

Biographical sketch

Dr. M. Elizabeth Barnes is a Discipline Based Education Researcher in Biology. She brings unique insight into the perceptions of evolution and religion within biology, religious students' experiences in biology, and the intersection of race/ethnicity and religion on student attitudes towards evolution. Her work has documented the obstacles that religious students encounter in biology classes.

As a PhD student at Arizona State University, she successfully obtained NSF funding through the NSF Graduate Research Fellowship Program (DGE-1311230; \$150,200 total stipend and tuition support awarded, 2015-2018) and as a post-doc at she obtained funding from the NSF as a Co-PI of the project "*A Large-scale Systematic Exploration of the Impact of Culturally Competent Biology Education*" (NSF IUSE #1818659; awarded \$423,003, 2018 - 2021). Funding for the GRF and NSF-IUSE was used to identify, document, and test instructional practices meant to be inclusive for religious undergraduate biology students. Dr. Barnes was the researcher primarily responsible for the study design, data collection, analyses, and dissemination of results. She is now motivated to continue this research productivity at MTSU as a PI lead of her own projects.

Intellectual Merit: During her time as a GRF, Dr. Barnes explored, described, and tested instructional practices that were inclusive for religious STEM students. She uniquely documented that differences between the religious cultures of college biology instructors, who are often secular, and their students, who are often Christian, can lead to evolution education that is not culturally competent for religious students (Barnes & Brownell, 2016; Barnes & Brownell, 2017; Barnes, Truong et al., 2017). The research done during the GRF also included studies which documented instructional practices that decreased students' perceived conflict between their religious beliefs and evolution (Barnes, Elser et al., 2017; Barnes, Truong et al., 2018; Barnes, Werner, et al., 2020), culminating in a new instructional framework for teaching evolution called "Religious Cultural Competence in Evolution Education (ReCCEE)" (Barnes & Brownell, 2017). As a post-doc and Co-PI on *A Large-scale Systematic Exploration of the Impact of Culturally Competent Biology Education* Dr. Barnes has been exploring the efficacy of her novel instructional framework in introductory biology courses nationwide.

Broader Impacts: The research for both the GRF and *A Large-scale Systematic Exploration of the Impact of Culturally Competent Biology Education* has contributed to the broader scientific community's goals of benefiting science and societal relations, improving the ability of scientists to successfully communicate to religious audiences and increasing participation of religious groups in learning and accepting evolution, a core concept of biology (American Association for the Advancement in Science, 2011).

Key Findings and Research Products: During her GRF period, Dr. Barnes published nine first author manuscripts, gave eight peer-reviewed talks and presented 15 posters at national and international conferences. Her research was highlighted twice in *Scientific American* and in *The Smithsonian*, reaching wide audiences. *A Large-scale Systematic Exploration of the Impact of Culturally Competent Biology Education* has yielded one published manuscript (Barnes et al., 2020), one in press, and three that are in preparation after data collection and analyses. Findings thus far indicate that instructors teaching evolution at the college level often do not address students' religious beliefs when teaching evolution and some address religion in an antagonistic way; religious students perceive evolution instructors as antagonistic towards religion even when the instructors avoid talking about religion (Barnes, Truong, et al., 2017). However, providing religious scientist role models, giving students autonomy over their decision to accept evolution, and highlighting the

potential compatibility of religion and science can increase religious students' comfort in the biology classroom, decrease their perceived conflict between their religious beliefs and evolution, and increase their acceptance of evolution (Barnes, Elser, et al., 2017; Barnes, Truong, et al., 2018; Barnes, Werner, et al., 2020).

Professional Preparation

Arizona State University	Biological Sciences	B.S., 2013
Arizona State University	Biology Education Research	M.S., 2014
Arizona State University	Biology Education Research	Ph.D., 2018

Appointments

Middle Tennessee State University	Assistant Professor of Biology Ed	Present
Arizona State University	Postdoctoral Scholar, Biology Ed	2018 - 2020

Example Products

Barnes, M.E., & Brownell, S.E. (2018). A Call to Use Cultural Competence When Teaching Evolution to Religious College Students: Introducing Religious Cultural Competence in Evolution Education (ReCCEE). *CBE-Life Sciences Education*, 16 (4).

<https://doi.org/10.1187/cbe.17-04-0062>.

Barnes, M.E., Truong, J.M., Brownell, S.E. (2018). Can Six Minutes of Culturally Competent Evolution Education Reduce Students' Level of Perceived Conflict between Evolution and Religion? *The American Biology Teacher*, 80(2), 106-

115. <https://doi.org/10.1525/abt.2018.80.2.106>.

Barnes, M. E., & Brownell, S. E. (2017). Experiences and Practices of Evolution Instructors at Christian Universities that can Inform Culturally Competent Evolution Education. *Science Education*, 101(6), 1-24. <https://doi.org/10.1002/sce.21317>.

Barnes, M. E., Elser, J., & Brownell, S. E. (2017). Impact of a Short Evolution Module on Students' Perceived Conflict between Religion and Evolution. *The American Biology Teacher*, 79(2), 104-111. <https://doi.org/10.1525/abt.2017.79.2.104>.

Barnes, M. E., Truong, J. M., & Brownell, S. E. (2017). Experiences of Judeo-Christian Students in Undergraduate Biology. *CBE-Life Sciences Education*, 16(1), 15.

<https://doi.org/10.1187/cbe.16-04-0153>.

Barnes, M. E., Evans, E. M., Hazel, A., Brownell, S. E., & Nesse, R. M. (2017). Teleological Reasoning, not Acceptance of Evolution, Impacts Students' Ability to Learn Natural Selection. *Evolution: Education and Outreach*, 10(7). <https://doi.org/10.1186/s12052-017-0070-6>.

Barnes, M. E., & Brownell, S. E. (2016). Practices and Perspectives of College Instructors on Addressing Religious Beliefs When Teaching Evolution. *CBE-Life Sciences Education*, 15(2), 18. <https://doi.org/10.1187/cbe.15-11-0243>.