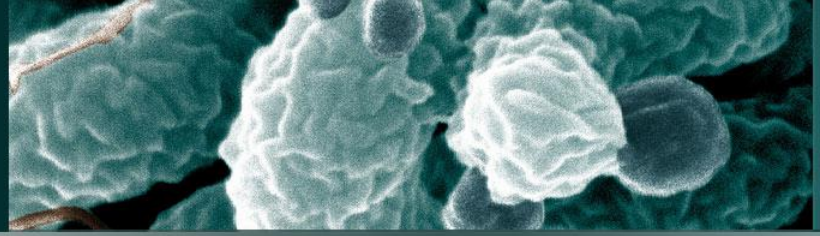
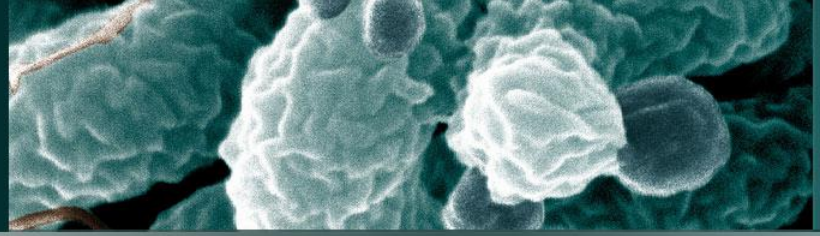


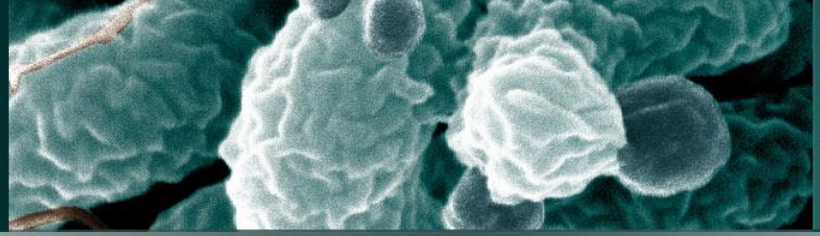
Herlihy's The Human Body in Health and Illness
7th edition

Chapter 5
Microbiology Basics



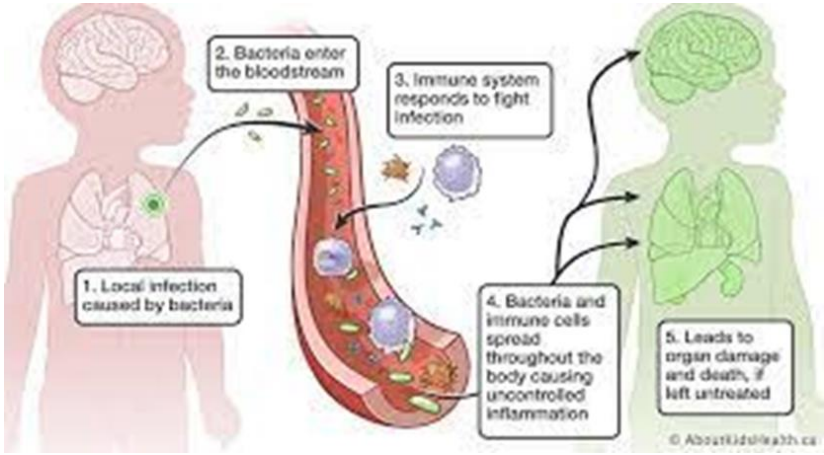
Microbiology Basics

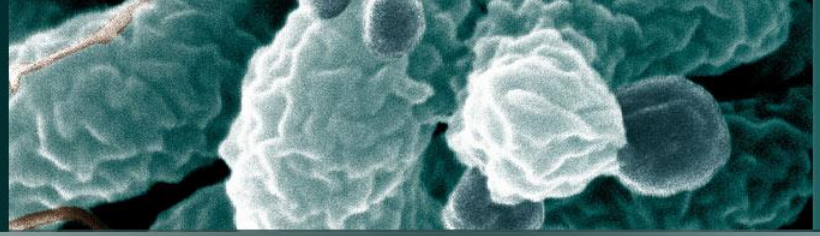
1. Define *disease* and *infection.*
2. List the characteristics of the different types of pathogens, including the types of bacteria by shape.
3. Describe the types of bacteria by staining characteristics.
4. Define portals of exit and portals of entry.
5. List common ways by which infections are spread.
6. Identify the microbiological principles described in Five Germ-Laden Stories.



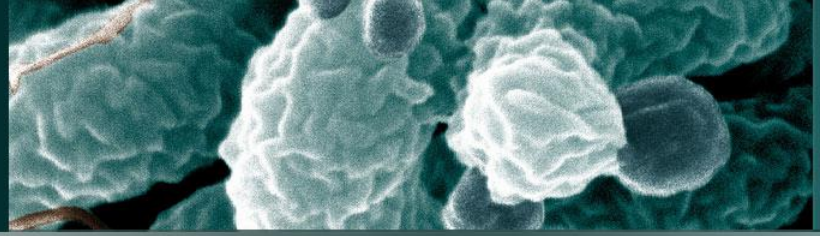
What Is Disease?

- Disease: Failure of the body to function normally
- Pathogens: Disease-producing microorganisms
- Infection: Invasion of the body by a pathogen
  - Localized: Restricted to a small area
  - Systemic: More widespread; usually spread through blood
  - Colonization



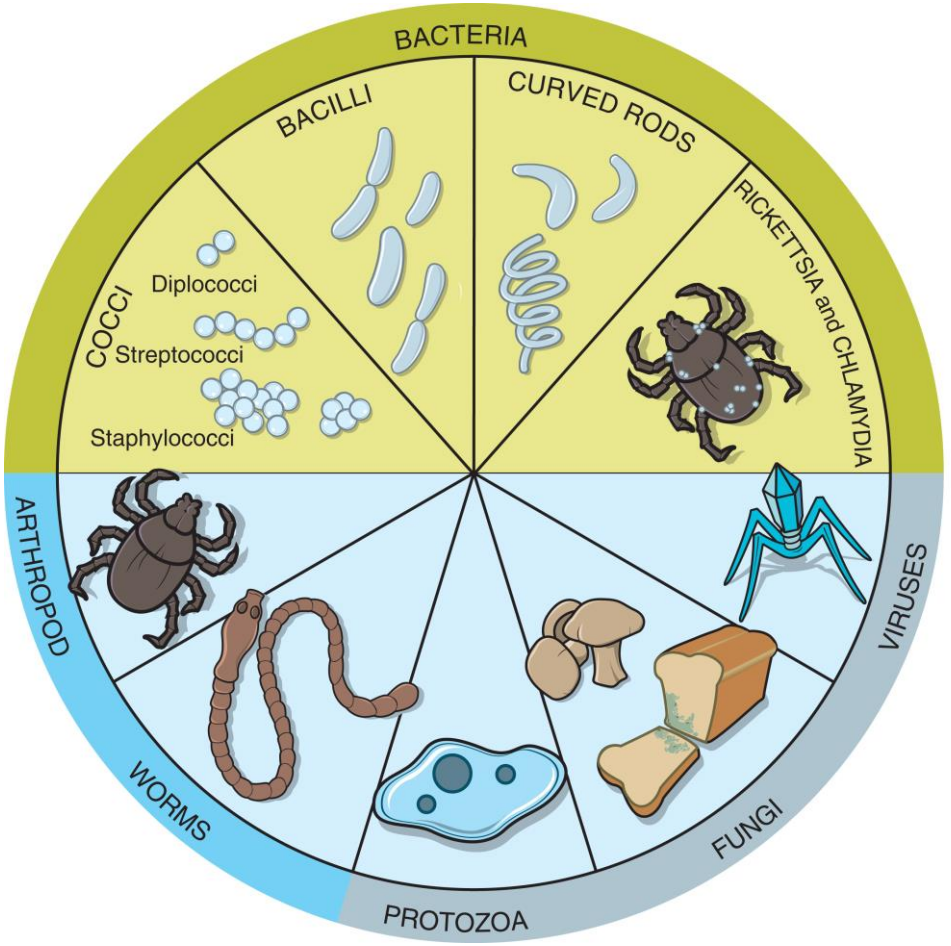


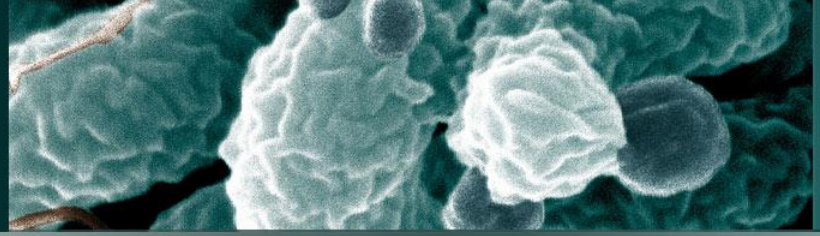
Explain what a pathogen is?



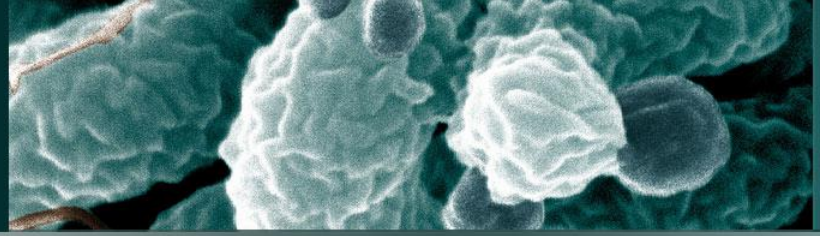
Types of Pathogens

- Bacteria
- Viruses
- Fungi
- Protozoa
- Worms
- Arthropods



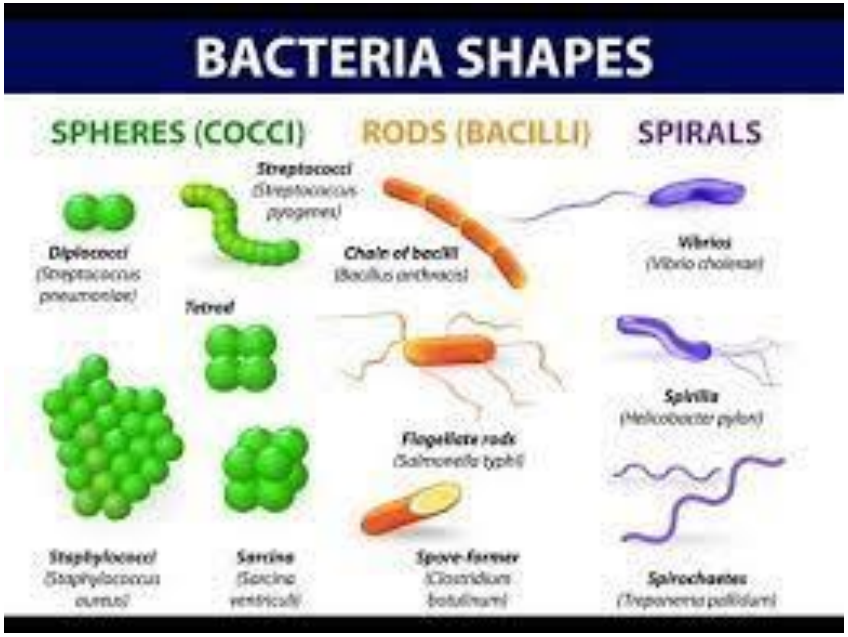


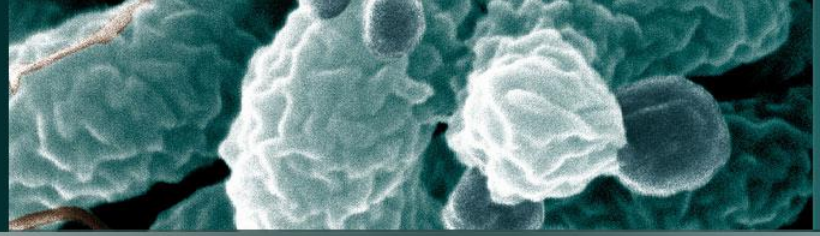
What is the difference between a local and systemic infection?



Microorganisms: Bacteria

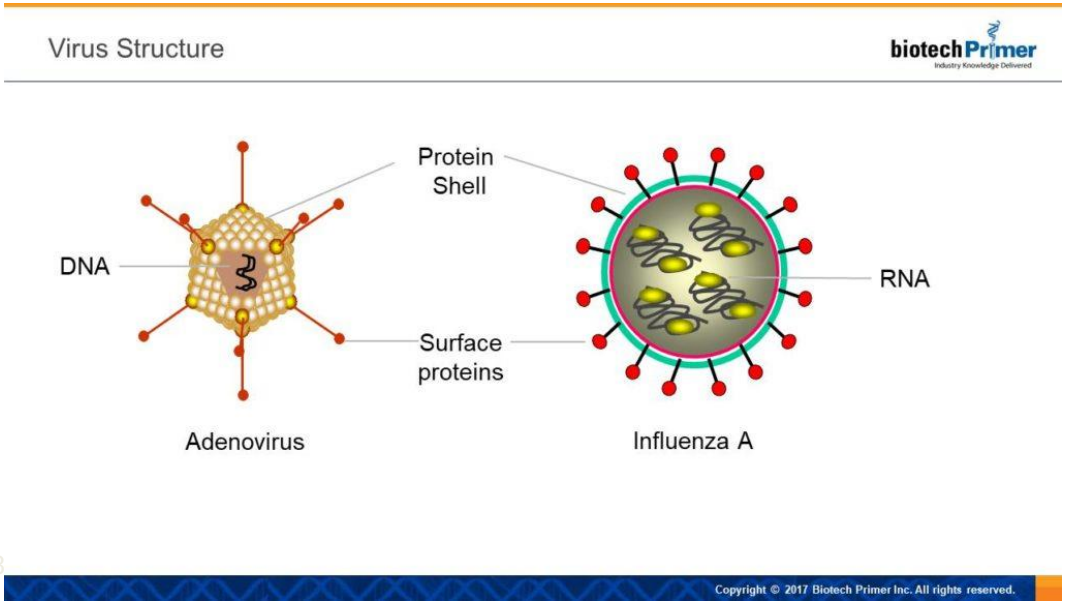
- Good Bacteria (microbiota and normal flora)
- Single cell
- Have cell wall
- Able to form spores
- Often grouped by shapes, clusters
  - Coccus (round), bacillus (rod-shaped), curved rod

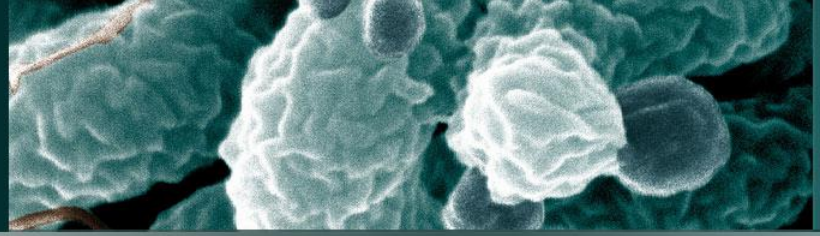




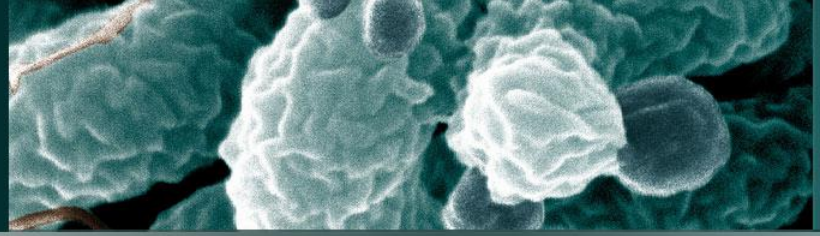
Viruses

- Virus consists of DNA or RNA with a protein shell
- Viruses reproduce only within a host
- Examples of a virus are measles, mumps COVID-19



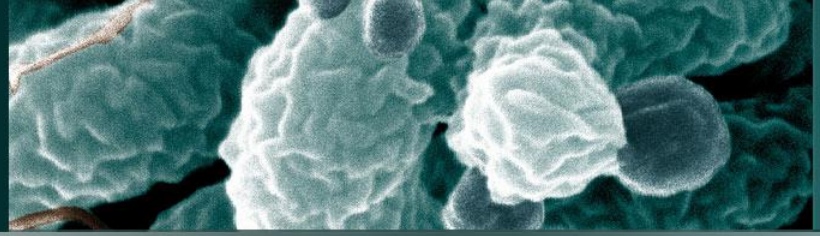


What is the difference between colonization and infection?



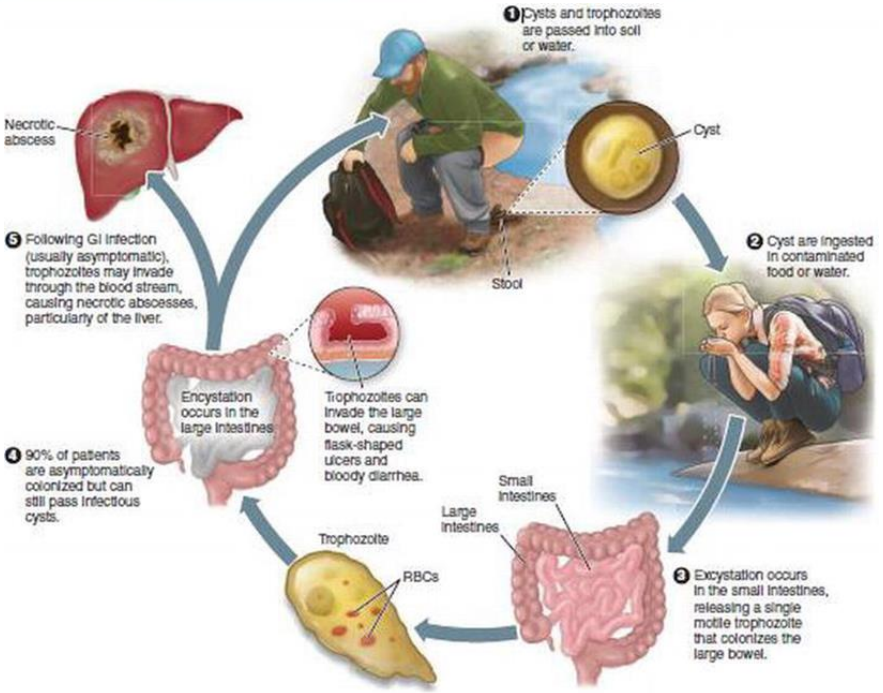
Fungi

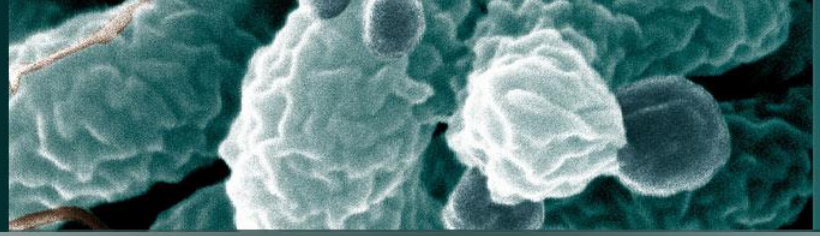
- Fungi cause mycotic infections
- Plantlike organism
- Grow best in dark and damp places
- Fungi cause mycotic (means fungus) infections which are usually localized such as athlete's foot, ringworm, and thrush
- Systemic fungal infections are rare, but when they occur, they are life-threatening and difficult to cure.



Protozoa

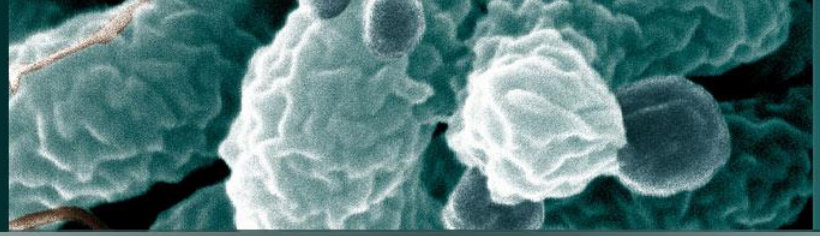
- Protozoa are animal-like microbes
- Four main types of protozoa are amebas, ciliates, flagellates, and sporozoan
- Found in soil and most bodies of water
- Ingested through contaminated water, food, and cause severe diarrhea.





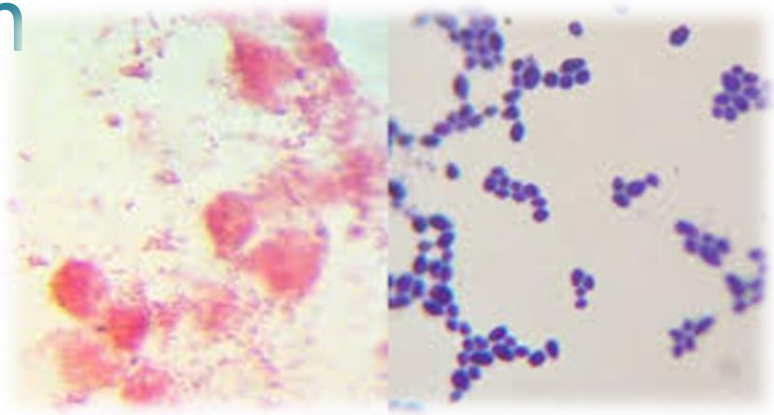
Arthropods and Worms: Multicellular Organisms

- Worms
  - Round or flat
  - Transmission by fecal-oral route
  - Infestation causes weight loss, anemia, and generalized debilitation. Infestation by worms is treated with drugs called anthelmintics
- Arthropods
  - Animals with jointed legs
  - Ectoparasites and vectors

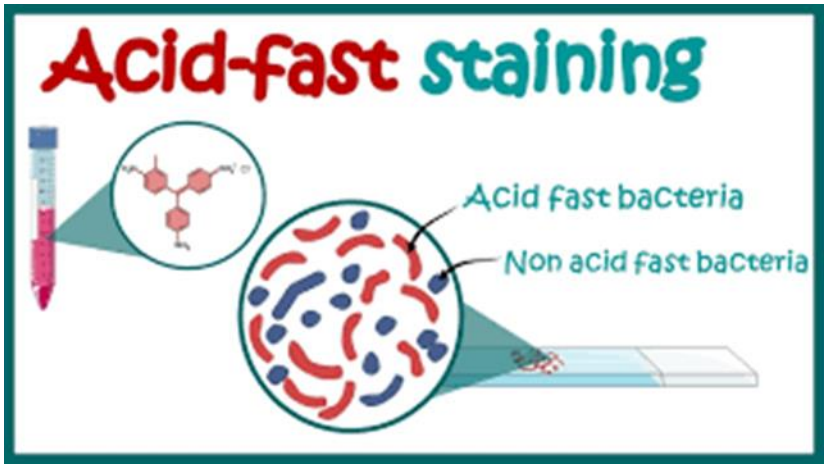


What is a helminth?

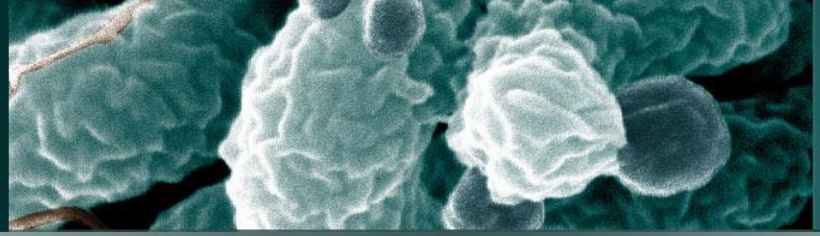
Laboratory Identification of Pathogens



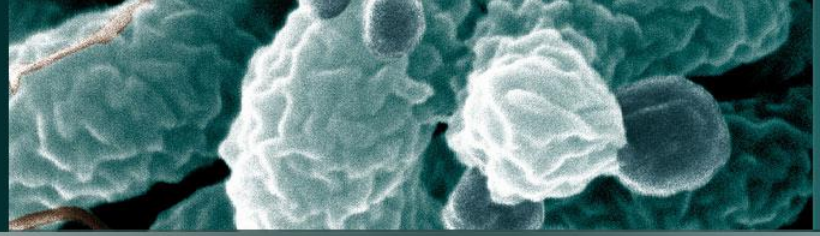
- Staining
  - Gram stain
    - Gram-positive (purple or blue)
    - Gram-negative (pink or red)
  - Acid-fast stain (retains red stain)



- Culture: Pathogen sample collected and grown in a medium

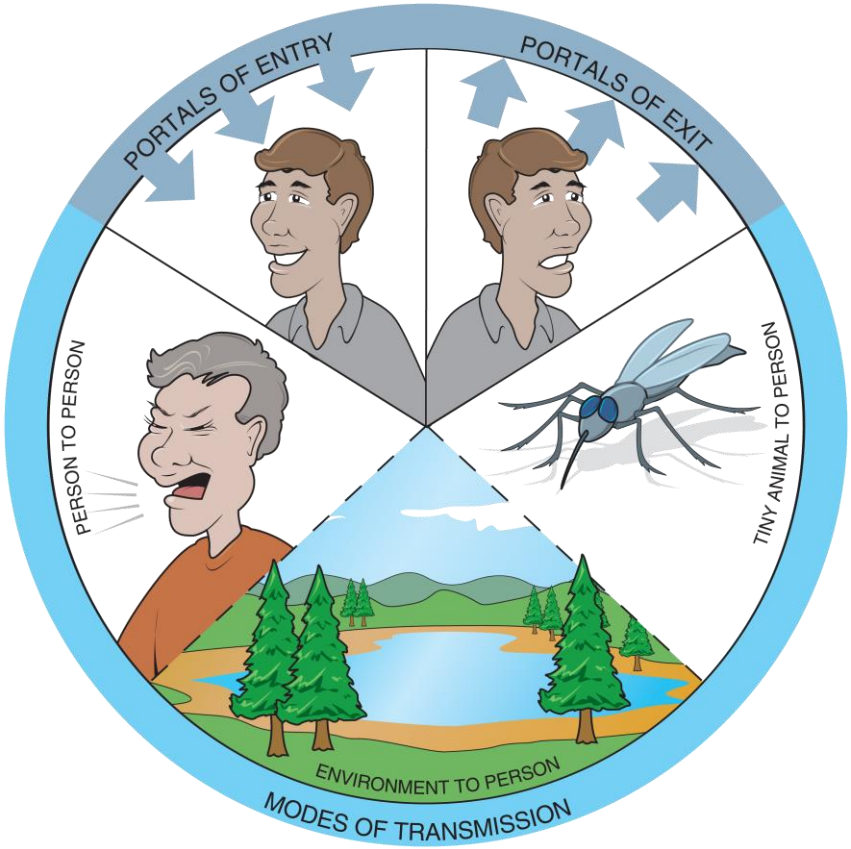


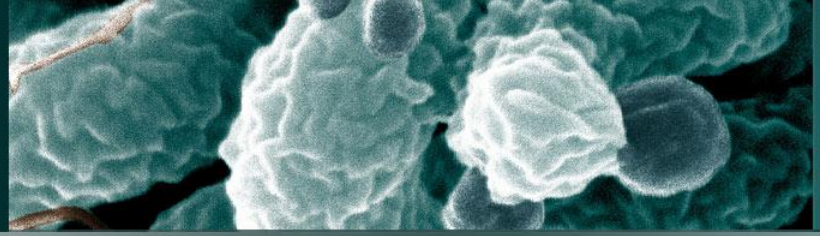
What is an arthropod?



The Spread of Infection: Portals of Entry

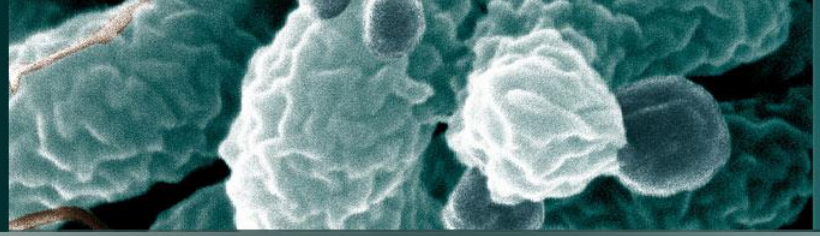
- Respiratory tract
- Gastrointestinal tract
- Genitourinary tract
- Eyes
- Skin
- Parenteral route



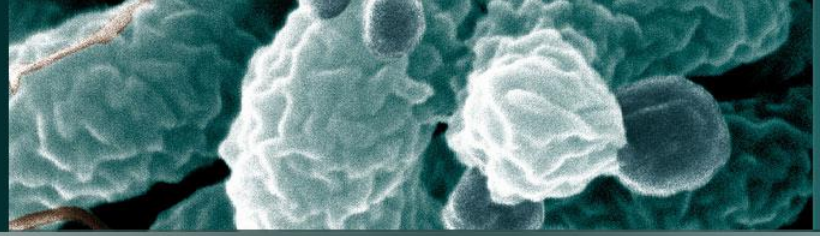


The Spread of Infection: Portals of Exit

- Respiratory tract
- Gastrointestinal tract
- Genitourinary tract
- Eyes
- Skin
- Breasts

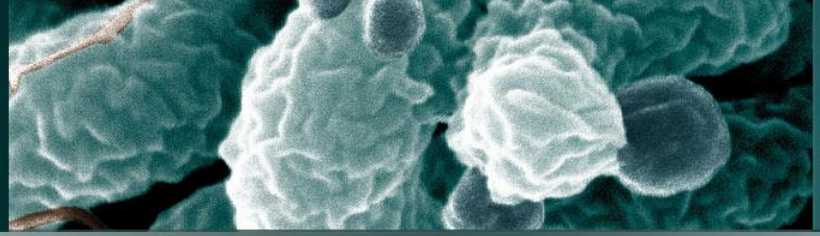


What does it mean when you hear fecal-oral route?



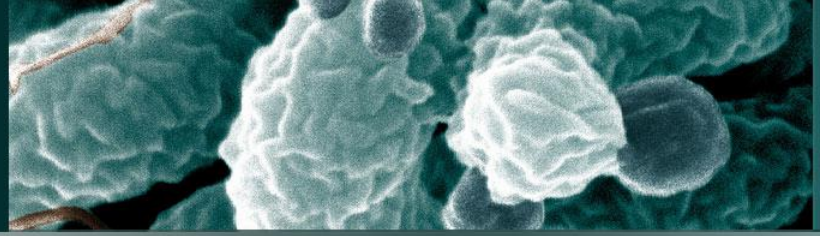
The Spread of Infection: Modes of Transmission

- Modes of transmission
  - Person-to-person- (Droplet, contact (direct/indirect))-fomites
  - Environment-to-person-Includes contact with contaminated water, air, food, or soil
  - Tiny animals–to-person- includes the use of insects/vectors



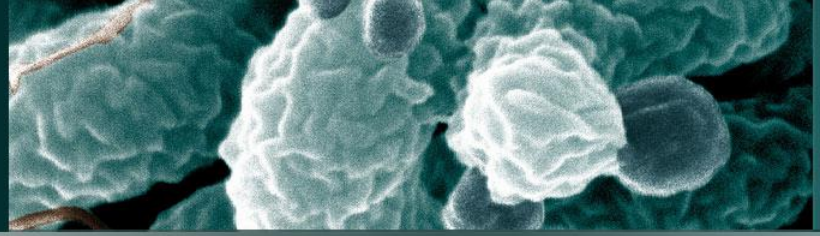
Dr. Semmelweis Screams, “Wash Those Mitts!”

- Read the story of Dr. Semmelweis
- What does the story tell us about nosocomial infection?
- Identify current parallels:
  - H1N1 flu
  - MRSA



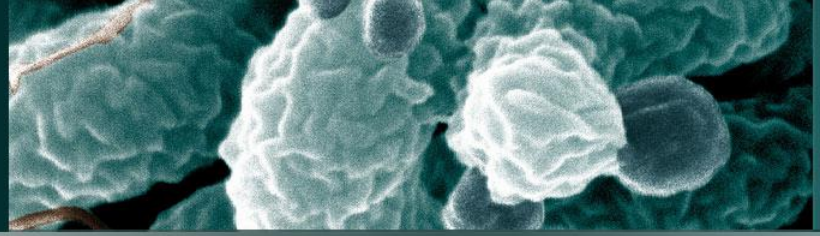
Flora and Her Vaginal Itch

- Read Flora's story
- What does this story tell us about normal flora, antibiotics, and superinfection?



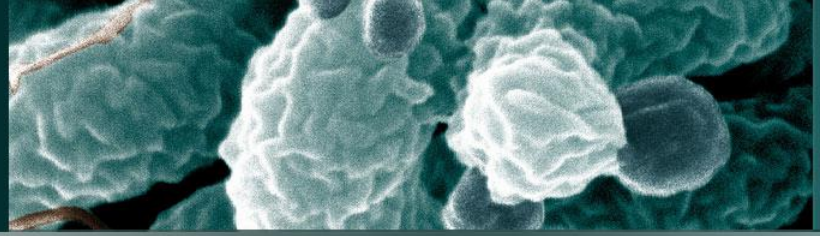
Rick, Nick, and the Sick Tick

- Read the story of the sick tick
- What does the story tell us about animal vector, reservoir of infection, and zoonosis?
- How does the story illustrate the difference between a communicable disease and a contagious disease?



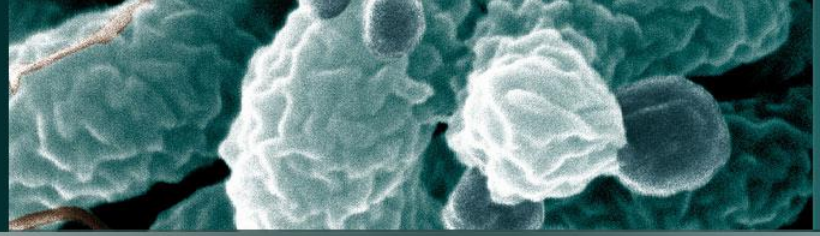
Why Typhoid Mary Needed to Lose Her Gallbladder

- Read Mary's story
- How does this famous historical event illustrate the concepts of carriers and reservoirs of infection?



A Pox News Alert

- Read the account of the various uses of the term *pox*
- Describe the range of conditions described as poxes, and identify the most important contemporary and historical examples



Questions?