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Flavin-based electron bifurcation, a novel mechanism of energy coupling in anaerobic microorganisms



○ Thauer Rudolf Kurt

Max Planck Institute for Terrestrial Microbiology (Germany)

Seven years ago we discovered that the cytoplasmic butyryl-CoA dehydrogenase-EtfAB complex from *Clostridium kluyveri* couples the exergonic reduction of crotonyl-CoA to butyryl-CoA with NADH and the endergonic reduction of ferredoxin with NADH via flavin-based electron bifurcation [1]. In the following years many other cytoplasmic enzyme complexes capable of energetic coupling via this novel mechanism were found in anaerobic microorganisms [2, 3]. The findings have revolutionized our understanding of the energy metabolism not only of Clostridia [4], but also of methanogenic archaea [5] and acetogenic bacteria [6]. A brief history of what recently was considered to be “the biggest breakthrough in bioenergetics of recent decades” [7] has been published [8].

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