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## *Mixed Cultures*

### **16.1. INTRODUCTION**

The dynamics of mixed cultures are important considerations in some commercial fermentations. They are critical to understanding the response of many ecological systems to stress. The use of organisms with recombinant DNA has added another dimension to our consideration of how cells within a population interact with each other.

Many food fermentations, such as cheese manufacture, depend on multiple interacting species. The biological treatment of waste waters relies on an undefined complex mixture of microorganisms. The ratio of various species in the treatment process is critical; sudden shifts in the composition of the population can lead to failure of the unit to meet its objectives.

In all natural environments, cells exist in potentially mixed populations. Understanding how these cells interact with one another is critical to understanding the natural cycles for the elements (e.g., C, N, and S), the response of ecosystems to environmental challenges (for example, acid rain), and the rate and extent of degradation of chemicals introduced into such ecosystems.

As discussed in Chapter 14, many populations with recombinant DNA behave as mixed-culture systems. Some members of the population will lose or modify the inserted gene (often carried on a plasmid). Although a single species is present, the formation of mutant or plasmidless cells leads to a distinct subpopulation. The interaction of the