

JESSICA KEE EUN CHOI

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CURRICULUM VITAE

I. Academic Degrees

Rutgers University, New Brunswick, NJ

Aug 2012 - Oct 2017

Ph.D. Degree

Major: Microbial Biology

University of Notre Dame, Notre Dame, IN

Aug 2008 - May 2012

Bachelor of Science Degree

Majors: Biological Sciences, Computer Applications / Minor: Korean

II. Research Interests

- Bioremediation and other fields of applied microbiology

The prospect of applying microbiology to help solve global environmental issues is fascinating to me and primarily drove my passion for microbiology. I am excited by microbes with the potential to remove environmental pollutants (heavy metals, aromatics, etc.), reduce waste (such as greenhouse gas emissions), or recycle materials (such as with biofuel production).

- Microbe-mineral transformations

Microbes have the capacity to make a living almost anywhere, such as on the surfaces of rocks. Additionally, they thrive on such surfaces and concurrently transform rocks in ways that are beneficial. I am interested in learning more about their mechanisms, the controlling factors, and whether these processes can be applied in the field to help remedy contamination.

- Genetic manipulation

Changing the genome of microbes to give them additional capabilities can provide alternative tools for bioremediation efforts, especially when the capabilities are not found in the natural microbiota of a certain environmental niche. Furthermore, using microbes may be more economical than chemical or physical methods of removing pollutants.

III. Research Experience

Pérez-Rodríguez Laboratory, Univ. of Pennsylvania **2017-Present**

Postdoctoral project: "Chemosynthetic transformations of asbestos minerals and implications for bioremediation efforts."

Yee Laboratory, Rutgers University – New Brunswick **2013-2017**

Ph.D. project: "Experimental studies on fermentative *Firmicutes* from anoxic environments: isolation, evolution, and their geochemical impacts."

1. Isolation and characterization of a new environmental isolate representing a novel genus and species.
2. Genetic manipulation of aerobes and anaerobes (conjugation, mutagenesis, transformation, and complementation).
3. Laboratory synthesis of artificial metal oxyhydroxides, like ferrihydrite.
4. Analysis of the metabolome or specific metabolic by-products from bacterial cultures through ion chromatography (IC), high-performance liquid chromatography (HPLC), and gas chromatography (GC).
5. Detection of various metals by different spectrophotometric methods, IC, and inductively-coupled plasma optical emission spectrometry (ICP-OES).
6. Molecular techniques, including gene sequencing and cloning.
7. Phylogenomic comparisons to determine evolution of outer membrane in the *Firmicutes* phylum.

Marine Biological Laboratory, WHOI **Summer 2015**
and Dawson Laboratory, UC Davis **and Winter 2015-16**

Summer project: "Taming the amoebae – a preliminary investigation on methods for genetic manipulation of predatory marine amoebae."

1. Novel vector construction using Gibson assembly and cloning
2. Various methods of genetic manipulation of multiple predatory marine amoebae (transfection and electroporation).
3. Bioinformatic analyses on genomic data obtained.
4. Isolation of novel microbial eukaryotes.

Jones Laboratory, University of Notre Dame **2010-2012**

Undergraduate project: "DNA-based investigation on the methane-oxidizing bacteria in north temperate lakes."

1. Field work at different temperate lakes involving water and sediment samples, as well as measurement of various chemical attributes.
2. Microbial isolation and quantification of methanotrophs through qPCR.
3. GC analysis of water samples for methane concentrations.
4. Statistical correlation tests using R.

Duncan Laboratory, University of Oklahoma **Summer 2010**

Summer NSF-funded REU project: "Preliminary investigation of sulfate-reducing bacteria in a passive water treatment system at Tar Creek, OK."

1. Field work, sampling sediment cores at various locations in one cell of an artificial water treatment system.
2. DNA extraction from sediment samples, DNA quantification by spectrometry, and qPCR amplification.
3. Denaturing gradient gel electrophoresis (DGGE) to look at and compare community compositions from different samples.

IV. Teaching Experience

Teaching Assistant/Instructor, **2013-14, 2015-17**
Rutgers University – New Brunswick

General Microbiology laboratory course

- Instructed approximately 40 undergraduate students per semester on classical and molecular microbiology techniques, including aseptic work, microscopy, culturing, identification of an unknown organism, and genetic isolation/manipulation techniques.
- Assessments done through evaluation of laboratory notebooks, weekly quizzes, written scientific reports, and exams.

Undergraduate Teaching Assistant, University of Notre Dame **Fall 2011**
Classical and Molecular Genetic laboratory course

- Assisted in instructing approximately 20 second-year undergraduate students, working with mutated *Drosophila melanogaster* fruit flies, DNA extraction, PCR, Southern blot, and gene sequencing.
- Helped with grading laboratory exams.

Undergraduate Teaching Assistant, University of Notre Dame **Fall 2010 & 2011**
General Biology laboratory course

- Assisted the graduate TA with teaching approximately 40 first-year undergraduate students per semester on the basics of scientific research, such as scientific writing, molecular techniques, and individual projects.

V. Appointments

Instructor, Rutgers University – New Brunswick **Summer 2017**

Department of Biochemistry and Microbiology

Teaching Assistant, Rutgers University – New Brunswick **2015-2017**

Department of Biochemistry and Microbiology

Instructor, Rutgers University – New Brunswick **Summer 2016**

Department of Biochemistry and Microbiology

Graduate Assistant, Rutgers University – New Brunswick **2014-2015**

Department of Environmental Sciences

Teaching Assistant, Rutgers University – New Brunswick **2013-2014**

Department of Biochemistry and Microbiology

Undergraduate Teaching Assistant, University of Notre Dame **2010, 2011**

Department of Biological Sciences

VI. Awards

Post-course Research Opportunity Fund MBL, Wood's Hole, MA	2015
Marine Biological Laboratory Scholarship Wood's Hole, MA Includes funds from: the John & Elisabeth Buck Endowed Scholarship, Bernard Davis Endowed Scholarship Fund, and William Randolph Hearst Educational Endowment	2015
Hachnasarian Scholarship Rutgers University – New Brunswick	2013
Woodruff Fellowship Rutgers University – New Brunswick	2012
Undergraduate Research Fellowship American Society for Microbiology	2011
Research Experience for Undergraduates Fellowship National Science Foundation	2010

VII. Peer-reviewed Journal Articles

1. Choi JK, Rowe AR, Zacharoff L, Yee N. **2018**. Extracellular Fe(III) reduction by *Clostridium acetobutylicum*. (In prep, submission for January 2018 to Applied & Environmental Microbiology).
2. Choi JK, Orlovetska Y, Yee N. **2017**. Evolution of the outer membrane of Gram-negative *Firmicutes*. (In prep, submission for December 2017 to Microbial Genomics).
3. Choi JK, Shah M, Yee N. **2016**. *Anaerospromusa subterranea* gen. nov., sp. nov., a spore-forming anaerobe belonging to the class *Negativicutes* isolated from saprolite. IJSEM. 66:3848-3854.
4. Yee N, Choi J, Porter AW, Carey S, Rauschenbach I, Harel A. **2014**. Selenate reductase activity in *Escherichia coli* requires Isc iron-sulfur cluster biosynthesis genes. FEMS Microbiol. Lett. 361:138-143.

VIII. Seminars and Conference Presentations

1. Choi JK. **2017**. The evolution of Gram-negative *Firmicutes*. Princeton Environmental Geology and Geochemistry Seminar series, Princeton, NJ.
2. Choi JK, Yee N. **2016**. Extracellular iron reduction by the Gram-positive fermenter *Clostridium beijerinckii*. 252nd American Chemical Society National Meeting & Exposition, Philadelphia, PA. <Poster>
3. Choi JK, Shah M, Yee N. **2016**. *Anaerospromusa subterranea* strain RU4^T, gen. nov., sp. nov., a spore-forming anaerobe belonging to the class *Negativicutes* isolated from saprolite. Northeastern Microbiologists: Physiology, Ecology, and Taxonomy (NEMPET), Blue Mountain Lake, NY.
4. Choi JK, Shah M, Yee N. **2015**. *Anaerospromusa subterraneum* gen. nov., sp. nov., a spore-forming obligate anaerobe isolated from saprolite. Theobald Smith Society Meeting-in-Miniature, New Brunswick, NJ. <Poster>

5. Yee N, Choi JK, Porter Aw, Carey S, Rauschenbach I. **2014**. Iron and molybdenum metabolism in Se(VI)-respiring bacteria. Goldschmidt Conference, Sacramento, CA.
6. Duncan KE, Nairn R, Strevett K, Choi JK. **2014**. Analysis of microbial communities in passive treatment systems of Tar Creek Superfund site water. American Society of Mining and Reclamation National Conference, Oklahoma City, OK.
7. Choi JK. **2013**. Elucidation of the genes required for iron reduction in *Clostridium* sp. FGH. Theobald Smith Society Meeting-in-Miniature, New Brunswick, NJ.
8. Choi JK, Coloso JJ, Fechtner LC, Jones SE. **2012**. DNA-based investigation on the methane-oxidizing bacterial abundance in north temperate lakes. American Society for Microbiology General Meeting, San Francisco, CA. <Poster>

IX. Professional Affiliations

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| 1. American Chemical Society | 2016-2017 |
| 2. American Society for Microbiology
Theobald Smith Society (NJ branch) | 2014-Present |
| 3. American Society for Microbiology – Rutgers University
student chapter | 2012-Present |
| 4. American Society for Microbiology | 2011-Present |