Stanford

Jonathan Payne

Dorrell William Kirby Professor, Senior Associate Dean for Faculty Affairs, Senior Fellow at the Woods Institute for the Environment and Professor, by courtesy, of Biology

Earth & Planetary Sciences

Bio

BIO

Jonathan Payne is the Dorrell William Kirby Professor in the Department of Earth and Planetary Sciences, a Senior Fellow at the Woods Institute for the Environment, and the Senior Associate Dean for Faculty Affairs in the Doerr School of Sustainability at Stanford University.

His research addresses the relationship between environmental change and biological evolution in the fossil record, focusing primarily on identifying the causes of mass extinction events and the processes that control subsequent recovery of the Earth system and its biosphere. He and his research group also use data from the rock record, as well as fossil and living species, to quantify long-term evolutionary trends and pinpoint their underlying controls, while placing the current biodiversity crisis in geological context. These research efforts integrate data and techniques from paleontology, sedimentary geology, isotope geochemistry, climate modeling, and conservation biology.

He currently teaches courses for undergraduate and graduate students on the Sixth Extinction (and the other five), Macroevolution, Carbonate Sedimentology and Rock Physics, and Quantitative Methods in Paleobiology. He is the 2015 recipient of the Allan V. Cox Medal from Stanford University for excellence in advising undergraduate research, as well as the Charles Schuchert Award from the Paleontological Society for excellence and promise in the science of paleontology. He is a fellow of both the Paleontological Society and the Geological Society of America.

He received his B.A. in Geosciences from Williams College. He then worked for two years as a high school teacher before returning to graduate school, earning a Ph.D. in Earth and Planetary Sciences from Harvard University. Following a post-doctoral fellowship at Penn State, he joined the Stanford faculty in the fall of 2005.

ACADEMIC APPOINTMENTS

- Professor, Earth & Planetary Sciences
- Senior Fellow, Stanford Woods Institute for the Environment
- Professor (By courtesy), Biology
- Member, Bio-X
- Affiliate, Stanford Woods Institute for the Environment

ADMINISTRATIVE APPOINTMENTS

- Dorrell William Kirby Professor of Geological Sciences, Stanford University, (2020- present)
- Senior Associate Dean for Faculty Affairs, School of Earth, Energy and Environmental Sciences, Stanford University, (2020- present)

- Professor of Biology (by courtesy), Stanford University, (2016- present)
- Professor of Geological Sciences, Stanford University, (2016-2020)
- Chair, Department of Geological Sciences, Stanford University, (2015-2019)
- Associate Chair, Dept. of Geological & Environmental Sciences, Stanford University, (2014-2015)
- Associate Professor of Biology (by courtesy), Stanford University, (2012-2016)
- Associate Professor of Geological and Environmental Sciences, Stanford University, (2012-2016)
- Assistant Professor of Biology (by courtesy), Stanford University, (2010-2012)
- Affiliated Faculty Member, Woods Institute for the Environment, Stanford University, (2009- present)
- Assistant Professor of Geological and Environmental Sciences, Stanford University, (2005-2012)
- Post-doctoral Fellow, Pennsylvania State University, (2005-2005)
- Research Assistant, Harvard University, (2002-2005)
- Teaching Assistant, Harvard University, (2000-2005)
- Science and Mathematics Teacher, The American School in Switzerland (TASIS), (1997-1999)

HONORS AND AWARDS

- Fellow, Geological Society of America (2018)
- Stuart A. Northrop Distinguished Lecture, University of New Mexico (2017)
- Allan V. Cox Medal, Stanford University (2015)
- Charles Schuchert Award, Paleontological Society (2015)
- Fellow, Paleontological Society (2015)
- Stanford Fellow, Stanford University (2014-2016)
- VPUE Faculty Scholar, Stanford University (2013-2014)
- CAREER Award, NSF (2012)
- Frederick E. Terman Fellowship, Stanford University (2007-2009)
- Honorable mention for best paper, Palaios (2006)
- National Defense Science and Engineering Graduate Fellowship, US Department of Defense (1999 - 2002)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Co-Chair, Scientific Program Committee, Theme 14, Goldschmidt Geochemistry Conference (2017 - 2017)
- Invited Speaker, Penn State; UT Austin; University of New Mexico; Stanford; US Geological Survey (2017 - 2017)
- Invited Speaker, Stanford University; Colgate University (2016 - 2016)
- Invited Speaker, U of Chicago; Northwestern; U of Zurich; U of Padua; U Penn; Lehigh; UC Davis (2015 - 2015)
- Member, Breadth Governance Board, Stanford University (2014 - 2015)
- Co-chair, Theme Team for Goldschmidt 2014 - 'Evolution of the Earth's Environment' (2014 - 2014)
- Convener, Topical Session on Ecosystem Geobiology and Paleobiology, Geological Society of America Annual Meeting (2014 - 2014)
- Invited Speaker, University of Michigan; Yale University (2014 - 2014)
- Outside Chair for PhD Exam (EESS x3), Stanford University (2014 - 2014)
- Panelist, NASA Exobiology Program (2014 - 2014)
- Pre-major advisor - 4 students, Stanford University (2014 - 2014)
- Research mentor: 2 high school teachers; 4 undergraduate students; 17 high school students, Stanford University (2014 - 2014)

- Member, Teaching Task Force, Stanford University, School of Earth Sciences (2013 - 2014)
- Co-organizer, Paleontological Society short course at GSA Annual Meeting - 'Ecosystem Paleobiology and Geobiology' (2013 - 2013)
- Convener, Topical Session on End-Permian Mass Extinction, Joint GSA-GSC Meeting in Chengdu, China (2013 - 2013)
- Convener, Topical Session on the History of the Biological Pump, Goldschmidt Geochemistry Conference, Florence, Italy (2013 - 2013)
- Invited Speaker, University of Zurich; Syracuse University; Bodega Marine Lab, UC Davis (2013 - 2013)
- Lecture for Camp for Talented Youth Geology Class (Middle School Students), Stanford University (2013 - 2013)
- Lecture for SES Summer Program in Paleoclimate for K-12 teachers, Stanford University (2013 - 2013)
- Member, Theme Team for Goldschmidt 2013 - 'Evolution of the Earth's Environment' (2013 - 2013)
- Outside Chair for PhD Exam (Physics), Stanford University (2013 - 2013)
- Pre-major advisor - 4 students; Major advisor (GES) - 2 students, Stanford University (2013 - 2013)
- Research mentor: 2 high school teachers, Stanford Research Experience for Teachers Program; 20 high school students; 7 undergraduate students, Stanford University (2013 - 2013)
- Member, Society for the Study of Evolution (2012 - present)
- Chair, GES Undergraduate Curriculum Committee, Stanford University (2012 - 2014)
- Undergraduate Program Director, GES, Stanford University (2012 - 2014)
- Invited Speaker, Hopkins Marine Station, Stanford University; University of California at Berkeley; Agouron Institute Meeting: The Comings and Goings of Animal Life on Earth; Scripps Institute of Oceanography; Saudi Aramco (2012 - 2012)
- Lecture for Camp for Talented Youth Geology Class (Middle School Students), Stanford University (2012 - 2012)
- Lecture for SES VPUE and SURGE Summer Undergraduate Research Students, Stanford University (2012 - 2012)
- Major advisor (GES) - 2 students, Stanford University (2012 - 2012)
- Outside chair for PhD Exam - 5 exams (Biology x2, CEE, Chemistry, Physics), Stanford University (2012 - 2012)
- Research mentor: 2 high school teachers, Stanford Research Experience for Teachers Program; 10 high school students (7 presented posters at AGU December meeting); 5 undergraduate students (4 presented posters at AGU December meeting), Stanford University (2012 - 2012)
- Associate Editor, American Journal of Science (2011 - present)
- Member, American Chemical Society (2011 - present)
- Co-chair, Geobiology Search Committee, Stanford University (2011 - 2014)
- Convener, Topical session on Carbon Isotopes and the Geological Carbon Cycle at the European Geophysical Union Annual Meeting (2011 - 2011)
- Invited Speaker, Princeton University (2011 - 2011)
- Lecture for Camp for Talented Youth Geology Class (Middle School Students), Stanford University (2011 - 2011)
- Lecture for SES VPUE Summer Undergraduate Research Students, Stanford University (2011 - 2011)
- Outside chair for PhD Exam - 1 exam (EESS), Stanford University (2011 - 2011)
- Research mentor for 1 high school science teacher, Stanford Research Experience for Teachers Program, Stanford University (2011 - 2011)
- Research mentor for 5 high school students (all 5 presented posters at AGU December meeting in San Francisco); Research mentor for 3 undergraduate students (2 funded by VPUE, 1 funded by SURGE), Stanford University (2011 - 2011)
- Invited Speaker, University of California at Berkeley; University of Frankfurt; University of California at Santa Cruz; Field Museum of Natural History, Chicago, IL (2010 - 2010)
- Lecture for Camp for Talented Youth Geology Class (Middle School Students), Stanford University (2010 - 2010)
- Lecturer for SES Summer High School Interns and Undergraduate Research Students, Stanford University (2010 - 2010)
- Research mentor for 1 high school science teacher, Stanford Research Experience for Teachers Program, Stanford University (2010 - 2010)
- Research mentor for 12 high school students (10 presented posters at AGU December meeting in San Francisco), Stanford University (2010 - 2010)
- Member, Earth Sciences Council, Stanford University (2009 - present)
- Convener, Topical session on Geochemistry of Extinction and Radiation Events at Goldschmidt Conference (2009 - 2009)

- Invited Speaker, Stanford GES & Geophysics Joint Dept Seminar; San Jose State University; California Academy of Sciences; University of California at Santa Barbara; University of New Mexico (2009 - 2009)
- Lecturer, SES VPUE Summer Undergraduate Research Students and High School Interns, Stanford University (2009 - 2009)
- Outside chair for PhD Exam - 2 exams (Biology), Stanford University (2009 - 2009)
- Research mentor for 2 high school students (both presented posters at AGU December meeting in San Francisco), Stanford University (2009 - 2009)
- Member, SES Educational Outreach Committee, Stanford University (2008 - present)
- SES Librarian Search Committee, Stanford University (2008 - 2009)
- Invited Speaker, MIT; Stanford School of Earth Sciences Faculty Forum; Chevron-Texaco, San Ramon, CA; Harvard University; NASA Ames Research Center; UC Santa Cruz (2008 - 2008)
- Lecturer and mentor, SES VPUE Summer Undergraduate Research Students (2008 - 2008)
- Associate Editor, Newsletter on Stratigraphy (2007 - present)
- Member, American Geophysical Union (2007 - present)
- Member, University Human Skeletal Remains Oversight Committee, Stanford University (2007 - present)
- GES TA Training Coordinator, Stanford Univesity (2007 - 2014)
- GES Long Range Planning Committee, Stanford University (2007 - 2010)
- GES Dept Seminar Coordinator, Stanford University (2007 - 2009)
- Convener, Topical Session on Extinction Selectivity at GSA Annual Meeting (2007 - 2007)
- Invited Speaker, California Academy of Sciences; Guizhou Geological Survey, Guiyang, China; University of California at Berkeley; University of California at Davis; Williams College (2007 - 2007)
- Lecturer and mentor, SES Summer High School Interns (2007 - 2007)
- Outside chair for PhD Exam - 4 exams (Biological Sciences), Stanford University (2007 - 2007)
- Associate Editor, Palaeontologia Electronica (2006 - present)
- Member, Earth Systems Committee of the Whole, Stanford University (2006 - present)
- Member, GES Undergraduate Curriculum Committee, Stanford University (2006 - 2012)
- Judge, SES Annual Research Review (2006 - 2008)
- Invited Speaker, San Jose State University; Chevron-Texaco, San Ramon, CA; University of Chicago; Northwestern University (2006 - 2006)
- Lecture for SES Summer High School Interns, Stanford University (2006 - 2006)
- Lecture for SES VPUE Summer Undergraduate Research Students, Stanford University (2006 - 2006)
- Member, American Association for the Advancement of Science (2005 - present)
- Proposal Reviewer, NSF (Sedimentary Geology and Paleobiology; Geobiology and Low Temperature Geochemistry; Antaractic Earth Sciences) , NASA Astrobiology, Petroleum Research Fund of the American Chemical Society, Swiss National Science Foundation, Austrian Science Fund, National Geographic Society, Lewis and Clark Foundation, Paleontological Society (Student Grants), US Civilian Research and Development Foundation (2005 - present)
- Invited Speaker, Peninsula Geological Society, Stanford, CA; Middle East Technical University, Ankara, Turkey; Pennsylvania State University; Stanford University; University of Connecticut; University of Michigan (2005 - 2005)
- Manuscript Reviewer, Science, PNAS, Geology, Earth and Planetary Science Letters, Geobiology, Paleobiology, Environmental Science, American Journal of Science, Journal of Paleontology, Global and Planetary Change, Geochimica et Cosmochimica Acta, Geological Society of America Bulletin, Palaeoworld, New Mexico Museum of Natural History Bulletin, Palaios, Palaeogeography Palaeoclimatology Palaeoecology, Sedimentology, Lithos, Acta Palaeontologica Polonica, Journal of Zoological Systematics and Evolutionary Research, Gondwana Research, Nature Geoscience (2004 - present)
- Invited Speaker, University of Kyushu, Japan; Universidad Nacional Autonoma de Mexico, Hermosillo (2004 - 2004)
- Member, American Association of Petroleum Geologists (2003 - present)
- Member, Society for Sedimentary Geology (2003 - present)
- Invited Speaker, University of Kansas (2003 - 2003)

- Invited Speaker, Guizhou Bureau of Geology and Mineral Resources, China (2002 - 2002)
- Member, Paleontological Society (2000 - present)
- Member, Geological Society of America (2000 - present)
- Member, Sigma Xi (1997 - present)

PROGRAM AFFILIATIONS

- Center for East Asian Studies

PROFESSIONAL EDUCATION

- Ph.D., Harvard University , Earth and Planetary Sciences (2005)
- A.M., Harvard University , Earth and Planetary Sciences (2002)
- B.A., Williams College , Geosciences (1997)

LINKS

- Paleobiology Group: https://paleobiology.stanford.edu

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Research

My research group studies the relationship between environmental change and biological evolution in the fossil record. The primary focus of my research group is on understanding the causes of mass extinctions and the processes that control subsequent recovery of biodiversity and global ecosystems. We are working to constrain the causes of the end-Permian and end-Triassic mass extinctions using high-resolution sedimentary, geochemical, and paleontological records developed from carbonate platform sediments in China, Italy, Turkey, and Japan. We are also using global data on fossil occurrence patterns and body sizes to study longer-term connections between environmental change and biological evolution, with a focus on extinction selectivity and body size evolution.

Teaching

I teach courses for undergraduates in historical geology and invertebrate paleobiology and courses for graduate students in carbonate sedimentology, geobiology, and paleobiology.

Teaching

COURSES

2025-26

- Macroevolution: BIO 136, BIO 236, EPS 136, EPS 236 (Spr)

2024-25

- Quantitative Methods in Paleobiology: EPS 161, EPS 261 (Spr)
- The Sixth Extinction (and the Other Five): BIO 169, BIO 237, EARTHSYS 127A, EARTHSYS 227A, EPS 137, EPS 237 (Aut)

2023-24

- Macroevolution: BIO 136, BIO 236, EPS 136, EPS 236 (Spr)

2022-23

- Geology of Oman Field Trip: GEOLSCI 293A (Aut)

- The Sixth Extinction (and the Other Five): BIO 169, BIO 237, EARTHSYS 127A, EARTHSYS 227A, GEOLSCI 137, GEOLSCI 237 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Valerie Martin, Antonio Skillicorn, Lucy Webb

Postdoctoral Faculty Sponsor

Brian Beaty, Mark Nikolic, Ashley Prow Fleischer, Pulkit Singh, Mingzhao Sun

Doctoral (Program)

Kemi Ashing-Giwa, Susannah Herz, Leah Kahn, Eliane Petersohn

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biology (School of Humanities and Sciences) (Phd Program)

Publications

PUBLICATIONS

- **Impact of warming on aquatic body sizes explained by metabolic scaling from microbes to macrofauna.** *Proceedings of the National Academy of Sciences of the United States of America*
  Deutsch, C., Penn, J. L., Verberk, W. C., Inomura, K., Endress, M., Payne, J. L.
  2022; 119 (28): e2201345119

- **Ecologically diverse clades dominate the oceans via extinction resistance.** *Science (New York, N.Y.)*
  Knope, M. L., Bush, A. M., Frishkoff, L. O., Heim, N. A., Payne, J. L.
  2020; 367 (6481): 1035–38

- **Energetic tradeoffs control the size distribution of aquatic mammals** *Proceedings of the National Academy of Sciences of the United States of America*
  Gearty, W., McClain, C. R., Payne, J. L.
  2018: 4194–99

- **Temperature-dependent hypoxia explains biogeography and severity of end-Permian marine mass extinction.** *Science (New York, N.Y.)*
  Penn, J. L., Deutsch, C., Payne, J. L., Sperling, E. A.
  2018; 362 (6419)

- **Body size downgrading of mammals over the late Quaternary.** *Science (New York, N.Y.)*
  Smith, F. A., Elliott Smith, R. E., Lyons, S. K., Payne, J. L.
  2018; 360 (6386): 310–13

- **A model for the decrease in amplitude of carbon isotope excursions across the Phanerozoic** *American Journal of Science*
  Bachan, A., Lau, K. V., Saltzman, M. R., Thomas, E., Kump, L. R., Payne, J. L.
  2017; 317: 641-676

- **In Memoriam: Richard Karl Bambach (18 May 1934-20 June 2025)** *PALEOBIOLOGY*
  Bush, A. M., Bennington, J., Daley, G. M., Knoll, A. H., Kowalewski, M., Miller, A. I., Payne, J. L., Wing, S. L.
  2026

- **Investigating the response of Glycymeris septentrionalis (Bivalvia) and Terebratalia transversa (Brachiopoda) to euxinia: Implications for mass extinctions** *GEOLOGY*
  Ashing-Giwa, K., Payne, J. L., Sperling, E. A.
  2026; 54 (2): 138-142

- **A reversed latitudinal ocean oxygen gradient in the Proterozoic Eon** *NATURE GEOSCIENCE*
  He, R., Pohl, A., Zhang, X., Chang, C., Prow-Fleischer, A., Payne, J. L., Xiao, S., Ridgwell, A., Lu, Z.
  2026

- **Heterogeneous Carbonate Lithium Isotope Records Across the end-Permian Mass Extinction Indicate a Highly Perturbed Lithium Cycle in the Early Triassic** *AMERICAN JOURNAL OF SCIENCE*
  Taylor, K., Rauzi, S., Isson, T., Ibarra, D. E., Hulse, D., Kimmig, S. R., Payne, J. L., Altiner, D., Lehrmann, D. J., Kalderon-Asael, B., Planavsky, N. J., Lau, K.
  2026; 326
- **Upper Permian to lowermost Triassic carbon isotope stratigraphy of Iranian open-marine successions** *PALAEOGEOGRAPHY PALAEOCLIMATOLOGY PALAEOECOLOGY*
  Arefifard, S., Korte, C., Payne, J. L.
  2025; 679
- **Extinction threatens to cause morphological and ecological homogenization in sharks.** *Science advances*
  Bazzi, M., Lloyd, W. L., Ebersole, J. A., Sternes, P. C., Al Aswad, J. A., Payne, J. L.
  2025; 11 (44): eaea0278
- **Early gigantic lamniform marks the onset of mega-body size in modern shark evolution.** *Communications biology*
  Bazzi, M., Siversson, M., Wintner, S., Newbrey, M., Payne, J. L., Campione, N. E., Roberts, A. J., Natanson, L. J., Hall, S., Blake, T., Kear, B. P.
  2025; 8 (1): 1499
- **Macroevolutionary coupling of marine biomass and biodiversity across the Phanerozoic.** *Current biology : CB*
  Singh, P., Ferré, J., Thrasher, B., Monarrez, P. M., Al-Ramadan, K., Cantrell, D. L., Lehrmann, D. J., Morsilli, M., Payne, J. L.
  2025
- **MOBS 1.0: A Database of Interspecific Variation in Marine Organismal Body Sizes** *GLOBAL ECOLOGY AND BIOGEOGRAPHY*
  McClain, C. R., Heim, N. A., Knope, M. L., Monarrez, P. M., Payne, J. L., Santos, I., Webb, T. J.
  2025; 34 (6)
- **Physiology and climate change explain unusually high similarity across marine communities after end-Permian mass extinction.** *Science advances*
  Al Aswad, J. A., Penn, J. L., Monarrez, P. M., Bazzi, M., Deutsch, C., Payne, J. L.
  2025; 11 (13): eadr4199
- **New foraminifera from the Changhsingian (Upper Permian) of the Taurides (southern Turkey) with remarks on their evolutionary origins** *JOURNAL OF PALEONTOLOGY*
  Altiner, D., Payne, J. L., Lehrmann, D. J., Atasoy, S., Ozkan-Altiner, S.
  2025
- **Calcium isotopes support spatial redox gradients on the Tethys European margin across the Triassic-Jurassic boundary** *CHEMICAL GEOLOGY*
  Prow-Fleischer, A. N., Lu, Z., Blattler, C. L., He, T., Singh, P., Kemeny, P., Todes, J. P., Pohl, A., Bhattacharya, T., van de Schootbrugge, B., Wignall, P. B., Todaro, S., Payne, et al
  2025; 673
- **Size bias in the documentation of marine biodiversity** *OIKOS*
  McClain, C. R., Webb, T. J., Heim, N. A., Knope, M. L., Monarrez, P. M., Payne, J. L.
  2024
- **Metazoan-algal benthic automicritic slope boundstone: The Triassic Great Bank of Guizhou carbonate platform, Xiliang margin, China** *AAPG BULLETIN*
  Kelley, B. M., Lehrmann, D. J., Yu, M., V. Lau, K., Altiner, D., Minzoni, M., Enos, P., Li, X., Payne, J. L.
  2024; 108 (10): 1851-1884
- **Body-size reductions in dacryoconarid tentaculitoids during Devonian warming** *GEOSPHERE*
  Prow-Fleischer, A. N., Lu, Z., Meehan, K. C., Yang, Z., Ivany, L. C., Payne, J. L.
  2024
- **Body-size reductions in dacryoconarid tentaculitoids during Late Devonian warming** *GEOSPHERE*
  Prow-Fleischer, A. N., Lu, Z., Meehan, K. C., Yang, Z., Ivany, L. C., Payne, J. L.
  2024
- **Body-size reductions in dacryoconarid tentaculitoids during Late Devonian warming** *GEOSPHERE*

Prow-Fleischer, A. N., Lu, Z., Meehan, K. C., Yang, Z., Ivany, L. C., Payne, J. L.
2024

- **Presentation of the 2023 Charles Schuchert Award of the Paleontological Society to Erik A. Sperling** *JOURNAL OF PALEONTOLOGY*
  Payne, J. L.
  2024; 98 (5): 914-915
- **Navigating uncertainty in maximum body size in marine metazoans.** *Ecology and evolution*
  McClain, C. R., Webb, T. J., Heim, N. A., Knope, M. L., Monarrez, P. M., Payne, J. L.
  2024; 14 (6): e11506
- **Phanerozoic co-evolution of O2-CO2 and ocean habitability.** *National science review*
  Lu, Z., Rickaby, R. E., Payne, J. L., Prow, A. N.
  2024; 11 (6): nwae099
- **Carbonate factory response through the MECO (Middle Eocene Climate Optimum) event: Insight from the Apulia Carbonate Platform, Gargano Promontory, Italy** *SEDIMENTARY GEOLOGY*
  Morabito, C., Papazzoni, C. A., Lehrmann, D. J., Payne, J. L., Al-Ramadan, K., Morsilli, M.
  2024; 461
- **A global ecological signal of extinction risk in marine ray-finned fishes (class Actinopterygii).** *Cambridge prisms. Extinction*
  Bak, T. M., Camp, R. J., Heim, N. A., McCauley, D. J., Payne, J. L., Knope, M. L.
  2023; 1: e25
- **Reduced strength and increased variability of extinction selectivity during mass extinctions.** *Royal Society open science*
  Monarrez, P. M., Heim, N. A., Payne, J. L.
  2023; 10 (9): 230795
- **Prolonged and gradual recovery of metazoan-algal reefs following the end-Permian mass extinction** *GEOLOGY*
  Kelley, B. M., Yu, M., Lehrmann, D. J., Altiner, D., Payne, J. L.
  2023
- **Selectivity of mass extinctions: Patterns, processes, and future directions.** *Cambridge prisms. Extinction*
  Payne, J. L., Al Aswad, J. A., Deutsch, C., Monarrez, P. M., Penn, J. L., Singh, P.
  2023; 1: e12
- **Linking host plants to damage types in the fossil record of insect herbivory** *PALEOBIOLOGY*
  Schachat, S. R., Payne, J. L., Boyce, C.
  2023; 49 (2): 232-258
- **Macroevolutionary patterns in vertebrate clades over the last 200 million years: the interaction among body size, metabolism and environment**
  Smith, F. A., Lyons, S. K., Heim, N., Payne, J. L.
  OXFORD UNIV PRESS INC.2023: S294
- **Macroevolutionary patterns in vertebrate clades over the last 200 million years: the interaction among body size, metabolism and environment**
  Smith, F. A., Lyons, K., Heim, N., Payne, J.
  OXFORD UNIV PRESS INC.2023: S293-S294
- **Hierarchical multi-label taxonomic classification of carbonate skeletal grains with deep learning** *SEDIMENTARY GEOLOGY*
  Ho, M., Idgunji, S., Payne, J. L., Koeshidayatullah, A.
  2023; 443
- **Illusion of flight? Absence, evidence and the age of winged insects** *BIOLOGICAL JOURNAL OF THE LINNEAN SOCIETY*
  Schachat, S. R., Goldstein, P. Z., Desalle, R., Bobo, D. M., Boyce, C., Payne, J. L., Labandeira, C. C.
  2022
- **Marine Ooid Sizes Record Phanerozoic Seawater Carbonate Chemistry** *GEOPHYSICAL RESEARCH LETTERS*
  Trower, E. J., Smith, B. P., Koeshidayatullah, A., Payne, J. L.
  2022; 49 (22)

- **Reduction in animal abundance and oxygen availability during and after the end-Triassic mass extinction.** *Geobiology*
  Singh, P., Lu, W., Lu, Z., Jost, A. B., Lau, K., Bachan, A., van de Schootbrugge, B., Payne, J. L.
  2022
- **GUADALUPIAN CARBON ISOTOPE STRATIGRAPHY INDICATES EXTENDED INTERVAL OF CARBON CYCLE STABILITY** *AMERICAN JOURNAL OF SCIENCE*
  Arefifard, S., Payne, J. L., Rizzi, M.
  2022; 322 (9): 1019-1046
- **Breathless through Time: Oxygen and Animals across Earth's History** *BIOLOGICAL BULLETIN*
  Sperling, E. A., Boag, T. H., Duncan, M. I., Endriga, C. R., Marquez, J., Mills, D. B., Monarrez, P. M., Sclafani, J. A., Stockey, R. G., Payne, J. L.
  2022
- **Unraveling overprinted formation mechanisms of massive dolostone in the Lower Triassic sequence of an isolated carbonate platform in Nanpanjiang Basin, south China** *SEDIMENTARY GEOLOGY*
  Li, X., Lehrmann, D. J., Luczaj, J., Kelley, B. M., Cantrell, D. L., Yu, M., Ferrill, N., Payne, J. L.
  2022; 440
- **Quantitative evaluation of the roles of ocean chemistry and climate on ooid size across the Phanerozoic: Global versus local controls** *SEDIMENTOLOGY*
  Koeshidayatullah, A., Trower, E. J., Li, X., Mukerji, T., Lehrmann, D. J., Morsilli, M., Al-Ramadan, K., Payne, J. L.
  2022
- **Generating and testing hypotheses about the fossil record of insect herbivory with a theoretical ecospace** *REVIEW OF PALAEOBOTANY AND PALYNOLOGY*
  Schachat, S. R., Payne, J. L., Boyce, C., Labandeira, C. C.
  2022; 297
- **Duration and Intensity of End-Permian Marine Anoxia** *GEOCHEMISTRY GEOPHYSICS GEOSYSTEMS*
  Pimentel-Galvan, M., Lau, K. V., Maher, K., Mukerji, T., Lehrmann, D. J., Altiner, D., Payne, J. L.
  2022; 23 (1)
- **First record of shark microremains from the Lower Khartam Member, Khuff Formation: an Upper Permian origin of the genus Lissodus, or a new placement of the Permo/Triassic boundary in Saudi Arabia?** *STRATIGRAPHY*
  Babiker, J., Kaminski, M. A., Humphrey, J. D., Al-Ramadan, K., Payne, J. L., Alqubalee, A.
  2022; 19 (3): 179-186
- **Triassic Foraminifera from the Great Bank of Guizhou, Nanpanjiang Basin, south China: taxonomic account, biostratigraphy, and implications for recovery from end-Permian mass extinction** *JOURNAL OF PALEONTOLOGY*
  Altiner, D., Payne, J. L., Lehrmann, D. J., Ozkan-Altiner, S., Kelley, B. M., Summers, M. M., Yu, M.
  2021; 95: 1-53
- **A global ecological signal of extinction risk in terrestrial vertebrates.** *Conservation biology : the journal of the Society for Conservation Biology*
  Munstermann, M. J., Heim, N. A., McCauley, D. J., Payne, J. L., Upham, N. S., Wang, S. C., Knope, M. L.
  2021
- **Ecological Filtering and Exaptation in the Evolution of Marine Snakes** *AMERICAN NATURALIST*
  Gearty, W., Carrillo, E., Payne, J. L.
  2021
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