



Anastacia Dressel

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Research Experiences

Barstow Research Team | Undergraduate Research Assistant

Cornell University, August 2022 – Present

- Executes molecular and microbiology procedures and techniques for bacteria growth and analysis.
- Assists in designing experiments with the goal of sustainable rare earth element separation.
- Received Engineering Learning Initiatives grants to pursue a project focused on engineering *V. natriegens* to more efficiently biosorb rare earth elements.

Scott Lab in Insect Toxicology | Undergraduate Research Assistant

Cornell University, November 2020 – Present

- Uses advanced molecular biology procedures, including PCR, Sanger Sequencing, Nanodrop, and DNA extraction.
- Conducts data analysis using applications such as Microsoft Excel, R, DNASTar, MegAlign, and Chromas.
- Runs experiments, organizes data, and contributes figures, methods, and feedback for the publications of other researchers in the lab.

Mickey Leland Energy Fellowship | Participant

*Department of Energy hosted at Lawrence Livermore National Laboratory,
June – August 2023*

- Utilized equipment to perform SEM imaging, FTIR spectroscopy, light spectroscopy, and TGA analysis to categorize polymers at different stages of a functionalization procedure.
- Focused on optimizing a procedure developed to filter rare earth elements from coal mine tailings.
- Drafted a technical report of important findings and future directions for the given project.
- Presented at multiple Department of Energy and ORISE events on research and results.
- In discussion to continue project with LLNL in Spring 2024 pending approval.

Engineers for a Sustainable World | Biofuels R&D Member

Cornell University, September 2021 – January 2023

- Conducted literature reviews and developed methods and materials for a research project related to using biochar as a slow release fertilizer.
- Presented research and findings at public expositions.
- Worked closely with professors to develop procedures for research and plan future projects.

Publications

- 7) Dressel, A. et al. (2023). *Rare Earth Element Capture Using Functionalized Electrospun Nanofibers*. Mickey Leland Energy Fellowship Program. LLNL-TR-852870.
 - Currently being drafted for submission to an ACS Chemical Safety and Health special edition.
- 6) Medin, S. et al. (2023). Multiple Rounds of in vivo Random Mutagenesis and Selection in *Vibrio natriegens* Result in Substantial Increases in REE Binding Capacity. *ACS Synthetic Biology*. <https://doi.org/10.1021/acssynbio.3c00484>
- 5) Silva, J. et al. (2023) Fitness costs in the presence and absence of insecticide use explains abundance of two common *Aedes aegypti* *kdr* resistance alleles found in the Americas [Provisionally accepted]. *PLOS Neglected Tropical Diseases*.
- 4) Scott, J. et al. (2023). Selection and characterization of spinetoram resistance in field collected *Drosophila melanogaster*. *Pesticide Biochemistry and Physiology*, 194 (2023) 105508. <https://doi.org/10.1016/j.pestbp.2023.105508>.
- 3) Mertz, R. et al. (2023). Frequencies and distribution of *kdr* and *Ace* alleles that cause insecticide resistance in house flies in the United States. *Pesticide Biochemistry and Physiology*, 194 (2023) 105497. <https://doi.org/10.1016/j.pestbp.2023.105497>.
- 2) Fisher, C. et al. (2023). A globally distributed insecticide resistance allele confers a fitness cost in the absence of insecticide in *Aedes aegypti*, the yellow fever mosquito. *Journal of Medical Entomology*, 60(3). <https://doi.org/10.1093/jme/tjad015>.
- 1) Marecos, S. et al. (2022). Practical and thermodynamic constraints on electromicrobially accelerated CO₂ mineralization. *iScience*, 25(8). <https://doi.org/10.1016/j.isci.2022.104769>.

Skills

- Python (Jupyter Notebook), Julia, and R
- Lab Skills (PCR, Sanger Sequencing, Nanopore, SEM Imaging, FTIR, TGA, UV Vis)
- Bioinformatics Software (DNASTAR, Geneious)
- Microsoft Office
- Statistical Analysis (R, MATLAB)
- CAD (Fusion 360)
- COMSOL Physics Simulations
- Swing Dance
- Oboe, Singing, Piano

Relevant Coursework

Math: Multivariable Calculus, Differential Equations, Linear Algebra, Uncertainty Analysis & Statistics

Science: Kinematics, Electricity & Magnetism, Molecular Biology, Chemistry, Organic Chemistry, Biochemistry, Thermodynamics

Engineering: Python, Heat and Mass Transfer, Environmental Processes for Environmental Engineering, Computer-Aided Engineering, Biomaterials & Bioinstrumentation, Future Energy Systems, Environmental Systems Analysis, Statics & Mechanics of Solids

Presentations

- Dressel, A. (2023). Rare Earth Element Capture Using Functionalized Electrospun Nanofibers. IgniteOff! National Competition Semifinals. LLNL-PRES-851526.
- Dressel, A. (2023). Rare Earth Element Capture Using Functionalized Electrospun Nanofibers. Mickey Leland Energy Fellowship Technical Forum. LLNL-PRES-852871.
- Dressel, A. & Clark, J. (2023). Electrospun PVA/PEI Nanofibers for Rare Earth Element Extraction. CHRES Technical Forum at the Department of Energy National Energy Technologies Laboratory (NETL). LLNL-PRES-851971.
- Dressel, A. (2023). Engineering Rare Earth Biosorption via Random Mutagenesis. Engineering Learning Initiatives Spring Poster Session, Cornell University.

Education

Cornell University, College of Engineering

B.S. in Biological Engineering

Expected May 2024, GPA 3.84

Lake Mills High School

High School Diploma, June 2020

Valedictorian, GPA: 4.0, National Merit Finalist

Awards

- Cornell ELI Undergraduate Fall 2023 Research Award Recipient
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