



Chapter 4

Isolation and Maintenance of Cyanobacterial Endosymbionts

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Abstract

Cyanobacteria are a wide and diversified phylum of bacteria capable of photosynthesis. Cyanobacteria are the pioneer colonizers of a particular environment, and establishment in the environment is preceded by microbial consortia formation. Some heterotrophic bacteria are in symbiotic association with cyanobacteria for the carbon and nitrogen exchange and recycling of the key nutrients. The heterotrophic bacteria are coexisting partners with cyanobacteria in the cyanosphere. When cyanobacteria are in consortium with heterotrophic bacteria, the system becomes more stable with a longer lifespan. The present protocol focused on the isolation of endosymbiont heterotrophic bacteria of cyanobacteria in brief.

Key words Cyanosphere, Heterotrophic bacteria, Consortium, Interspecies interaction

1 Introduction

Cyanobacteria constitute pioneer colonizers of specific environments, and their settlement in new biotopes precedes the establishment of intricate microbial consortia [1, 2]. Indeed, these autotrophic microorganisms rarely live in isolated populations but thrive in complex communities where intricate interactions take place [3]. Cyanobacteria are frequently associated with heterotrophic bacteria in nature [4], and geological evidence of interspecies interactions between cyanobacteria and heterotrophs dates to 440 million years ago [5]. The cohesiveness of such interactions is illustrated by the paucity of axenic cyanobacterial strains, despite persistent attempts to isolate them from their consortiums [6].

Cultures of isolated cyanobacterial strains typically contain coexisting heterotrophic bacterial partners that are considered their phycosphere, the so-called cyanosphere [7]. Although axenic cultures of cyanobacteria can be achieved, cyanobacterial cultures comprising associated coexisting bacterial populations are more