

# Two Heads Are Better Than One

## Introduction

Use Planarian flatworms to demonstrate regeneration.

## Concepts

- Regeneration
- Cell division
- Growth and development

## Background

Many organisms are capable of regenerating lost body parts. The tail of some lizards readily falls off when grasped by a predator. A new tail is then grown. Humans regenerate parts of their skin when it has been damaged. Generally, the more complex a species of animal, the less its ability to regenerate complete body parts. Invertebrates show some of the most striking regenerative abilities. Some invertebrates can regenerate a whole new body from just a few hundred remaining cells.

Planarians (Phylum Platyhelminthes) regenerate entire new bodies from almost any body piece of moderate size. Tail pieces will regenerate new heads and vice versa. However, small pieces from the posterior of the worm are unlikely to regrow a normal head.

## Materials

- |                         |                             |
|-------------------------|-----------------------------|
| Planarians, brown, 6–10 | Pipet, disposable           |
| Marker                  | Scalpel                     |
| Microscope slide        | Spring water or pond water  |
| Paintbrush, small       | Video microscope (optional) |
| Petri dishes, 4         |                             |

## Safety Precautions

*This activity is not considered hazardous, but always follow appropriate laboratory safety rules. Take caution whenever working with a scalpel. Follow all normal laboratory guidelines. Wash hands thoroughly after completing the activity.*

## Preparation

- Using a marker, label the four specimen dishes as follows—heads, tails, lengthwise, and partial heads.
- Pour spring or pond water into each dish.

## Procedure

- Three types of cuts will be made—a mid-length cut, lengthwise cut, and partial lengthwise cut.
- Obtain a microscope slide. Place a drop of water on the slide. This slide will be used as the platform for the planarian dissections.
- Place a planarian on the drop of water on the microscope slide.
- Using a scalpel, cut a total of two planarians in half about mid length (Cut #1). See Figure 1. Use a new drop of water for each planarian.

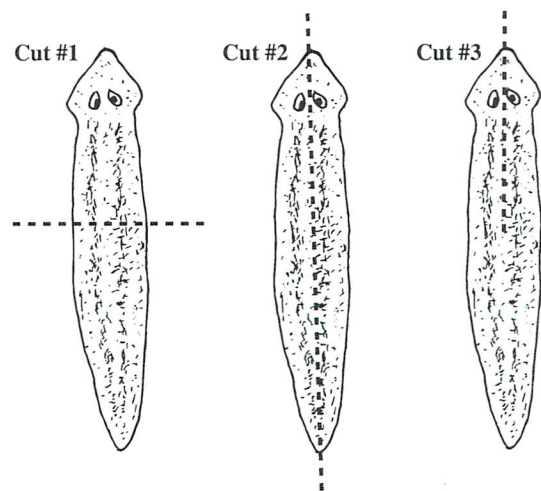


Figure 1.

5. Using a small paintbrush, move the head pieces into the dish labeled “heads” and the tail pieces into the “tails” dish.
6. Cut two planarians in half lengthwise (Cut #2). See Figure 1. Put these pieces into the dish labeled “lengthwise.”
7. Make partial lengthwise cuts on the last planarians. Begin at the anterior (head) end and cut in a posterior direction until about mid length. This will cut them so that the head is split but the tail is intact (Cut #3). See Figure 1. This type of cut can result in two heads regenerating to one tail! Put these planarians in the “partial heads” dish.
8. Put all dishes in a dark, cool place.
9. Ask the students to predict which ones will regenerate more quickly and have them explain why.
10. Check the dishes every few days.
11. New growth will appear as buds of light colored tissue.
12. Full generation will take a few weeks and will vary with temperature.

## Disposal

See Flinn Suggested Biological Waste Disposal Type IV in the *Flinn Scientific Catalog/ Reference Manual*.

## Tips

- Planarians may be ordered from Flinn Scientific, Catalog Nos. LM1094 and LM1095, or collected locally. Search for planarians on the undersides of rocks in the riffle portions of streams. Keep the planarians in shallow spring water and in a cool place.
- Demonstrate the planaria cuts in front of student, if needed.
- If a video microscope is available, project the planaria before and after the cuts are made. Otherwise have students look at them at the demonstration table.
- Each planaria cut should be made on a microscope slide in a drop of water.

## Connecting to the National Standards

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

### ***Unifying Concepts and Process: Grades K–12***

Constancy, change, and measurement  
 Evolution and equilibrium  
 Form and function

### ***Content Standards: Grades 5–8***

Content Standard A: Science as Inquiry  
 Content Standard C: Life Science, structure and function in living systems, reproduction and heredity, regulation and behavior, diversity and adaptations of organisms

### ***Content Standards: Grades 9–12***

Content Standard A: Science as Inquiry  
 Content Standard C: Life Science, biological evolution, matter, energy, and organization in living systems; behavior of organisms

**Materials for *Two Heads Are Better Than One* are available from Flinn Scientific, Inc.**

Catalog No.	Description
LM1094	Brown Planaria, Class Size 30
LM1095	Brown Planaria, Class Size 100
AP8170	Petri Dish, Disposable, 20
AB1047	Scalpel, Student Quality
AB1419	Brushes, Sorting, Camel Hair, Pkg. 6

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