

# JESSICA R. KREWALL

LinkedIn Profile: [Jessica \(Kenneson\) Krewall](#)  
[jrk0023.wixsite.com/eportfolio2](http://jrk0023.wixsite.com/eportfolio2)

Trained as a biochemist and enzymologist, I have experience in acquiring and implementing a variety of skills to understand protein structure, function, and mechanism. During my postdoctoral training, I am expanding my skill set to include x-ray crystallography, mammalian cell culture, and an understanding of translational research. My career thus far has trained me to be resourceful and resilient in the face of challenging projects. A passion for problem-solving and helping others drives me to pursue a career in research where I can make a difference. I believe I have the mindset and skills to be a valuable team member of any lab group.

## EDUCATION

**AUG 2015 – SEP 2021**

**DOCTORAL CANDIDATE IN CHEMISTRY, AUBURN UNIVERSITY**

Defended candidacy proposal: “Investigation of the unique catalase mechanism of catalase-peroxidase” under the mentorship of Doug C. Goodwin, Ph.D.

Dissertation: “Impacts of the oxidizable scaffold of catalase-peroxidase (KatG): Modulation of a heme peroxidase for catalytic versatility”

**AUG 2011 – MAY 2015**

**B.S. IN CHEMISTRY WITH HONORS, WAYLAND BAPTIST UNIVERSITY**

Graduated *Cum Laude* with minors in molecular biology and math as an honors program scholar

Honors thesis: “Binding affinity of RecA to mutation sites known to cause drug resistance in *Mycobacterium tuberculosis* with a homemade DSLR documentation system” under the mentorship of Robert Moore, Ph.D.

## EMPLOYMENT

**OCT 2021 – PRESENT**

**POSTDOCTORAL ASSOCIATE, YALE UNIVERSITY**

Carry out independent research under the mentorship of Dr. Anderson  
Mentor incoming undergraduate and graduate students to the Anderson laboratory  
Assist in the purchasing of lab materials and various managerial tasks  
Assist in maintenance of laboratory instruments

**AUG 2015 – JUL 2016, JAN 2021 – SEP 2021**

**GRADUATE TEACHING ASSISTANT, AUBURN UNIVERSITY**

Prepare pre-lab lecture and supervise students in general chemistry, honors general chemistry and biochemistry labs  
Grade weekly lab reports for biochemistry labs  
Provide weekly office hours for honors general chemistry students  
Teach weekly recitation for honors general chemistry  
Grade exams for general chemistry and biochemistry courses

**MAY 2019 – DEC 2020**

**MASS SPECTROMETRY CORE FACILITY GRADUATE ASSISTANT, AUBURN UNIVERSITY**

Fill nitrogen storage tank for the mass spec. facility and the chemistry department 1-2 times per week

Analyze samples on the Q-Tof instrument throughout the week (~10-15 hours per week)

Assist in instrument troubleshooting

Assist in implementing an online submission form for the core facility

**AUG 2016 – MAY 2019**

**GRADUATE RESEARCH ASSISTANT, AUBURN UNIVERSITY**

Trained two new undergraduate students as they began their projects in the Goodwin laboratory

Trained two new graduate students as they began their projects in the Goodwin laboratory

Maintained inventory of chemicals and supplies within the lab

Performed necessary lab safety responsibilities including safety checks and waste management

Acted as a contact for maintenance and purchasing of equipment

\*Tasks listed here were continued throughout my time in graduate school. Metrics listed here are specifically for the designated time period.

**AUG 2011 – MAY 2015**

**CHEMISTRY DEPARTMENT WORK-STUDY, WAYLAND BAPTIST UNIVERSITY**

Prepare lab space and solutions needed for the lab classes every week

Supervise and assist students during lab

Manage the stock room and chemical inventory

Managed the conversion of entire chemical inventory to digital format

Graded quizzes, exams, and some homework for general chemistry classes

**JAN 2012 – MAY 2015**

**WELCH FOUNDATION RESEARCH FELLOW, WAYLAND BAPTIST UNIVERSITY**

Being one of two first researchers for the Moore research group involved project planning, extensive literature research, and learning new techniques. To start a new research project in my university, my advisor and I developed an in-house created documentation system able to image a wide range of laboratory detection techniques. During my time as an undergraduate researcher, I also enjoyed the benefits of camaraderie with other scientists – we helped each other and taught each other new techniques. Because of this, I was familiarized with techniques like live cell culture, Soxhlet extractions, and live animal studies that I would have otherwise missed.

## **SKILLS**

- Proficient at executing lab experiments
- Adept at training and mentorship
- Approach problems creatively
- Determined and resourceful
- Independent yet teachable

## **RESEARCH EXPERIENCE**

**OCT 2021 – PRESENT**

**IDENTIFICATION AND EVALUATION OF INHIBITORS OF THE SARS-COV-2 MAIN PROTEASE,  
ANDERSON LAB**

Evaluate inhibitory effects of synthesized compounds against SARS-CoV-2 main protease  
Design a mammalian cell line useful for monitoring inhibitor's effects against target protein  
Structural investigation of inhibitor – target protein binding

- FRET-based cleavage enzyme assay
- Lentiviral induction protocol
- Mammalian cell culture
- Western blot analysis
- Protein crystallization
- X-ray crystallography
- Chromatography using FPLC instrumentation

**JAN 2016 – SEP 2021**

### **ELUCIDATING HEME INTERMEDIATES OF KATG CATALASE MECHANISM, GOODWIN LAB**

Design and problem-solve kinetic experiments  
Gained experience in managing a number of projects at once  
Acquired experience in how to mentor other scientists in their individual projects

- UV-Vis spectroscopy
- Stopped-flow spectroscopy
- Electron paramagnetic spectroscopy
- Rapid-freeze quench sample prep.
- Kinetic experiments
- Recombinant protein expression
- Ni-NTA chromatography
- Anion exchange chromatography
- Oxygen sensitive electrode assays
- Simple QM calculations using Gaussian
- Tryptic digests (in-gel and solution)
- Troubleshooting broken instruments
- Designing experiments
- Cross-cultural communication
- Troubleshooting experiments
- Lab management/supervision

**JAN 2012 – MAY 2015 (WELCH FELLOWSHIP AND HONORS PROGRAM RESEARCH)**

### **DEVELOPMENT OF DLSR DOCUMENTATION SYSTEM, MOORE LAB**

Carried out literature research to identify a new research project for the chemistry department  
Oligonucleotide design for new research project  
Learned how to use Photoshop and ImageJ for processing images of data for quantification  
Determined ideal camera settings for the various detection methods used by WBU science department  
Started applications with microfluidic devices

- SDS-polyacrylamide gel electrophoresis
- Northern blotting
- Electrophoretic mobility shift assays
- ImageJ data analysis
- Troubleshooting assay problems
- Agarose gel electrophoresis
- Project design

**SUMMER 2013 & SUMMER 2014 (VOLUNTARY PARTICIPATION)**

### **CYTOTOXIC EFFECTS OF PLANT EXTRACTS ON T41 MURINE BREAST CANCER CELLS, GRAY AND REINHART LABS**

Assisted and trained colleagues on using the in-house-made documentation system for bioluminescent assays, western blots, and SDS-PAGE  
Learned new techniques from colleagues in these research groups (live cell culturing and Soxhlet extractions)

- Culturing T41 murine breast cancer cells
- Soxhlet extraction of plant compounds
- TLC separation of plant extracts
- HPLC analysis of plant extracts
- Bioluminescent cell viability assays
- Western blotting

## FALL 2013 (VOLUNTARY PARTICIPATION)

### SALT INTAKE STUDIES, DERDERIAN-PERRERIA LAB

- Handled, fed, and weighed ~20-30 rats over one study
- Aided in the necropsy of rat tissues from the study

## PUBLICATIONS

Barton, C., Clohan Gasaway, K., Islam, R., Aziz, T., Krewall, J.R., Punthrangkul, D., Wilian, K.R. (2022) Implementation of an at-home, first-semester biochemistry lab course: A module based on banana tyrosinase, *Journal of Chemical Education*, 99, 4, pp 1571-1578.

De Faria, C.F., Moreira, T., Lopes, P., Costa, H., Krewall, J.R., Barton, C.M., Santos, S., Goodwin, D.C., Machado, D., Viveiros, M., Machuqueiro, M., and Martins, F. (2021) Designing new antitubercular isoniazid derivatives with improved reactivity and membrane trafficking abilities, *Biomedicine & Pharmacotherapy*, 144, 112362.

Krewall, J.R., Minton, L.E., Goodwin, D.C. (2020) KatG Structure and Mechanism: Using Protein-based Oxidation to Confront the Threats of Reactive Oxygen. *ACS Books Symposium Series*; American Chemical Society; Vol. 1357, pp 83-120.

Njuma, O.J., Davis, I., Ndontsa, E.N., Krewall, J.R., Liu, A., Goodwin, D.C. (2017) Mutual synergy between catalase and peroxidase activities of the bifunctional enzyme KatG is facilitated by electron hole-hopping within the enzyme. *Journal of Biological Chemistry*, 292, pp 18408-18421.

## POSTER PRESENTATIONS

### SEPTEMBER 2022 (SCHEDULED)

#### YALE DEPARTMENT OF PHARMACOLOGY ANNUAL RETREAT, NEW HAVEN, CONNECTICUT

Progress toward a SARS-CoV-2 PROTAC: Utilizing biochemical, structural, and cellular tools for the identification of a main protease targeted degrader

### JULY 2019

#### ENZYMES, COENZYMES, AND METABOLIC PATHWAYS GORDON RESEARCH SYMPOSIUM AND CONFERENCE, WATERVILLE VALLEY, NEW HAMPSHIRE

Elucidating the novel features of the catalase mechanism of catalase-peroxidase

### APRIL 2018

#### 9<sup>TH</sup> ANNUAL SOUTHEAST ENZYME CONFERENCE, GSU, ATLANTA, GEORGIA

How intraprotein radical transfer and the role-reversal of heme intermediates generate a unique catalase mechanism

### OCTOBER 2017

#### 46<sup>TH</sup> SOUTHEAST MAGNETIC RESONANCE CONFERENCE, NHMFL, TALLAHASSEE, FLORIDA

Role reversal between peroxidase reaction intermediates generates the distinct catalase mechanism of catalase-peroxidase

### MAY 2017

#### 7<sup>TH</sup> ANNUAL LESTER ANDREWS RESEARCH SYMPOSIUM, MSU, STARKVILLE, MISSISSIPPI

Directing off-pathway protein oxidation to preserve enzyme activity: At last, a role for the proximal tryptophan of KatG

**APRIL 2017**

**8<sup>TH</sup> ANNUAL SOUTHEAST ENZYME CONFERENCE**, GSU, ATLANTA, GEORGIA

Directing off-pathway protein oxidation to preserve enzyme activity: At last, a role for the proximal tryptophan of KatG

**MARCH 2014**

**247<sup>TH</sup> AMERICAN CHEMICAL SOCIETY NATIONAL MEETING**, DALLAS, TEXAS

Development of a documentations system utilizing a high-end DSLR camera

**APRIL 2013**

**4<sup>TH</sup> ANNUAL SPRING RESEARCH DAY**, WBU, PLAINVIEW, TEXAS

A novel application of EMSA and DSLR technology for detecting RecA binding to *Mycobacterium tuberculosis* DNA sequences

**APRIL 2013**

**116<sup>TH</sup> ANNUAL TEXAS ACADEMY OF SCIENCE MEETING**, SU, KERRVILLE, TEXAS

A novel application of EMSA and DSLR technology for detecting RecA binding to *Mycobacterium tuberculosis* DNA sequences

**OCTOBER 2012**

**WEST TEXAS STEM CONFERENCE**, UTPB, MIDLAND, TEXAS

A novel application of EMSA and DSLR technology for detecting RecA binding to *Mycobacterium tuberculosis* DNA sequences

## **ORAL PRESENTATIONS AT SCIENTIFIC MEETINGS**

**APRIL 2015**

**6<sup>TH</sup> ANNUAL SPRING RESARCH DAY**, WBU, PLAINVIEW, TEXAS

Binding affinity of RecA to mutation sites known to cause drug resistance in *Mycobacterium tuberculosis* with a homemade DSLR documentation system

**MARCH 2015**

**118<sup>TH</sup> ANNUAL TEXAS ACADEMY OF SCIENCE MEETING**, UIW, SAN ANTONIO, TEXAS

Development of a documentation system utilizing a high-end DSLR camera

**APRIL 2014**

**5<sup>TH</sup> ANNUAL SPRING RESEARCH DAY**, WBU, PLAINVIEW, TEXAS

Development of a documentation system utilizing a high-end DSLR camera

**MARCH 2014**

**117<sup>TH</sup> ANNUAL TEXAS ACADEMY OF SCIENCE MEETING**, A&M, GALVESTON, TEXAS

Development of a versatile documentation system for bioanalytical methods

**NOVEMBER 2013 (INVITED PRESENTATION)**

**69<sup>TH</sup> SOUTHWEST REGIONAL MEETING OF THE AMERICAN CHEMICAL SOCIETY**, BU, WACO, TEXAS

Development of a versatile documentation system for bioanalytical methods

## **ORAL PRESENTATIONS BY INVITATION TO THE PUBLIC & OUTREACH**

### **FEBRUARY 2018**

#### **EUFAULA CITY SCHOOL DISTRICT STEAM DAY, ADMIRAL MOORER MS, EUFAULA, ALABAMA**

STEAM day hosted at Admiral Moorer Middle School is a half-day event where middle-school students and their parents are exposed to the excitement and application of science, technology, engineering, art, and mathematics through fun and engaging activities.

For STEAM Day 2018, I led 2 sections of “Viruses, Vaccines, and Your Immunity” where attendees were encouraged to fold their own paper virus, learn about 3 key immune cell types, and play a game demonstrating the concept of herd immunity.

### **MARCH 2017**

#### **EUFAULA CITY SCHOOL DISTRICT STEAM DAY, ADMIRAL MOORER MS, EUFAULA, ALABAMA**

STEAM day hosted at Admiral Moorer Middle School is a half-day event where middle-school students and their parents are exposed to the excitement and application of science, technology, engineering, art, and mathematics through fun and engaging activities.

For STEAM Day 2017, I led 3 sections of “Fun with Enzymes” where attendees were taught about enzymes and the role of antioxidants in our bodies, monitored a colorimetric reaction catalyzed by an enzyme, and recorded their findings to analyze their results.

### **MARCH 9-10, 2017**

#### **GUEST LECTURER, ADMIRAL MOORER MIDDLE SCHOOL, EUFAULA, ALABAMA**

The main purpose of my visit to teach the Science Detectives class was to share with the 7<sup>th</sup> and 8<sup>th</sup> grade students what a biochemist does and what we study in hopes that they are exposed to the opportunities awaiting them should they pursue such a field in the future.

I led a lecture and interactive activity on amino acids, protein sequences, protein structure and function. Students were each an amino acid and the class had to rearrange to form the peptide displayed on the board.

On the second day, I lectured on enzyme function and, in general, the role of enzymes within our body. I lead the students in a group experiment in test tubes and lead discussion to help them understand what was happening in the different test tubes.

### **MARCH 2020**

#### **SCIENCE FAIR JUDGE, GREATER EAST ALABAMA SCIENCE AND ENGINEERING FAIR, AUBURN UNIVERSITY**

### **MARCH 2018**

#### **SCIENCE FAIR JUDGE, GREATER EAST ALABAMA SCIENCE AND ENGINEERING FAIR, AUBURN UNIVERSITY**

### **FEBRUARY 2018**

#### **SCIENCE FAIR JUDGE, EUFAULA CITY SCHOOLS DISTRICT SCIENCE FAIR, EUFAULA, ALABAMA**

As a science fair judge for Middle School students, I engaged students about their projects, evaluating their scientific approach and creative methods. Though judging the students’ work is a major part of this outreach event, it is even more important that the students come away from the experience inspired to keep pursuing scientific endeavors and aim for improvement for future projects.

### **OCTOBER 2018**

#### **JR. MAD SCIENTIST DEMO NIGHT, GRADUATE WOMEN IN SCIENCE, AUBURN UNIVERSITY**

### **OCTOBER 2017**

#### **JR. MAD SCIENTIST DEMO NIGHT, GRADUATE WOMEN IN SCIENCE, AUBURN UNIVERSITY**

### **OCTOBER 2016**

#### **JR. MAD SCIENTIST DEMO NIGHT, GRADUATE WOMEN IN SCIENCE, AUBURN UNIVERSITY**

Jr. Mad Scientist is a community outreach event hosted by the Auburn University chapter of Graduate Women in Science where families from the community are invited to an exciting, hands-on encounter with science.

In 2016, I led a booth aimed at teaching kids about how our immune system attacks germs through an interactive game. In 2017 and 2018, I co-lead the oobleck pool station, teaching kids (and parents) about non-Newtonian fluids.

#### **APRIL 2015**

**SALLY SOCIETY'S "POWER OF THE PURSE" EVENT, PLAINVIEW, TEXAS**

#### **SEPTEMBER 2015**

**SALLY SOCIETY'S "POWER OF THE PURSE" EVENT, LUBBOCK, TEXAS**

Presented to a women's philanthropy group about the research that I pursued as an undergraduate researcher developing a documentation system from a high-end DSLR camera for use in the WBU Math and Science Department which a distinct focus on promoting presence of women in the STEM fields.

#### **FEBRUARY 2014**

**PLAINVIEW ROTARY CLUB, PLAINVIEW, TEXAS**

#### **OCTOBER 2013**

**PLAINVIEW KIWANIS CLUB, PLAINVIEW, TEXAS**

Presented to the Plainview community clubs about the research that I pursued as an undergraduate researcher developing a documentation system from a high-end DSLR camera for use in the WBU Math and Science Department.

## **PROFESSIONAL ORGANIZATIONS AND LEADERSHIP**

#### **FALL 2017 – SUMMER 2019**

**PROFESSIONAL DEVELOPMENT CHAIR, AUBURN LOCAL SECTION YOUNGER CHEMISTS COMMITTEE**

Planned and organized a wellness camping retreat for graduate students (Fall 2019)

Organized and served as moderator for 2 career panels for graduate students (2017 & 2018)

Planned and hosted a few professional development seminars for grad students based on feedback

Coordinated visit for graduate student choice colloquium speaker (Spring 2018)

Planned and hosted meet-and-greet coffee breaks for faculty and graduate students (2018-2019)

#### **FALL 2017 – SUMMER 2019**

**STUDENT MEMBER OF SAFETY COMMITTEE, AUBURN UNIVERSITY CHEM & BIOCHEM DEPARTMENT**

Assist in safety checks and assessments throughout the department

Discuss safety and risk assessment with the safety committee

Trained in campus emergency response (one of four for the department)

#### **FALL 2017 – SUMMER 2019**

**ADMINISTRATIVE VICE PRESIDENT, AUBURN CHEMISTRY GRADUATE STUDENT ASSOCIATION**

Facilitate discussions between Department of Chemistry and Biochemistry students and administration

Represented graduate student body in a number of faculty meetings

Responsible for communicating association news to graduate students and postdoctoral researchers

Aided in the advertisement of department-wide stress-buster events (making, posting, and circulating fliers)

#### **AUGUST 2014 – MAY 2015**

**PRESIDENT'S AMBASSADOR, WAYLAND BAPTIST UNIVERSITY**

Hosted tables during Board of Trustee luncheons and meetings

Represented the student body to the Board of Trustees and major donors of the university  
Volunteered for philanthropy events hosted by the university or university board  
Exemplified academic and excellence to the student body

**JANUARY – DECEMBER 2013**

**PRESIDENT**, WBU STUDENT CHAPTER OF THE AMERICAN CHEMICAL SOCIETY

**JANUARY – DECEMBER 2012**

**SECRETARY**, WBU STUDENT CHAPTER OF THE AMERICAN CHEMICAL SOCIETY

Participated and lead the Plainview Area Homeschool Chemistry Enrichment Program (August 2012 - May 2013) where a group of students prepared lab materials, pre-lab lectures, and post-lab help for the students' questions and homework help

**2019 – 2021**

MEMBER - AMERICAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

**2012 – PRESENT**

MEMBER - NATIONAL AMERICAN CHEMICAL SOCIETY MEMBER

**2015 - 2021**

MEMBER - AUBURN LOCAL SECTION OF THE AMERICAN CHEMICAL SOCIETY

**2012 – 2015**

MEMBER - SOUTHWEST REGIONAL AMERICAN CHEMICAL SOCIETY MEMBER

**2012 – 2015**

MEMBER - TEXAS ACADEMY OF SCIENCE MEMBER

**AUGUST 2011 – MAY 2015**

MEMBER - WBU STUDENT CHAPTER OF THE AMERICAN CHEMICAL SOCIETY MEMBER

## **HONORS AND AWARDS**

- Women's Chemist Committee/Eli-Lilly Travel Award (Fall 2019)
- Auburn College of Science and Mathematics Graduate Research Travel Award (Summer 2019)
- Malone-Zallen Graduate Research Fellowship (May 2018)
- 3<sup>rd</sup> place poster presentation, 9<sup>th</sup> Annual Southeast Enzyme Conference (April 2018)
- Travel award to the 46<sup>th</sup> Southeastern Magnetic Resonance Conference (October 2017)
- 2<sup>nd</sup> place poster presentation, 7<sup>th</sup> Annual Lester Andrews Research Symposium (May 2017)
- Travel award to the 7<sup>th</sup> Annual Lester Andrews Research Symposium (May 2017)
- Outstanding Chemistry Major Award (2013 and 2014)
- Dr. Dorothy McCoy Scholarship (Aug. 2014 – May 2015)
- Harold & Audrey Temple Scholarship (Aug. 2014 – May 2015)
- Hearst Science and Math Scholarship (Aug. 2014 – May 2015)
- Harold Reese Scholarship (2012 – 2014)
- Dr. L.C. Wayland Memorial Scholarship (Aug. 2014 – May 2015)
- Norman & Louise Wright Scholarship (Aug. 2014 – May 2015)
- Joe & Jennie Richardson Scholarship (2012 and 2013)
- Mary Jones/Houston Scholarship (Fall 2011)