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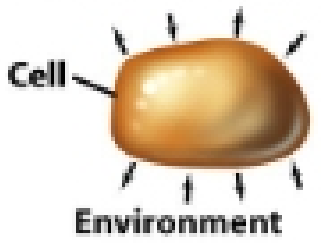
Microbiology Test 1 Review Sheet

1. Describe the difference between a basic and applied biological science.
   - a ***basic biological science***. It has been a foundation for understanding many processes of physiology, ecology, and genetics

   - an ***applied biological science***. It has—and continues to—help us solve many problems relating to health, agriculture, and industry

2. Be able to state and describe the six characteristics of cellular life.

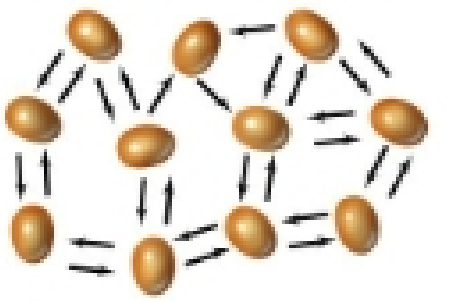
1. Metabolism
Uptake of nutrients from the environment, their transformation within the cell, and elimination of wastes into the environment. The cell is thus an *open* system.



2. Reproduction (growth)
Chemicals from the environment are turned into new cells under the direction of preexisting cells.

3. Differentiation
Formation of a new cell structure such as a spore, usually as part of a cellular *life cycle*.

4. Communication
Cells *communicate* or *interact* primarily by means of chemicals that are released or taken up.



5. Movement
Living organisms are often capable of self-propulsion.

6. Evolution
Cells contain genes and *evolve* to display new biological properties. Phylogenetic trees show the evolutionary relationships between cells.

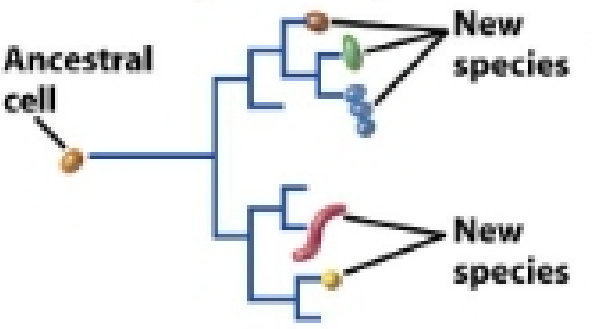


Figure 1-3 Brock Biology of Microorganisms 11/e
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3. All cells carry out or have the potential to carry out **metabolic processes**.

4. Know the seven scientists from lecture #1 and their contributions to the study of microbiology.
- **Robert Hooke**- first to describe microorganisms (mold)→ coined the term "cells" on viewing cork

- **Antoni Von Leeuwenhoek**- first to describe bacterial cells "wee animalcules" (1684)

- **Ferdinand Cohn**- (founder of the science of bacteriology) defined bacteria as chlorophyll-less cells of characteristic shape that multiply by cross division and live as

single cells, filamentus cell chains, or cell aggregates. First to describe the life cycle of endospore-forming bacteria
- **Louis Pasteur**- microbes in lactic acid fermentation (1857), yeast in alcohol fermentation (1860), disproof of spontaneous generation (1864), developed vaccines to rabies (1885), chicken cholera, and anthrax

- **Robert Koch**-developed methods for pure culture of microorganisms (1881), postulates for determination of the etiological agents of disease (1884), discovered cause of tuberculosis

- **Martinus Beijerinck**- microbial selection (enrichment culture)(1901), identified aerobic nitrogen fixers, sulfate reducers, sulfate oxidizers, symbiotic nitrogen fixers, first to describe viruses, though he could not see them

-**Sergei Winogradsky-** developed concept of chemolithotropy, discovered several species, Microbiologie du sol

5. Know Koch's postulates:

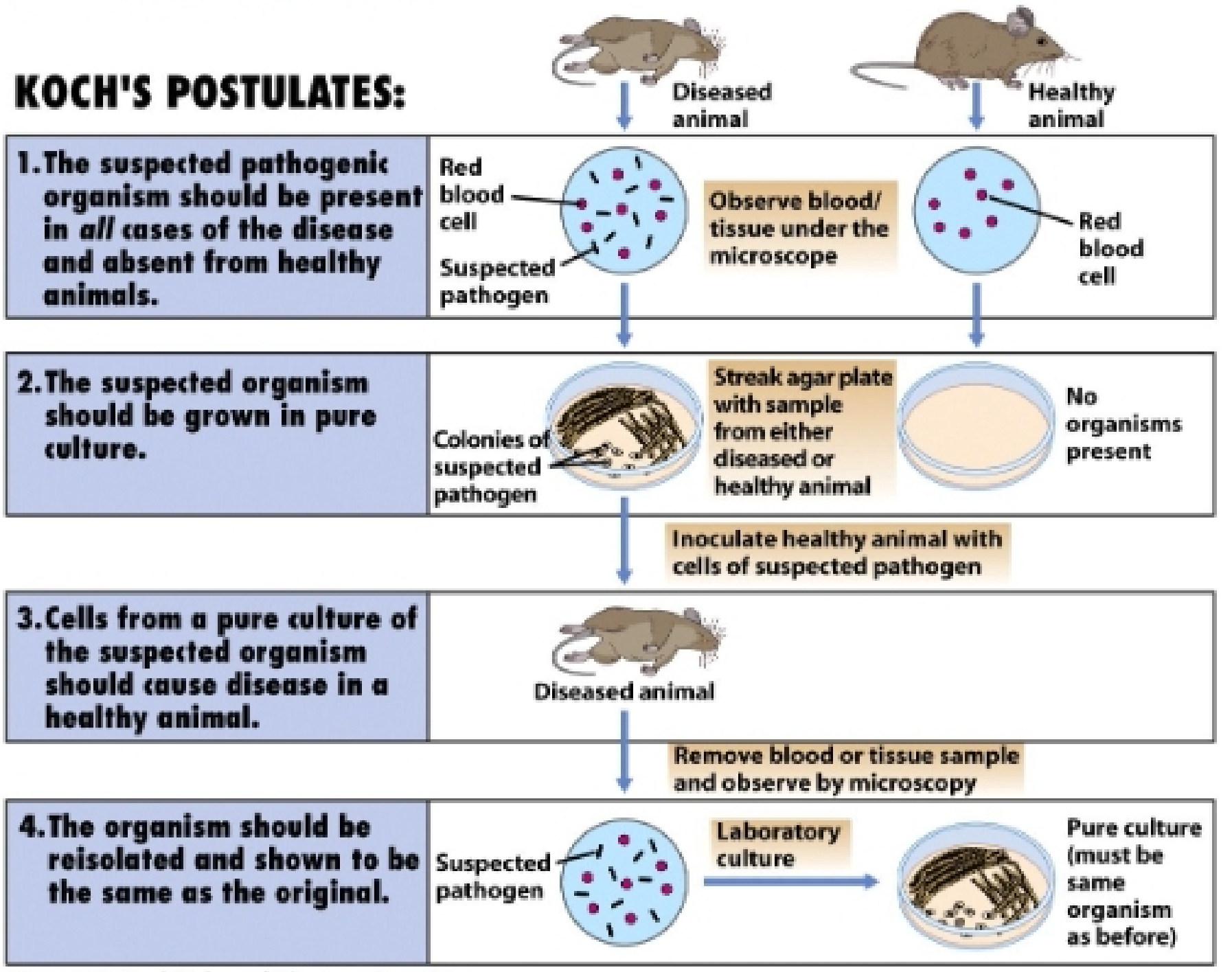
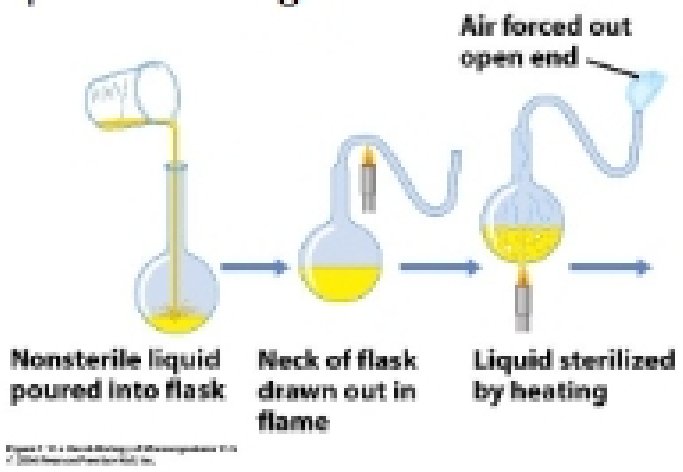
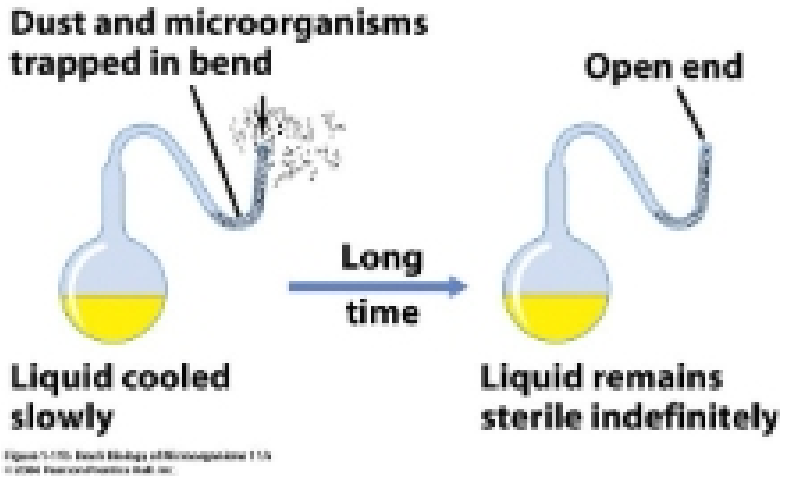
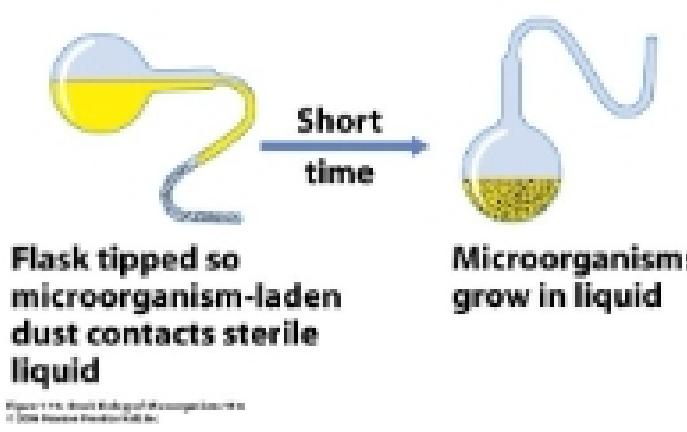


Figure 1-12 Brock Biology of Microorganisms 11/e

a. Suspected organism should be found in **diseased** individuals and be absent in **healthy** individuals.
b. Suspected organism should be grown in **pure culture**.
c. Cells from a pure culture of suspected organism should **cause disease** in a healthy animal.
d. Organism should be **reisolated** and shown to be **the same as the original**.
6. Be able to describe Pasteur's experiment, providing evidence against spontaneous generation.







7. What is enrichment culture?
- medium with specific and known qualities that favors the growth of a particular microorganism

8. How do prokaryotic cells differ from eukaryotic cells in their structures, size, and arrangement of DNA?