Determination of the existence of hopanoid in *Clostridium acetobutylicum* and the study of the hopanoid biosynthesis pathway

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The flexibility of a bacterial cell membrane is a result of the structural features of the membrane lipids. Hopanoid is a kind of important lipid in the membrane structure. Many bacteria contain hopaniods. Hopanoids are members of the triterpenic isoprenoids. Hopanoids predominantly occur in aerobic bacteria, such as methanothrophs, heterotrophs, and cyanobacteria. Hopanoids have also been found in some facultatively anaerobic bacteria, e.g., in photosynthetic purple nonsulfur bacteria, or in fermentative *Zymomonas spp*. Based on ordinary hopanoid pathway, in this study, we will try to find the detailed hopanoids biosynthesis pathway, including the enzymes and genes through the whole synthesis processes. Furthermore we will try to target the central genes, overexpress in *Clostridium acetobutylicum* ATCC 824 which can product butanol and other solvents to see the difference of hopanoids composition in the membrane and their influence on the membrane fluidity. And we also want to analyze the hopanoid composition in the different fermentation stages to see the connection between hopanoid content and butanol concentration.