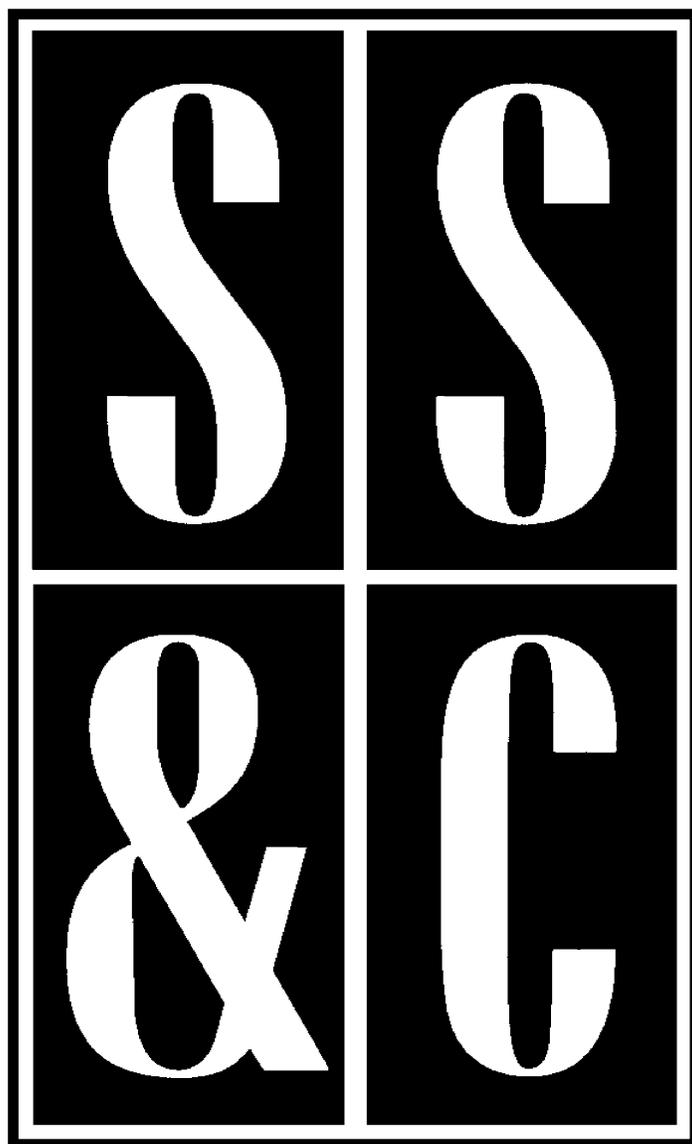


Scope, Sequence & Coordination

A National Curriculum Development and Evaluation Project for High School Science Education



A Project of the National Science Teachers Association



This project was supported in part by the National Science Foundation.
Opinions expressed are those of the authors and not necessarily those of the Foundation.
The SS&C Project encourages reproduction of these materials for free distribution.



Scope, Sequence & Coordination

SS&C Research and Development Center

Bill G. Aldridge, *Principal Investigator
and Project Director**
Dorothy L. Gabel, *Co-Principal Investigator*
Erma M. Anderson, *Associate Project Director*
Nancy Erwin, *SS&C Project Editor*
Rick McGolerick, *Project Coordinator*

Evaluation Center

Frances Lawrenz, *Center Director*
Doug Huffman, *Associate Director*
Wayne Welch, *Consultant*
University of Minnesota, 612.625.2046

Houston SS&C Materials Development and Coordination Center

Linda W. Crow, *Center Director*
Godrej H. Sethna, *School Coordinator*
Martha S. Young, *Senior Production Editor*
Yerga Keflemariam, *Administrative Assistant*
Baylor College of Medicine, 713.798.6880

Houston School Sites and Lead Teachers
Jefferson Davis H.S., Lois Range
Lee H.S., Thomas Goldsbury
Jack Yates H.S., Diane Schranck

California Coordination Center

Tom Hinojosa, *Center Coordinator*
Santa Clara, Calif., 408.244.3080

California School Sites and Lead Teachers
Lowell H.S., Marian Gonzales
Sherman Indian H.S., Mary Yarger
Sacramento H.S., Brian Jacobs

Iowa Coordination Center

Robert Yager, *Center Director*
Keith Lippincott, *School Coordinator*
University of Iowa, 319.335.1189

Iowa School Sites and Lead Teachers
Pleasant Valley H.S., William Roberts
North Scott H.S., Mike Brown

North Carolina Coordination Center

Charles Coble, *Center Co-Director*
Jesse Jones, *Center Co-Director*
East Carolina University, 919.328.6172

North Carolina School Sites and Lead Teachers
Tarboro H.S., Ernestine Smith
Northside H.S., Glenda Burrus

Puerto Rico Coordination Center**

Manuel Gomez, *Center Co-Director*
Acenet Bernacet, *Center Co-Director*
University of Puerto Rico, 809.765.5170

Puerto Rico School Site
UPR Lab H.S.

Pilot Sites

Site Coordinator and Lead Teacher
Fox Lane H.S., New York, Arthur Eisenkraft
Georgetown Day School, Washington, D.C.,
William George
Flathead H.S., Montana, Gary Freebury
Clinton H.S., New York, John Laffan**

Advisory Board

Dr. Rodney L. Doran (Chairperson),
University of Buffalo

Dr. Albert V. Baez, Vivamos Mejor/USA

Dr. Shirley M. Malcom, American Association
for the Advancement of Science

Dr. Shirley M. McBay, Quality Education for Minorities

Dr. Mary Budd Rowe, Stanford University

Dr. Paul Saltman, University of California, San Diego

Dr. Kendall N. Starkweather, International
Technology Education Association

Dr. Kathryn Sullivan, NOAA

* Western NSTA Office, 394 Discovery Court, Henderson, Nevada 89014, 702.436.6685

** Not part of the NSF-funded SS&C project.

Student Materials

Learning Sequence Item:

952

Construction of Food Chains and Tracing Energy Changes

March 1996

Adapted by: Bill George

Contents

Lab Activities

1. Nibbles and Bits (1)
2. Nibbles and Bits (2)
3. Nibbles and Bits (3)

Readings

Science as Inquiry

Nibbles and Bits (1)

With your teacher, select an area of the country or world to use as the class area to study. You may pick your home area. Suggest to your teacher the names of animals and plants that are common in that area. Your teacher will write these names on the chalkboard and will give you one of the names from this list.

Print this name onto a 3 × 5 index card your teacher has given you. Determine if you are a producer (a plant) or a consumer (an animal). Your teacher will now tape the card onto you.

Using colored string that your teacher has provided connect yourselves in a simple food chain. If you are a producer connect yourself with a consumer. Using the same colored string, connect to other consumers who may eat you for food. You have now formed a simple food web. If you are a consumer who eats other consumers, connect yourself to them using the same colored string.

Pick all other eaters of the same animal. Connect them with string. Add the other community members, one at a time. If possible, use a different color string for each plant or animal that is eaten (connect to all other animals that eat it). Now go back and see if there are any other animals that eat plants or animals in this group that are not connected with string. Connect them. You have now completed a food web of plants and animals.

1. Which groups of organisms begin a food chain? A food web?
2. In real life are there more producers than consumers? Why?
3. If you were to illuminate one of the groups of plants or animals from the food web, which would have the greatest impact? Why?
4. Do you think there are more food chains or food webs in nature? Explain.

Science as Inquiry

Nibbles and Bits (2)

You have been placed in teams of four or five students that will represent a specific food chain. Each team is to arrange themselves into a logical food chain by lining up in order from abiotic factors (factors that are nonliving but essential to living systems) to the last member of the food chain. Your teacher will issue food chain cards that represent all categories of a typical food chain. Arrange yourselves using these cards. When you have formed your food chain explain why you placed yourself at that point in the food chain.

1. What are the benefits of eating lower on the food chain?
2. When considering food chains, discuss the role of scavengers, parasites, and omnivores.
3. Where do humans fit into most food chains?
4. Discuss the effect of removing a link in the food chain.
5. Where do decomposers (bacteria) fit on a food chain? What would happen if the decomposers were removed from a food chain?

Science as Inquiry

Nibbles and Bits (3)**Overview:**

Biologists in the year 2014 observe a food chain that is part of an ecosystem on a distant planet. They find that it has many characteristics of food chains on Earth. Here is what they discover:

On a particular area of land, a small, plant-like organism capable of photosynthesis called a vortek serves as food for a snive. The snive, in turn, is preyed upon by a kluke. There are 100 vorteks, 50 snives, and 25 klukes. The food chain may be diagrammed as shown below.

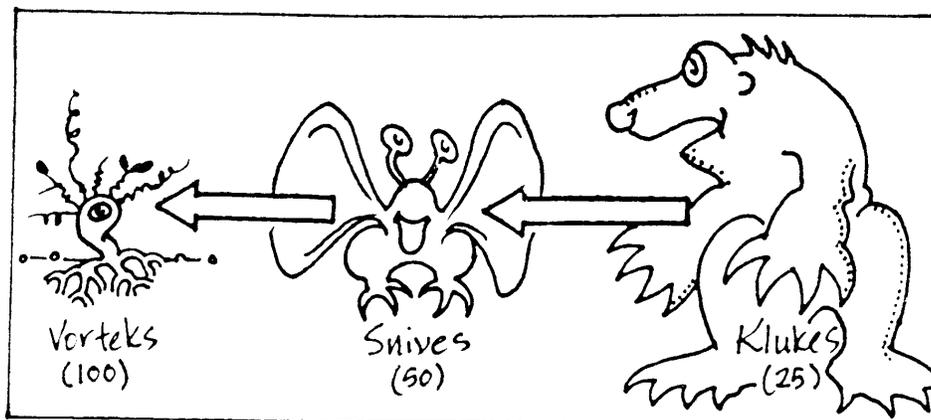
Procedure:

On a blank sheet of paper, list the members of this food chain by placing them in order, with the members at the bottom of the food chain near the bottom of the page, and spacing them 5 cm apart.

For each member, beginning with the bottom one, draw a horizontal block around it to represent the numbers of each member inside the block following these guidelines:

- A. Height: each block should be 5 cm tall, so that it touches the bottom of the block above it.
- B. Width: make the width to scale according to the numbers of each organism in the food chain—10 organisms in 1 cm. (The block around the vorteks, for example, is 10 cm wide.)
- C. Centering: center each block on the page.
- D. Label the boxes according to what the enclosed members eat.

Diagram of a Food Chain from a Far-Off Planet



1. Explain why you chose certain labels for each box.
2. What shape is formed by all the boxes?
3. This food chain is similar to many on earth. What factors do you think cause certain food chains to have this shape?
4. How would the numbers of each member of the food chain—vorteks, snives, and klukes—change over time in each situation listed below?
 - a. A deadly disease wipes out all of the klukes.
 - b. All vorteks are consumed by visiting biologists.
5. What would happen if a tertiary (third order) consumer called the joon was introduced?
6. Turn your drawing upside down. Describe a food chain on Earth that might have a shape similar to this one.