Dr. SHAHINA AKTER

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CAS-ANSO Visiting Scholar Fellow, Department of Microbiology, Chinese Academy of Science
Editor, *PLOS ONE* • ASM Communication Committee Member

Biography

Dr. Shahina Akter, PhD, is a distinguished Principal Scientific Officer and in-charge at the Genomic Research Laboratory of the Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka, and a Visiting Scholar Fellow at the Chinese Academy of Sciences, the world's top-ranked research institution. She is an accomplished University of Dhaka alumna, holding a PhD in Microbiology for her pioneering work in edible vaccine development, as well as an MS and BSc in Botany. Her extensive and multidisciplinary expertise spans edible vaccine innovation, genetic transformation, immunoinformatics, cytogenetics, genomics, and *in silico* structural modeling of high-impact infectious diseases, including Dengue, SARS-CoV-2, and Pneumococcal disease. Dr. Akter expertly integrates sophisticated computational and experimental methodologies, such as Next-Generation Sequencing (NGS), molecular docking, antibody response engineering, and *in silico* cloning for both microbial and plant-based expression systems, to address complex biological challenges. With a proven track record of productivity and leadership, she has authored 66 peer-reviewed scientific publications and has supervised over 20 students in microbiology and molecular biology. Actively engaged in the global scientific community, she serves as an Academic Editor for *PLOS ONE* and is a member of the American Society for Microbiology (ASM) Communication Committee, while maintaining multiple ongoing international research collaborations. Through her innovative research, strategic mentorship, and editorial contributions, Dr. Akter consistently delivers impactful advancements in global health, vaccine technology, and the broader field of biological sciences.

Career Objective

- Driven by a passion for scientific discovery, I aim to make meaningful contributions through research and collaboration. My key objectives are to:
  - Advance precision medicine and human health by applying expertise in bioinformatics, genomics, and microbiology to enable tailored treatments
  - Conduct impactful research that positively addresses challenges at the intersection of human health and the environment
  - Foster innovative and collaborative environments that bring together diverse expertise to achieve breakthroughs in biotechnology and related fields

PhD Thesis

Development of an edible vaccine against pneumococcal diseases using transgenic plant October 2018

Department of Microbiology, University of Dhaka, Bangladesh *Thesis link:* `http://repository.library.du.ac.bd:8080/bitstream/handle/123456789/1078/Sahina.pdf?sequence=1`

Current Research

- Skin-based vaccine development

- Development of Edible vaccine using transgenic plant and conventional vaccine preparation
- Immunoinformatics approaches for vaccine design of different microbes through reverse vaccinology
- Integrated genomic analysis of ovarian and breast cancer-related genes in human using NGS technology
- Production of a locally developed low-cost molecular diagnostic kit to tackle the COVID-19 pandemic
- Whole-genome sequencing and data analysis of Human, SARS-CoV-2 and other organisms
- Characterization of certain bacterial DNA isolated from different sources
- Investigation of potential active compounds in *Carica papaya*, *Annona muricata* etc.
- Rapid Diagnosis of Antibiotic-Resistant UTIs in BD Women Using Genome-Guided Raman Spectroscopy

Special Achievements

- CAS-ANSO Visiting Research Scholar
- Appointed as a member of Communication Committee of American Society for Microbiology (ASM)

Areas of Expertise

- **Genomics, Immunoinformatics, Bioinformatics, Biotechnology, Microbiology, Molecular Biology, Cytogenetics, and Immunology**

Technical Skills

- **Whole-genome sequencing:** Sample collection, DNA/RNA extraction, library preparation, NGS sequencing using NovaSeq6000, NextSeq 550 and MiniSeq
- **Molecular techniques:** DNA isolation, Plasmid isolation, PCR, qRT-PCR, restriction digestion, gel electrophoresis
- **Protein techniques:** Protein extraction, SDS-PAGE profiling, Western blotting, ELISA, DAS-ELISA
- **Animal model:** Handling rabbit and mice, serum collection, IP injection, heart puncture, antibody raising
- **Plant genetic transformation:** Tissue culture, *Agrobacterium*-mediated transformation, gene gun technique
- **Cell culture:** Seeding, culture maintenance, cell count, preservation
- **Bacterial study:** Isolation, identification, antibiotic resistance analysis
- **Cytogenetics:** Chromosomal study by conventional and fluorescent banding
- **Vaccine development:** WEM preparation, sonication, protein profiling, immunization
- ***In silico* vaccine design:** ezbiocloud, Expasy, Swiss-Model, Dynumut, PSIPRED, DiANNA, VaxiJen, AllerTop, trRosetta, IEDB, ProSA-Web, PROCHECK, ClusPro, JCat
- **Data analysis:** GeneTek, BaseSpace, IEDB, Resfinder, Kmerfinder, Galaxy, MEGA, SnapGene Viewer, MLST
- **LGC Oligonucleotide synthesizer:** Creating sequence files, calibrations, script files, reagent management

Academic Qualifications

Post-doctorate in Microbiology
Institute of Microbiology, Chinese Academy of Sciences

Doctor of Philosophy (PhD) in Microbiology & Immunology **2018**
Department of Microbiology, University of Dhaka, Bangladesh

Master of Science (MS) in Biotechnology **2001 (held in 2005)**
Department of Botany, University of Dhaka, Bangladesh *Result: Grade A*

Bachelor of Science (BSc) in Biotechnology **2000 (held in 2003)**
Department of Botany, University of Dhaka, Bangladesh *Result: Grade A*

Higher Secondary Certificate (HSC) **1995**
Govt. Begum Badrunnesa Mohila College, Dhaka, Bangladesh *Result: 76.10%*

Secondary School Certificate (SSC) **1993**
Dhanmondi Government Girl's High School, Dhaka, Bangladesh *Result: 76.90%*

Professional Experience

Principal Scientific Officer **2019 – Present**
Genomic Research Laboratory, Bangladesh Council of Scientific and Industrial Research (BCSIR)

Senior Scientific Officer **2011 – 2019**
Genomic Research Laboratory, Bangladesh Council of Scientific and Industrial Research (BCSIR)

Scientific Officer **2006 – 2011**
Genomic Research Laboratory, Bangladesh Council of Scientific and Industrial Research (BCSIR)

More than 19 years of working experience in Molecular Biology, specializing in Microbiology, Immunology (in silico vaccine design), Molecular Cytogenetics, Plant Tissue Culture, Animal and Cell Culture Techniques, Biotechnology, and Bioinformatics.

Job Responsibilities

- Experiment design, execution, and analysis
- Liaising and coordinating with the research team to perform R&D
- Writing and editing scientific manuscripts, reports, and presentations
- Applying for grants, monitoring, evaluation, and report submission
- Supervising junior lab members and thesis students
- Recognizing, analyzing, and solving a variety of problems

Publications (57 articles, 5 under review)

As First Author

1. **Akter, S***, Oliveira, JI, Barton, C, Sarkar, MH, Shahab, M, Banu, TA, Goswami, B, Osman, E, Uzzaman, MS, Nafisa, T, Molla, MA, Yeasmin, M, Farzana, M, Habib, A, Shaikh, AA, & Khan, S. Spike protein mutations and structural insights of pangolin lineage B.1.1.25 with implications for viral pathogenicity and ACE2 binding affinity. *Scientific Reports*, **2023**, 13(1), 1-19.
2. **Akter S***, Shahab M, Sarkar MH, Banu TA, Goswami B, Chowdhury SF, Naser SR, Habib A, Shaikh AA, Saki M, Zheng G, & Khan S. Computational design of medicinal compounds to inhibit RBD-hACE2 interaction in Omicron variant: Unveiling a vulnerable target site. *Informatics in Medicine Unlocked*, **2023**, 40, 101281.

3. **Akter S**, Shahab M, Sarkar MH, Hayat C, Banu TA et al. Immunoinformatics approach to epitope-based vaccine design against the SARS-CoV-2 in Bangladeshi patients. *Journal of Genetic Engineering and Biotechnology*, **2022**, 20(1), 1-14.
4. **Akter S**, Towfikee SH, Banu TA, Sarkar MH, Goswami B, et al. Aetiology in a female bronchiectasis patient presenting with shortness of breath. *J Clin Images Med Case Rep*, **2022**, 3(5), 1828.
5. **Akter S**, Banu TA, Goswami B, Osman E, Uzzaman MS, et al. Coding-Complete Genome Sequences of Three SARS-CoV-2 Strains from Bangladesh. *Microbiology Resource Announcement*, **2020**.
6. **Akter S**, Akhtar T, Habib A, Khan S, Islam S. *In vitro* clonal multiplication of *Aegle marmelos* (L.) through cotylodinary node culture. *BJSIR*, **2013**, 48(1), 13-18.
7. **Akter S**, Alam Sk S. Differential Fluorescent Banding Pattern in Three Varieties of *Cicer arietinum* L. *Cytologia (Japan Mendel Society)*, **2005**, 70(4), 441-445.

As Corresponding Author

8. Younas S, Malik ZI, Khan MU, Manzoor S, Rehman HM, Hammad HM, **Akter S**. Identification of novel therapeutic inhibitors against E6 and E7 oncogenes of HPV-16 associated with cervical cancer. *PLoS One*, **2025**, 20(10), e0323595.
9. Nahian M, Shahab M, Khan MR, Akash S, Banu TA, Sarkar MH, **Akter S**. Development of a broad-spectrum epitope-based vaccine against Streptococcus pneumoniae. *PLoS ONE*, **2025**, 20(1), e0317216.
10. Shahab M, de Farias Morais GC, Akash S, Fulco UL, Oliveira JIN, Zheng G, **Akter S**. A robust computational quest: Discovering potential hits to improve the treatment of pyrazinamide resistant *Mycobacterium tuberculosis*. *J Cell Mol Med*, **2024**, 28, e18279.
11. Silva MK, Akash S, de Aquino JGF, **Akter S**, Fulco UL, Oliveira JIN. A newly discovered circovirus and its potential impact on human health and Disease-editorial. *International Journal of Surgery*, **2024**.
12. Nahian M, Shahab M, Mazumder L, **Akter S** *et al.* In silico design of an epitope-based vaccine against PspC in *Streptococcus pneumoniae* using reverse vaccinology. *J Genet Eng Biotechnol*, **2023**, 21, 166.
13. Mazumder L, Shahab M, Islam S, Begum M, Nobre JIO, Begum S, **Akter S**. An immunoinformatics approach to epitope-based vaccine design against PspA in *Streptococcus pneumoniae*. *Journal of Genetic Engineering and Biotechnology*, **2023**, 21, 57.
14. Shahab M, Hayat C, Sikandar S, Zheng G, **Akter S**. *In Silico* Designing of a Multi-Epitope Vaccine against *Burkholderia pseudomallei*: Reverse Vaccinology and Immunoinformatics. *Jour. of Gen. Engi. and Biotech.*, **2022**, 20, 100.
15. Yeasmin S, Banu TA, Goswami B, Sarkar MH, Jahan E, Habib A, Khan S, **Akter S**. Development of an effective *in vitro* regeneration protocol of Strawberry from leaf explants. *Plant Tissue Cult. & Biotech.*, **2022**, 32(1), 67-75.
16. Banu TA, Khan S, Goswami B, Afrin S, Habib A, **Akter S**. Indirect organogenesis and somatic embryogenesis for regeneration of *Rauvolfia serpentina* L. from root explants. *Bangladesh J. Bot.*, **2020**, 49(4), 1021-1027.

As Co-author (Selected)

17. Uddin MM, Goswami B, Uddin N, Hossain S, **Akter S**, Islam M, Habib A, Khan S, Banu TA. In vitro Regeneration of Exotic Kiwi Fruit (Actinidia deliciosa) in Bangladesh. *Plant Tissue Culture and Biotechnology*, **2025**, 35(1), 33-40.
18. Naser SR, Chowdhury SF, Sarkar MMH, Habib MA, **Akter S**, Banu TA, Goswami B, Khan S. Exploring the potential of Bacillus spp. for secondary metabolite production through genome mining approaches. *Journal of Genetic Engineering and Biotechnology*, **2025**, 23, 100595.
19. Rahman MA, Alves GB, Silva GBR, Al-Mutairi AA, **Akter S**, Yihune E, et al. Pharmacological Evaluation of active compounds in papaya associated with thrombocytopenia inhibition in dengue patients through *in silico* approaches. *Scientific Reports*, **2025**, 15, 2692.
20. de Farias Morais GC, Alves GB, **Akter S**, Akash S, Aktaruzzaman M, Al Hasan MS, Fulco UL,

da Silva Junior ED, Oliveira JIN. Perampanel monotherapy in pediatric epilepsy: Emphasizing the need for comprehensive safety evaluation. *Epilepsia Open*, **2025**.

21. Mohammad MAS, Andersson P, Bulach D, Duchene S, da Silva AG, Lin C, Seemann T, Howden BP, Stinear TP, Taznin T, Habib MA, **Akter S**, Banu TA, Sarkar MMH, Goswami B, Jahan I, Khan MS. Molecular Epidemiology of SARS-CoV-2 in Bangladesh. *Viruses*, **2025**, 17(4), 517.
22. Al Sium SM, Goswami B, Chowdhury SF, Naser SR, Sarkar MK, Faruq MJ, **Akter S**, et al. An insight into the genome-wide analysis of bacterial defense mechanisms in a uropathogenic *Morganella morganii* isolate from Bangladesh. *PLoS ONE*, **2025**, 20(1), e0313141.
23. Goswami B, Rahman A, Jahan I, **Akter S**, Banu TA, et al. A rare homozygous ALX4 mutation in a Bangladeshi girl with frontonasal dysplasia type-2 (FND2). *Heliyon*, **2024**, 10, e34929.

Achievements

- Team member of the great invention of the "BCSIR-Covid Kit" in Bangladesh
- Developed a plant-based Edible Vaccine for the first time in Bangladesh which has been submitted for patent

Supervision

- More than 20 MS students have completed their thesis work under my supervision, and four students are continuing their work

Peer Review (Selected from 37+ journals)

- *PLoS One* (H-Index 435)
- *Scientific Report* (H-index 315)
- *BMC Bioinformatics* (H-index 242)
- *International Journal of Biological Macromolecules* (H-index 191)
- *FEMS Microbiology Letter* (H-index 172)
- *Immunology* (H-Index 157)
- *Molecular Medicine* (H-index 133)
- *Archives of Virology* (H-Index 130)
- *Expert Review of Vaccine* (H-index 105)
- *Molecular Biotechnology* (H-Index 91)
- *Frontiers in Nutrition* (H-Index 77)
- *Journal of Basic Microbiology* (H-Index 73)
- *Nanotechnology Reviews* (H-Index 60)
- *Journal of Food Quality* (H-Index 60)
- *Informatics in Medicine Unlocked* (H-Index 55)
- *Biologia* (H-index 50)
- *Journal of Genetic Engineering and Biotechnology* (H-Index 48)
- *Nanotechnology, Science and Applications* (H-Index 35)
- *Open Chemistry* (H-Index 34)
- *BMC Chemistry* (H-index 30)
- *Biosciences Biotechnology Research Asia* (H-index 23)
- *Annals of Proteomics and Bioinformatics*
- *Plant Science Today* (H-Index 15)
- *Infection and Drug Resistance* (H-Index 65)
- *Plant Cell, Tissue and Organ Culture* (H-Index 98)

Editorial Roles

- Academic Editor: *PLoS ONE*
- Editorial Board Member: Springer Nature

- Editorial Board: *American Journal of Biochemistry and Biotechnology (AJBB)*
- Editorial Board: *Insights of Clinical and Medical Image (ICMI)*

Awards and Grants

Awards

- CAS-ANSO Visiting Fellowship award 2024, Beijing, China
- Research Training Fellowship 2007-2008 for Developing Country Scientists (RTFDCS) by CCSTDS, Chennai, India
- Dutch-Bangla Bank Foundation Fellowship Program
- Best poster presenter award by American Society of Microbiology (ASM)

Grants

- Special Allocation from Ministry of Science and Technology, Government of Bangladesh (2023-24, 2022-23, 2021-22, 2017-18)
- Bangabandhu Fellowship on Science and ICT

Seminar Presentations (Oral/Poster)

- Immunoinformatic Approach to Engineer a Multi-epitope Vaccine against SdrG gene in *Staphylococcus epidermidis*, Institute of Microbiology, Chinese Academy of Sciences
- Reverse Vaccinology: Pioneering Immunoinformatics for Epitope-Based Vaccine Design, BCSIR Congress-24, Dhaka, Bangladesh
- Reverse Vaccinology: An Immunoinformatics Approach to Epitope-Based Vaccine Design against SARS-CoV-2 in Bangladeshi Patients, BCSIR Congress-22, Dhaka, Bangladesh
- Coding-Complete Genome Sequences of Three SARS-CoV-2 Strains from Bangladesh, ICSTB 2021, Dhaka, Bangladesh
- Development of an Edible Vaccine against Pneumococcal Diseases using Transgenic Plant, ICSTB 2021, Dhaka, Bangladesh
- Transformation of GUS & alternative marker gene into tobacco plant using *Agrobacterium tumafeciens* and gene gun, 9th International Plant Tissue Culture and Biotechnology Conference, University of Dhaka
- Conservation and Propagation of Indigenous Medicinal Plants, National Workshop on Biodiversity Awareness, Conservation and Utility, October 12-13, 2009, Bangalore, India

Training Programmes Attended (Mentionable)

- Bioinformatics Training Course, Senate Building, University of London, UK (2 months)
- MerMade 6 Hardware and Software Training (Oligonucleotide synthesizer)
- Beginner's Introduction to Next Generation Sequencing, Microbial Genomics and SARS-CoV-2 Bioinformatics, The Bioscience Factory
- Basic Cell and Tissue Culture Technique, CARS, University of Dhaka
- Development of plant based edible vaccine through genetic transformation, UAS, GKVK, Bangalore, India (3 months)
- Molecular Biotechnology training, University of Texas at Austin and City University of New York, USA, and Department of Botany, University of Dhaka
- Regional Training-Workshop on Awareness Building on the Recent Advances of Agricultural Biotechnology and Biosafety, BARC and AGBIOS, BRAC Centre INN, Dhaka
- Scanning Electron Microscope (SEM) training
- Monitoring and Evaluation on Project Development, National Academy for Planning and Development (NAPD), Ministry of Planning
- STI Policy for Socio-Economic Development (SPED), 30 August – 3 September 2021, Malaysia

Professional Memberships

- American Society of Microbiology (ASM)
- Scientist Forum of Bangladesh Council of Scientific and Industrial Research
- Bangladesh Association of Women Scientists
- Bangladesh Academy of Science (BAS)
- Asian Federation of Biotechnologist (AFOB)
- Bangladesh Botanical Society (BBS)
- Bangladesh Association of Plant Tissue Culture & Biotechnology (BAPTC&B)
- Bangladesh Bioinformatics and Computational Biology Association (BBCBA)
- Global Network of Bangladeshi Biotechnologists (GNOBB)

Personal Details

- **Father's Name:** S.M. Azaher Uddin
- **Mother's Name:** Anjumonoara Begum
- **Husband's Name:** Md. Shahadath Hossain Towfikee
- **Son's Name:** Saabiq IBN Tawfiq
- **Permanent Address:** 759, West Shewrapara, Mirpur, Dhaka-1216, Bangladesh
- **Phone No.:** 088-01724096941, 088-01711838874
- **E-Mail Address:** shupty2010@gmail.com; shahinaakter@bcsir.gov.bd
- **Date & Place of Birth:** 1 February 1978, Dhaka
- **Blood Group:** O+ve
- **Nationality:** Bangladeshi
- **Marital Status:** Married

References

- **Dr. Carl Barton**
  Department of Computer Science, Birkbeck, University of London, UK
  Email: c.barton@bbk.ac.uk
- **Professor Chowdhury Rafiqul Ahsan**
  Department of Microbiology, University of Dhaka, Dhaka-1000, Bangladesh
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Declaration

I hereby declare that the particulars furnished herein by me are true to the best of my knowledge and belief.

Shahina Akter, PhD

Last Updated: December 2025