



## The Geochemical Origin of Microbes

William F. Martin and Karl Kleinermanns

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### Abstract

This is a textbook covering the transition from energy releasing reactions on the early Earth to energy releasing reactions that fueled growth in the first microbial cells. It is for teachers and college students with an interest in microbiology, geosciences, biochemistry, evolution, or all of the above. The scope of the book is a quantum departure from existing “origin of life” books in that it starts with basic chemistry and links energy-releasing geochemical processes to the reactions of microbial metabolism. The text reaches across disciplines, providing students of the geosciences an origins/biology interface and bringing a geochemistry/origins interface to students of microbiology and evolution. Beginning with physical chemistry and transitioning across metabolic networks into microbiology, the timeline documents chemical events and organizational states in hydrothermal vents – the only environments known that bridge the gap between spontaneous chemical reactions that we can still observe in nature today and the physiology of microbes that live from H<sub>2</sub>, CO<sub>2</sub>, ammonia, phosphorus, inorganic salts and water. Life is a chemical reaction. What it is and how it arose are two sides of the same coin.

### Key Features

- Provides clear connections between geochemical reactions and microbial metabolism
- Focuses on chemical mechanisms and transition metals
- Richly illustrated with color figures explaining reactions and processes
- Covers the origin of the Earth, the origin of metabolism, the origin of protein synthesis and genetic information as well as the escape into the wild of the first free-living cells: Bacteria and Archaea