

# Rohit Farmer

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## Research Summary

I have ten years of interdisciplinary research experience, applying computational methods at the intersection of biology, chemistry, and medicine. I am building tools to analyze single-cell data on multiple platforms in my current position at CHI, NIH. In the past, I have worked on applying deep learning to large-scale molecular data to understand drug bioactivation and toxicity. I have also worked with protein structure/complex prediction, modeling protein-protein interactions, molecular dynamics simulations, virtual screening, and sequence analysis.

## Teaching & Research Experience

|                  |                                 |   |
|------------------|---------------------------------|---|
| 2019- <i>now</i> | Computational Biologist         | National Institutes of Health, USA<br>Center for Human Immunology   |
| 2018-2019        | Postdoctoral Research Associate | Washington University in St. Louis, USA<br>Department of Pathology and Immunology   |
| 2008-2019        | Assistant Professor             | Sam Higginbottom University of Agri., Tech. and Sci. (SHUATS), India<br>Department of Computational Biology and Bioinformatics (CBBI) |
| 2016-2018        | Associate Editor                | The Allahabad Journal of Science and Technology<br>(Formerly The Allahabad Farmer)  |

## Administrative Experience

|           |                                  |  |
|-----------|----------------------------------|--|
| 2015-2016 | International Training Associate | SHUATS, India<br>Directorate of International Education and Training |
|-----------|----------------------------------|--|

## Teaching Assignments

|           |  |                              |
|-----------|--|------------------------------|
| 2008      | Molecular Genetics (UG, MBGE-441)  | SHUATS, India                |
| 2009-2011 | Biomolecular Modelling (UG, BI-605)                                      | SHUATS, India                |
| 2012-2014 | <i>Assisted in teaching</i> Physical Biochemistry (UG, Bio143)           | University of Birmingham, UK |
| 2015-2017 | Concepts of Bioinformatics (UG, CBBI-502)                                | SHUATS, India                |
| 2015-2017 | Structural Bioinformatics (UG, CBBI-601)                                 | SHUATS, India                |
| 2015-2017 | Fundamentals of Bioinformatics and Information Technology (PG, CBBI-701) | SHUATS, India                |
| 2015-2017 | Computer Aided Drug Designing (PG, CBBI-803)                             | SHUATS, India                |

## Education

|           |  |   |
|-----------|--|---|
| 2011-2015 | Doctor of Philosophy (Ph.D.)<br>Biosciences  | University of Birmingham, UK  |
| 2008-2010 | Master of Technology (M.Tech.)<br>Bioinformatics <i>CGPA 9.35/10; Silver Medal</i> | Sam Higginbottom Institute of Agri., Tech. and Sci. (SHIATS), India |
| 2004-2008 | Bachelor of Technology (B.Tech.)<br>Biotechnology <i>CGPA 8.41/10</i>              | Allahabad Agricultural Institute, India                             |

## Certifications & Licenses

|      |   |  |
|------|---|--|
| 2021 | Amateur Radio Technician Class - KC3SNU               | Federal Communications Commission, USA |
| 2019 | Deep Learning with Python and Keras                   | Udemy                                  |
| 2019 | Python for Data Science and Machine Learning Bootcamp | Udemy                                  |
| 2017 | Algorithms for DNA Sequencing                         | Johns Hopkins University, Coursera     |

|      |                                 |                                    |
|------|---------------------------------|------------------------------------|
| 2017 | Python for Genomic Data Science | Johns Hopkins University, Coursera |
|------|---------------------------------|------------------------------------|

## Awards & Achievements

|           |   |   |
|-----------|---|---|
| 2014      | Travel grant, 28 <sup>th</sup> Annual Symposium of The Protein Society, USA               | Biochemical Society   |
| 2013      | Travel grant, 15 <sup>th</sup> EMBL PhD Symposium, Germany                                | EMBL  |
| 2013      | Travel grant, ISMB/ECCB'13, Germany   | National Science Foundation                                       |
| 2013      | George Parks travel grant, Molecular Perspectives On Protein-Protein Interactions, Poland | University of Birmingham  |
| 2012      | Travel grant, ECCB'12, Switzerland  | Swiss Foundation for Excellence and Talent in Biomedical Research |
| 2011-2014 | PhD scholarship   | The Darwin Trust of Edinburgh                                     |
| 2010      | Silver medal in M.Tech. Bioinformatics  | SHIATS  |

## Scientific Skills

**Computational Biology:** Single cell cytometry data analysis, molecular structure prediction, molecular docking, molecular dynamics simulation, bioinformatics

**Experimental Biology:** PCR, Gibson assembly, restriction digestion, plasmid transformation, microbiology techniques, HPLC

**Data Science & Machine Learning:** Data wrangling & visualization, feature engineering, dimensionality reduction, supervised & unsupervised learning, linear & mixed-effects modeling, deep-learning ~ Tidyverse, Lme4, NumPy, Pandas, SciPy, Matplotlib, Seaborn, Plotly, Scikit Learn, Keras, TensorFlow

**Operating Systems:** Linux, Mac OS X, MS Windows

**Computer Languages (Proficient):** R, Python, Perl

**Computer Languages (Familiar):** C++,  $\LaTeX$ , HTML, CSS, Java Script

**Database:** SQLite, Neo4J

**HPC:** SLURM, PBS

**Containers & VMs:** Docker, Singularity, Oracle Virtual Box

**VCS:** Git, Mercurial

## Transferable Skills Training

|      |  |   |
|------|--|---|
| 2018 | Mentorship Training Program                                  | Washington University in Saint Louis, USA |
| 2018 | Mentoring Undergraduate Research                             | Washington University in Saint Louis, USA |
| 2012 | Leading Academics, Leadership development program            | University of Birmingham, UK              |
| 2012 | One day course on Poster Presentations: Planning the Content | University of Birmingham, UK              |
| 2012 | Talent Pool, Training program on entrepreneurship            | University of Birmingham, UK              |
| 2012 | One day course on Speed Reading                              | University of Birmingham, UK              |
| 2011 | One day course on Time Management                            | University of Birmingham, UK              |

## Conferences Attended & Organised

|      |                                       |                     |
|------|---------------------------------------|---------------------|
| 2021 | CSHL Systems Immunology, Virtual      | Poster Presentation |
| 2020 | CSHL Biological Data Science, Virtual | Poster Presentation |

|      |   |                               |
|------|---|-------------------------------|
| 2019 | Symposium on Personal Control of Genomic Data for Research, USA                         | Participant                   |
| 2019 | FOCIS 2019, USA   | Participant                   |
| 2015 | National Conference on Bioinformatics Panorama in Agriculture and Health, India         | Sponsor Liaison               |
| 2014 | 1 <sup>st</sup> RSG-UK Student Symposium on Computational Biology and Life Sciences, UK | Secretary                     |
| 2014 | Synthetic Biology of Antibiotic Production II, Spain                                    | Short Talk                    |
| 2014 | The 28 <sup>th</sup> Annual Symposium of the Protein Society, USA,                      | Poster Presentation           |
| 2013 | 15 <sup>th</sup> EMBL PhD Symposium, Germany  | Short Talk                    |
| 2013 | ISMB/ECCB'13, Germany   | Poster Presentation           |
| 2013 | Molecular Perspectives On Protein-Protein Interactions, Poland                          | Poster Presentation           |
| 2012 | 11 <sup>th</sup> European Conference on Computational Biology, Switzerland              | Poster Presentation           |
| 2012 | 3 <sup>rd</sup> BEAR Postgraduate Conference on Research Computing, UK                  | Secretary and Sponsor Liaison |
| 2010 | The Eighth Asia Pacific Bioinformatics Conference, India                                | Poster Presentation           |
| 2009 | National Workshop on Functional Genomics and Proteomics, India                          | Participant                   |
| 2009 | International Conference on Open Source for Computer Aided Drug Discovery, India        | Poster Presentation           |

## Professional Memberships

|           |  |
|-----------|--|
| 2013-2014 | The Protein Society                                    |
| 2012-2015 | International Society for Computational Biology (ISCB) |
| 2012-2015 | Biochemical Society                                    |

## Extra Curricular Positions Held

|           |  |                          |
|-----------|--|--------------------------|
| 2013-2014 | Co-Founder and Secretary, Regional Student Group, UK | Student Council, ISCB    |
| 2011-2012 | Secretary, Bharat Parivar, Guild of Students         | University of Birmingham |
| 2009-2010 | Vice president for Society of Biotechnology          | SHIATS                   |

## Community Involvement

|           |  |
|-----------|--|
| 2019      | Reviewed 1 research article for MEEGID - Infection, Genetics and Evolution.        |
| 2020      | Reviewed 1 research article for Biophysical Journal.                               |
| 2020-2021 | Reviewed 2 research articles for the Journal of Biomolecular Structure & Dynamics. |
| 2021-2022 | Reviewed 3 research articles for ACS Omega.  |
| 2021      | Reviewed 1 research article for Textile Research Journal.                          |

## Software Developed

**HDStIM:** A high-dimensional approach for the identification and quantification of single-cell responses in stimulation-cytometry data. <https://niaid.github.io/HDStIM/>

## Publications

**Rohit Farmer.** Modelling polyketide synthases and related macromolecular complexes. *PhD Thesis. University of Birmingham*, 2015. <https://etheses.bham.ac.uk/id/eprint/5909/>

## Book Chapter

**Farmer R.\***, Thomas C. M., and Winn P. J. Modelling Polyketide Synthases and Similar Macromolecular Complexes. In: Wadhwa G., Shanmughavel P., Singh A., Bellare J. (eds) *Current trends in Bioinformatics: An Insight*. Springer, Singapore, 2018, 121-144. [https://doi.org/10.1007/978-981-10-7483-7\\_7](https://doi.org/10.1007/978-981-10-7483-7_7)

## Submitted Peer Reviewed Article(s)

Apps R., Biancotto A., Candia J., Kotliarov Y., Perl S., Cheung F., **Farmer R.**, Mule M. P., Chen J., Martins A. J., Shi R., Zhou H., Bansal N., Schum P., Olnes M. J., Milanez-Almeida P., Han K. L., Sellers B. A., Cortese M., Hagan T., Rouphael N., Pulendran B., King L., Manischewitz J., Khurana S., Golding H., Most R. G. van der, Dickler H. B., Germain R. N., Schwartzberg P. L., and Tsang J. S. High dimensional dynamic response pattern discovery reveals acute and persistent impacts of H5N1 vaccination with and without adjuvant, 2021.

## Published Peer Reviewed Articles

Google Scholar: *h-index 10, i10-index 11*, [http://bit.ly/rf\\_cite](http://bit.ly/rf_cite)

22. Flynn N. R., Ward M. D., Schleiff M. A., Laurin C. M. C., **Farmer R.**, Conway S. J., Boysen G., Swamidass S. J., and Miller G. P. Bioactivation of isoxazole-containing bromodomain and extra-terminal domain (bet) inhibitors. *Metabolites*, 11(6), 2021.
21. **Farmer R.**, Thomas C. M., and Winn P. J. Structure, function and dynamics in acyl carrier proteins. *PLOS ONE*, 14(7):1–17, 2019.
20. Konda A. K., **Farmer R.**, Soren K. R., P. S. S., and Setti A. Structural modelling and molecular dynamics of a multi-stress responsive WRKY TF-DNA complex towards elucidating its role in stress signalling mechanisms in chickpea. *Journal of Biomolecular Structure and Dynamics*, 36(9):2279–2291, 2018.
19. Dhusia K., Yadav P. K., **Farmer R.**, and Ramteke P. W. Inhibition of polyamine biosynthesis for toxicity control in *Serratia marcescens* strain WW4 by targeting ornithine decarboxylase: A structure-based virtual screening study. *International Journal of Computational Biology and Drug Design*, 11(1-2):114–134, 2018.
18. Lodhi S. S., **Farmer R.**, Jaiswal Y. K., and Wadhwa G. In Silico Structural, Virtual Screening and Docking Studies of Human Cytochrome P450 2A7 Protein. *Interdisciplinary Sciences: Computational Life Sciences*, 7(2):129, 2015.
17. Lodhi S. S., **Farmer R.**, Singh A. K., Jaiswal Y. K., and Wadhwa G. 3D structure generation, virtual screening and docking of human Ras-associated binding (Rab3A) protein involved in tumourigenesis. *Molecular Biology Reports*, 41(6):3951, 2014.
16. Khanim F., Davies N., Veliça P., Hayden R., Ride J., Pararasa C., Chong M. G., Gunther U., Veerapen N., Winn P. J., **Farmer R.**, Trivier E., Rigoreau L., Drayson M., and Bunce C. Selective AKR1C3 inhibitors do not recapitulate the anti-leukaemic activities of the pan-AKR1C inhibitor medroxyprogesterone acetate. *British Journal of Cancer*, 110(6):1506–1516, 2014.
15. Kumar S., **Farmer R.**, Turnbull A. P., Tripathy N. K., and Manjasetty B. A. Structural and functional conservation profiles of novel cathepsin L-like proteins identified in the *Drosophila melanogaster* genome. *Journal of Biomolecular Structure and Dynamics*, 31(12):1481–1489, 2013.
14. Haines A. S., Dong X., Song Z., **Farmer R.**, Williams C., Hothersall J., Płoskoń E., Wattana-Amorn P., Stephens E.R., Yamada E., Gurney R., Takebayashi Y., Masschelein J., Cox R. J., Lavigne R., Willis C. L., Simpson T. J., Crosby J., Winn P. J., Thomas C. M., and Crump M. P. A conserved motif flags acyl carrier proteins for  $\beta$ -branching in polyketide synthesis. *Nature Chemical Biology*, 9(11):685–692, 2013.
13. Singh S., Sablok G., **Farmer R.**, Singh A. K., Gautam B., and Kumar S. Molecular dynamic simulation and inhibitor prediction of cysteine synthase structured model as a potential drug target for trichomoniasis. *BioMed Research International*, 2013(390920), 2013.
12. Paital B., Kumar S., **Farmer R.**, and Chainy G. B. N. In silico prediction of 3D structure of Mn superoxide dismutase of *Scylla serrata* and its binding properties with inhibitors. *Interdisciplinary Sciences: Computational Life Sciences*, 5(1):69, 2013.

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11. Kumari S., Shridhar S., Singh D., Priya P., **Farmer R.**, Hundal J., Sharma P., Bavishi K., Schrick K., and Yadav G. The role of lectins and HD-ZIP transcription factors in isoprenoid based plant stress responses. *Proceedings of the Indian National Science Academy*, 78(4):671–691, 2012.
10. Lodhi S. S., **Farmer R.**, Singh A. K., Wadhwa M., Jaiswal Y. K., and Wadhwa G. Statistical analysis of differential gene expression profile for colon cancer. *Indian Journal of Biotechnology*, 11:396–403, 2012.
9. Gautam B., Singh G., Wadhwa G., **Farmer R.**, Singh S., Singh A. K., Jain P. A., and Yadav P. K. Metabolic pathway analysis and molecular docking analysis for identification of putative drug targets in *Toxoplasma gondii*: novel approach. *Bioinformation*, 8(3):134–141, 2012.
8. Fazil M. H. U. T., Kumar S., **Farmer R.**, Pandey H. P., and Singh D. V. Binding efficiencies of carbohydrate ligands with different genotypes of cholera toxin B: Molecular modeling, dynamics and docking simulation studies. *Journal of Molecular Modeling*, 18(1), 2012.
7. Paital B., Kumar S., **Farmer R.**, Tripathy N. K., and Chainy G. B. N. In silico prediction and characterization of 3D structure and binding properties of catalase from the commercially important crab, *Scylla serrata*. *Interdisciplinary Sciences: Computational Life Sciences*, 3(2):110–120, 2011.
6. Singh S., Singh G., Singh A. K., Gautam B., **Farmer R.**, Lodhi S. S., and Wadhwa G. Prediction and analysis of paralogous proteins in *Trichomonas vaginalis* genome. *Bioinformation*, 6(1):31–34, 2011.
5. Jeyakumar E., Lawrence R., **Farmer R.**, and Sahai S. *In vitro* and *In silico* analysis of xylanase produced by *Bacillus licheniformis*. *Applied Biological Research*, 13(1):17–27, 2011.
4. Yadav P. K., Singh R., Jain P. A., Singh S., Gautam B., and **Farmer R.** *In silico* epitope prediction for glycoprotein D in human herpes simplex virus-1. *Int J Pharm Sci Rev Res*, 7(2):148–153, 2011.
3. Yadav P. K., Sachan R., Tandon S., Singh S., Gautam B., **Farmer R.**, and Jain P. A. *In silico* study of heterodimerization of TLR2 and TLR6. *Int J Pharm Sci Rev Res*, 7(1):113–120, 2011.
2. Gautam B., Katara P., Singh S., and **Farmer R.** Drug target identification using gene expression microarray data of *toxoplasma gondii*. *International Journal of Biometrics and Bioinformatics (IJBB)*, 4(3):113, 2010.
1. **Farmer R.**<sup>†</sup>, Gautam B., Singh S., Yadav P. K., and Jain P. A. Virtual screening of AmpC/ $\beta$ -lactamase as target for antimicrobial resistance in *Pseudomonas aeruginosa*. *Bioinformation*, 4(7):290–4, 2010.

## Preprint

Rahman F., **Farmer, R.**, Das S., Vayani F. and Hassan M. Highlights of the 1<sup>st</sup> Student Symposium of the ISCB RSG UK. *F1000Research*, 4:154, 2015. <https://doi.org/10.12688/f1000research.6616.1>

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