3rd Grade Life Science Unit

Energy Flow

Teacher Background Information – for teacher content knowledge only, NOT student learning goals

However complex the workings of living things, they share with all other natural systems the same physical principles of the conservation and transformation of matter and energy.

Almost all life on earth is ultimately maintained by transformations of energy from the sun. Plants capture the sun's energy and use it to synthesize energy rich molecules, (primarily sugars) from molecules of carbon dioxide and water. These molecules then serve directly or indirectly as the source of energy for the plants themselves and ultimately for all animals and decomposer organisms (such as bacteria and fungi). At each stage in the food web, some energy is stored in newly made structures and some is dissipated into the environment as heat produced by the energy-releasing chemical processes in cells.

AAAS Benchmarks/National and Science Education Standards

- Almost all kinds of animals' food can be traced back to plants. 5E/E1
- Some source of "energy" is needed for all organisms to stay alive and grow. 5E/E2
- Over the whole earth, organisms are growing, dying and decaying, and new organisms are being produced by the old ones
- *A great variety of kinds of living things can be sorted into groups in many ways using various features to decide which things belong to which group.*

Big Idea

Energy is passed from one organism to another through food webs; which can include plants, animals, dead things, and the sun.

Essential Question

How are plants, animals, dead things and the sun connected to one another in food webs?

Instructional Implications

It's all right to start students on food chains of what eats what in various environments, but labeling the steps in the chain as "energy transfer" is not necessary. Transfer of energy at this level is better illustrated in physical systems; biological energy transfer is far too complicated. Familiarity with the recycling of materials fosters the notion that matter continues to exist even though it changes from one form to another and moves from place to place. Matter never appears out of nowhere and never just disappears.

In their early years the temptation to simplify matters by saying plants get food from soil should be resisted.

As student become more familiar with the characteristics of more and more organisms, they should be given opportunities to develop their own schemes for classifying them without using the Linnaean classification system. Hopefully their classification schemes will vary according to the uses made of them. The goal is for students to realize there are many ways to classify things but how good any classification is depends on its usefulness.

Local Connections

- Observations and interactions within the natural world of the child, including pets and plants in the classroom, the natural environment around the school, camp, and outdoor experiences.
- Visits to DIPAC and Forest Service/Glacier
- Discovery SE Naturalists and other local resources such as Richard Carstenson, Mary Wilson, and Kristen Romanoff (AK Fish and Game)

Materials/Resources

- Soil Habitats, Seeds of Science Roots of Reading
- Alaska Dept of Fish and Game (skull collections)
- ADF&G Alaska Wildlife curriculum, wildlife ecology cards
- Discovery SE
- Food chain activities on Kidspiration software
- "Mystery Pellets" in Picture-Perfect Science Lessons 3-6
- Sealaska Units: Hemlock, Salmon

ASSESSMENTS

Understanding Student Ideas Assessments

Volume 3, Probe 18: Rotting Apple

Volume 2, Probe 15: "Is It Food For Plants?

Related Scientist or Career Path

Rachel Carson by Justine and Ron Fontes

Student Difficulties and Misconceptions

The concept that plants make their own food is very difficult for elementary students to understand; therefore, photosynthesis should not be taught until middle school.

Alaska Life Science Content Standard GLE

The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by:

- [3] SC3.1 identifying and sorting examples of living and non- living things in the local environment. (L)
- 3] SC3.2 organizing a simple food chain of familiar plants and animals. (L)
- [4] SC3.2 identifying a simple food chain of familiar plants and animals, diagramming how energy flows through it, and describing the effects of removing one link.

The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by

- [3] SC1.1 sort Alaskan plants and/or animals using physical characteristics (e.g., leaves, beaks) (L)
- [3] SC2.1 sort animals and plants into groups based on appearance and behaviors
- [3] SC2.2 observe and compare external features of plants and of animals that may help them grow, survive, and reproduce.