

Beach Hopper Bonanza



Field trips are exciting. Field trips incorporating inquiry-based learning and live animals are even better.

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Introduction/Overview

This second grade unit focuses on beach hoppers, tiny amphipods found on most sandy beaches. The first three lessons focus on learning beach hopper characteristics in the classroom and teaching students how to do scientific fieldwork. Once the students are beach hopper experts, they take a field trip to the sandy beach to conduct experiments on beach hoppers.



Background

On the west coast, there are primarily 2 species of beach hoppers, *Orchestoidea californiana* and *O. corniculata*. The animals reach lengths of 28 (1.1 inches) and 25 mm (.98 inches), respectively. Beach hoppers can be found along the mid tide line where the sand is neither too dry nor too wet. Typically, they can be found on both sheltered and exposed beaches, near washed up algae. It is best to go in search of them prior to the field trip. Look for small holes and start digging or look under algae in the wrack line. (Refer to the Beach Hopper Biology websites listed in the Resources section.)

Introductory Lessons

Lesson 1-Intro to beach hoppers-KWHL chart

Goal-how to ask good science based questions while learning about beach hoppers

Key concepts-Good science based questions help us learn information and sharing information is a good way to learn.

Show a picture of a beach hopper and describes where they live and sets up a chart, labeled 'Beach Hoppers' with four columns-what we know, what we want to know, how we can learn, and what we learned. Students are asked to provide their thoughts and ideas on the first three questions. If time permits, the instructor can label the picture of a beach hopper and go through its anatomy (antenna, eye, head, thorax, abdomen, walking legs, cheli) and discuss how the parts of the animal are used. (A beach hopper picture with anatomical labels can be found on the OIMB GK12 webpage, under Beach Hopper Unit Summary, see Resources section.)

Lesson 2-Can you jump as far as a beach hopper?

Goal-measuring and introduction to proportions by comparing how far beach hoppers and humans can jump (Relative to body size, beach hoppers can jump much further than humans.)

Key concepts-accurate measuring and proportions

This lesson incorporates live animals and math. First ask students if they think they can jump farther than a beach hopper. Divide the students into two groups. Each group measures both how far they and a beach hopper can jump. Measure the heights of students in group one. Lay a tape

measure on the ground and record how far each student can jump. In group two, students put a beach hopper in their hand and measure its length with a ruler. To determine how far a beach hopper can jump, place a target with circles indicating 3, 6, 9 and 12 inches from the center on the ground. Each student puts their beach hopper in the middle and observes how far it jumps. Switch roles for groups and repeat. Introduce the concept of relative body size proportion, explaining how a beach hopper can jump much farther than a human. Determine how much farther a beach hopper jumps, compared to its body length, than humans can. (A worksheet can be found on the OIMB GK12 webpage, under Beach Hopper Unit Summary, see Resources section.)

Lesson 3-Wrap up and review, field trip preparation

Goal-prepare the students for the field trip and plan and discuss the field trip experiments

Key concepts-appropriate field trip behavior, how to ask a good question and conduct experiments

Lead the students in a discussion to decide and list good field trip rules and what the class needs to bring to the beach. Revisit the KWHL chart and have the students reflect on what they have learned about beach hoppers, what more they want to know and how, when they go to the beach, they could discover some answers. Lead a discussion on what the students will do on the field trip based on their responses. Guide them towards the three experiments planned for the field. The first determines where (high, mid and low) in the tidal zones beach hoppers live. The second examines what substrate beach hoppers prefer to live near. The final experiment looks at if beach hoppers hop in a specific direction when released.

Field Trip

Reconnaissance work will be needed to determine the best beach for the field trip. Factors include location, ability to easily locate beach hoppers, safety of the beach, human activity, and how much beach is exposed during low tide. Although an extreme low tide is usually not required, the tide must be low enough to expose the area of digging for the duration of the field trip.

Supplies

Shovels, buckets, sieves (a kitchen colander with small holes will work), clipboards, Rite in the Rain paper, pencils (Field trip data sheets can be found on the OIMB GK12 webpage, see Resources section.)

Divide the students into groups of no more than 10 students with at least one group leader and 2 helpers. Each group should have 3 shovels, 3 buckets, 1 sieve and 1 clipboard. Designate one student to be the recorder for each experiment and switch recorders for each experiment. Allow 30-40 minutes for each experiment.

Once the students arrive at the beach, hold a review session with the entire group to remind them of their 3 experiments and review beach etiquette (treat animals with respect, refill any holes dug, etc).

Experiment 1-Where do beach hoppers live?

The expected answer-they live at the mid tide line where it is not too dry and not too wet. Beach hoppers are poor swimmers and cannot live low on the shore where there is too much water, but

will dry out if they are too high on the shore due to the sun. (Give students a hint that they should dig near holes). (See field journal sheet 1 on OIMB GK12 webpage in Resources section) Have students predict where and why they think they will find the most beach hoppers. Start digging at the high tide line and have students count how many they find and record their data. After 10 minutes, have the students move to the mid tide line and repeat their search. After 10 minutes, repeat at the low tide line. Have them make observations about the size and color of the organisms.

Experiment 2-What do beach hoppers like to live near?

The expected answer-they prefer seaweed as that is what they eat. It also provides refuge from the sun and predators. (See field journal sheet 2 on OIMB GK12 webpage see Resources section)



Keep the students in the same groups and work in the mid intertidal where there are the most beach hoppers. Ask the students to list possible habitats-seaweed, rock, driftwood, and just sand. Start digging and have the students keep tally of how many beach hoppers they find near each spot. Have the students capture and place beach hoppers in a bucket containing some damp seaweed for the next experiment.

Experiment 3-What direction will a beach hopper hop?

The expected answer-beach hoppers orient themselves according to the slope of the beach, jumping landward. This prevents them from moving downward on the shore where they would get into deeper water where it would be harder for them to swim. (See field journal sheet 3 on OIMB GK12 webpage in Resources section)

The students will hopefully have collected 20-30 beach hoppers. Lead a discussion on how the beach hoppers should be released (head towards the water, head towards the land, etc.) Students release equal numbers of beach hoppers at the high, mid, and low zones and observe the beach hoppers' behaviors. Assign students the task of releasing one beach hopper at a time and have them observe the direction they hop. One student will record the direction the beach hopper moved, writing if the beach hopper stayed there or continued moving.

If time remains, students can practice sieving sand and looking for other animals, seeing what lives where.

Post lessons

Many lessons, from a variety of disciplines can be created based on the field trip.

Examples:

Graphing-have the students graph the distribution of beach hoppers per zone (low, mid and high tide lines)

Day in the Life of a Beach Hopper-each student will write and illustrate a story depicting how a beach hopper would spend a day

Zonation poster-students can work in groups or individually to draw a poster showing what they found in different zones of the beach.

Credits

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Photos by Trish Mace

Resources

Beach Hopper Biology Websites

http://www.wallawalla.edu/academics/departments/biology/rosario/inverts/Arthropoda/Crustacea/Malacostraca/Eumalacostraca/Peracarida/Amphipoda/Gammaridea/Talitridae/Megalorchestia_californiana.html

<http://www.answers.com/topic/beach-hopper>

OIMB GK12 Beach Hopper Unit Summary

<http://www.uoregon.edu/~oimb/Academics/GK12/field%20inquiries/beach%20hopper%20field%20inquiry.pdf>

OIMB GK12 Field Trip Data Sheets

<http://www.uoregon.edu/~oimb/Academics/GK12/field%20inquiries/Hopper%20Field%20Journal.pdf>

Jump Worksheet

<http://www.uoregon.edu/~oimb/Academics/GK12/field%20inquiries/beach%20hopper%20pre%20lesson.pdf>