

microbial taxonomy and classification

I. Methods of Microbial Taxonomy

1. Morphological methods

- a. Morphological methods of microbial taxonomy involve studying the physical characteristics of microorganisms, such as shape, size, and arrangement of cells.
- b. This can include techniques like microscopy, which can be used to observe the shape and size of cells, as well as their internal structures.

2. Chemical Methods

- a. Chemical methods of microbial taxonomy involve analyzing the chemical composition of microorganisms, such as their cell walls, lipids, and pigments.

3. Biochemical methods

- a. Biochemical methods of microbial taxonomy involve studying the metabolic activities of microorganisms, such as their ability to ferment certain sugars or produce enzymes.

4. Genetic methods (DNA-DNA Hybridization, PCR-based techniques, 16S rRNA gene sequencing)

- a. Genetic methods of microbial taxonomy are based on the analysis of the genetic makeup of microorganisms.
- b. DNA-DNA hybridization is a method that compares the genetic relatedness of two microorganisms by analyzing the degree of homology between their DNA sequences.
- c. PCR-based techniques like RFLP, ARDRA, ERIC-PCR, PFGE, TGGE, Rep-PCR are used to study the genotypic variation of microorganisms.
- d. 16S rRNA gene sequencing is the most widely used genetic method in microbial taxonomy. It allows the identification of microorganisms by comparing the sequence of their 16S ribosomal RNA gene to a database of known sequences.
- e. 16S rRNA gene sequencing is especially useful for identifying and classifying bacteria and archaea, as it provides information about the evolutionary relationships among these microorganisms.
- f. Another genetic method is the use of whole genome sequencing (WGS), that is useful for identification of bacterial and fungal species and for detecting genetic markers such as antibiotic resistance genes.

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