
Zhantao Du

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EDUCATION

The Ohio State University, Columbus, OH

Ph.D. in Molecular, Cellular, and Developmental Biology

Brandeis University, Waltham, MA

Master of Science in Molecular and Cell Biology

Graduation May 2023

Overall GPA: **3.765/4.0**

Westminster University, Salt Lake City, UT

Bachelor of Science in Biology

Graduation August 2021

Overall GPA: **3.551/4.0**

Major GPA:**3.7/4.0**

RELEVANT COURSES

Cancer Biology, Immunology, Biochemistry, Biotechnology, Advanced Cell Biology, Molecular Biology, Developmental Biology, Organic Chemistry, Data Analysis

RESEARCH EXPERIENCES

PhD Rotation Project, Humanized SSTR2-MMAF to Treat Meningioma with HDACi Upregulation

Aug 2023 –

Advisor: Dr. X. Margaret Liu, The Ohio State University

- Humanized SSTR2 mAb was produced in bioreactor and shaker flasks using CHO cells, followed by purification with liquid chromatography. Antineoplastic drug MMAF was conjugated to mAb as the agent for targeting and killing meningioma cells. Antibody-drug conjugate binding affinity to meningioma cells and normal arachnoidal cells was evaluated using flow cytometry. Cytotoxicity of ADC on meningioma cells was studied by performing an MTT assay. Human meningioma cells CH157-MN were transplanted into nude mice brains. Tumor growth was monitored using bioluminescence imaging and MRI. (Project ongoing)

Independent Study, Study of evolutionary developmental biology in Haloarchaea

Dec 2021 – May 2023

Advisor: Dr. Alexandre Bisson, Brandeis University

- 101 Haloarchaea species across 31 genera were chosen for this study. The growth media composition was modified for all strains for optimal growth conditions. Haloarchaea cells were imaged during both the early exponential and stationary phases. Images were then analyzed for parameters (aspect ratio, area, circularity) that quantitatively describe the morphology of each cell. The growth rate of each species was also calculated based on culture optical density. These data along with the phylogeny of all species were considered to explore any possible correlations.
- **Significance:** Haloarchaea takes on a wide variety of shapes, however, its ability to transition from one morphology to another over the growth period was not known until 2017. This study aims to understand how this unique feature relates to the evolutionary

history of Haloarchaea and, to explore where and when Haloarchaea species acquired the ability of shape transitioning on the level of genetics.

**Independent Study, Study of Halophilic species in gypsum crystals from the Great Salt Lake
Jan 2020 - May 2021**

Advisor: Dr. Bonnie Baxter, Great Salt Lake Institute, Westminster University

- Developed an independent research project based on immersion in the current literature and available expertise. Collected Gypsum (sodium sulfate) from the Great Salt Lake, cleaned and sterilized the surface, and sorted based on clay inclusions. Crushed crystals were placed in liquid growth media to culture entrapped microorganisms. Liquid media cultures were transferred to solid growth media to isolate a single species, and genomic DNA was extracted. PCR and sequencing revealed the genetic identity of each strain, and cultures from clay inclusions revealed distinct populations.
- **Significance:** Gypsum is a prevalent mineral on Mars at sites of ancient lakes. Techniques analyzing the entrapment of extremophile microorganisms at the Great Salt Lake can be applied to the preservation of potential life or biosignatures in gypsum on Mars.

**Independent Study, Halophile Species from salt crystals from Great Salt Lake
Sept 2019 - Nov 2019**

Advisor: Dr. Bonnie Baxter, Great Salt Lake Institute, Westminster University

- Cultivated microorganisms from salt (halite) crystals harvested from the Great Salt Lake. Haloarchaea colonies were isolated and inoculated into media for DNA extraction. The 16S rRNA gene was examined through amplification by PCR and subsequent DNA sequencing. Comparative genomics helped align new species with genera existing in the database.
- **Significance:** This study aims to explore new species of Halophilic microorganisms, and species biogeography based on observing the location of identical species in other saline ecosystems.

Group Study, Millcreek Urbanization Study

Sept 2018-Dec, 2018

Advisor: Dr. Foad Yousef, Biology Department, Westminster University

- Studied the association of stream quality and urbanization. Conducted field survey and collected data on turbidity, temperature, oxygen content, and pH of samples along a creek that runs from the Wasatch mountains through Salt Lake City.
- **Significance:** Results showed that the stream quality decreased as the urbanization level increased.

Publications/Presentations

Evolutionary Developmental Biology in Haloarchaea, April 12, 2023

- Du, Z. (2023). *Evolutionary Developmental Biology in Haloarchaea* (Publication No. 30419793). [Master's thesis, Brandeis University]. ProQuest Dissertations and Theses database.

Utah NASA Space Grant Consortium 2021 Conference, May 10, 2021

- Invited presentation, *Life in gypsum at Great Salt Lake: an analog for Mars*

National Conference on Undergraduate Research, April 12 - 14, 2021

- *Identification of Haloarchaea in gypsum from Great Salt Lake*

Westminster Campus Undergraduate Research Conference, Sept 2020

- *Identification of Haloarchaea in gypsum from Great Salt Lake*

Teaching Experience

East High School Volunteer, April 2018

- Teaching Assistant: Tutored high school students in Mathematics

Honors & Awards

Great Salt Lake Institute Undergraduate Research Fellowship

May-August 2020

Dean's List

Fall 2017, Fall 2018, Spring 2020

Merit-based scholarship, \$68,000

August 2017-May 2021

Highlighted Skills

- Molecular Biology: Western blot, PCR, MTT assay, DNA extraction and purification, plasmid transformation, cell culturing, sterile technique, gel electrophoresis
- Animal study: Intracranial injection, intravenous injection, subcutaneous injection, tumor and organ harvest
- Instrumentation: Liquid chromatography, High-performance liquid chromatography, Bioreactor, Flow cytometry, Nano-flow cytometry, MRI, In vivo imaging system (IVIS), TIRF microscopy, spectroscopy, fluorometry, mass spectrometry, ultraviolet-visible spectroscopy
- Computational: R, Python, Bioinformatics (e.g. BLAST)
- Field Biology: Field peristaltic pump/filtration systems, chlorophyll extraction, turbidity and salinity measurement
- Familiar with accessing and reading scientific literature and navigating databases