

# Culturing *Paramecia* and Other Ciliates

## Live Material Care Guide

### Background

*Paramecia* are the most common of the protozoans. They occur abundantly in waters containing decaying vegetable matter, since their food consists mainly of bacteria that decompose dead organic matter. A single *Paramecium* can consume 2–5 million *E.coli* in 24 hours. *Paramecia* are oval in shape and quick moving. They are barely visible to the naked eye, usually white or clear in color (although *P. bursaria* are green due to a symbiotic relationship with green algae), and can reproduce both sexually and asexually. When conditions are favorable, *Paramecia* reproduce asexually by transverse division at a rate of up to five times daily. *Paramecia* and other ciliates are easily found in pond water and provide an excellent study organism for students. Cultures are easily started and maintained. Many culture techniques and media recipes have been tried—two common culture media for *Paramecia* are described here.

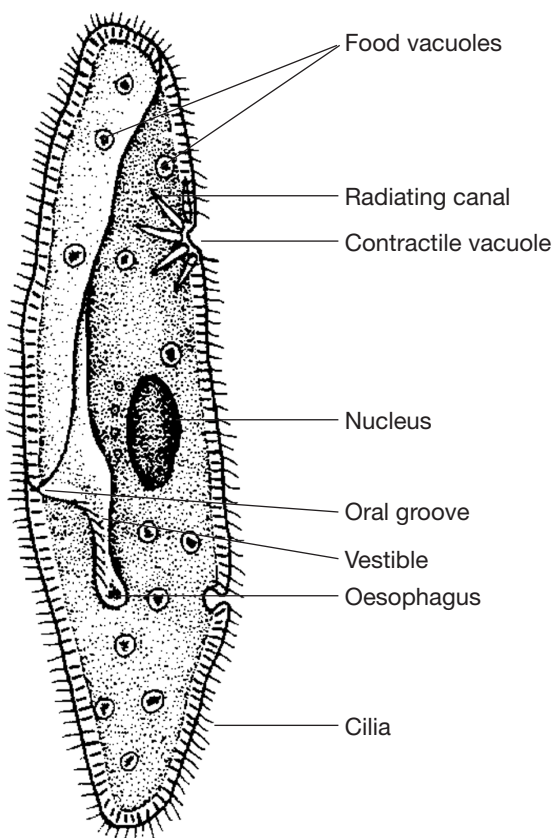


Figure 1. *Paramecium*

### Culturing Media

Upon receipt of *Paramecium* stock cultures, loosen the bottle caps and immediately aerate the cultures by forcing air into the liquid using a clean pipet. Cultures should be kept at 16–22 °C and stored out of direct sunlight. A certain amount of experimentation may be necessary to find a suitable place to house stock cultures—place multiple subcultures in a variety of locations to determine the best environment for culture storage. Hay infusion is the most commonly used culture medium for *Paramecium*. Pre-made culture media are available from Flinn Scientific; alternatively, suitable media may also be prepared using any of the recipes described on the following page.

#### Hay Infusion

Boil 10 g of chopped Timothy hay (other types of hay will also work) in one liter of spring water for about 30 minutes. Filter the boiled hay mixture through several layers of cheesecloth. Allow the solution to cool and then add 2 drops of 1 M NaOH and a

pinch of black soil.

Pour 200 mL of the liquid medium into each culture dish (stacking culture dishes work best) and let sit for 24 hours uncovered. Add two cooked, crushed wheat seeds or 1–2 g of crushed, dried lettuce to each dish. Boil wheat seeds or crushed lettuce in a few mL of water for 15 minutes before adding to media. The lettuce leaves should be dried slowly in an oven until crisp, then ground up with a mortar and pestle. Store the dried lettuce in a tightly sealed container for future use.

### Alfalfa Medium

Alfalfa medium is also excellent for growing ciliates. Add one alfalfa for each liter of boiling 1× Chalkey's solution (recipe below). Allow the alfalfa to soak and form a sediment on the bottom of the container. The sediment will be a food source for bacteria.

#### Chalkey's Stock Solution 10×\*

0.06 g	CaCl <sub>2</sub>
1.00 g	NaCl
0.04 g	KCl
1 L	Distilled water

\*Dilute by a factor of 10 for 1× solution (e.g., dilute 100 mL to 1 L with distilled water).

To culture ciliates, add 10 previously boiled wheat seeds to a jar containing 750 mL of cooled alfalfa medium. Inoculate the jar with 100 mL of ciliate culture. If time allows, wait three weeks for the culture to peak.

Subculture by preparing culture dishes with 200 mL of fresh medium and add 5–6 mL of the established ciliate culture as inoculum. (Monitor cultures regularly using a stereoscope.)

### Tips

- When ciliate numbers are high, they are easier to see with the naked eye. Observe cultures regularly using a stereoscope to monitor population levels. Ciliate cultures will often strike a perfect “balance” and continue to thrive for long periods of time. Thriving cultures can be used in turn to create multiple subcultures.
- Alfalfa pills can be purchased at garden shops, farm supply stores, and health food stores.
- *Paramecia* and other ciliates are generally fast-moving organisms, which makes them challenging for students in slide manipulation and focusing. Quieting solutions, such as methyl cellulose, can be helpful in slowing down the organisms for microscopic observation. Use low power (100X) to scan for *Paramecia* before switching to a higher magnification (400X).

## NGSS Alignment

This laboratory activity relates to the following Next Generation Science Standards (2013):

### Disciplinary Core Ideas: Middle School

MS-LS1 From Molecules to Organisms:  
Structures and Processes

LS1.A: Structure and Function

MS-LS2 Ecosystems: Interactions,  
Energy, and Dynamics

LS2.A: Interdependent Relationships  
in Ecosystems

LS2.B: Cycle of Matter and Energy  
Transfer

in Ecosystems

### Disciplinary Core Ideas: High School

HS-LS1 From Molecules to Organisms:  
Structures and Processes

LS1.A: Structure and Function

HS-LS2 Ecosystems: Interactions, Energy, and  
Dynamics

LS2.A: Interdependent Relationships in  
Ecosystems

LS2.B: Cycle of Matter and Energy  
Transfer

in Ecosystems

### Science and Engineering Practices

Asking questions and defining problems

### Connections to Nature of Science

Scientific knowledge is based on  
empirical evidence

### Crosscutting Concepts

Cause and effect

Scale, proportion, and  
quantity

Systems and system  
models

Energy and matter

Structure and function

## Disposal

*Paramecium* cultures may be disposed of according to Flinn Suggested Biological Waste Disposal Method Type IV. Please consult your current *Flinn Scientific Catalog/Reference Manual* for proper disposal procedures.

## Materials for *Culturing Paramecia and Other Ciliates* are available from Flinn Scientific, Inc.

Catalog No.	Description
LM1072	Blepharisma, Rose-colored Ciliate, 30
LM1159	Paramecium aurelia, Small Multiple Nuclei, 30
LM1161	Paramecium bursaria, Harbor Green Algae, 30
LM1076	Paramecium caudatum, 30
LM1078	Paramecium multimicronucleatum, 30 Largest Common Paramecium
LM1080	Spirostomum, Ciliate, up to 3 mm, 30
LM1082	Stentor, Blue-green Ciliate
LM1084	Vorticella, Bell-shaped Ciliate, 30
FB0514	Paramecium Medium, 946 mL
FB0540	Timothy Hay, 100 g
M0171	Quieting/Slowing Solution, 100 mL
AB1264	Culture dish, 300-mL

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.