Katelyn E. Gray

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PROFESSIONAL APPOINTMENTS

2019 – Present Postdoctoral Researcher, *Department of Plant and Soil Sciences, University of Delaware, Newark, DE*

2019 Adjunct Professor, *Department of Environmental Science & Technology, Austin Community College, Austin, TX*

EDUCATION

2012 – 2018 *Yale University, New Haven, CT*
- Ph.D. in Geochemistry
- Advisor: Dr. Ruth Blake (*previously Dr. Mark Pagani, deceased*)
  Dissertation title: Reconstructing Terrestrial Climates using Clumped Isotope Thermometry and Phosphate Oxygen Isotopes from Gar Scales

2008 – 2011 *Rice University, Houston, TX; Cum Laude*
- Ecology & Evolutionary Biology, B.S.
- Earth Science, Geochemistry Track, B.S.
- Advisor: Dr. Lawrence Gilbert, UT Austin
  Thesis title: Male mate preference in *Heliconius melpomene* and its evolutionary implications

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, and carbon 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
- Killam, D., Das, S., Martindale, R.C., **Gray, K.E.**, and Junium, C., 2022. Photosymbiosis and nutrient utilization in giant clams revealed by nitrogen isotope schlerochronology. In revision, *Geochimica et Cosmochimica Acta*.
- Jorquera, M.A., Campos, M.A., Zhang, Q., Acuña, J.J., Rilling, J.I., Ruiz, T., Carrazana, E., Reyno, C., Araya, M.M., Hollenback, A., **Gray, K.E.**, Jaisi, D.P., Ogram, A., Bai, J., Zhang, L., Xiao, R., Elias, M., and Sadowsky, M.J., 2022. Structure and functional properties of bacterial communities in surface sediments of Lake Villarrica, a lake recently declared as a "Saturated

Zone" in southern Chile. In revision, *Microbial Ecology*.

- Musser, M., **Gray, K.E.,** Massoudieh, A., and Jaisi, D.P., 2022. Phosphorus source tracking, bioavailability, and cycling in the Murderkill River. Under review*, Journal of Geophysical Research: Biogeosciences*.
- **Gray, K.E.** and Brandon, M.T., 2022. An ideal terrestrial thermometer using carbonate clumped isotopes from gar scales. In revision, *Geochemistry, Geophysics, Geosystems*. Preprint DOI: 10.1002/essoar.10510341.1
- **Gray, K.E.**, Brandon, M.T., and Blake, R., 2022. Unique physiology of Lepisosteidae imparts a novel phosphate-water fractionation in their scale biogenic apatite. In submission, *Paleogeography Paleoclimatology Paleoecology.* Preprint DOI: 10.1002/essoar.10511139.1
- **Gray, K.E.,** Stout, L.M., Campos, M., and Jaisi, D.P., 2022. Effects of salinity on biogeochemical cycling of phosphorus and nitrogen in coastal soil. In submission, *Biogeochemistry*.

INVITED TALKS

May 2022	*Effects of Salinity on Biogeochemical Cycling of Nutrients in Coastal Soil,* International Workshop on Biogeochemical Drivers and Nutrient Cycling in Coastal Soils and Waters, University of Delaware
Sep 2021	*Effects of Salinity on Biogeochemical Cycling of Phosphorus in Coastal Soil*, 2nd Applied Microbial Ecology Laboratory Webinars, Universidad de La Frontera, Temuco, Chile
Nov 2019	*Reconstructing Terrestrial Climates using Clumped Isotope Thermometry and Phosphate Oxygen Isotopes from Gar Scales,* Colloquium series, Department of Earth Sciences, University of Delaware

PROFESSIONAL PRESENTATIONS

- 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

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

Sep 2019 – Present — *University of Delaware, advisor Dr. Deb Jaisi*
- Interpretation of P concentrations in sequentially extracted phosphorus pools (SEDEX and Hedley) and measurement of $\delta^{13}C$, $\delta^{15}N$, and $\delta^{18}O_{water}$ using GasBench and elemental analyzer (EA) coupled with Thermo Delta V IRMS to understand nutrient cycling

Aug 2012 – Dec 2018 — *Yale University, advisors Dr. Mark Pagani and Dr. Ruth Blake*
- Creation of a paleothermometer from clumped isotopes and $\delta^{18}O$ in PO_4^{3-} from bioapatite to calculate $\delta^{18}O_{water}$, measured on a dual-inlet Thermo MAT 253 and Thermo TC/EA coupled with Thermo Delta Plus XP IRMS

Jan 2015 — *California University of Technology, advisor Dr. John Eiler*
- Measuring clumped isotopes, Δ_{47}, in bioapatite using Thermo MAT 253

May – Aug 2011 — *The University of Texas at Austin, advisor* Dr. Larry Gilbert
- Evolutionary implications of male mate preference in the butterfly *Heliconius melpomene*

Sep – Dec 2010 — *Rice University, advisors Dr. Amy Dunham and Dr. Brian Maitner*
- Role of phylogeny in success of invasive avian species in Hawaii and Florida

May – Jul 2010 — *The University of Texas at Austin, advisors Dr. Julia Clarke and Dr. N. Adam Smith*
- Evolution of the avian brain using brain and ear canal endocasts from CT scans of extant bird species

Feb – May 2010 — *Rice University, advisor Dr. Cin-Ty Lee*
- Provenance determination using lead isotope ratios in California Condor feathers

FIELD EXPERIENCE

Aug 2022 — *Susquehanna Flats, Chesapeake Bay, Maryland, US*
- Collection of plant and water samples and sediment cores

Aug 2020 — *R/V Sharp, Chesapeake Bay, US*
- Multicore and CTD rosette data collection

Jul 2020, Jan 2021 — *Chesapeake Bay, Maryland, US*
- Scuba diving for sediment and water collection

Aug 2020, Jan. and May 2021 — *Murderkill River, Delaware, US*
- Water sampling along main river and surrounding watershed

Jul 2017 — *Geologic Transect of Honshu and Kochi, Japan*
- Primary organizer for Yale Dept. of Geology & Geophysics biannual field trip

Aug 2015 — *Swiss Alps, Yale University*

• Yale Dept. of Geology & Geophysics biannual field trip

Nov 2014 *Tims Ford Reservoir, Tennessee*
• Worked with TWRA to collect adult *Lepisosteus osseus*

Oct 2014 *New England, Yale University, G&G 111L, Dynamic Earth*
• Field assistant for undergraduate trip

Jul 2014 *Transect of Eastern United States, Connecticut to Texas*
• Collected adult *L. osseus* and *L. platostomus*

Aug 2013 *Great Britain, Yale University*
• Yale Dept. of Geology & Geophysics biannual field trip

May 2013 – Jun 2013 *Petrified Forest National Park, Arizona, Yale Peabody Museum*
• 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 Δ_{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 Δ_{47} and $\delta^{18}O$

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

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 – 2022 *Judge, Annual DENIN Research Symposium, University of Delaware*

2020, 2021 *Rice Alumni Volunteers for Admission prospective undergraduate interviewer*

2013, 2019 *Guest speaker, 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^{th} – 6^{th} graders

2010, 2011 *Annual Sally Ride Festival, Rice University*
• Exposing 4^{th} – 8^{th} grade girls to the sciences

May 2010 – Jul 2010 *UT Austin Vertebrate Paleontology Laboratory*
• 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 *Geochimica et Cosmochimica Acta, Environmental Pollution, Frontiers in Forests and Global Change, Soil Biology and Biochemistry,* and *Water Research*

TRAINED GRADUATE AND UNDERGRADUATE STUDENTS

• 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