Carbon Utilization and Fatty Acid Profiles
For Characterization of Bacteria

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Understanding relationships among bacteria advances our knowledge of bacterial ecology and community structure, assists in the investigation of an unknown bacterium, and facilitates communication between laboratories concerning strains. Typically, unknown strains of bacteria are classified by comparing phenotypic or genetic characteristics to those of bacteria previously identified and representative of known taxa. The characterization of bacteria recovered from soil is time consuming, often frustrating, and sometimes difficult. With techniques such as nucleic acid or fatty acid analysis, the streamlining of diagnostic tests in microtubes or microplates, and the principles of numerical taxonomy, relationships between bacterial strains can be investigated more efficiently than ever before.

Many characteristics and behavior patterns are incorporated into identification schemes. Typically, one must first establish the major group to which it belongs; i.e., whether it is phototrophic, chemoautotrophic, chemolithotrophic, or chemoheterotrophic, aerobic or anaerobic, microaerophilic or facultative. Other characteristics of interest pertain to the chemical, nutritional, morphological, biochemical, physiological, genetic, pathogenic and antigenic properties of the bacterium (Krieg & Holt, 1984).

This chapter describes the analyses of C utilization patterns and fatty acid profiles for bacterial characterization and identification. The capacity of a strain to metabolize various C substrates can be used in its identification by matching its pattern of utilization with those of known strains (Goor et al., 1984). Fatty acid profiles also are a stable and reliable means of delineating taxa (Miller & Berger, 1985; DeBoer & Sasser, 1986). As informative as these two methodologies are, they do not stand alone as identification techniques, but are to be used with other techniques to characterize and gain further information on bacterial isolates, including those from soil.