

## Katelyn E. Gray

Department of Earth & Planetary Sciences  
Johns Hopkins University  
3400 N Charles St  
Baltimore, MD 21218-2687

kgray37@jh.edu  
katelyn.e.gray@gmail.com  
(512) 680-6448  
www.katelyngray.org

---

### PROFESSIONAL APPOINTMENTS

- |                |  |
|----------------|--|
| 2023 – Present | Blaustein Fellow, <i>Department of Earth and Planetary Sciences, Johns Hopkins University, Baltimore, MD</i>         |
| 2019 – 2023    | Postdoctoral Researcher, <i>Department of Plant and Soil Sciences, University of Delaware, Newark, DE</i>            |
| 2019           | Adjunct Professor, <i>Department of Environmental Science &amp; Technology, Austin Community College, Austin, TX</i> |

### EDUCATION

- |             |  |
|-------------|--|
| 2012 – 2018 | <i>Yale University, New Haven, CT</i> <ul style="list-style-type: none"><li>• Ph.D. in Geochemistry</li><li>• Advisor: Dr. Ruth Blake (<i>previously Dr. Mark Pagani, deceased</i>)<br/>Dissertation title: Reconstructing Terrestrial Climates using Clumped Isotope Thermometry and Phosphate Oxygen Isotopes from Gar Scales</li></ul>              |
| 2008 – 2011 | <i>Rice University, Houston, TX; Cum Laude</i> <ul style="list-style-type: none"><li>• Ecology &amp; Evolutionary Biology, B.S.</li><li>• Earth Science, Geochemistry Track, B.S.</li><li>• Advisor: Dr. Lawrence Gilbert, UT Austin<br/>Thesis title: Male mate preference in <i>Heliconius melpomene</i> and its evolutionary implications</li></ul> |

### RESEARCH INTERESTS

- Phosphorus cycling through Earth's history and link to current anthropogenic eutrophication
- Application of clumped and phosphate oxygen isotopes to paleoclimate
- Coupling of nitrogen, phosphorus, carbon, and sulfur cycles using stable isotopes

### PROFESSIONAL MEMBERSHIPS

- American Geophysical Union
- Geochemical Society
- Geological Society of America
- Association for Women Geoscientists
- Soil Science Society of America

### PUBLICATIONS

- Li, Q., **Gray, K.E.**, and Jaisi, D.P., 2022. Relative roles of sediment transport and localized erosion on phosphorus load in the lower Susquehanna River and its mouth in the Chesapeake Bay, USA. *Journal of Geophysical Research: Biogeosciences*, 127.8, e2022JG006944. doi.org/10.1029/2022JG006944
- Campos, M.A., Zhang, Q., Acuña, J.J., Rilling, J.I., Ruiz, T., Carrazana, E., Reyno, C., Hollenback, A., **Gray, K.E.**, Jaisi, D.P., Ogram, A., Bai, J., Zhang, L., Xiao, R., Elias, M., Sadowsky, M.J., Hu, J., and Jorquera, M.A., 2023. Structure and functional properties of bacterial communities in surface sediments of the recently declared nutrient-saturated Lake Villarrica in Southern Chile. *Microbial Ecology*. 86, 1513-1533. doi.org/10.1007/s00248-023-02173-2

- Killam, D., Das, S., Martindale, R.C., **Gray, K.E.**, Paytan, A., and Junium, C.K., 2023. Photosymbiosis and nutrient utilization in giant clams revealed by nitrogen isotope sclerochronology. *Geochimica et Cosmochimica Acta*. 359, 165-175. doi.org/10.1016/j.gca.2023.08.018
- **Gray, K.E.** and Brandon, M.T., 2025. A Terrestrial Thermometer Using Carbonate Clumped Isotopes from Gar Scales. *Geochemistry, Geophysics, Geosystems*. 26.2, e2024GC011714. doi.org/10.1029/2024GC011714
- **Gray, K.E.**, and Brandon, M.T., 2025. A High-Resolution Carbonate Clumped Terrestrial Temperature Record from a Cretaceous-Paleogene Section in North Dakota, USA. In preparation for *Paleoclimatology and Paleoceanography*.
- **Gray, K.E.**, Brandon, M.T., Hren, M.T., and Blake, R.E., 2025. Unique physiology of Lepisosteidae imparts a novel phosphate-water fractionation in their scale biogenic apatite. In preparation. Preprint DOI: 10.1002/essoar.10511139.1
- **Gray, K.E.**, Stout, L.M., Campos, M., and Jaisi, D.P., 2025. Effects of salinity on biogeochemical cycling of nutrients in coastal soil. In preparation for *Science of the Total Environment*.
- **Gray, K.E.**, Gomes, M.L., and Martindale, R.C. 2025. Environmental Change in the Early Jurassic: Unraveling the causes and consequences of shallow marine biological productivity changes during the Toarcian Ocean Anoxic Event in North America. In preparation for *Paleoclimatology and Paleoceanography*.
- Musser-Cooper, M.S., **Gray, K.E.**, Massoudieh, A., and Jaisi, D.P., 2025. Phosphorus source tracking, bioavailability, and cycling in the Murderkill River, Delaware, USA. In preparation.

## INVITED TALKS

- |          |   |
|----------|---|
| Nov 2024 | <i>Phosphorus Cycling in the Past, Present, and Future</i> , Bromery Seminar, Johns Hopkins University  |
| May 2022 | <i>Effects of Salinity on Biogeochemical Cycling of Nutrients in Coastal Soil</i> , International Workshop on Biogeochemical Drivers and Nutrient Cycling in Coastal Soils and Waters, University of Delaware |
| Sep 2021 | <i>Effects of Salinity on Biogeochemical Cycling of Phosphorus in Coastal Soil</i> , 2nd Applied Microbial Ecology Laboratory Webinars, Universidad de La Frontera, Temuco, Chile                             |
| Nov 2019 | <i>Reconstructing Terrestrial Climates using Clumped Isotope Thermometry and Phosphate Oxygen Isotopes from Gar Scales</i> , Colloquium series, Department of Earth Sciences, University of Delaware          |

## PROFESSIONAL PRESENTATIONS

- **Gray, K.E.** *A Geochemical Perspective on Bioapatite Biomineralization*. Annual Mid-Atlantic Geobiology Symposium, Baltimore, MD, USA, Feb 2025 [oral presentation]
- **Gray, K.E.**, and Brandon, M.T. *High-Resolution Temperature Record Across the K-Pg Boundary (67.1 to 65.9 Ma) using Clumped Isotopes in Gar Scales from North Dakota, USA*. GSA Annual Meeting, Anaheim, CA, USA, Sept 2024 [oral presentation]
- Brandon, M.T., and **Gray, K.E.** *Use of the Effective Temperature Concept to Account for Temperature Variation in Clumped Isotope Measurements of Gar Scales*. GSA Annual Meeting, Anaheim, CA, USA, Sept 2024 [poster presentation]
- **Gray, K.E.**, and Brandon, M.T. *Field Test of a New Bioapatite Clumped Isotope Thermometer in K-Pg Boundary Section in North Dakota, USA*. 9th International Clumped Isotope Workshop, Stony Brook, NY, USA, Aug 2024 [poster presentation]
- Brandon, M.T., and **Gray, K.E.** *Use of the Effective Temperature Concept to Account for Seasonal and Daily Temperature Variation in Clumped Isotope Measurements*. 9th International Clumped Isotope Workshop, Stony Brook, NY, USA, Aug 2024 [oral presentation]
- **Gray, K.E.**, Gomes, M.L., and Martindale, R.C. *Paired Sulfur and Phosphorus Biogeochemical*

- Cycling Show Bottom-Water Anoxia Preceded the Toarcian Ocean Anoxic Event*. Goldschmidt Annual Meeting, Chicago, IL, USA, Aug 2024 [oral presentation]
- **Gray, K.E.**, Gomes, M.L., and Martindale, R.C. *Paired Sulfur and Phosphorus Biogeochemical Cycling Across the Toarcian Ocean Anoxic Event*. Annual Northeastern Geobiology Symposium, New Haven, CT, USA, Apr 2024 [oral presentation]
  - **Gray, K.E.**, and Brandon, M.T. *A Terrestrial Thermometer Using Carbonate Clumped Isotopes from Gar Scales*. AGU Annual Meeting, San Francisco, CA, USA, Dec 2023 [poster presentation]
  - Li, Q., **Gray, K.E.**, and Jaisi, D.P. *Relative Roles of Sediment Transport and Localized Erosion on Phosphorus Load in the Lower Susquehanna River and its Mouth in the Chesapeake Bay, USA*. ASA-CSSA-SSSA Annual Meeting, Baltimore, MD, USA, Nov 2022 [oral presentation]
  - Tuoni, S., **Gray, K.E.**, Sakhno, Y., and Jaisi, D.P. *Extraction and Characterization of Phosphorus in Soils Treated with Synthesized Hydroxyapatite Fertilizers*. ASA-CSSA-SSSA Annual Meeting, Baltimore, MD, USA, Nov 2022 [oral presentation]
  - **Gray, K.E.**, Stout, L.M., Sparks, D.L. and Jaisi, D.P. *Effects of salinity on biogeochemical cycling of phosphorus in coastal soil*. Goldschmidt Annual Meeting, Virtual, Jul 2021 [poster presentation]
  - **Gray, K.E.**, and Brandon, M.T. *Clumped-isotope temperatures from gar scales, with an application to a terrestrial K-Pg section*. GSA Annual Meeting. Indianapolis, IN, USA, Nov 2018 [oral presentation]
  - **Gray, K.E.**, Brandon, M.T., and Pearson, D. *A high resolution carbonate-clumped terrestrial temperature record from a Cretaceous-Paleogene section in North Dakota, USA*. Goldschmidt Annual Meeting. Boston, MA, USA, Aug 2018 [oral presentation]
  - **Gray, K.E.**, and Henkes, G.A. *A carbonate clumped isotope calibration of gar scale apatite*. GSA Annual Meeting. Seattle, WA, USA, Oct 2017 [oral presentation]
  - **Gray, K.E.**, and Pagani, M. *Gar scales and their terrestrial paleoclimate proxy potential*. Goldschmidt Annual Meeting. Prague, Czech Republic, Aug 2015 [poster presentation]

## COURSES TAUGHT

### *Austin Community College*

- Introduction to Environmental Science (ENVR 1301), Spring 2019 (student rating 84%), Summer 2019 (student rating 93%)
  - Overview of environmental science, with emphasis on scientific research and public policy; covered topics included ecology and conservation, nutrient cycling, hydrology, soils and their use, non-renewable and renewable energy, air, water, and soil waste pollution and management, and climate change.

## TEACHING FELLOWSHIPS AND GUEST LECTURESHIPS

### *Johns Hopkins University*

Spring 2025 AS.270.354: Stable Isotope Geochemistry (Guest lecturer)  
 Spring 2024 AS.270.311: Geobiology (Guest lecturer)

### *University of Delaware*

Fall 2019, Fall 2021 PLSC 445: Biogeochemical Cycling of Nutrients (Guest lecturer)  
 Spring 2020, Fall 2022 PLSC 405: Environmental Forensics and Society (Guest lecturer)

### *Yale University*

Fall 2017 G&G 100: Natural Disasters (Teaching fellow)  
 Spring 2017, 2016 G&G 205: Natural Resources & Sustainability (Teaching fellow)  
 Spring 2015, 2013 G&G 125: History of Life (Teaching fellow)  
 Fall 2013 G&G 250/550: Paleontology & Evolutionary Theory (Teaching fellow)

### *Rice University*

Spring 2011 EBIO 202: Introductory Biology (Lab section leader and grader)

## RESEARCH EXPERIENCE

May 2023 – Present	<p><i>Johns Hopkins University, advisor Dr. Maya Gomes</i></p> <ul style="list-style-type: none"> <li>• Measurement of <math>\delta^{34}\text{S}</math> of acid volatile and chromium reducible sulfur (pyrite) using a Thermo TC/EA coupled to a Thermo Delta V IRMS</li> </ul>
Sep 2019 – May 2023	<p><i>University of Delaware, advisor Dr. Deb Jaisi</i></p> <ul style="list-style-type: none"> <li>• Interpretation of P concentrations in sequentially extracted phosphorus pools (SEDEX and Hedley) and measurement <math>\delta^{13}\text{C}</math>, <math>\delta^{15}\text{N}</math>, and <math>\delta^{18}\text{O}_{\text{water}}</math> using a GasBench and elemental analyzer (EA) coupled to a Thermo Delta V IRMS to understand nutrient cycling</li> <li>• Measurement of <math>\delta^{18}\text{O}_{\text{phosphate}}</math> from water and soil samples using a Thermo TC/EA coupled to a Thermo Delta V IRMS</li> </ul>
Aug 2012 – Dec 2018	<p><i>Yale University, advisors Dr. Mark Pagani and Dr. Ruth Blake</i></p> <ul style="list-style-type: none"> <li>• Creation of a paleothermometer from clumped isotopes and <math>\delta^{18}\text{O}_{\text{phosphate}}</math> from bioapatite to calculate <math>\delta^{18}\text{O}_{\text{water}}</math>, measured on a dual-inlet Thermo MAT 253 and Thermo TC/EA coupled to a Thermo Delta Plus XP IRMS</li> </ul>
Jan 2015	<p><i>California University of Technology, advisor Dr. John Eiler</i></p> <ul style="list-style-type: none"> <li>• Measuring clumped isotopes, <math>\Delta_{47}</math>, in bioapatite using a Thermo MAT 253</li> </ul>
May – Aug 2011	<p><i>The University of Texas at Austin, advisor Dr. Larry Gilbert</i></p> <ul style="list-style-type: none"> <li>• Evolutionary implications of male mate preference in the butterfly <i>Heliconius melpomene</i></li> </ul>
Sep – Dec 2010	<p><i>Rice University, advisors Dr. Amy Dunham and Dr. Brian Maitner</i></p> <ul style="list-style-type: none"> <li>• Role of phylogeny in success of invasive avian species in Hawaii and Florida</li> </ul>
May – Jul 2010	<p><i>The University of Texas at Austin, advisors Dr. Julia Clarke and Dr. N. Adam Smith</i></p> <ul style="list-style-type: none"> <li>• Evolution of the avian brain using brain and ear canal endocasts from CT scans of extant bird species</li> </ul>
Feb – May 2010	<p><i>Rice University, advisor Dr. Cin-Ty Lee</i></p> <ul style="list-style-type: none"> <li>• Provenance determination using lead isotope ratios in California Condor feathers</li> </ul>

## FIELD EXPERIENCE

Aug 2023	<p><i>R/V Rachel Carson, Chesapeake Bay, US</i></p> <ul style="list-style-type: none"> <li>• Sediment core, water, and CTD rosette data collection</li> </ul>
Aug 2022	<p><i>Susquehanna Flats, Chesapeake Bay, Maryland, US</i></p> <ul style="list-style-type: none"> <li>• Collection of plant and water samples and sediment cores</li> </ul>
Aug 2020	<p><i>R/V Sharp, Chesapeake Bay, US</i></p> <ul style="list-style-type: none"> <li>• Multicore and CTD rosette data collection</li> </ul>
Jul 2020, Jan 2021	<p><i>Chesapeake Bay, Maryland, US</i></p> <ul style="list-style-type: none"> <li>• Scuba diving for sediment and water collection</li> </ul>
Aug 2020, Jan. and May 2021	<p><i>Murderkill River, Delaware, US</i></p> <ul style="list-style-type: none"> <li>• Water sampling along main river and surrounding watershed</li> </ul>
Jul 2017	<p><i>Geologic Transect of Honshu and Kochi, Japan</i></p> <ul style="list-style-type: none"> <li>• Primary organizer for Yale Dept. of Geology &amp; Geophysics biannual field trip</li> </ul>
Aug 2015	<p><i>Swiss Alps, Yale University</i></p> <ul style="list-style-type: none"> <li>• Yale Dept. of Geology &amp; Geophysics biannual field trip</li> </ul>
Nov 2014	<p><i>Tims Ford Reservoir, Tennessee</i></p> <ul style="list-style-type: none"> <li>• Worked with TWRA to collect adult <i>Lepisosteus osseus</i></li> </ul>
Oct 2014	<p><i>New England, Yale University, G&amp;G IILL, Dynamic Earth</i></p> <ul style="list-style-type: none"> <li>• Field assistant for undergraduate trip</li> </ul>
Jul 2014	<p><i>Transect of Eastern United States, Connecticut to Texas</i></p> <ul style="list-style-type: none"> <li>• Collected adult <i>L. osseus</i> and <i>L. platostomus</i></li> </ul>
Aug 2013	<p><i>Great Britain, Yale University</i></p> <ul style="list-style-type: none"> <li>• Yale Dept. of Geology &amp; Geophysics biannual field trip</li> </ul>

- May 2013 – Petrified Forest National Park, Arizona, Yale Peabody Museum  
 Jun 2013 • Collecting Triassic vertebrate fossils, including *Poposaurus* sp.  
 Aug 2010 Washington state and Montana, Montana State University; GEOL 419, Paleontology Field Camp  
 • Field paleontology projects on both modern and fossil sites

## RESEARCH GRANTS AND AWARDS

- May 2020 USDA-NIFA, Postdoctoral Fellowship, “Are Missing Gaps in Sediment Phosphorus Effluxes a Culprit to Water Quality Improvement?” \$164,535  
 • Award #2020-67034-31779; Effects of seasonal redox on phosphorus cycling in Chesapeake Bay  
 May 2016 Yale Institute for Biospheric Studies (YIBS) Small Grants Program, Doctoral Dissertation Improvement Grant, \$4800  
 • Analyzing  $\Delta_{47}$  in modern and fossil *Lepisosteus* sp. scales  
 Sep 2015 Yale Analytical and Stable Isotope Center, YIBS Matching Funds, \$500  
 • Funding for running samples for  $\Delta_{47}$  and  $\delta^{18}\text{O}$   
 Apr 2014 Yale Institute for Biospheric Studies (YIBS) Small Grants Program, Doctoral Pilot Grant, \$1500  
 • Collecting *L. osseus* specimens to use for climate proxy research

## VOLUNTEER EXPERIENCE

- Fall 2024– Coach, Johns Hopkins Sport Taekwondo Club  
 Present • Leading classes and refereeing for local tournaments  
 May 2025 Organizing committee, 3<sup>rd</sup> Annual EPS Research Day, Johns Hopkins University  
 Fall 2024 – Organizing committee, 2025 Mid-Atlantic Geobiology Symposium  
 Spring 2025 • Website design, scheduling, and event planning  
 May 2024 Organizing committee, 2<sup>nd</sup> Annual EPS Research Day, Johns Hopkins University  
 May 2021 Primary organizer, International Workshop on Biogeochemical Drivers and Nutrient Cycling in Coastal Soils and Waters  
 Nov 2021 Judge, DENIN Pitch:90, University of Delaware  
 Mar 2020 – 2023 Judge, Annual DENIN Research Symposium, University of Delaware  
 2020 – 2025 Annual Rice Alumni Volunteers for Admission prospective undergraduate interviewer  
 2013 – 2019 Guest speaker (annual), Wells Branch Elementary School, Austin, TX  
 • Exposed students to Earth Science through lecture and hands-on activities  
 2012 – 2016 Yale Peabody Museum Annual Paleo-Knowledge Bowl  
 • Paleontology trivia contest for 4<sup>th</sup> – 6<sup>th</sup> graders  
 2010, 2011 Annual Sally Ride Festival, Rice University  
 • Exposing 4<sup>th</sup> – 8<sup>th</sup> grade girls to the sciences  
 May 2010 – UT Austin Vertebrate Paleontology Laboratory  
 Jul 2010 • Cataloging and fossil prep work

## ACTIVITIES AT SCIENTIFIC MEETINGS

- Session Convener, Goldschmidt Virtual 2020, *Linking Nutrient Cycling and Redox Conditions Across Space and Time*
- Student volunteer, Goldschmidt 2018

## EDITORIAL ACTIVITIES

- Manuscript Reviewer for *Environmental Pollution*, *Environmental Science & Technology*, *Frontiers in Forests and Global Change*, *Geochimica et Cosmochimica Acta*, *JGR Biogeosciences*, *Soil Biology and Biochemistry*, and *Water Research*

### **TRAINED GRADUATE AND UNDERGRADUATE STUDENTS**

- Promise Thapa (Johns Hopkins University, BS '27), labwork mentor, Fall 2024
- Musser, Margaret (University of Delaware, MS, '20), fieldwork and labwork collaborator
- Anton, Jessica (University of Delaware, MS '21), fieldwork and labwork collaborator
- Tuoni, Sarah (University of Delaware, BS '23), labwork mentor, Spring 2021 – Present
- Townsend, Christopher (University of Delaware, BS '22), labwork mentor, Spring 2021 – 2022

### **COLLEGIATE AWARDS AND HONORS**

- President's Honor Roll, Fall 2008, Fall 2009, Fall 2010, and Spring 2011
- East Texas Geological Society 2010 & 2011 Scholarships
- Devlin-Schnable Memorial for Field Camp Scholarship, Spring 2010

### **RELEVANT SKILLS**

- PADI Advanced Open Water Scuba Diver
- PADI Rescue Diver
- PADI Dry Suit Diver
- Scientific glassblowing
- Conversational in Spanish