

Madeline M. Davis

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EDUCATION

(Pursuing) PhD August 2018 — Present

At the University of Tennessee, Knoxville

GPA: 3.82

Major: Biochemistry & Cellular and Molecular Biology (BCMB)

BACHELOR OF SCIENCE August 2013 — May 2017

At the University of Tennessee, Knoxville

GPA: 3.82

Major: Biological Sciences

❖ Concentration in *Biochemistry & Molecular and Cellular Biology*

Secondary Major: Modern Foreign Languages and Literature

❖ Concentration in *German Language and Literature*

RESEARCH EXPERIENCE

GRADUATE RESEARCH ASSISTANT May 2019 — Present

In the lab of Dr. Barry D. Bruce

- ❖ Investigate dimerization dynamics of transit peptide receptor Toc34 and transit peptides using Single-Molecule Foerster Resonance Energy Transfer
- ❖ Characterize styrene maleic acid polymer insertion into thylakoid lipid monolayers using Langmuir-Blodgett techniques in combination with Neutron Reflectometry
 - In collaboration with **Dr. Minh Phan** at Oak Ridge National Laboratory
- ❖ Explore nucleic acid import into the chloroplast using a model RNA, Eggplant Latent Viroid (ELVd)
 - In collaboration with **Dr. Tessa Burch-Smith** in BCMB

ROTATION STUDENT August 2018 — May 2019

In the lab of Dr. Andreas Nebenführ

- ❖ Investigate the effects of organelle surface manipulations on organelle movements in *Arabidopsis thaliana* to clarify myosin-directed organelle trafficking model

In the lab of Dr. Barry D. Bruce

- ❖ Characterize homodimerization dynamics of chloroplast protein import receptor Toc34

In the lab of Dr. Tessa Burch-Smith

- ❖ Determine whether ELVd requires nuclear or cytosolic processing for chloroplast entry

UNDERGRADUATE AND VOLUNTEER POST-BACCALAUREATE RESEARCHER January 2016 — August 2018

In the lab of Dr. Andreas Nebenführ

- ❖ Investigate role of myosin XI proteins in intracellular transport in *Arabidopsis thaliana*
- ❖ Capture images using fluorescence microscopy
- ❖ Cultivate *Arabidopsis* plants and harvest seeds for future experiments
- ❖ Analyze images using computer imaging software such as ImageJ
- ❖ Compile results graphically using Prism and Adobe Illustrator

PRESENTATIONS

“Intracellular Transport: The Role of Class XI Myosins in Organelle Movement and Root Hair Growth in *Arabidopsis thaliana*” — Poster, April 2017

- ❖ Presented as part of the Exhibition of Undergraduate Research and Creative Achievement (EURECA) at the University of Tennessee, Knoxville

“Investigating psToc34 Dimerization Dynamics with Single Molecule FRET” — Poster, March 2019

- ❖ Presented at the BCMB Department’s Spring Retreat

PUBLICATIONS (IN PREPARATION)

Davis, M., and Nebenführ, A. **Regarding the role of myosin XI isoforms in root hair growth and organelle movement.**

Korotych, O., Brady, N., Phan, M., Davis, M., Ankner, J., and Bruce, B. **Regarding the characterization of SMA polymer insertion into thylakoid lipid monolayers using neutron and x-ray reflectometry.**

SKILLS AND TECHNIQUES

- ❖ Standard cloning techniques
- ❖ Transient gene expression via particle bombardment
- ❖ Fluorescence microscopy of plant tissue and isolated chloroplasts
- ❖ Protein expression and purification
 - Immobilized Metal and Chitin Affinity Chromatography
- ❖ Fluorescent dye-protein conjugation
- ❖ UV-Vis spectroscopy
- ❖ Chloroplast isolation
- ❖ RNA extraction
- ❖ Reverse transcription (RT) PCR
- ❖ SDS-PAGE and agarose gel electrophoresis
- ❖ Plant growth and care (*Arabidopsis thaliana*, *Pisum sativum*, and *Solanum melongena*)
- ❖ Sigmaplot and Prism software
- ❖ Rudimentary coding (Matlab and Sigmaplot)

AWARDS AND SCHOLARSHIPS

- ❖ Fred M. Roddy Scholarship, 2013 — 2014
- ❖ Center for International Education Study Abroad Scholarship, 2015
- ❖ National Merit Scholarship, 2013 — 2017
- ❖ EURECA: Silver ORE Undergraduate Research Excellence Award, 2017
- ❖ EURECA: First Place in Cellular and Molecular Biology, 2017
- ❖ Tennessee Fellowship for Graduate Excellence, Fall 2018 (voluntarily ceded, December 2018)

TEACHING EXPERIENCE

GRADUATE TEACHING ASSISTANT at The University of Tennessee

General Genetics (BIOL 240) — Spring 2019

- ❖ Planned lessons and facilitated discussions each week
- ❖ Met with students individually upon request