Protozoa Exceed the Speed Limit!

Introduction

Protozoa, especially the ciliated form, often move too quickly for beginners to follow their movements under the microscope. Here's how to slow them down!

Background

Biologists employ various methods for slowing the movements of protozoans. One of the most commonly used methods involves placing study organisms into a very thick, viscous solution so that ciliar movement is restricted and the net result is slowed movement of the organism. A good material for this purpose is methyl cellulose solution.

Methyl cellulose is a gray/white powder that "swells" in water to form a viscous, colloidal solution. It is a very thick, syrupy solution that is difficult for microscopic organisms to navigate. A dilute solution (3%) is thick but yet not so osmotically imbalanced that it is immediately harmful to the organisms. Thus, methyl cellulose solution slows the movement of organisms while allowing them to maintain their natural appearance and behavior.

Materials

- Methyl cellulose solution, 3%
- Microscope slide
- Cover slip
- Microscope
- Organism culture
- Beral-type pipet

Safety Precautions

Although this activity is considered nonhazardous, please observe all normal laboratory safety guidelines. Wash hands thoroughly with soap and water before leaving the laboratory.Please review current Safety Data Sheets for additional safety, handling, and disposal information.

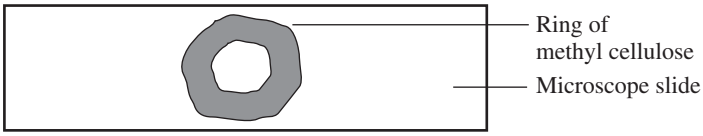

Figure 1.

Procedure

1. Use a stirring rod or pipet to make a circular ring of methyl cellulose solution in the center of a clean microscope slide as shown in Figure 1.
2. With a pipet, place a sample of the organism culture in the center of the methyl cellulose ring as shown in Figure 2.
3. Place a cover slip over the methyl cellulose ring and culture drop. Gently press on the cover slip to slightly mix the methyl cellulose and the culture material.
4. Examine the organism with your microscope. Observe what happens when the organisms are immersed in the methyl cellulose solution.

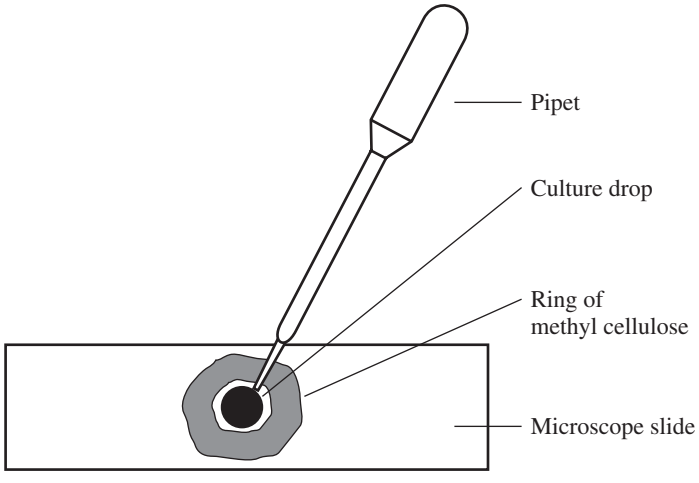

Figure 2.

Tips

- The resulting dilution of the culture and the methyl cellulose will depend upon the amount of methyl cellulose present on the slide and the amount of culture solution added. Some experimentation may be required to find the optimal dilution for a particular type of organism.
- Depression slides with several drops of methyl cellulose added to the culture may also be used.
- The shelf life of methyl cellulose solution is excellent if the container is kept tightly closed during storage.

Publication No. 510
032317

- A fun activity is for students to actually time a ciliate and determine its rate of movement in miles per hour (mph). By measuring the diameter of the microscope field and then using a stopwatch to time the ciliate crossing the microscope field, students can calculate the protozoan's speed in mph. They will be amazed at how fast the organisms move! Students can then compare how long it takes an organism to move the same distance through a methyl cellulose solution.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12
Evidence, models, and explanation
Content Standards: Grades 5–8
Content Standard C: Life Science, regulation and behavior
Content Standard G: History and Nature of Science
Content Standards: Grades 9–12
Content Standard C: Life Science, behavior of organisms
Content Standard G: History and Nature of Science

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. Methyl cellulose may be rinsed down the drain with excess water according to Flinn Suggested Disposal Method #26b.

Materials for *Protozoans Exceed the Speed Limit!* are available from Flinn Scientific, Inc.

Catalog No.	Description
M0171	Methyl Cellulose Solution, 3% aqueous, 100 mL
LM1074	Didinium, Predator of Paramecium
LM1082	Stentor, Trumpet-shaped Ciliate
LM1084	Vorticella, Bell-shaped Ciliate
LM1175	Paramecium caudatum, Vital Stained
LM1230	Instant Protozan Mix

Consult the Flinn Scientific website for current prices.