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Plasmids specifying ϵ-caprolactam degradation in *Pseudomonas* strains

(ϵ-Caprolactam degradation; plasmids; *Pseudomonas*)

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1. SUMMARY

The large plasmid DNAs were found in several strains of *Pseudomonas* sp. capable of growing on ϵ-caprolactam as a sole source of carbon and nitrogen. The ability to grow on ϵ-caprolactam and ϵ-aminocaproic acid as sole sources of carbon or nitrogen and adipic acid as a sole source of carbon could be transferred in interspecies crosses. All transconjugants harboured corresponding large plasmid DNAs. It was suggested that the discovered plasmids possessed the genetic material controlling several consecutive reactions of ϵ-caprolactam catabolism yielding acetate and succinate.

2. INTRODUCTION

ϵ-Caprolactam is widely used in the production of polymers for industrial, agricultural and domestic purposes. Production of the monomer itself as well as the consecutive stages of synthesis and processing of polymeric materials based on it, entail pollution of waste waters with ϵ-caprolactam [1]. This explains the great attention given to the studying microbiological degradation of ϵ-caprolactam and its derivatives.

Consecutive stages of catabolism of ϵ-caprolactam used by bacteria as a sole source of carbon and nitrogen have been studied previously [2,3]. Recent data allow a supposition that in *Corynebacterium aurantiacum* one of the degradative reactions of ϵ-caprolactam, namely transamination of ϵ-aminocaproic acid, might be under plasmid control [4]. However, so far participation of plasmid genes has been shown only in the determination of conversion of the cyclic dimer of ϵ-aminocaproic acid into a linear dimer and further into a monomer by *Flavobacterium* sp. K12 [5].

In this paper we present data which suggest that the plasmids detected in several *Pseudomonas* strains determine the ability to utilize ϵ-caprolactam and ϵ-aminocaproic acid as a sole source of carbon and nitrogen.

3. MATERIALS AND METHODS

3.1. Bacterial strains and plasmids

To conduct the conjugative transfer of plasmids two strains of recipients were used: *P. putida* BS846 (derivative of strain BS228 Ade$^-$ [7] which is resistent to 100 mg/l streptomycin and 10 mg/l gentamycin) and *P. aeruginosa* PAT967 Met$^-$