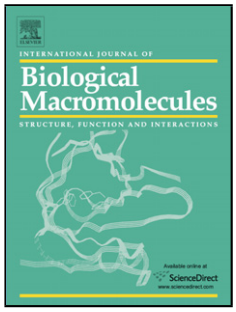

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Biosynthesis and Structural Characterization of Polyhydroxyalkanoates Produced by *Pseudomonas aeruginosa* ATCC 27853 from Long Odd-Chain Fatty Acids

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ABSTRACT

Pseudomonas aeruginosa ATCC 27853 was cultured on media containing long odd-chain fatty acids. Heptadecanoic, nonadecanoic, and heneicosanoic acids sustained cell growth and resulted in polyhydroxyalkanoate (PHA) accumulation when culturing was conducted under nitrogen starvation conditions. No PHA was produced using a complete or magnesium-deprived medium. The isolated polyesters were characterized by gas chromatography and liquid chromatography–electrospray ionization mass spectrometry (ESI-MS) of methanolyzed samples, ^{1}H and ^{13}C NMR spectroscopy, gel permeation chromatography, ESI MS of partially pyrolyzed samples, and differential scanning calorimetry. These PHAs are composed of seven different odd-chain repeating units starting from 3-hydroxyvalerate, with the highest species being the, to date, unreported constituent 3-hydroxyheptadecanoate, and minor amounts of 2 or 3 even-chain comonomers. The PHAs are soft, sticky, rubber-like materials having glass transition temperatures between -45 and -39 °C, melting temperatures between 48 and 52 °C, enthalpies of melting around 11 J/g, and molar masses ranging from 77 to 188 kg/mol. Statistical analysis of the ESI mass spectra of the