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# The Role of Microbial Electron Transfer in the Coevolution of the Biosphere and Geosphere

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## Abstract

All life on Earth is dependent on biologically mediated electron transfer (i.e., redox) reactions that are far from thermodynamic equilibrium. Biological redox reactions originally evolved in prokaryotes and ultimately, over the first ~2.5 billion years of Earth's history, formed a global electronic circuit. To maintain the circuit on a global scale requires that oxidants and reductants be transported; the two major planetary wires that connect global metabolism are geophysical fluids—the atmosphere and the oceans. Because all organisms exchange gases with the environment, the evolution of redox reactions has been a major force in modifying the chemistry at Earth's surface. Here we briefly review the discovery and consequences of redox reactions in microbes with a specific focus on the coevolution of life and geochemical phenomena.