NAME _____

DATE _____

Bacterial Motility

Motility is the ability of a microorganism to propel itself spontaneously. In most bacteria, this is accomplished using flagella. In general, motility is important because it allows bacteria to move closer to areas of higher nutrition and away from unfavorable environments—such as areas too high or low in pH or temperature. Flagellated motility also plays an important part in pathogenesis, allowing bacteria to move (and spread) through bodily fluids. However, there are pathogenic bacteria that do not possess this ability. To differentiate bacteria that are motile from those that are nonmotile, we must perform macroscopic and microscopic motility tests.

Inoculating Motility Media

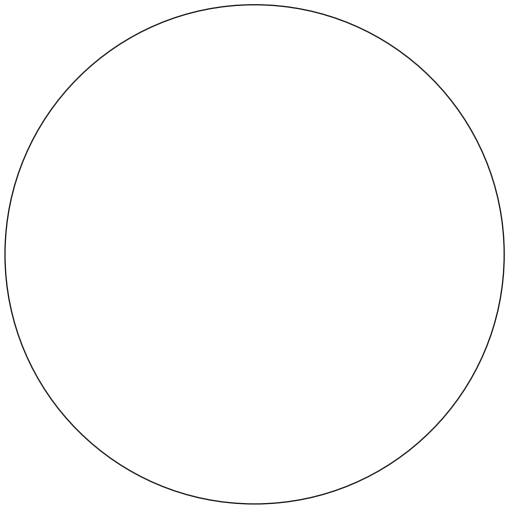
1. Light and adjust a Bunsen burner.
2. Take the tube of *Enterobacter areogenes* in one hand. Unscrew the top of the tube, but keep the tube covered with the cap.
3. With your other hand, flame the inoculating needle. Uncover the tube, flame the mouth of the tube, and then slowly place the needle into the tube. Touch the bacterial culture to pick up bacteria. When pulling the needle out of the tube, make certain it does not touch anything. Flame the mouth of the tube again, and replace the cap. Return the culture tube to the rack
4. With your free hand, uncap the tube containing the Motility Indole Ornithine Media and flame the mouth of the tube. Stab the needle once straight down to about two-thirds the depth of the medium. Then, remove the needle along the same path. Again, make certain it does not touch anything.
5. Quickly cap the tube and place it in the test tube rack. Flame the needle. Mark the tube to identify the bacterium used, the current date, and your initials.
6. Repeat the preceding steps for *Micrococcus roseus*.
7. Take both inoculated, labeled tubes to the place indicated by your instructor for incubation. Check the tubes for growth every 24 hours.

"Hanging Drop" Slide Preparation

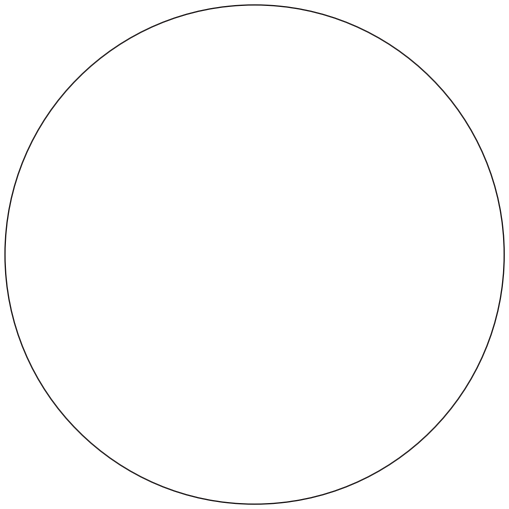
1. Smear a ring of petroleum jelly or paraffin wax around the depressed area of the slide.
2. Flame the inoculating loop.
3. Uncap the test tube containing the *Bacillus cereus* broth culture. Flame the mouth of the tube.
4. Place the loop inside the tube to collect some of the culture.
5. Place a small drop of the bacterial suspension on a coverslip.
6. Turn the depression slide upside down, and place it over the coverslip. The concave part of the slide should now form an arch over the drop of bacterial suspension.
7. Quickly rotate the slide on its axis so that the slide is right side up, with the coverslip up.
8. Place the slide on the microscope stage. Begin on low power and work up to the oil immersion lens. Complete the Observations and Questions sections of the LabSheet.
9. When you have finished your observations, dispose of the coverslip as directed by your instructor. Take the depression slide to the container indicated by your instructor for sterilization and cleaning.

Observations

Examine the slide. Record your findings at both the low-power and high-power objectives. Be sure to include a description of their movement. Illustrate and use labels.

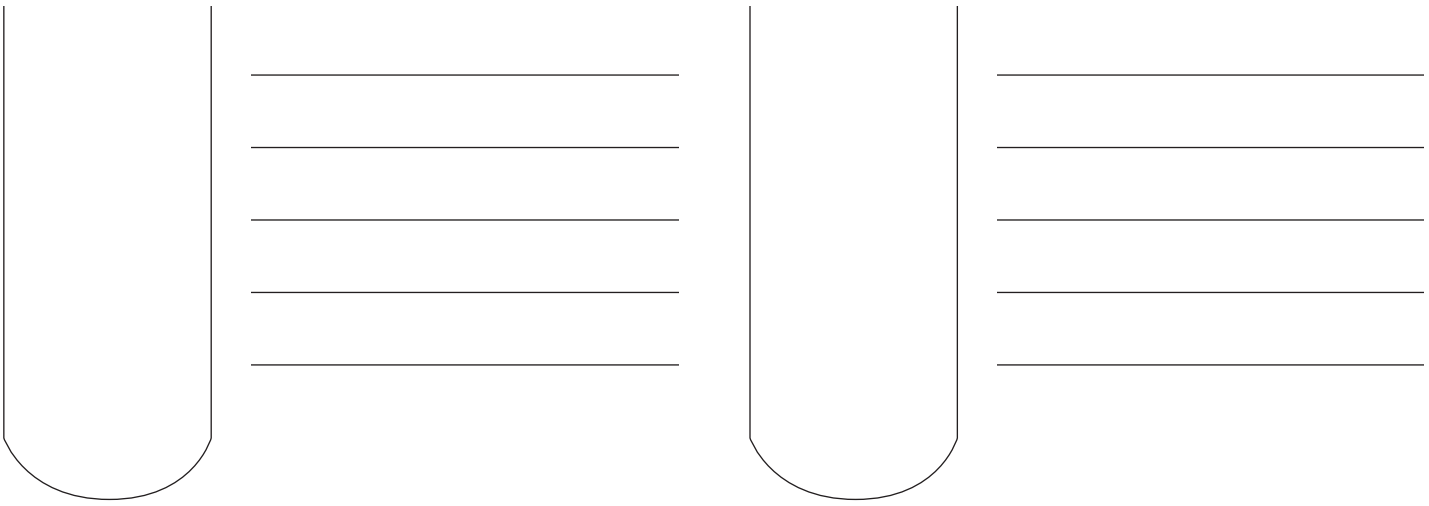


Bacillus cereus – Low power



Bacillus cereus – High power

Examine the tubes and record your findings. Include a description of the media. Illustrate with colors for media and shading to represent diffuse growth.



Questions

1. What is bacterial motility?

2. Your culture tube contains a motility medium. What is its purpose?

3. How can you tell the difference between a negative and a positive motility test using this medium?

4. What anatomical feature allows most bacteria to become motile?

5. List four flagellum (or flagella) arrangements and draw a simple picture illustrating each.

(1) _____	(2) _____
(3) _____	(4) _____

6. Using a textbook or other resource, describe the flagella arrangement (if any) of:
   a. *Enterobacter areogenes*

   b. *Micrococcus roseus*

   c. *Bacillus cereus*

7. Describe the type of motility of *Bacillus cereus* under the low-power objective and high-power objective.

8. Design a test where one can manipulate the environment or add a dependent variable causing a change in motility.

9. Which of the inoculated media tested positive for motility? How can you tell?

10. Using a microbiology textbook or other resource(s) describe any other bacteria that may test negative for motility.

Carolina Biological Supply Company
2700 York Road, Burlington, North Carolina 27215
Phone: 800.334.5551 • Fax: 800.222.7112
Technical Support: 800.227.1150 • www.carolina.com
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