

# SHANE D. SCHOEPFER

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## EDUCATION:

### University of Washington

Doctor of Philosophy in Earth and Space Sciences  
Dissertation Title: *Nutrients, Productivity, and Redox Conditions during Greenhouse Extinctions in the Panthalassic Ocean*  
Advisor: Dr. Peter D. Ward

Seattle, WA  
August 2014

### Brown University

Bachelor of Arts in Geology-Biology - magna cum laude  
Master of Science in Geological Sciences  
Thesis Title: *Stable Isotopes of Inorganic Nitrogen Nutrients in Narragansett Bay*  
Advisor: Dr. Warren Prell

Providence, RI  
May 2009  
May 2009

## PROFESSIONAL EXPERIENCE:

### Assistant Professor, Western Carolina University

August 2017 - Present

### Postdoctoral Scholar, University of Calgary

Supervisor: Dr. Charles M. Henderson

December 2014-Present

### Field Camp Instructor

University of Washington  
University of Calgary  
Western Washington University

Summer 2015, 2016, 2017  
Summer 2015  
Summer 2014

### Contributor to the Sedimentary Geochemistry and Paleoenvironments Project

International effort to compile data from marine sediments, to better understand long-term changes in ocean chemistry.

### Guest Editor

The Palaeozoic-Mesozoic Transition in South China: Oceanic Environments and Life from the Late Permian to the Late Triassic, a two-part special issue of *Palaeogeography, Palaeoclimatology, Palaeoecology*

### Reviewer

*Geology*  
*AAPG Bulletin*  
*Palaeogeography, Palaeoclimatology, Palaeoecology*  
*Journal of Asian Earth Sciences*  
*Marine and Petroleum Geology*

<b>Teaching Assistant, University of Washington</b>	<b>2013-2014</b>
<i>Dinosaurs</i>	Winter 2014
<i>Physical Processes of the Earth</i>	Fall 2013
<i>Field Geology</i>	Summer 2013, 2014
<i>Invertebrate Paleontology</i>	Spring 2013
<i>Introduction to Geological Sciences</i>	Winter 2013

<b>Visiting Professor, Colorado College</b>	<b>Fall 2012</b>
<i>GY210: block II: The Rocky Mountains as a Physical System,</i>	
<i>GY210: block III: The Rocky Mountains as a Chemical System</i>	

<b>NSF GK12 Ocean and Coastal Interdisciplinary Science teaching fellow, Ingraham High School, Seattle, WA</b>	<b>2011-2012</b>
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<b>Tidal Estuaries Monitoring and Assessment Program</b>	<b>Summer 2008</b>
Based at the National Ocean Service's Hollings Marine Lab, Charleston SC	
Monitored anthropogenic nutrients and their impact on estuarine fauna throughout the southeast.	

**HONORS AND AWARDS:**

Peter Misch Fellowship	2013
Inquisitive Graduate Student Support Grant	2013
Exxon Mobil Graduate Student Support Grant	2013
Robert and Nadine Bassett Fund Student Support Grant	2012
Best Oral Presentation in Geobiology - <i>UW ESS Research Gala</i>	2012
Best Oral Presentation by a Graduate Student - <i>UW ESS Research Gala</i>	2010
Phi Beta Kappa	2009
NOAA Ernest F. Hollings Scholarship	2007
Eagle Scout	2005

**ONGOING RESEARCH PROJECTS:**

**Reconstructing Productivity in Paleomarine Systems**

- Compiling data from modern ocean sediment cores, to better quantify the relationship between the accumulation rate of proxies (such as organic carbon, phosphorus, and barium) and the primary productivity of phytoplankton in the overlying water column.

**High-Resolution Paleoenvironmental Studies in South China**

- Contributing geochemical analyses to a comprehensive study of the Penglaitan section (Guangxi), likely the highest resolution extant record of the latest Permian.
- Contributing to ongoing work on the Shangsi section (Sichuan), including a study of latest Permian redox conditions and the development of marine refugia in the Early Triassic.

**The Triassic-Jurassic extinction in the Panthalassic Basin**

- Applying paleoproductivity tools to the Kennecott Point section (British Columbia), to better understand how nitrogen limitation affected phytoplankton in the open ocean during the prolonged Mesozoic greenhouse period.
- Samples collected from the accreted Mino-Tamba terrane of Japan will allow for future comparative studies across the Panthalassic basin.

### **The Permian-Triassic extinction along coastal Western Pangaea**

- Conducting a series of linked outcrop and core studies of the Late Permian and Early Triassic ranging from southern Idaho to northeastern British Columbia.
- Focusing on proxies for nutrient cycling and productivity, to better understand changes in the intensity of coastal upwelling during latest-Permian global warming.

### **Cretaceous Paleoenvironments of the James Ross Basin, Antarctica**

- Using trace element geochemistry to reconstruct the depositional environment of the James Robb Basin during the latest Cretaceous, based on samples collected during two six-week cruises on the Antarctic research vessel *Laurence M. Gould* in 2010-2011.

## **PREVIOUS RESEARCH EXPERIENCE:**

### **Nautilus Conservation in the Indo-Pacific**

Winter 2012

- Participated in shipboard fieldwork on the Great Barrier Reef, recording video of the cephalopod genus *Nautilus* in its natural habitat.
- Video and catch numbers are being used to compare the population density of *Nautilus* in heavily fished vs. protected regions, to assist in conservation of these living fossils.

### **Devonian Reef Complexes of Western Australia**

Summer 2009, 2010

- Participated in ~3 months of fieldwork measuring sections and collecting samples from the Devonian reef system of the Canning Basin, for paleomagnetic, stable isotope, and trace element geochemical analysis.
- Worked with Chevron personnel to better understand sequence stratigraphy in carbonates and Late Devonian paleoecology.

### **Tracing Eutrophication in Narragansett Bay Using Stable Isotopes**

2008-2009

- Self-designed Master's research using dual-isotope methods to trace anthropogenic impacts on the nitrogen cycle in Narragansett Bay, Rhode Island.
- Collected samples from around the Bay over an annual cycle to better understand how seasonal ecology was impacted.

### **Landscape Evolution in Western Colorado**

Summer 2006

- Field-based geomorphological research on the age and origins of Unaweep Canyon.
- NSF Research Experience for Undergraduates grant through Mesa State College.
- Helped to organize and guide a Geological Society of America field trip in 2008.

**GRANT  
PROPOSALS:**

**Biostratigraphy and Geochemical characterization of Early Triassic Montney deposition-  
Funded by Progress Energy, December 2015**

- Proposal for complete biostratigraphic and geochemical study of a 400 m core of the Early Triassic Montney Formation in northeastern British Columbia.
- Proposal based on preliminary geochemical results generated at the University of Calgary using handheld XRF.
- Valued at \$120k of salary and in kind support.

**Application for GK12 Ocean and Coastal Interdisciplinary Science teaching fellowship  
Funded by NSF, Spring 2012**

- Program provided graduate student support to active researchers who were helping to teach marine science in Seattle area public schools.
- Worked with science teachers at Ingraham High School to develop activity in support of the Biology, Earth Science, and Marine Biology curricula.

**Collaborative Research: Productivity and Redox Conditions in the Panthalassic Ocean  
during the Triassic-Jurassic transition: Insights into greenhouse mass extinctions**

- Proposal for a comprehensive geochemical study of Triassic-Jurassic boundary sections deposited in the Panthalassic (proto-Pacific) Ocean.
- Submitted to NSF Sedimentary Geology and Paleobiology July 2011, redeveloped and resubmitted in January 2013.

**STUDENT  
MENTORING:**

**Chen Shen - Master's thesis project**

- Using a high-resolution geochemical dataset from the Montney Formation to understand the effects of Milankovitch cycles on marine environments in the Early Triassic.

**Amanda Godbold – Master's thesis project**

- Assembling a comprehensive paleoenvironmental study of an earliest Triassic 'refuge' from the Shangsi section in Sichuan, China. Amanda presented her results at the 2016 Geological Society of America annual meeting, and won an award for Best Student Presentation in Geobiology.

**Ranjot Brar - Senior thesis project**

- Collected biostratigraphic samples from the Phosphoria Formation of southern Idaho in the summer of 2015; we are now integrating conodont biostratigraphy with geochemistry in Late Permian rocks from Idaho, Alberta, and northeastern British Columbia.

**Galen Griggs - UW undergraduate laboratory assistant**

- Galen assisted with stable isotope measurements on samples from the Peck Creek section in northeastern British Columbia. Galen is now pursuing a Ph.D. at UC Davis.

**INSTRUMENTAL  
EXPERTISE:**

Extensive experience measuring organic C and N isotopes using a continuous flow Elemental Analyzer-Isotope Ratio Mass Spectrometer (EA-IRMS).

Extensive experience measuring C and O isotopes in carbonates using a Kiel III autosampler and dual inlet Isotope Ratio Mass Spectrometer (IRMS).

Experience preparing samples for mineral and chemical composition measurements using X-ray fluorescence (XRF), X-ray diffraction (XRD), and Inductively Coupled Plasma Atomic Absorption Spectroscopy (ICP-AES).

Experienced with thin section petrography and use of JEOL 773 electron microprobe.

Certified in safe use of handheld XRF (HH-XRF) for rapid trace element measurements.

**PUBLIC TALKS:**

Nanjing Institute of Geology and Paleontology, Jiangsu, China	2016
University of Calgary, Calgary, AB	2016
Arkansas Tech University, Russellville, AR	2015
UW Earth and Space Sciences Research Gala, Seattle WA	2014
Colorado College, Colorado Springs, CO	2012
UW Earth and Space Sciences Research Gala, Seattle WA	2012
UW Program on Climate Change, Graduate Climate Seminar, Seattle, WA	2011
UW Earth and Space Sciences Research Gala, Seattle WA	2010

## PUBLICATIONS:

### *In Review:*

Shu-zhong Shen, Jahandar Ramezani, Chang-qun Cao, Jun Chen, Douglas H. Erwin, Lei Xiang, Hua Zhang, **Shane D. Schoepfer**, Charles M. Henderson, Quan-feng Zheng, Samuel A. Bowring, Yue Wang, Xiang-dong Wang, Dong-xun Yuan, Yi-chun Zhang, Lin Mu, Jun Wang, Ya-sheng Wu. 2016. A sudden end-Permian mass extinction in South China. *Geological Society of America Bulletin*.

### *Published:*

**Shane D. Schoepfer**, Thomas S. Tobin, James D. Witts, Robert J. Newton. 2017. Intermittent euxinia in the high-latitude James Ross Basin during the latest Cretaceous and earliest Paleocene. *Palaeogeography, Palaeoclimatology, Palaeoecology*. **In Press.**

Amanda L. Godbold, **Shane D. Schoepfer**, Charles M. Henderson. 2017. Precarious Ephemeral Refugia during the Earliest Triassic. *Geology*. **In Press.**

Lei Xiang, **Shane D. Schoepfer**, Shu-zhong Shen, Chang-qun Cao, Hua Zhang. 2016. Evolution of oceanic uranium and molybdenum reservoir size around the Ediacaran-Cambrian transition at western Zhejiang, South China. *Earth and Planetary Science Letters*. **In Press.**

Guijie Zhang, Xiaolin Zhang, Dongping Hu, Dandan Li, Thomas J. Algeo, James Farquhar, Charles M Henderson, Liping Qin, Megan Shen, Danielle Shen, **Shane Schoepfer**, Kefan Chen, Yanan Shen. 2016. Redox chemistry changes in the Panthalassic Ocean linked to the end-Permian mass extinction and delayed Early Triassic biotic recovery. *Proceedings of the National Academy of Sciences*. **In Press.**

Hanlie Hong, Qian Fang, Lulu Zhao, **Shane Schoepfer**, Chaowen Wang, Nina Gong, Zhaohui Li, Zhong-Qiang Chen. 2016. Weathering and alteration of volcanic ashes in various depositional settings during the Permian-Triassic transition in South China: Mineralogical, elemental, and isotopic approaches. *Palaeogeography, Palaeoclimatology, Palaeoecology*. **In Press.**

**Shane D. Schoepfer**, Thomas J. Algeo, Peter D. Ward, Kenneth H. Williford, James W. Haggart. 2016. Testing the limits in a greenhouse ocean: Did low nitrogen availability limit marine productivity during the end-Triassic mass extinction? *Earth and Planetary Science Letters*, Volume 451, Pages 138-148.

Lei Xiang, **Shane D. Schoepfer**, Hua Zhang, Dong-xun Yuan, Chang-qun Cao, Quan-feng Zheng, Charles M. Henderson, Shu-zhong Shen. 2015. Oceanic redox evolution across the end-Permian mass extinction at Shangsi, South China. *Palaeogeography, Palaeoclimatology, Palaeoecology*, Volume 448, Pages 59-71.

Eva E. Stüeken, Julien Foriel, Roger Buick, **Shane D Schoepfer**, 2015. Selenium isotope ratios, redox changes and biological productivity across the end-Permian mass extinction. *Chemical Geology*, Volume 410, Pages 28-39.

Alex H. Kasprak, Julio Sepúlveda, Rosalyn Price-Waldman, Kenneth H. Williford, **Shane D. Schoepfer**, James W. Haggart, Peter D. Ward, Roger E. Summons, Jessica H. Whiteside, 2015. Episodic photic zone euxinia in the northeastern Panthalassic Ocean during the end-Triassic extinction. *Geology*, Volume 43, Pages 307-310.

**Shane D. Schoepfer**, Jun Shen, Hengye Wei, Richard V. Tyson, Ellery Ingall, Thomas J. Algeo. 2015. Total organic carbon, organic phosphorus, and biogenic barium fluxes as proxies for paleomarine productivity. *Earth Science Reviews*, Volume 49, Pages 23-52.

Hengye Wei, Jun Shen, **Shane D. Schoepfer**, Leo Krystyn, Sylvain Richoz, and Thomas J. Algeo, 2015. Environmental controls on marine ecosystem recovery following mass extinctions, with an example from the Early Triassic. *Earth Science Reviews*, Volume 49, Pages 108-135.

Jun Shen, **Shane D. Schoepfer**, Qinglai Feng, Lian Zhou, Jianxin Yu, Huyue Song, Hengye Wei, and Thomas J. Algeo, 2015. Marine productivity changes during the Permian-Triassic boundary crisis and Early Triassic recovery. *Earth Science Reviews*, Volume 49, Pages 136-162.

Gregory J. Barord, Fredrick Dooley, Andrew Dunstan, Anthony Ilano, Karen N. Keister, Heike Neumeister, Thomas Preuss, **Shane Schoepfer**, Peter D. Ward. 2014. Comparative Population Assessments of *Nautilus* sp. in the Philippines, Australia, Fiji, and American Samoa Using Baited Remote Underwater Video Systems. *PLoS ONE* 9(6): e100799.

**Shane D. Schoepfer**, Charles M. Henderson, Geoffrey H. Garrison, Julien Foriel, Peter D. Ward, David Selby, James C. Hower, Thomas J. Algeo, Yanan Shen. 2013. Termination of a continent-margin upwelling system at the Permian–Triassic boundary (Opal Creek, Alberta, Canada). *Global and Planetary Change*, Volume 105, Pages 21-35.

**Shane D. Schoepfer**, Charles M. Henderson, Geoffrey H. Garrison, Peter D. Ward. 2012. Cessation of a productive coastal upwelling system in the Panthalassic Ocean at the Permian–Triassic Boundary. *Palaeogeography, Palaeoclimatology, Palaeoecology*, Volumes 313–314, Pages 181-188.

Patrick A. Flight, **Shane D. Schoepfer**, David M. Rand. 2010. Physiological stress and the fitness effects of *Mpi* genotypes in the acorn barnacle *Semibalanus balanoides*. *Marine Ecology Progress Series* Volume 404, Pages 139-149.

Andres Aslan, Karl Karlstrom, William C. Hood, Rex D. Cole, Thomas W. Oesleby, Charles Betton, M. Magdalena Sandoval, Andy Darling, Sam Kelley, Adam Hudson, Bryan Kaproth, **Shane Schoepfer**, Mary Benage, Rachel Landman. 2008. River incision histories of the Black Canyon of The Gunnison and Unaweep Canyon: Interplay between late Cenozoic tectonism, climate change, and drainage integration in the western Rocky Mountains, in Reynolds, R.G., ed., *Roaming the Rocky Mountains and Environs: Geological Field Trips: Geological Society of America Field Guide 10*, Pages 175–202.

**CONFERENCE  
PRESENTATIONS:**

*Porcupine Creek – a Permian-Triassic Boundary Section from the Enigmatic Cache Creek Terrane, British Columbia*

**Oral Presentation:** Geological Society of America 2016 Annual Meeting – Denver

*Open Ocean Nitrogen Limitation Preceded the End-Triassic Mass Extinction: Evidence from Haida Gwaii, British Columbia*

**Oral Presentation:** Geological Society of America 2015 Annual Meeting – Baltimore

*Marine Environmental Responses to Volcanism in the latest Changhsingian: Evidence from Penglaitan, Guangxi*

**Oral Presentation:** Geological Society of America 2014 Annual Meeting – Vancouver

*Nitrogen Limitation and Productivity in the Permian-Triassic Greenhouse Ocean*

**Poster Presentation:** American Geophysical Union 2014 Fall Meeting – San Francisco

*Gradients in Nutrient Distribution and Productivity in Northeast Panthalassa across the PTB*

**Oral Presentation:** Geological Society of America 2012 Annual Meeting – Charlotte

*Extreme Nitrogen Limitation Corresponds with Marine Extinctions During the Triassic-Jurassic Transition*

**Oral Presentation:** Geological Society of America 2011 Annual Meeting - Minneapolis

*Increasing Nitrogen Limitation at the P/Tr Boundary: A Pan-Oceanic Phenomenon?*

**Oral Presentation:** Geological Society of America 2011 Annual Meeting – Minneapolis

*Termination of a Productive Upwelling System in Eastern Panthalassa at the P/T Boundary: Evidence from Opal Creek, AB*

**Oral Presentation:** Geological Society of America 2010 Annual Meeting - Denver

*Examination of Gunnison River influences on Cactus Park Lake Beds using Heavy Mineral and Geochemical Analyses*

**Poster Presentation:** American Geophysical Union 2008 Fall Meeting – San Francisco

*Quaternary Abandonment and Sedimentary Fill History of Cactus Park and Unaweep Canyon, Uncompahgre Plateau, Colorado*

**Poster Presentation:** Geological Society of America 2007 Annual Meeting – Philadelphia