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from September to December 2024

Born in 1951 in San Bernardino, Cal., USA

B.S. in Biology from the University of San Francisco, Ph.D. in Biology from the University of California, Los Angeles

PROJECT

Reshaping Education in the Biological Sciences

My research plan focuses on how academic fields adjust to major conceptual shifts. Specifically, I will interact with scholars in diverse fields asking how their discipline has been reshaped in response to a radical new idea, and how education was recast. Two major revolutions in biology were: in the 1800s, the development of the theory of evolution by natural selection; and in the 1900s, the discovery of DNA as the genetic material of life. Technological advances in DNA sequencing ~15 years ago have made this process inexpensive, resulting in a 21st-century revolution with the discoveries that the vast diversity of the biosphere is microbial and that microbes are essential for the health of all major components of the natural world. These discoveries demand a fundamental change – the integration of microbiology and macrobiology, which have developed largely as independent fields. A more holistic view can unify biology in ways not possible before. Significance: humankind is at a critical crossroads, facing the challenges of global climate change, while maintaining human, animal, and environmental health. Biologists now recognize that understanding the form and function of the microbial world will be critical to the development of strategies to address these challenges, but, in the face of intellectual silos, the field is ill-prepared. A metaphysical approach to and an examination of biology education is an essential first step for the discipline.

Recommended Reading

McFall-Ngai, Margaret J. (2007). "Care for the Community: A Memory-Based Immune System May Have Evolved in Vertebrates because of the Need to Recognize and Manage Complex Communities of Beneficial Microbes." *Nature* 445: 153. <https://doi.org/10.1038/445153a>.

McFall-Ngai, Margaret J., Michael G. Hadfield, Thomas C. G. Bosch, Hannah V. Carey, Tomislav Domazet-Lošo, Angela E. Douglas, Nicole Dubilier, et al. (2013). "Animals in a Bacterial World, a New Imperative for the Life Sciences." *Proceedings of the National Academy of Sciences* 110: 3229–3236. <https://doi.org/10.1073/pnas.1218525110>.

Nyholm, Spencer V., and Margaret J. McFall-Ngai (2021). "A Lasting Symbiosis: How the Hawaiian Bobtail Squid Finds and Keeps Its Bioluminescent Bacterial Partner." *Nature Reviews Microbiology* 19: 666–679. <https://doi.org/10.1038/s41579-021-00567-y>.

PUBLICATIONS FROM THE FELLOWS' LIBRARY

McFall-Ngai, Margaret (2019)

Evolutionary "experiments" in symbiosis : the study of model animals provides insights into the mechanisms underlying the diversity of host-microbe interactions

Wissenschaftskolleg zu Berlin
<https://kxp.ktoplus.de/DB=9.663/PPNSET?PPN=1666549312>

30. June 2024