CHAPTER 4
AN INTRODUCTION TO CELL STRUCTURE AND HOST-PATHOGEN RELATIONSHIPS

ORGANISM CLASSIFICATION

- All living organisms can be divided into prokaryotes or eukaryotes
- Prokaryotes do not contain a nucleus or membrane-enclosed structures like those found in eukaryotes
- Bacteria can be classified by genus and species, just like all other organisms
- Further classification of bacteria can be based on size, shape, and arrangement

STAINING

- Staining is used to make organisms visible under the microscope
- There are two major types of stain: simple stains, which use one dye, and differential stains, which use more that one dye
- The Gram stain is used to classify bacteria on the basis of their cell wall structure

STAINING

- Several stains, such as the capsule, flagella, and endospore stains, are used to identify structures associated with the bacterial cell
- The acid-fast stain is used to confirm the identity of *Mycobacterium* species
- Cell morphology and staining are often used for diagnostic testing

HOST-PATHOGEN RELATIONSHIPS

- Pathogens are organisms that cause disease in humans
- Infectious disease is a complex process that involves both the pathogen and the host
- Pathogens can be classified as opportunistic (causing disease if the host's defenses are compromised in some way) or primary/ obligate (causing disease even if the host's defenses are intact)

BACTERIAL PATHOGENICITY AND VIRULENCE

- Infection by a pathogen requires the pathogen to get in, stay in, defeat the host defense, damage the host, and be transmissible
- Virulence refers to how fit a pathogen is to survive in the host and thus how harmful it is
- There are virulence genes that are carried on the bacterial chromosome or on extrachromosomal pieces of DNA such as plasmids

BACTERIAL PATHOGENICITY AND VIRULENCE

- Virulence gene expression can be regulated by quorum sensing
- A biofilm can assist in the infectious process by inhibiting the exposure of bacteria to the host defense, antibiotics and other molecules toxic to bacteria

PROKARYOTIC VS EUKARYOTIC CELL STRUCUTRE

- The structure of the prokaryotic cell is distinctly different from that of the eukaryotic cell
- Many of the structures of the eukaryotic cell have important roles in the infectious disease process