

Bi 1X, Spring 2011

Week 8

- **Plate Count Anomaly**
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Background:

The idea of this "anomaly" was coined by Staley and Konopka¹ in 1985 to describe the large discrepancy between the numbers of cells observed in natural environments by microscopy versus those that form colonies on solid media. During the activities of the first few weeks, you got an idea of the organisms that inhabit the pond water through microscopy. Today, you will examine the pond bacteria by growing them on agar plates containing different media.

Materials:

- Plates of different types; You will be given a selection of the following:
 - LB medium, with and without garlic
 - Baxter pond water medium, with and without glucose
 - BBB pond water medium, with and without glucose
 - Knorr's chicken broth medium
 - Egg plates
 - Optional: double egg plates
- Pond water
- Plating supplies

Protocol:

1. Spread 100 μ L of pond water on each plate using plating beads.
2. Label your plates and incubate at **room temperature**.

Answer the following questions in your notebook based on your observations on the colonies that grew on your plates:

1. What are the elements crucial for cell growth? Think about the "basic building blocks of life" (proteins, nucleic acids, lipids, sugars). Which elements are they built of? (Hint: Read about growth medium on the Wiki: http://en.wikipedia.org/wiki/Growth_medium. Why would you need e.g. sulfur?)
2. *E.coli* can metabolize different sugars (ranging from glucose to really complicated ones). Do you think you will see a difference if the cell has to digest more complicated molecules? Will there be any difference in the enzymes *E. coli* needs to use? (You can answer this question by comparing *E. coli* growth in medium with glucose and with lactose, which is a sugar composed of galactose and glucose).

¹ Staley JT, Konopka A (1985) Measurement of in situ activities of nonphotosynthetic microorganisms in aquatic and terrestrial habitats. Annual Review of Microbiology 39: 321-346.

3. What factors might cause different organisms to prefer different elements in their media? Why not have one, common favorite recipe? Think in terms of evolution and competition between the species.
4. Use the morphology (shape, color) to describe the different organisms that grew on your plates. Discuss each type of plate separately. Are there colonies typical for a given plate?
5. Is LB plate supplemented with garlic special? How do you think garlic might influence bacterial growth? Think about 'home-made elixirs' that are supposed to help you when you have a cold or infection.
6. Are there differences between the plates from the different ponds? With and without glucose?