

Supplemental Material

CBE—Life Sciences Education

Cavagnetto *et al.*

Supplemental Materials for, “Accuracy and Trust: A Study of Small Group Interaction in Biology”

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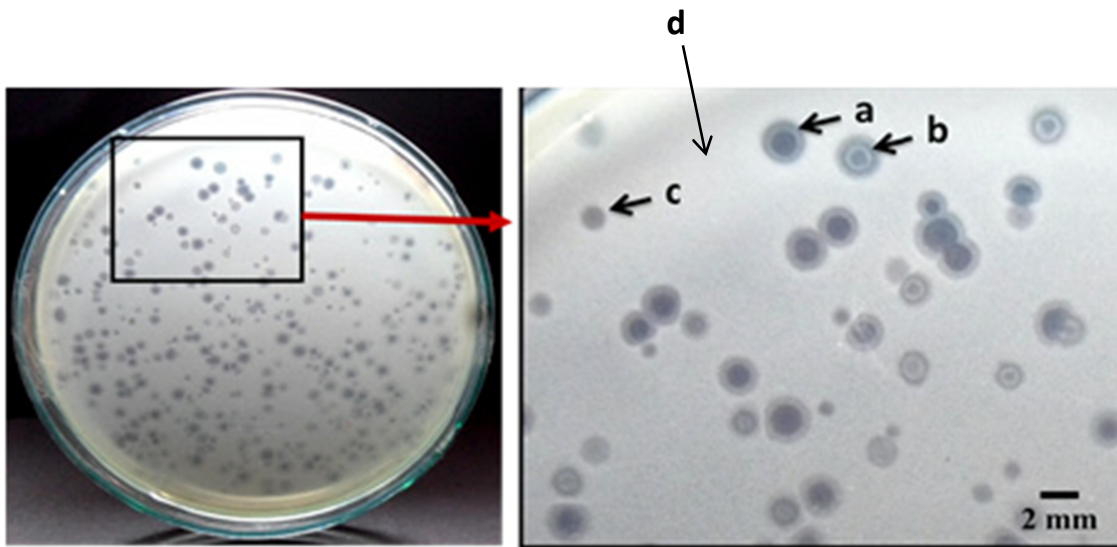
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Student Group Work

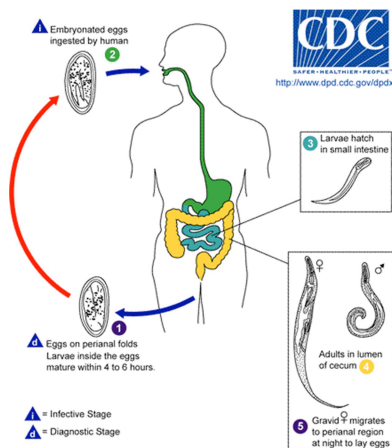
Week 6 Question Set

This week's group work is related to Bacteria and Bacteriophages. You will take a quiz on this material during week 7.



1. A. What kind of experiment is this?
- B. Discuss the similarities and differences between Points a, c, and d on the plate above. What biological organism(s) is present in each location, and where did they come from in the experiment?

2. A. Describe the features or attributes that make an organism "living".
- B. Using what you have learned so far this semester, would you consider bacteria to be living?
- C. Using what you have learned so far this semester, would you consider viruses, and in particular bacteriophage, to be living?



3. A pinworm is a parasite that infects humans and lives and grows within our digestive tract.

- A. In the pinworm-human interaction, which organism is the host and which is the parasite?
- B. What does the host provide to the parasite?
- C. How is the human-pinworm example related to bacteriophage and *M. smegmatis*? Describe the similarities and differences.

Student Group Work

Week 9 Question Set

This week's group work is related to using Phage as tools in biology. You will take a quiz on this material during week 11 (AFTER SPRING BREAK!).

1. One application of phages is to quickly detect the presence of food-borne pathogenic bacteria in food. As an example, a microbiologist working for Chobani takes two batches of yogurt off of the production line. She suspects that one yogurt sample is contaminated with *Listeria*, a common food-borne pathogen, while the other one may or may not be contaminated.

A. The scientist takes an extract from the contaminated yogurt sample and adds 1000 *Listeria*-specific virus particles. After shaking and incubation for a day, what will happen to the number of phage particles in the sample? Why? Is this experiment selective for *Listeria* or could other bacteria lead to false positive results?

B. Based on your answer to Part A., how could the scientist tell if the second yogurt sample was contaminated with either *Listeria* or with *E. coli*, another potentially pathogenic bacterial species?

2. Phage therapy is an alternative to antibiotic treatment for bacterial infections. In phage therapy, phages specific to pathogenic bacteria are delivered to the site of an infection (e.g. on wound dressings, by oral ingestion, through an IV).

A. One side effect of antibiotic treatment is that these chemicals kill many beneficial bacteria in the human gut. Why might phage therapy, for example to combat a *Listeria* infection in the gut, be superior?

B. One problem with antibiotics is that they are typically unstable and quickly degrade in the body resulting in the need for frequent, high doses during treatment. What advantage would phage therapy have over antibiotic treatments in this respect?

3. *Leuconostoc* is a type of bacteria that is used widely in food fermentation, including during the production of wine. Many reports have surfaced of phages negatively influencing wine making by killing *Leuconostoc* bacteria.

A. Discuss with your partners if you think either lytic, lysogenic, or both types of phages would have a major, negative impact on wine making.

B. How could wine makers reduce their chances of losing *Leuconostoc* bacteria during wine making?

Biology 107 Laboratory

Spring 2017

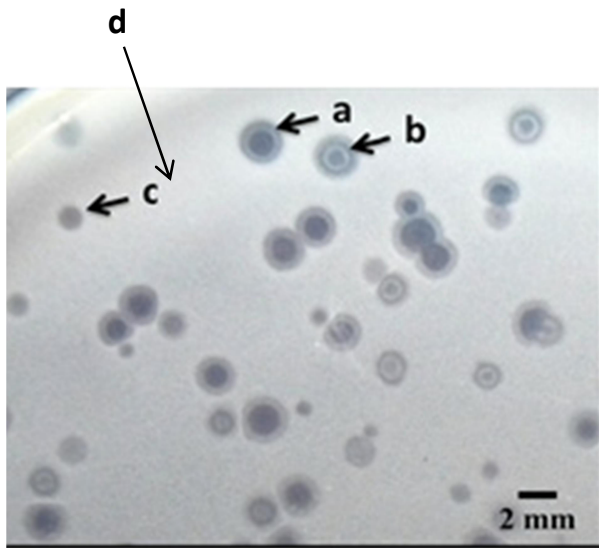
Quiz 2 – Week 7

2 Points total; 0.5 points per question

1. Below are two statements. For each, fill in the blank with either bacteria, viruses, or both bacteria and viruses.

A. _____ are able to generate their own energy using only external sources such as sunlight or glucose. Therefore they are considered living.

B. _____ are able to infect other organisms. This does not tell a scientist if they are living or non-living.



2. If a student were to grow organisms from Points a and d on the experimental outcome shown above, what would they obtain?

Point	Bacteria (Y/N)?	Phage (Y/N)?
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a.

d.

Biology 107 Laboratory

Spring 2017

Quiz 4 – Week 11

2 Points total; 1 point each question

1. A food scientist is working for a dairy farm and she suspects that a dangerous strain of *E. coli* may have contaminated a batch of milk. Describe an experiment that would allow the scientist to quickly and selectively screen for the presence of *E. coli*.

2. Phage therapy has been shown to have advantages over traditional chemical antibiotics.

A. What is one reason that salmonella phages may be preferred over chemical antibiotics to treat a salmonella infection in the human gut?

B. How many doses of salmonella phages would a doctor need to supply, in theory, if a patient came in with a salmonella infection? Compare this to the standard, 5-7 day course of antibiotics that are normally used.