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ABSTRACT

This activity package is designed as a resource for the classroom teacher. It contains numerous activities, experiments, and demonstrations in environmental education for the elementary grades. Numerous field trips are described. Each activity includes: objectives, suggested materials, suggested methods, and a description of the activity. Where indicated, illustrations are given. Resource information, such as appropriate films, filmstrips, books, and periodicals, is included for the classroom teacher. (MA)

DRAFT

THE GOOD BUGS AND THE BAD BUGS

Written for the U.S. Environmental Protection Agency

By Richard Spencer and Eleanor Mac Onie

Illustrated by Courtney Smith

Summer 1977

PREFACE

This activity package has been developed for the United States Environmental Protection Agency. It is designed as a resource for the classroom teacher. These activities can be utilized in any order and can be adapted, modified, or expanded to meet the particular needs of the class. The activities are appropriate for primary children Kindergarten - Grade 3.

The objectives are:

1. to introduce the different factors which influence plant and animal life;
2. to introduce the concepts of pest management;
3. to introduce the concept of using alternative farming methods;
4. to provide an awareness of the responsibilities of the individual for maintaining a productive and liveable environment; and
5. to motivate the children, and their teachers to work constructively toward the solution of environmental problems.

This activity package conforms with the guidelines set forth in the Report of the Subcommittee on Environmental Education, Federal Interagency Committee on Education, "Fundamentals of Environmental Education", November 1976, U.S. Department of Health, Education, and Welfare/Education Division.

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INTRODUCTORY ACTIVITY TO THE GOOD BUGS AND THE BAD BUGS

OBJECTIVES:

1. to introduce terms: insect, Good Bug, Bad Bug, pest, and pesticide;
2. to introduce the concept that insects can have an effect on the total environment including the life cycle and food chain of all living things;
3. to provide an awareness of the dangers of pesticides;
4. to provide an awareness that methods of pest controls other than pesticides are needed; and
5. to provide an introduction into the methods of Integrated Pest Management (IPM).

SUGGESTED MATERIALS:

A Ladybug Beetle hand puppet: Make one out of an old red or orange sock or dye a white sock. Use two buttons for the eyes. Use a magic marker or black felt circles to make the black spots. Use pipe cleaners for antennae (feelers). Use orange or red felt for the wings, two pairs. Be as creative as possible.

SUGGESTED METHODS:

1. Use the hand puppet to present the activity.
2. LB is the Ladybug Beetle and T is the teacher.

ACTIVITY: USE A LADYBUG BEETLE HAND PUPPET AS A TEACHING DEVICE

LB. What is my name?

T. Your name is Ladybug.

LB. Did you know that some people call me Ladybird?

T. You are not a bird.

LB. Yes, I know, but I have wings and I can fly.

T. Do you have any other names?

LB. Yes, I am also called Lady Beetle. Can you guess why? It is because I am a beetle. A beetle is an insect.

T. AN INSECT ! What is an insect?

LB. We insects are animals. We have: six (true) legs; two feelers (antennae); and three body parts, a head, a chest (or thorax), and a stomach (or abdomen). We may have no wings or one or two pair of wings.. Sometimes we are called bugs.

T. Are all bugs insects?

LB. Yes, all bugs are insects, but not all insects are bugs. Some bugs you might know are bed bugs, stink bugs, lace bugs and water bugs.

T. Some people say bugs are pests.

LB. I agree, some bugs and other insects are pests. They destroy the farmer's crops, trees, and plants. They can eat the wood in your house (termites), the clothes in your closet, and the rugs on your floors (moths). There are some that love to eat houseplants and plants in your yard (Japanese Beetle). In fact there are some that can make us sick (mosquito). Some even bite and sting (wasps). There are Bad Bugs, but there are Good Bugs, too.

T. People call Bad Bugs, pests, because they destroy plants and food and can harm people.

LB. But, I am not a pest, am I?

T. No, Ladybug, you are a Good Bug. Many Ladybug Beetles are collected and sent to farms and gardens that need their help to eat the Bad Bugs called aphids.

LB. What else do the Good Bugs do?

T. Good Bugs help us in several ways. The bees help by transferring pollen from the flowers on our plants. They also give us food. Bees make honey. Locusts, ants, termites, beetle grubs, caterpillars, and grasshoppers are used for food (protein) by millions of people in many parts of the world.

LB. I know a way we help. We provide food for other bugs and insects and other animals as well, such as birds, fish, frogs, salamanders, and turtles.

T. Other bugs and insects help build up the soil, aerate it, and break down things that were once living.

LB. How does man get rid of the Bad Bugs, the pests?

INTRODUCTORY ACTIVITY TO THE GOOD BUGS AND THE BAD BUGS

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T. Your name is Ladybug.

LB. Did you know that some people call me Ladybird?

T. You are not a bird.

LB. Yes, I know, but I have wings and I can fly.

T. Do you have any other names?

LB. Yes, I am also called Ladybug Beetle. Can you guess why? It is because I am a beetle. I have powerful jaws for chewing. I have heavy wings that look like two shields on my back. Underneath are the folded wings that I use when I fly. A beetle is an insect.

T. AN INSECT! What is an insect?

LB. We insects are animals. We have: six (true) legs; two feelers (antennae); and three body parts, a head, a chest (or thorax), and a stomach (or abdomen). We may have no wings or one or two pair of wings. Sometimes we are called bugs.

T. Are all bugs insects?

LB. Yes, all bugs are insects, but not all insects are bugs. The only real bugs are those with the soda-straw mouths made for poking into plants or drinking the blood of animals. Bugs have four wings or no wings at all. Half of the wing is tough, like a beetles's. The other half is thin, like that of a fly. Some bugs you might know are bed bugs, squah bugs, stink bugs, lace bugs and water bugs. I am not really a bug. I am a beetle.

T. Some people say bugs are pests.

LB. I agree, some bugs and other insects are pests. They destroy the farmer's crops, trees, and plants. They can eat the wood in your house (termites), the clothes in your closet, and the rugs on your floors (moths). There are some that love to eat houseplants and plants in your yard (Japanese Beetle). In fact there are some that can ~~make us sick~~ (mosquito). Some even bite and sting (wasps). There are Bad Bugs, but there are Good Bugs, too.

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T. No, Ladybug, you are a Good Bug. Many Ladybug Beetles are collected and sent to farms and gardens that need their help to eat the Bad Bugs called aphids.

LB. What else do the Good Bugs do?

T. Good Bugs help us in several ways. The bees help by transferring pollen from the flowers on our plants. They also give us food. Bees make honey. Locusts, ants, termites, beetle grubs, caterpillars, and grasshoppers are used for food (protein) by millions of people in many parts of the world.

LB. I know a way we help. We provide food for other bugs and insects and other animals as well, such as birds, fish, frogs, salamanders, and turtles.

T. Other bugs and insects help build up the soil, aerate it, and break down things that were once living.

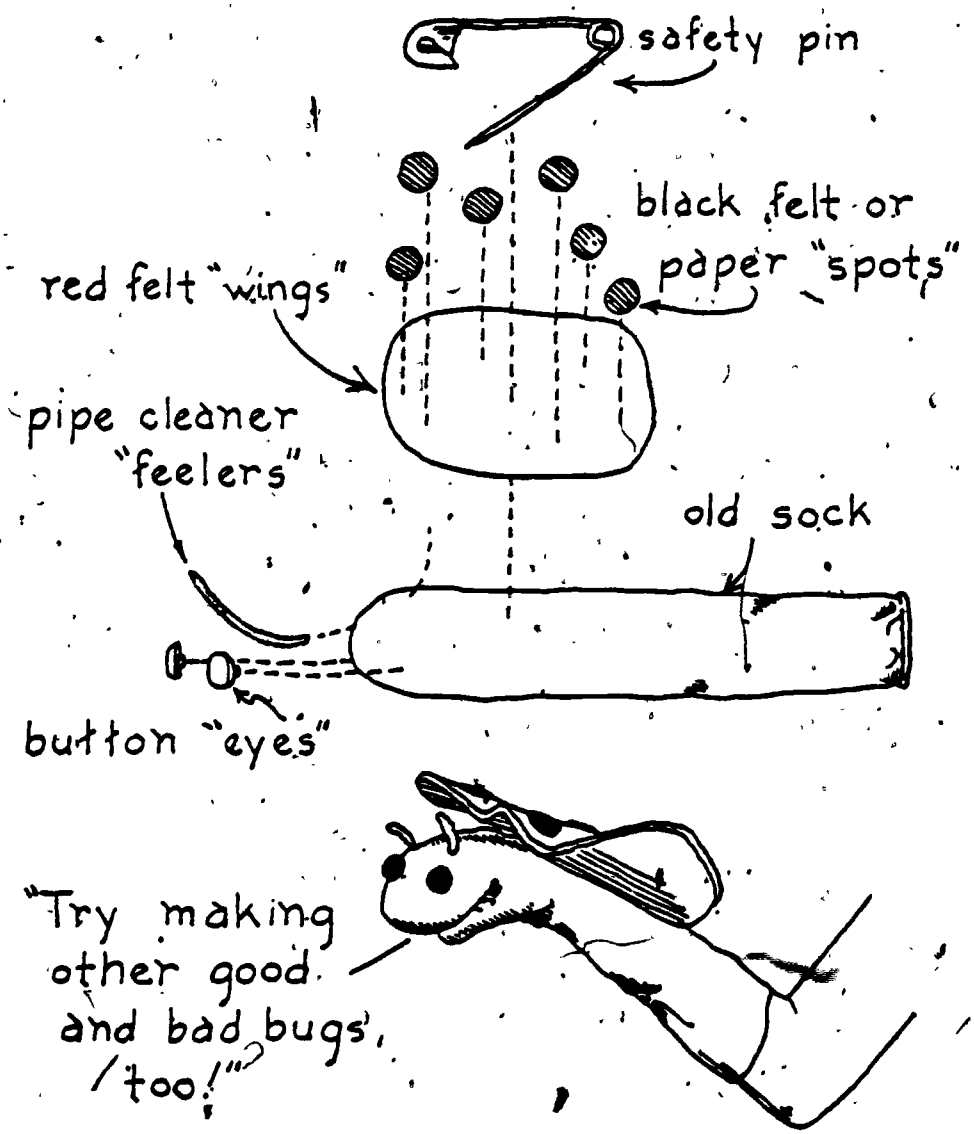
LB. How does man get rid of the Bad Bugs, the pests?

T. The farmer can plant crops that the bugs don't like to eat. He can plow up the fields after a crop has been harvested. This disturbs the life cycle of the insect. Some farmer's use traps to catch the pests. You can even pick the bugs off by hand. It takes time but it works. Smoke will also drive the insects away. Farmers also use pesticides to get rid of pests.

LB. PESTICIDES ! What is a pesticide?

T. Pesticide comes from the words, pest, meaning a destructive animal, and icide meaning to kill. Pesticides are made by man out of chemicals and are usually sprayed or dusted on plants. Pesticides can be useful, but used unwisely they can hurt many different living animals, the good as well as the bad. All insects play a role in nature's plan. Many insects can be harmful at one stage and beneficial at another stage of their life cycle.

Making a Ladybug Beetle Hand Puppet:



EPALAND

OBJECTIVE:

.. to show how insects affect the environment.

SUGGESTED MATERIALS:

A Ladybug Beetle hand puppet called Millie.

SUGGESTED METHOD:

Use the hand puppet to present the stories of the ant, aphid, and honeybee. The stories may be presehted singularly or in groups.

ACTIVITY: USE MILLIE, THE LADYBUG HAND PUPPET, TO TELL A STORY.

It is fun to make believe. Let's pretend there is a mythical kingdom called Epaland where great numbers of insects live. Now imagine yourself to be very small and the insects and bugs to be very large. Are you ready? Hop on my back just between my wings. You are about to enter the Kingdom of Epaland.

This is my friend Harvey Ant. Let us find out what he does. "Hello Harvey, do you have time to tell the boys and girls something about yourself? I am sure they would like to hear where you live, what you eat, and what you do."

"Glad to meet you. As you can see, I scurry here and I scurry there. I am a very busy insect. Each ant has his own job to perform. Some of us nurse the baby ants, some of us forage for bits of food, and some of us gather pollen off the flowers. I am a scavanger because I collect dead insects. We carry what we have collected

back to our ant hill, the place where we live. We live in a colony with lots of other ants."

"Yesterday there was a picnic in the meadow. My family and I have been busy cleaning up all the bits of food that were left. We carry the food back to our ant hill and store the food in the tunnels we have built. The stored food that we do not eat decays and puts back organic matter into the soil. When we build our tunnels we aerate the soil by loosening the earth. This allows the air to get into the soil. Each ant has something important to do. We live and work together. In fact there are some ants who benefit from special relationships with other insects."

"One such relationship is the one with Alfred Aphid. Alfred Aphid is sometimes called an ant cow. Look on that plant over there. That is Alfred. Why don't you go talk to Alfred while I get back to my clean up job. By, see you on the sidewalk."

"Thanks, that is a good idea," says Millie. "Let us walkover and talk to Alfred about ants and aphids living and working together. Hi, Alfred, have you got a minute?"

"What are you doing here, Millie? I thought I was all alone except for my ant friends. You are not going to eat me are you?"

"It is all right Alfred. I have some boys and girls with me who want to know why the ants follow you."

"The ants follow me to get my honeydew. You see, my favorite

food is plant sap. When I build up a sap surplus in my body, I secrete a special sweet substance known as honeydew. Ants like to use honeydew for their food. When an ant taps me with its antennae I secrete honeydew. The ant drinks the honeydew and moves on to the next aphid. He goes from aphid to aphid. When the ant has eaten all he wants, the ant hurries back to the ant hill to feed the ants ant larvae that remained behind."

"The ants like my honeydew so much they will often protect my eggs by carrying the eggs to safety when the lacewing or ladybug tries to eat them for their dinner. If you see ants on a plant it usually means aphids are close by."

"Unlike most other insects my babies look just like me. The only difference is the size. They are just alot smaller than I am. Within hours of the time my babies hatch they start making honeydew. Now, do you understand why ants follow me around."

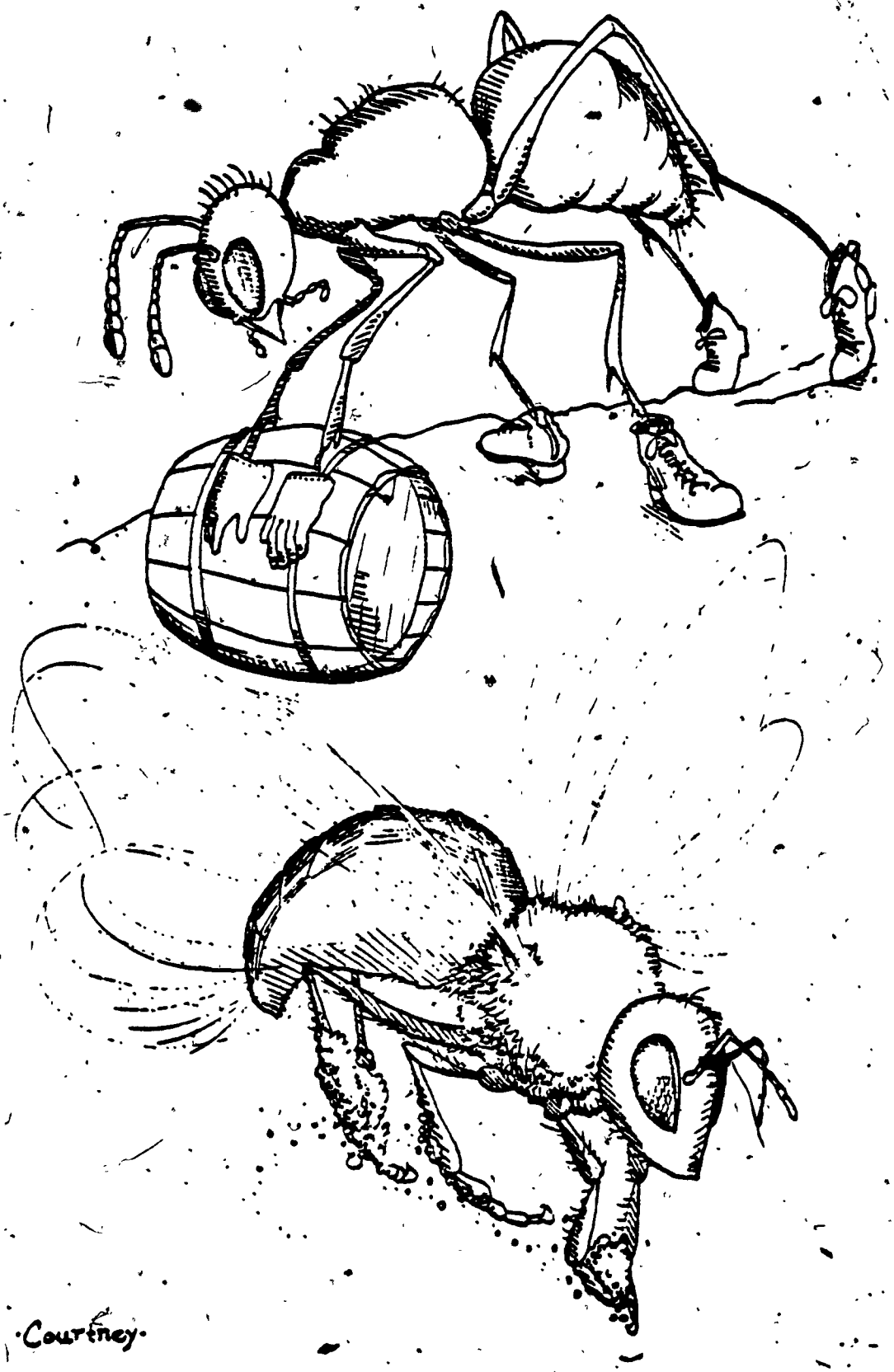
"In Epaland aphids are considered pests because we overeat. You get a large colony of aphids together and we can do alot of harm to plants. Farmers just don't like us around his fields or in his garden. They will use pesticides bring ladybug beetles like Millie to control us. But aphids do serve a useful purpose. Remember I make food for the ants, I do eat unhealthy and weak plants, and I provide food for other insects. Oh boy, am I hungry. Please excuse me. I must get back to my munching. See you around your garden."

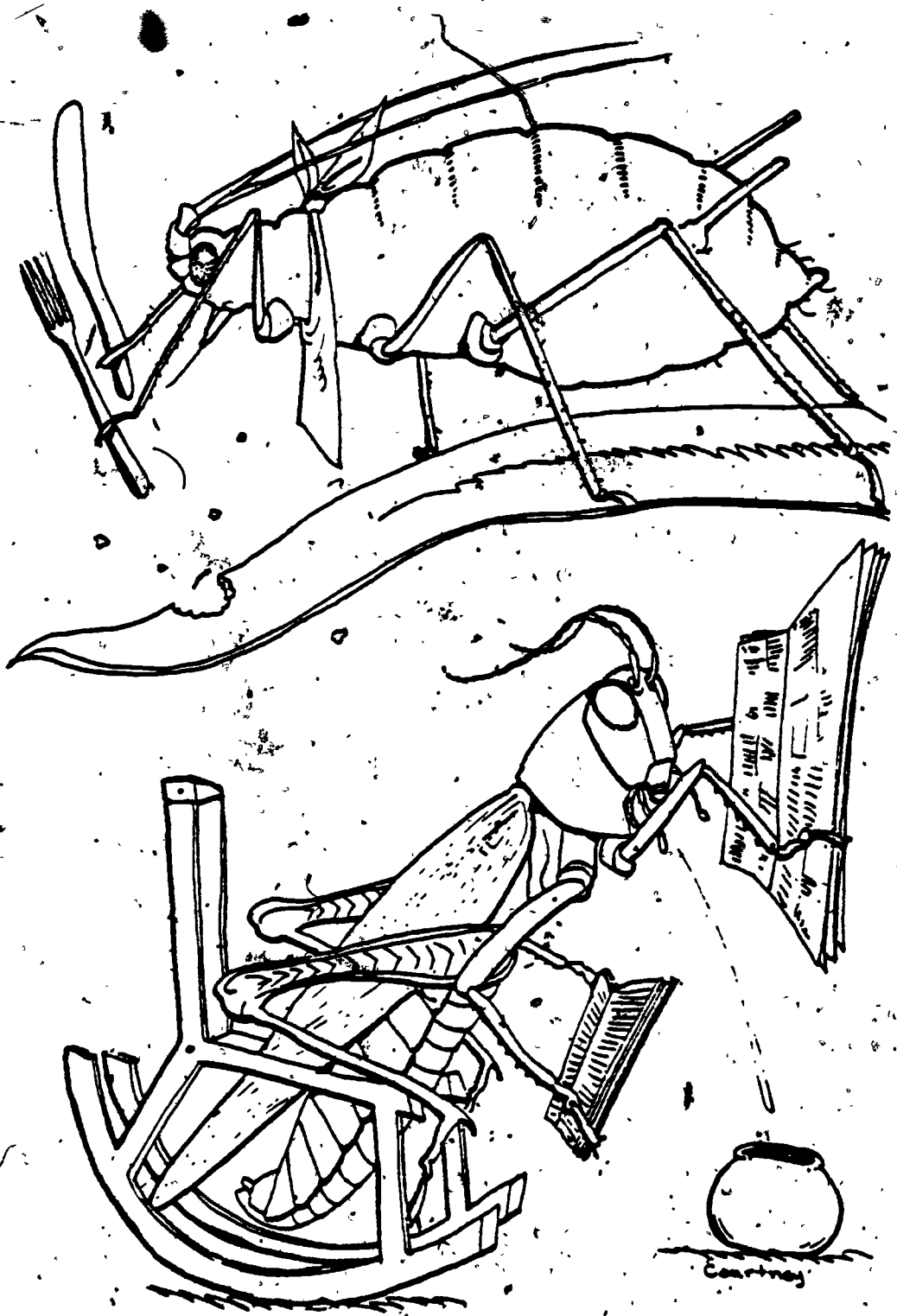
"Another friend I want you to meet is Waldo Honeybee. He is flying overhead. If you stay perfectly still he probably won't hurt you. It looks like he is going to land on the clover. Even though he looks busy buzzing around maybe he will tell us what he does in Epaland. Do you have a minute to talk to us Waldo?"

"I sure do. I am a worker bee. I fly around collecting pollen and nectar to take back to the hive. I go from flower to flower on a particular type of plant. I may work on an apple tree all day long. I collect the pollen with the tiny hairs which are all over my body. The pollen we bees carry from flower to flower will help those plants make seeds. These seeds will grow into new plants that will produce the fruits, apples, peaches, pears, oranges, and grapefruit that people love to eat. The worker bees in the hive will take the pollen and nectar and turn it into food. This food is called honey which both bees and people like to eat."

"Bees live in a hive. Just recently Farmer Rightway gave us a new hive. The old one was getting old and crowded. The new hive is very large. With the additional room we can make alot more honey this y[illegible]ch Farmer Rightway can collect and sell. I have to fly. The bees back in the hive are waiting for me. We work together."

"Boys and girls it is my dinner time, too. I will tell you about more of my friends another time. So long."


Courtney



MILLIE AND THE FARMER

OBJECTIVES:

1. to provide an awareness of the dangers of pesticides;
2. to provide the concepts of Scientific Ecological Farming; and
3. to provide an awareness of the responsibility of the individual for maintaining a productive and liveable environment.

SUGGESTED MATERIALS:

A Ladybug Beetle hand puppet called Millie.

SUGGESTED METHOD:

Use the hand puppet to present the activity.

ACTIVITY: USE MILLLE, THE LADYBUG BEETLE HAND PUPPET, TO TELL A STORY

Hi, Boys and Girls. I'm back again with another story. Since you were so good last time, I'm going to take you with me to work. I'll let you sit on the fence and watch. But, let me warn you to stay away from the corn fields. Farmer Wrongway is spraying with pesticides today. He is spraying because many pests got into his fields.

It was his fault really. He could have prevented it. He could have made his fields strong and healthy but he didn't. Farmer Wrongway over worked his fields. Willy Worm tells me the soil is just worn out. It is exhausted. It needs a rest. Willy Worm also says it could use a good dinner, lots of good organic matter.

Did you know that the soil eats? It sure does. It needs all kinds of elements and minerals. They help plants grow healthy and strong, just as vitamins and minerals help boys and girls grow big and strong. There is Farmer Rightway. He is outback near his barn. He's working

on a compost pile. This is a pile of organic matter such as old vegetables, horse manure, grass, leaves, and materials that used to be alive. The compost will make what we call enriched soil to feed the fields. Mr. Rightway is a wise farmer.

He is friendly to us Good Bugs, too. He helps us and provides us safe homes. We return his kindness by keeping pests from hurting his crops. Remember I eat the tiny bugs called aphids that eat the plant sap from the leaves on his crops. Waldo Honeybee and Willy Worm also help around the farm. Waldo makes honey and carries pollen from flower to flower. Willy helps by aerating the soil and ingesting dirt.

Farmer Rightway is also a smart farmer. He knows that in order to help us, he must keep his fields as strong as he can. He plows the old crops under to help enrich the soil. He tries to plant strong healthy types of plants to keep out bug pests. He plants different kinds of plants to see which ones grow the best. For example, he may plant alfalfa between his cotton crop. This way he can keep harmful insects off of the cotton. The sweeter alfalfa is used as a trap crop. It attracts the harmful insects. This is why I think Farmer Rightway is a smart farmer.

Well, enjoy your view while I go back to work. Be back soon.

FARMER RIGHTWAY'S FARM

OBJECTIVE:

to introduce methods of pest control such as natural predators and pesticides.

SUGGESTED MATERIALS:

A ladybug Beetle hand puppet called Millie.

SUGGESTED METHOD:

Use the hand puppet to present the activity.

ACTIVITY: USE MILLIE, THE LADYBUG BEETLE HAND PUPPET, TO TELL A STORY

Let me tell you another interesting story. The farmer has always played an important role in the history of our country. But he has had to battle the bugs and pests.

Take, for example, Farmer Rightway who grows food on his farm. He grows enough food for all of us in this room to eat. He grows such things as corn, green beans, spinach, and wheat. His farm is really a big place. It stretches as far as the eye can see.

On this farm he has lots and lots of animals. He has cows, pigs, chickens, and horses.

Farmer Rightway has problems. His problems are small enough to hold in your hand. These problems are caused by PESTS. His little pests are insects but only a couple of different kinds. Farmer Rightway is angry. He says that he is going to spray to kill all those bugs. His daughter, Jenny, says, "But Daddy, you don't want to do that."

Farmer Rightway says in a demanding voice, "Why don't I?"

Jenney says, "You will kill all our insect friends such as the ladybug beetle, praying mantis, lacewing, and honeybee. Daddy, we need those bugs. We need honeybees to help pollinate the flowers on our fruit trees and to make honey for our hives. The ladybug eats the aphids off of our trees. The praying mantis and the lacewing eat other "Bad Bugs" that are harming our crops.

Farmer Rightway says in despair, "What can I do now?"

Jenny replies, "I know, we can call Mr. Blue Jeans, the County Agent."

Farmer Rightway says, "OK, let's give him a call."

Farmer Rightway tells the County Agent, "I need some advice on how to handle some pests that are taking over my fields."

Mr. Blue Jeans, the County Agent says, "I'll be right over to take a first hand look at your problem Farmer Rightway."

When the County Agent arrives, the two of them walk through the fields. Mr. Blue Jeans suggests, "I think you will need to plant another type of crop. You will have to plant it right in the middle of each row of corn. It must be done quickly to be of help. In the meantime, you will have to use a pesticide on the most affect area. Make sure you use the right pesticide for the type of pest that is eating the corn. Use the pesticide sparingly so as not to kill too many of our insect friends."

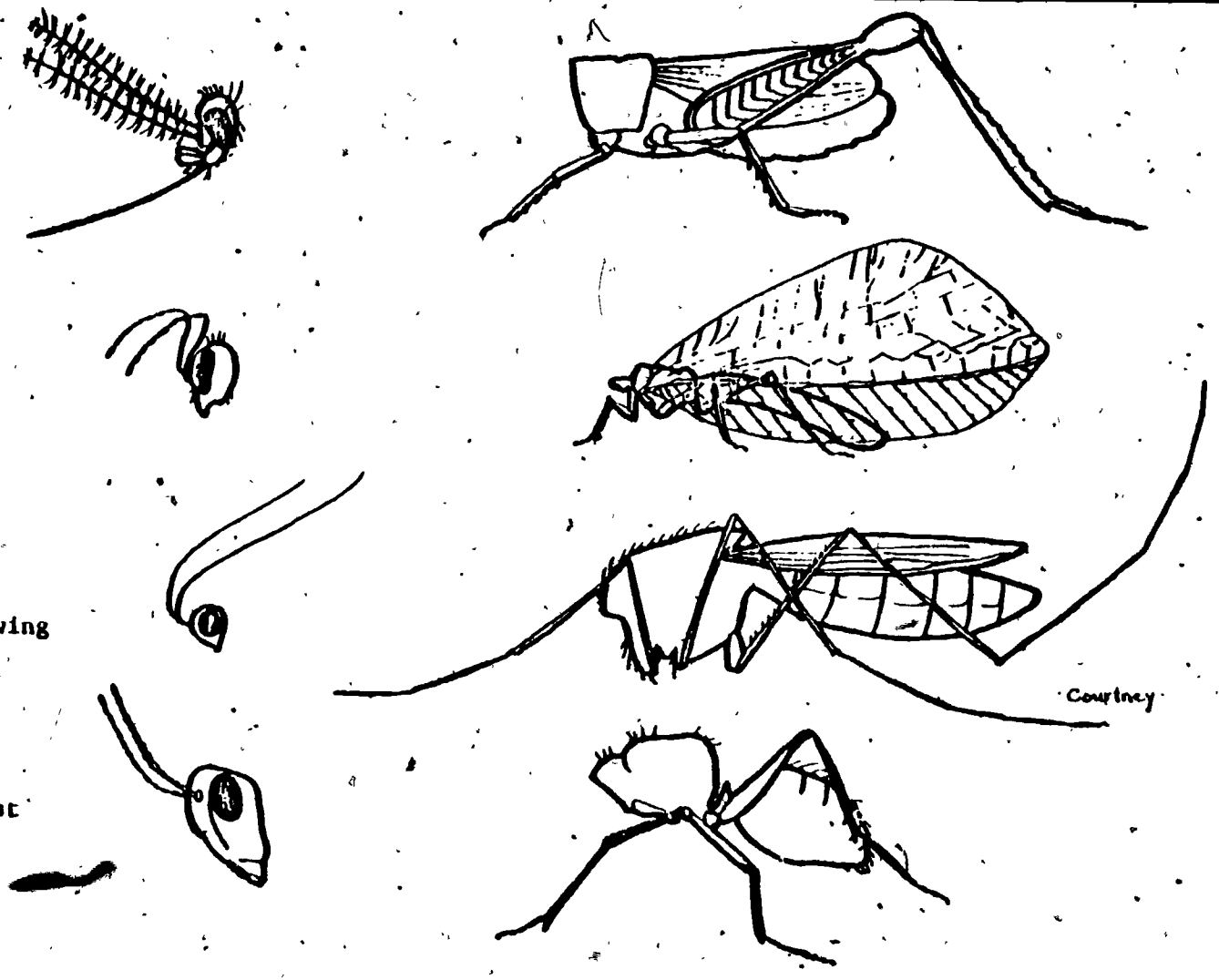
"When the other plants grow, the rest of the pests that are still alive will eat the new plant. They will leave the corn alone. Next year the corn should be planted in a different part of the farm. This land needs a rest. Planting in a different area will cause next years corn pests to starve, since there will not be corn here to eat. Plant alfalfa, soybeans, or hay in this field, then plow it under."

"Next year's corn seed should be that new fortified brand ZXY. This brand is supposed to stand off the attack of the corn pest very well."

Farmer Rightway shakes hands with Mr. Blue Jeans and thanks the County Agent for his help.

Farmer Rightway turns to his daughter and says, "What do you think of those ideas, Jenny?"

"Great, let's get started."



How well do you know your insects? Can you match the heads to the correct bodies? Good luck!

THINGS TO DO

BOOKS TO ENJOY:

Bason, Lillian. Spiders. Washington, D.C.: National Geographic Society, Books for Young Explorers, 1974.

Behn, Harry. Cricket Songs. New York: Harcourt Brace, Javanovich, Inc., 1964.

Behn, Harry. More Cricket Songs. New York: Rand McNally and Company, Inc. 1971.

Boyd, Lorenz. Follow the Butterfly Stream. New York: Abingdon Press, 1971.

Conklin, Gladys. I Like Caterpillars. New York: Holiday House, 1960.

Daly, Eileen. Butterfly! A Story of Magic. Racine, Wis.: Western Publishing, 1969.

Friskey, Margaret. Johnny and the Monarch. Chicago: Children's Press, 1961.

George, Jean Craighead. All Upon a Stone. New York: Thomas Y. Crowell, 1971.

George, Jean Craighead. Who Really Killed Cock Robin? New York: E.P. Dutton and Company, 1971.

Goudey, Alice. Butterfly Time. New York: Charles Scribner's Sons, 1964.

Graham, Maragret Bloy. Be Nice to Spiders. New York: Harper and Row, 1967.

Huntington, Harriet. Let's Go to the Woods. Garden City, New York: Doubleday & Company, 1968.

____. Ladybug. New York: Morrow, 1966.

Lubell, Winifred and Cecil. The Tall Grass Zoo. Chicago: Rand McNally, 1960.

Miles, Miska. The Apricot ABC. Boston: Little Brown, 1969.

Podendorf, Illa. The True Book of Insects. Chicago: Childrens Press, 1954.

Selsam, Milicent E. Terry and the Caterpillars. New York: Harper & Row, 1962.

____. Spiders. New York: Thomas Y. Crowell, 1955.

____. The True Book of Spiders. Chicago: Childrens Press, 1962.

____. We Like Bugs. New York: Holiday House, 1962.

Wonder Starters. Butterflies. New York: Wonder Books, 1972.

POEMS TO LEARN:

Brown, Margaret Wise. Nibble Nibble. New York: Young Scott Books, 1959.

"A Child's Delight" (a firefly in a jar)
"Bumble Bee"
"Little Black Bug"

deRegniers, Beatrice Schenck; Eva Moore; and Mary M. White. Poems Children Will Sit Still For. New York: Scholastic Book Services, 1973.

"The Caterpillar" by Christina Rossetti
"Firefly" by Elizabeth Maddox Roberts
"Little Snail" by Hilda Conkling

Thompson, Jean McKee. Poems to Grow On. Boston: Beacon Press, 1957.

"Spiders" by Aileen Fisher
"Fuzzy Wuzzy, Creepy Crawly" by Lillian Schulz
"Earth Worm" by Mary McBurney Green
"Mrs. Brownish Beetle" by Aileen Fisher
"Little Bug" by Rhoda W. Bacmeister

SONGS TO SING:

"Farmer's In a Pickle" (Music to Farmer in the Dell)

Bertail, Inez. Complete Nursery Song Book. New York: Lothrop, Lee and Shepard, 1967.

"Over in the Meadow"

Boni, Margaret Bradfor. Favorite American Song. New York: Simon and Schuster, 1956.

"Shoo Fly, Don"t Bother Me"

Glazer, Tom. Eye Winker Tom Tinker Chin Chopper. New York: Doubleday and Company, Inc. 1973.

"The Barnyard Song"
"Bingo"
"Eentsy Weentsy Spider"
"I Know An Old Lady"
"The Little White Duck"
"Old MacDonald"
"There Was a Little Turtle"

Jaye, Mary T., Imogene Hilyard and Victor and Victor Valla. Making Music Your Own. New Jersey: Silver Burdett Company, 1971.

"John the Rabbit"
"Barnyard Family"
"On the Farm"
"Morning on the Farm"

McLaughlin, Roberta and Lucille Wood. Sing A Song. New Jersey: Prentice-Hall, Inc. 1960.

"If You Were A Farmer"
"Had a Little Rooster"
"Let's Make a Garden"

FINGER PLAYS TO SAY:

Here is the beehive. (make a fist)
Where are all the bees?
Hiding away where nobody sees.
They are coming out now.
They are all alive.
One, two, three, four, five. (hold up fingers)
Buzz, buzz, buzz

There was a little turtle. He lived in a box.
He swam in a puddle. He climbed on the rocks.
He snapped at a mosquito, he snapped at a flea,
He snapped at a minnow. And he snapped at me.
He caught the mosquito. He caught the flea,
He caught the minnow. But he didn"t catch me.
VACHEL LINDSAY

ART PROJECTS TO DO:

Make a variety of insects out of colored construction paper that can be cut, pasted or stapled. Hang the insects in a mobile.

Use molded egg cartoons as insect bodies. Cut or tear for desired size and shape. Paint and decorate with buttons for eyes and pipe cleaners for antennae, etc.

Make hand puppet of worms from brown socks. Use buttons for eyes.

Create your own Good Bugs and Bad Bugs Puppets. Use socks or paper bags.

FILMSTRIPS TO SEE:

Insects SVE 435.4 Primary Price $7.50

Society for Visual Education Inc.
1345 Diversey Parkway
Chicago, Illinois 60614

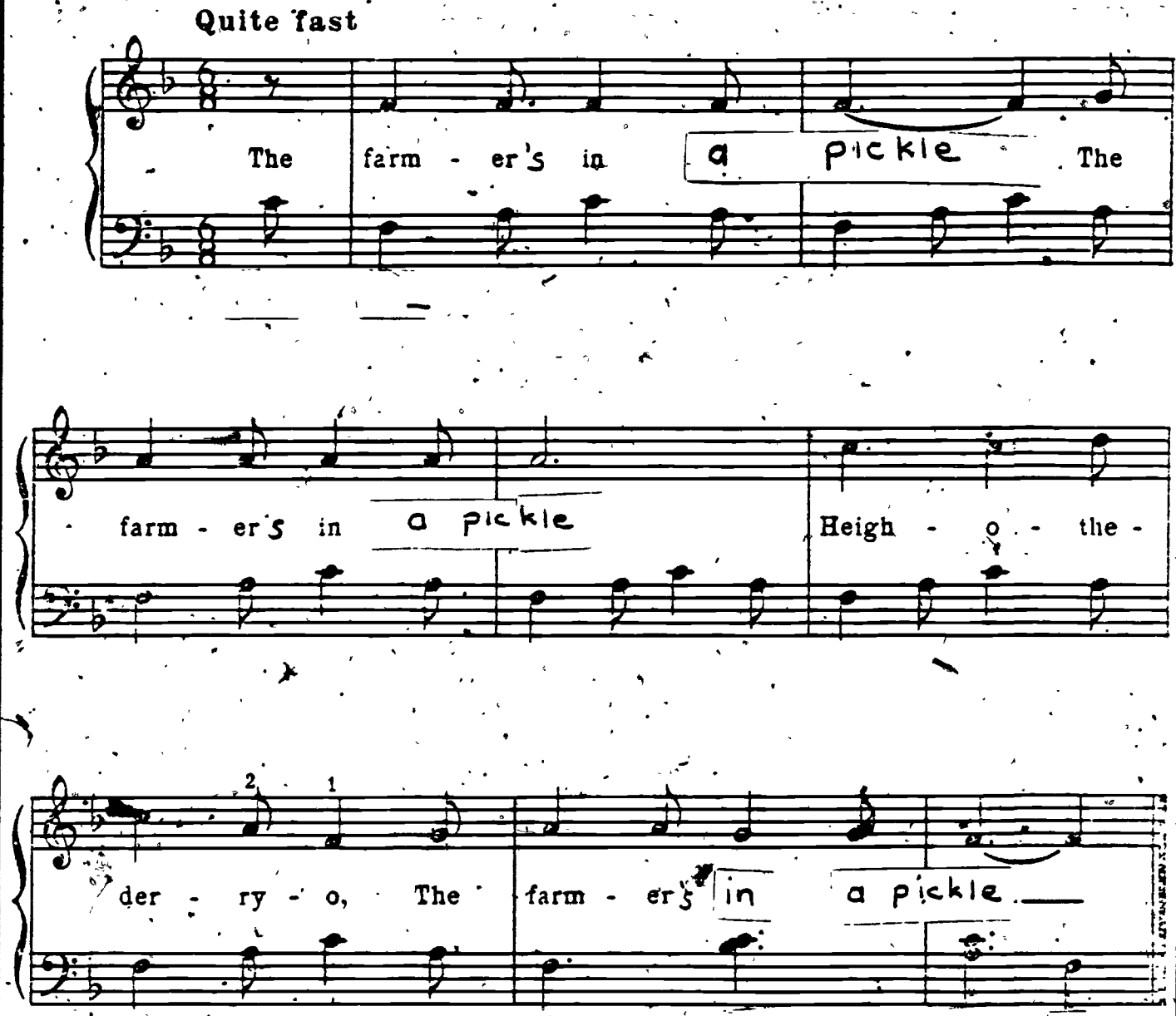
The Battle of the Bugs Primary and Intermediate
U.S. Environmental Protection Agency
Pesticides Division Regional Branch Chief
% your local EPA Headquarters
Or try your State Co-ordinator of Environmental Education

GOVERNMENT PUBLICATIONS:

The Battle of the Bugs Pamphlet
U.S. Environmental Protection Agency
Department PMI 5
401 "M" St. S.W.
Washington, D.C. 20460

There Lived a Wicked Dragon written by Martha Finan
An Environmental Coloring Book (SW-105)
U.S. Environmental Protection Agency
Solid Waste Management Publications Department
401 "M" St. S.W.
Washington, D.C. 20460

THE FARMER'S IN A PICKLE



2. The bugs are in the field.
3. The bugs are eating the corn.
4. Here comes some help.
5. The planes are gone to spray.
6. The bees may get sick.
7. Find a better way.
8. New plants we have to try.
9. Good bugs we have to get.

GARDENS IN THE CLASSROOM
BOTTLE GARDENS USING JARS AND PLASTIC SHOE BOXES

OBJECTIVES:

1. to create self contained environments called ecosystems;
2. to develop an understanding of the relationships of living things;
3. to develop the concept of a food chain;
4. to develop the concept of a life cycle;
5. to develop simple garden techniques;
6. to develop mechanical skills in working with gardens;
7. to develop the idea that different factors can influence the growth of living things;
8. to build bottle gardens for use in a variety of experiments and activities; and
9. to allow students to create things to brighten the classroom.

SUGGESTED MATERIALS:

A. BASIC MATERIALS (for bottle gardens)
   1. jars (wide mouth), gallon, large peanut butter, or plastic shoe boxes
   2. charcoal (fish tank type)
   3. loam (enriched soil)
      a. potting soil (take equal parts of dirt, sand, organic material, peat, or composted material. Sterilize by baking in an oven at 200 F for 1 hour.
   4. plastic or glass covers for jars or terrariums

   Note: Remember that enough containers will be needed to perform other activities that are suggested throughout this booklet.

B. MATERIALS FOR TERRARIUMS:
   1. animals (small)
      a. worms
      b. insects
      c. hermit crabs
      d. frog or salamander
      e. other small animals (teachers discretion)
   2. plants (small)
      a. several small plants
      b. pieces of fungi
      c. lichens
      d. mushrooms
      e. bits of decaying wood
   3. Since different areas of the country have different types of soil it is possible to create terrariums for the local environment. Use soil and materials from a specific area familiar to the students. In this case, plants and animals should be from the same area or at least common to the area.

C. HERB GARDENS
1. smaller jars (wide mouth) or a shoe box will do
2. use only one type of herb to a garden (seeds)
3. place in a sunny area, but not in direct sunlight
4. cut back when plants appear full, this is harvesting

D. VEGETABLE GARDENS
1. begin vegetables from seed in the early spring then transplant out of doors once warmer weather arrives
2. kitchen counter top gardens
   a. take the tops off such vegetables as
      1. potatoes
      2. carrots
      3. yams
   b. place the bottom portion into a container of water

SUGGESTED METHODS FOR PREPARING BOTTLE OR SHOE BOX GARDENS

A. Clean jars and plastic shoe boxes

B. Rinse charcoal to remove dust

C. Prepare soil mixture (unless premixed is used)

D. Place charcoal on the bottom of the containers. Charcoal will provide for drainage and keep down the growth of algae.
   1. a 1"-2" layer in gallon jars
   2. a 1" layer in large peanut butter jars
   3. a 1/2" layer in plastic shoe boxs

E. Add the loam/soil to a depth of two to three inches

F. Add plants, plantings, or seeds
   1. scoop small hole using a spoon or other tool
   2. insert plant into the hole
   3. cover roots completely
   4. arrange any extras a child may want to add
   5. add water (just enough to moisten the soil)
   6. add animals only in the terrariums

G. If placing the jar on it's side, a stand will be needed--a few suggestions are:
   1. use 4 small rocks, one on each corner
   2. chunks of clay
   3. pieces of wood 1x2x2"
   4. build a stand
   5. use a macrame hanger

ACTIVITIES:

BUILD A BOTTLE GARDEN OR TERRARIUM. OBSERVE THE RELATIONSHIPS OF THE LIVING THINGS IN THE TERRARIUMS.

SOME DO'S AND DON'TS

1. Do let the gardens become established before beginning any of the other activities.
2. Do remove dead leaves and weeds in a garden that is to florish. Throw this organic material in the compost pile.
3. Do watch for pests and diseases in the gardens that are to be maintained throughout the year.
4. Do remove the lid of a closed garden if heavy moisture appears on the glass around the top.
5. Don't place any garden in direct sunlight (unless experimenting).
6. Don't add any extra water to a closed garden after the original watering unless it contains animals or really needs watering.

BOOKS TO ENJOY:

Bancroft, Henrietta. Down Come the Leaves. New York: Thomas Y. Crowell, 1961.

Benton, William and Elizabeth. How Does My Garden Grow? Racine, Wis.: Western Publishing, 1969.

Cole, Joanna. Plants in Winter. New York: Thomas Y. Crowell Company, 1973.

Downer, Mary Louise. The Flower. New York: William R. Scott, 1955.

Jordan, Helen J. How a Seed Grows. New York: Thomas Y. Crowell, 1960.

Lerner, Sharon. I Found a Leaf. Minneapolis: Learner Publications, 1964.

Miner, Irene. The True Book of PLants We Know. Chicago: Childrens Press, 1953.

Podendorf, Illa. The True Book of Plant Experiments. Childrens Press, 1972.

Schwartz, Julius. Magnify and Find Out Why. New York: Scholastic Book Services, 1972.

Selsam, Milicent E. Seeds and More Seeds. New York: Harper & Brothers, 1959.

____. The True Book of Buds. Chicago: Childrens Press, 1970.

Watson, Aldren. My Garden Grows. New York: Viking Press, 1963.

Webber, Irma. Up Above and Down Below. New York: William R. Scott, 1953.

FILMSTRIPS TO SEE:

Plants: How They Live and Grow
SVE 471.1 Plant Parts and How They Work
SVE 471.2 How Plants Make Food
SVE 471.3 Seed Magic: Life Story of a Bean
SVE 471.4 Plant Variety: The Plant Zoo

Each filmstrip with guide $10.50 each record $7.00 each cassette $7.00
Set of four filmstrips with record or cassette $64.00

Plant Experiments SVE 436.1 Price $7.50

Scavengers and Decomposers in a Community SVE 426.5 Filmstrip $9.50
Record $ 7.00 Cassette $7.00

SVE Society for Visual Education Inc.
1345 Diversey Parkway
Chicago, Illinois 60614

GOVERNMENT PUBLICATIONS

Fun with the Environment
Office of Public Affairs
U.S. Envirnmental Protection Agency
401 M St. SW
Washington, D.C. 20460

Miniature Environments (For a free copy send to:)
U.S. Department of the Interior
Bureau of Outdoor Recreation
C St. between 18th and 19th NW
Washington, D.C. 20006

If you want more they are 80¢ per copy, send your request to:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

NATIONAL WILDLIFE FEDERATION PUBLICATIONS:

Plants in the Classroom, Factors affecting Growth
Educational Servicing Section
National Wildlife Federation
1412 16th St. N.W.
Washington, D.C. 20036
Cat. No. 7900 TA . $1.50

INVESTIGATIONS INTO FACTORS WHICH CAN INFLUENCE PLANT GROWTH

OBJECTIVE:

to show how various conditions influence plant growth.

SUGGESTED MATERIALS:

pots, plants and soils listed below or jar or box gardens previously made in class.

SUGGESTED METHODS:

Using well established plants or gardens, vary the following factors;

1. temperature - too hot, too cold, just right
2. sunlight - too much, too little, just right
3. water - too much, too little, just right
4. soil conditions
   a. clay - a very hard type of soil
   b. sand
   c. topsoil - from around the school yard
   d. good topsoil - potting type soil
   e. silt from a stream, if possible

ACTIVITY:

EXPERIMENTATION, OBSERVATION, AND GROUP DISCUSSION OF THE FACTORS WHICH CAN INFLUENCE PLANT GROWTH. HAVE THE STUDENTS RUB A SMALL AMOUNT OF SAND THEN SOIL BETWEEN THEIR HANDS. THE SAND WILL LEAVE NO RESIDUE. BUT THE TOPSOIL WILL HAVE A RESIDUE. THE RESIDUE IS ORGANIC MATTER WHICH CONTAINS THE NEEDED MATERIALS FOR PLANT GROWTH.

OBSERVING BUGS IN A TERRARIUM

OBJECTIVES:

1. to develop an understanding of the relationship of living things;
2. to develop the concept of a food chain;
3. to develop the concept of a life cycle; and
4. to demonstrate pest control using a naturally occuring insect.

SUGGESTED MATERIALS:

a net (one can be made out of an old nylon hose, a broom handle, a clothes hanger, and tape); collecting jars, baby food jars with holes in the lids, or cottage cheese containers with nylon hose as lids ; and some pests. These can be captured out of doors in the early spring and fall. Care should be taken while the students are collecting bugs. No one wants to get bit or to get poison ivy. Some ladybugs and a terrarium.

SUGGESTED METHODS:

Aphids can be found by sweeping grassy areas and bush tops. Sweep the net just on the top of the grass. Carefully place any insects which are caught into the waiting collecting jars.

When ready, preferrably the same day, transfer the insects to the terrarium. It should be noted that insects tend to be host specific. That is, they prefer one particular type of plant. Even after "bugs" are collected they may not infest (attack) the plants that are in the gardens unless they are naturally attracted to them.

After pests have been introduced to the plants they should be watched to see what develops. If the pests stay long enough they

might produce a new generation; this would be an example of a life cycle. Once the aphids or pests have shown signs of staying, introduce the Ladybugs to the pests. The concepts include the food cycle because the aphids eat the plants, the Ladybugs eat the aphids, and a bird would eat the Ladybug.

ACTIVITIES: COLLECT INSECT PESTS IN THE NEIGHBORHOOD. INTRODUCE INSECTS INTO A TERRARIUM AND OBSERVE THEIR RELATIONSHIPS. DEVELOP A CONTROL OF PEST USING A NATURALLY OCCURING INSECT.

BOOKS TO ENJOY:

Caudill, Rebecca. A Pocketful of Cricket. New York: Holt, Rinehart and Winston, 1964.

Stevens, Carla. Catch A Cricket. New York: Young Scott Books, 1961.

AN INVESTIGATION INTO PESTICIDES

OBJECTIVE:

. to make students aware of the dangers of pesticides and their effect on the environment.

SUGGESTED MATERIALS:

extra bottle gardens or shoe box gardens infested with pests, three or more, and a common household pesticide.

SUGGESTED METHODS:

Develop a plan of control for a garden infested by pests. The type of pesticide used should be one which the student can recognize. A nonaerosol propellant would be best. Remember this activity is to show the harm that pesticides can do.

Using the spray applicator, spray one of the infested plants according to the directions on the pesticide's label. The second plant can be oversprayed. The last plant will not be sprayed; it is the control plant. A control is used to keep a check on all other factors such as; light, water, and plant food. More than three plants may be used. Treat all plants equally with respect to plant food, water, and sunlight. Place, DANGER-PESTICIDE, signs in front of the two test gardens which were sprayed. If the students should come in contact with the pesticides, wash hands or clothings as soon as possible...REMEMBER - PESTICIDES CAN KILL OR CAUSE ILLNESS.

ACTIVITY:

OBSERVE AND DISCUSS THE EFFECTS OF PESTICIDES ON PLANTS AND ANIMALS.

. Explain that insects die because the spray is a poison. The insect eats the poison by eating the leaves of the plant. Any animal which eats a littler insect with the poison also gets poisoned. So in this fashion the pesticide poisoning runs right through the food chain. This is why there is concern over the use of pesticides. Animals are being killed by indirect contact poisoning.

Ask the students what will happen to their cat if it eats a bird that has eaten poisoned insects?

NOTE:

Application of the pesticide should only be performed by the teacher.

GOVERNMENT PUBLICATIONS:

Safe Pesticide Use Around the Home
Office of Public Affairs (A-107)
U. S. Environmental Protection Agency
401 "M" St. S.W.
Washington, D. C. 20460

NATIONAL WILDLIFE FEDERATION PUBLICATIONS:

Pesticides Are Perilous (2-29 copies 15¢ each or 30-99 copies 12¢ each)
Educational Servicing Section
National Wildlife Federation
1412 16th St. N.W.
Washington, D. C. 20036

Pesticides and Your Environment (A Guide for the Homeowner and Home Gardener)
Address is the same as for Pesticides Are Perilous
A single copy is free--additional copies are 20¢ each

FROM ROCKS TO SOIL

OBJECTIVE:

to demonstrate how weather and other natural forces wear away rock forming soil or earth.

SUGGESTED MATERIALS:

several pieces of soft stone, limestone, fine sandstone, or small building bricks if sandstone is not readily available; hot plate; pan of ice water; and a spoon to pick up hot stones

SUGGESTED METHODS:

1. Have students rub two pieces of soft stone together. The students will find small fine particules breaking off the larger stones.
2. Heat small pieces of soft stone on a hot plate for several seconds (30). Drop it quickly into a waiting pan of ice water. The heat expands the stone. The ice water causes it to contract and should cause it to split apart. If this does not happen the first time, then try again. Relate this to summer and winter over many years.

ACTIVITY:

EXPERIMENTATION AND OBSERVATION OF SOIL OR EARTH BEING MADE FROM STONE.

BOOKS TO ENJOY:

Gates, Richard. The True Book of Conservation. Chicago; Children's Press, 1959.

Cromer, Richard. Soil. Chicago: Follett, 1967.

ART PROJECTS TO DO:

Use a soft stone to make a picture on a sidewalk. Explain that the soft stone is leaving broken off particles on the pavement. Compare this to lead from a pencil which wears away. It becomes necessary to sharpen the pencil or chalk which wears away on the blackboard.

Use concepts of weathering and natural forces. Construct a collage type bulletin board. Show the various forces such as rain, ice, wind, heat, and pressure wearing down larger rocks to form soil.

WATER HOLDING CAPACITY OF SOIL

OBJECTIVE:

to allow students to see that soil is capable of retaining water.

SUGGESTED MATERIALS:

large plastic transparent cups, two measuring cups, three kinds of dry soil; sand, modeling clay, and black loam

SUGGESTED METHODS:

1. Punch small holes in the bottom of three plastic cups.
2. Fill each cup about 3/4 full with different types of soil: sand, clay, and black loam. (Clay may be pre-wet art type.)
3. Add the same amount of water to each cup.
4. Pour water into cups one at a time.
5. Allow the water to drain into the second measuring cup.
6. Measure the run off with the second measuring cup.

ACTIVITY:

DETERMINE WHICH SOIL RETAINS THE MOST WATER. NORMALLY IT WILL BE THE LOAM WHICH CONTAINS WATER HOLDING ORGANIC MATERIAL.

RECYCLING ORGANIC MATERIAL TO CREATE ENRICHED SOIL

OBJECTIVES:

1. to demonstrate how vegetables and other organic materials can be recycled into useful products again; and
2. to show how students can make their own compost to create enriched soil they can use in their school gardens.

SUGGESTED MATERIALS:

coffee cans or gallon cans with plastic lids, something to use as a stirer, composting materials, and sand and dirt for loam.

Use only plant materials, such as: coffee grounds, tea leaves dry cereal, straw, hay, cut grass, celery leaves, lettuce leaves, peanut shells, clam and oyster shells, and newspaper.

Ammonium nitrate may be needed as an additional source of nitrogen. This will speed up the decomposition of the materials.

Some materials NOT to use include: orange and grapefruit peels, oak, holly, and magnolia leaves. These materials require a great deal of time before they begin to break down.

SUGGESTED METHOD:

Begin by breaking the shells and leaves into smaller pieces. Tear the newspapers into small pieces. Fill each can about 2/3 full with the mixture. Stir it well and moisten with water. Cover the cans and put them in a warm place in the room. Use a well ventilated area because the decomposing materials will have an unpleasant smell. Stir the contents every few days. Students can observe the mixture when they stir it. In a couple of days the students should begin to notice changes. Once the material changes, in about a month, it is ready to mix with sand and dirt. This mixture is called loam.

As soon as it is moistened the loam is ready to use to plant seeds.

ACTIVITIES:

MAKE AN ORGANIC COMPOST PILE OUT OF WASTE MATERIALS. OBSERVE THE DECOMPOSITION OF THE COMPOST. STUDENTS SHOULD OBSERVE THE FOLLOWING:

1. changes in appearance (SEE)
2. smell or odor (SMELL)
3. plant growth (SEE)
4. sounds (HEAR)
5. temperature of contents (FEEL)

USE COMPOST TO CREATE LOAM.

GOVERNMENT PUBLICATIONS:

Mulches for Your Garden. (One free copy is available by writing to:)
Home and Garden Bulletin No. 185
Soil Conservation Service
Publication Division
Office of Communication
U.S. Department of Agriculture
Washington, D.C. 20250

COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY PUBLICATIONS:

Ecology of Compost (10¢ per copy)
Office of Public Service and Continuing Education
State University of New York College of Environmental Science and Forestry
Syracuse, New York 13210

GERMINATING SEEDS WITHOUT SOIL

OBJECTIVE:

to allow students to observe the development of plants from seeds.

SUGGESTED MATERIALS:

culture dishes; cotton balls, or paper towels; seeds such as lima beans, pea beans, alfalfa, or radish seeds; and water

SUGGESTED METHOD:

Dampen the towel or cotton ball and place in the culture dish. Put the seeds on the top of the towel or cotton. Place the cover over the dish. Put the entire dish in a dark spot. Observe the dish daily for changes. Once leaves and roots appear the plant should be transplanted or the bean sprouts eaten.

ACTIVITY:

GERMINATE SEVERAL DIFFERENT TYPES OF SEED AND COMPARE RESULTS. GROW BEAN SPROUTS OR ALFALFA. ONCE THEY SPROUT THEY CAN BE WASHED AND EATEN WITH LUNCH.

A SIMPLE PROPAGATION CHAMBER

OBJECTIVE:

to allow students to propagate plants from cuttings or seeds.

INTRODUCTION:

A propagation chamber is similar to a hydroponic system except that there is organic material mixed with the vermiculite.

SUGGESTED MATERIALS:

pots for potting, plastic bags which fit over pots, rubber bands, sand or vermiculite, peat or organic material from the compost activity, and plant cuttings (without flower or flower buds) or seeds

SUGGESTED METHODS:

Prepare a propagation soil mixture by taking equal parts of vermiculite or sand and peat or organic matter and mix well. Use this soil to fill the pots. Water the soil and allow the soil mixture to drain. Then push cutting or seeds gently into the soil. Put a cover over the cutting and top of the pot with the plastic bag. Use a rubber band to hold the bag in place. Place the chamber in a well lit and warm spot. Remember, it is harmful to place almost any house plant in direct sunlight. Once the seeds or cuttings have formed roots and seem to be doing well, gently remove them from the chamber and transplant into an indoor or outdoor garden.

ACTIVITY:

PROPAGATE SEVERAL DIFFERNT TYPES OF PLANT CUTTINGS OR SEEDS. NOTE WHICH PLANTS PROPAGATE EASILY AND THOSE PLANTS THAT ARE HARD TO PROPAGATE BY THIS METHOD.

GROWING PLANTS WITHOUT SOIL (HYDROPONICS)

OBJECTIVE:

to develop the concept of hydroponics, the growth of plants without soil.

INTRODUCTION:

Hydroponics is the growing of plants without the use of soil. Plants and vegetables can grow as long as they recieve the essential nutrients, plus air, light, and water. To illustrate this, hydroponic gardens can be grown in the classroom.

SUGGESTED MATERIALS:

clay or plastic pot, the kind with holes in the bottom, drip saucers, a medium such as course sand or vermiculite, seeds, small stones, a solution (mixture) of balanced food and water.

SUGGESTED METHODS:

Place the small stones over the holes in the bottom of the pots. This will allow for drainage of excess water and will also allow air to reach the roots. Fill the containers with the sand or vermiculite. Add the plant food solution and water, and allow it to drain into the saucers. Now add the seeds. When the container is placed in a warm and well lit place growth should be noticed in just a few days.

When the plants are ready for transplanting to a soil mixture, they should be removed gently from the sand or vermiculite. The roots should be rinsed off with gently running water. This will remove the residue from the old growing medium.

ACTIVITY: OBSERVE THE GROWTH OF SEEDS WITHOUT SOIL.

SOIL AND LIVING THINGS

OBJECTIVE:

to make students aware of the different forms of life in a scoop of topsoil.

SUGGESTED MATERIALS:

shovel or scoop, pans, newspapers, popsickle sticks, and magnifying lenses

SUGGESTED METHODS:

Go into the school yard with a scoop or shovel and a can or pan. In an area of lush growth dig down beneath the top layer of soil. Collect both the top layer and right beneath the top layer of soil. Take the soil back into the classroom. Spread newspapers on the desk tops. Then empty the soil onto the paper. Have students sort through the soil looking for living things, such as: grubs and larvae, snails and slugs, ticks, mites, other insects, spiders and worms.

ACTIVITY: COLLECTING AND OBSERVING ANIMAL LIFE IN SOIL

WORM FARM

OBJECTIVES:

1. to introduce students to the concepts that life of different forms exists in different habitats.
2. to show that the earth worm is a vital part of soil building.

SUGGESTED MATERIALS:

plastic shoe box, top soil (good or enriched), tape, black construction paper, worms (obtained by the students), scoop or shovel

SUGGESTED METHODS:

Fill the plastic shoe box all but 1" from the top. Then put in your worms. Cover, but top is not to be tight fitting, air must get in. Tape the black construction paper on one side, 1/2 of the top and the entire back side of the shoe box. The back side should be taped to allow the students to lift the paper up to look into the box.

The soil should be moist but not overly wet or you will drown the worms. The worms will be attracted to the dark side of the box. Allow a few days before the worms can build their burrows in the soil. A good loose soil will permit the worms to build their tunnels faster.

Add grass and some leaves every once in a while. This will provide interesting observations for the students and yourself. You can expect squeals of horror and delight from any number of students.

ACTIVITIES:

MAKE AND OBSERVE A WORM FARM. STUDENTS COULD HOLD THE WORMS AND DESCRIBE THEIR FEELINGS.

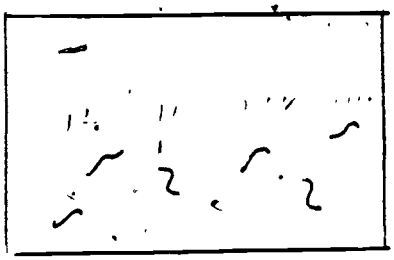
BOOKS TO ENJOY:

Hogner, Dorothy Childs. Earthworms. New York: Thomas Y. Crowell, 1953.

Lionni, Leo. Inch by Inch. New York: Ivan Obolensky, 1960.

AN ART PROJECT TO DO:

Use plastic packing materials that look like worms, manila paper, crayons or paint and glue. Draw dirt and grass and then paste on worm like things.



ANT FARM

OBJECTIVES:

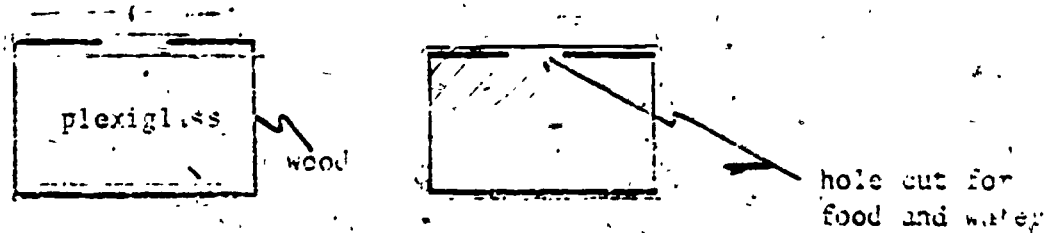
1. to allow students to gain first hand knowledge of an insects life cycle and food chain;
2. to make students aware that ants are useful in making enriched soil;
3. to give students first hand knowledge into the methods of collecting insects; and
4. to make students aware that some insects are social insects, that is they live and work together as a community.

SUGGESTED MATERIALS:

2 pieces of plexi-glass or clear plastic that are the same size (approximately 12" by 9" and 1/8" thick), 1 knife or other cutting device, 4 pieces of wood stripping 1/4 " square, 2 lengths for sides 8 1/2" and 2 pieces for the top and bottom 12" in length, glue (Elmer's), 1 1/2" wide tape, and sand with ants. (Students can gently scoop ants up into a collecting jar.)

SUGGESTED METHODS:

Lay one piece of plastic flat on a table. Pace wood strips along the bottom and sides. Cut top piece of stripping into two sections. (See diagram.) Glue the wood strips in place and wait for the glue to dry. Collect ants. Add ants and sand to the part of the farm that is finished. Gently smooth sand level with wood sides. Place the second piece of glass or plastic on the first. Tape the edges together. Double tape the bottom. Use a tape on the top that is easily removed for feeding and watering. Stand upright and support as needed. Add food and water in small quantities.



ACTIVITIES:

COLLECT ANTS, BUILD ANT FARM, AND WATCH THE ANTS' ACTIVITIES. EXPERIMENT WITH VARIOUS TYPES OF FOOD. ADD DEAD INSECTS, SUCH AS FLIES EVERY ONCE IN A WHILE. INSECTS ARE ALMOST ALL PROTEIN, SO DEAD INSECTS WILL SUPPLY THIS TO THE ANT COLONY.

BOOKS TO ENJOY:

Hitte, Kathryn. Boy, Was I Mad! New York: Parents Magazine Press, 1969

Mizumura, Kazue. The Way of an Ant. New York: Atheneum, 1970.

Myrick, Mildred. Ants Are Fun. New York: Harper & Row, Publishers, 1968.

Ross, Edward S. The Ants. Chicago: Childrens Press, Inc., 1967.

SOUND HIKE

OBJECTIVE:

to become more aware of the environment around us.

SUGGESTED MATERIALS:

ears, tape recorder to record sounds for later discussion (optional)

SUGGESTED METHODS:

Take the students into the park or a quiet wooded area. Stop at intervals along the way. Have the students listen quietly then close their eyes and listen for 30 seconds. Have the students describe the sounds they hear (birdcalls, crickets, wood peckers, traffic, horns, bells, the wind through the trees, etc.)

ACTIVITY: DISCUSS WITH STUDENTS:

WHICH SOUNDS THEY LIKED BEST AND WHY?
DID IT REMIND YOU OF SOMETHING ELSE?
WHICH SOUND WAS THE LOUDEST?
WHICH SOUND WAS THE QUIETEST?
WHICH SOUND WAS THE HIGHEST?
WHICH SOUND WAS THE LOWEST?

COLOR HIKE

OBJECTIVE:

to help students become more aware of their environment.

SUGGESTED METHODS:

Take a walk on the school grounds, along a path near some woods, or in a nearby park and conduct activity.

ACTIVITIES:

Collect different green objects. Feel them. Smell them. Arrange them in order from the lightest to the darkest green. Taste a clean piece of grass, a spring onion, or a leaf. Rub them between the thumb and forefinger to release the fragrance.

Ask how many different colors can be found on a tree.

Find and describe things which are: yellow, red, brown, orange, grey, green, blue, black, etc.

ART PROJECTS TO DO:

Make leaf and bark rubbings.

Place leaves between two sheets of wax paper and put in a phone book to dry. Iron the dry leaves with a cool iron to make decorative transparencies.

Make a collage out of leaves and bark. Glue on to tagboard.

HAVE A GREEN DAY LUNCHEON

OBJECTIVE:

to develop the concepts that green foods have a wide variety of tastes and flavors.

SUGGESTED MATERIALS:

Have the students bring a prepared green food dish from home. The foods might include: lettuce, cabbage, green peas, green peppers, pickles, spinach, kale, lima beans, okra, broccoli, limes, artichokes, turnip greens, snap beans, dandilion leaves, clover, water crest, asparagus and jello. Paper plates, napkins, spoons, and green koolaid to drink.

ACTIVITY: THANK [redacted] EARTH AND EAT UP.

A TOUCHING EXPERIENCE

OBJECTIVE:

to become more aware of the different textures in the environment.

SUGGESTED MATERIALS:

food size baggies, tweezers or prongs

SUGGESTED METHODS:

Have the students go on a "Treasure Hunt".

1. The treasure is items in nature that are: cool, warm, wet, bumpy, smooth, dry, waxy, tacky, toothy, thorny, etc.
2. Have the students look for: the softest leaf, the roughest leaf, the leaf with the most awn, (Awn is the hair on plants) the smoothest rock, the roughest rock, the smoothest twig, the roughest twig, etc.
3. Have the students capture insects to touch. How do they feel? Do insects smell? Can you identify the body parts? Does the insect have wings?
4. Have the students touch all the collected objects. Have the students arrange them in order from roughest to smoothest.

ACTIVITY: TAKE THE STUDENTS ON A TREASURE HUNT AND COLLECT OBJECTS. DISCUSS HOW EACH OBJECT FEELS.

A CIRCLE OF GRASS

OBJECTIVE:

to become aware of the microhabitat that can exist in a small grassy area or a long standing pasture.

SUGGESTED MATERIALS:

a grassy section of the school yard or a near by park and magnifying lenses

SUGGESTED METHODS:

1. Find an area of grass to be examined. Make an imaginary circle with your arms.
2. Using a magnifying glass have the students do the following within the circle formed by their arms.
   a. Look for different types of plants.
   b. Look for different types of animals.
   c. Spread the grass apart and investigate the top layer of soil.
   d. Dig up a clover or alfalfa plant (if possible) to discover swellings on the roots in which bacteria may live. This special bacteria is capable of taking nitrogen from the air and forming nitrogen compounds which plants need to produce protein. The nitrogen helps enrich the soil.
   e. Examine the root system of a plant of grass to observe its water and soil holding capacity. Look for the tiny root hairs.
   f. Look for seeds on a spike of grass. After pollinization more seeds are formed which produce new plants and also provide food for birds and other small animals.
   g. Look for worms that aerate the soil and also provide food for the birds.
   h. Look for beetles and other insects that aerate the soil and also provide food for other insects and other animals.

ACTIVITY:

OBSERVE AND DISCUSS THE INTERRELATIONSHIPS FOUND IN A SMALL GRASSY AREA.

A BOOK TO ENJOY:

____. Lions in the Grass. New York: World, 1958.

FILMSTRIPS TO SEE:

Let's Explore a Lawn SVE 423.3 Intermediate Price $8.50

Grass Land Community Interaction SVE 429.4 Primary Price $11.50

SVE Society for Visual Education, Inc.
1345 Diversey Parkway
Chicago, Illinois 60614

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INVESTIGATING A CRACK IN THE PAVEMENT

OBJECTIVES:

1. to make students aware of the microhabitat that exists in the pavement;
2. to make students aware of the natural succession of plants in the environment;
3. to make students aware of the competition for sunlight, soil, and water; and
4. to make students aware of the relationship of insects (ants) and plants.

SUGGESTED MATERIALS:

hand magnifying lenses and a pavement with plants growing in the cracks

SUGGESTED METHODS:

Locate a pavement with plants growing in the cracks. Position several students around these microhabitats. Pass out the hand lenses. Instruct the students to look for plants such as moss, grass, and weeds and animals such as insects, worms, and spiders.

Have students examine the cracks to see if there is a relationship between the work of animals, ants; and worms, and the plants. Ask students to look for signs that a plant may have out grown its growing space, a crack in the pavement.

Have students notice where small tough plants have begun to grow and where larger plants are developing. This will show succession, the orderly sequence of plants and animals until a given area is finally taken over by the dominant type of vegetation. This will also show competition among plants for sunlight, soil, and water.

ACTIVITIES:

OBSERVE AND DISCUSS THE GROWTH OF PLANTS AND ANIMALS IN A CRACK IN THE PAVEMENT; THE EFFECTS OF UNCONTROLLED PLANTS AND WEEDS ON STREETS AND SIDEWALKS; THE NEED FOR ANIMALS TO HELP EACH OTHER; THE IDEA OF SUCCESSION, LITTLE PLANTS MAKING WAY FOR THE BIGGER PLANTS; THE WEATHERING OF ROCKS; AND HOW PLANTS HELP TO BREAK DOWN ROCKS AND SIDEWALKS TO MAKE SOIL OR EARTH.

OBSERVE AND COMPARE PLANTS AND TREES NEAR A BUSY STREET WITH THE SAME KIND OF PLANTS AND TREES THAT ARE LOCATED AWAY FROM THE STREET. THIS SHOULD SHOW THE EFFECT OF AIR POLLUTION, POISONIOUS GASES, HAS ON LIVING THINGS.

A BOOK TO ENJOY:

Howell, Ruth. A Crack in the Pavement. New York: Atheneum, 1970.

LIFE IN A FIELD

OBJECTIVES:

1. to make students aware of the microhabitat that exists in a woodland field or a weedy field; and
2. to allow students to gain first hand knowledge of the homes insects build or make..

SUGGESTED MATERIALS:

a field area that contains weeds and tall grasses, magnifying lenses, and collecting jars

SUGGESTED METHODS:

While on a hike in the early spring stop near a field. Explain that the students are to look for signs that insects are present. They are to look for eggs, egg cases, chrysalis, galls, leaf miners, and other forms of insects. Tell them to collect several galls and egg cases to bring back into the classroom. In the classroom cut the gall open to observe the home and perhaps the grub that made the gall.

If mantis cases were brought into the classroom and the mantis should hatch, return them to their natural environment. They help control the "Bad Bugs" which are harmful.

ACTIVITIES:

COLLECT, OBSERVE, AND DISCUSS INSECTS, PLANTS, AND OTHER ANIMALS WHICH LIVE IN THE FIELD. USE THE HAND LENSES TO GET A CLOSER LOOK AT INSECTS AND SMALL THINGS. RETURN LIVING THINGS BACK INTO THE ENVIRONMENT ONCE THE STUDENTS HAVE FINISHED WITH THEM.

FILMSTRIP TO SEE:

Let's Explore a Field SVE 423-1 Intermediate Price $8.50
SVE Society for Visual Education Inc.
1345 Diversey Parkway
Chicago, Illinois 60614

LIFE AROUND A TREE

OBJECTIVE:

to make students aware of the microhabitat on, near, or in a tree.

SUGGESTED MATERIALS:

a living tree, magnifying lenses, and a light meter (optional)

SUGGESTED METHODS:

Have the students look for various plants and animals near, in, on, and around a tree. Look for animal droppings, nesting materials, nuts, and shells cracked by squirrels, shells with small round holes gnawed by mice, food storage piles, and other signs of animal life. If the tree has a hole in the trunk look inside to see if there is other evidence of animal life in the tree.

Using a hand lens look on the trunk for animals, lichens, moss, or bracket fungi.

Determine which side of the tree receives the most sunlight. Using a light meter, measure the sunlight at ground level that the tree receives at various times of the day.

ACTIVITIES:

HAVE THE STUDENTS LOOK FOR INSECTS AND OTHER ANIMALS AND PLANT LIFE IN, ON, AND AROUND A TREE. DISCUSS THE RELATIONSHIPS THAT EXIST BETWEEN THESE LIVING THINGS. TAKE A SEED OR NUT FROM THE TREE AND SOME SOIL FROM AROUND THE BOTTOM OF THE TREE AND GERMINATE THE SEED. ONCE IT IS LARGE ENOUGH, TRANSPLANT THE SEEDLING BACK INTO THE WOODS.

BOOKS TO ENJOY:

Busch, Phyllis S. Once There Was A Tree. New York: Scholastic Book Service, 1972.

Silverstein, Shel. The Giving Tree. New York: Harper & Row, 1964.

Urdry, Janice May. A Tree Is Nice. New York: Harper & Brothers, 1956.

LIFE AROUND A STUMP OR ROTTING LOG

OBJECTIVE:

to make students more aware of the microhabitat that can exist in, on, and around a stump or rotting log.

SUGGESTED MATERIALS:

magnifying lenses, collecting jars, rotting log or stump

SUGGESTED METHODS:

In a field or woods stop at a fallen tree or at a stump which is beginning to rot. Have the children use their lenses if needed to observe the life forms which inhabit the wood and surrounding area. Have the students carefully observe the differences between decaying wood and cut wood. Note all the differences which may occur between life around a living tree and a decaying tree.

Decaying wood provides homes and food for such animals as beetles, beetle larvae, termintes, ants, sowbugs, pillbugs, millipedes and other invertebrates. Other animals will be in the same habitat to eat on the decaying wood and the cycle will continue.

Desaying wood may also provide a home for other plants. Bacteria, fungi, and molds are three plants which may grow in a rotting log. Bracket fungus may be found on the bark and mold and bacteria might be found in moist parts of the wood. These plants help break down the decaying stump or log. This returns valuable materials to the soil. This material can then be used by other plants.

ACTIVITIES:

HAVE THE STUDENT OBSERVE AND COLLECT ANIMALS AROUND THIS HABITAT. DISCUSS THE DIFFERENCES THAT OCCUR IN DIFFERENT HABITATS, FOOD, WEATHER, ANIMALS, AND PLANTS. RETURN ANY SAMPLES THAT ARE COLLECTED TO THEIR ENVIRONMENT.

LIFE AROUND A ROCK

OBJECTIVE:

to make students more aware of the microhabitat that can exist around a rock.

SUGGESTED MATERIALS:

a grassy area with large rocks and magnifying lenses

SUGGESTED METHODS:

A hands on, crawling experience to investigate the life forms and the relationships that exist under and around a rock. A rock can provide shelter and a control on the environment it is in. It is not edible and it is relatively unchanging for long periods of time. Hand out the hand lenses. Instruct the students to observe the area around and beneath the rock. It is important to return the rock and any other material to its original place.

ACTIVITY:

ON A NICE DAY WHILE TAKING A HIKE OR WALK, STOP AT A GRASSY AREA WITH ROCKS. USING THE HAND LENSES HAVE THE STUDENTS LOOK FOR SUCH THINGS AS, PLANTS, INSECTS, AND OTHER ANIMALS THAT ARE AROUND THE ROCK AND UNDER IT. THE ACTIVITY CAN BE PERFORMED AT VARIOUS TIMES OF THE YEAR. THERE WILL BE CHANGES IN THE LIFE FORMS DURING THE DIFFERENT SEASONS. ON REGROUPING COMPARE AND DISCUSS THE STUDENTS OBSERVATIONS.

A TRIP TO A BEEHIVE

OBJECTIVES:

1. to develop the concept of the usefulness of the honeybee;
2. to develop the concept that bees are good insects and should be protected as well as respected;
3. to make students aware of the community life of honeybees;
4. to make students aware of the importance of honeybees in the pollination of flowers;
5. to develop first hand knowledge of insect social order; and
6. to give students a first hand look at insect life cycle and the food chain.

INTRODUCTION:

Bees are fun to learn about and to watch and can provide an excellent learning tool. They can be used to teach the concepts of life cycles, sociobiology, and pollination ecology.

Many activities of bees in the hive can be observed. These include the producing of beeswax, the building of honey combs, honeymaking, birth and egg laying, and the caring and grooming of the queen bee. The student may be able to observe the famous dance of the bees which is a form of communication. The dance is used in telling the hive about the location of certain flowers or about a swarm of bees. Most students will be genuinely interested in learning about pollination, the helping of plants to make seeds, and the making of honey.

Many beekeepers are willing to help teach others about honeybees. Some will provide observation hives and assistance at no cost. Some may provide samples of different types of honey for the students to taste.

SUGGESTED METHOD:

Contact the local Cooperative Extension Service or the Apiculture

Center of a local university to determine whether there is a teaching beekeeper in the area. Arrange with the beekeeper for a visit and for the subject matter to be covered.

ACTIVITY:

TAKE THE STUDENTS TO A LOCAL BEEHIVE AND LEARN AS MUCH AS YOU CAN ABOUT OUR FRIEND, THE HONEYBEE. UPON RETURN TO THE CLASSROOM DISCUSS...

BOOKS TO ENJOY:

Adrian, Mary. Honeybee. New York: Holiday House, 1952.

Shuttlesworth, Dorothy. All Kinds of Bees. New York: Random House, 1967.

Fulks, Gene. Buzz, Buzz, Buzzing Bees. New York: Holt Rhinehart and Winston, 1967.

Rood, Ronald. Bees, Bugs and Beetles. New York: Scholastic Book Services, 1965.

Neal, Charles D. What Is A Bee. Chicago: Benfic Press, 1961.

Tibbets, Albert B. The First Book of Bees. New York: Franklin Watts Inc., 1952.

Lewellen, John. The True Book of Honeybees. Chicago: Childrens Press, 1953.

Goudey, Alice E. There Come the Bees. New York: Scribner's Sons, 1960.

____. The Beginning Knowledge Book of Bees and Wasps. New York: Macmillian Company, 1964.

Hawes, Judy. Bees and Beetles. New York: Crowell, 1972.

Hawes, Judy. Watch Honeybees With Me. New York: Crowell,

Kohn, Bernice. The Busy Honeybee. New York: Scholastic Book Service, 1972.

Russell, Franklin. Honeybees. New York: Knopf, 1967.

A FILMSTRIP TO SEE:

Bees and Beetles
Crowell Publishing Co.
New York, New York

RESOURCES FOR THE CLASSROOM TEACHER

Borror, Donald and Dwight M. Delong. An Introduction to the Study of Insects. 3rd. Edition. New York: Holt Rinehart and Winston, 1971.

Harlan, Jean Durgin. Science Experiences for the Early Childhood Years. Columbus, Ohio: Charles E. Merrill Publishing Company, 1976.

Kimball, John W. Biology 2nd Edition. Reading, Massachusetts: Addison Wesley Publishing Co., 1968.

Palmer, E. Lawerence. Field Book of Natural History. New York: McGraw Hill Book Co., 1949.

Russel, Helen Ross. A Teacher's Guide Ten-Minute Field Trips Using the School Grounds for Environmental Studies. Chicago, Ill.: J.G. Ferguson Publishing Co., 1973.

Wright, Michael. The Complete Indoor Gardener. New York: Random House, 1974.