

CU Museum of Natural History  
Department of Geological Sciences  
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### Position

Assistant Professor, Department of Geological Sciences, University of Colorado, Boulder.  
Curator of Invertebrate Paleontology, CU Museum, University of Colorado, Boulder.

### Education

Ph.D. Department of Geophysical Sciences, 2006 University of Chicago, Chicago, IL, USA

B.A. College of Creative Studies (Biology), June 2000 University of California, Santa Barbara, CA, USA

### Professional Experience

**2017** – Assistant Professor, Department of Geological Sciences, University of Colorado, Boulder.

**2017** – Curator of Invertebrate Paleontology, CU Museum, University of Colorado, Boulder.

**2015 - 2016** Springer Fellow, Department of Paleobiology, National Museum of Natural History, Smithsonian Institution

**2012-2015** Abbott Fellow, Department of Paleobiology, National Museum of Natural History, Smithsonian Institution.

**2012** Visiting Scholar, Cooperation and Evolution of Multicellularity program. Kavli Institute for Theoretical Physics.

**2011** Visiting Scholar Fellowship, National Evolutionary Synthesis Center.

**2008-2012** Postdoctoral Researcher, Museum für Naturkunde, Leibniz Institute for Evolution and Biodiversity at the Humbolt University, Berlin.

**2006-2008** Research Associate, Department of Biology, Duke University.

**2004** Research assistant for John Alroy, the Paleobiology Database, National Center for Ecological Analysis and Synthesis.

**2001** Santa Fe Institute Complex Systems Summer School; Budapest, Hungary.

**2001** Comparative Invertebrate Embryology. Friday Harbor Marine Laboratories.

### Publications

35. **Simpson, C.** in prep. Is there a large-scale trend in the maximization of energy? Invited for *Paleobiology*
34. **Simpson, C.**, in Review. Complex multicellularity as an evolutionary response to viscous Snowball Earth Oceans, *American Naturalist*

33. Hiebert, L., **Simpson, C.**, Tiozzo, S., in review, Coloniality, clonality, and modularity in animals: the elephant in the room. *Journal of Experimental Zoology-B*
32. **Simpson, C.**, in Revision, An ecological driver for the macroevolution of modular polymorphism within colonial invertebrates. *Journal of Experimental Zoology-B*
31. **Simpson, C.**, A. Herrera-Cubilla, J. B. C. Jackson, 2020, How colonial animals evolve. *Science Advances* 6(2), eaaw9530. doi:10.1126/sciadv.aaw9530
30. **Simpson, C.** 2018. Serving up light. *Current Biology* 28(16), R873-R875.
29. Hopkins, M. J., D. W. Bapst, **C. Simpson**, R. C. M. Warnock, 2018. The inseparability of sampling and time and its influence on attempts to unify the molecular and fossil records. *Paleobiology*, 44(4), 561-574. doi:10.1017/pab.2018.27
28. **Simpson, C.**, J.B.C Jackson, and A Herrera-Cubilla. 2017. Evolutionary determinants of morphological polymorphism in colonial animals. *American Naturalist*. 190(1):17-28. Preprint at *bioRxiv*. <http://dx.doi.org/10.1101/046409>
27. **Simpson, C.** 2017. The measurement of species selection on evolving characters. *bioRxiv*. <http://doi.org/10.1101/176438>
26. **Simpson, C.** 2017. The case for species selection. *bioRxiv*. <http://dx.doi.org/10.1101/084046>
25. **Simpson, C.** 2016. Understanding macroevolution through the origin of higher taxa. *Ecology*, 97: 3246-3248. doi:10.1002/ecy.1550
24. Soreghan, G.S., N.G. Heavens, L.A. Hinnov, S.M. Aciego, and **C. Simpson**. 2015. Reconstructing the dust cycle in deep time: The case of the late Paleozoic icehouse. In, *Earth-Life Transitions: Paleobiology in the context of Earth System Evolution* P. David Polly, Jason J. Head, and David L. Fox, editors. The Paleontological Society Papers volume 21. pp. 83 - 120.
23. Orzechowski, E.A, Lockwood, R., Byrnes, J.E., Anderson, S.C., Finnegan, S., Harnik, P.G., Finkel, Z.V., Lindberg, D.R., Liow, L.H., Lockwood, R., Lotze, H.K., McClain, C.M., McGuire, J.L., O’Dea, A., Pandolfi, J.M. **Simpson, C.**, Tittensor, D.P. 2015. Determinants of extinction risk over the last 500 million years: A meta-analysis of marine bivalves and gastropods. *Global Change Ecology*. 21(10): 3595-3607.
22. Finnegan, S., S.C. Anderson, P.G. Harnik, **C. Simpson**, D.P. Tittensor, J.E. Byrnes, Z.V. Finkel, D.R. Lindberg, L.H. Liow, R. Lockwood, H.K. Lotze, C.M McClain, J.L McGuire, A. O’Dea, and J. M. Pandolfi, 2015. Paleontological baselines for evaluating extinction risk in the modern oceans. *Science*. 348(6234):567-570. DOI: 10.1126/science.aaa6635
21. **Simpson, C.** and D.H. Erwin, 2014. Enriching macroevolution. *Science*. 344(6189):1234-1235.
20. Hopkins, M., **C. Simpson**, and W. Kiessling, 2014. Differential niche dynamics among major marine invertebrate clades. *Ecology Letters*. 17(3):314-323. doi: 10.1111/ele.12232
19. **Simpson, C.**, 2013. Species selection and the macroevolution of coral photosymbiosis and coloniality. *Evolution* 67(6): 1607-1621. For a special issue on multilevel selection.
18. Nowak, M. D., R. J. Carter, A. B. Smith, **C. Simpson**, and D.J. Zwickl, 2013. A Simple Method for Estimating Informative Node Age Priors for the Fossil Calibration of Molecular Divergence Time Analyses. *PLOS One* 8 (6) (June 5): e66245. doi:10.1371/journal.pone.0066245.

17. Kiessling, W., **C. Simpson**, B. Beck, H. Mewis, and J. Pandolfi, 2012. Equatorial decline of reef corals during the last Pleistocene interglacial. *Proceedings of the National Academy of Sciences*. doi: 10.1073/pnas.1214037110
16. Harnik, P. G., **C. Simpson**, and J. L. Payne, 2012. Long-term differences in extinction risk among the seven forms of rarity. *Proceedings of the Royal Society B: Biological Sciences*. doi:10.1098/rspb.2012.1902
15. Harnik, P. G., H. K. Lotze, S. C. Anderson, Z. V. Finkel, S. Finnegan, D. R. Lindberg, L.H. Liow, R. Lockwood, C.M. McClain, J.L. McGuire, A. O’Dea, J.M. Pandolfi, **C. Simpson**, and D. P. Tittensor, 2012. Extinctions in ancient and modern seas. *Trends in Ecology and Evolution*. 27(11): 608-617. doi: 10.1016/j.tree.2012.07.010
14. **Simpson, C.** and J. Müller, 2012. Species selection in the molecular age, in From Clone to Bone: The Synergy of Morphological and Molecular Tools in Paleobiology, Johannes Müller and Rob Asher, eds. Cambridge University Press. Pp 116-134.
13. **Simpson, C.**, 2012. The evolutionary history of division of labour. *Proceedings of the Royal Society B: Biological Sciences* 279(1726): 116-121. doi: 10.1098/rspb.2011.0766
12. **Simpson, Carl**, W. Kiessling, H. Mewis, R. C. Baron-Szabo, and J. Müller, 2011. Evolutionary diversification of reef corals: a comparison of the molecular and fossil records. *Evolution* 65(11), 3274-3284. doi: 10.1111/j.1558-5646.2011.01365.x
11. Liow, L. H., **C. Simpson**, et al. 2011. Pioneering Paradigms and Magnificent Manifestos – Leigh Van Valen’s priceless contributions to evolutionary biology. *Evolution* 65(4), 917-922. doi: 10.1111/j.1558-5646.2011.01242.x
10. Kiessling, W. and **C. Simpson**, 2011. On the potential for ocean acidification to be a general cause of ancient reef crises. *Global Change Biology*, 17(1), 56-67. doi: 10.1111/j.1365-2486.2010.02204.x.
9. **Simpson, C.**, 2011. *How many levels are there? How insights from evolutionary transitions in individuality help measure the hierarchical complexity of life*, in The Major Transitions in Evolution Revisited. Edited by Brett Calcott and Kim Sterelny. The Vienna Series in Theoretical Biology, MIT Press. Pp 199-226.
8. McShea, D. W. and **C. Simpson**, 2011. *The miscellaneous transitions in evolution*, in The Major Transitions in Evolution Revisited. Edited by Brett Calcott and Kim Sterelny. The Vienna Series in Theoretical Biology, MIT Press. Pp 19-34.
7. **Simpson, C.**, 2010. Species selection and driven mechanisms jointly generate a large-scale morphological trend in monobathrid crinoids, *Paleobiology* 36(3), 481-496. doi: 10.1666/08018.1

6. **Simpson, C.** and W. Kiessling, 2010. Diversity of Life Through Time. Encyclopedia of Life Sciences. John Wiley & Sons. doi: 10.1002/9780470015902.a0001636.pub2
5. **Simpson, C.** and W. Kiessling, 2010. The role of extinction in large-scale diversity-stability relationships, *Proceedings of the Royal Society B: Biological Sciences*, 277, 1451-1456. doi: 10.1098/rspb.2009.2062
4. Kiessling, W., **C. Simpson**, and M. Foote, 2010. Reefs as cradles of evolution and sources of biodiversity in the Phanerozoic, *Science*, 327, 196. doi: 10.1126/science.1182241
3. **Simpson, C.** and P. G. Harnik, 2009. Assessing the role of abundance in marine bivalve extinction over the post-Paleozoic, *Paleobiology*, 35(4), 631–647. doi: 10.1666/0094-8373-35.4.631
2. Alroy, J., et al. 2008. Phanerozoic trends in the global diversity of marine invertebrates, *Science*, 321(5885), 97–100. doi: 10.1126/science.1156963
1. Sánchez, J. A., W. Zeng, V. R. Coluci, **C. Simpson** and H. R. Lasker, 2003, How similar are branching networks in nature? A view from the ocean: Caribbean gorgonian corals, *Journal of Theoretical Biology*, 222(1), 135-138. doi: 10.1016/S0022-5193(03)00017-1

### Fellowships & Grants

- Springer Fellowship, “Quantifying the stochastic and deterministic aspects of macroevolution” Smithsonian Institution, National Museum of Natural History 2015-2016.
- NSF ELT Collaborative Research: “Investigating the Biotic and Paleoclimatic Consequences of Dust in the Late Paleozoic.” 2013-2017. with Gerilyn Soreghan, Linda Hinnov, Sarah Aciego, and Nicholas Heavens.
- Abbott Postdoctoral Fellowship, “The Macroevolution of Bryozoan Polymorphism” Smithsonian Institution, National Museum of Natural History. 2012-2015.
- Co-P.I. with W. Kiessling. “Evolutionary rates of zooxanthellate and azooxanthellate corals and their controlling factors.” Deutsche Forschungsgemeinschaft, 2011-2013.
- Müller, Johannes. “Patterns of diversification in caenophidian snakes - an integrated paleontological and molecular approach.” Deutsche Forschungsgemeinschaft, 2011-2013.
- Aberhan, Martin. “Intrinsic and environmental controls of evolutionary rates in fossil and extant bivalves.” Deutsche Forschungsgemeinschaft, 2011-2013.
- NESCent Short-term Visiting Scholar. “Understanding the role of photosymbiosis in coral macroevolution.” Summer 2011.
- Santa Fe Institute Complex Systems Summer School Fellowship, 2001

### Student Mentoring

- **Sarah Leventhal:** Ph.D. student, working on the macroevolution of colonial traits in bryozoans
- **Andrea Halling:** Ph.D. student, working on the experimental macroevolution of multicellularity
- **David Zelagin:** Ph.D. student, working on the macroevolution of polymorphism in ants and bryozoans
- **Grant Vagle:** iQBio rotation student, worked on patterns of heritability within the bryozoan *Wilbertopora*
- **Sarah Tweedt:** Postdoc, working on the macroevolution of cell types in sponges.
- **Stephanie Plaza-Torres:** Postbaccalaureate research assistant, working on body sizes of Cyrogenian fossils and the origins of photosymbiosis in scleractinian corals.
- **Sarah Jamison-Todd:** Undergraduate geology major, working on whale macroevolutionary dynamics. How does invading a new adaptive zone influence extinction and origination?
- **Kaylie Stowe:** Undergraduate Evolutionary Biology major, working on phenotypic plasticity within bryozoan colonies

### Teaching

- GEOL 1020: Introduction to Earth History. Examines how Earth's interior and surface, the atmosphere and climate, the oceans, and life interact and have changed over the immensity of geologic time. For majors and non-majors.
- GEOL 5700 Macroevolution
- MUSM 6110: Technology and the future of museums.
- MUSM 5110: Introduction to museum studies
- MUSM 6110: Field approaches to Paleobiology, starting Fall 2020
- Bryozoan Brunch
- Macroevolution reading group
- Instructor for 2018 "Evolution of Coloniality and Modularity" at Centro de Biologia Marinha (CEBIMAR) of the Universidade de São Paulo, Brazil

**Invited Presentations and workshops**

Mizzou, 4/2020; AGU, 12/2019; University of New Mexico, 10/2019; Pomona College, 4/2019; University of Texas at Austin, 4/2018; Western Interior Paleontological Society, 2018; Denver Museum of Nature and Science, 1/ 2018; CU Ebio Brown bag, 12/2017; CU Museum of Natural History, Science Pub, 4/2017; Santa Barbara Museum of Natural History, 8/2016; American Museum of Natural History, 2/2016; University of Maryland, 11/2015; Washington Society of Paleontology, 10/2015; University of Oklahoma, 9/2015; University of Akron, 12/2014; Santa Fe Institute, 10/2014; Harvard, 2/2014; Stanford, 3/2014; Virginia Tech, 2/2013; Origin of Multicellularity, NESCent 5/2013. National Museum of Natural History; The origin and evolution of multicellularity. Kavli Institute of Theoretical Physics. 2-3/2013; Extinction in ancient and modern seas, NESCent working group. 2011 - 2012; Phylogenetic Approaches to Paleobiology: Diversity, Rates, and Trends, Geological Society of America, 2011; Symposium in Honor of Leigh Van Valen, University of Chicago, 1/2011; Stanford University; University of California, Berkeley; Santa Fe Institute; Conference on the Red Queen's Hypothesis, Centre for Ecological and Evolutionary Synthesis. Oslo, Norway; The major transitions in evolution revisited, Konrad Lorenz Institute, Altenberg, Austria.

**Reviews for**

*JEZ-B, Science Advances, Royal Society Open Science, PNAS, TREE, Proceedings B, Phil Trans B, Methods in Ecology & Evolution, Current Biology, BioScience, Biological Reviews, Evolution, Paleobiology, Acta Biotheoretica, Behavioral Ecology, Foundations of Science, Biology & Philosophy, Interface focus, Wiley-Blackwell, NSF, PLOS One, Evolutionary Biology, MIT Press, Cambridge University Press, John Templeton Foundation, Peer Community in Paleobiology.*

**Professional Affiliations**

Paleontological Society, Society for the Study of Evolution, Geological Society of America, American Society of Naturalists, American Geophysical Union, Society of Vertebrate Paleontology