

# Rachel M. Laker

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## **Education**

### **2023 The University of Chicago**

PhD Candidate in the Department of Geophysical Sciences  
Dissertation: Preservational heterogeneity of marine vertebrates in a sequence stratigraphic context: inferring exposure and burial dynamics from bone preservation  
Advisor: Dr. Susan Kidwell  
Committee Members: Dr. Clara Blättler, Dr. Andy Campbell, Dr. Raymond Rogers (Macalester College).

### **2018 University of Wyoming**

Master of Science in Geology (GPA 3.93)  
Thesis: Using non-destructive Raman spectroscopy to determine fossil diagenesis  
Advisor: Dr. Mark T. Clementz  
Committee: Dr. Laura Vietti, Dr. Todd Surovell, Dr. John Kaszuba

### **2016 Miami University of Ohio**

Bachelor of Science in Geology (GPA 3.74, Advisors Dr. Brian Currie and Dr. Ellen Currano) Bachelor of Music in Horn Performance (GPA 3.99, Instructor Gregory Phillips)  
Obtained simultaneously with dual departmental honors.

## **Professional Activities**

### **Grants, Fellowships, and other Funding**

2022 GSA Graduate Research Grant  
2022 Society of Sedimentary Geology Student Research Grant  
2021 Paleontological Society Student Research Award  
2021 Society of Sedimentary Geology Student Research Grant  
2020 Paleontological Society Student Research Award  
2020 GSA Graduate Student Research Grant

### **Academic Awards and other Accomplishments**

2017 W.E. Andrau Scholarship, UWyo  
2017 John R. Hanley Scholarship, UWyo  
2017 Marie Morisawa Memorial Scholarship, UWyo

- 2016 John R. Hanley Scholarship, UWyo
- 2016 Klaenhammer Excellence Fund, UWyo
- 2015 Undergraduate Summer Scholar Award, Miami University
- 2015 David Morrow Field Geology Award, Miami University
- 2014 Radabaugh Geology Scholarship, Miami University
- 2013 Carl E. Limper Scholarship for Outstanding Geology Academic Performance, Miami University

## **Field Experience**

- 2022 Dissertation work: measuring the Aguja Formation, Big Bend National Park, TX.
- 2022 Field Assistant to Melissa Wood; geology and paleontology of the Washakie Formation, WY.
- 2021 Dissertation work: measuring the Aguja Formation, Big Bend National Park, TX.
- 2019 Invited to join/advise the Colorado Northern Community College field course in paleontology, Morrison Formation, CO.
- 2015 Undergraduate thesis work: Ichnology of the Stump and Curtis formations, UT.

## **Awarded Permits**

- 2022 BIBE-2022-SCI-0013: NPS Research and Collections Permit titled “Diagenetic variability of fossil vertebrate remains in a sequence stratigraphic context: Late Cretaceous-age Aguja Formation of Big Bend National Park”
- 2021 BIBE-2021-SCI-0017: NPS Research and Collections Permit titled “Diagenetic variability of fossil vertebrate remains in a sequence stratigraphic context: Late Cretaceous-age Pen, Aguja, and Javelina formations of Big Bend National Park”

## **Publications**

Currano, E. D., **Laker, R.**, Flynn, A. G., Fogt, K. K., Stradtman, H. and Wing, S. L. (2016), Consequences of elevated temperature and  $p\text{CO}_2$  on insect folivory at the ecosystem level: perspectives from the fossil record. *Ecol Evol*, 6: 4318–4331. doi:10.1002/ece3.2203

## **In Preparation**

**Laker, R.M.**, Vertebrate fossil permineralization within a sequence stratigraphic context: records of early diagenesis in Eocene siliciclastics of the Valley of the Whales, Egypt. *Journal of Geology*.

**Laker, R.M.**, Microtaphonomic and authigenic variability in a sequence stratigraphic context: evidence of variable post-mortem conditions and a cryptic sequence boundary in the Miocene siliciclastics of the Calvert Cliffs, Maryland.

**Laker, R.M.**, Sequence stratigraphic analysis of the Aguja Formation, Cretaceous, Big Bend National Park.

### **Professional Meeting Presentations**

**Laker, R.M.**, 2022. Transforming fossil diagenesis from a problem into a tool: microtaphonomic features of bone reflect early depositional environments and thus the dynamics of time-averaging in Miocene (Calvert Cliffs, MD) and Eocene (Valley of the Whales, Egypt). Society of Vertebrate Paleontology Annual Meeting.

**Laker, R.M.**, 2022. Depositional rates are reflected in microtaphonomic and mineralogic preservation of marine vertebrate remains: comparing diagenetic trends across sedimentary basins using the Valley of the Whales (Eocene, Egypt) and Calvert Cliffs (Miocene, MD). Geological Society of America Annual Meeting.

**Laker, R.M.**, 2021. Understanding diagenetic variation in fossil assemblages: leveraging the sequence stratigraphic context of vertebrate remains within the Calvert Cliffs (Miocene of Maryland). In the "Future Leaders in Paleontology" Session of the Geological Society of America Annual Meeting.

**Laker, R.M.**, 2021. Authigenic variation as a function of exposure duration in the marine Eocene vertebrates of Wadi Al-Hitan, Egypt: diagenetic insights into the controls of bone preservation. 9th International Bone Diagenesis Meeting.

**Laker, R.M.**, Gingerich, P.D., Kidwell, S., 2020. Variation in the Diagenesis of Whale Bones: Insights from Sequence Stratigraphy. Geological Society of America 2020 Online Annual Meeting.

**Laker, R.M.**, 2020. Strong Variation in Diagenesis of Bones as a Function of Sequence Stratigraphy: Eocene Valley of the Whales, Egypt. Society of Vertebrate Paleontology Annual Meeting Virtual 2020.

**Laker, R.M.**, 2019. Diagenetic heterogeneity of time-averaged vertebrate marines in marine settings: a test case of the Miocene Sharktooth Hill Bone Bed, California. Geological Society of America 2019 Annual Meeting

**Laker, R.M.**, and Clementz, M.T., 2018, Quantifying Organic Presence in Young Fossil Specimens with Raman Spectroscopy, Society of Vertebrate Paleontology Program and Abstracts, p. 78.

**Laker, R.M.**, and Clementz, M.T., 2017, Using Non-Destructive Raman Spectroscopy to Investigate Young Fossil Diagenesis, 8th Bone Diagenesis Conference, Oxford, UK.

Clementz, M.T., and **Laker R.M.**, 2017, Assessing Preservation of Tympanic Bullae of Fossil and Modern Cetacea Using Raman Spectroscopy (1064 nm), 8th Bone Diagenesis Conference, Oxford, UK.

**Laker, R.M.**, and Clementz, M., 2017, Using Raman Spectroscopy as a Tool to Investigate Sub-Fossil and Young Fossil Diagenesis, Society of Vertebrate Paleontology Meeting Program and Abstracts, v. 6, no. B46 (105).

**Laker, R.M.**, and Currie, B.S., 2015, Ichnology of the Upper Jurassic Curtis and Stump formations, central and northeastern Utah: Relationships between paleoenvironmental setting and sequence stratigraphic position, Geological Society of America Annual Meeting Abstracts with Programs, v. 45, no. 7.

### **Invited Talks**

- 2021 Macalester College, “Authigenic Infill and Bone Preservation in the Calvert Cliffs, MD, as a function of sequence stratigraphic context”
- 2020 PaleoClub at The University of Chicago, “Preservational heterogeneity of marine vertebrates in a sequence stratigraphic context: inferring exposure and burial dynamics from bone preservation”

## **Teaching and Outreach**

### **Courses Taught**

- Spring 2023 Field Course in Modern and Ancient Environments on “Coasts and Coastal Resilience”, Lecturer, with Broc Kokesh (lecturer), Susan Kidwell (professor) and Michael LaBarbera (guest)
- Autumn 2022 Global Warming (Flipped Course), Instructor, The University of Chicago

### **Teaching Assistanceships** *(at The University of Chicago unless noted)*

- Winter 2023 Physical Geology, with Edwin Kite
- Spring 2022 Environmental History of the Earth, with Mark Webster
- Winter 2022 Field Course in Geology, with Susan Kidwell
- Autumn 2021 Physical Geology, with David Rowley
- Spring 2021 Environmental History of the Earth, with Mark Webster
- Winter 2021 Biological Evolution, with David Jablonski
- Autumn 2020 Physical Geology, with David Rowley
- Spring 2020 Environmental History of the Earth, with Mark Webster
- Winter 2020 Natural Hazards, with Noboru Nakamura
- Autumn 2019 Earth as a Planet, with Fred Ciesla
- Spring 2019 Environmental History of the Earth, with Mark Webster
- Winter 2019 Biological Evolution, with David Jablonski
- Autumn 2018 Earth as a Planet, with Fred Ciesla
- Spring 2018 Principles of Paleontology (University of Wyoming), with Mark Clementz
- Spring 2017 Principles of Paleontology (University of Wyoming), with Mark Clementz
- Fall 2016 Global Sustainability

### **Teaching Development Coursework**

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|------|---|
| 2022 | Course Design and College Teaching, The University of Chicago |
| 2020 | Project Implicit and A4BL (optional awareness training)       |
| 2019 | Theories in Science Education, The University of Chicago      |

## Other

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|-----------|--|
| 2022-2023 | <p><b>Founder and leader, Writing Accountability Group</b><br/>Organized weekly gatherings for peers within the Department of Geophysical Sciences to write together ~2 hrs/week; selected relevant readings or creativity prompts to help overcome writing hesitancy</p>  |
| 2021      | <p><b>Field Safety Advisory Board Geophysical Sciences Representative</b> for the University of Chicago Office of Safety through UChicago GRAD; advised on resources to offer for common field work issues including personal safety, conflict resolution, and emergency resources.</p>                                  |
| Fall 2017 | <p><b>Research Assistant</b>, Mechanobiology of a Resilient Bone Extracellular Matrix: A Multiscale Perspective on How Bats Achieve Exceptional Mechanical Properties in Wing Bones, University of Wyoming; prepared bat bones for elemental analysis and Raman spectroscopy and collected Raman spectra of samples.</p> |
| 2012-2016 | <p><b>Substitute Teacher</b>, Batesville Community School Corporation (Indiana), K-12 experience in all subjects, with a specialty in band.</p>  |

## Outreach

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|-----------|---|
| 2022      | <p><b>South Side Science Festival – Geophysical Sciences Volunteer</b><br/>Lead the Paleobiology team to design an interactive 3D-print based phylogenetic activity, one of five teams representing the DoGS at the University of Chicago. Festival targeted local communities to engage with science.</p>                                  |
| 2018-2023 | <p><b>Skype a Scientist Participant</b><br/>Participant in a program designed to connect students and teachers to scientists via Skype to interact with students in a Q&amp;A or lecture format (grades 4-12); subjects include general paleontology, sedimentology, taphonomy, careers in geology, and my personal scientific journey.</p> |

- 2019                    **Science Works Career Exploration at the Museum of Science and Industry**  
 Joined fellow graduate students in hosting a booth representing DoGS at UC. Communicated with children and parents about fossils and what we can learn from them, using local limestone embedded with brachiopods as an example of Chicago's Paleozoic past.
- 2019, 2023           **Geophysical Department Open House at the University of Chicago**  
 Presented at a graduate-student-led event where we hosted ~80 high school students and offered 45-minute mini-courses on various subjects within the department. Partnered with a graduate student to conduct a phylogenetic analysis with pasta noodles – then illustrated the complexities of taphonomy by breaking them; students created a matrix using observations and teamwork.
- 2016-2018           **Geology Museum Outreach Volunteer, University of Wyoming**  
 Regular volunteer for events hosted or attended by the University of Wyoming Geology Museum, including the Eclipse Festival, Wyoming Rocks!, the Fossil Fish Festival, and Earth Day. Worked hands-on with children to explore science, including teaching them to prep specimens, identify minerals, and conduct their own experiments.

## **Service**

### **Organized Professional Symposia**

- October, 2022        **Great Lakes Student Paleoconference (GLSP) Host Committee Member.** Served as a member of the hosting committee for a 4th iteration of the student-led paleontology conference at the Field Museum (80+ students from ~7 surrounding institutions); coordinated volunteers, found housing options for participants, planned dinners, built the meeting's website, and presented a talk.
- October, 2022        **Technical Session Chair at Geological Society of America**  
 "Laws of the Grave: Advances in Taphonomy across the Paleontologic Record"; Morning session and Poster session.  
 Co-chair: Broc Kokesh

### **Committees Served**

- 2020-2023        **Society of Vertebrate Paleontology Student and Postdoc Liaison Committee**

PhD Student Representative: The committee provides student members with resources for navigating the conference and arranges a Round Table event where students can speak with professionals on specific topics.

- 2019-2020 **Graduate Student Representative of the Colloquia Committee, Department of Geophysical Sciences, University of Chicago**  
Provided student nominations to the committee, invited guest speakers for the weekly department colloquium, and organized meet-and-greets between speakers and students.

### **Other**

- 2022 **SafeSVP Representative**  
Completed safety training for Code of Conduct violations at the in-person meeting; acted as a resource to help members report violations.

### **Field Courses**

- 2021 Salton Trough, California; Teaching Assistant and second-in-command on a field methods course over Spring Break 2021 with Susan Kidwell at the University of Chicago.
- 2019 San Salvador, Bahamas; Modern and Ancient Carbonates with Susan Kidwell and Michael LaBarbera (the University of Chicago); designed and implemented taphonomic experiments.
- 2015 Summer Geology Field Camp (Miami University); created geologic maps across Idaho, Wyoming, and Montana as part of the geology capstone requirement.
- 2015 Argentina; Lived with Argentine families and traveled across central Argentina as a winter field course in both Spanish and Geology with Miami University, 3 weeks.

### **Professional Societies**

Geological Society of America, The Paleontological Society, Society for Sedimentary Geology, Society of Vertebrate Paleontology