

Noel Alexander Heim

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Education

- University of Georgia**, Ph.D. in Geology 2008
Dissertation: *The spatial structure of biodiversity in the fossil record: contrasting global, continental and regional responses to climate change*
Advisor: Steven M. Holland
- University of California, Riverside**, M.S. in Geological Sciences 2003
Thesis: *Trilobites from the Tethyan Himalaya and the Cambrian biostratigraphy and biogeography of equatorial peri-Gondwanaland*
Advisor: Nigel C. Hughes
- University of Chicago**, B.S. with honors in Geophysical Sciences 2000
Honors Thesis: *Rare earth element abundances in minerals in the vesicles and vugs of Ibitira and ordinary chondrites*
Advisor: Meenakshi Wadhwa

Scholarly Interests

- Stratigraphic Paleobiology**—identifying how the structure of the stratigraphic record affects the fossil record, including biases, environmental drivers, and feedbacks
- Causes and consequences of extinction in modern and ancient oceans**—long-term impacts of extinction on evolutionary rates, biodiversity, and ecosystem function
- Citizen science & conservation**—coupling environmental sensor data with biological data from citizen scientists, e.g. iNaturalist and LiMPETS, to generate models of local and regional change
- Conservation paleobiology**—application of paleontological approaches and data to study society-relevant issues with particular focus on conservation biology and ecosystem restoration efforts
- Evolutionary trends**—quantifying and explaining evolutionary trends, including morphological complexity, ecological diversity, and body size, over the past 550 million years

Professional Appointments

- Tufts University**, Department of Earth and Ocean Sciences, Medford, MA
Lecturer, earth history and paleobiology 2019-present

Stanford University , Department of Geological Sciences, Stanford, CA	
Director & Mentor, Stanford Earth Young Investigators: Biodiversity Program	2012-2019
Basic Life Science Research Scientist	2016-2019
Basic Life Science Research Associate	2012-2016
University of Wisconsin-Madison , Department of Geoscience	
Assistant Scientist	2011-2012
Postdoctoral Research Associate	2008-2011
Georgia Perimeter College , Science Department, Lawrenceville, GA	
Adjunct Instructor	2005-2006
Maine School of Science and Mathematics , Limestone, ME	
Middle School Summer Camp Director	2001
Middle School Summer Camp Instructor	2000, 2001, 2003
High School Instructor	2000-2001
Residential Assistant, High School Dorm	2000-2001

Additional Training & Professional Development

Cornell University , Civic Ecology Lab	
Environmental Education Outcomes Certificate	2017
Stanford University	
The Social Ocean	2017
Beginning Spanish I	2017
Trans 101 Workshop	2016
Inequities in Active Learning Workshop	2016
Beginning Programming: JavaScript	2015
Applied Ichnology: The Use of Trace Fossils in Sequence Stratigraphy, Exploration & Production Geology	2013
Respectful Community Workshop	2013
The Writer's Studio, Creative Nonfiction	2013
University of Wisconsin-Madison	
Delta Program in Research, Teaching and Learning	2010-2011
University of Washington , Friday Harbor Laboratories	
Marine Invertebrate Zoology	2002

University Teaching Experience

(i=undergrad intro, u=undergrad upper level, g=graduate level)

Tufts University

Instructor, Department of Earth and Ocean Sciences

- Earth History and Paleontology, Fall 2019 (u)

Stanford University

Instructor, Department of Geological Sciences

[†]cross listed in Biology, [‡]cross listed in Earth Systems

- Undergraduate Research in Geological Sciences, Winter 2019, Spring 2019 (u)
- [‡]Coevolution of Earth and Life (i.e., historical geology), Fall 2018 (i)
 - supervised 2 graduate teaching assistants
- ^{†‡}Evolution of Marine Ecosystems, Fall 2017 (u, g)
 - supervised 1 graduate teaching assistant
- ^{†‡}Invertebrate Paleobiology, Spring 2013, Spring 2016 (u, g)
 - supervised 1 graduate teaching assistant
- “Big Data” in Historical Earth Systems Science, Spring 2014 (g)

University of Wisconsin-Madison

Instructor, Department of Geoscience

- Invertebrate Paleontology, Winter 2011 (u)
- Geoscience Data Analysis, Spring 2012 (g)
- Seminar in Paleontology, Fall 2010 (u)

Guest Lecturer, Department of Geoscience

- Paleobiology: 2 lectures on diversity and the fossil record, Spring 2009 (i)
- Evolution & Extinction: 1 lecture on the Permian mass extinction, Fall 2010 (i)
- Evolution & Extinction: 2 lectures on evolutionary development and adaptation, Fall 2012 (i)

Georgia Perimeter College

Adjunct Instructor, Science Department

- Physical Geology Lecture, Spring 2006 (i)
- Physical Geology Lab, Spring 2005 (i)

University of California, Riverside

Teaching Assistant, Department of Earth Sciences

- Oceanography, Fall 2002 (i)
- The Earth’s Dynamic Surface, Winter 2003 (i)
- Natural Hazards and Disasters, Spring 2003 (i)

Graduate Student Thesis Committees

Erin Fenlon, M.S., Department of Geoscience, University of Wisconsin-Madison 2010
 Thesis: *Goldilocks' Bivalves: Evolution on Three Spatiotemporal Scales*

Undergraduate Research Students

Devin Jamar Hagan, Stanford Earth System Science, California intertidal invertebrate ecology & climate change 2019-present
 Niza Contreras, Stanford Earth System Science, Extinction threat in dragonflies 2018-present
 Teke Dado, Stanford Earth System Science, Early Paleozoic body size evolution 2017
 Mary Cirino, Stanford Computer Science, Building a species-level body-size database using PaleoDeepDive 2015-2016

Undergraduate Workers Supervised

Johannah Farner, Stanford Earth Systems Sciences, Dragonfly body size data collection 2018
 Andrea Contreras, Stanford Earth Systems Sciences, Dragonfly body size data collection 2018
 Joanna Tang, UC Davis Environmental Science, Fish & trilobite body size data collection 2016
 Natalie Cheng, Stanford Post-baccalaureate, Bivalve body size data collection 2016
 Rebia Khan, Stanford Biology, Fish body size data collection 2015-2016
 Margaret Deng, UC San Diego Earth Sci., Fish and protist body size data collection 2015-2016
 Galen Griggs, U. Wash. Post-baccalaureate, Marine animal body size data collection 2012-2014
 Annaka Clement, U. Wisconsin Geoscience, Macrostrat data entry 2011-2012

Research Experience

Stanford University, Stanford, CA

Research Scientist, Department of Geological Sciences 2012-2019

- Impacts of climate change on Eastern Pacific intertidal ecology
- Evolution of biological complexity
- Evolution of marine animal body size and ecosystems over the past 550 million years
- Predicting extinction threat in poorly-evaluated species such as butterflies and dragonflies
- Extinction selectivity in modern and ancient animals
- Ecological consequences of the emerging sixth mass extinction
- Compilation, management, and analysis of a large body size and ecological database

University of Wisconsin-Madison

Research Scientist, Department of Geoscience

2008-2012

- Evolution of Earth's sedimentary record
- Co-evolution of marine life and environments over the past 550 million years
- Compilation, management, and analysis of large paleobiological and geological databases, the Paleobiology Database and Macrostrat, respectively

University of Georgia, Athens, GA

Doctoral Student Researcher, Department of Geology

2003-2008

- Field-based study of climate-induced extinction in marine communities 320 million years ago
- Long-term evolution of the latitudinal diversity gradient in fossil marine animals
- Impacts of intercontinental species migration on biodiversity dynamics

University of California, Riverside

Master's Student Researcher, Department of Earth Sciences

2001-2003

- Field-based study of 520 million year old trilobites from the Indian Himalaya
- Systematics and geometric morphometrics of Cambrian trilobites
- Biostratigraphy of early and middle Cambrian trilobites

National Museum of Natural History, Washington, DC

Undergraduate Research Intern, Paleobiology Department

1999

- Sample early Cenozoic fossil plants in the field, Big Horn Basin, Wyoming, USA
- Devise a test to see how well paleobotanist identify species from partial leaf specimens

Field Museum of Natural History, Chicago, IL

Undergraduate Research Assistant, Geology Department

1999-2000

- Digitize published images of Paleozoic tetrapods

Undergraduate Research Assistant, Geology Department

1998-2000

- SEM characterization and elemental mapping of meteorites

University of Chicago, Chicago, IL

Undergraduate Research Assistant, Department of the Geophysical Sciences

1998-2000

- Pick and count marine carbonate sediments for fossils and sedimentary grains
- Measure mass of bivalve shells before and after taphonomy experiment
- Curate Cenozoic fossil bivalve collection

Fossil Preparator, Department of Organismal Biology & Anatomy

1997-1998

- Prepare dinosaur fossils for study by removing rock matrix from bones

Montana State University, Bozeman, MT

Field Assistant, Museum of the Rockies

1997

- Prospect for Cretaceous dinosaurs in central and eastern Montana badlands
- Excavate dinosaur fossils and prepare them for safe transport to the museum

High School & Middle School Teaching Experience

Stanford University

Director & Mentor, Stanford Earth Young Investigators: Biodiversity internship program 2012-2019

Innovative Program Planning & Development

- Set the vision and goals for the program.
- Develop engaging hands-on conservation, evolution, and paleontology curriculum.
- Design, coordinate, and lead day-long and overnight field trips to study living and fossil animals.
- Evaluate program and implement improvements.

Teaching and Intern Management

- Oversee an 8-week program: recruit, hire, train and manage high school cohorts of 20 interns who collect scientific data and work in groups to conduct original citizen science research projects.
- Mentor interns in conducting original research projects from hypothesis development to communicating results. 34 student pairs presented their work at a professional meeting (AGU).
- Provide feedback on intern projects in a way that is compassionate and fosters improvement.
- Deliver science curriculum that consists mainly of hands-on, inquiry-based activities.

Maine School of Science and Mathematics

Adjunct High School Instructor 2000-2001

- Physical Geology, with lab, Fall 2000
- Earth History, with lab, Spring 2001
- Statistics, Academic Year 2000-2001

Middle School Summer Camp Director of Academics & Instructor 2001

- Hire 11 instructors to teach week-long, hands-on science courses for boys in grades 5-9.
- Provide course feedback to camp instructors and approve 18 course curricula.
- Manage camp budget and procure teaching materials.
- Teach hands-on courses in ecology, paleontology & geology (also in 2000 & 2003).

High School Research Interns (Summer)

10 Bay Area high school students, analysis and scientific writing, marine animal body size	2018
19 Bay Area high school students, extant Lepidoptera body sizes	2017
19 Bay Area high school students, extant nematode body sizes	2016
18 Bay Area high school students, extant bacteria and archaea cell sizes	2015
16 Bay Area high school students, fossil and extant ostracod body sizes	2014
19 Bay Area high school students, fossil and extant echinoderm and ostracod body sizes	2013

High School Research Students (Academic Year)

Dipashreya Sur, Notre Dame HS, Body size co-evolution in mammals & nematodes	2017-2018
Charin Park, Saratoga HS, Body size co-evolution in birds & parasitic	2016-2018

Outreach & K-12 Field Trips

Geology & Paleontology of New Brighton Beach , Capitola, CA	
Stanford Earth Young Investigators: Biodiversity Interns, High School	2013-2018
Wilkinson School, Half Moon Bay, 7 th and 8 th grades	2017
Bay Area Science Festival, General Public	2014-2016, 2018
Paleontology of Monterey Formation , Santa Cruz Mountains, Scotts Valley, CA	
Discovery Charter School, San Jose, 5 th grade	2015
Geological Walking Tour of Stanford's Building Stones , Stanford, CA	
The Girls' Middle School, Palo Alto, 6 th grade	2015
Sedimentary Geology of the Panoche Hills , California's Central Valley	
Stanford Earth Young Investigators: Biodiversity Interns, High School	2015
Paleontology of the Monterey Formation , Salinas Valley, California	
Stanford Earth Young Investigators: Biodiversity Interns, High School	2014-2018
Geological Hiking Tour of Pinnacles National Park , California	
Stanford Earth Young Investigators: Biodiversity Interns, High School	2014-2018
Sedimentary Geology of Black Diamond Mines , Antioch, CA	
Stanford Earth Young Investigators: Biodiversity Interns, High School	2014
Tide Pools at Bean Hollow , San Mateo County, California	
Stanford Earth Young Investigators: Biodiversity Interns, High School	2013-2014
Paleontology of the Fossil Cliffs at Joggins & Parrsboro , Nova Scotia, Canada	
Maine School of Science and Mathematics, High School	2001

Other Outreach & K-12 Teaching Experience

Invited Speaker, Milstein Science Series: Prehistoric Ocean Dwellers, American Museum of Natural History, New York.	2017
Volunteer Judge, Sea Lion Bowl: Northern California Regional National Ocean Science Bowl Competition for High School Students, Stanford, California.	2017
Invited Speaker, Think Evolution VIII: A Summer Institute for Science Educators, University of California Museum of Paleontology, Berkeley, California.	2016
STEM Career Panel, Upward Bound Math & Science, University of San Francisco.	2015

Guest Programs Volunteer (Docent), The Georgia Aquarium, Atlanta.	2005-2006
Middle School Instructor, Maine School of Science & Mathematics Summer Camps, Limestone, ME.	2000-2003
High School Instructor, Maine School of Science & Mathematics, Limestone, ME.	2000-2001

Principal Field Experience

Cretaceous stratigraphy and sedimentology, Book Cliffs, Utah. Two weeks.	2010
Mississippian and Pennsylvanian invertebrate paleontology, Ozark Uplift, Arkansas and Oklahoma. Approximately three weeks annually.	2004-2007
Permian sequence stratigraphy, Guadalupe Mountains, west Texas. One week.	2005
Carboniferous invertebrate paleontology, Basin & Range Province. Four weeks.	2004
Cambrian paleontology, Himalayas, Ladakh, India. Five weeks.	2001
Paleocene and Eocene paleobotany, Big Horn Basin, Wyoming. Four weeks.	1999
Cretaceous dinosaur paleontology, central and eastern Montana. Eight weeks.	1997

Group Research Initiatives

ePANDDA Working Group: Enhancing Paleontological & Neontological Data Discovery	2015-2018
NESCent Working Group: Evolutionary Macroecology of Body Size	2014-2015
Developer and contributor, Macrostrat (http://macrostrat.org)	2008-2012
Member, The Paleobiology Database (http://paleobiodb.org)	2003-present

Service

Session organizer and co-chair, <i>The Sixth Extinction: Integrating Paleobiological, Ecological, and Physiological Perspectives</i> , North American Paleontological Convention (NAPC), Riverside, California	2019
Proposal Reviewer, NSF Sedimentary Geology & Paleobiology Program	2013, 2014, 2019
Proposal Reviewer, American Chemical Society-Petroleum Research Fund	2018
Proposal Reviewer, European Research Council	2015
Proposal Reviewer, National Science Center, Poland	2015

Manuscript Reviewer

2006-present

<i>Computers & Geosciences</i>	<i>Journal of Paleontology</i>	<i>Peer J</i>
<i>Ecology</i>	<i>Nature Communications</i>	<i>PLoS One</i>
<i>Evolution</i>	<i>Palaeontology</i>	<i>Proceed. of the Nat. Acad. Sci. USA</i>
<i>Geology</i>	<i>PALAIOS</i>	<i>Proceed. of the Royal Soc. B</i>
<i>Global Change Biology</i>	<i>Paleobiology</i>	<i>Scientific Reports</i>
<i>Journal of Geology</i>	<i>Paleontological Soc. Special Pubs.</i>	<i>Yale University Press</i>
<i>Journal of the Geological Soc., London</i>		

Geology Department Representative, Graduate Student Association, University of Georgia	2004-2008
Graduate Student Representative, Geology Depart. Faculty Meetings, University of Georgia	2007-2008
Session co-chair, <i>Geographic Diversity Patterns</i> , GSA Annual Meeting, Denver, Colorado	2007
Secretary and Webmaster, Graduate Student Association, University of Georgia	2005-2007
Co-organizer, Grad Fest, Evolution & Ecology Graduate Research Unit, University of California, Riverside	2003
Co-organizer, Hewett Club Lecture Series, Department of Earth Sciences, University of California, Riverside	2002-2003

Invited Presentations

Tufts University, Department of Earth & Ocean Sciences, Medford, Massachusetts	2019
Stanford University, Department of Geological Sciences, Stanford, California	2017
University of California Museum of Paleontology, Berkeley	2017
Milstein Science Series, American Museum of Natural History, New York	2017
Department of Earth Sciences, Dartmouth College, Hannover, New Hampshire	2016
Think Evolution Workshop, University of California Museum of Paleontology, Berkeley	2016
Department of Earth & Planetary Sciences, University of California, Davis	2016
Department of Earth & Planetary Sciences, University of California, Santa Cruz	2016
Department of Biology, University of San Francisco	2016
Department of Geology, University of Georgia, Athens	2015
Department of Geology, Grand Valley State University, Allendale, Michigan	2015
Department of Geology & Environmental Earth Science, Miami University of Ohio	2014
University of New Mexico, Albuquerque	2013
University of California Museum of Paleontology, Berkeley	2013
School of Geography & Geosciences, University of St. Andrews, Scotland, UK	2012
William Smith Meeting 2012, <i>Strata and Time: Probing the gaps in our understanding</i> , London	2012
Geosciences Program, Midwestern State University, Wichita Falls, Texas	2012
Evolution Seminar Series, Crow Institute, University of Wisconsin-Madison	2011

Department of the Geophysical Sciences, University of Chicago	2009
Department of Geoscience, University of Wisconsin-Madison	2008
Department of Geology, Geography & Planning, Missouri State University	2008

Fellowships

US EPA Science to Achieve Results (STAR) Graduate Fellowship (3 years full funding)	2005-2008
Graduate School Assistantship, University of Georgia (2-year competitive assistantship)	2003-2005
Summer Fellowship, Evolution & Ecology Graduate Research Unit, U. of California, Riverside	2001
Dean's Fellowship, Graduate Division, University of California, Riverside	2001-2002

Grants Awarded

Mentoring Undergraduates in Interdisciplinary Research Grant, Stanford Woods Institute	2018,2019
Stephen J. Gould Grant, Paleontological Society	2004
Geological Society of America Research Grant	2004
Gilles and Bernadette Allard Award, Department of Geology, University of Georgia	2004
Miriam Watts-Wheeler Award, Department of Geology, University of Georgia	2004

Awards & Honors

Heim <i>et al.</i> (2015) recommended by <i>Faculty of 1000</i>	2015
Graduate Student of the Year, Department of Geology, University of Georgia	2008
Dean's List, University of Chicago	1997-2000

Professional Affiliations

The Geological Society of America
 The Paleontological Society
 Western Society of Malacologists
 National Association of Geoscience Teachers
 Bay Area Teen Science
 California Outdoor Education Coalition

Computer, Internet & Statistical Programming Languages

Advanced User

- R – statistical programming language
- PostgreSQL and PostGIS – relational database and GIS spatial extension
- MySQL – relational database

Proficient

- Git & GitHub – Version control system and collaborative project hosting platform
- PHP – programming language that interfaces with HTML, PostgreSQL and MySQL
- JavaScript – programming language mainly used for making interactive web applications

Novice

- Python – general-purpose computer programming language
- C – general-purpose computer programming language
- QGIS – open-source geographic information system application

Journal Articles in Preparation

Heim NA and Payne JL. Probabilistic Assessment of Extinction Threat: A Case Study in Butterflies. Target Journal: *Proceedings of Royal Society of London B*.

Journal Articles in Review or Revision

Heim NA, Bakshi S[†], Buu L[†], Chen S[†], Heh S[†], Jain A[†], Noll C[†], Patkar A[†], Rizk N[†], Sundararajan S[†], Villante I[†], Knope ML and Payne JL. *In revision*. Respiratory and circulatory anatomy constrains size evolution in marine macrofauna. *Paleobiology*. Accepted pending moderate revision August 2019. [†] = high school student advisee.

Knope ML, Bush AM, Frishkoff LO, **Heim NA**, Payne JL. *In revision*. Ecological diversity buffers marine animals from extinction. *Science*. Revisions requested August 2019.

Payne JL and **Heim NA**. *In review*. Inverse association between body size and extinction risk in the marine fossil record. *Paleobiology*. Revisions submitted July 2019.

Bush AM, Wang SC, Payne JL, **Heim NA**. *In review*. A unified quantitative framework for analyzing the magnitude, selectivity, and biotic effects of extinction and origination. *Paleobiology*. Final revisions submitted August 2019.

Peer-reviewed Journal Articles

Saulsbury J, Moss DK, Ivany LC, Kowalewski M, Lindberg D, Gillooly JF, **Heim NA**, McClain CR, Payne JL, Roopnarine PD, Schöne BR, Goodwin D, Finnegan S. 2019. Evaluating the influences of temperature, primary production, and evolutionary history on bivalve growth rates. *Paleobiology*, 45(3):405-420. DOI: 10.1017/pab.2019.20.

McClain CR, **Heim NA**, Knope ML, and Payne JL. 2018. Is biodiversity energy-limited or unbounded? A test in fossil and modern bivalves. *Paleobiology*, 44(3):385-401. DOI: 10.1017/pab.2018.4

Heim NA, Payne JL, Finnegan S, Knope ML, Kowalewski M, Lyons SK, McShea DW, Novack-Gottshall PM, Smith FA, and Wang SC. 2017. Hierarchical complexity and the size limits of life. *Proceedings of Royal Society of London B*, 284: 20171039. DOI: 10.1098/rspb.2017.1039.

Payne JL, Bush AM, **Heim NA**, Knope ML, and McCauley DJ. 2016. Ecological selectivity of the emerging mass extinction in the oceans. *Science*, 353(6305):1284-1286. URL: <http://science.sciencemag.org/content/early/2016/09/13/science.aaf2416>.

Payne JL, Bush AM, Chang ET, **Heim NA**, Knope ML, and Pruss SB. 2016. Extinction intensity, selectivity, and their combined macroevolutionary influence in the fossil record. *Biology Letters*, 12(10): 20160202. DOI: 10.1098/rsbl.2016.0202.

Smith FA, Payne JL, **Heim NA**, Balk M, Finnegan S, Kowalewski M, Lyons SK, McClain CR, McShea DW, Novack-Gottshall PM, Anich PS, and Wang SC. 2016. Body size evolution across the Geozoic. *Annual Review of Earth and Planetary Sciences*, 44:523-553. URL: <http://www.annualreviews.org/doi/abs/10.1146/annurev-earth-060115-012147>.

Heim NA, Knope ML, Schaal EK, Wang SC, and Payne JL. 2015. Cope's Rule in the Evolution of Marine Animals. *Science*, 347(6224):867-870. DOI: 10.1126/science.1260065.

Knope ML, **Heim NA**, LO Frishkoff, and Payne JL. 2015. Limited role of functional differentiation in early diversification of animals. *Nature Communications*, 6:6455. DOI: 10.1038/ncomms7455.

Payne JL, **Heim NA**, Knope ML, and McClain CR. 2014. Metabolic dominance of bivalves predates brachiopod diversity decline by more than 150 million years. *Proceedings of the Royal Society B*, 281(1783):20133122. DOI: 10.1098/rspb.2013.3122.

Rook DL, **Heim NA**, and Marcot J. 2013. Contrasting patterns and connections of rock and biotic diversity in the marine and terrestrial fossil records of North America. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 372: 123-129. DOI: 10.1016/j.palaeo.2012.10.006.

Finnegan S, **Heim NA**, Peters SE, and Fischer WW. 2012. Climate Change and the Selective Signature of the Late Ordovician Mass Extinction. *Proceedings of the National Academy of Sciences of the U.S.A.* (PNAS), 109(18): 6829-6834. DOI: 10.1073/pnas.1117039109.

Heim NA and Peters SE. 2011. Local Environmental Breadth Determines Geographic Range and Longevity in Fossil Marine Genera. *PLoS One*, 5(6): e18946. DOI: 10.1371/journal.pone.0018946.

Heim NA and Peters SE. 2011. Covariation in macrostratigraphic and macroevolutionary patterns in the marine record of North America. *The Geological Society of America Bulletin*, 123: 620-630. DOI: 10.1130/B30215.1.

- Peters SE and **Heim NA**. 2011. Stratigraphic distribution of marine fossils in North America. *Geology*, 39: 259-262. DOI: 10.1130/G31442.1.
- Peters SE and **Heim NA**. 2010. The geological completeness of paleontological sampling in North America. *Paleobiology*, 36: 61-79. DOI: 10.1666/0094-8373-36.1.61.
- Peng S, Hughes NC, **Heim NA**, Sell BK, Zhu X, Myrow PM, and Parcha SK. 2009. Cambrian trilobites from the Parahio and Zanskar Valleys, Indian Himalaya. *Journal of Paleontology*, 83(sp. 71): 1-95. DOI: 10.1666/08-129.1.
- Heim NA**. 2009. Stability of regional brachiopod diversity structure across the Mississippian/Pennsylvanian boundary. *Paleobiology*, 35: 393-412. DOI: 10.1666/0094-8373-35.3.393.
- Heim NA**. 2008. A null biogeographic model for quantifying the role of migration in shaping patterns of global taxonomic richness and differentiation diversity, with implications for Ordovician biogeography. *Paleobiology*, 34: 195-209. DOI: 10.1666/0094-8373(2008)034[0195:ANBMFQ]2.0.CO;2.
- Myrow PM, Snell KE, Hughes NC, Paulsen TS, **Heim NA**, and Parcha SK. 2006. Cambrian depositional history of the Zanskar Valley region of the Indian Himalaya: tectonic implications. *Journal of Sedimentary Research*, 76: 364-381. DOI: 10.2110/jsr.2006.020.

Peer-reviewed Book Chapters

- Railsback LB, Layou KM, **Heim NA**, Holland SM, Trogon ML, Jarrett MB, Izsak GM, Bulger DE, Wysong EJ, Trubee KJ, Fiser JM, Cox JE, and Crowe DE. 2012. Geochemical evidence for meteoric diagenesis and cryptic surfaces of subaerial exposure in peritidal carbonates of Late Ordovician age from the Nashville Dome, central Tennessee, USA. In Morad, S., M. Ketzer and L.F. de Ros (eds) *Linking Diagenesis to Sequence Stratigraphy*. International Association of Sedimentologists Special Publication no. 45, p. 257-270. DOI: 10.1002/9781118485347.ch11
- Peters SE and **Heim NA**. 2011. Macrostratigraphy and macroevolution in marine environments: testing the common-cause hypothesis. In McGowan, A. and A.B. Smith (eds.), *Comparing the Geological and Fossil Records: Implications for Biodiversity Studies*. Geological Society Special Publication 358, p. 95-104. DOI: 10.1144/SP358.7.

Field Guides & Other Publications

- Heim NA** and Geary DH. 2013. The Fossil Record. In Losos, J. (editor in chief). *The Princeton Guide to Evolution*. Princeton University Press, Princeton, N.J., p. 112-119.
- Heim NA**. 2013. Extinction Rates and the Fossil Record. In MacLeod, N. (editor in chief). *Grzimek's Animal Life Encyclopedia, Extinction*. Cengage Learning, Detroit, p. 103-109.
- Hughes NC and **Heim NA**. 2005. Paleozoic: Cambrian. In Selley, R.C., Cocks, L.R.M. and Plimer, I.R. (eds.), *Encyclopedia of Geology*. Elsevier, Amsterdam, p. 163-175.

Jensen S., Droser ML, and **Heim NA**. 2002. Trace fossil and ichnofabrics of the Lower Cambrian Wood Canyon Formation, southwest Death Valley area. *In* Corsetti, F.A. (ed.), *Proterozoic-Cambrian of the Great Basin and Beyond*, Pacific Section SEPM Book 93, p. 123-135.

Meeting Abstracts

Heim NA, Knope ML, Payne JL. 2019. *North American Paleontological Convention*. Respiratory and circulatory anatomy supersede ecological escalation in driving size increase in marine animals.

Payne JL and **Heim NA**. 2019. *North American Paleontological Convention*. Body size and extinction risk in the fossil record and the modern world.

Munstermann MJ, **Heim NA**, McCauley DJ, Payne JL, Wang SC, Knope ML. 2019. *International Congress for Conservation Biology*. The global ecological signature of extinction risk in terrestrial vertebrates.

Heim NA and Payne JL. 2018. *GSA Annual Meeting*. Eco-physiological drivers of body size evolution in marine animals. *GSA Abstracts with Programs*, 50(6). DOI: 10.1130/abs/2018AM-320104.

Heim NA, Saltzman J and Payne JL. 2018. *GSA Annual Meeting*. Summer paleobiology research experience for high school students. *GSA Abstracts with Programs*, 50(6). DOI: 10.1130/abs/2018AM-320109.

Werbin ZR, Wojciehowski JD, Wang H, Habermeier C, **Heim NA**, Finnegan S, Payne JL, Wang SC. 2018. *GSA Annual Meeting*. Comparing the age selectivity of modern extinctions with Phanerozoic background and mass extinctions. *GSA Abstracts with Programs*, 50(6). DOI: 10.1130/abs/2018AM-324110.

Wang H, Habermeier C, **Heim NA**, Finnegan S, Payne JL, Wang SC. 2018. *GSA Annual Meeting*. Are we entering a sixth mass extinction? Age selectivity of modern extinctions. *GSA Abstracts with Programs*, 50(6). DOI: 10.1130/abs/2018AM-323991.

Heim NA and Payne JL. 2018. *SICB Annual Meeting*. Estimating global extinction threat levels in butterflies. 39-4.

Saulsbury J, Finnegan S, Lindberg DR, Moss DK, Ivany LC, Gilooly JF, Goodwin D, **Heim NA**, Keating-Bitonti C, Kowalewski M, McClain CR, Payne JL, Roopnarine PD, and Schoene BR. 2017. *GSA Annual Meeting*. Evaluating the influences of temperature, productivity, and phylogenetic constraint on bivalve growth rates. *GSA Abstracts with Programs*, 49(6). DOI: 10.1130/abs/2017AM-304698.

Knope ML, Bush AM, Frishkoff LO, **Heim NA**, and Payne JL. 2017. *Evolution*. A comparative analysis of the filling of ecological 'space' by marine animals. T975

Heim NA. 2017. *Bay Area Conservation Biology Symposium*. An ecological shift in the Pacific mole crab (*Emerita analoga*) population at Ocean Beach, San Francisco.

Heim NA. 2017. *MARINE Oceans Colloquium*. Conservation paleobiology: What are the prospects and potential collaborations?

Payne JL, Bush AM, Chang ET, **Heim NA**, Knope ML, and Pruss SB. 2016. *AGU Fall Meeting*. Seeking a paleontological signature for mass extinctions caused by flood basalt eruptions. V43F-01.

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13. Kothari S, Gao A, **Heim NA**, and Payne JL. 2015. *AGU Fall Meeting*. The Prevalence of Specific Ecologies in Marine Organisms with Relation to Environmental Factors. ED41A-0841.
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15. Park C, Saux J, **Heim NA**, and Payne JL. 2015. *AGU Fall Meeting*. Mass Extinctions' Selectivity on the Diversity of Marine Modes of Life. ED41A-0861.
16. Sundararajan D, Gutierrez F, **Heim NA**, and Payne JL. 2015. *AGU Fall Meeting*. The Influence of pH on Prokaryotic Cell Size and Temperature. ED41A-0863.
17. Tenorio A, Duong C, **Heim NA**, and Payne JL. 2015. *AGU Fall Meeting*. Correlation Between Ecospace and Metabolic Rate of Marine Organisms Through Geologic Time. ED41A-0844.
18. Wang F, Wong W, **Heim NA**, and Payne JL. 2015. *AGU Fall Meeting*. The Effect of Abiotic Factors on Marine Animal Body Size. ED41A-0859.
19. Yuan A, Huynh C, **Heim NA**, and Payne JL. 2015. *AGU Fall Meeting*. The effect of size and ecology on extinction susceptibility. ED41A-0842.
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24. Siram A, Idgunji S, **Heim NA**, and Payne JL. 2014. *AGU Fall Meeting*. Body Size Preference of Marine Animals in Relation to Extinction Selectivity. ED41A-3412.
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