

## Education

**2010** PhD (Scholarship funded by DAAD) in Microbiology at the Technische Universität Bergakademie Freiberg, Germany (secured grade “Very good/Magna cum laude)

PhD thesis “**Diversity of 16S rRNA and arsenite oxidase genes in microbial communities and arsenite-oxidizing isolates from arsenic-contaminated soils and aquifers**”.

**2002** Master of Science in Microbiology at the University of Dhaka, Bangladesh with specialization in Environmental Microbiology and Molecular Biology (secured first class second position).

Master thesis (fellowship by NUFU, Norway) “**Determination of *Shigella* specific genes and serologically cross reactive proteins in *Enterobacteriaceae* and certain gram positive environmental isolates.**”

**2001** Bachelor of Science in Microbiology at the University of Dhaka, Bangladesh (Secured first class first position).

Bachelor project (fellowship by NUFU, Norway) “**Survival of *Shigella flexneri* cells in laboratory microcosms**”

**1997** Higher Secondary School Certificate from Dhaka Board, Bangladesh

**1995** Secondary School Certificate from Dhaka Board, Bangladesh

## Academic Awards

- Prime Minister Gold Medal Award for outstanding academic performance for being the top student in the faculty of biological science.
- Dean’s Gold Medal Award for excellent academic result and highest attendance at B.Sc in the faculty of biological science, University of Dhaka.
- Government Talent pool Scholarship obtaining the third position in the University ranking for excellent academic result at B.Sc.
- Best Merit Student Award by the department of Microbiology, University of Dhaka for excellent academic result at B.Sc and MS.
- “Sumitomo Corporation, Japan” scholarship for outstanding academic performance in the faculty of biological science, University of Dhaka.  
[ selected for the scholarship for 4 times i.e. each year of the four year B.Sc. study based on result]
- General Grade Scholarship provided by Board of Intermediate and Secondary Education, Dhaka for the performance the in H.S.C. examination
- NUFU (Norway) research fellowship for M.S. research.
- DAAD (German academic exchange service) scholarship for Ph.D in Germany.
- TWAS young scientist award 2012, (category: Biological science)
- JSPS HOPE fellow to attend 5<sup>th</sup> meeting on Life science in global environment with Nobel Laureates in Japan.

## Work/Research experience

Since **March 2012** **Assistant Professor**, Department of Microbiology, University of Dhaka (UoD)

**19<sup>th</sup> November, 2011 to 29<sup>th</sup> February, 2012** **Assistant Professor**, Department of Microbiology, Jahangirnagar University, Savar, Dhaka

**16<sup>th</sup> January to 18<sup>th</sup> November, 2011** **Lecturer**, Department of Microbiology, Jahangirnagar University, Savar, Dhaka

**3<sup>rd</sup> June, 2010 to 15<sup>th</sup> January, 2011** **Assistant Professor**, Department of Microbiology, Primeasia University (Bangladesh)

**October, 2005 to March, 2006 Lecturer**, Department of Microbiology, Primeasia University (Bangladesh) from

**2006-2010 PhD Research Work:** (Scholarship funded by DAAD). Worked in the Institute of Bioscience, Interdisciplinary Ecological Center of Technical University of Freiberg, Germany to complete PhD work . **Short description:** Cultivation-dependent and culture-independent molecular methods to investigate in-situ microbial communities in arsenic-contaminated aquifers in Bangladesh and in anthropogenic arsenic-polluted soils and groundwaters from Muldenhütten, near Freiberg, Germany, with historic arsenic pollution. Partial 16S rRNA gene clone-bank analyses, ARDRA, AFDRA, RFLP, sequencing, Phylogenetic alignment, cluster analysis, capillary gel electrophoresis, statistical data analysis, autotrophic and heterotrophic arsenite oxidizing bacteria isolation, molecular fingerprinting, functional arsenite oxidase gene analysis.

**Graduate Research Project** (Scholarship funded by NUFU, Norway). Worked in Environmental Microbiology and Molecular Ecology Laboratory in a project collaborated with the Department of Microbiology, University of Dhaka and NUFU, Norway, to complete M.S thesis **Short description:** Isolation of *Shigella* spp. from water samples using pre enrichment and enrichment media designs, biochemical and serological analysis, colony blot hybridization , PCR for identification, Plasmid profile and antibiotic sensitivity assay, Extraction of Protein by Sonication, Estimation of Protein concentration, ELISA, SDS-PAGE, Western Blot assay.

**Undergraduate Research Project:** Worked in the Environmental Microbiology and Molecular Ecology Laboratory, to complete research project for partial fulfillment of Bachelor of Science, 4-year integrated Honours degree. **Short description:** Variable inoculum preparation, Microcosm setup with dialysis membrane, Viability assessment by fluorescent microscopy, DAPI staining, DNA extraction, PCR, Agarose gel electrophoresis, Resuscitation of injured *Shigella* cells by different designs of special pre-enrichment and enrichment broth and Confirmation of *Shigella*: by biochemical test (e.g.: RAPID- one).

#### **Training experience:**

a) Attended and awarded certificate for the workshop on “**Quality assurance program for molecular based diagnosis of infectious diseases**” held under the auspices of the Department of Microbiology, University of Dhaka, Bangladesh Atomic Energy Commission and the International Atomic Energy Agency, Vienna. It was done under the supervision of **Dr. Sook-Fan Yap, IAEA expert from the University of Malaya, Malaysia** and Dr. Chowdhury R. Ahsan, Dept. of Microbiology, University of Dhaka. **Short description of the training:** Extraction of DNA of *Mycobacterium tuberculosis* (Mtb) from clinical samples, PCR amplification of the DNA, Agarose gel electrophoresis of the PCR products, observation of desired DNA under UV light, auto radiography.

b) Attended and awarded certificate for the workshop on “**Molecular Ecology**” held under the auspices of the Department of Microbiology, University of Dhaka, and NUFU, Norway. It was done under the supervision of Prof. Nils Kåre Birkeland, University of Bergen , Norway and Prof. Sirajul Islam Khan, department of Microbiology, University of Dhaka. **Short Description:** Training on molecular techniques such as **FISH, DGGE, Ribotyping**, Extraction of Plasmid DNA, Extraction of Chromosomal DNA, PCR etc.

c) Attended and awarded certificate for the training on “**Real time PCR**” held at the state-of-art training facility at Gurgaon, India between 11<sup>th</sup> to 13<sup>th</sup> April, 2012.

#### **Other laboratory experiences:**

Performed Cloning, Sequencing, Clone library generation, Construction of Phylogenetic tree, SDS-PAGE, Plasmid DNA extraction, Chromosomal DNA extraction, ELISA, antibiotic potency assay, antibiotic sensitivity test, enzyme assay, Chromatographic separation, screening and isolation of microorganisms from samples, Southern blot hybridization, RFLP, RAPD, ribotyping etc.

## Projects

**Project 1:** Project on ‘Antibiotics and resistant bacteria pollutions: its impact on the environmental microbial communities and development of resistance gene pools.’ 2012-2013 grants funded by Science and Technology, Bangladesh. Principal investigator: **Dr. Munawar Sultana**

**Project 2:** Project on ‘Isolation and detection of ESBL producing *Enterobacteriaceae* from hospital effluents’ was funded by UGC (University Grant Commission) for 2011-2012. Principal investigator: **Dr. Munawar Sultana**,

**Project 3:** Project on ‘Isolation and characterization of arsenic resistant bacteria from Nuclear reactor surrounding areas in Savar, Bangladesh’ was funded by UGC (University Grant Commission) for 2010-2011. Principal investigator: **Dr. Munawar Sultana**, Co-investigator: Nihad adnan, Jahangirnagar University: Research report submitted successfully.

**Project 4:** Project on ‘Prevalence and characterization of *qnr* gene in extended spectrum  $\beta$ -lactamase producing enterobacterial isolates in Bangladesh’ 2011-2012 grants. Principal investigator: Prof. Dr. Md. Anwar Hossain, University of Dhaka, Co-investigator: **Dr. Munawar Sultana**, Dr. Mohammed Ziaur Rahman, ICDDR,B.

**Project 5:** Project on ‘Exploring the microbiological processes of arsenic (re)mobilization and potential remediation of arsenic in SAR technology’ was funded by NWO-WOTRO for 2010-2013. Collaborator: Prof. Dr. Sirajul Islam Khan, University of Dhaka, Munawar Sultana, (Bangladesh) and Prof. Dr. H.V. Westerhoff, Dr. W.F.M. Röling, VU University, Amsterdam (The Netherlands)

## Thesis/Projects supervised/Co-supervised

Student	Degree	Session
Susan vogler (project)	Bachelor in Bioscience (Biowissenschaft), Institute of Bioscience, TU Bergakademie Freiberg, Germany	2007-2008
Christine Moschner (Project)	Bachelor in Bioscience (Biowissenschaft) Institute of Bioscience, TU Bergakademie Freiberg, Germany	2009-2010
Nadja Muth (Project)	Bachelor in Bioscience (Biowissenschaft) Institute of Bioscience, TU Bergakademie Freiberg, Germany	2009-2010
S.M. Shafiu Haq (Project)	B.Sc. (Honours), Dept. of Microbiology, Primeasia University Dhaka, Bangladesh	2010-2011
Shvro Prokash Nandi (Thesis)	MS, department of Microbiology, University of Dhaka	2011-12
Nazratan Naeem (Thesis)	MS, department of Microbiology, University of Dhaka	2011-12
Dipan Baroi (Project)	MS, department of Microbiology, University of Dhaka	2011-12
Samina Momtaz (Thesis)	MS, department of Microbiology, University of Dhaka	2012-13

Sabia Sultana (Thesis)	MS, department of Microbiology, University of Dhaka	2012-13
Sanjoy Mukharjee (Project)	B.Sc. (Honours), Dept. of Microbiology, University of Dhaka, Dhaka, Bangladesh	2012-13
Md. Showkat Mahmud	PhD student, Department of Microbiology, University of Dhaka, Dhaka, Bangladesh	2009-current

## Publications/Posters

### A. Journal publication:

#### 2013

Nandi, SP., **Sultana, M.**, and Hossain, MA (2013) Prevalence and Characterization of Multidrug Resistant Zoonotic *Enterobacter* spp. in Poultry of Bangladesh (accepted for publication in Food borne pathogen and disease)

Rahman, MZ., Akter, S., Azmuda, N., **Sultana, M.**, Weill, F.X., Khan, SI., Grimont P.A., Birkeland, NK. Serological cross-reaction between O-antigens of *Shigella dysenteriae* type 4 and an environmental *Escherichia albertii* isolate (accepted for publication in *Current Microbiology*)

Nandi, SP., Rahman, MZ., Momtaz, S., **Sultana, M.**, and Hossain, MA Emergence and Distribution of Foot-and-Mouth Disease virus (FMDV) serotype A and O in Bangladesh (accepted for publication in *Transboundary and Emerging Diseases*).

Alam, SMS., Amin, MR., **Sultana, M.**, Rahman, MZ., and Hossain, MA. (2012) Antigenic Variation of Capsid Protein VP1 in Foot-and-Mouth 1 Disease Virus (FMDV) Serotype Asia1 of South Asian Region (Submitted to International Journal of Bioinformatics and Research)

#### 2012

**Sultana, M.**, Vogler, S., Zargar, K., Schmidt, C., Saltikov, C., Seifert, J., Schlömann, M. (2012) New clusters of arsenite oxidase and unusual bacterial groups in enrichments from arsenic-contaminated soil. *Arch.Microbiol.*, **194**:623–635

Ahmed Rupa, F., **Sultana, M.**, Inatsu, Y., **Bari, ML.**, and **Hossain, MA.** (2012) Prevalence of antibiotic resistant bacteria on tomato surfaces and effectiveness of disinfectants in reducing the microbial load. *J. food Sci. Eng*, **2**: 293-300.

Azmuda,N., Rahman, MZ., **Sultana, M.**, Jenssen EL., Khan, SI., Birkeland, NK. (2012) Evidence of interspecies O antigen gene cluster transfer between *Shigella boydii* 15 and *Escherichia fergusonii*, *APMIS*, 120(12):959-66. DOI 10.1111/j.1600-0463.2012.02926.x

#### 2011

**Sultana, M.**, Härtig, C., Friedrich, B.P., Seifert, J., Schlömann, M., 2011. Bacterial communities in Bangladesh aquifers differing in aqueous arsenic concentration. *Geomicrobiology journal*. **28**, 191-211

Rahman, M.Z., Azmuda,N., Hossain, J., **Sultana, M.**, Khan, S.I., Birkeland, N.K., Recovery and Characterization of Environmental Variants of *Shigella flexneri* from Surface Water in Bangladesh.2011. *Current Microbiology*, **63** (4) 372-376.

## **2007**

Rahman, M.Z., **Sultana, M.** Birkeland, N.K., Khan, S.I., 2007. Serological cross-reactivity of environmental isolates of *Enterobacter*, *Escherichia*, *Stenotrophomonas*, and *Aerococcus* with *Shigella* spp. specific antisera. *Current Microbiology*. 54 (1), 63-67.

## **2005**

**Sultana, M.**, Rahman, M.Z., Birkeland, N.K., Khan, S.I., 2005. Survival of *Shigella flexneri* cells in laboratory microcosms. *Journal of Biological Physics and Chemistry*. 5, 114-117.

Rahman, M.Z., **Sultana, M.**, Islam, M.S., Khan, S.I., 2005. Comparison of virulence properties of environmental *V. mimicus* with that of *V. cholerae* 01. *Bangladesh Journal of Microbiology (BSM)* 22, 139-143.

## **B. NCBI Publication**

About 165 sequences of 16S rRNA gene (nearly full length) and arsenite oxidase gene (both from isolated bacteria and clones) have been published in the GenBank database in 2010.

### **Accession numbers:**

16S rRNA gene sequences of clones:

GU183572, GU183573, GU183574, GU183575, GU183576, GU183577, GU183578, GU183579, GU183580, GU183581, GU183582, GU183583, GU183584, GU183585, GU183586, GU183587, GU183588, GU183589, GU183590, GU183591, GU183592, GU183593, GU183594, GU183595, GU183596, GU183597, GU183598, GU183599, GU183600, GU183601, GU183602, GU183603, GU183604, GU183605, GU183606, GU183607, GU183608, GU183609, GU183610, GU183611, GU183612, GU183613, GU183614, GU183615, GU183616, GU183617, GU183618, GU183619, GU183620, GU183621, GU183622, GU183623, GU183624, GU183625, GU193978, GU193979, GU647069, GU647070, GU647071

GU731255, GU731256, GU731257, GU731258, GU731259, GU731260, GU731261, GU731262, GU731263, GU731264, GU731265, GU731266, GU731267, GU731268, GU731269, GU731270, GU731271, GU731272, GU731273, GU731274, GU731275, GU731276, GU731277, GU731278, GU731279, GU731280, GU731281, GU731282, GU731283, GU731284, GU731285, GU731286, GU731287, GU731288, GU731289, GU731290, GU731291, GU731292, GU731293, GU731294, GU731295, GU731296, GU731297, GU731298, GU731299, GU731300, GU731301, GU731302, GU731303, GU731304, GU731305, GU731306, GU731307, GU731308, GU731309, GU731310, GU731311, GU731312, GU731313, GU731314, GU731315, GU731316, GU731317, GU731318, GU731319, GU731320, GU731321, GU731322, GU731323, GU731324, GU731325, GU731326, GU731327, GU731328, GU731329, GU731330, GU731331, GU731332, GU731333, GU731334, GU731335, GU731336, GU731337, GU731338, GU731339, GU731340, GU731341, GU731342, GU731343, GU731344, GU731345, GU731346, GU731347, GU731348, GU731349

16S rRNA gene sequences of isolates:

GU183570, GU183571, GU731236, GU731237, GU731238, GU731239, GU731240, GU731241, GU731242, GU731243, GU731244, GU731245, JX872223- JX872227

Arsenite oxidase gene sequences of clones:

GU731350, GU731351, GU73135, GU731356, GU731357, GU731358, GU731359, GU731360, GU731361, GU731362, GU731363, GU731364, GU731365, GU731366, GU731367, GU731368, GU731369, GU731370, GU731371, GU731372, GU731373, GU731374, GU731375, GU731376, GU731377, GU731378, GU731379, GU731380, GU731381, GU731382, GU731383, GU731384, GU731385, GU731386, GU731387, GU731388, GU731389, GU731390, GU731391, GU731392, GU731393, GU731394, GU731395, GU731396, GU731397, GU731398, GU731399, GU731400, GU731401, GU731402, GU731403, GU731404, GU731405, GU731406, GU731407, GU731408, GU731409, GU731410, GU731411, GU731412

Arsenite oxidase gene sequences of isolates:

GU731246, GU731247, GU731248, GU731249, GU731250, GU731251, GU731252, GU731253, GU731254, GU731231, GU731232, GU731233, GU731234, GU731235.

### C. Book publication

25 copies of a book entitled ‘**Diversity of 16S rRNA and Arsenite Oxidase Genes in Microbial Communities and Arsenite-oxidizing Isolates from Arsenic-contaminated Soils and Aquifers**’ was published and Printed with the support from German Academic Exchange Service.

### D. Seminar publication:

1. “Emergence of multidrug resistance zoonotic *Salmonella* from poultry of Savar, Bangladesh” abstract was published in **Journal of Food Science and Engineering**, Volume 2, 2012 Page no 519.
2. “Molecular Characterization of multidrug resistant-Extended Spectrum Beta Lactamase Producing Zoonotic *Enterobacter* spp. from Poultry of Bangladesh” abstract was published in **Journal of Food Science and Engineering**, Volume 2, 2012 Page no 521.
3. “Antigenic Variation of Capsid Protein VP1 of Foot-and-Mouth Disease Virus Prevalent in South Asian Region” abstract was published in **Journal of Food Science and Engineering**, Volume 2, 2012 Page no 520.
4. “**FMD Virus Genotyping Tool**” abstract was published in **Journal of Food Science and Engineering**, Volume 2, 2012 Page no 522.
5. Bacterial diversity in arsenic contaminated overburden soils and the corresponding genes of arsenite oxidase, published in *Biospectrum-das magazine für Biowissenschaften*, 2009, abstract no: PO21, page 146.
6. Tracking of *Shigella* in Bangladeshi surface water: a comparative analysis of *Shigella* spp. and its close relatives, published in *FEMS 2009 program book- Microbes and Man-independence and future challenges*, page 51.
7. Bacterial diversity in arsenic contaminated overburden soils and the corresponding genes of arsenite oxidase, published in *FEMS 2009 program book- Microbes and Man-independence and future challenges*, page 177

### E. Conference Proceedings:

**Sultana, M.**, Hossain, M.A. (July, 2012). Pollution of Antibiotic resistant bacteria: Prospective studies on spreading of antibiotic resistance, food hygiene and aquaculture in Bangladesh. International conference on Green Chemistry for sustainable development, Jessore Science and Technology University, Jessore, Bangladesh. P: 30-34, ISBN: 978-984-33-5307-8

**Sultana M.**, Nandi S. P. and Hossain M. A.; ‘Prevalence of Multidrug Resistant Zoonotic Bacteria in Poultry of Bangladesh’; was published in Asian Food Security Association (AFSA) conference proceedings December 2012.

Alam, SM, Amin, M.R., **Sultana, M** and Hossain, M.A. ‘Antigenic Variation of Capsid Protein Vp1 of Foot and Mouth Disease Virus Prevalent in South Asian Regions’ was published in Asian Food Security Association (AFSA) conference proceedings December 2012.

### F. Poster presentation:

#### International

1. **Sultana M.**, Adnan N., Islam O. K., Nandi S. P., and Hossain M. A. (2013). ‘Ciprofloxacin resistance in clinical waste water (CWW) isolates of extended spectrum  $\beta$ - lactamase (ESBL) producing *Escherichia* spp. from Bangladesh’ is **accepted** by Federation of European Microbiological Societies (FEMS), in Fifth Congress of European Microbiologist, which will be held in July 21-25, 2013; Liepzig, Germany.
2. Nandi S. P., Rahman M. Z., Momtaz S., **Sultana M.**, and Hossain M. A. (2013). ‘Emergence and Distribution of Foot-and-Mouth Disease Virus (FMDV) subtypes during recent outbreaks in Bangladesh’ is **accepted** by Federation of European Microbiological Societies (FEMS), in Fifth Congress of European Microbiologist, which will be held in July 21-25, 2013; Liepzig, Germany.
4. Rahman A., Ashraf M. A., Nandi S. P., Alam S. M. S., Zaman F., **Sultana M.**, Hossain M. A.; ‘FMD Virus Genotyping Tool’ (Poster Presentation). International Training Workshop on Bioinformatics and computational biology in South Asian perspective held on September 25-26 in Chittagong, Bangladesh. (Acquired the first price).

5. Poster on “**Emergence of multidrug resistance zoonotic *Salmonella* from poultry of Savar, Bangladesh**” was presented in 1st AFSA (Asian Food Security Association) on Food Safety and Food Security, 15-17, 2012, Osaka, Japan.
6. Poster on “**Molecular Characterization of multidrug resistant-Extended Spectrum Beta Lactamase Producing Zoonotic *Enterobacter* spp. from Poultry of Bangladesh**” was presented in 1st AFSA (Asian Food Security Association) on Food Safety and Food Security, 15-17, 2012, Osaka, Japan.
7. Poster on “**Antigenic Variation of Capsid Protein VP1 of Foot-and-Mouth Disease Virus Prevalent in South Asian Region**” was presented in 1st AFSA (Asian Food Security Association) on Food Safety and Food Security, 15-17, 2012, Osaka, Japan.
8. Poster on “**FMD Virus Genotyping Tool**” was presented in 1st AFSA (Asian Food Security Association) on Food Safety and Food Security, 15-17, 2012, Osaka, Japan.
9. Poster on “**Serological cross-reactivity of environmental isolates of *Enterobacter*, *Escherichia*, *Stenotrophomonas* and *Aerococcus* with *Shigella* spp. specific antisera**” was presented in 11<sup>th</sup> Asian Conference on Diarrhoeal Diseases and Nutrition March 8-10, 2006, Bangkok, Thailand.
10. Poster on “**Bacterial diversity in arsenic contaminated overburden soils and the corresponding genes of arsenite oxidase**” was presented as a poster in 60<sup>th</sup> Annual conference on Association for General and Applied Microbiology (VAAM) 8-11 March, 2009, Bochum, Germany.
11. Poster on “**Bacterial diversity in arsenic contaminated overburden soils and the corresponding genes of arsenite oxidase**” was presented in FEMS (Federation of European Microbiological Societies), 3<sup>rd</sup> Annual conference of European Microbiologist, June, 2009, Gothenburg, Sweden.
12. Poster on ‘**Microbial quality of raw, powdered and pasteurized milk samples originated from cows and camels in Bangladesh**’ was presented and awarded 2<sup>nd</sup> prize in the science fair organized by NSU-Life science club, in 2010.

#### National

1. Sultana M., Naeem N., Sultana F., Nandi S. P., and Hossain M. A. (2013). ‘Antibiotic Pollution and Occurrence of Multi-Drug Resistant (MDR) Bacteria in Environments of Bangladesh’ is submitted in First International conference on biotechnology (ICB) which will be held in May 25-26, 2013; in Bangladesh.
2. Nandi S. P., Rahman M. Z., Momtaz s., Sultana M., and Hossain M. A. (2013). ‘Foot-and-Mouth Disease Virus (FMDV) Subtypes Circulating During Recent Outbreaks in Bangladesh’ is accepted as oral presentation by upcoming BSM (Bangladesh Society of Microbiologist) conference.
3. Nandi S. P., Sultana M., Mahmud M. S. and Hossain M. A. (2013). ‘Molecular Characterization of Emerging Multidrug Resistant Zoonotic *Salmonella* from Poultry of Savar, Bangladesh’ is presented as oral in 10th Annual Scientific Conference of CVASU in 6 April, 2013.

#### Membership

1. General member, GMA (Graduate Microbiologist Association)
2. General member, BSM (Bangladesh Society of Microbiologists)
3. DAAD alumni, German Academic exchange service.
4. General member (former); VAAM (German Microbiologists association)
5. Registered graduate of UoD (Life member)
6. General member, BBBA (Biosafety and biosecurity in Bangladesh)

**Language proficiency**

1. Bengali: Mother language.
2. English: Reading, writing, speaking, understanding (very good)
3. German: Reading, writing, speaking, understanding (good)
4. Hindi: Reading, speaking, understanding (good)