

Prompt: Microbial life can easily live without us; we, however, cannot survive without the global catalysis and environmental transformations it provides." Do you agree or disagree with this statement?

Across 3.5 billion years, microorganisms have shaped the Earth to make it habitable for plants, animals, and humans (1). Beyond orchestrating the Great Oxidation event that significantly contributed oxygen to the atmosphere (1), microbes regulate global biogeochemical cycling, which keeps our planet's system in a relatively stable environmental state (2). Alongside microbes, humans have had a profound impact on Earth due to our superior intellectual and communicative abilities, which are unique to our species. The emergence of the industrial revolution has made mankind "major players in Earth's geochemical cycles" (3), and has allowed us to dominate the biosphere with remarkable scale through the appropriation of various ecosystems (4). Our continued technological advancement has also allowed us to manipulate biological entities to create artificial systems and decrease our dependence on nature (3). This paper will discuss how microbes and humans may be capable of living without one another, while also examining why a world without microbes would significantly reduce our quality of life.

Microbes do not need humans

Microbes are resilient and can survive in environments inhabitable by humans. Constantly evolving, the Earth we know today is vastly different than when microorganisms first emerged. The planet experienced massive bombardments and large impacts that had the potential of killing all forms of life (5). For instance, it is believed that the early Earth was once hit by a meteor, creating a period of time with extremely hot surface temperatures, nearing 100° C (5, 6). However, there is geological evidence of microorganisms, such as hyperthermophiles, that withstand these conditions (5), thereby demonstrating the robustness of microbial life. Today, we continue to observe microbes that can thrive in other extreme environments, such as deep ocean sediments, arctic soils, and acid mine drainage (7, 8). In addition, microbes are able to produce and consume various metabolites, including peptides, complex carbohydrates, and antibiotics (7). This allows them to cross-feed and further establish themselves in highly specific niches, where they can ultimately maintain their existence (7).