Understanding the Kalihi Stream Environment –
From the big to the little (food webs to cells)
Lesson 5

Objectives
The student will be able to do the following:
- Describe and illustrate differences between a plant and animal cells
- Identify plants as the main source of energy in a food chain
- Diagram a food web (advanced) or food chain

Materials
- Microscopes (the more the better)
- Prepared slides with plant and animal cells
- Worksheets (one per student)
- Food web kits, one per group
- Crayons, colored pencils, etc.
- Extra paper (if desired)
- Glue or tape (if desired)
- Overheads or pictures of cells and food webs

Background
This unit uses the Kalihi Stream environment to target two specific Hawai‘i state standards (food chains/webs and plant v. animal cells). Within the context of the Kalihi Stream project, this activity continues to build a better understanding of the relationships between organisms in the stream environment. This unit introduces cells and food chains/webs (although students may already know these), but also provides a hands-on activity to showcase advanced understanding.

Advance Preparation
For the sake of time, slides with plant and animal slides should be prepared in advance of class (given more time, students could themselves prepare slides by swabbing the inside of their cheeks and using onions). Microscopes should be set up in one corner of the room to make it easy for one teacher to assist students using them. Other students should work in their groups.

Each student should have a copy of the worksheet.

Each team should have a food web kit. Kits can be assembled by printing out the schematics of animals, plants, and arrows, cutting these apart, and paper clipping them together to make one kit per group.

Procedure
1. Have students read the introductory paragraph. Pause at certain questions and vocabulary words to go over anything difficult or worthy of extra attention.
2. Slip the class into groups of 4 or 5 (depends on the number of microscopes – the number of groups will dictate how long each group gets to spend at a microscope). Ideally each student should have 8-10 minutes with a microscope.
3. Have one group at a time go to the microscope station to examine animal and plant cells. One teacher will need to work with the students to help them use the microscopes, identify cells, and identify the differences between the cells.
4. As asked on the worksheet, students should draw the animal and plant cells and label important parts.
5. Other groups should use the food web kits to create a food web of the Kalihi stream. They may want to glue the diagrams to another sheet of paper (if desired) and may want to color in the schematics (if desired).

Activities
Students will be doing two concurrent activities.
1. One group at a time will come to the microscopes, practice putting the slides under the microscopes, and use the microscope to identify cells. They should draw and label the cells on the worksheet.
2. The rest of the groups should work together the put the schematic drawings together into a food chain or web. They can color the drawings in and glue them to a piece of paper if desired.
3. Student groups will need to rotate out of the microscope station.

Note
Hihiwai from - http://www.hanaleiwatershedhui.org/science/nature/natureimages/hihiwai2.jpg
'O'opu nopili from - http://library.thinkquest.org/J0110028/past/water/oopunopili/nopili.jpg
My stream environment needs energy!

We have been looking at the Kalihi Stream and its environment. The Kalihi stream environment is everything near the stream, including all of the plants, animals, and nonliving things like rocks and water in the area.

What keeps living things alive in the environment?
Energy is what gives plants and animals the power to grow and move. The main source of energy on the earth is the sun.

What captures energy?
Plants capture energy. Plants are the main source of energy for all other living creatures on earth. Plants are eaten by animals, and then animals eat other animals. So energy moves from plants to animals through a food chain. Energy can follow many pathways between plants and animals, so in an environment there can be many food chains. When these chains are put together, they make a food web.

How do plants capture the sun’s energy?
All plants and animals are constructed of cells. Cells are like little bodies that work together to coordinate everything our bodies do.

All cells are encircled by a cell membrane, sort of like how our skin covers our body. All cells also have a nucleus, which is like a miniature brain.

Plant cells have extra things that animal cells don’t have. Plants have tiny little organs called chloroplasts inside them. The chloroplasts capture the sun’s energy and turn it into food energy. Plant cells store the food energy in their cell walls. Cells walls are hard structures that surround each plant cell, like a box. Plants take the sun’s energy and turn it into food. When plants are eaten by animals, this food energy then moves through a food chain or a food web, allowing the Kalihi environment to keep on working.
Plant and animal cells

All cells have:  
Cell membrane  
Nucleus

Plant cells also have:  
Cell wall  
Chloroplast (these are tiny!)

Draw each type of cell. Label cells with cell membrane, nucleus, cell wall, and chloroplast (if you can see them).

Draw an animal cell.  

Draw a plant cell

What is different about plant and animal cells?
Animal versus Plant Cells

Cheek cells

Onion Cells

Cell Wall.

Animal Cell

Plant Cell

http://www.bbc.co.uk/schools/gcsebitesize/biology/cellprocesses/1cellfunctionsrev2.shtml

Right from: http://www.cookecorp.com/data/cheek313_GalleryXL.jpg
Left from: http://www.btinternet.com/~stephen.durr/
Food Chains

A terrestrial food chain
Copyright © Pearson Education, Inc.

A marine food chain:
- algae
- plankton
- arctic cod
- ringed seal
- polar bear

Left graphic from: kentsimmons.uwinnipeg.ca/16cm05/1116/16ecosys.htm
Right graphic from: http://www.climatechangenorth.ca/section-BG/BG_HS_10_O_E.html

Materials have been developed in partnership with the University of Hawaii-Manoa GK-12 program (NSF grant #0538500), Kalihi Ahupua'a Ulu Pono Afahui (KAUAPA), and the Kalihi Waena Elementary School, Honolulu, HI.
Duplication for educational purposes only.
Marine Food Chain

The Marine Food Chain

Mammals

Bigger Fish

Phytoplankton

Small Fish

Zooplankton

Figure from: http://drake.marin.k12.ca.us/stuwork/ROCKwater/PLANKTON/Food%20Chain.htm

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Food Web

Graphic from: http://www.biologycorner.com/worksheets/foodweb.htm
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Pulelehua (Butterfly, eats flower nectar)

Axis deer (eats plants)

Mongoose (eats animals)

Ae’o (Stilt, eats fish)

Hihiwai (eats plants)

Akupa (eats fish)

'O'opu nopili (eats plants)

People
Materials have been developed in partnership with the University of Hawaii-Manoa GK-12 program (NSF grant #05385500), Kāhīhī Ahupua’a Ulupono Ahahui (KAUPA), and the Kālīhi Waena Elementary School, Honolulu, Hi. Duplication for educational purposes only.