

**Soumyadev Sarkar, Ph.D.**

Assistant Research Scientist

Arizona State University

Center for Fundamental and Applied Microbiomics

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**EDUCATION**

**2012 – 2019: Ph.D. Science, Jadavpur University, India**

*Thesis:* Novel insights into the nitrogen stress response of *Papiliotrema laurentii* strain RY1

Supervisor: Prof. Ratan Gachhui, Department of Life Science & Biotechnology

**2010 – 2012: Master of Science in Biotechnology, Jadavpur University, India**

*Thesis:* Gene expression analysis of mutant p53 transcriptional targets conferring increased chemoresistance to human tumors

Supervisor: Dr. Susanta Roychoudhury, Principal Scientist, CSIR – Indian Institute of Chemical Biology

**2007 – 2010: Bachelor of Science in Microbiology, University of Calcutta, India**

**RESEARCH POSITIONS**

**2025-Present: Assistant Research Scientist, Arizona State University, USA**

Biocrust Ecology and *Arabidopsis* Microbiome

**2022 – 2025: Postdoctoral Research Scholar, Arizona State University, USA**

**Advisor: Prof. Ferran Garcia-Pichel, Regents' Professor and Center Director, Center for Fundamental and Applied Microbiomics, Arizona State University**

(1) Isolation and characterization of Microbes Responsible for Phenotype Transfer from Transgenic Plants to Wild-Type Plants (2) Role of Non-Phototrophs in the Growth and Fitness of Biological Soil Crust

**2019 – 2022: Postdoctoral Scientist, Kansas State University, USA**

**Advisor: Dr. Sonny T.M. Lee, Assistant Professor, Division of Biology, Kansas State University**

Complex microbe-microbe and host-microbe interactions in plant-microbe systems.

**2011: Project Assistant, Indian Institute of Chemical Biology, India**

Gene expression of mutant p53 transcriptional targets that had the potential to confer increased resistance to human tumors.

## GRANTS AND AWARDS

1. ASM Peggy Cotter Award by the American Society for Microbiology, United States of America, 2025
2. Department of Biotechnology, West Bengal – Grant: Identification of genes involved in the growth of *Cryptococcus laurentii* strain RY1 in nitrogen limiting condition, \$2400, 2013-2015. Key personnel in writing the proposal and executing the project.
3. Best Presenter Award for Best Poster at the International Conference on Molecular Biology and its Applications, organized by the Department of Life Science & Biotechnology, Jadavpur University, India, 2014

## SCHOLARSHIPS

1. Senior Research Fellowship under the State Government Fellowship Scheme, India, 2016 – 2019.
2. Junior Research Fellowship under the State Government Fellowship Scheme, India, 2014 – 2016.
3. UGC Fellowship for Doctoral Studies, India, 2013 – 2014.

## PEER-REVIEWED PUBLICATIONS

**Citation Number: 770+; h-index: 12; Total publications: 32.**

**First author publications: 12; Corresponding Author Publications: 4**

### Peer-Reviewed Articles

1. Kazarina, Anna, **Soumyadev Sarkar**, Bryttan Adams, Brooke Vogt, Leslie Rodela, Sophia Pogranichny, Summer Powell, et al. 2025. “Interaction of Plant-Derived Metabolites and Rhizobiome Functions Enhances Drought Stress Tolerance.” *Genome Biology* 26 (1). <https://doi.org/10.1186/s13059-025-03778-1>.
2. Kazarina, Anna, Hallie Wiechman, **Soumyadev Sarkar**, Tanner Richie, and Sonny T. M. Lee. 2025. “Recovery of 679 Metagenome-Assembled Genomes from Different Soil Depths along a Precipitation Gradient.” *Scientific Data* 12 (1): 521. DOI: <https://www.nature.com/articles/s41597-025-04884-2>
3. **Sarkar, Soumyadev**, Anna Kazarina, Paige M. Hansen, Kaitlyn Ward, Christopher Hargreaves, Nicholas Reese, Qinghong Ran, et al. 2025. “Metabolism Diversification of Ammonia-Oxidizing Archaea and Bacteria under Different Precipitation Gradients and Land Legacies.” *Applied Soil Ecology*. A Section of Agriculture, Ecosystems & Environment 206 (105831): 105831. DOI: <https://www.sciencedirect.com/science/article/pii/S0929139324005626>
4. Heredia-Velásquez, Ana Mercedes\*, **Soumyadev Sarkar\***, Finlay Warsop Thomas, Ariadna

Cairó Baza, and Ferran Garcia-Pichel. 2024. “Urea-Based Mutualistic Transfer of Nitrogen in Biological Soil Crusts.” *The ISME Journal*, December, wrac246. DOI: <https://doi.org/10.1093/ismejo/wrac246> (\*Co-first authors)

5. Richie, Tanner G., Leah Heeren, Abigail Kamke, Kourtney Monk, Sophia Pogranichniy, Trey Summers, Hallie Wiechman, Qinghong Ran, **Soumyadev Sarkar**, Brandon L Plattner, Sonny TM Lee 2023. “Limitation of Amino Acid Availability by Bacterial Populations during Enhanced Colitis in IBD Mouse Model.” *MSystems*, November, e0070323. DOI: <https://doi.org/10.1128/msystems.00703-23>

6. Kazarina, Anna, **Soumyadev Sarkar**, Shiva Thapa, Leah Heeren, Abigail Kamke, Kaitlyn Ward, Eli Hartung, et al. 2023. “Home-Field Advantage Affects the Local Adaptive Interaction between *Andropogon gerardii* Ecotypes and Root-Associated Bacterial Communities.” *Microbiology Spectrum*, August, e0020823. DOI: <https://doi.org/10.1128/spectrum.00208-23>

7. **Sarkar, Soumyadev**, Abigail Kamke, Kaitlyn Ward, Eli Hartung, Qinghong Ran, Brandi Feehan, Matthew Galliard, Ari Jumpponen, Loretta Johnson, and Sonny T. M. Lee. 2022. “*Pseudomonas* Cultivated from *Andropogon Gerardii* Rhizosphere Show Functional Potential for Promoting Plant Host Growth and Drought Resilience.” *BMC Genomics* 23 (1): 784. <https://doi.org/10.1186/s12864-022-09019-0>.

8. **Sarkar, Soumyadev**, Abigail Kamke, Kaitlyn Ward, Aoesta K. Rudick, Sara G. Baer, Qinghong Ran, Brandi Feehan, et al. 2022. “Bacterial but Not Fungal Rhizosphere Community Composition Differ among Perennial Grass Ecotypes under Abiotic Environmental Stress.” *Microbiology Spectrum*, April, e0239121. DOI: <https://journals.asm.org/doi/full/10.1128/spectrum.02391-21>

9. Gupta, Suchetana, Ditipriya Mallick, Kumarjeet Banerjee, Shrimon Mukherjee, **Soumyadev Sarkar**, Sonny Tm Lee, Partha Basuchowdhuri, and Siddhartha S. Jana. 2022. “D155Y Substitution of SARS-CoV-2 ORF3a Weakens Binding with Caveolin-1.” *Computational and Structural Biotechnology Journal* 20 (January): 766–78. DOI: <https://doi.org/10.1016/j.csbj.2022.01.017>

10. Mukherjee, Avishek, **Soumyadev Sarkar**, Rubia Parvin, Debbethi Bera, Uttariya Roy, and Ratan Gachhui. 2020. “Remarkably High Pb<sup>2+</sup> Binding Capacity of a Novel, Regenerable Bioremediator *Papillotrema laurentii* RY1: Functional in Both Alkaline and Neutral Environments.” *Ecotoxicology and Environmental Safety* 195 (June): 110439. DOI: <https://doi.org/10.1016/j.ecoenv.2020.110439>

11. Bhattacharya, Debanjana, Ritam Sinha, Priyadarshini Mukherjee, Debaki Ranjan Howlader, Dhrubajyoti Nag, **Soumyadev Sarkar**, Hemanta Koley, Jeffrey H. Withey, and Ratan Gachhui. 2020. “Anti-Virulence Activity of Polyphenolic Fraction Isolated from Kombucha against *Vibrio Cholerae*.” *Microbial Pathogenesis* 140 (March): 103927. DOI: <https://doi.org/10.1016/j.micpath.2019.103927>

12. Mukherjee, Avishek, **Soumyadev Sarkar**, Suchetana Gupta, Sayanika Banerjee, Sanjib Senapati, Riya Chakrabarty, and Ratan Gachhui. 2019. “DMSO Strengthens Chitin Deacetylase-Chitin Interaction: Physicochemical, Kinetic, Structural and Catalytic Insights.”

- Carbohydrate Polymers* 223 (November): 115032. DOI: <https://doi.org/10.1016/j.carbpol.2019.115032>
13. **Sarkar, Soumyadev**, Avishek Mukherjee, Subhadeep Das, Bidisha Ghosh, Shouvik Chaudhuri, Debanjana Bhattacharya, Arpita Sarbajna, and Ratan Gachhui. 2019. “Nitrogen Deprivation Elicits Dimorphism, Capsule Biosynthesis and Autophagy in *Papiliotrema laurentii* strain RY1.” *Micron* 124 (September): 102708. DOI: <https://doi.org/10.1016/j.micron.2019.102708>
14. **Sarkar, Soumyadev**, Avishek Mukherjee, Rubia Parvin, Subhadeep Das, Uttariya Roy, Somdeep Ghosh, Punarbasu Chaudhuri, et al. 2019. “Removal of Pb (II), As (III), and Cr (VI) by Nitrogen-Starved *Papiliotrema laurentii* strain RY1.” *Journal of Basic Microbiology* 59 (10): 1016–30. DOI: <https://doi.org/10.1002/jobm.201900222>
15. **Sarkar, Soumyadev**, Somnath Chakravorty, Avishek Mukherjee, Debanjana Bhattacharya, Semantee Bhattacharya, and Ratan Gachhui. 2018. “De Novo RNA-Seq Based Transcriptome Analysis of *Papiliotrema laurentii* strain RY1 under Nitrogen Starvation.” *Gene* 645 (March): 146–56. DOI: <https://doi.org/10.1016/j.gene.2017.12.014>
16. **Sarkar, Soumyadev**, Suchetana Gupta, Writachit Chakraborty, Sanjib Senapati, and Ratan Gachhui. 2017. “Homology Modeling, Molecular Docking and Molecular Dynamics Studies of the Catalytic Domain of Chitin Deacetylase from *Cryptococcus laurentii* strain RY1.” *International Journal of Biological Macromolecules* 104 (Pt B): 1682–91. DOI: <https://doi.org/10.1016/j.ijbiomac.2017.03.057>
17. Bhattacharya, Debanjana, Deblina Ghosh, Semantee Bhattacharya, **Soumyadev Sarkar**, Parimal Karmakar, Hemanta Koley, and Ratan Gachhui. 2018. “Antibacterial Activity of Polyphenolic Fraction of Kombucha against *Vibrio cholerae*: Targeting Cell Membrane.” *Letters in Applied Microbiology* 66 (2): 145–52. DOI: <https://doi.org/10.1111/lam.12829>
18. Chakraborty, Writachit, **Soumyadev Sarkar**, Somnath Chakravorty, Semantee Bhattacharya, Debanjana Bhattacharya, and Ratan Gachhui. 2016. “Expression of a Chitin Deacetylase Gene, up-Regulated in *Cryptococcus laurentii* strain RY1, under Nitrogen Limitation.” *Journal of Basic Microbiology* 56 (5): 576–79. DOI: <https://doi.org/10.1002/jobm.201500596>
19. Bhattacharya, Debanjana, Semantee Bhattacharya, Madhu Manti Patra, Somnath Chakravorty, **Soumyadev Sarkar**, Writachit Chakraborty, Hemanta Koley, and Ratan Gachhui. 2016. “Antibacterial Activity of Polyphenolic Fraction of Kombucha Against Enteric Bacterial Pathogens.” *Current Microbiology* 73 (6): 885–96. DOI: <https://doi.org/10.1007/s00284-0161136-3>
20. Chakravorty, Somnath, **Soumyadev Sarkar**, and Ratan Gachhui. 2015. “Identification of New Conserved and Variable Regions in the 16S rRNA Gene of Acetic Acid Bacteria and *Acetobacteraceae* Family.” *Molecular Biology* 49: 668-677.

<https://link.springer.com/article/10.1134/S0026893315050052>

## Reviews

21. Das, Subhadeep, Sampad Basak, and **Soumyadev Sarkar\***. 2025. "Decoding salivary ncRNAomes as novel biomarkers for oral cancer detection and prognosis." *Noncoding RNA* 11, (2025). (\*Corresponding author). <https://www.mdpi.com/2311-553X/11/2/28>

22. Morrison, Austin Gregory, **Soumyadev Sarkar**, Shahid Umar, Sonny T. M. Lee, and Sufi Mary Thomas. 2023. "The Contribution of the Human Oral Microbiome to Oral Disease: A Review." *Microorganisms* 11 (2): 318. <https://doi.org/10.3390/microorganisms11020318>

23. **Sarkar, Soumyadev\***. 2023. "Proteogenomic Approaches to Understand Gene Mutations and Protein Structural Alterations in Colon Cancer" *Physiologia* 3, no. 1: 11-29. (Feature Paper, Invited) (\*Corresponding author). DOI: <https://doi.org/10.3390/physiologia3010002>

24. Ghosh, Bidisha, **Soumyadev Sarkar**, Nayim Sepay, Kaustuv Das, Sukhen Das, and Sujata Ghosh Dastidar. 2021. "Factors for COVID-19 Infection That Govern the Severity of Illness." *SciMedicine Journal* 3 (2): 177–97. DOI: <https://scimedjournal.org/index.php/SMJ/article/view/323>

## Mini-Review

25. Das, Subhadeep, and **Soumyadev Sarkar\***. 2024. "Arbuscular Mycorrhizal Fungal Contribution towards Plant Resilience to Drought Conditions." *Frontiers in Fungal Biology* 5 (February): 1355999. (\*Corresponding author). DOI: <https://www.frontiersin.org/journals/fungal-biology/articles/10.3389/ffunb.2024.1355999/full>

## Perspective

26. **Sarkar, Soumyadev**, Kaitlyn Ward, Abigail Kamke, Qinghong Ran, Brandi Feehan, Tanner Richie, Nicholas Reese, and Sonny T. M. Lee. 2022. "Perspective: Simple State Communities to Study Microbial Interactions: Examples and Future Directions." *Frontiers in Microbiology* 13 (January): 801864. DOI: <https://doi.org/10.3389/fmicb.2022.801864>

## Methods

27. **Sarkar, Soumyadev**, Tanner Richie, and Sonny T.M. Lee. 2023. "Visualizing, Binning, and Refining of Metagenome-Assembled Genomes (MAGs) with Anvi'o." *Bio-Protocol* 13 (9). DOI: <https://doi.org/10.21769/bioprotoc.4684>. (Invited)

28. **Sarkar, Soumyadev**, Tanner Richie, and Sonny T.M. Lee. 2023a. "Metagenomic Protocol (from Quality Control to Mapping) for Metagenome-Assembled Genomes Using Anvi'o." *Bio-Protocol* 13 (9). DOI: <https://doi.org/10.21769/bioprotoc.4683>. (Invited)

## Book-Chapters

29. Das, Rajarshi, and **Soumyadev Sarkar\***. 2024. “Chapter Twelve - Exosomal RNA in Bacterial Infections.” In *Exosomal RNA*, edited by Debalina Bhattacharya, Mainak Mukhopadhyay, and Kursad Turksen, 271–94. **Academic Press**. (\*Corresponding author)

30. Chakravorty, Somnath, Semantee Bhattacharya, Debanjana Bhattacharya, **Soumyadev Sarkar**, and Ratan Gachhui. 2019. “10 - Kombucha: A Promising Functional Beverage Prepared From Tea.” In *Non-Alcoholic Beverages*, edited by Alexandru Mihai Grumezescu and Alina Maria Holban, 285–327. **Woodhead Publishing**. DOI: <https://doi.org/10.1016/B978-0-12-815270-6.00010-4>

### Preprints

31. Gayathri Subash C., Gupta Suchetana, Sengupta Tanusree, **Soumyadev Sarkar**. 2025. “Structural Insights into Zn<sup>2+</sup> and Ca<sup>2+</sup> binding to Human Protein Z and Their Impact on Membrane Association.” *bioRxiv*. The Preprint Server for Biology, October. DOI: <https://doi.org/10.1101/2025.10.09.681514>

32. Richie, Tanner G., Hallie Wiechman, Carson Ingold, Leah Heeren, Abigail Kamke, Sophia Pogranichniy, Kourtney Monk, Trey Summers, Qinghong Ran, **Soumyadev Sarkar**, Brandon L. Plattner, Ashley Sidebottom, Eugene Chang, Sonny T.M. Lee. 2024. “*Eubacterium rectale* Detoxification Mechanism Increases Resilience of the Gut Environment.” *bioRxiv*. The Preprint Server for Biology, May. DOI: <https://doi.org/10.1101/2024.05.09.593360>

### TALKS AND POSTER PRESENTATION (SELECTED)

1. Oral and Poster presentation entitled “Urea-based Mutualistic Transfer of Nitrogen in Biological Soil Crusts” at the ASM Microbe 2025, organized by the American Society for Microbiology, held in Los Angeles, USA, 2025
2. Poster entitled “Insights into Perennial Grass Ecotype Host-rhizobium Interaction Under Abiotic Environmental Stress Through Marker Genes and Culturomics” at the ASM Microbe 2022, organized by the American Society for Microbiology, held in Washington D.C., USA, 2022
3. Oral presentation entitled “Interactive effect of depth profile, land history, and precipitation gradients across Kansas determines microbial community and function” at the ESA Annual Meeting, USA, 2021 (virtual conference)
4. Oral presentation entitled “Effects of moisture perturbations on the potential nitrogen cycle contributors in native prairie soil” at the MAPS Symposium organized by Kansas NSF EPSCoR, held at The University of Kansas, Lawrence, USA, 2020
5. Poster entitled “Interactive Effects of Precipitation and Land-use on Microbial

- Functional Potential Over Different Soil Depth Profiles” at the ASM Microbe 2020, organized by the American Society for Microbiology, held in Chicago, USA, 2020 (virtual conference)
6. Abstract entitled “Detection of stress functional responses in bacterial populations under dry soil conditions shows potential microbial mechanisms to resist drought conditions” at the 2020 Annual Meeting organized by The Ecological Society of America, USA, 2020 (virtual conference)
  7. Poster entitled “De novo RNA-Seq based transcriptome analysis of *Cryptococcus laurentii* strain RY1 under nitrogen starvation” at the Microbiology in the New Millennium: from Molecules to Communities, organized by Bose Institute, held in Kolkata, India, 2017
  8. Poster entitled “Structural insights into a chitin deacetylase, over-expressing under nitrogen limitation in *Cryptococcus laurentii* strain RY1” at the 11th Asia Pacific Chitin and Chitosan Symposium and 5th Indian Chitin and Chitosan Society Symposium, held in Kochi, India, 2016
  9. Poster entitled “Identification and in silico characterization of a chitin deacetylase gene overexpressing in *Cryptococcus laurentii* strain RY1 in nitrogen limiting conditions” at the 9th International Conference on Yeast Biology, organized by IISER, Jadavpur University, IACS, University of Calcutta, and CSIR IICB, held in Kolkata, India, 2015
  10. Oral presentation and a poster entitled “Insights from Modeling the 3D structure of  $\gamma$  Glutamyl transferase from *Cryptococcus laurentii* strain RY1” at the International Conference on Molecular Biology and its Applications, organized by the Department of Life Science & Biotechnology, Jadavpur University, held in Kolkata, India, 2014
  11. Poster entitled “Biochemical and molecular characterization of chitin deacetylase isolated from *Cryptococcus laurentii* strain RY1” at the 27th International Carbohydrate Symposium organized by The International Carbohydrate Organization, held at the Indian Institute of Science, Bangalore, India, 2014

## ACADEMIC SERVICE

### Editorial Responsibilities:

- Associate Editor: Frontiers in Microbiome (2025-present).
- Early Career Editorial Board Member: Engineering Microbiology (2024-2028).
- Guest Associate Editor: Frontiers in Microbiology (2025-2026), Frontiers in Cellular and Infection Microbiology (2024-2025), Frontiers in Endocrinology (2025), Frontiers in Fungal Biology (2023-2026), Frontiers in Oncology (2025).
- Special Issue Editor: Global Translational Medicine (2024-2025)
- Guest Editor: Journal of Visualized Experiments (JoVE) (2023-2024), Vaccines (2022- 2023),

Agronomy (2023-2024).

### **Reviewer Responsibilities:**

#### **Microbiology & Soil Science**

- *Soil Biology and Biochemistry*
- *Applied Soil Ecology*
- *Resources, Environment and Sustainability*
- *Environmental Microbiology*
- *Rhizosphere*
- *Industrial Crops & Products*
- *Journal of Environmental Quality*
- *Current Plant Biology*
- *International Journal of Microbiology*
- *Research in Microbiology*
- *Acta Oecologica*
- *Frontiers in Microbiology*

#### **Chemistry & Molecular Biology**

- *New Journal of Chemistry*
- *RSC Advances*
- *Current Issues in Molecular Biology*
- *Journal of Biomolecular Structure & Dynamics*
- *Genes*
- *Biomolecules*
- *International Journal of Molecular Sciences*

#### **Agriculture & Plant Sciences**

- *Horticulture Plant Journal*
- *Agronomy*
- *Plants*

#### **Food & Nutrition Sciences**

- *Food Research International*
- *Journal of Food Composition and Analysis*
- *Food and Humanity*
- *Applied Food Research*

#### **Medical & Health Sciences**

- *Frontiers in Oral Health*
- *Frontiers in Pharmacology*
- *Cell Stress and Chaperones*

- *Journal of International Medical Research*
- *Biomed*
- *Life*

#### **Multidisciplinary, Sustainability & Data**

- *Scientific Reports*
- *Heliyon*
- *Data in Brief*
- *Encyclopedia*
- *Sustainability*
- *Water*
- *Coatings*

#### **PROFESSIONAL ASSOCIATIONS**

Sigma XI (Nominated Member, USA), American Society for Microbiology (USA), Arizona and Southern Nevada American Society for Microbiology (ASM, USA), Indian Science Congress Association (India), The Society of Biological Chemists (India).

#### **TEACHING**

##### **2012 – 2018: Tutor and laboratory instructor, Jadavpur University, India**

Provided teaching support for post-graduate students in Biotechnology at the Department of Life Science & Biotechnology. Designed and taught the students how to conduct Microbiology and Biochemistry (MSBT 1/7) experiments. Supervised the practical examination annually.

#### **MENTORING**

1. Kaitlyn Ward, Undergraduate Student, Kansas State University, USA
  2. Abigail Kamke, Undergraduate Student, Kansas State University, USA
  3. Brendan Newcomer, Undergraduate Student, Kansas State University, USA
  4. Nicholas Reese, Undergraduate Student, Kansas State University, USA
  5. Christopher Hargreaves, Undergraduate Student, Kansas State University, USA
  6. Leslie Raudela, Undergraduate Student, Kansas State University, USA
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