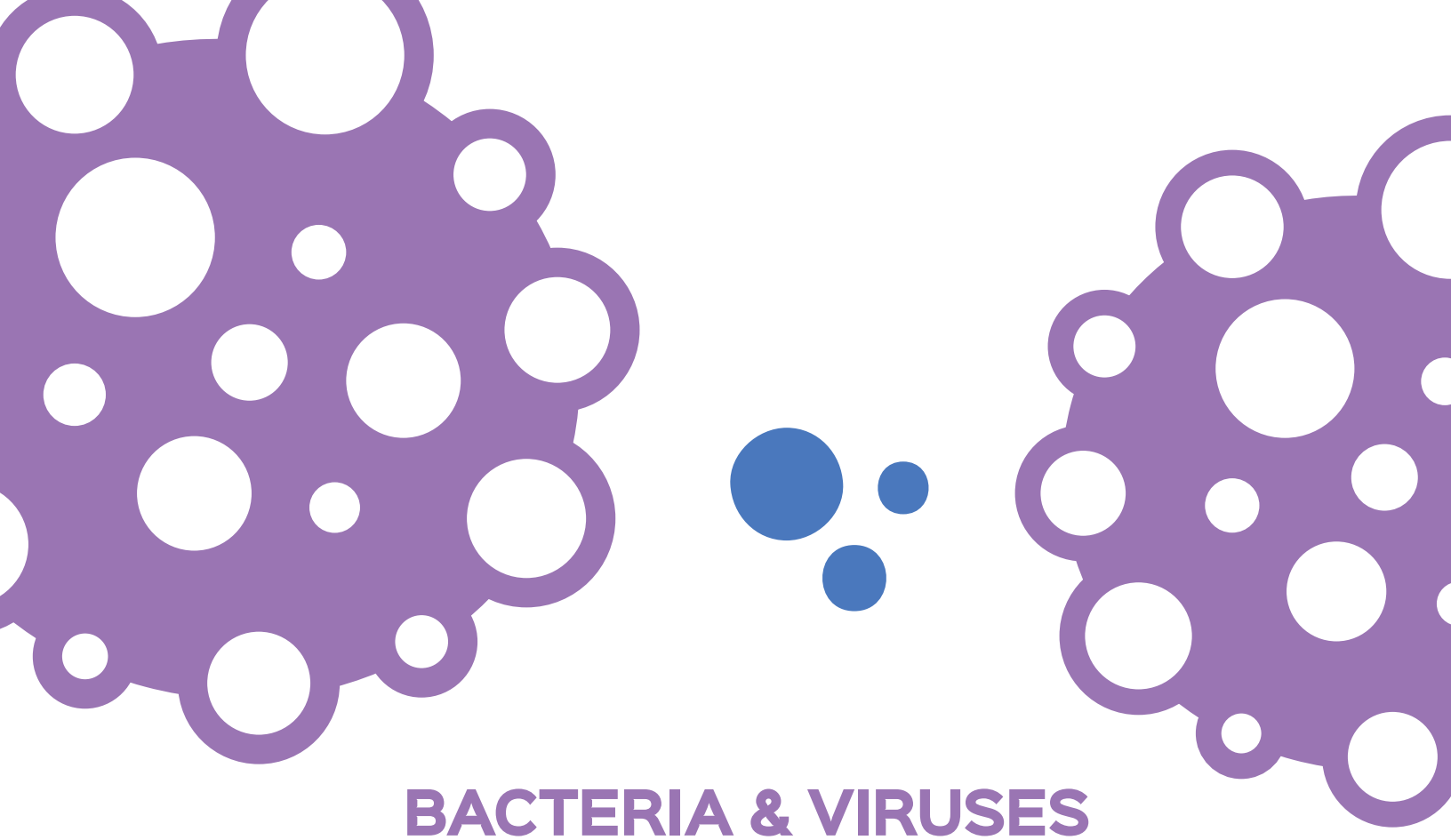


BACTERIA & VIRUSES

LESSON 12

Some diseases have plagued humanity since our earliest parents walked the earth—which ought to remind us of our fallen condition. Still, there's much to learn about these fascinating microscopic creatures.

New Vocabulary

Antibiotics
Binary fission
Capsid
Capsule
Plasmids
Chemosynthetic
Decomposers
Flagella
Host cell
Lysogenic cycle
Lytic cycle
Pilus
Prokaryotes
Vaccinations
Virulence

OUTLINE & NOTES

LESSON 12A: BACTERIA

I. Microbiology is the study of _____

II. Classification of bacteria

A. Two kingdoms that include bacteria: _____

and _____

B. Bacteria in both kingdoms are _____ : they have no

_____ inside their cells.

C. How archaebacteria and eubacteria differ:

1. _____

2. _____

3. _____

III. Benefits of bacteria

A. A few of the ways bacteria benefit us and our ecosystem:

1. _____

2. _____

3. _____

4. _____

IV. Cellular anatomy of bacteria

A. **Cell membrane:** _____

B. **Cell wall:** _____

C. **Capsule:** _____

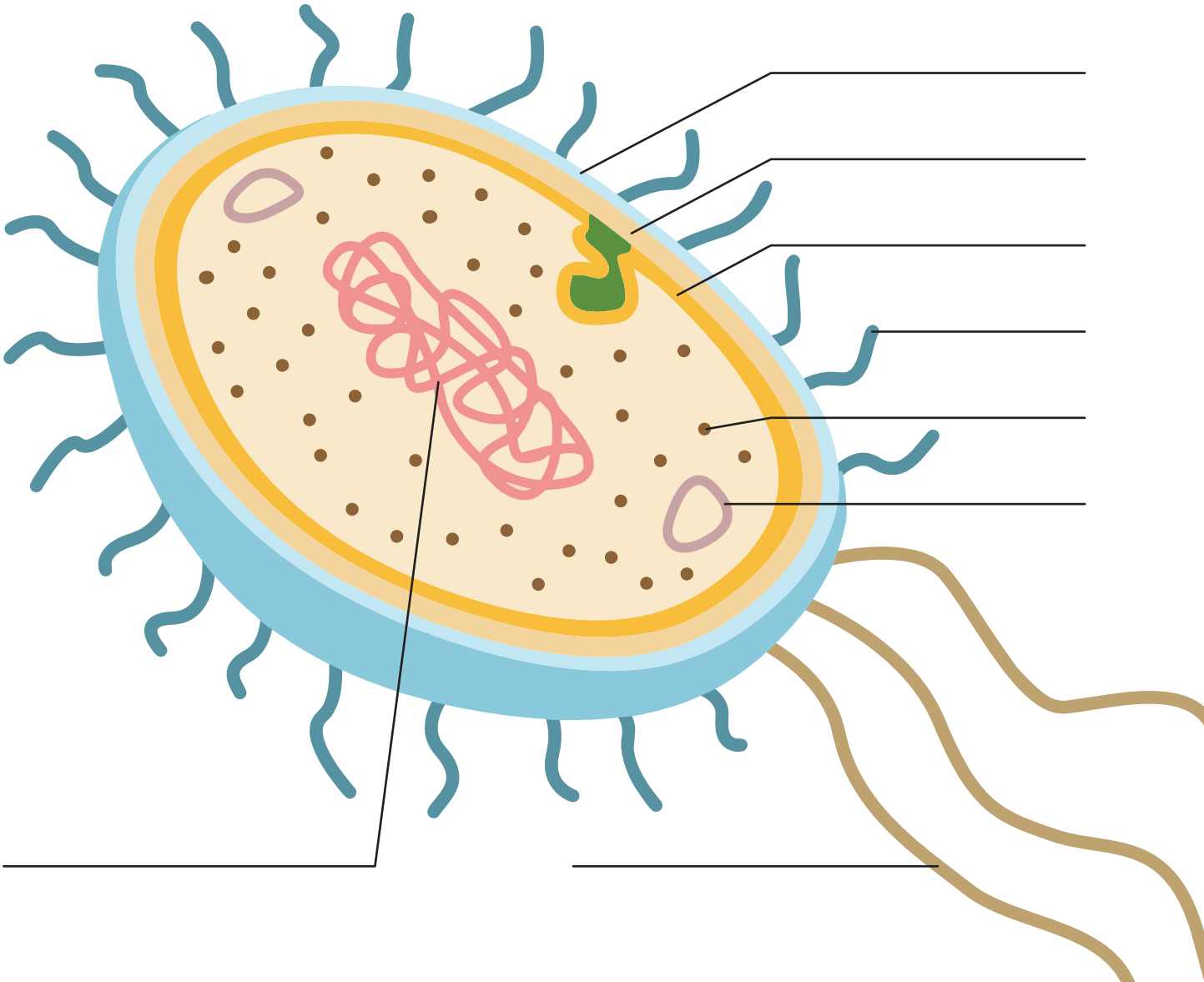
D. **Double-stranded DNA:** _____

E. **Ribosomes:** _____

F. **Plasmids:** _____

G. **Pilus:** _____

H. **Flagella:** _____



V. Bacteria shapes

A. Coccus: _____

B. Bacillus: _____

C. Spirillum: _____

D. Spirochaeta: _____

Notes

VI. Bacterial reproduction

A. Bacteria reproduce via _____

1. Cells _____ as bacterial chromosomes _____ into two _____

2. A dividing wall called a _____ forms down the cell which results in two _____

B. Conditions required for bacteria to thrive:

1. _____
2. _____
3. _____
4. _____

Notes

VII. Pathogenic bacteria

A. Pathogenic bacteria cause

_____

B. The Development of _____

has helped treat many deadly bacterial diseases.

C. Downside of antibiotics has been

_____

_____

_____

_____

_____

OUTLINE & NOTES

LESSON 12B: VIRUSES

I. Viruses and life

A. Viruses are not truly _____ because they lack many _____

B. Without the living machinery of a _____, the code in a virus does _____. But inside a cell they _____

C. Outside of a host cell, viruses don't...

1. _____
2. _____
3. _____
4. _____

Notes

II. Structure of a virus

A. Core of _____ or _____

B. Protein shell called a _____

III. Viruses and their host

A. Viruses can infect the cells of _____, _____, _____, _____, or _____

B. Viruses target _____ **to be their** _____

C. The ability of a virus to infect a cell is called _____

D. When a virus invades a _____ and takes it over, the _____ becomes a factory to make _____

Notes

IV. The lytic cycle

A. First, the virus must _____, usually through one of many ways including being _____, _____, _____, or _____

B. Then it _____ using _____

C. It then penetrates the cell and the _____ of the virus enters the cell via _____

D. The _____ is left outside the cell.

E. The virus's DNA begins to steal _____ from the cell in order to _____ its own _____

F. New _____ are assembled using _____ to form _____ around the replicated _____

G. The cell's _____ and _____ are used by the virus and depleted until the cell _____

H. Then, _____ in the virus cause the cell to _____ and release new _____ into the environment where they'll seek out new _____

Notes

V. The lysogenic cycle

A. Viruses do not always immediately _____ a cell. Sometimes they remain _____ for a time.

B. This happens when a virus _____ and integrates its _____ into the _____ genome.

C. Each time the _____ is _____ during cell division, the _____ is passed on to _____

D. When a certain _____ is applied, it _____ the virus to enter an _____

E. The virus then enters the _____ and a large number of cells may be _____ all at once.

VI. Fighting viruses

A. _____

B. _____

C. _____

Notes

LABORATORY ASSIGNMENT

LESSON 12

Microorganisms in your environment

Bacteria are unicellular organisms that thrive nearly everywhere. They are the smallest living organisms that can be seen with a compound microscope. Most are heterotrophic, meaning they cannot make their own food, while some are autotrophic—obtaining their food via photosynthesis or chemosynthesis.

In this lab you'll be comparing several locations to see where the greatest number and kinds of microorganisms are found by growing bacteria in a petri dish with nutrient agar. Nutrient agar is a medium that contains the nutrients necessary to grow a wide variety of bacteria.

Materials

- 5 Petri dishes of nutrient agar
- Masking tape
- Cotton swabs

Safety Precaution:

It's very important to use caution when working with unknown microorganisms as you do not know whether or not they are pathogenic. Once the petri dish is sealed, do not reopen it.

Instructions

1. Obtain a petri dish containing nutrient agar. This will serve as the food source for your bacteria to be grown on.

2. Choose several locations where you'd like to collect bacteria. You'll use a clean cotton swab for each location. Good places to test include:

- The inside of your mouth
- Your cell phone
- Laptop keyboard
- Handle of soap dispenser
- Table
- Under your fingernails
- Door handles
- Pen or pencil

3. Run the cotton swab across your surface, lift the lid off the petri dish, and gently draw a squiggly line back and forth across the agar. As you're doing this, roll the swab between your fingers.

4. Close the lid of the petri dish and take a piece of masking tape and wrap it just around the edge of the petri dish. Do not put tape across the flat top of the dish — this will obscure your view of the growing bacteria. Record the location you took your sample from on your petri dish.

5. Place your petri dishes upside down in a dark location, being sure to keep them at room temperature or a bit warmer. A cardboard box is a good place to keep them.

6. After 48 hours, carefully count the total number of colonies in your petri dishes. Record the data on the table below. Return your petri dishes to their dark location.

7. After 96 hours, again carefully count the total number of colonies in your petri dishes and record the data on the table below. Return your petri dishes to their dark location.

8. After 144 hours, count the total number of colonies in your petri dishes and record the data on the table below.

Location of Bacteria Collection	Colonies after 48 hours	Colonies after 96 hours	Colonies after 144 hours

LAB REPORT
LESSON 12

Write a lab report. Be sure to answer these questions when writing your report. Don't forget to write down your hypothesis before you begin collecting your results.

Observation Questions:

- According to the data you collected, which location had the largest population of microorganisms?
- Which location had the smallest population?

Discussion Questions:

- Where would you be more likely to pick up the microorganisms of disease — in an environment with large populations of a few kinds, or an environment with a small population of many different kinds? Explain.
- How reliable do you think the results of this experiment were? Explain.
- Suggest factors that may have made the results reliable or unreliable.
- Given your results, what environmental factors seem to encourage the growth of large numbers of bacteria in this location?