Preface

Biopolymers are the most abundant molecules in living matter. Microorganisms are capable of producing a wide variety of biopolymers, including polynucleotides, polyamides (protein), polysaccharides, polyphosphate, polyesters, and polyketides. However, homopolymers, which are made up of only a single type of amino acid, are far less ubiquitous; in fact, only two amino-acid homopolymers are known to occur in nature: poly-ε-L-lysine (ε-poly-L-lysine, ε-PL) and γ-poly-glutamic acid (γ-PGA).

ε-PL, consisting of 25–30 L-lysine residues with a linkage between the α-carboxyl group and the ε-amino group, is produced by actinomycetes. Because ε-PL is a polycationic peptide and thus exhibits antimicrobial activity against a wide spectrum of microorganisms, including Gram-positive and Gram-negative bacteria, and because it is both safe and biodegradable, ε-PL is used as a food preservative in several countries. In contrast, γ-PGA is an unusual anionic polypeptide in which D- and/or L-glutamate is polymerized via γ-amide linkages. γ-PGA is secreted into the growth medium of *Bacillus subtilis* as a fermentation product with a variable molecular weight (typically, 10–1,000 kDa).

Over the past decade, the biological and chemical functions of these two homopoly amino acids have been reported, thereby being promising materials for medical and industrial applications. This Microbiology Monographs volume covers the current knowledge and most recent advances in regard to the occurrence, biosynthetic mechanisms, biodegradations, and industrial and medical applications of these polymers.

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http://www.springer.com/978-3-642-12452-5

Amino-Acid Homopolymers Occurring in Nature
Hamano, Y. (Ed.)
2010, VII, 250 p. 62 illus., Hardcover
ISBN: 978-3-642-12452-5