therefore conclude that only the metabolism involving Aio could have performed anaerobic As redox conversion in the Archaea.

doi:10.1016/j.bbabio.2014.05.107

S8.P27

Exploring structural/functional relationship in Type II NADH dehydrogenases
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Type-II NADH:quinone oxidoreductases (NDH-II) are membrane proteins involved in respiratory chains. NDH-II performs the same reaction as Complex I, but does not contribute to the generation of the ion electrochemical potential. Both enzymes may be expressed by the same organism according to its metabolic demands. Some pathogenic bacteria contain only genes encoding NDH-II and in animal mitochondria only Complex I is expressed. The study of NDH-II gained a new enthusiasm after the publication of two yeast comparative studies, through a range of methodologies, of the differences in the ion electrochemical potential. Both enzymes may be expressed by the same organism according to its metabolic demands. Some pathogenic bacteria contain only genes encoding NDH-II and in animal mitochondria only Complex I is expressed. 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doi:10.1016/j.bbabio.2014.05.108

S8.P28

Independent origins of the methyl segments of the Wood–Ljungdahl pathway
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The nature of the carbon metabolism of the extinct primordial organisms is a critical question to understand the origins of life [1,2]. Central to core carbon metabolism is the C1 chemistry involving folate and its structural analog, methanopterin. Based on the chemical properties of the vents, Lane and Martin [3] put forward a methanogenic origin of archaea, having the Wood–Ljungdahl (WL) pathway as the universal carbon fixation pathway between the two prokaryotic domains. Could it be that an imprint of early chemistry is preserved in the C1 metabolism of modern organisms? We won’t know unless we look, and genomes harbor abundant information. By studying the distribution and frequency of the enzymes for methanopterin and folate biosynthesis within sequenced genomes [4,5], we found that these distinct biosynthetic routes are unrelated across the two domains, indicating that the corresponding pathways arose independently. This dichotomy is also observed in the structurally unrelated enzymes and different organic cofactors that methanogens (archaea) and acetogens (bacteria) use to perform methyl synthesis in their H4F- and H4MPT-dependent versions, respectively, of the WL pathway. The data suggests that, in contrast to the ancestry of the acetyl synthesis segment, the methyl segment of the WL pathway evolved in a later stage, after the divergence of bacteria and archaea, which independently invented genetically-encoded means to synthesize methyl groups via enzymatic reactions.

References

doi:10.1016/j.bbabio.2014.05.109

S8.P29

Direct observation of CWD bacteria reproduction
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Cell wall defective (CWD) bacteria are made by using lysozymes to disrupt the cell wall and are insensitive to β-lactam antibiotics [1]. Understanding the mechanism of this resistance should provide significant insight on how CWD bacteria grow, reproduce and proliferate [2–4]. Accordingly, we observed different properties of CWD bacteria, such as growth, metabolism, and protein synthesis. We prepared CWD Escherichia coli and cultured them in ampicillin. The CWD E. coli did not divide but grew, reaching a maximum diameter of 10 μm at 8 h of culturing. Consistent with this observation, protein synthesis and metabolic activity were observed for 8 h. Upon removing the ampicillin from the culture, the CWD E. coli began to deform and divide. Furthermore, the divided CWD E. coli was only 3–5 μm diameters, suggesting the division mechanism did not function beyond this size. Finally, we will also discuss...