

Introduction to Microbiology

Reading Outline - Module 1

Resources:

Textbook Readings

Chapter 20, Pages 259-276

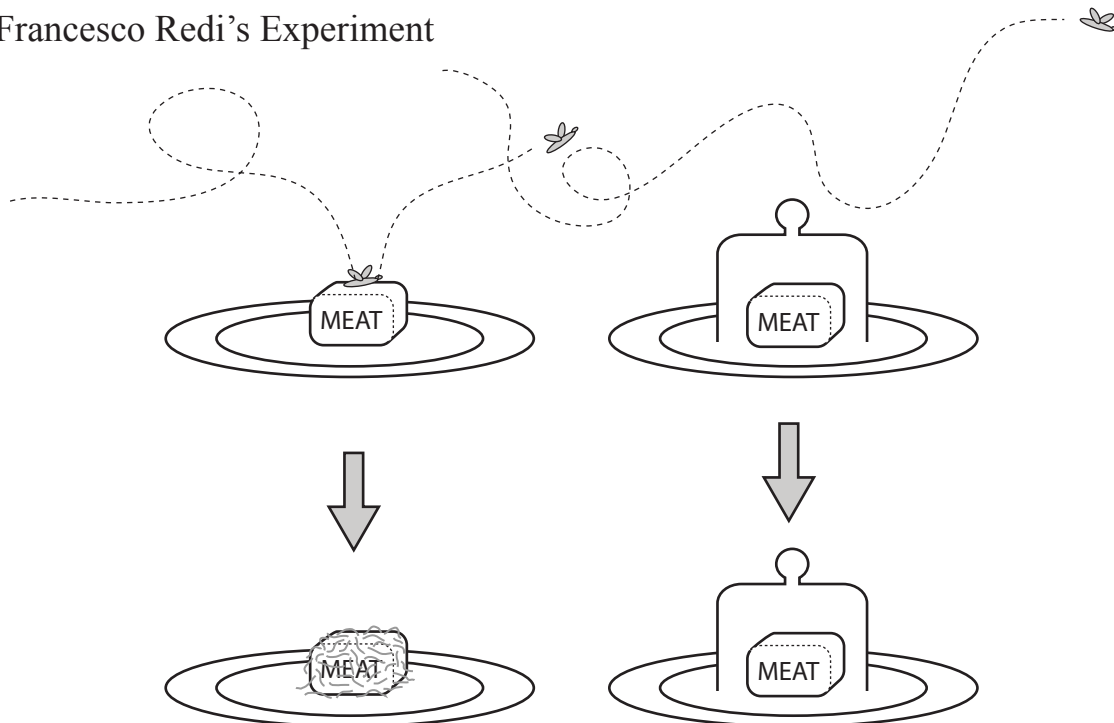
Historical Perspectives	260-264
Nomenclature and Classification	264-267; 268-269
Cell Classifications	267-268
Microbiology Classifications	269
Pathogen Classifications	269-275

Chapter 21

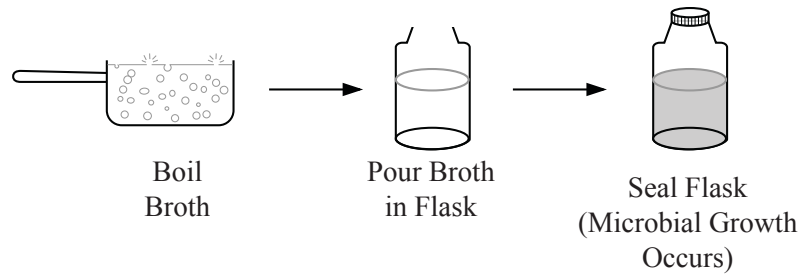
Groupings of Bacteria (only)	296-297
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1. Understanding of the cause of Disease and Control of Disease
 - A. Spontaneous Generation as a Theory (Page 260ff)
 - i. Francesco Redi's Experiment (Page 260)

Francesco Redi's Experiment

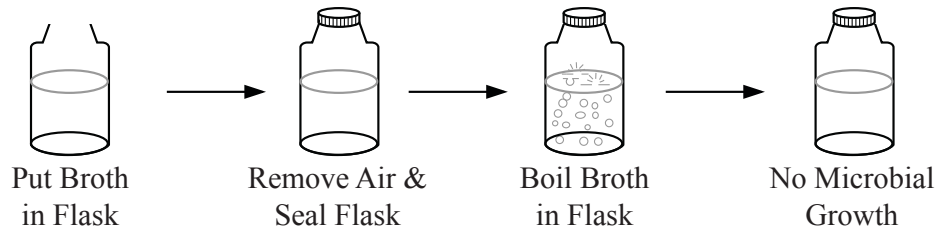


i. John Needham's Experiment (Page 260)



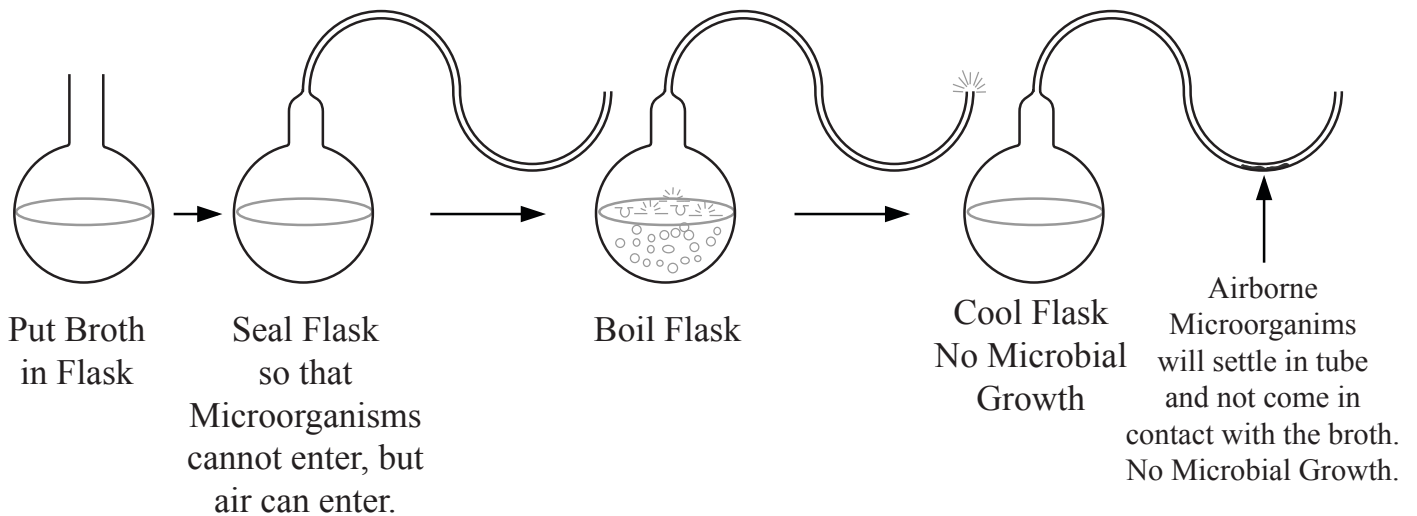
iii. Spallanzani's Experiment (Page 260)

Spallanzani Experiment

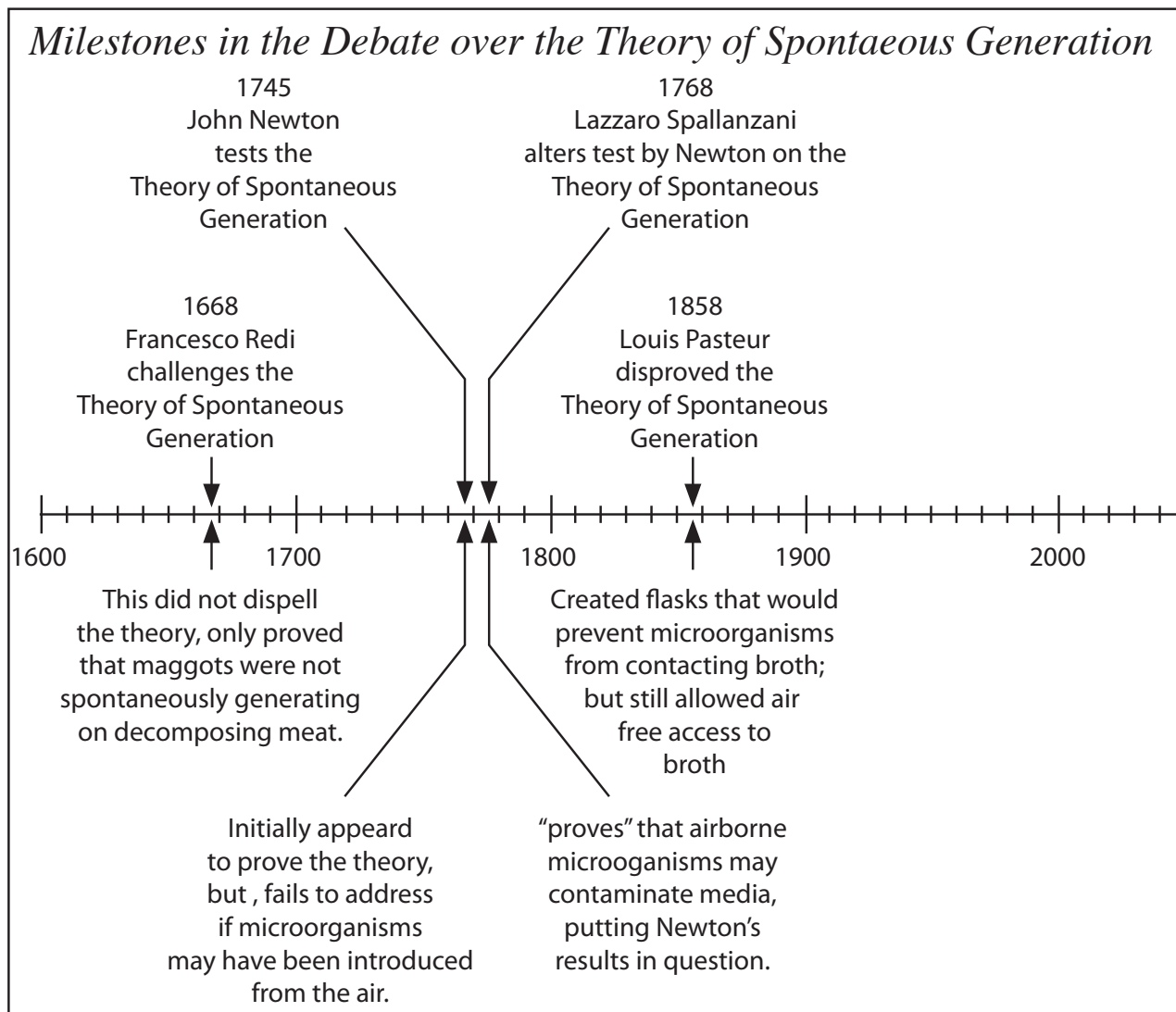
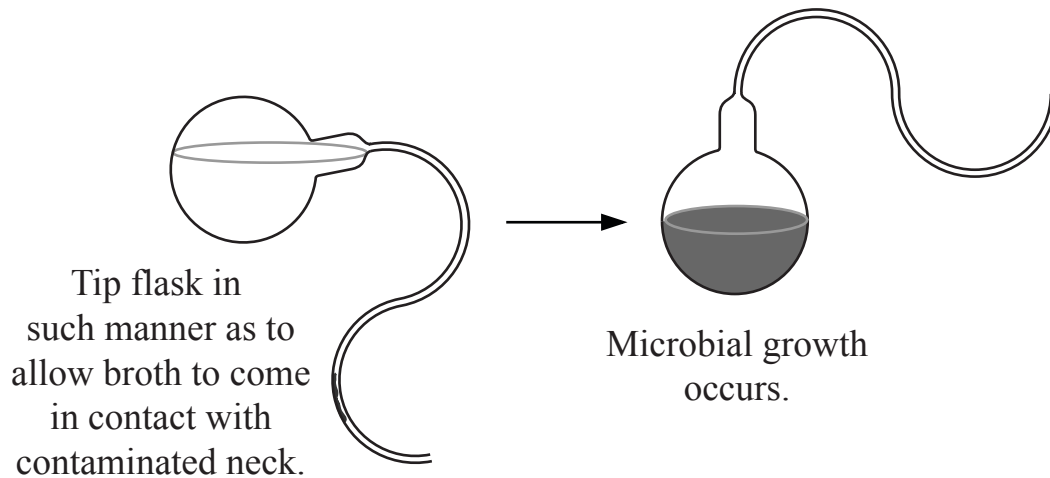


iv. Louis Pasteur (Page 260)

a. Initial set up

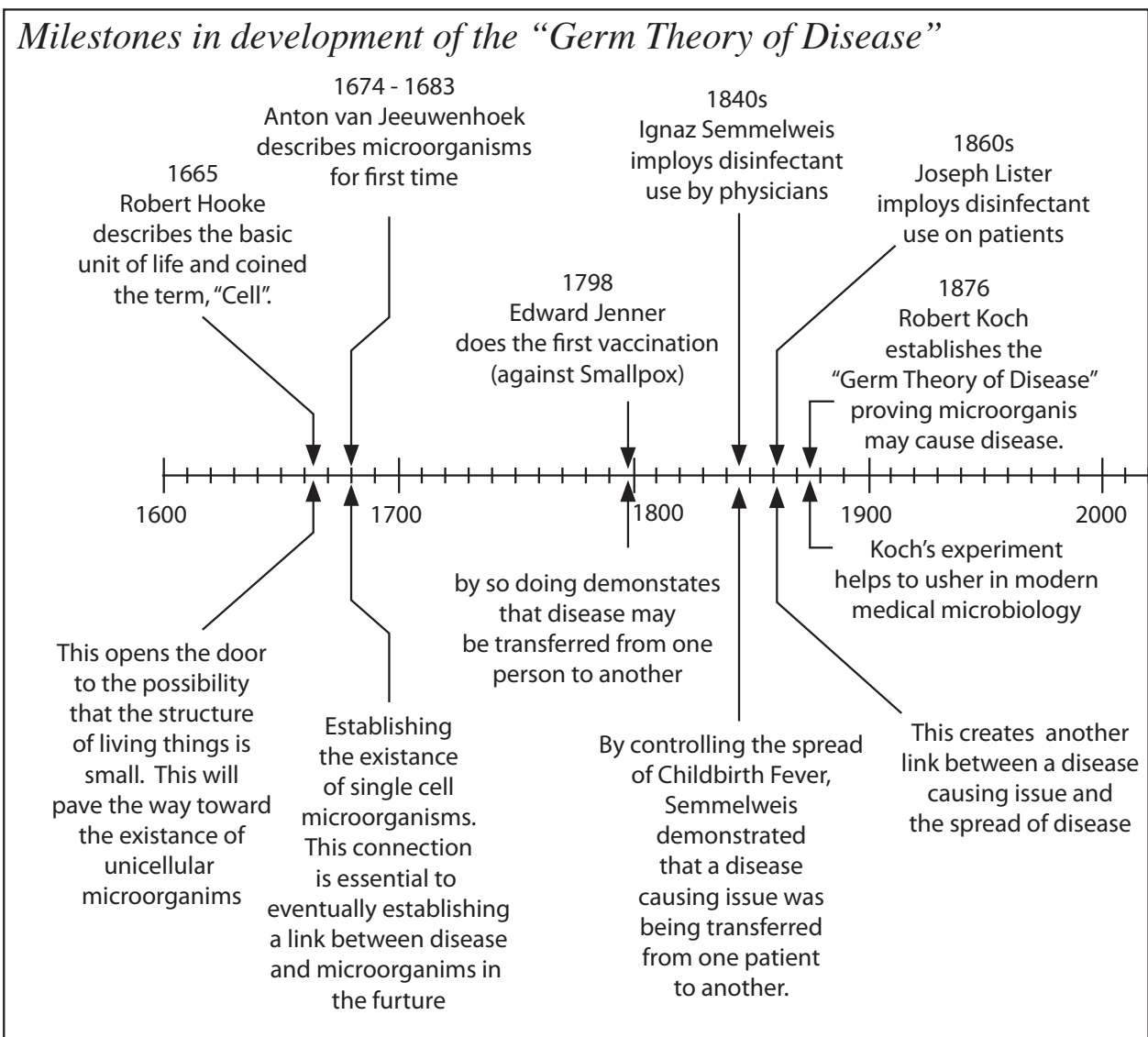


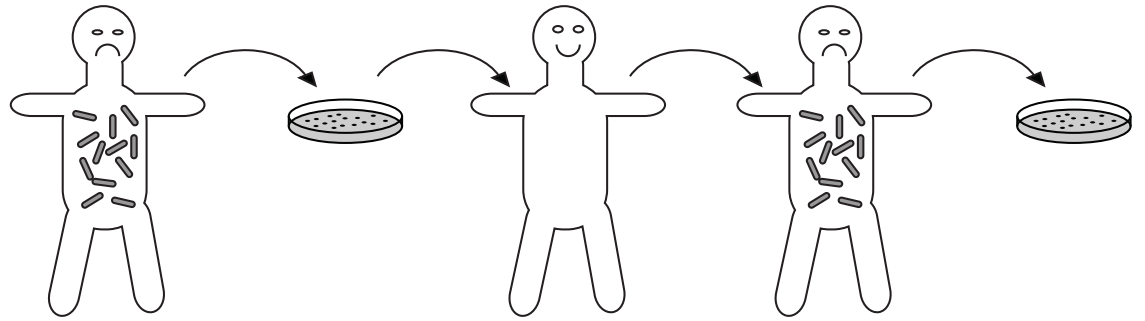
b. At a later date



B. Development of the Germ Theory of Disease (Pages 262 - 263)

- i. Robert Hooke – 1665 (Page 262)
- ii. Anton van Leeuwenhoek – 1674 – 1683 (Page 262)
- iii. Edward Jenner – 1798 (Page 261)
- iv. Ignaz Semmelweis – 1840s (Page 262)
- v. Joseph Lister – 1860s (Pages 262 - 263)
- vi. Robert Koch – 1876 (Page 263)





1. The agent of disease must be in all people with a disease in question.

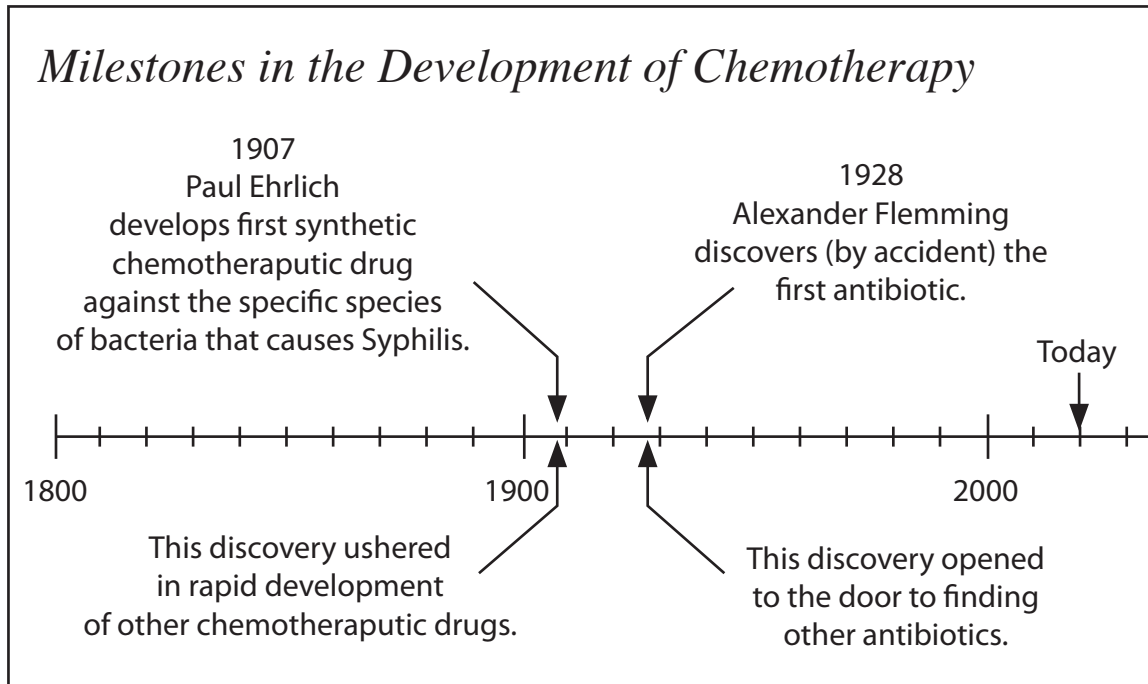
2. The agent of disease must be isolated in pure culture.

3. If agent of disease is given to healthy individual, the individual must demonstrate symptoms associated with the disease in question.

4. The agent of disease must again be isolated in pure culture.

C. Chemotherapy and Modern Medicine (Page 263 - 266)

- i. Issues in the development of chemotherapy
 - a. Selective Toxicity: destroy disease causing microorganisms without effecting host. (Page 264)
 - b. “Perfect Drug” vs. Side effects (Page 266)
 - c. Antibiotics (Page 266)
- i. Historical Figures (Pages 263 – 266)
 - a. Paul Ehrlich (Pages 264 – 266)
 - b. Alexander Fleming (Page 266)



2. Nomenclature (Page 266ff, see also, page 268)

(Suggestion: Read “Kingdoms” (Pages 268 - 269), first)

A. Microbiology defined (Page 266)

B. Binomial Nomenclature

(Ex: *Staphylococcus aureus* or Staphylococcus aureus)

i. Genus: Staphylococcus

ii. Species: aureus

iii. Abbreviation: S. aureus

Suggested Additional Reading: See
“Binomial Nomenclature” in
Animations and Other Links

3. Cell Types (Page 267ff)

A. Eukaryotic

- i. Cell membrane
- ii. Nucleus with DNA
- iii. Cytoskeleton

B. Prokaryotic

- i. No Nucleus, DNA as loop within cell
- ii. Cell Wall of Peptidoglycan
- iii. Cell Capsule
(will deal with this later)
- iv. DNA as loop within the cell

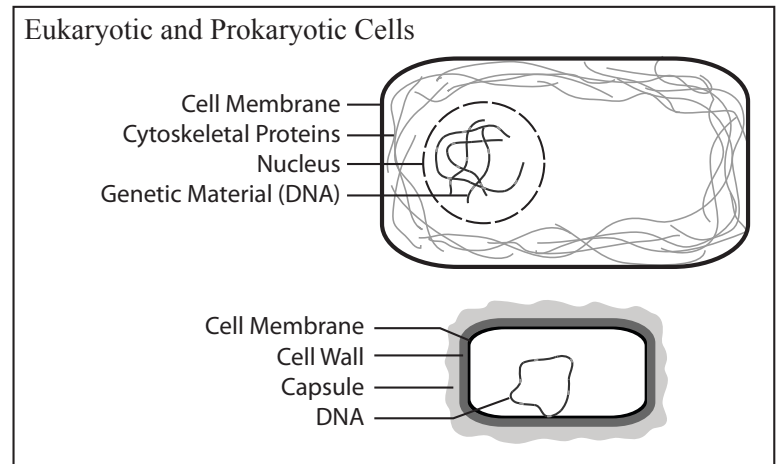


Image Support: See Eukaryotic vs Prokaryotic Cell Structure

4. Groupings of Microorganisms

A. Bacteria (Page 269ff)

- Bacteriology
 - i. Pathogenic vs Nonpathogenic species (Page 269)
 - ii. Microbial Associations (or Interspecific [Symbiotic] Relationships) (SEE Pages 296-297)
 - a. Saprophytic Organism (Page 296)
 - b. Mutualism (Page 296)

- Example: *Escherichia coli*
- c. Commensalism (Page 297)
- d. Parasitism
- iii. Normal Flora (or Normal Microbiota) and Antagonism (or competitive inhibition) (Page 297)

5. Mycoplasmas (Page 270)

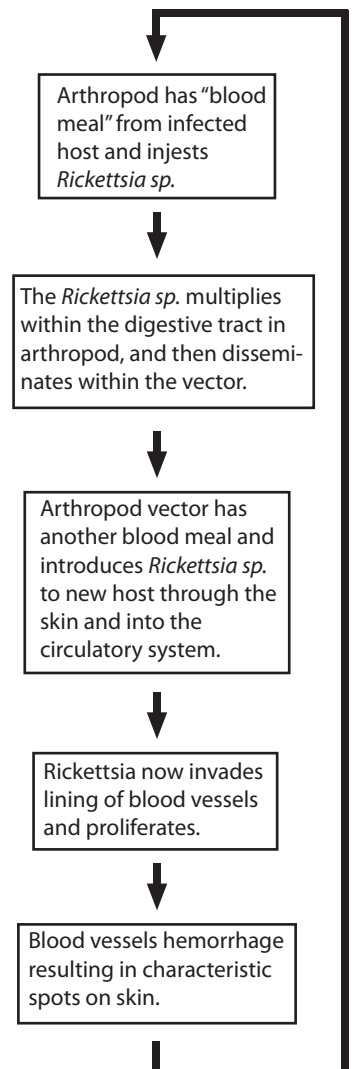
A. General Characteristics:

- i. No Cell Wall
- ii. Repeated infections tend to get worse
- iii. Example: *Mycoplasma pneumoniae*, the causative agent of Primary Atypical Pneumonia (“Walking Pneumonia”)

6. Rickettsia (Page 270)

A. General Characteristics:

- i. Obligate Intracellular Parasite
- ii. Arthropod Vector: flees, ticks, mites, etc.
- iii. Transmission Route



7. Chlamydia (Page 270ff)

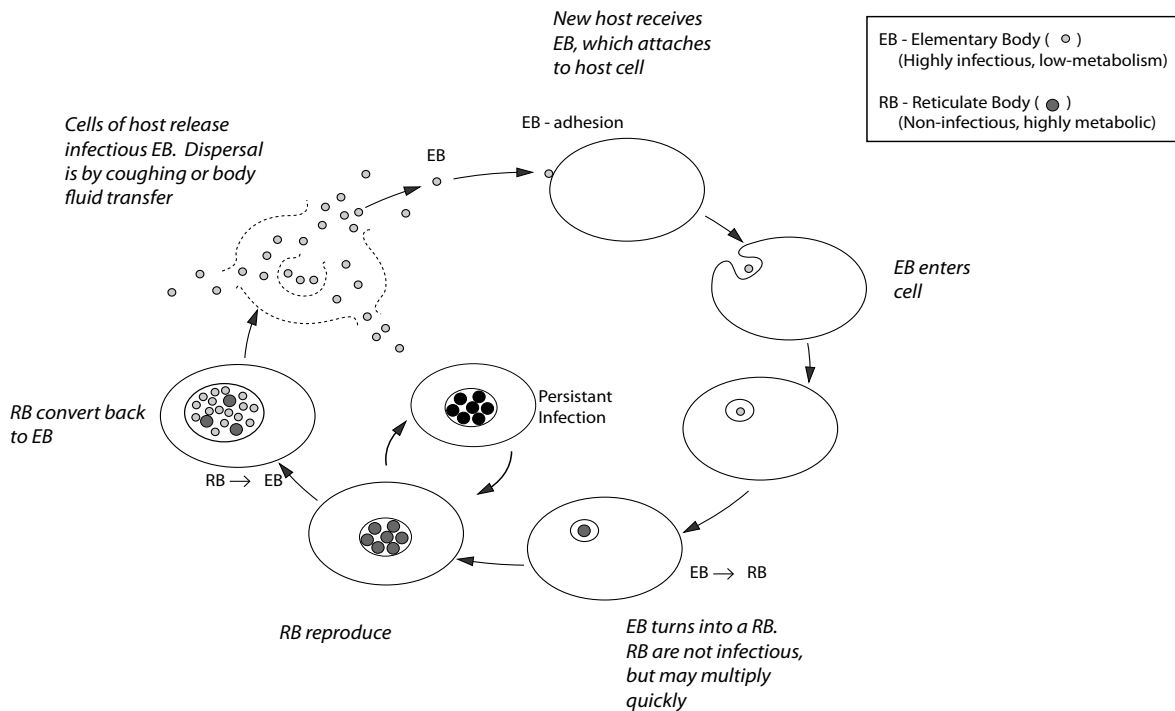
A. General Characteristics:

- i. Obligate intracellular parasite
- ii. NO arthropod vector
- iii. Non-motile
- iv. Energy dependent on host
- v. Generalized Life cycle of Chlamydia (*not in text*)

a. Two forms

- Elementary body (highly infectious, but inactive)
- Reticulate Body (noninfectious, but actively growing)

Image Support: See several images.



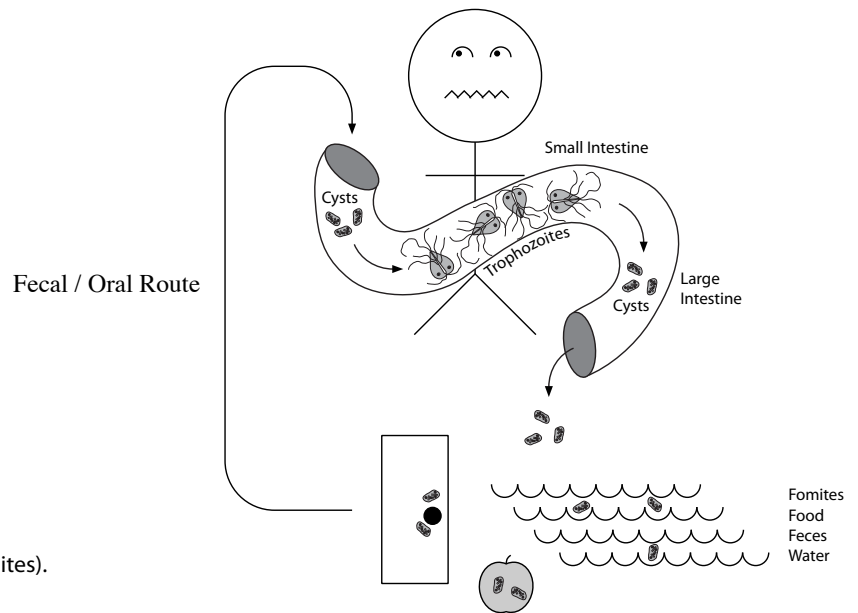
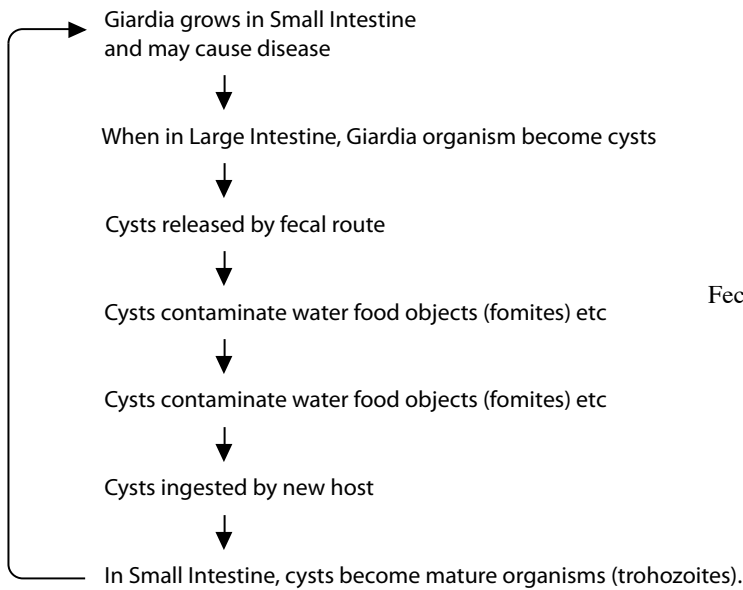
8. Protozoa (Page 271)

A. General Characteristics:

- i. Single Celled Eukaryotes
- ii. Only ~12 species cause disease, but they are serious diseases

B. Example of a common disease: Giardiasis, causative agent Giardia lamblia

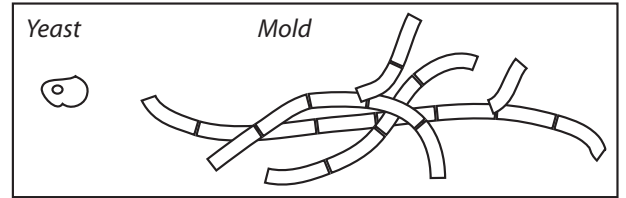
Giardia lamblia Life Cycle



9. Fungi (Page 271ff)

A. General Characteristics:

- i. Eukaryotic
- ii. Single celled (yeast) or Multicellular (molds)
 - a. Dimorphic



Single celled (yeast) ↔ Multicellular (molds)

- iii. Saprophytic

B. Mycoses (fungal diseases) (Page 272)

- i. Superficial Mycoses of skin
- ii. Cutaneous Mycoses
- iii. Subcutaneous Mycoses
- iv. Systemic Mycoses

10. Viruses (Page 272ff)

A. General Characteristics:

- i. Obligate intracellular parasite
- ii. Basic Viral Anatomy

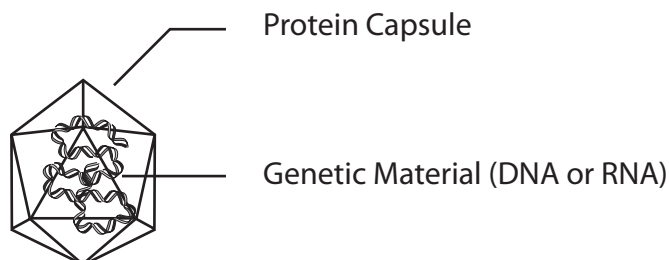


Image Support: See Viral Life Cycle