Bangalore 560 012. India.

(i) Name: Umesh Varshney

(ii) Date & Place of Birth: Oct. 26, 1957. Vill. & P. O. Gonda, District- Aligarh 202123

(iii) Present Position/designation: J. N. Tata Chair Professor.

(iv) Address with Tel/Fax: Department of Microbiology and Cell Biology, Indian Institute of Science, Bangalore 560012, India, Tel: 080-2360 0169; 080-2293 2686; Fax: 080-2360 2697; E-mail: varshney@iisc.ac.in

(v) Academic Qualifications (B. Sc. onwards):

Ph. D. (1985) Biochemistry with specialization in Molecular Biology, the University of Calgary, Calgary, Canada, Thesis Title: 'Structure and expression of human metallothionein gene family'.

M. Sc. (1979) Microbiology with minor in Biochemistry, the G. B. Pant University of Agriculture and Technology, Pantnagar, 263145, India.

B. Sc. (1975) Chemistry, Botany and Zoology, Jiwaji University, Gwalior, 474011, India.

(vi) Positions held (in chronological order):

2021- : Dean, Faculty of Science, Indian Institute of Science, Bangalore, 560012.

2020- : J. N. Tata Chair Professor, Indian Institute of Science, Bangalore, 560012.

2016-2020: Chair, Division of Biological Sciences, Indian Institute of Science, Bangalore, 560012.

2015-2016: Dean, UG Program, Indian Institute of Science, Bangalore, 560012.

2013-2016: Chair, Department of Microbiology and Cell Biology, Indian Institute of Science, Bangalore, 560012.

2010-2015: Co-ordinator, UG Biology, Indian Institute of Science, Bangalore 560012.

2009- : Honorary Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Jakkur, Bangalore.

2007-2009: Co-ordinator, Integrated Ph. D. Program, Indian Institute of Science, Bangalore, 560012.

2002- : Professor, Department of Microbiology and Cell Biology, Indian Institute of Science, Bangalore, 560012.

1997-2002: Associate Professor, Department of Microbiology & Cell Biology, Indian Institute of Science, Bangalore, 560012.

1991-1997: Assistant Professor, Indian Institute of Science, Bangalore, India.

1988-1991: Post-doctoral research associate at Massachusetts Institute of Technology, Cambridge, MA, USA

1985-1988: Alberta Heritage Foundation for Medical Research post-doctoral fellow, Department of Medical Biochemistry, University of Calgary, Calgary, Canada.

1986-1987: Sessional instructor (part-time), Department of Biology, University of Calgary, Calgary, Canada.

(vii) Fellowship/Membership of academies/societies/professional bodies.

1. Fellow, The World Academy of Sciences, Trieste, Italy (2019)
2. Fellow, Indian National Science Academy, New Delhi (2008)
3. Fellow, The National Academy of Sciences (India), Allahabad, (2008)
4. Fellow, Indian Academy of Sciences, Bangalore (2002)
5. Elected member, Guha Research Conference, India (1998)
6. Life member, Society of Biological Chemists (India), Bangalore, India
7. Life member, Indian Cell Biology Society, New Delhi
8. Member, American Society for Microbiology, USA
9. Member, American Society for Biochemistry and Molecular Biology, USA

(viii) Awards/recognitions:

1. J N Tata Chair (by Jamsetji Tata Trust) at Indian Institute of Science, Bangalore (2020).
2. Goyal Prize, 2018 (*awarded 2019*).
3. Alumni Award for Excellence in Research for Science for 2019, Indian Institute of Science, Bangalore.
4. President, Society of Biological Chemists (India), 2017- 2018.
5. Council Member, FAOBMB (2017-)
6. Outstanding alumnus of the College of Basic Science and Humanities, G. B. Pant University of Agriculture and Technology, Pantnagar, 2016.
7. G. N. Ramachandran Gold Medal for Excellence in Biological Sciences & Technology, 2014 (CSIR).
8. Sir Walter Murdoch Distinguished Collaborator, Murdoch University, Murdoch, Australia (2013-2016).
9. Ranbaxy Research Awards, Medical Sciences- Basic Research, 2012.
10. Honorary Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore (2009-)
11. J. C. Bose National Fellowship, 2008- (DST, New Delhi).
12. Life Sciences Research Award, 2002, Novo Nordisk Education Foundation, India.
13. Shanti Swarup Bhatnagar Prize in Biological Sciences, 2001 (CSIR, New Delhi).
14. P. S. Sarma Memorial Award, 2001, Society of Biological Chemists (I), Bangalore.
15. First National Bioscience Career Development Award, 1999 (DBT, New Delhi).

(ix) Oration awards:

1. The 34th Foundation day oration, Institute of Life Sciences, Bhubaneshwar, Odisha (Feb. 11, 2023).

2. Annual Endowment Lecture, 2022 of the Department of Biochemistry, University of Hyderabad, Hyderabad.
3. Prof. J Das Memorial Lecture Award for year 2021 (selected for in 2022), Indian Cell Biology Society.
4. Prof. J. V. Bhat Endowment Oration 2016, Manipal University, Manipal.
5. 69th CSIR Foundation day lecture at Indian Institute of Chemical Biology, Kolkata (Sept. 26, 2011)

(x) Chair/Member of the Task Forces of the Funding Agencies:

1. Co-Chair, Special -TEC- Indian Tuberculosis Genomic Surveillance Consortium, Department of Biotechnology, New Delhi (2022-2025).
2. Chair, National Biotech URJIT (University Research Joint Industry Translational) Cluster Steering Committee, Department of Biotechnology, New Delhi (2022-).
3. Member, The Biotechnology APEX Board of the Department of Biotechnology (DBT Apex Board), DBT, New Delhi (2022-).
4. Chair, Program Advisory Committee on Interdisciplinary Biological Sciences, Science and Engineering Research Board, Department of Science and Technology, New Delhi.
5. Chair, Early Career Fellowship Committee, Wellcome-Trust DBT-India Alliance (2018-2021)
6. Co-Chair, Technical Expert Committee on Basic Research in Modern Biology, DBT, New Delhi (2018- 2022)
7. Member, Scientific & Technical Appraisal & Advisory Group on Knowledge Generation and Discovery Research, New Tools and Technologies, DBT, New Delhi (2018-2022)
8. Chair, Infectious Diseases Task Force, DBT, New Delhi (2014-2017)
9. Member, The Wellcome Trust - DBT India Alliance Early Career Fellowship Committee (2012-2018)
10. Member, Animal Sciences and Biotechnology Research, CSIR (2015-2018)
11. Member, Technical Advisory Committee, Centres of Excellence and Innovation in Biotechnology, DBT, New Delhi (2014-2016)
12. Co-Chair, Infectious Diseases Task Force, DBT, New Delhi (2009-2014)
13. Member, Expert Committee on Tuberculosis, DBT, New Delhi (2009-2014)
14. Member, Task Force on Basic Research in Modern Biology, DBT, New Delhi (2009-2011).

(xi) Chair/Member Research Advisory Committees/Governing Councils/Sectional Committees

1. Chair, PAC, Regional Centre for Biotechnology, Faridabad (2022-)
2. Chair, RAP-SAC, National Institute of Plant Genomics Research, New Delhi (2022-)
3. Chair, RC, CSIR-Institute of Microbial Technology, Chandigarh (2020-)

4. Convenor, Sectional Committee on General Biology, Indian Academy of Sciences, Bangalore (2019- 2021)
5. Member, Scientific Advisory Board, InStem, Bangalore (2022-)
6. Member, RC, CSIR-Centre for Cellular and Molecular Biology, Hyderabad (2017-2020).
7. Member, RAP-SAC, National Institute of Immunology, New Delhi (2012- 2018).
8. Member, RAP-SAC, Centre for DNA Fingerprinting and Diagnosis (2008-2018).
9. Member, Governing Council, Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram (2009- 2021).
10. Member, RC, CSIR-Institute of Genomics and Integrative Biology, Delhi (2013-2016).
11. Member, RAP-SAC, National Centre for Cell Sciences, Pune (2013-2015).
12. Member, RC, CSIR-Institute of Microbial Technology, Chandigarh (2008-2010).
13. Member, Governing Council, National Centre for Cell Sciences, Pune (2010-2013).
14. Member, Senate, Indian Institute of Science Education and Research, Thiruvananthapuram (2009-2014).
15. Member, Academic Advisory Committee, Indian Institute of Science Education and Research, Thiruvananthapuram (2009-2014).
16. Member, Scientific Advisory Committee, Sir Dorabji Tata Centre for Tropical Diseases, Indian Institute of Science, Bangalore (2000-2011).

(xii) Editorial Board Member/Reviewer

1. Associate Editor, J. Genet., Indian Academy of Sciences (2016-2020)
2. Member, Editorial Board, Indian Journal of Biochemistry and Biophysics (past).
3. Reviewer for international journals in molecular, general biology and general science (Nature, Nature Microbiol., Nature Commun., Nucleic Acids Res., Science Advances, J. Biol. Chem., J. Mol. Biol., and numerous others).
4. Reviewer Ph. D. theses of numerous national and international Universities.

(xiii) National fellowship examinations

1. Convenor, Life Sciences, Joint CSIR-UGC NET for JRF/Lectureship (2016-)
2. Member, Co-ordination committee, Kishore Vaigyanik Protsahan Yojana (1999-2007)

(xiv) Current areas of research:

Research activities in my group are focused in the area of molecular biology of eubacteria. We use *Escherichia coli* and mycobacteria as model organisms and exploit various heterologous systems to address mechanistic evolutionary aspects relevant to protein synthesis, and DNA repair pathways. Advances in our understanding of the process of protein synthesis are fundamental to development of novel strategies in broader areas of biotechnology, medicine and agriculture. As to our studies in the area of DNA repair, it is

known that pathogenic mycobacteria are exposed to reactive oxygen species and reactive nitrogen intermediates within host macrophages. Both of these innate immune responses lead to DNA damage. Thus, we believe that our studies would contribute to the overall scientific endeavor of developing newer drug targets and the attenuated strains to control mycobacterial infections such as tuberculosis, which has attained the status of global human health problem.

(xv) List of publications in indexed journals:

1. Sah, S. and **Varshney, U.** (2023) Methionyl-tRNA formyltransferase utilizes 10-formyldihydrofolate as an alternate substate and impacts antifolate drug action. **Microbiology** (Reading), *in press*.
2. Naz, S., Paritosh, K., Sanyal, P. Khan, S., Singh, Y, **Varshney, U.** and Nandicoori, V.K. (2023) GWAS and functional studies suggest a role for altered DNA repair in the evolution of drug resistance in *Mycobacterium tuberculosis*. **eLife**, *in press*
3. Singh, J., Mishra, R., Ayyub, S. Hussain, T.*, and **Varshney, U.*** (2022) The initiation factor 3 (IF3) residues interacting with initiator tRNA elbow modulate the fidelity of translation initiation and growth fitness in *Escherichia coli*. **Nucleic Acids Res.** 50, 11712-11726. (doi.org/10.1093/nar/gkac1053)
4. Chowdhury, A. R., Sah, S., **Varshney, U.**, and Chakravortty, D. (2022) Salmonella Typhimurium outer membrane protein A (OmpA) renders protection from nitrosative stress of macrophages by maintaining the stability of bacterial outer membrane. **PLoS Pathog.** 18: e1010708. (doi.org/10.1371/journal.ppat.1010708)
5. Raj, P., Selvam, K., Roy, K., Tripathi, S. M., Kesharwani, S., Balasubramanian, G., **Varshney, U.** and Sundriyal, S. (2022) Identification of a new and diverse set of *Mycobacterium tuberculosis* is uracil-DNA glycosylase (*Mt*Ung) inhibitors using structure-based virtual screening: experimental validation and molecular dynamics studies. **Bioorg. Med. Chem. Letts.** (doi.org/10.1016/j.bmcl.2022.129008)
6. Lahry, K., Gopal, A., Sahu, A. K., Marbaniang, C. N., Shah, R.A., Mehta, A. and **Varshney, U.** (2022) An alternative role of RluD in the fidelity of translation initiation in *Escherichia coli*. **J. Mol. Biol.** 434, 167588. doi: 10.1016/j.jmb.2022.167588.
7. Kapoor, I., Shaw, A., Naha, A., Emam, E. A. F. and **Varshney, U.** (2022) Role of the nucleotide excision repair pathway proteins (UvrB and UvrD2) in recycling UdgB, a base excision repair enzyme in *Mycobacterium smegmatis*. **DNA Repair (Amst)** 113: article 103316. doi.org/10.1016/j.dnarep.2022.103316
8. Datta, M., Singh, J., Modak, M. J., Pillai, M. and **Varshney, U.** (2022) Systematic evolution of initiation factor 3 and the ribosomal protein uS12 optimizes *Escherichia coli* growth with an unconventional initiator tRNA. **Mol. Microbiol.** 117, 462-479. doi: 10.1111/mmi.14861.
9. Raja, S., Paul, A., Raghavan, S. Narayanan, S., Shee, S., Singh, A., **Varshney, U.**, Gopal, B. and Vijayan, M. (2022) Structural variability of *Mycobacterium tuberculosis* SSB and susceptibility to inhibition. **Current Science**, 122, 281-289.

10. Ray, U., Sharma. S, Kapoor, I., Kumari, S., Gopalakrishnan, V., Vartak, S.V., Nitu Kumari, N., **Varshney, U.** and Raghavan, S.C. (2021) G4 DNA present at human telomeric DNA contributes towards reduced sensitivity to γ-radiation induced oxidative damage, but not bulky adduct formation. **Int. J. Radiation Biol.** 97, 1166-1180. doi: 10.1080/09553002.2021.1955997.

11. Naz, S., Dabral, S., Nagarajan, S. N., Arora, D., Singh, L.V., Kumar, P., Singh, Y., Kumar, D., **Varshney, U.*** and Nandicoori, V. K.*, (2021) Compromised base excision repair pathway in *Mycobacterium tuberculosis* imparts superior adaptability in the host. **PLoS Pathog.** 17: e1009452. doi.org/10.1371/journal.ppat.1009452

12. Mehta, A., Raj, P, Sundriyal, S. Balasubramanian, G. and **Varshney, U.** (2021) Use of a molecular beacon based fluorescent method for assaying uracil DNA glycosylase (Ung) activity and inhibitor screening. **Biochem. Biophys. Rep.** 26, doi.org/10.1016/j.bbrep.2021.100954

13. Datta, M., Pillai, M., Modak, M. J., Liiv, A., Khaja, F. T., Hussain, T., Remme, J. and **Varshney, U.** (2021) A mutation in the ribosomal protein uS12 reveals novel functions of its universally conserved PNSA loop. **Mol. Microbiol.** 115, 1292–1308 (doi: 10.1111/mmi.14675).

14. Shetty, S. and **Varshney, U.** (2020) Regulation of translation by one-carbon metabolism in bacteria and the eukaryotic organelles. **J. Biol. Chem.** 296, 100088 doi:10.1074/jbc.REV120.011985.

15. Lahry, K., Gopal, A., Sah, S., Shah, R. A. and **Varshney, U.** (2020) Metabolic flux of N^{10}-formyltetrahydrofolate plays a critical role in the fidelity of translation initiation in *Escherichia coli*. **J. Mol. Biol.** 432, 5473-5488. doi: 10.1016/j.jmb.2020.08.003.

16. Raj, P., Karthik, S, Arif, S. M., **Varshney, U**. and Vijayan, M. (2020) Aggregation, plasticity and enzyme action of *Mycobacterium smegmatis* MutT1. **Acta Cryst. D** 76, 982–992 (doi.org/10.1107/S2059798320010992).

17. Sah, S., Lahry, K., Talwar, C., Singh, S. and **Varshney, U.** (2020) Monomeric NADH-oxidizing methylenetetrahydrofolate reductases from *Mycobacterium smegmatis* lack flavin coenzyme. **J. Bacteriol.** 202, e00709-19. doi: 10.1128/JB.00709-19.

18. Kapoor, I. and **Varshney, U.** (2020) Diverse roles of nucleoside diphosphate kinase in genome stability and growth fitness. **Curr. Genet.** 66, 671-682. doi: 10.1007/s00294-020-01073-z.

19. Tharp, J. M., Krahn, N., **Varshney, U.** and Söll, D. (2020) Hijacking Translation initiation for synthetic biology. **Chembiochem.** 21, 1387-1396. doi: 10.1002/cbic.202000017.

20. Kurthkoti, K., Kumar, P., Sang, P. B., **Varshney, U.** (2020) Base excision repair pathways of bacteria: new promise for an old problem. **Future Med Chem.** 12, 339-355. doi: 10.4155/fmc-2019-0267.

21. Ayyub, S. A. and **Varshney, U.** (2020) Translation initiation in mammalian mitochondria: a prokaryotic perspective. **RNA Biol.** 17, 165-175. doi: 10.1080/15476286.2019.1690099.

22. Kapoor, I., Emam, E. A. F., Shaw, A. and **Varshney, U.** (2019) Nucleoside diphosphate kinase escalates A to C mutations in MutT deficient strains of *Escherichia coli*. **J. Bacteriol.** pii: JB.00567-19. doi: 10.1128/JB.00567-19.

23. Kapoor, I., Varada, R., Aroli, S. and **Varshney U**. (2019) Nudix hydrolases with Coenzyme A (CoA) and acyl-CoA pyrophosphatase activities confer growth advantage to *Mycobacterium smegmatis*. **Microbiology** (Reading) 165, 1219-1232. doi: 10.1099/mic.0.000850

24. Datta, M., Aroli, S., Karmakar, K., Dutta, S., Chakravortty, D. and **Varshney, U**. (2019) Development of mCherry tagged UdgX as a highly sensitive molecular probe for specific detection of uracils in DNA. **Biochem Biophys Res Commun.** 518, 38-43. doi: 10.1016/j.bbrc.2019.08.005.

25. Ravi, V., Jain, A., Khan, D., Ahamed, F., Mishra, S., Giri, M., Inbaraj, M., Krishna, S., Sarikhani, M., Maity, S., Kumar, S., Shah, R. A., Dave, P., Pandit, A. S., Rajendran, R., Desingu, P. A., **Varshney, U.**, Das, S., Kolthur-Seetharam, U., Rajakumari, S., Singh, M., Sundaresan, N. R. (2019) SIRT6 transcriptionally regulates global protein synthesis through transcription factor Sp1 independent of its deacetylase activity. **Nucleic Acids Res.** 47, 9115-9131. doi: 10.1093/nar/gkz648.

26. Ahn, W. C., Aroli, S., Kim, J. H, Moon, J. H., Lee, G. S., Lee, M. H., Sang, P. B., Oh, B. H., **Varshney, U.***, and Woo, E. J.* (2019) Covalent binding of uracil DNA glycosylase UdgX to abasic DNA upon uracil excision. **Nat. Chem. Biol.** 15, 607-614. [*Co-corresponding authors].

27. Shah, R., Varada, R., Sah, S. Shetty, S. Lahry, K. Singh, S., **Varshney, U.** (2019) Rapid formylation of the cellular initiator tRNA population makes a crucial contribution to its exclusive participation at the step of initiation. **Nucleic Acids Res.** 47, 1908-1919. doi: 10.1093/nar/gky1310.

28. Govindan, A., Ayyub, S. A. and **Varshney, U.** (2018) Sustenance of *Escherichia coli* on a single $tRNA^{Met}$. **Nucleic Acids Res.** 46,115 66-11574. doi:.

29. Datey, A., Sreenivas, A., Chandrasekharan, G, Joseph, A., Sah, S., Saha, S., Aluri, S., **Varshney, U.*** and Chakravortty, D.* (2018) Rewiring of one carbon metabolism in Salmonella serves as an excellent live vaccine against systemic salmonellosis. **Vaccine** 36, 7715-7727. doi: 10.1016/j.vaccine.2018.10.079. [*Co-corresponding authors].

30. Singh, A., Arif, S. M., Sang, P. B., **Varshney, U.** and Vijayan, M. (2018) Structural insights into the specificity and catalytic mechanism of mycobacterial nucleotide pool sanitizing enzyme MutT2. **J. Struct. Biol.** 204, 449-456. doi: 10.1016/j.jsb.2018.10.002.

31. Govindan, A., Miryala, S., Mondal, S. and **Varshney, U.** (2018) Development of assay systems for amber codon decoding at the steps of initiation and elongation in mycobacteria. **J. Bacteriol.** 200, pii: JB.00372-18. doi: 10.1128/JB.00372-18.

32. Ayyub, S., Lahry, K., Dobriyal, D., Mondal, S. and **Varshney, U.** (2018) Antimicrobial activity of fusidic acid in *Escherichia coli* is dependent on the relative levels of ribosome recycling factor (RRF) and elongation factor G (EFG). **FEMS Microbiol. Lett.** 365, doi: 10.1093/femsle/fny133.
33. Sah, S., Shah, R. A., Govindan, A., Varada, R., Rex, K. and **Varshney, U.** (2018) Utilization of 10-formyldihydrofolate as substrate by dihydrofolate reductase (DHFR) and 5-aminoimidazole-4-carboxamide ribonucleotide (AICAR) tranformylase/IMP cyclohydrolase (PurH) in *Escherichia coli*. **Microbiology** (Reading) 164, 982-991. doi: 10.1099/mic.0.000671.
34. Shah, R. A., Shetty, S. and **Varshney, U.** (2018) Role of the two highly conserved features of initiator tRNAs in initiation of proteins synthesis in eubacteria. **Proc. Indian Natl. Sci. Acad.** 84, 429-438 doi: 10.16943/ptinsa/2018/49343
35. Singh, A., Vijayan, M. and **Varshney, U.** (2018) Distinct properties of a hypoxia specific paralog of single stranded DNA binding (SSB) protein in mycobacteria. **Tuberculosis (Edinb)** 108, 16-25. doi.org/10.1016/j.tube.2017.10.002.
36. Agrawal, P., Varada, R., Sah, S., Bhattacharyya, S. and **Varshney, U.** (2018) Species specific interactions of Arr with RplK mediate stringent response in bacteria. **J. Bacteriol.** 200, e00722-17. doi: 10.1128/JB.00722-17.
37. Ayyub, S. A., Dobriyal, D., Shah, R. A., Lahry, K., Bhattacharyya, M., Bhattacharyya S., Chakrabarti, S. and **Varshney, U.** (2018) Coevolution of the translational machinery optimizes initiation with unusual initiator tRNAs and initiation codons in mycoplasmas. **RNA Biol.** 15, 70-80. doi: 10.1080/15476286.2017.1377879.
38. Ayyub, S. A., Aswathy S. L., Dobriyal, D., Srinivas A., Spremulli, L. L. and **Varshney, U.** (2018) Fidelity of translation in the presence of mammalian mitochondrial initiation factor 3. **Mitochondrion** 39, 1-8. doi: 10.1016/j.mito.2017.08.006.
39. Arif, S. M., **Varshney, U.** and Vijayan, M. (2017) Hydrolysis of diadenosine polyphosphates. Exploration of an additional role of *Mycobacterium smegmatis* MutT1. **J. Struct. Biol.** 199, 165-176. doi: 10.1016/j.jsb.2017.07.002.
40. Ayyub, S. A., Dobriyal, D. and **Varshney, U.** (2017) Contributions of the N- and C-terminal domains of initiation factor 3 to its functions in the fidelity of initiation and antiassociation of the ribosomal subunits. **J. Bacteriol.** 199, e00051-17. (doi: 10.1128/JB.00051-17).
41. Chembazhi, U., Patil, V., Sah, S., Reeves, W., Tiwari, R., Woo, E-J. and **Varshney, U.** (2017) Uracil DNA glycosylase (UDG) activities in *Bradyrhizobium diazoefficiens*: characterization of a new class of UDG with broad substrate specificity. **Nucleic Acids Res.** 45, 5863-5876. doi: 10.1093/nar/gkx209
42. Arif, S. M., Patil, A. G., **Varshney, U.** and Vijayan, M. (2017) Biochemical and structural studies of *Mycobacterium smegmatis* MutT1, a sanitization enzyme with unusual modes of association. **Acta Cryst. D** 73, 349–364. doi: 10.1107/S2059798317002534

43. Bianco P. R., Pottinger, S., Tan, H. Y., Nguyenduc, T., Rex, K., **Varshney, U.** (2017) The IDL of *E. coli* SSB links ssDNA and protein binding by mediating protein-protein interactions. **Protein Sci.** 26, 227-241. doi: 10.1002/pro.3072
44. Shetty, S., Shah, R., Chembazhi, U. V., Sah, S. and **Varshney, U.** (2017) Two highly conserved features of bacterial initiator tRNAs license them to pass through distinct checkpoints in translation initiation. **Nucleic Acids Res.** 45, 2040-2050. doi: 10.1093/nar/gkw854
45. Shetty, S. and **Varshney, U.** (2016) An evolutionarily conserved element in initiator tRNAs prompts ultimate steps in ribosome maturation. **Proc. Natl. Acad. Sci. (USA)** 113, E6126-E6134.
46. Singh, A., **Varshney, U.** and Vijayan, M. (2016) Structure of the second single stranded DNA binding protein (SSBb) from *Mycobacterium smegmatis*. **J. Struct. Biol.** 196, 448-454.
47. Qin, B., Yamamoto, H., Ueda, T., **Varshney, U.**, Nierhaus, K. H. (2016) The termination phase in protein synthesis is not obligatorily followed by the RRF/EF-G dependent recycling phase. **J. Mol. Biol.** 428, 3577-3587.
48. Bhattacharyya, S. and **Varshney, U.** (2016) Evolution of initiator tRNAs and selection of methionine as the initiating amino acid. **RNA Biol.** 13, 810-819.
49. Aluri, S., Sah, S, Miryala, S. and **Varshney, U.** (2016) Physiological role of methylenetetrahydrofolate dehydrogenase (FolD), methenyltetrahydrofolate cyclohydrolase (FchA) and formyltetrahydrofolate synthetase (Fhs) from *Clostridium perfringens* in a heterologous model of *Escherichia coli*. **Microbiology** (Reading) 162, 145-155.
50. Sang, P. B., Srinath, T., Patil, A. G., Woo, E. J., **Varshney, U.** (2015) A unique uracil-DNA binding protein of the uracil DNA glycosylase superfamily. **Nucleic Acids Res.** 30, 8452-8463.
51. Aluri, S., Rex, K. and **Varshney, U.** (2015) Simultaneous presence of *fhs* and *purT* genes is disadvantageous for the fitness of *Escherichia coli* growth. **FEMS Microbiol. Lett.** Jul;362(14). pii: fnv101. Doi: 10.1093/femsle/fnv101
52. Arif, S. M., Geethanandan, K., Mishra, P., Surolia, A., **Varshney, U.**, Vijayan, M. (2015) Structural plasticity in *Mycobacterium tuberculosis* uracil-DNA glycosylase (MtUng) and its functional implications. **Acta Crystallogr. D Biol. Crystallogr.** 71, 1514-1527.
53. Shetty, S., Bhattacharyya, S. and **Varshney, U.** (2015) Is the cellular initiation of translation an exclusive property of the initiator tRNAs? **RNA Biol.** 12, 675-680.
54. Sah, S. and **Varshney, U.** (2015) Impact of mutating the key residues of a bifunctional 5,10-methylenetetrahydrofolate dehydrogenase-cyclohydrolase (FolD) from *Escherichia coli* on its activities. **Biochemistry** 54, 3504-3513.
55. Agrawal, P., Miryala, S. and **Varshney, U.** (2015) Use of *Mycobacterium smegmatis* deficient in ADP-ribosyltransferase as surrogate for *Mycobacterium tuberculosis* in drug testing and mutation analysis. **PLoS ONE** 10, e0122076.

56. Sah, S., Aluri, S., Rex, K. and **Varshney, U.** (2015) One-carbon metabolic pathway rewiring in *Escherichia coli* reveals an evolutionary advantage of 10-formyltetrahydrofolate synthetase (Fhs) in survival under hypoxia. **J. Bacteriol.** 197, 717-726.
57. Shetty, S., Nadimpalli, H., Shah, R. A., Arora, S., Das, G. and **Varshney, U.** (2014) An extended Shine-Dalgarno sequence in mRNA functionally bypasses a vital defect in initiator tRNA. **Proc. Natl. Acad. Sci. (USA)** 111, E4224-4233.
58. Sharma, R., Zaveri, A., Gopalakrishnapai, J., Thiruneelakantan, S., **Varshney, U.** and Visweswariah, S. (2014) Paralogous cAMP-receptor proteins (CRP) in *Mycobacterium smegmatis* show biochemical and functional divergence. **Biochemistry** 53, 7765-7776.
59. Roy, A., **Varshney, U.** and Pal, D. (2014) Avoiding acidic streaking in two-dimensional gel electrophoresis: case study with two bacterial whole cell protein extracts. **J. Biosci.** 39, 631-642.
60. Samhita, L., Nanjundiah, V. and **Varshney, U.** (2014) How many initiator tRNA genes does *Escherichia coli* need? **J. Bacteriol.** 196, 2607-2615.
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174. **Varshney, U.** and van de Sande, J. H. (1987) Use of ^{32}P dNTPs to enhance the radioactive signal of ^{35}S dNTPs in Sanger's DNA sequence analysis. **Biotechniques** 5, 410-411.
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(xv) List of short reviews/opinions:

182. **Varshney, U.** (2021) Book review: Annual Review of Microbiology, 2020 (Susan Gottesman and Caroline S. Harwood (eds)). **Current Science** 121, pp 1362-1363.
183. **Varshney, U.** (2019) Book review: Annual Review of Microbiology, 2018 (Eds. Susan Gottesman, Caroline S. Harwood and Olaf Schneewind) **Current Science** 117, pp 1537-1538.
184. Invited views article, 'Make Science an Attractive Career' (**Nature** Vol. 521, p154, 2015)

185. **Varshney, U.** (2007) Book review: Annual Review of Microbiology, 2006 (Eds. L. Nicholas Ornston et. al.) **Current Science** 92, pp 1633-1635.
186. **Varshney, U.** (1998) Book review: Concepts in Biotechnology (Editors: D. Balasubramanian, C. F. A. Bryce, K. Dharamlingam, J. Green and K. Jayaraman; University Press, India, Ltd., Hyderabad) **Ind. J. Biochem. Biophys.** 35, 131-132.
187. **Varshney, U.** (1996) Book review: Annual Review of Microbiology 1994 (Editors: N. Ornston, A. Belows and E. P. Greenberg; Annual Reviews Inc., 4139 E1 Camino Way, Palo Alto, CA, USA) **Current Science** 71, 421-422.
188. **Varshney, U.** (1994) Nobel prize for Chemistry. **Current Science** 66, 6-7.
189. **Varshney, U.** (1994) Nobel prize for Medicine or Physiology. **Current Science** 66, 8-9.

Special issue editor:

190. Edited a special issue of **Resonance** (Vol. 17, number 12, December 2012) on Har Gobind Khorana.
191. Edited a special issue of **J. Biosciences** (Vol. 31, October 2006) on History of tRNA Research.

(xvii) Supervision of Ph. D. theses (Completed, and awarded):

1. **Dr. Madhurima Datta,** 2021 (Title: Roles of the ribosomal protein uS12 and the initiation factor 3 in the maintenance of fidelity of translation in *Escherichia coli*).
2. **Dr. Kuldeep Lahry,** 2021 (Title: Roles of N^{10}-formyl-tetrahydrofolate (N^{10}-fTHF), ribosomal large subunit pseudouridine synthase D (RluD), and transcription-translation coupling in the fidelity of translation initiation in *Escherichia coli*).
3. **Dr. Indu Kapoor,** 2018 (Title: Studies on Nudix hydrolase proteins and crosstalk between DNA repair pathways).
4. **Dr. Riyaz Ahmad Shah,** 2018 (Title: Role of conserved features of initiator tRNA and ribosome heterogeneity in translation initiation in *Escherichia coli*).
5. **Dr. Ashwin Govindan,** 2018 (Title: Alternate fates of tRNAs in initiation and elongation).
6. **Dr. Priyanka Agrawal,** 2018 (Title: Physiological role of Arr, an ADP-ribosyltransferase in *Mycobacterium smegmatis*).
7. **Dr. Shreya Ahana Ayyub,** 2017 (Title: The role of initiation factor 3: insights from *E. coli*, mitochondria and mycoplasma).
8. **Dr. Sunil Shetty,** 2016 (Title: Initiation of protein synthesis: Role of the three consecutive GC base pairs in the anticodon stem of initiator tRNAs).
9. **Dr. Souvik Bhattacharyya,** 2016 (Title: Fidelity of translation initiation in *E. coli*: roles of the transcription-recycling factor RapA, 23S rRNA modifications, and evolutionary origin of initiator tRNA).
10. **Dr. Srinivas Aluri,** 2015 (Title: Physiological role of folate dehydrogenase in one

carbon metabolism of *Escherichia coli*).

11. **Dr. Pau Biak Sang,** 2015 (Title: DNA repair proteins in mycobacteria and their physiological importance).
12. **Dr. Smriti Ahuja,** 2013 (Title: The mechanism of decoding at the P-site of the ribosome and the role of 3 GC base pairs in targeting the initiator tRNA to the P-site of the ribosome).
13. **Dr. Laasya Samhita,** 2013 (Title: How much initiator tRNA does *Escherichia coli* need?).
14. **Dr. Sanjay Kumar Bharti,** 2011 (Title: Studies on the mechanism of uracil excision repair in *Escherichia coli* and structure-function relationship of single stranded DNA binding proteins from *Escherichia coli* and *Mycobacterium tuberculosis*).
15. **Dr. Suman Kapoor,** 2010 (Title: Study on the mechanism of initiator tRNA selection on the ribosomes during translation initiation and rescue of the stalled ribosomes by SsrA in *Escherichia coli*).
16. **Dr. Krishna Kurthkoti,** 2010 (Title: Physiological importance of DNA repair in mycobacteria).
17. **Dr. Anuradha Seshadri,** 2009 (Title: Mechanism of ribosome recycling in eubacteria and the impact of rRNA methylations on ribosome recycling and fidelity of initiation in *Escherichia coli*).
18. **Dr. N. Sadananda Singh,** 2007 (Title: Mechanism of recycling of ribosomes stalled on mRNAs in *Escherichia coli*).
19. **Dr. Gautam Das,** 2007 (Title: Studies on initiator tRNA selection on the ribosomes in *Escherichia coli*)
20. **Dr. Rahul Gaur,** 2007 (Title: Metabolism of queuosine, a modified nucleoside in *Escherichia coli* and *Caenorhabditis elegans* AND dual function of bovine mitochondrial initiation factor 1 and 2 in *Escherichia coli*).
21. **Dr. Pradeep Kumar,** 2005 (Title: DNA repair in mycobacteria).
22. **Dr. Narottam Acharya,** 2003 (Title: Mechanistic studies on uracil DNA glycosylases from *Escherichia coli* and mycobacteria: interaction with uracil containing DNA, single stranded DNA binding proteins (SSBs) and an inhibitor protein, Ugi).
23. **Dr. Arasada Rajeswara Rao,** 2002 (Title: Studies on ribosome recycling using mycobacterial ribosme recycling factor and elongation factor G).
24. **Dr. Mini Thomas,** 2002 (Title: Molecular design of novel peptide-based ligands for sequence specific recognition of double stranded DNA). *Jointly with Prof. S. Bhattacharya, Department of Organic Chemistry, IISc.*
25. **Dr. Priya Handa,** 2001 (Title: Mutational analyses of *Escherichia coli* uracil DNA glycosylase and studies on interaction between single stranded DNA binding proteins and uracil DNA glycosylases from *Escherichia coli* and *Mycobacterium tuberculosis*).
26. **Dr. Swapna Thanedar,** 2000 (Title: Use of formylation defective initiator tRNAs in the

study of significance of formylation in initiation of protein synthesis in *E. coli*).

27. **Dr. Kedar Purnapatre,** 1999 (Title: Uracil DNA glycosylase from mycobacteria and *Escherichia coli*: mechanism of uracil excision from synthetic substrates and differential interaction with uracil DNA glycosylase inhibitor (Ugi) and single stranded DNA binding proteins (SSBs).
28. **Dr. Nandicoori Vinay Kumar,** 1999 (Title: Mechanism of uracil excision from different structural contexts of DNA oligomers by *E. coli* uracil DNA glycosylase and its applications).

(xviii) Supervision of M.S. theses:

1. **Mr. Ullas Chembazhi,** 2016 (Title: A Novel Family of Uracil DNA glycosylases).
2. **Ms. Aparna Oruganty,** 2007 (Title: Role of queuosine in codon-anticodon recognition).
3. **Mr. Sanjay Kumar Bharti,** 2005 (Title: Structural and functional analysis of hook forming region of *Mtu*SSB in *Escherichia coli*).
4. **Ms. Laasya Samhita,** 2004 (Title: Significance of multiple copies of initiator tRNA genes in *Escherichia coli*).
5. **Ms. Vasupradha Vethantham,** 2001 (Title: On the importance of formylation in eubacterial translation initiation).
6. **Mr. Shaillay Kumar Dogra,** 2001 (Title: Towards an understanding of ribosome recycling factor: *in silico* and *in vivo* approaches).
7. **Ms. Anahita Dastur,** 2000 (Title: Use of XylE as a reporter system: promoter analysis of the initiator $tRNA^{fMet}$ gene from *M. tuberculosis* and comparison with the *M. smegmatis* promoter).
8. **Ms. Sneha Ramesh,** 1999 (Title: Mutational analysis of *M. tuberculosis metA* promoter and cloning of the initiator tRNA gene from *M. smegmatis*, and cloning and overexpression of histones, TH2A and TH2B, & RAD51).
9. **Ms. Nidhi Rumpal,** 1998 (Title: Investigation into mechanism of uracil excision by uracil DNA glycosylase from *Escherichia coli* and study on organization and copy number of initiator tRNA genes in slow- and fast- growing mycobacteria).

(xix) Organization of conferences/symposia

1. Organizer, G. N. Ramachandran birth centenary symposium (October 8, 2022, online), Indian Institute of Science, Bangalore and Central Leather Research Institute, Chennai.
2. Organizer, Khorana birth centenary symposium (August 30, 2022, online), Indian Academy of Sciences, Bangalore
3. Organizer (together with Profs. V. Nagaraja, U. Vijayraghavan, A. Singh and K. N. Balaji), international meeting on 'Biological Transactions: from Molecules to Organisms' Department of Microbiology and Cell Biology, Indian Institute of Science, Bangalore, Jan. 17-20, 2019.

4. Organizer (together with Prof. V. Nagaraja), international meeting on 'MCB75: From Molecules to Organisms' Department of Microbiology and Cell Biology, Indian Institute of Science, Bangalore, Dec. 11-14, 2015
5. Organizer (together with Prof. V. Ramakrishnan, MRC, Cambridge) Workshop on Protein Synthesis, Dec. 21-28, 2012, Indian Institute of Science, Bangalore, 560012.
6. Organizer, international meeting 'From Innovations in Nucleic Acids Research to Regulation of Biological Processes', Indian Institute of Science, Bangalore, Dec. 17-19, 2011.
7. Organizer, Guha Research Conference, India, 2009 (together with Profs. S. Das and T. Kundu).
8. Organizer, 21st International tRNA Workshop, 2005.
9. Organizer, The First RNA Group meeting of India, 2003