

Hexanoic acid production from CO by *Clostridium* sp. JS66: physiological and metabolic characterization

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C1 gases including carbon monoxide, carbon dioxide, and hydrogen are emitted from steel industrial facilities, causing global warming. C1 gases are recently spotlighted as feedstocks for fuels/chemicals production. Especially, gas fermentation by acetogenic bacteria utilizing C1 gases as carbon and energy sources has been studied for converting C1 gases to valuable biofuel/chemicals. Here, we report a newly isolated strain *Clostridium* sp. JS66 from mudflat as a hexanoic acid producer from C1 gases. *Clostridium* sp. JS66 exhibited over 99% of 16s rRNA similarity to *C. carboxidivorans* P7, a known hexanoic acid-producing acetogen; but, distinct phenotypic differences, an average nucleotide identity (ANI) value of 95.5 %, and DNA-DNA hybridization value of 33 % suggests that *Clostridium* sp. JS66 is a noble species distinct from *C. carboxidivorans* P7. Further physiological and metabolic characterization was performed through optimizing fermentation conditions, analyzing genomic data, and identifying key pathways for hexanoic acid production.