Deoxyribonuclease and phosphatase activities in myxobacteria

José Muñoz, Francisco González, M. Magdalena Martínez-Cañamero, M. Angeles Goicoechea, Antonio L. Extremera and José M. Arias*

Departamento de Microbiología, Facultad de Ciencias, Universidad de Granada, E-18071 Granada, Spain (*Reprint address)

Abstract

Myxococcus xanthus DK101, *Myxococcus fulvus* Mx f2, *Corallococcus coralloides* Cc c410 and *Stigmatella aurantiaca* Sg a1 showed cell-bound deoxyribonuclease and alkaline and acid phosphatase activities. Both phosphatases were also released into the culture supernatants. Cell-bound alkaline phosphatases had a molecular weight of about 30,000 daltons. *Myxococcus stipitatus* Mx s2 exhibited cell-bound DNase and acid phosphatase, but not alkaline phosphatase. Acid phosphatase was also excreted to the supernatants.

Introduction

One of the most important characteristics of the myxobacteria is their ability to produce a great variety of enzymes, such as proteases, cell wall cleaving enzymes, lipases, nucleases and phosphatases (Rosenberg and Varon, 1984). These enzymes degrade complex macromolecules and even lyse other micro-organisms and some of the products of the degradation of the macromolecules are utilized by the myxobacteria as nutrients. The nutritional role of phosphatases and deoxyribonucleases is unclear since the deoxyribonucleases reported are restriction enzymes (Morris and Parish, 1976; Mayer and Reichenbach, 1978) and phosphatases have only been investigated during the life cycle (Dworkin, 1973; González *et al.*, 1987).

In this paper we report our studies on phosphatase and deoxyribonuclease activities in several myxobacteria, and discuss a possible role of these enzymes in the availability of phosphate.

Materials and methods

Bacteria and culture conditions

Five myxobacterial strains have been used to study phosphatase and deoxyribonuclease activities: *Myxococcus xanthus* DK101, from the collection of D. Kaiser (Stanford, U.S.A.), *Corallococcus coralloides* Cc c410, *Myxococcus fulvus* Mx f2, *Myxococcus stipitatus* Mx s2 and *Stigmatella aurantiaca* Sg a1, a gift from H. Reichenbach (Braunschweig, FRG). *M. xanthus* was grown in CTT liquid medium (Bretscher and Kaiser, 1978) and the others in CT liquid medium (Kimchi and Rosenberg, 1976). All the myxobacteria were incubated at 28°C, except *M. xanthus*, which was incubated at 33°C. Cultures were shaken at 200 rpm.

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