

Frank L. Forcino

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PROFESSIONAL EXPERIENCE

- 2014 – Present **Assistant Professor**, Geosciences and Natural Resources, Western Carolina University
- 2016 – Present **Science Education Program Coordinator**, Western Carolina University
- 2013 – 2014 **Postdoctoral Researcher**, Geocognition Research Lab and the BEACON Center for the Study of Evolution in Action, Michigan State University

EDUCATION

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| Ph.D. Earth and Atmospheric Sciences | 2013 | University of Alberta |
| M.S. Geological Sciences | 2009 | San Diego State University |
| B.S.Ed. Earth and Space Science | 2007 | West Chester University of Pennsylvania |

UNIVERSITY TEACHING EXPERIENCE

- Professor*
- Science Methods of Grades K-6, Kingston, Jamaica (F19)
 - Supervised Student Teaching, WCU (F16, S17, F17, S18, F18, S19, F19)
 - Historical Geology, WCU (F14, F15, F16, F17, F18, F19)
 - Introduction to Science Education, WCU (F16, F17, F18, F19)
 - Secondary Science Education Methods, WCU (F16, F17, F18, F19)
 - Sedimentology and Stratigraphy, WCU (S15, S17, S19)
 - Education Research Methods, WCU (S18)
 - Advanced Secondary Science Education Methods, WCU (F17)
 - Semester Field Trip Course to KY, WCU (F15, S18)
 - Science & Inquiry, WCU (S18)
 - Paleoecology, WCU (S16)
- Co-Instructor*
- Ecological Training in R, U of A (S13)
- Lab Instructor*
- Introduction to Paleontology, U of A (S10, S11, S12)
 - Advanced Sedimentology, U of A (F09, F10, F11)
 - The Oceans, SDSU (S08, F09, S09)
- Guest Instructor*
- Introductory Paleontology (S11, S12, S13)
- Student Teacher*
- Earth and Space Science, West Chester Henderson High School (2006 – 2007)
- Band Instructor*
- Marching Band, Upper Dublin High School (2002 – 2004)

INVITED TALKS

- 2019 Hillel Academy, Kingston, Jamaica, *Teaching Science Through Inquiry*
- 2019 UNC Chapel Hill, *The general public's understanding of geology compared with belief in pseudoscientific abilities of gemstones and crystals*
- 2019 University of Utah, *The general public's understanding of geology compared with belief in pseudoscientific abilities of gemstones and crystals*
- 2019 WCU's Global Spotlight Series: Welcome to the Anthropocene, *How we got here: A brief history of the past one billion years*
- 2017 WCU Darwin Day Celebration, *Comparing the evolution understanding of biology majors to geology majors and the general public*
- 2016 The Village Nature Series hosted by the Cashiers-Highlands Land Trust, *If Rocks Could Talk*
- 2016 University of North Carolina Wilmington, *Sample Size Requirements for Paleoecological Research*
- 2014 University of Tennessee, Chattanooga, *Sample Size Requirements for Paleoecological Research*

PEER-REVIEWED PUBLICATIONS

Forcino, F.L., Hurdling-Jones, H.J., and Stafford, E.S. (2019) Spatial Variation in Predation in the Pinecrest Beds, Florida. *Eastern Paleontologist* 4:1-15.

Forcino, F.L., Stafford, E.S. and Tetreault, R.L. (2019) Brachiopod morphology, life mode, and crushing predation in the Ordovician Arnheim Formation, Kentucky, USA. *Historical Biology*, 31:914-925.

Forcino, F.L., and Stafford, E.S. (submitted, in revisions) The influence of collection method on paleoecological datasets: in-place versus surface collected fossil samples in the Pennsylvanian Finis Shale. *PLOS ONE*.

Leighton, L.R., Schneider, C.L., **Forcino, F.L.**, and Molinaro, D.J. (submitted, in review) Competition affects marine invertebrate global diversity and niche saturation through time. *Proceedings of the Royal Society B*.

Salter, R.L., **Forcino, F.L.**, and Momsen, J.L. (in preparation for resubmission) Evolution understanding in high school biology and non-majors historical geology. *Journal of Geoscience Education*.

Salter, R.L., Linton, W.S., and **Forcino, F.L.**, (in preparation for initial submission) How metaphors and analogies for plant processes affect the general public's likelihood to personify plants and understand climate change. *The American Biology Teacher*.

Mendonca, S., Barclay, K.M., Schneider, C.L., Molinaro, D.J., Webb, A.E., **Forcino, F.L.**, and Leighton, L.R. (2018) Analyzing trends in tropical Devonian brachiopod communities during environmental change in the Waterways Formation of northern Alberta. *Palaeogeography, Palaeoclimatology, Palaeoecology* 506:84-100.

Forcino, F.L., Leighton, L.R., Twerdy, P., and Cahill, J.F. (2015) Reexamining sample size requirements for multivariate, abundance-based community research: when resources are limited, the research does not have to be. *PLOS ONE*, DOI:10.1371/journal.pone.0128379.

Forcino, F.L., Ritterbush, K. and Stafford, E.S. (2015) Evaluating the effectiveness of the Mantel test and Procrustes Randomization test for exploratory ecological similarity among paleocommunities. *Palaeogeography, Palaeoclimatology, Palaeoecology* 426:199-208.

Mead, L.S., Clarke, J.B. **Forcino, F.L.**, and Graves Jr., J.L. (2015) Factors influencing minority student decisions to consider a career in evolutionary biology. *Evolution: Education and Outreach* 8:6, DOI 10.1186/s12052-015-0034-7.

Forcino, F.L. (2013) The importance of a laboratory section on student learning outcomes in a university introductory earth science course. *Journal of Geoscience Education* 61:213-221.

Forcino, F.L., Barclay, K., Schneider, C.L., Linge-Johnsen, S. and Leighton, L.R. (2013) Comparison of the multivariate paleocommunity results from different categorizations of two fossil datasets from carbonate units. *Palaeogeography, Palaeoclimatology, Palaeoecology* 386:479-491.

Forcino, F.L. (2012) Multivariate assessment of the required sample size for paleocommunity research. *Palaeogeography, Palaeoclimatology, Palaeoecology* 315:134-141.

Forcino, F.L., Richards, E.J, Leighton, L.R., Chojnacki, N. and Stafford, E.S. (2012) The sensitivity of paleocommunity sampling strategy at different spatiotemporal scales. *Palaeogeography, Palaeoclimatology, Palaeoecology* 313:246-253.

Forcino, F.L., Stafford, E.S. and Leighton, L.R. (2012) Perception of paleocommunities at different taxonomic levels: how low must you go? *Palaeogeography, Palaeoclimatology, Palaeoecology* 365:48-56.

Forcino, F.L., Stafford, E.S., Warner, J.J., Webb, A.E., Leighton, L.R., Schneider, C.L., Michlin, T.S., Palazzolo, L.M., Morrow, J.R. and Schellenberg, S.A. (2010) Effects of data categorizations on paleocommunity analysis: a case study from the Pennsylvanian Finis Shale of Texas. *PALAIOS* 25:144-157.

PROFESSIONAL CONFERENCE ABSTRACTS (* = undergraduate student author)

*Cothren, H.R., **Forcino, F.L.**, Stafford, E.S. and Schoepfer, S.D. (2019) Major and trace elemental analysis of Late Pennsylvanian Midland Basin shale members from Texas: Geological Society of America Abstracts with Programs: v. 51.

*Llyod, A., *Recchuiti, M., Stafford, E.S. and **Forcino, F.L.** (2019) The influence of sample size on the perception of fossil community differences between in-place and surface collected samples: Geological Society of America Abstracts with Programs: v. 51.

*Selles, C., **Forcino, F.L.** and Leighton, L.R. (2019) Survival of the sharpest: Community trends in ornamentation as a proxy for predation in Devonian strophomenate brachiopods: NAPC 2019 Program & Abstracts.

Stafford, E.S. and **Forcino, F.L.** (2019) Meta-analysis of field-based fossil collection methods: Geological Society of America Abstracts with Programs: v. 51.

*Hurding-Jones, H. and **Forcino, F.L.** (2018) The public's understanding of geology compared to belief in pseudoscientific properties of gems and crystals: Geological Society of America Abstracts with Programs: v. 50.

*Linton, W. and **Forcino, F.L.** (2018) How language affects student understanding of climate change in relation to plant processes: Geological Society of America Abstracts with Programs: v. 50.

Forcino, F.L. and Stafford, E.S. (2017) Comparing community composition between in-place and surface-collected samples: Geological Society of America Abstracts with Programs: v. 49.

Forcino, F.L. and Salter, R.L. (2017) Are Open Ended Questions Worth the Extra Time? A Comparison of Open Ended, Multiple Choice, and Likert Scale Items for Assessing the General Public's Understanding of Evolution: Geological Society of America Abstracts with Programs: v. 49.

*Howard, R., **Forcino, F.L.** and Stafford, E.S. (2017) Predation repair frequency in brachiopods of the Ordovician Corryville Member, Grant Lake Formation, Kentucky: Geological Society of America Abstracts with Programs: v. 49.

*Hurding-Jones, H., **Forcino, F.L.** and Stafford, E.S. (2017) Does spatial heterogeneity affect predation within the Pinecrest Beds, Tamiami Formation, Florida?: Geological Society of America Abstracts with Programs: v. 49.

*Pedigo, R., *Hurding-Jones, H., Stafford, E.S. and **Forcino, F.L.** (2017) Variations of community dynamics between size categories in the Tamiami Formation, Florida: Geological Society of America Abstracts with Programs: v. 49.

Stafford, E.S., *Montoya, L.M., and **Forcino, F.L.** (2017) Comparisons of community and predation between large and small gastropods in the Miocene St. Mary's Formation, Maryland: Geological Society of America Abstracts with Programs: v. 49.

Forcino, F.L. (2016) Why don't we teach evolution in geology class?: Comparing the evolution understanding of biology majors to geology majors and the general public : Geological Society of America Abstracts with Programs: v. 48.

*Howard, R., **Forcino, F.L.** and Stafford, E.S. (2016) Predation Repair Frequency in Brachiopods of the Ordovician Kope Formation in Kentucky: Geological Society of America Abstracts with Programs: v. 48.

*Hurding-Jones, H., *Beldon, M., *Montoya, L.M., **Forcino, F.L.** and Stafford, E.S. (2016) Predation and community dynamics in the Pinecrest Beds, Tamiami Formation, Florida: Geological Society of America Abstracts with Programs: v. 48.

Salter, R.L. and **Forcino, F.L.** (2016) Understanding Evolution: Variation between high school and college students: Geological Society of America Abstracts with Programs: v. 48.

Stafford, E.S. and **Forcino, F.L.** (2016) Experimental abiotic shell fragmentation in *Mercenaria Mercenaria* Geological Society of America Abstracts with Programs: v. 48.

*Brazelton, J.D., **Forcino, F.L.** and Stafford, E.S. (2015) Investigation of damage patterns induced by crushing on bivalve shells: Geological Society of America Abstracts with Programs: v. 47, p. 348.

*Douglas, M.L. and **Forcino, F.L.** (2015) Evidence of poor evolution education among southern university students: Geological Society of America Abstracts with Programs: v. 47, p. 70.

Forcino, F.L. (2015) Falling behind in the south: comparing evolution understanding of the southeast to the rest of the USA: Geological Society of America Abstracts with Programs: v. 47, p. 70.

Forcino, F.L., Stafford, E.S. and Leighton, L.R. (2015) A comparison of brachiopod attachment strategies through the Paleozoic: Geological Society of America Abstracts with Programs: v. 47, p. 428.

*Mendonca, S.E., Webb, A.E., Barclay, K.M., Rocca, A.N., Molinaro, D.J., Schneider, C.L., **Forcino, F.L.** and Leighton, L.R. (2015) Waterways Formation: analyzing trends in tropical Devonian brachiopod communities through environmental change: Geological Society of America Abstracts with Programs: v. 47, p. 427.

*Montoya, L.M., **Forcino, F.L.** and Stafford, E.S. (2015) Lateral variation of drillhole frequency within the Miocene St. Mary's Formation, Maryland: Geological Society of America Abstracts with Programs: v. 47, p. 80.

*Montoya, L.M., **Forcino, F.L.** and Stafford, E.S. (2015) Temporal and spatial variation of drillhole frequency within the Miocene St. Mary's Formation, Maryland: Geological Society of America Abstracts with Programs: v. 47, p. 427.

*Salter, R.L. and **Forcino, F.L.** (2015) Comparing the public's understanding of evolution in the south to the rest of the United States using open response items: Geological Society of America Abstracts with Programs: v. 47, p. 70.

*Salter, R.L. and **Forcino, F.L.** (2015) Hitting below the belt: Differences in evolution understanding in southeastern vs. non-southeastern states. SABER National Meeting Abstract #33.

*Salter, R.L. and **Forcino, F.L.** (2015) The great divide: Effect of instructional practice on evolution understanding in high school and college: Geological Society of America Abstracts with Programs: v. 47, p. 618.

Stafford, E.S. and **Forcino, F.L.** (2015) Abiotic damage on gastropod shells and implications for predation research: Geological Society of America Abstracts with Programs: v. 47, p. 79.

Forcino, F.L. and Libarkin, J. (2013) Not saying "evolution" may be the key to teaching evolution: Geological Society of America Abstracts with Programs: v. 45, p. 284.

Forcino, F.L. (2012) The importance of a laboratory section on student learning outcomes in a university introductory Earth Science course: Geological Society of America Abstracts with Programs: v. 44, p. 100.

Forcino, F.L. and Leighton, L.R. (2012) What do all these numbers mean? Multivariate goodness-of-fit threshold for community similarity: Geological Society of America Abstracts with Programs: v. 44, p. 625.

Schneider, C.L., **Forcino, F.L.**, Barclay, K. and Leighton, L.R. (2012) Significance of paleocommunity analysis for interpreting the ecology and geology of the Devonian Waterways Formation, northeastern Alberta, Canada: Geological Society of America Abstracts with Programs: v. 44, p. 625.

Forcino, F.L. and Leighton, L.R. (2012) Sample size requirements for detecting change in abundance-based taxonomic composition: Ecological Society of America Abstracts, COS 145-3, p. 148.

Forcino, F.L. (2011) Multivariate assessment of the minimum required sample size for community paleoecological research: Geological Society of America Abstracts with Programs, v. 43, p. 501.

Leighton, L.R., Schneider, C.L., Stafford, E.S., Molinaro, D.J. and **Forcino, F.L.** (2011) The role of competition and life-mode on global biodiversity through time: Geological Society of America Abstracts with Programs, v. 43, p. 541.

Forcino, F.L. and Leighton, L.R. (2010) Determining the most robust method of measuring disaggregated fossil material: the colonial conundrum: Geological Society of America Abstracts with Programs, v. 42, p. 255.

Forcino, F.L. and Leighton, L.R. (2010) Determining the smallest sample size needed for paleocommunity research: A case study from the Finis Shale of Texas: Geological Society of America Abstracts with Programs, v. 42, p. 72.

Forcino, F.L., Richards, E.J., Chojnacki, N., Stafford, E.S. and Leighton, L.R. (2010) Spatial variation of late Pennsylvanian paleocommunities: ecological and sampling implications: Geological Society of America Abstracts with Programs, v. 42, p. 27.

Stafford, E.S., Tyler, C.L., Leighton, L.R. and **Forcino, F.L.** (2010) Repair Frequency and Predation Risk in Intertidal Gastropod Populations: Geological Society of America Abstracts with Programs, v. 42, p. 322.

Forcino, F.L., Schellenberg, S.A., Deutschman, D.H., Ford, H.L., Dyck, K.A. and Koch, P.L. (2009) Confounding effects on determining temperature from the intraskeletal chemical variations of *Mytilus californianus*: Geological Society of America Abstracts with Programs, v. 41, p. 401.

Forcino, F.L., Stafford, E.S., Warner, J.J., Michlin, T.S., Palazzolo, L.M., Webb, A.E., Leighton, L.R., Schneider, C.L., Morrow, J. R. and Schellenberg, S.A. (2008) Effects of different data types on paleocommunity analyses: A case study from the Finis Shale (Pennsylvanian) of Texas: Geological Society of America Abstracts with Programs, v. 40, p. 539.

ADDITIONAL PULCIATIONS

Schneider, C.L., Grobe, M., Leighton, L.R., Hein, F.J., and **Forcino, F.L.** (2014) Outcrops of the Lower Waterways Formation (Firebag and Calumet Members) on the Clearwater, Athabasca, and Firebag Rivers, Alberta (NTS 74D, E): Energy Resources Conservation Board/Alberta Geological Survey Open File Report, 50 pp.
http://www.ags.gov.ab.ca/publications/abstracts/OFR_2014_08.html

Forcino, F.L. and Leighton, L.R. (2012) The lazy paleontologist: Evidence for doing less and getting the same meaningful result: University of Alberta Earth & Atmospheric Sciences Graduate Student Association ATLAS Symposium.

Forcino, F.L., Luth, R.W. and Leighton, L.R. (2012) The importance of assessing student knowledge gains and retention at incremental stages of an earth science curriculum: Centre for Teaching and Learning Annual Report.

Forcino, F.L. (2011) Getting more from less: evidence that multivariate analyses require smaller sample sizes: University of Alberta Earth & Atmospheric Sciences Graduate Student Association ATLAS Symposium.

Forcino, F.L. (2011) Science or fiction: an anticipatory set for undergraduate science classes: University of Alberta Festival of Teaching.

Pierce, B.C., Morrow, J.R., Schellenberg, S.A., Leighton, L.R., **Forcino, F.L.** and Schneider, C.L. (2011) Assessing the allogenic and autogenic controls on cyclothem deposition of an epeiric shelf: A case study from the Upper Pennsylvanian Finis Shale of Texas: Masters Thesis, San Diego State University, Geological Sciences Department.

Forcino, F.L., Schellenberg, S.A., Deutschman, D.H., Ford, H.L., Dyck, K.A. and Koch, P.L. (2009) Confounding effects on determining temperature from the intraskeletal chemical variations of *Mytilus californianus*: Masters Thesis, San Diego State University, Geological Sciences Department.

CHAired SESSIONS

- 2017 **Methods for Assessing Knowledge and Understanding among K–16 Students and the General Public:** Geological Society of America Annual Meeting, Southeastern Section. *Southeast National Association of Geoscience Teachers Sponsored and Paleontology Society Sponsored Session.*
- 2016 **Evolution and Geoscience Education:** Geological Society of America Annual Meeting, Southeastern Section. *Southeast National Association of Geoscience Teachers Sponsored and Paleontology Society Sponsored Session.*
- 2015 **Paleontology:** Geological Society of America Annual Meeting, Southeastern Section.
- 2012 **Topics in Paleoecology:** Predation/Biotic Interactions, Fidelity/Taphonomy, and Community Ecology/Whole Organism Paleoecology: Geological Society of America Annual Meeting.

PEER REVIEWER

- 2017 PALAIOS
- 2016 *Special Topics in Paleobiology: Conservation Paleobiology*
- 2015 Paleobiology
- 2015 – 2016 Palaeogeography, Palaeoclimatology, Palaeoecology

SENIOR THESIS ADVISEES

- 2019-20 Erin “Micki” Recchuiti, Paleoecology of the late Pennsylvanian of north Texas
- 2018 Richardson Pedigo
- 2018 Holly Hurding-Jones, Predation and community dynamics in the Pinecrest Beds, Tamiami Formation, Florida
- 2016 Morgan Douglas, Paleoclimate Record for Ocala National Forest
- 2016 Rainee Howard, Repair Frequency in Ordovician Brachiopods of northern Kentucky

PROFESSIONAL SERVICE

- 2019 – Present National Association of Geoscience Teachers State Representation for North Carolina
- 2016 – 2019 **President** of the SE National Association of Geoscience Teachers

PROFESSIONAL ACTIVITIES

- 2017 Evaluator – Western Regional Science and Engineering Fair, Cullowhee, NC
Public Outreach – Smokey Mountain HS Science Night, Sylva, NC
- 2016 Evaluator – Western Regional Science and Engineering Fair, Cullowhee, NC
Public Outreach – School District Science Olympiad guest instructor, Smokey Mountain High School, Sylva, NC
Public Outreach – CVS NC Science Night, Cullowhee Valley School, Cullowhee, NC
Public Outreach – Fossil and Rock Presentation and Discussion, Shining Rock Classical Academy, Waynesville, NC
- 2015 Public Outreach – Rocket to Creativity, WCU Summer Program
Evaluator – Western Regional Science and Engineering Fair, Cullowhee, NC
Public Outreach – School District Science Olympiad guest instructor, Fairview School, Sylva, NC
- 2013 Evaluator – Mid-Michigan Symposium for Undergraduate Research, East Lansing, MI
- 2010 Public Outreach – Fossil Presentation for Daly Grove Elementary School, Edmonton, AB, Canada
- 2009 Public Outreach – University of Alberta Paleontology Museum Invertebrate Fossil Collection, Museum Friends and Volunteers
Public Outreach – Fossil Presentation for Daly Grove Elementary School, Edmonton, AB, Canada
- 2006 Tutor – West Chester Area School District Science Olympiad students
- 2005 Tutor – West Chester Area School District Science Olympiad students

UNIVERSITY, COLLEGE, AND DEPARTMENT SERVICE

Teacher Recruitment Taskforce/Committee, 2019—present
EdTPA Commission, 2019—present
Visiting Assistant Professor of Geology Search Committee, 2019 (*Co-chair)
CAEP Accreditation Steering Committee, 2017—present
Professional Education Council, 2016—present
Science Education Committee, 2015—present (*Chair)
College of Education and Allied Professionals Associate Dean Search Committee, 2017—2018
College of Arts and Sciences Curriculum Committee, 2016
Geochemistry position search committee 2016—2017
Geology Program Recruitment and Assessment Committee, 2015—2016
Geology Student Affairs Committee, 2016—2018
Annual Open House Recruitment, 2015—present

GRANTS

2016 **Provost's Internal Funding Support Grant**, Western Carolina University (\$10,000)
2011 **Centre for Teaching and Learning Research Fellowship**, University of Alberta (\$20,000)
Geological Society of America Student Research Grant (\$1,000)
Circumpolar/Boreal Alberta Research Grant Award (\$2,000)
2010 **Paleontological Society Student Research Grant**, G. Arthur Cooper Award (\$800)
2008 **Sigma Xi Grants in Aid**, (\$1,000)

AWARDS

2019 **Outstanding Academic Supervisor**, College of Education and Allied Professions, Western Carolina University
2017 *Nominee*: **Innovative Scholarship Award**, Western Carolina University
2012 **Dissertation Fellow**, University of Alberta
2012 **Andrew Stewart Memorial Graduate Prize**, University of Alberta
2011 **Mary Louise Imrie Graduate Student Award**, University of Alberta
2010 **Provost Doctoral Entrance Award**, University of Alberta
2009 **Provost Doctoral Entrance Award**, University of Alberta
2006 **Herbert-Beller Scholarship Award for Academic Excellence**, West Chester University of Pennsylvania

PROFESSIONAL SOCIETIES

Geological Society of America
National Association of Geoscience Teachers
Paleontological Society
Ecological Society of America

PROFESSIONAL DEVELOPMENT

College Student Cognition, MSU (2013)
Design an Effective Field Experience, Geological Society of America Annual Meeting Short Course (2012)
Teaching Big, U of A Centre for Teaching and Learning Symposium (2012)
National Evolutionary Synthesis Center, Catalysis Meeting, K-12 Evolution Education and the Underrepresented (2013)
Paleobiology Database Intensive Workshop, Macquarie University, Sydney, Australia (2011)