



The tree of life, based on analysis of DNA sequences from organisms across all three domains of life: Bacteria, Archaea, and Eukarya. Scientific ocean drilling allows researchers to access environments below the seafloor that resemble early Earth and/or are analogues to environments found elsewhere in the solar system (after illustration by Jayne Doucette in Teske and Edwards, 2005). By analyzing microbial communities in these environments, we can better predict what primitive ancestral cells may have looked like as well as clarify what types of lifestyles likely exist on extraterrestrial bodies. (a) Microbial colonization (orange dots) of mineral incubation experiments in subseafloor oceanic crust on the Juan de Fuca Ridge flank (Orcutt et al., 2011, <https://doi.org/10.1038/ismej.2010.157>). (b) A microscopic view of microbial life in a subseafloor sediment core sample obtained by drilling vessel *Chikyu* off Shimokita Peninsula, Japan. Green particles represent microbial cells (Morono et al., 2009, <https://doi.org/10.1038/ismej.2009.1>). *Photo credit: JAMSTEC.* (c) A microscopic image of a microbial cell (white) on a 2 km deep, 20-million-year-old coal particle (black) obtained by *Chikyu* during IODP Expedition 337 [Site C0020; Inagaki et al., 2015, <https://doi.org/10.1126/science.aaa6882>; Trembath-Reichert et al., 2017, <https://doi.org/10.1073/pnas.1707525114>). *Photo courtesy of Elizabeth Trembath-Reichert, Caltech*