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# MITOCHONDRIA AND ANAEROBIC ENERGY METABOLISM IN EUKARYOTES

BIOCHEMISTRY AND EVOLUTION

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IN EUKARYOTES

Mitochondria are sometimes called the powerhouses of eukaryotic cells because mitochondria are the site of ATP synthesis in the cell. ATP is the universal energy currency, it provides the power that runs all life processes. To survive, humans need oxygen for the production of ATP in mitochondria. The sugars, fats and proteins from our diet are converted to carbon dioxide in mitochondria in a process that requires oxygen. Just like a fire needs oxygen to burn, our mitochondria need oxygen to make ATP. From textbooks and popular literature, one can easily get the impression that all mitochondria require oxygen. But that is not the case. There are many groups of organisms known that make ATP in mitochondria without the help of oxygen. They have preserved biochemical relicts from the early evolution of eukaryotic cells. Eukaryotes arose and diversified during phases of Earth's history when there was hardly any oxygen available, and certainly not enough to breathe. How the anaerobic variants of mitochondria work, in which organisms they occur, and how the eukaryotic anaerobes that possess them fit into the larger picture of rising atmospheric oxygen levels during the course of Earth's history are the topic of this book.



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[www.degruyter.com](http://www.degruyter.com)  
ISBN 978-3-11-066677-9



d|u|p  
düsseldorf university press