# What’s for Lunch?

## Contributors

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## Intended Audience

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-4</td>
<td></td>
</tr>
<tr>
<td>5-8</td>
<td></td>
</tr>
<tr>
<td>9-12</td>
<td>X</td>
</tr>
</tbody>
</table>

## Activity Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom Setting</td>
<td>X</td>
</tr>
<tr>
<td>Requires special equipment</td>
<td></td>
</tr>
<tr>
<td>Uses hands-on manipulatives</td>
<td></td>
</tr>
<tr>
<td>Requires mathematical skills</td>
<td></td>
</tr>
<tr>
<td>Can be performed individually</td>
<td></td>
</tr>
<tr>
<td>Requires group work</td>
<td>X</td>
</tr>
<tr>
<td>Requires more than one (45 min class) period</td>
<td></td>
</tr>
<tr>
<td>Appropriate for special needs student</td>
<td></td>
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</tbody>
</table>
Introduction

Description

In this lab activity, students will identify paper aquatic insects and match them to different regions.

Abstract

Leaf decomposition is a major process in stream ecosystems. In this activity, students will investigate the aquatic insects responsible for decomposing leaves in stream ecosystems.

Core Themes Addressed

<table>
<thead>
<tr>
<th>Microbial Cell Biology</th>
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</thead>
<tbody>
<tr>
<td>Microbial Genetics</td>
<td></td>
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<tr>
<td>Microorganisms and Humans</td>
<td></td>
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<tr>
<td>Microorganisms and the Environment</td>
<td></td>
</tr>
<tr>
<td>Microbial Evolution and Diversity</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>X</td>
</tr>
</tbody>
</table>

Keywords

Decomposition, Stream ecology, Aquatic Invertebrates

Learning Objectives

At completion of this activity, learner will

1. Identify the abiotic factors that influence decomposition rates.
2. List the steps of the scientific method

National Science Education Standards Addressed

Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry

Standard D: Life Science

- Matter, energy, and organization in living systems
Student Prior Knowledge

Students should have the following knowledge prior to completing this activity:

1. Be able to recognize the importance of food webs.

Teacher Background Information

In the environment, dead plants and animals (also known as organic matter) decompose or breakdown into simpler components. Organic matter is able to decompose due to the activity of organisms known as decomposers. Decomposers are typically bacteria, fungi, and invertebrates. The process of decomposition is very important to the ecosystem. Without decomposition, the earth’s surface would soon be completely covered with dead plants and animals. Decomposition is an important ecological process that cycles energy and nutrients. The decomposers release those nutrients from the organic matter into the environment. Nutrients released by organic matter can then be easily used by other organisms, such as plants.

Decomposition occurs in all ecosystems but one of the most highly studied is the freshwater ecosystem, including both ponds and streams. In freshwater ecosystems, leaves that fall into the water immediately begin to decompose. An important group of decomposers in aquatic systems is aquatic insects. Because these aquatic insects ‘shred’ leaf materials to break them down, they are known as ‘shredders’. To study decomposition in stream ecosystems, researchers often use leaf packs. A leaf pack is a mesh bag that contains a single leaf type. This mesh bag allows bacteria, fungi, and aquatic insects to get inside while keeping the leaves from falling out. These leaf packs are placed in the water for a set amount of time. This amount of time can be anywhere from a few weeks to a few months.

Class Time

This activity will require a minimum of one 50 minute class period.

1. Introduction PowerPoint – 15 minutes
2. Lab Activity – 20 minutes
3. Wrap up questions/Review – 15 minutes
Teacher Preparation Time

This lesson will require approximately 30 minutes preparation time to print, cut, and assemble aquatic insect cards.

Materials and Equipment (2 per group)

1. Envelope (leaf pack)
2. Paper Aquatic Insect (22-26 per envelope)
3. Aquatic Insects Key
4. Leaf Pack Key

Methods

1. Use the Aquatic Insect Key to identify the aquatic insects in their “leaf pack”.
2. Record the aquatic insects on the activity worksheet.
3. Compare the aquatic insects to the Leaf Pack Key.
4. Align insect population with the geographically diverse stream systems.

Tips/Suggestions

1. To maintain integrity of paper aquatic insects, print on cardstock or laminate.
2. To increase student involvement, the ecosystems can be changed to represent a local stream.

Answers to Student Handouts

1. In your own words explain the steps to set up a leaf pack experiment.
   1. Collect, dry, and weigh leaves. 2. Place into mesh bags and secure in the stream. 3. Let them decompose in the stream for an extended amount of time. 4. Collect leaf packs from the stream and rinse macroinvertebrates from leaf packs. 5. Dry and weigh leaves.

2. List two (2) abiotic (non-living) factors influence how fast organic matter decomposes.

   Temperature, type of material, and amount of moisture.

3. Put the following steps in order:

   a. _____3____ Form a testable hypothesis
   b. _____6____ Make conclusions
   c. _____5____ Analyze results
   d. _____2____ Formulate a question about the observation
   e. _____1____ Make an observation
   f. _____4____ Do an experiment to test the hypothesis
Introduction

Decomposition occurs in all ecosystems but one of the most highly studied is the freshwater ecosystem, including both ponds and streams. In freshwater ecosystems, leaves that fall into the water immediately begin to decompose. An important group of decomposers in aquatic systems is aquatic insects. Because these aquatic insects ‘shred’ leaf materials to break them down, they are known as ‘shredders’. To study decomposition in stream ecosystems, researchers often use leaf packs. A leaf pack is a mesh bag that contains a single leaf type. This mesh bag allows bacteria, fungi, and aquatic insects to get inside while keeping the leaves from falling out. These leaf packs are placed in the water for a set amount of time. This amount of time can be anywhere from a few weeks to a few months.

Student Background Knowledge

Students should have the following knowledge prior to completing this activity:

1. Be able to recognize the importance of food webs.

Vocabulary

Decomposition: The process in which materials breakdown or decay into original elements.

Decomposers: Organisms that are responsible for breaking down materials (usually bacteria, fungi, and insects).

Shredders: The group of aquatic insects that shred leaf material in stream ecosystems.

Materials Checklist

<table>
<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
<td>Envelope (leaf pack)</td>
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<tr>
<td>Paper Aquatic Insects (22-26 per envelope)</td>
</tr>
<tr>
<td>Aquatic Insect Key</td>
</tr>
<tr>
<td>Leaf Pack Key</td>
</tr>
</tbody>
</table>
**Procedure**

1. Use the Aquatic Insect Key to identify the aquatic insects in your “leaf pack”.
2. Record the aquatic insects on the activity worksheet.
3. Compare the aquatic insects to the Leaf Pack Key.
4. Align insect population with the geographically diverse stream systems.

**Results**

**Aquatic Insects Found in Your Leaf Pack**

<table>
<thead>
<tr>
<th>Category</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphipoda (Scuds)</td>
<td>Oligocheates (Worms)</td>
</tr>
<tr>
<td>Oligocheates (Worms)</td>
<td>Coleoptera (Beetles)</td>
</tr>
<tr>
<td>Hemiptera (True Bugs)</td>
<td>Ephemeroptera (Mayflies)</td>
</tr>
<tr>
<td>Odonata (Dragonflies)</td>
<td>Plecoptera (Stoneflies)</td>
</tr>
<tr>
<td>Odonata (Dragonflies)</td>
<td>Diptera (Flies)</td>
</tr>
<tr>
<td>Trichoptera (Caddisflies)</td>
<td>Hirundea (Leeches)</td>
</tr>
</tbody>
</table>

1. Using the Leaf Pack Key, determine what temperature your leaf pack came from.

2. Why do you think that your leaf pack came from this temperature?

**Conclusions**

1. Check with your teacher to see if your guess was correct. Was your guess correct?
Student Worksheet

What’s For Lunch?

Students Name: ___________________________ Date: _________________

1. In your own words explain the steps to set up a leaf pack experiment.

2. List two (2) abiotic (non-living) factors influence how fast organic matter decomposes.

________________________________________________________________________

________________________________________________________________________

3. Put the following steps in order:

   a. ________ Form a testable hypothesis
   b. ________ Make conclusions
   c. ________ Analyze results
   d. ________ Formulate a question about the observation
   e. ________ Make an observation
   f. ________ Do an experiment to test the hypothesis