

# Lauren Todorov

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## Education

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### University of Illinois - Urbana-Champaign, IL, USA

Aug 2020 – *present*

Master of Science in Geology

**Advisor:** Bruce W. Fouke, Professor of Geology, Microbiology, Integrative Biology,  
Director of the Roy J. Carver Biotechnology Center, Institute of Genomic Biology Affiliate

### University of Illinois - Urbana-Champaign, IL, USA

Aug 2016 – May 2020

Bachelor of Science in Molecular and Cellular Biology (MCB)

Minor(s): Chemistry, Art & Design

Certificate(s): Microbiology, Science Communications, Undergraduate Research

Overall GPA: 3.92/4.00

- Dean's List Cum Laude
- 2019 Senior 100
- 2020 Highest Distinction in Research in MCB

### Oakton Community College - Des Plaines, IL, USA

Aug 2015 – May 2016

Overall GPA: 4.00/4.00

- President's Scholar Honor

### Oxford University – Oxford, England

Jul 2014 – Aug 2014

- Studied Shakespeare at the Hertford College for the summer
- Presented a thesis on William Shakespeare's *Henry IV Part I*, *Henry IV Part II*, and *Titus Andronicus*

## Graduate Research & Teaching Experiences

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### Wanless Fellow

Aug 2020 – *present*

### Department of Geology - Urbana, IL

**Project:** Paragenetic Sequence of Carbonate Kidney Stones' Distinct Stratigraphic Layering and Frequency

- Collaborating with Mayo Clinic, Northwestern University Hospital, and Dornier MedTech to further understand the stratigraphy and fragmentation of kidney stones during medical treatments, such as extracorporeal shockwave lithotripsy (ESWL) and laser lithotripsy
- Developing project protocols and handling all experiments, high-resolution imaging, and data analysis
- Understanding the results and interpretations of this kidney stones research to determine the mechanisms of formation and dissolution, while also integrating the work to the concept of "Universal Biomineralization" that is also observed in corals, cave speleothems, Yellowstone hot spring and Roman aqueducts

## Undergraduate Research & Teaching Experiences

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### **Jenner Family Undergraduate Research Fellow**

May 2019 – May 2020

**Carl R. Woese Institute for Genomic Biology - Urbana, IL**

**Project:** Sulfate Reducing Bacteria Streamers and Iron Sulfides Rapidly Occlude Porosity and Increase Hydraulic Resistance in Proppant-Filled Shale Fractures

- Conduct DowDuPont and Shell sponsored research on oil field bio-souring, the results of which will simultaneously have direct implications to the NASA Astrobiology Institute research regarding subsurface microbial biomarkers on Mars
- Inoculate anaerobic cultures for experiments and obtain genomic data of the microbial communities

### **Mark Tracy Translational Research Undergraduate Fellow**

Aug 2018 – May 2020

**Carl R. Woese Institute for Genomic Biology - Urbana, IL**

**Project:** Sulfate Reducing Bacteria Streamers and Iron Sulfides Rapidly Occlude Porosity and Increase Hydraulic Resistance in Proppant-Filled Shale Fractures

- Conduct DowDuPont and Shell sponsored research on oil field bio-souring, the results of which will simultaneously have direct implications to the NASA Astrobiology Institute research regarding subsurface microbial biomarkers on Mars
- Inoculate anaerobic cultures for experiments and obtain genomic data of the microbial communities

### **University of New South Wales Exchange**

Sep 2019 – Dec 2019

**School of Biotechnology and Biomedical Studies – Sydney, Australia**

**Project:** Modern and Ancient Stromatolites and their Associated Microbiome

- Worked with Dr. Martin van Kranendonk, Director of the Australian Center of Astrobiology (ACA), and Dr. Brendan Burns, member of the ACA, to obtain a full characterization of biotic components in modern stromatolites, a full characterization of the crystalline components of modern stromatolites, and a comparison of the biotic and crystalline components of the modern stromatolites to complementary ancient stromatolite samples
- Obtained samples of ancient 2.5 Ga stromatolites from South Africa and modern microbial mats from Shark Bay that will be subsequently used for a M.Sc. in geology correlating stromatolites to coral, kidney stones, hot springs, and roman aqueduct biomineralization

### **Carl. R Woese Undergraduate Research Scholar**

May 2018 – Jun 2019

**Carl R. Woese Institute for Genomic Biology - Urbana, IL**

**Project:** Correction Factors for  $\delta^{18}\text{O}$ -Derived Global Sea Surface Temperature Reconstructions From Diagenetically Altered Intervals of Coral Skeletal Density Banding

- Analyzed coral skeleton extensively using cutting-edge microscopy
- Quantified computationally the porosity of the coral skeleton for paleothermometry reconstructions of sea surface temperature
- Created figures and assisted in writing the final manuscript for submission to *Scientific Reports*

### **General Chemistry 102 Merit Teaching Assistant**

Aug 2018 – Dec 2018

**University of Illinois at Urbana-Champaign**

- Handled a class of 24 students, twice a week for 2 hours, on subjects relating to chemical and physical properties and compositional changes of substances
- Promoted student engagement by using a broad range of teaching techniques and methods in order to inspire and motivate learning
- Met with students individually and held office hours to facilitate learning

- Proctored exams and quizzes and graded all coursework fairly

**Undergraduate Research with Bruce Fouke**

Jan 2018 – May 2018

**Carl R. Woese Institute for Genomic Biology - Urbana, IL**

**Project:** Enhancing Coral Larvae Settlement via a New Cutting-Edge Integration of Materials Engineering, Omics-Driven Biology and CaCO<sub>3</sub> Geobiology

- Designing and developing a CaCO<sub>3</sub> substrate with the use of material science and 3D printing
- Performing metagenomics analysis of bacterioplankton in sea water samples

**Undergraduate Research with Bruce Fouke**

Aug 2017 – Jan 2018

**Carl R. Woese Institute for Genomic Biology - Urbana, IL**

**Project:** Culturing Microbial Communities in Controlled Stress Micro-Environments (NASA Project 11)

- Assisting on microbial evolution experiments involving controlled step-wise and continuous gradients of Ciprofloxacin to *Escherichia coli* populations
- Acquiring techniques of creating microfluidic devices, inoculating cultures, and making agar plates
- Designing a glass microfluidic device cutting stencil for reproducibility
- Performing genetic analysis of microbial mutations

**Shadow**

Jun 2016 – Jun 2016

**Jesse Brown VA Medical Center - Chicago, IL**

**Project:** Lipid Emulsion Infusion: Resuscitation for Local Anesthetic and other Drug Overdose

- Observed techniques for cancer research
- Shadowed Dr. Guy Weinberg in research on the effect of lipid emulsion on pharmacokinetics of bupivacaine on rats

**Lab Assistant**

Feb 2016 – May 2016

**Oakton Community College Biology Lab - Des Plaines, IL**

- Assisted the lab managers in maintaining the lab equipment
- Collaborated with professors to prepare their classes for the laboratory period
- Acquired techniques with cleaning scientific equipment and preparing for various experiments

**Undergraduate Research with Tom Firak**

Mar 2016 – Jun 2016

**Oakton Community College - Des Plaines, IL**

**Project:** Northern Suburban Soil Analysis

- Tested for new antibiotics found in the soil around the northern suburban area
- Acquired microbiological techniques such as working with cultures and aseptic procedures

**Student Volunteer**

Apr 2015 – May 2015

**The Field Museum of Natural History's Pritzker DNA Lab - Chicago, IL**

**Project:** Multiple births by a captive swellshark *Cephaloscyllium ventriosum* via facultative parthenogenesis

- Researched and completed the parthenogenesis project that occurred with a swell shark from the National Aquarium in Baltimore, Maryland
- Acquired techniques with DNA extraction, running PCRs, operating a genetic analyzer to sequence the DNA, and various computer systems

## Publications

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1. Feldheim, K. A., Clews, A., Henningsen, A., **Todorov, L.**, McDermott, C., Meyers, M., Bradley, J., Pulver, A., Anderson, E. and Marshall, A. (2016), “Multiple Births by a Captive *Swellshark Cephaloscyllium Ventriosum* via Facultative Parthenogenesis.” *Journal of Fish Biology*, 11 Nov. 2016, doi:10.1111/jfb.13202.
2. Sivaguru M., Fouke K.W., **Todorov L.**, Kingsford M.J., Fouke K.E., Trop J.M. and Fouke B.W. (2019) “Correction Factors for  $\delta^{18}\text{O}$ -Derived Global Sea Surface Temperature Reconstructions From Diagenetically Altered Intervals of Coral Skeletal Density Banding.” *Front. Mar. Sci.* 6:306. doi: 10.3389/fmars.2019.00306
3. Fouke B.W., Bhattacharjee A.S., Fried G.A., Sivaguru M., Sanford R., Zhou., Wunch K., Stephenson A., Ferrar J.A., **Todorov L.G.**, Fouke K.W., and Werth C.J., (2019) “Sulfate Reducing Bacteria Streamers and Iron Sulfides Rapidly Occlude Porosity and Increase Hydraulic Resistance in Proppant-Filled Shale Fractures.” Unpublished manuscript, Department of Geology, University of Illinois at Urbana-Champaign, Urbana, USA.
4. Sivaguru M., **Todorov L.G.**, Fouke C.E., Munro C.M.O., Fouke K.W., Fouke K.E., and Fouke B.W. (2019) “Scleractinian Corals Regulate the Abundance of Zooxanthellae Symbionts and Biomolecules in Response to Increasing Water Depth and Sea Surface Temperature.” Unpublished manuscript, Department of Microbiology, University of Illinois at Urbana-Champaign, Urbana, USA.

## Conference Presentations

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### **The 2020 Undergraduate Research Symposium**

Apr 2020

#### **Online (due to COVID-19)**

“Changes in Coral Tissue Cellular Structure and Biochemistry Across Bathymetric Gradients and Seasonal Changes in Sea Surface Temperature”

**Lauren G. Todorov**, Mayandi Sivaguru, Courtney E. Fouke, Cara M. O. Munro, Kyle W. Fouke, Kaitlyn E. Fouke, and Bruce W. Fouke

- Awarded Highest Distinction in Research for this project

### **Geological Society of Australia’s Geological and Earth Science Student Symposium**

Nov 2019

#### **The University of New South Wales John Niland Scientia Building**

“Seafloor Diagenesis of Coral Skeleton Density Banding: An Inconvenient Truth”

Kyle W. Fouke, **Lauren G. Todorov**, Mayandi Sivaguru, Michael J. Kingsford, Glenn A. Fried, Ellamae Fried, Kaitlyn E. Fouke, Jeffrey M. Trop and Bruce W. Fouke

- Awarded 1<sup>st</sup> runner up in poster presentations

### **The 2019 Undergraduate Research Symposium**

Feb 2019

#### **Illini Union Ballroom**

“Seafloor Diagenesis of Coral Skeleton Density Banding: An Inconvenient Truth”

Kyle W. Fouke, **Lauren G. Todorov**, Mayandi Sivaguru, Michael J. Kingsford, Glenn A. Fried, Ellamae Fried, Kaitlyn E. Fouke, Jeffrey M. Trop and Bruce W. Fouke

### **The School of Earth, Society & Environment’s 2019 Research Review**

Feb 2019

#### **Illini Union Ballroom**

“Seafloor Diagenesis of Coral Skeleton Density Banding: An Inconvenient Truth”

Kyle W. Fouke, **Lauren G. Todorov**, Mayandi Sivaguru, Michael J. Kingsford, Glenn A. Fried, Ellamae Fried, Kaitlyn E. Fouke, Jeffrey M. Trop and Bruce W. Fouke

**Geological Society of America 2018 Annual Meeting** Nov 2019  
**Indiana Convention Center**  
“Seafloor Diagenesis of Coral Skeleton Density Banding: An Inconvenient Truth”  
Kyle W. Fouke, **Lauren G. Todorov**, Mayandi Sivaguru, Michael J. Kingsford, Glenn A. Fried, Ellamae Fried, Kaitlyn E. Fouke, Jeffrey M. Trop and Bruce W. Fouke

**Institute for Genomic Biology: External Advisory Board** Oct 2017  
**I Hotel and Conference Center**  
“Culturing Microbial Communities in Controlled Stress Micro-Environments”

- Co-presenter of the project to 17 world-renowned members of the External Advisory Board

## Honors & Awards

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**Wanless Fellowship** Apr 2020

- Awarded to an incoming graduate student a total annual value of \$38,678 annually by the Department of Geology, including a \$22,379 stipend, tuition waiver, health insurance, and other school fees

**Highest Distinction in Research** May 2020

- Awarded by the School of Molecular and Cellular Biology to one student from the graduating class who has submitted the Highest quality senior thesis, as well as meets all of the eligibility requirements

**Geological Society of Australia’s 1<sup>st</sup> Runner Up Poster Presentation** Nov 2019

- Awarded \$100 by the University of New South Wales

**Jenner Family 2019 Summer Fellowship** Apr 2019

- Awarded \$5,000 by the University of Illinois Molecular and Cell Biology Department for pursuing a senior thesis

**Senior 100 Award** Apr 2019

- Honor awarded by the University of Illinois Student Alumni Association to the top 100 seniors at the university

**Mark Tracy Award for Undergraduate Translational Research Fellowship** Aug 2018

- Awarded \$4,000 by the Institute for Genomic Biology to pursue research in industry-related work

**Carl R. Woese Undergraduate Research Scholar of 2018 Fellowship** May 2018

- Awarded \$4,500 by the Institute for Genomic Biology to pursue summer research

## Professional Memberships

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- National Society of Collegiate Scholars
  - National Honor Society
  - Bioscience Journal Club
  - Beta Psi Omega Biology Fraternity
  - Alpha Chi Sigma Chemistry Fraternity
  - Wildlife and Conservation Club
  - Geological Society of America

## Outreach Activities

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**Geology Judge, Illinois State Fair 4-H Virtual Project Show** Jul 2020 – Aug 2020  
University of Illinois Extension

- Judged the 4-H geology submissions for the Illinois State 4-H’s 2020 virtual project show, consisting of kids ages 8-18. The 4-H program is the largest out-of-school program in the country that consists of 6 million kids throughout the country and 200,000 throughout the state of Illinois. The fair consists of 70 project topics with 4 classes/groups for submission.

**Camp Counselor, Pollen Power**

May 2019 – Aug 2019

Carl R. Woese Institute for Genomic Biology

- Taught campers how to examine sunflower, lily, primrose, and cattail pollen
- Managed the Silk Dissection activity that allowed for 6<sup>th</sup> to 8<sup>th</sup> grade girls to learn how to apply the scientific method by dissecting, investigating and imaging corn stalks
- Trained campers on the Zeiss V16 and Zeiss Confocal 710 microscopes

**Camp Counselor, Pollen Power**

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**Camp Counselor, Scholar Athlete Project**

May 2018 – Aug 2018

Carl R. Woese Institute for Genomic Biology

- Created and presented a 3D interactive sculpture of the Tree of Life to explain evolution through the 3 domains of life, microscopy, current research, and Carl Woese's discoveries
- Educated 13-18 year old athletes about the science and research on nutrition and how that can be applied to improve their overall performance in school and sports
- Lead tours through the research facility

**Executive Member, Secretary**

Jan 2018 – May 2018

Beta Psi Omega Biology Fraternity: UIUC Chapter

- Mentor 60+ undergraduate students interested in research-based careers on understanding scientific literature, practicing presentation skills, and obtaining laboratory positions
- Manage organization's correspondence and aid in planning of events promoting unity, diversity, service, proactivity, and professionalism

**Presenter, 4-H Clover Buds**

Dec 2017

Bruce Fouke's Team Representative

- Taught 4-8 year old children about Carl R. Woese's findings and evolution through the with the 3 domains of life
- Created interactive activities

**Executive Member, Social Chair**

Jan 2017 – May 2017

Beta Psi Omega Biology Fraternity: UIUC Chapter

- Mentor 60+ undergraduate students interested in research-based careers on understanding scientific literature, practicing presentation skills, and obtaining laboratory positions.
- Created events that promoted unity between UIUC members, Purdue members, faculty, and the general public

**Volunteer**

Aug 2016 – May 2017

Girl Scouts of America, Urbana

- Planned and executed activities with the Girl Scouts

**Volunteer**

Jan 2016 – Feb 2016

Cancer Wellness Center, Northbrook

- Assisted with patient information and file keeping increasing efficiency of the facility

## Skills

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**Languages:** English (native), Bulgarian (fluent), French (beginner)

**Computer:** R Studio, Geneious, Zen Blue, Zen Black, NPD.view 2, Canvas, Imaris X64, AxioVision SE64, Sigma Plot 11.0, Adobe Photoshop, Adobe LightRoom CC, Adobe LightRoom Classic CC, Adobe Indesign, Scribus, Microsoft Word, Microsoft Excel, Microsoft PowerPoint

**Microscopes:** Zeiss LSM 710 Confocal, Zeiss Axioscan.Z1, Nanozoomer, ApoTome.2/V16, Wideview field microscopes

**Other:** Glass cutting

## References

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Bruce Fouke, Professor and Director of Roy J. Carver Biotechnology Center  
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