Lab 04: Stream Ecology

Objectives

1. Understand the role of leaf packs in stream ecosystems as microhabitats for aquatic invertebrates.
2. Compare the diversity and abundance of invertebrates in riffles and pools of a stream.
3. Learn techniques for constructing and processing leaf packs.
4. Identify adult insects for use in personal insect collections.

Materials

- **For each group:**
    - Nylon mesh bags or netting (approx. 10” x 10”)
    - Dried leaves (from the same tree species, e.g., oak or maple)
    - String or zip ties
    - Permanent markers
    - Scissors
    - Scale (for weighing leaf packs)
    - Waterproof tags for labeling (optional)
- **For the lab:**
    - Buckets or plastic tubs (for holding leaves)
    - Stream access (instructor will deploy and retrieve leaf packs)
    - Trays or pans (for sorting leaf packs)
    - Forceps
    - Hand lenses or dissecting microscopes

- Field guides for aquatic invertebrates
- Vials or jars with ethanol (for preserving adult insects)
- Notebook or datasheets (for recording observations)

Introduction

Streams are dynamic ecosystems where leaves and other organic matter form the base of the food web. As leaves fall into streams, they decompose, providing energy and nutrients to microorganisms and macroinvertebrates. Leaf packs—clusters of leaves trapped in the stream—act as microhabitats, attracting a variety of aquatic organisms.

This lab focuses on comparing the invertebrates that colonize leaf packs placed in riffles (fast-flowing sections of a stream) versus pools (slow-moving sections). By examining the diversity and abundance of invertebrates, students will gain insight into habitat preferences and the ecological roles of stream organisms.

Instructions

Part 1: Constructing Leaf Packs

1. **Gather Materials:** Collect enough dried leaves to fill each leaf pack with approximately 30 grams of material. Ensure all leaves are from the same tree species to standardize the experiment.
2. **Weigh the Leaves:** Use a scale to measure 30 grams of dried leaves for each leaf pack.
3. **Assemble the Leaf Packs:**
    - Place the leaves inside a nylon mesh bag or netting.
    - Secure the opening with string or a zip tie, leaving a tag or marking to identify your group.
    - Label each leaf pack with a waterproof marker or tag (e.g., “Group A”, “Pack 1”).
4. **Submit to Instructor:** Hand your leaf packs to the instructor for deployment in the stream. The instructor will place equal numbers of leaf packs in riffles and pools.

Part 2: Retrieving Leaf Packs (Instructor)

- The instructor will collect the leaf packs after 3-4 weeks and bring them back to the lab for processing.

Part 3: Processing Leaf Packs

1. **Prepare for Sorting:** Place each retrieved leaf pack in a tray or pan. Add water to make it easier to separate leaves and organisms.
2. **Inspect the Leaves:** Carefully open the leaf pack and spread the leaves in the tray. Use forceps and hand lenses to search for aquatic invertebrates hiding in or on the leaves.
3. **Sort and Identify Invertebrates:**
    - Use this key from Leaf Pack Network or other field guides to identify organisms to the most specific level possible (e.g., mayfly, stonefly).
    - Record the number and types of invertebrates found on a datasheet.
4. **Adult Insects:** If adult insects are found, preserve them in vials of ethanol for later identification and addition to your insect collection project.

Part 4: Data Analysis and Discussion

1. **Group Data:** Combine data with other groups to compare the invertebrate diversity and abundance between riffles and pools.
2. **Analyze Results:** Discuss habitat differences and how they influence the composition of aquatic invertebrate communities.
3. **Reflect:** Consider the ecological roles of the organisms found and how leaf decomposition contributes to the stream's food web.

Notes

- Handle all organisms gently and release any specimens not being preserved back into the stream.
- Clean up your workstation and return all materials to their proper places after the lab.

References

https://leafpacknetwork.org/wp-content/uploads/2020-lpn-manual-chapter2.pdf

https://leafpacknetwork.org/wp-content/uploads/StroudWebsiteMacroKeyFNL.pdf