

Arafat Rahman

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Education

- Ph.D. in Genetics, Genomics, and Bioinformatics, University of California, Riverside, CA, USA (2017-2023).
- M.S. in Microbiology, University of Dhaka, Dhaka, Bangladesh (cGPA 3.65, 2012-2013).
- B.S. in Microbiology, University of Dhaka, Dhaka, Bangladesh (cGPA 3.61, 2009-2012)

Research Experience

<i>Research Associate – Computational Biologist</i>	Plasmid dynamics of <i>Agrobacterium</i> and <i>Rhizobium</i> Weisberg Lab, Department of Botany and Plant Pathology, Oregon State University, Corvallis, OR	2026-Current
<i>Post-Doctoral Research</i>	Genomic Epidemiology and Evolution of <i>Agrobacterium vitis</i> Weisberg Lab, Department of Botany and Plant Pathology, Oregon State University, Corvallis, OR	2023-2026
<i>Ph.D. Dissertation</i>	How Competition Shapes the Fitness Landscape of Rhizobia Sachs Lab, University of California, Riverside, CA	2017-2023
<i>Research Assistant</i>	<i>Foot-and-Mouth Disease Virus Genomics and Epidemiology</i> Microbial Genetics and Bioinformatics Lab, Dept. of Microbiology, University of Dhaka, Dhaka, Bangladesh	2014-2015
<i>MSc Dissertation</i>	<i>Establishing silkworm as animal infection model for the screening of environmental, clinical, and veterinary pathogens</i> Advisor: Dr. M Anwar Hossain, Ph.D. Department of Microbiology, University of Dhaka	2013
<i>BSc Project</i>	<i>Development of Foot-and-Mouth Disease Virus Genotyping Tool</i> Advisor: Dr. M Anwar Hossain, Ph.D. Department of Microbiology, University of Dhaka	2012

Teaching Experiences

<i>Guest Lecturer</i> OSU	Lab Techniques in Plant Biology BOT332 Department of Botany and Plant Pathology Oregon State University, OR, USA	2025, 2026
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Lead Instructor Oxford BioDiscovery	Comprehensive Bioinformatics for Advanced Microbial Genomics (2 cohorts) Oxford BioDiscovery, Oxford, Oxfordshire, United Kingdom	2025
Teaching Assistant, MBL	Molecular and Cell Biology of Symbiosis, Marine Biological Laboratory (MBL), Woods Hole, MA, USA	May-June 2023
Teaching Assistant, UCR	BIOL102 – Introduction to Genetics (6 Quarters) BIOL 005C – Introduction to Evolution and Ecology Lab (3 Quarters) BIOL105 – Evolution (3 Quarters) BIOL05LA – Intro to Cell and Molecular Biology Lab (1 Quarters) University of California, Riverside, CA, USA	Fall 2018 – Fall 2022
Lecturer, NSTU	Department of Microbiology, Noakhali Science and Technology University, Noakhali, Bangladesh.	Oct 2015 – Sep 2017

Submitted Grants and Fellowships

1. Post-doctoral fellowship USDA NIFA AFRI 2026. Characterizing genetic determinants of host specialization in *Agrobacterium* (GRANT14627101).

First Authored Journal Publications

1. Sanath-Kumar R*, **Rahman, A***, Ren Z, Reynolds IP, Augusta L, Fuqua C, Weisberg AJ, Wang X. *Linear dicentric chromosomes in bacterial natural isolates reveal common constraints for replicon fusion*. **mBio**, 2025, e01046-25. *Co-first author
2. Jung JM*, **Rahman A***, Schiffer AM and Weisberg AJ, 2024. *Beav: a bacterial genome and mobile element annotation pipeline*. **mSphere**, 2024. pp.e00209-24. *Co-first author
3. **Rahman A**, Mancini M, Nadon C, Perez IA, Farsamin WF, Lampe MT, Le TH, Martínez LT, Weisberg AJ, Chang JH, Sachs JL. *Competitive interference among rhizobia reduces benefits to hosts*. **Current Biology**. 2023 Jul 24;33(14):2988-3001.
4. **Rahman A**, Islam MS, Saha O, Saha TC. *Molecular Evolutionary Analysis of α -Defensin Peptides in Vertebrates*. **Rajshahi University Journal of Science and Engineering**. 2016 Nov 19;44:85-93.
5. **Rahman A**, Sultana M, Uddin MA, Malek MA, Hossain M.A. *Silkworm as an animal infection model for the screening of environmental, clinical and veterinary pathogens*. **Bangladesh Medical Research Council Bulletin**. 2015;41(2):73-80.

Coauthored Journal Publications

1. Konup LA, Weisberg AJ, **Rahman A**, Schiffer AM, Janse LA, Konup AI, Pikovsky MY, Kyrk NN, Vuk AO, Ishchenko IA, Nikolaeva NI. *Crown Gall of Grapevine Caused by *Agrobacterium* in Ukraine*. **Mikrobiologichnyi Zhurnal**. 2026 Aug 10;88(2):3-17.
2. McGonigal P, **Rahman A**, Schiffer AM, Weisberg AJ, Nelson LM. *Phylogenetic analysis of *Allorhizobium vitis* strains in the Okanagan Valley, British Columbia, Canada*. **Plant Pathology** 75, no. 2: e70160.
3. Schiffer AM, **Rahman A**, Sutton W, Putnam ML, Weisberg AJ, 2025. *A comparison of short- and long-read whole-genome sequencing for microbial pathogen epidemiology*. **mSystems**, pp.e01426-25.
4. Sarkar MM, Rahman MS, Islam MR, **Rahman A**, Islam MS, Banu TA, Akter S, Goswami B, Jahan I, Habib MA, Uddin MM. *Comparative phylogenetic analysis and transcriptomic profiling*

- of Dengue (DENV-3 genotype I) outbreak in 2021 in Bangladesh. **Virology Journal**. 2023 Jun 19;20(1):127.
5. Weisberg AJ, **Rahman A**, Backus D, Tyavanagimatt P, Chang JH, Sachs JL. *Pangenome evolution reconciles robustness and instability of rhizobial symbiosis*. **Mbio** 2022 e00074-22.
 6. Chakrabarty RP, Alam AR, Shill DK, **Rahman A**. *Identification and qualitative characterization of new therapeutic targets in Stenotrophomonas maltophilia through in silico proteome exploration*. **Microbial Pathogenesis**. 2020 Jun 10:104293.
 7. Ahmed CS, Cui Y, Frie AL, Burr A, Kamath R, Chen JY, **Rahman A**, Nordgren T.M., Lin Y.H., Bahreini. R. *Exposure to Dimethyl Selenide (DMSe)-Derived Secondary Organic Aerosol Alters Transcriptomic Profiles in Human Airway Epithelial Cells*. **Environmental Science & Technology**. 2019 Nov 21;53(24):14660-9.
 8. Singha AC, **Rahman A**, Alam MJ, Mollah MNH. *Comparative Genome-Wide Association Studies using Canonical Correlation Analysis*. **International Journal of Statistical Sciences**. 2019 Vol. 18 2019 pp87-98.
 9. Siddique MA, Ali MR, Alam AS, Ullah H, **Rahman A**, Chakrabarty RP, Amin MA, Hoque SA, Nandi SP, Sultana M, Hossain MA. *Emergence of two novel sublineages Ind2001 BD 1 and Ind2001 BD 2 of foot-and-mouth disease virus serotype O in Bangladesh*. **Transboundary and Emerging Diseases**. 2018 Aug;65(4):1009-23.
 10. Rubayet-UI-Alam AS, **Rahman A**. *Selection analysis and phylogeographic simulation study of worldwide spread of Zika virus*. International Conference on Medical Engineering, Health Informatics and Technology (MediTec) 2016 Dec 17 (pp. 1-6). IEEE.
 11. Momtaz S, **Rahman A**, Sultana M, Hossain M.A. *Evolutionary analysis and prediction of peptide vaccine candidates for foot-and-mouth-disease virus types A and O in Bangladesh*. **Evolutionary Bioinformatics**. 2014 Jan;10:EBO-S17027.
 12. Sultana M, Siddique MA, Momtaz S, **Rahman A**, Ullah H, Nandi SP, Hossain MA. *Complete genome sequence of foot-and-mouth disease virus serotype O isolated from Bangladesh*. **Genome Announcements**. 2014 Feb 27;2(1).

Manuscript Under Review

1. **Rahman A**, Schiffer AM, Fuqua C, Woods RJ, Weisberg AJ. *Genomic insights into niche adaptation and the opportunistic infection potential of Agrobacterium pusense*. Microbiology Spectrum

Manuscript Under Preparation

1. **Rahman A**, Wagner N, Scott JC, Dung JKS, Schiffer AM, Pupko T, White RC, Savory EA, du Toit LJ, Grünwald NJ, Weisberg AJ, Chang JH. *Evolution and global spread of Xanthomonas hortorum pv. carotae in the context of agricultural modernization*
2. **Rahman A**, Torres-Martinez L, Weisberg AJ, Chang JH, Sachs JL. *Epidemic Bradyrhizobium haplotypes adapt to host metapopulations via acquisition of diverse, host-specific symbiosis ICEs*.

Conference Talks

1. **Rahman A**, Schiffer A, Hoekema S, Jung J, Weisberg A.J; *Global dissemination of clonal Allorhizobium vitis lineages is associated with virulence plasmids in otherwise diverse species-complex*. ASM Microbe 2026, June 3-7, Washington D.C.
2. **Rahman A**, Schiffer A., Larsen A., Sachs J.L, Harrison E.A, Weisberg A.J; *Plasmid mediated localized host adaptation in Rhizobium leguminosarum*. 14th Annual Yosemite Symbiosis Workshop, April 17-19, 2026, Yosemite Bug Rustic Mountain Resort, Midpines, CA.
3. **Rahman A**, Schiffer A.M, Jung J.M, Weisberg A.J; *Allorhizobium vitis genomics, epidemiology, ecology, and evolution in a global context*. 44th Annual Crown Gall/Agrobacterium Conference, September 21-22, 2024, Purdue University, Indiana, USA.
4. **Rahman A**, Porter A., Nadon C., Perez I., Farsamin W., Lampe M., Sachs J.L, *Interstrain competition among Bradyrhizobium reduces plant performance in Acmispon strigosus*. 25th

North American Symbiotic Nitrogen Fixation Conference, June 5-8, 2022, University of Wisconsin-Madison, Wisconsin, USA.

5. **Rahman A.**, Porter A., Nadon C., Perez I., Farsamin W., Lampe M., Sachs J.L. *Sub-optimal plant performance results from competition among Bradyrhizobium strains*. 35th Annual Conference of Bangladesh Society of Microbiologists, 11th December 2021, University of Dhaka, Dhaka, Bangladesh. **Awarded best talk** in technical session on “Food, agricultural and environmental microbiology”.
6. **Rahman A.**, Sultana S., Uddin M.A., Malek M.A., Sultana M., Hossain M.A., 2015: *Isolation and Characterization of Bacillus thuringiensis SW_R_F_1 from Flacherie Diseased Silkworm Larvae*, 1st International Conference of Bangladesh Society of Microbiologists, University of Dhaka, December 27-29, 2015.
7. **Rahman A.**, Ashraf M.A., Hossain S., Zaman F., Sultana M., Hossain M.A., 2014: *Development and Standardization of FMD Virus Genotyping Tool*. The 27th Annual Conference of Bangladesh Society of Microbiologists, University of Dhaka, April 28, 2014.

Poster Presentation

1. **Rahman A.**, Schiffer A., Jung J., Weisberg A. *Allorhizobium vitis* genomics, epidemiology, ecology, and evolution in global context. Plant Health 2024, American Phytopathological Society, Memphis, TN, USA 27-30 July, 2024.
2. **Rahman A.**, Schiffer A., Jung J., Weisberg A. *Allorhizobium vitis* genomics, epidemiology, ecology, and evolution in global context. APS Pacific Division Meeting, 26-28 March 2024, Corvallis, OR, USA.
3. **Rahman A.**, Porter A., Nadon C., Perez I., Farsamin W., Lampe M., Le T., Sachs J. *Sub-optimal plant performance results from competition among Bradyrhizobium strains*. ASM Microbe Conference, 9-11 August 2022, Washington, D.C., USA.
4. **Rahman A.**, Lampe M., Nadon C., Perez I., Farsamin W., Le T., Sachs J. *Characterizing in planta competitive fitness of wild Bradyrhizobium strains*, Southern California Evolutionary Genetics and Genomics Meeting, University of California, Irvine, October 19, 2019
5. **Rahman A.**, Ashraf M.A., Nandi S.P., Alam S.M.S., Khatun F., Hossain S., Hossain M., Zaman F., Sultana M., Hossain M.A. *FMD Virus Genotyping Tool*. International Training on Bioinformatics and Computational Biology in South Asian Perspective. University of Science and Technology, Chittagong, Bangladesh, September 25-26, 2012. *[Awarded the first prize]*

Honors and Awards

1. Nanopore Bursary Award, August 2024, Oxford Nanopore Technologies
2. Professional Development Award, Spring 2024, OSU Postdoctoral Association,
3. Dean's Distinguished Fellowship Award, Fall 2017, University of California, Riverside, USA.
4. Science and Technology R&D Grant, 2016-17, Ministry of Science and Technology, Government of Bangladesh, Bangladesh.
5. National Science and Technology (NST) Fellowship, 2013-14, Ministry of Science and Technology, Government of Bangladesh, Bangladesh.

Peer Review Services

1. Microbial Genomics: 2026
2. Microbial Genomics: 2025
3. BMC Microbiology: 2025
4. Microbial Pathogenesis: 2023
5. Journal of Medical Virology: 2021
6. PloS ONE: 2021

Mentoring

1. Lauren Harmon, Purdue University, under REEU (Research and Engagement Experiences for Undergraduates) internship program on Summer 2024. On her project she did experiments

- from bench (culture/DNA-extraction/PCR) to sequencing (Nanopore PromethION) to bioinformatics. She gave an excellent presentation on the final REEU symposium this month.
2. Trained one graduate student, Spencer M Peterman, from UC Riverside on Nanopore based amplicon-sequencing and analysis.
 3. Cassandra Nadon, undergrad research student, University of California, Riverside.
 4. Ivan A. Perez, undergrad research student, University of California, Riverside.

Talks and Science Outreach

1. Guest Lecturer in BOT 332 Lab Techniques in Plant Biology at BPP, Oregon State University. I lead the hands-on lab activity on “*Microbial Genome Assembly and Annotation*” during spring of 2024, 2025, 2026.
2. Invited Talk: *Current trends in microbial genomics and Bioinformatics*. 2nd RSC Bangladesh CompBio Symposium, February 22, 2025. University of Dhaka, Bangladesh.
3. Instructor on workshop “*Using the new HPC cluster*”, September 26, 2024, Department of Botany and Plant Pathology, Oregon State University, OR
4. Instructor and TA on Pre-Conference workshop on “*Nanopore Sequencing and Whole Genome Assembly and Annotation with nf-core/pathogensurveillance*”, Plant Health 2024, American Phytopathological Society.
5. Instructor and training assistant in Genetics and Genomics STEM Camp, Summer 2023-2025, Oregon State University, Corvallis, OR, USA
6. Talk: “*A Short Introduction to Nanopore Sequencing and Analysis*”, Bioinformatics User Group Session, November 15, 2023, Oregon State University.
7. Invited Talk: “*Epidemic spread of Bradyrhizobium haplotypes in a California metapopulation*”, Microbe Olympiad 2021, American Society for Microbiology Student Chapter of University of Dhaka,
8. Judge on Riverside County Science Fair, 2019.

Software Development

1. **PySyntenyViz** - Python based CLI tool to create and annotate synteny plots for small genomes or plasmids (2024): <https://github.com/acarafat/PySyntenyViz>
2. **Beav** - a bacterial genome and mobile element annotation pipeline (2024): <https://github.com/weisberglab/beav>
3. **TangleR** – R package for plotting tanglegram (2024): <https://github.com/acarafat/tangler>
4. **Bioinfutils** is a Python based command-line utility toolset designed for various bioinformatics formatting tasks (2023): <https://github.com/acarafat/BioinfUtils>

Organizational Activities and Professional Services

1. Executive Committee Member, Global Network of Bangladeshi Biotechnologists (2024-2025).
2. *Served as Treasurer*, GGB Graduate Student Association, 2019-2020.
3. Life Member, Global Network of Bangladeshi Biotechnologists GNOBB, Dhaka, Bangladesh (2016-present)
4. Life Member, Bangladesh Society of Microbiologist, Dhaka, Bangladesh (2015-present)
5. *Editor of Biggan Blog* (<https://bigganblog.org>), a science-based group blog in Bengali (2009-present)

Online courses and Certification

Link to the certificates available at: <https://arfrhmn.net/certification/>

1. Oxford Biodiscovery (2026): Machine Learning & Deep Learning for Biologists
2. Coursera X Brown University (2015): Coding the Matrix: Linear Algebra through Computer Science Applications
3. Coursera X UCSD (2014): Bioinformatics Algorithms (Part 1)
4. Coursera X Technical University of Denmark (2013): Computational Molecular Evolution

Bench and Analytical Skills

1. Molecular Biology: DNA and RNA extraction, PCR, qPCR, library-prep and cleanup, sequencing.
2. NGS Pipelines: RNA-Seq, Amplicon-Seq, and other common pipelines like MOTHUR, Kraken 2, DADA2.
3. Programming Languages: Python, R, UNIX.
4. Parametric statistics, Linear Models, Generalized Linear Models, Mixed models.
5. Phylogenetics (IQ-TREE, BEAST) and population genetics of haploid data (FST, AMOVA)

Popular Science Books

1. **Rahman A**, জেনেটিক্স বংশগতিবিদ্যার সহজ পাঠ (2022), a science book on Genetics for naïve reader, ISBN13: 9778984506428, Prokriy Porichoy, Bangladesh
2. **Rahman A**, প্রাণের বিজ্ঞান: সাম্প্রতিক জীববিজ্ঞানের ভাবনা ভাষান্তর (2017), a translation of science articles on various topics of life-sciences, ISBN13: 9789843419774, Prokriy Porichoy, Bangladesh
3. **Rahman A**, মস্তিষ্ক, ঘুম ও স্বপ্ন (2015), a science book on working of Brain, Sleep, and Dream for general reader, ISBN13: 9789848882542, Prokriy Porichoy, Bangladesh

Professional Training

1. Academic Development Day (panels and workshops), November 30, 2017, University of California, Riverside.
2. CRISPR/Cas workshop organized by Global Network of Bangladeshi Biotechnologist, March 28, 2017, University of Dhaka, Dhaka.
3. International Training Workshop on Bioinformatics and Computational Biology in South Asian Perspective, 25 September 2012, University of Science and Technology, Chittagong.

References

1. **Dr. Alexandra J. Weisberg** (Postdoc Advisor)
Assistant Professor
Department of Botany and Plant Pathology, Oregon State University
E-mail: weisbeal@oregonstate.edu
2. **Dr. Joel L. Sachs** (Ph.D. Advisor)
Professor & Chair,
Evolution Ecology & Organismal Biology, UC Riverside
E-mail: joels@ucr.edu
3. **Dr. M. Anwar Hossain** (Masters Thesis Advisor)
Professor of Microbiology,
Vice Chancellor, Jashore University of Science and Technology,
E-mail: hossaina@du.ac.bd