Md. Arafat Islam
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October 23, 2021

Dr. Brian Strahm
310C Cheatham Hall
310 West Campus Dr.
Blacksburg, VA 24061

Dear Dr. Brian Strahm,

With this letter, I am applying for a PhD position at Virginia Tech as advertised in ISME. Having M.Sc in Microbiology and Biotechnology from Chungbuk National University (CBNU), South Korea and 2 years of experience as a research assistant in a world class research team, I'm confident that my knowledge and skill sets will allow me to contribute successfully to the project of plant-soil-microbiome interactions related to soil health and carbon sequestration.

My long-term goal is to dedicate myself to the research field of microbial ecology, molecular microbiology and microbial biotechnology. During the Master degree program, I contributed to environmental microbiology related projects as a research assistant in the Environmental Microbiology and Genomics Lab (EMGL) at CBNU. My experience was mainly with ammonia-oxidation, an essential step of nitrification, by soil ammonia-oxidizing archaea. Nitrification mediated by ammonia-oxidizing archaea is one of the key processes of the global biogeochemical cycle as it plays a role in crop yield and production of N_2O gas. My contributions enabled me to publish an article in a peer reviewed international journal. I also partially worked on some ongoing projects related to interactions between plant and soil microorganisms.

The studies above led me to use the techniques of batch culture, co-culture, PCR, RT-qPCR, and phylogenetic analyses that I feel may be applicable to the research projects of your lab. I also conducted and co-operated in the organization and the creation of data for research papers using different analytical software such as sigmaplot, bioedit, mega7, BLAST and endnote.

Besides, I've 3 years working experience as a microbiologist in a leading pharmaceutical industry. I applied basic techniques of microbiology that helped to monitor the quality of the drug products. I conducted projects that required communication and collaborative work in the interdisciplinary team of this organization. I also have practical scripting skills in programming languages like HTML, CSS, & R.

I believe that if I am accepted as a PhD student, I will have a potential contribution to the research environment of Virginia Tech. I choose The USA, because it provides a unique kind of education and learning styles that encourage students to be creative and innovative. This country is dynamic, vibrant and its people are energetic, amicable and confident.

Sincerely,

Md. Arafat Islam

MD. ARAFAT ISLAM

M.Sc. in Microbiology & Biotechnology
Chungbuk National University, Republic of Korea.
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Cell: +8801642259303, +8801729682893

CAREER OBJECTIVE

Graduated in microbiology and biotechnology with a view to employing my knowledge, skills and abilities in research fields of microbial ecology, molecular microbiology and microbial biotechnology as well as acquiring exposure to upcoming technologies while being resourceful, innovative and flexible.

EDUCATIONAL QUALIFICATION

03/2016 – 02/2018 *Chungbuk National University, South Korea*
M. Sc in Microbiology and Biotechnology
Thesis: Characterization of an ammonia oxidizing archaeon of group I.1a isolated from an agricultural soil.
cGPA: 3.60 out of 4.0

01/2009 – 12/2012 *Jessore University of Science & Technology*
B. Sc in Microbiology
Project: Isolation & identification of *Lactobacillus delbrueckii* from local market curd
cGPA: 3.55 out of 4.0

PROFESSIONAL EXPERIENCES

- **Title/Position:** Executive, Microbiology Department.
- **Employer:** The ACME Laboratories LTD., Dhamrai, Dhaka, Bangladesh.
- **Duration:** 03 July, 2018- Present
- **Responsibilities:**
    - Monitoring microbiological quality of products (raw materials & finished), clean class environment and water.
    - Limit test method validation, cleaning validation & UV efficacy test.
    - Culture media preparation and Growth Promotion Test of culture media.
- **Knowledge & Skills:** GDP, GMP, GLP, CCR, CAPA, Protocol preparation, SOP preparation, IQ, OQ & PQ, Cell-culture, Isolation & identification of microorganisms (Using BD Phoenix System), HVAC requalification.

- **Achievements:**
    - Certification of Save The Children, 2018.
    - Certification of MHRA (Medicine & HealthCare Products Regulatory Agency), 2018.

RESEARCH & EXPERIMENTAL EXPERIENCES

- **Undergraduate project:** Isolation & identification of *Lactobacillus delbrueckii* from local market curd, project duration was four months.
- **Master's thesis:** Characterization of an ammonia oxidizing archaeon of group I.1a isolated from an agricultural soil.
- Full time research assistant in Environmental Microbiology and Genomics Lab (EMGL).
- Assisted in preparing and maintaining as well as interpreting experimental data.
- Isolated bacteria from environmental samples and maintained axenic cultures in the laboratory.
- Cultivated ammonia-oxidizing archaea and bacteria in laboratory conditions.
- Analytical softwares: Sigmaplot, Bioedit, mega7, R (basic scripts) and Microsoft Excel.
- Experimental instruments: Light microscope, PCR, qPCR, Spectrophotometer, Centrifuge, Gel electrophoresis, & BD phoenix identification system..
- Quantitative analyses: Determination of concentration of NH_4^+, NO_2^-, NO_3^-, and pyruvate.

LEADERSHIP & TEAMWORK

- Led organization of conferences, debating programs, sports and events at university.
- Led projects of website content writing in freelancing websites (e.g. upwork, formerly odesk).
- Played role as class representative in undergraduate program.
- Played role as a potential member of sport team, cultural teams and debating teams.

SKILLS & COMPETENCIES

- Excellent presentation skill,
- Team working,
- Patience,
- Attention to details,
- Decisiveness,
- Creative thinking.
- Technical skills (Microsoft Word, Website Content management system , HTML, and CSS),

RESEARCH TRAINING

Title: Enhancing the Microbiology Research Capacity of the Environment.
Topic / Duration: Statistical data analysis based on R language, Microbial ecology / 2 days.
Location: National Nakdong River Biological Resource Center, South Korea.

LANGUAGE PROFICIENCY

Bengali (native), **English** (IELTS- 7.0 out of 9.0; TOEIC -745 out of 990).

AWARDS & ACHIEVEMENTS

- Short listed candidate of commonwealth scholarship-2019.
- BK21 plus-2016 Scholarship & Foreign student scholarship-2016 at Chungbuk National University, Republic of Korea.
- Second runner-up team in the International Culture Festival 2016 held at Chungbuk National University, Republic of Korea.
- Champion team in the International Culture Festival 2017 held at Chungbuk National University, Republic of Korea.
- Champion team in Inter-department Debating Competition 2011 held at Jessore University of Science and Technology University.
- First Runner-up of Essay Writing Competition in Tree Plantation Fair 2004 held at Jashore.

PERSONAL DETAILS

Date of Birth	: 10.12.1989 (DD.MM.YY)
Marital Status	: Married
Children	: 1 daughter
Nationality	: Bangladeshi
Linked in	: Linkedin.com/in/arafatmicrobiologist
Address	: House-23, Ghoshpara B.B. Road Lichubagan, Jashore -7400, Bangladesh.

REFERENCES

Man-Young Jung, Ph.D Assistant Professor Department of Science Education, Division of Biology Education, Jeju National University, South Korea. Email: myjung@jejunu.ac.kr Phone: +821036520480	**Dr. Tarannum Taznin** Assistant Professor Department of Microbiology, Jashore University of Science and Technology, Jashore, Bangladesh. Email: t.taznin@just.edu.bd	**Md. Iqbal kabir Jahid, Ph.D** Professor & Chairman, Department of Microbiology, Jashore University of Science and Technology, Jashore, Bangladesh. Email:ikjahid_mb@just.edu.bd Phone: + 8801709818178

RECOMMENDATION LETTER

To whom it may concern

Department of Science Education

Division of Biology Education

Assis. Prof. Dr. Man-Young Jung

102 Jejudaeha-ro, Jeju-si, Jeju-do, 63243, South Korea

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Jeju, South Korea, 18th May 2021

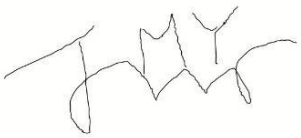
Re: Recommendation letter for Md. Arafat Islam

It is very pleasing to express with this recommendation letter for the application of **Md. Arafat Islam**. He studied at Chungbuk National University in Prof. Rhee's Lab for his Master degree under my co-supervision for one year. His major research topic was Environmental Microbiology related to the Nitrogen cycle, especially the ammonia-oxidizing step in the Nitrification process from the soil environment. Nitrification mediated by ammonia-oxidizing bacteria, archaea, and comammox is a key process of the global biogeochemical nitrogen cycle and plays a major role in fertilizer loss in industrial agriculture, eutrophication, and the production of the greenhouse gas N_2O. On the other hand, nitrification is essential for efficient sewage treatment.

Mr. Md. Arafat Islam enjoyed the research topic and analyzed many data based on fundamental research tools in molecular biology and essential microbiology. He has a relatively good understanding of nitrification and basic microbiology. I have seen that **Mr. Md. Arafat Islam** was always trying to do his best in his research. In addition, he had a pleasant personality which makes a good relationship with all colleges in the Lab.

In this sense, the application for **Mr. Md. Arafat Islam** will promote and keep his scientific background. In conclusion, I hope this recommendation letter for **Mr. Md. Arafat Islam** would be helpful for the application.

Please do not hesitate to contact me if additional information would be helpful.
Yours sincerely,



Assis. Prof. Dr. Man-Young Jung

Jeju National University

SYNOPSIS OF MASTER'S THESIS

Thesis Title: Characterization of an ammonia oxidizing archaeon of group I.1a isolated from an agricultural soil.

Abstract:

An ammonia-oxidizing archaeon (AOA), having chemolithoautotrophic, mesophilic and neutrophilic characteristics, designated as strain MY1 ^{T} , was isolated from an agricultural soil of Republic of Korea. Microscopic observation of isolated strain resulted in short-rod shape with a diameter of 0.3 to 0.5 μm and 0.6 to 1.0 μm in length. In addition, the strain MY1 ^{T} had no flagella and pilus at the surface of the cell. Strain MY1 ^{T} produced glycerol dialkyl glycerol tetraether (GDGT) membrane lipids such as crenarchaeol and GDGT-0 to GDGT-4 as major lipid. The isolated organism metabolized ammonium aerobically with nitrite production and thus had the ability to fix CO_2. Addition of keto acid compounds, such as pyruvate, α-ketoglutarate and oxaloacetate was necessary to sustain the growth of strain MY1 ^{T} . Optimal growth conditions were 25 °C temperature with pH of 7.0 and salinity 0.2 to 0.4 ‰ respectively. The levels of ammonia and nitrite concentrations that the strain MY1 T tolerated were up to 10 mM and up to 5 mM, individually. The genome of strain MY1 ^{T} was 1.6 Mb in size and had a DNA G+C content of 32.7 mol%. Phylogenetic analysis of 16S rRNA genes showed that strain MY1 ^{T} was affiliated with the phylum *Thaumarchaeota*, sharing 96.9 % 16S rRNA gene sequence identity with the *Nitrosopumilus maritimus SCM1* ^{T} , a marine AOA, and 84 % 16S rRNA gene sequence identity with Nitrososphaera viennensis EN76 ^{T} , a soil AOA. Based on the studies of phenotypic, phylogenetic and genomic structures of strain MY1 ^{T}, I propose the name *Nitrosoarchaeum koreensis* sp. nov. to be assigned as strain MY1 ^{T}.