

- Many advances in the discipline made through the study of microbes
- Microbial genetics
 - Avery, MacLeod, and McCarty determined that genes are contained in molecules of DNA
 - Beadle and Tatum established that a gene's activity is related to protein function
 - Explained translation of genetic information into protein
 - Investigated rates and mechanisms of genetic mutation
 - Determined how cells control genetic expression
- Molecular biology
 - Explanation of cell function at the molecular level
 - Pauling proposed that gene sequences could
 - Provide understanding of evolutionary relationships and processes
 - Establish taxonomic categories to reflect these relationships
 - Identify existence of microbes that have never been cultured
 - Woese determined that cells belong to domains Bacteria, Archaea, or Eukarya
 - Cat scratch disease caused by uncultured organism
- Recombinant DNA technology
 - Genes in microbes, plants, and animals manipulated for practical applications
 - Production of human blood-clotting factor by *E.coli* to aid hemophiliacs
- Gene therapy
 - Inserting a missing gene or repairing a defective one in humans by inserting desired gene into host cells
- What Role Do Microorganisms Play in the Environment?
 - Bioremediation uses living bacteria, fungi, and algae to detoxify polluted environments
 - Recycling of chemical such as carbon, nitrogen, and sulfur
 - Most microbes in the environment are not pathogenic
- How Do We Defend Against Disease?