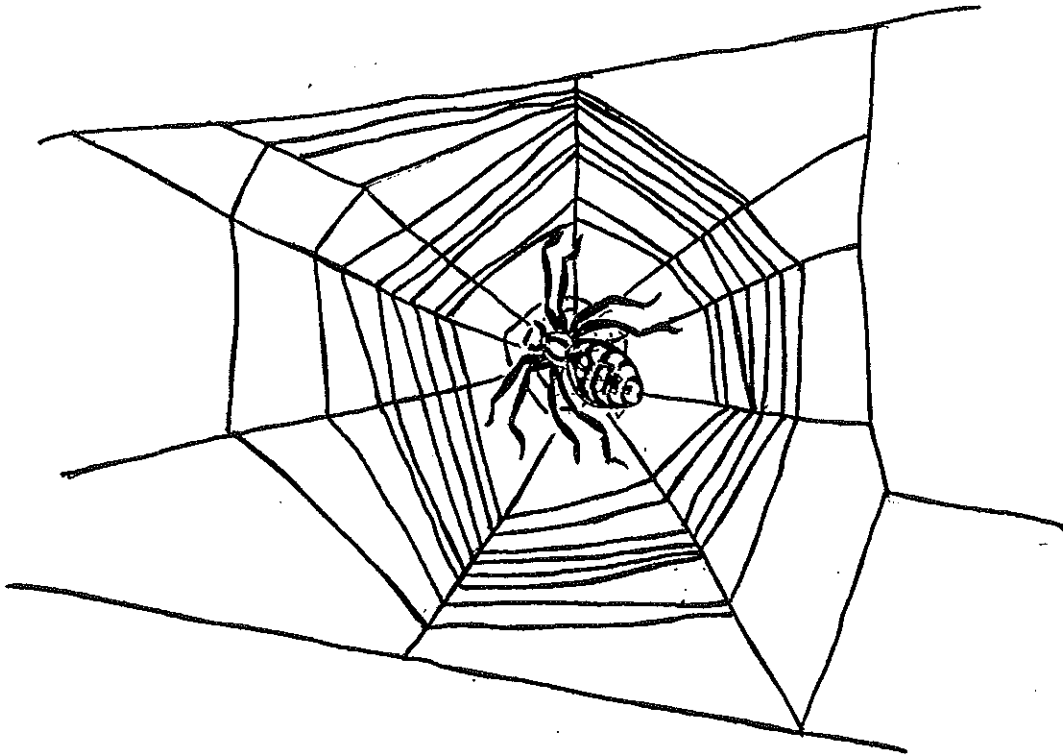




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THE WEB OF LIFE

The San Francisco Botanical Garden (SFBG) contains over 7000 kinds of plants from around the world. A wide variety of animals make their home in the garden as well. We look forward to helping your class explore the web of life created by the interactions of these plants and animals in their different habitats.

This teacher's guide is designed to help you and your students make the most of your visit. It includes some general background information for you to share with your class before your visit, activities to help prepare for the walk, other activities to extend the experience back in the classroom, and an annotated bibliography of useful materials. We encourage you to prepare your class by making use of these materials, especially if you are just beginning your exploration of these concepts. We offer this walk for grades 2 through 5, so please adapt the materials as necessary for your class.

Basic concepts

The walk is designed to illustrate four key concepts:

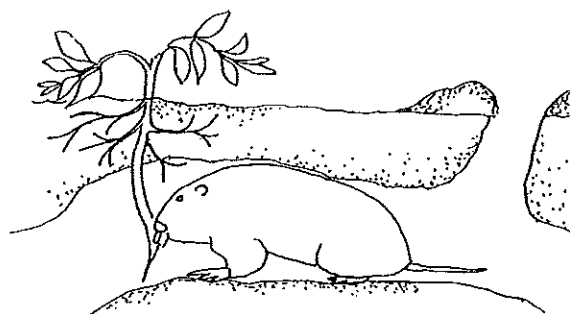
1. Plants and animals live together in the garden and help each other in many ways.
2. Plants make their own food in their leaves. Animals get their food by eating plants or other animals.
3. Different kinds of plants and animals live in different parts of the garden.
4. People are animals too, and the way we live can change the lives of plants and other animals.



A Day in the Garden (to be read aloud)

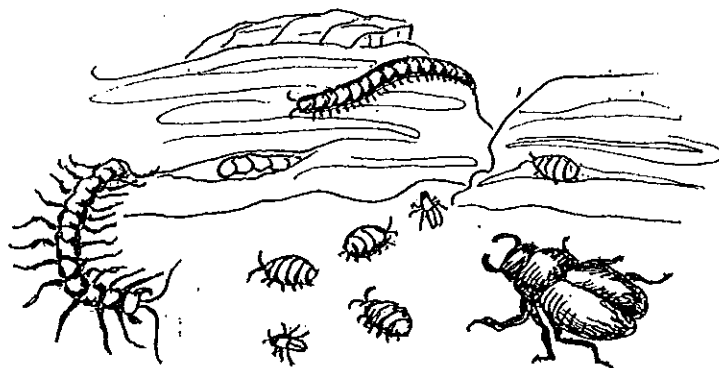
A new day is starting in the garden. The sun rises and shines on all the plants in the gardens. Green leaves turn to the sun, using the light to make food for the plants they are part of. As they make their food, the leaves also help make the air that living things need to breathe. The air is cool and fresh.

Out in the green lawn the ground is wiggling. A gopher is under the ground, eating the roots of the grass, clover, and other plants in the lawn. The gopher digs up and pops its head above the ground. SWOOSH! Wings flap overhead and the gopher dives back into its hole. It was lucky this time!



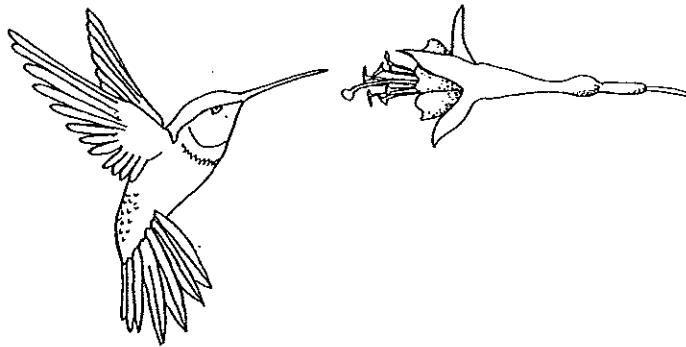
The hawk flies on. Such bad luck not to catch that gopher. Now it has nothing to feed its babies. Maybe it will have better luck in the forest catching a squirrel. There are so many of them, and they are plump and lazy from eating all the peanuts that people feed them. It should be easy to catch one.

The forest is shady and cool. A spider builds her web in the tree branches, hoping to catch an insect as it flies by. The ground is soft, covered with leaves that are slowly turning back into soil. Small animals like slugs, earthworms and roly-polies eat the dead leaves, breaking them down so other plants can grow in the soil they make. These little decomposers have an important job. Without them the forest would be piled high with leaves!



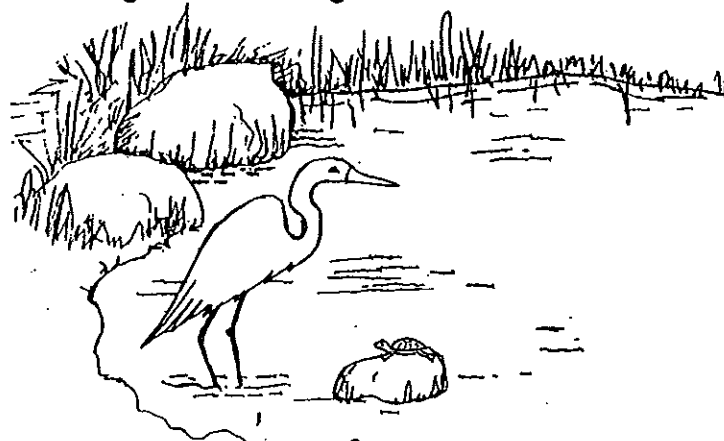
A slug crawls slowly along a fallen log. A small hand reaches out and – GULP – the slug is lunch for a young raccoon. Raccoons usually sleep during the day, but a noisy group of people passed by its hiding place and woke this one up. One slug isn't enough for a hungry raccoon. It wanders on out of the forest, looking for another snack.

What's that? A butterfly! Not such a good snack for a raccoon, but it is fun to watch. The butterfly flies from one flower to another, sipping out the sweet nectar inside and warming itself in the sun. As it goes, it carries pollen from one flower to another. With the right pollen, a flower can make a seed. Without the butterfly's help, the pollen might not get to the flower.



It's afternoon now and the sun is getting warm. Hummingbirds are singing their squeaky songs as they fly from one red flower to another, drinking the sweet nectar. Bees are buzzing around in the sunshine, collecting nectar to make honey. The raccoon decides to go to the pond for a drink. It hides when it hears some children coming down the path. It watches the people from the bushes and then walks on.

The pond is quiet. The sun shines on the green algae in the water. Turtles warm themselves on the rocks. Tiny fish swim around, nibbling on the algae. Someone is watching them, someone with beady eyes, a sharp beak and a long neck. Suddenly the sharp beak stabs the water, and a little fish slides down the long neck. An egret has found dinner.



The sun is going down now, and the white egret flies back to its nest in the trees. The school children and other human visitors have all gone home and the garden turns dark and quiet. Sweet smelling white flowers glow in the moonlight, and moths flutter over to sip at the nectar inside. Bats fly silently through the night sky, catching flying insects, and a fox wanders through the gardens, looking for mice and other small animals to eat. The young raccoon, sleepy from being awake during the day, takes a short nap and then goes out exploring in the dark. Maybe tomorrow people won't be so noisy, and it will be easier to get a good day's sleep.



Some questions to ask before your visit:

Why do you think there are animals in the garden? Aren't gardens for plants? (this isn't a zoo, animals live wild here, finding everything they need among the plants)

When we visit, we might not see all of the animals we heard about in the story. Why do think that might be? (they might be afraid of us, the weather might not be good for them, some of them might be asleep when we are there...)

What do you think we should do to make sure we don't bother the animals in the garden? (keep quiet, don't get too close, be careful not to hurt their homes...)

Vocabulary

We may use these words during your visit to the gardens, as seems appropriate for your students' grade level. You can share these definitions with your students, or have them use their dictionaries to find other definitions.

botanical garden – a place where different kinds of plants are grown to be studied and enjoyed

plant - a living thing, usually green, which makes its own food using the sun's energy

animal – a living thing which gets food by eating plants or other animals

fungus – a living thing that gets food from dead plants or animals. A mushroom is one part of a fungus.

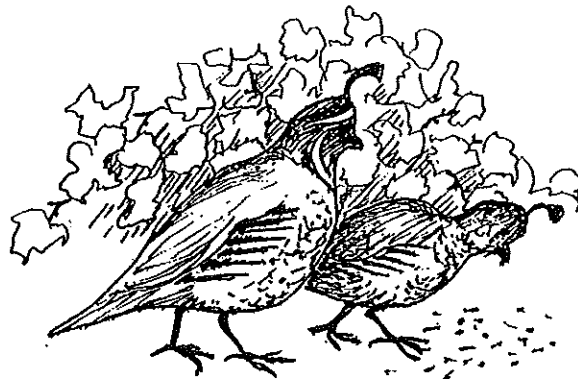
habitat - the home and environment of a plant or animal

predator – an animal which eats other animals

prey – an animal which is eaten by another animal

recycler– a living thing that breaks down dead plants or animals (also known as decomposers)

chlorophyll – the green coloring in plants which makes it possible for them to make their own food, or photosynthesize



Pre-visit activities

Becoming a nature detective

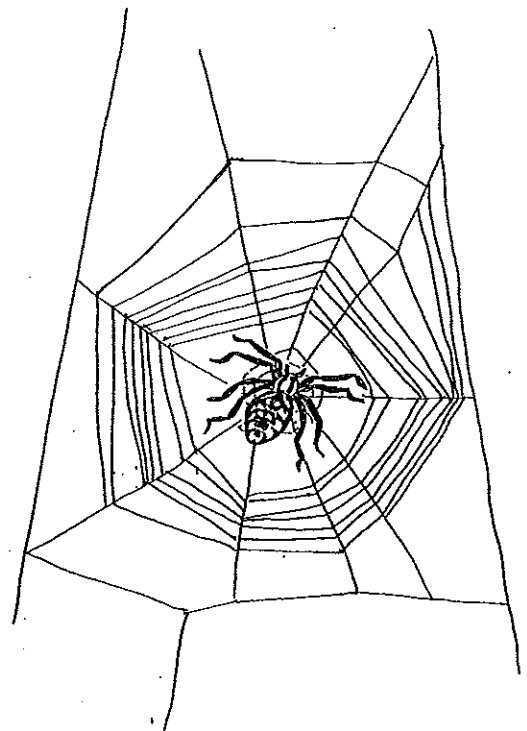
A visit to the SFBG is a chance for students to become nature detectives, exploring and discovering the wonders of the natural world around them. Help your students get ready to make the most of their trip with the following activity.

Introduce the concept of a "nature detective" to your students – a nature detective is someone who explores the natural world by observing closely, thinking about what they observe, and coming up with ideas about what they discover. Every one of us can be a nature detective – every one has special tools that can help them be a nature detective.

Divide children into small groups. Ask them to think about what tools we have *on our bodies* that we can use to explore the world around us. Each group can make of a list of the tools they think of, or can draw pictures illustrating their ideas. Have each group share their results with the class, and compile their ideas in a large list or drawing.

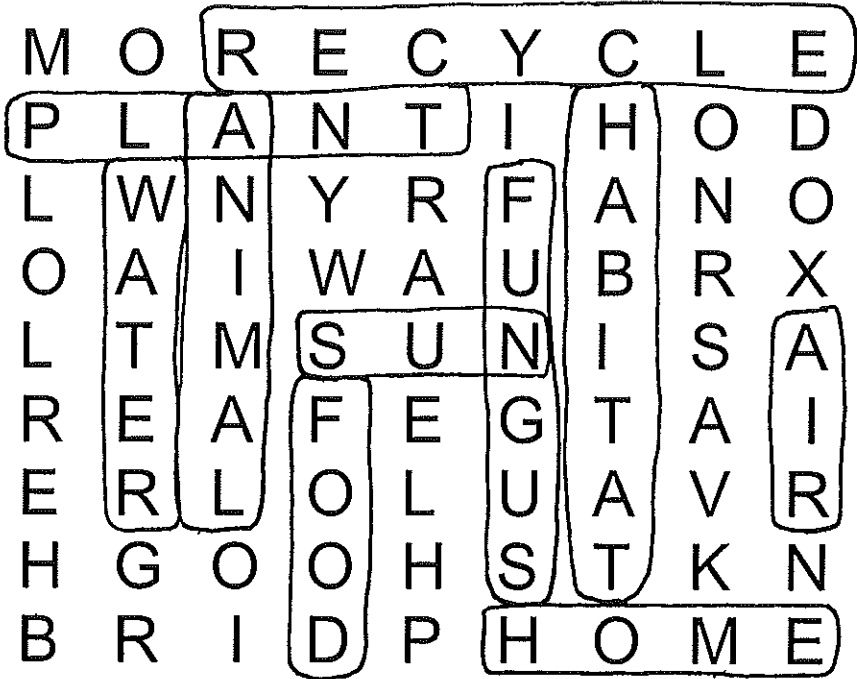
Here are some suggestions – you and your class may think of others

eyes - counters, cameras
 noses – scent detectors
 fingers – tweezers, feelers
 hands- rulers, cups
 hair – wind detector
 memories – notebooks and pencils
 ears – tape recorders
 feet – transportation
 skin – thermometer



Web of Life Word Seek

Use this scramble to help familiarize your students with some of the terms we will use on our walk! Student version is on the reverse.



Hidden word list

- | | |
|---------|---------|
| Plant | Home |
| Animal | Water |
| Fungus | Air |
| Sun | Food |
| Recycle | Habitat |

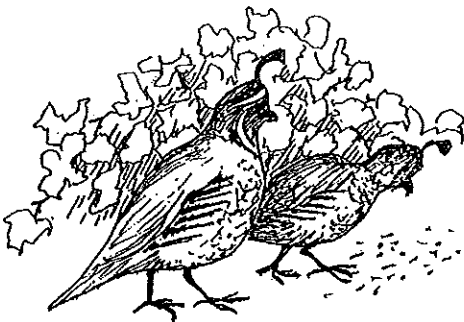
Web of Life Word Seek

Can you find all of the hidden words?

M O R E C Y C L E
P L A N T I H O D
L W N Y R F A N O
O A I W A U B R X
L T M S U N I S A
R E A F E G T A I
E R L O L U A V R
H G O O H S T K N
B R I D P H O M E

Hidden word list

Plant	Home
Animal	Water
Fungus	Air
Sun	Food
Recycle	Habitat



Web of life game

The following pages are designed to be cut into small slips which you can distribute to your students. Each slip contains the name of an organism and some information about the organism. It is not necessary to use every slip, and slips can be duplicated for a larger class without affecting the activity.

Distribute the information slips to your students. Have them make a simple nametag, perhaps with a drawing, representing the living thing on their slip. When students have finished making their name tags, have them stand in a large circle, wearing their nametags and holding their information slips.

Hold up a large ball of string, and explain that this will represent the connections between living things. Living things can be connected in different ways – one may be food for another, or may provide a home for another, or may help another travel. Choose one student to give the ball of string to, and ask them to think about how their living thing is connected to another. The first student should hold onto the end of the string and pass the ball to the student s/he has chosen, explaining how they are connected. That student then chooses another student, explains how they are connected, and still holding on to the string, passes the ball to that student. Continue until all children are part of the web. If necessary, they can pass to the same child more than once.

Ask the children what they think would happen if one part of the web disappeared. Imagine that all of the plants in the web were lost. Have any children representing the plants let go of the string. Then ask any children who were connected to the plants to drop the string, and then those who were connected to them. What happens to the web?



Grass

gets energy from: **sun**
 is eaten by: **deer, rabbit, mouse, worm, grasshopper**
 gives shelter to: **rabbit, mouse, worm, snake**

Robin

eats: **worm, blackberry, caterpillar, grass seed**
 is eaten by: **hawk, snake, raccoon**
 gets shelter from: **apple tree, blackberry plant**

California poppy

gets energy from: **sun**
 is eaten by: **deer, rabbit, mouse, caterpillar, grasshopper**
 gives shelter to: **caterpillar**

Blackberry plant

gets energy from: **sun**
 is eaten by: **deer, mouse, worm raccoon, robin**
 gives shelter to: **rabbit, robin, mouse, raccoon**

Apple tree

gets energy from: **sun**
 is eaten by: **deer, mouse, caterpillar, raccoon, worm**
 gives shelter to: **robin, hawk, caterpillar, raccoon**

Mouse

eats: **plants**
 is eaten by: **hawk, snake, coyote, raccoon**
 gets shelter from: **grass, clover, blackberry**

Raccoon

eats: **apple, blackberry, worm, robin eggs, mouse, caterpillar, grasshopper**
 is eaten by: **coyote, fungus**
 gets shelter from: **tree, blackberry**

Deer

eats: **plants**
 is eaten by: **coyote**
 gets shelter from: **apple tree, blackberry plant**

Grasshopper

eats: **grass, poppy**
 is eaten by: **mouse, raccoon, hawk**
 gets shelter from: **grass, poppy**

Caterpillar

eats: **plants**
 is eaten by: **robin, raccoon**
 gets shelter from: **poppy, dandelion, apple tree**

Dandelion

gets energy from: **sun**
 is eaten by: **deer, rabbit, mouse, worm**
 gives shelter to: **caterpillar, worm**

Worm

eats: **dead plants**
 is eaten by: **robin, raccoon**
 gets shelter from: **grass, clover, dandelion**

Clover

gets energy from: **sun**
 is eaten by: **deer, rabbit, worm**
 gives shelter to: **mouse, worm, snake**

Rabbit

eats: **grass, clover, poppy, dandelion**
 is eaten by: **hawk, snake, coyote**
 gets shelter from: **grass, blackberry**

Hawk

eats: **robin, grasshopper, rabbit, mouse, snake**
 is eaten by: **fungus**

Snake

eats: **mouse, rabbit, robin**
 is eaten by: **coyote, hawk, fungus**
 gets shelter from: **grass, clover**

Coyote

eats: **mouse, rabbit, deer, snake**
 is eaten by: **fungus**
 gets shelter from: **tree, blackberry**

Fungus

gets energy from: **everything, once it is dead!**
 is eaten by: **mouse, raccoon**

Post Visit Activities

Habitat Mural

A community is made up of many interconnecting parts that create a web of life in a habitat. In this activity, students will recreate that web based on their experiences at the gardens.

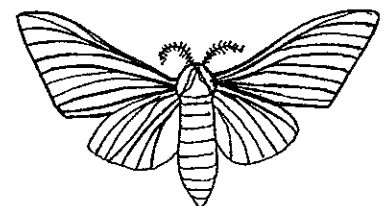
Ask students to name and briefly describe the different habitats they visited at the botanical garden. Help them remember as much as they can about the different areas they visited.

Imagine you had to build a pond, a forest or other community in a huge, empty space. What things would you need to fill in the space? Divide the students into small groups, and assign each group a habitat that they visited. Each group should make a list of everything they remember that can be found in their habitat. Encourage students to think broadly, considering both living and non-living parts of the community.

Next, give each group a large piece of paper on which they can draw all of the parts of their community. Allow ample time for students to draw the different parts of the community they are creating.

When the drawings are completed, hang them so all students can see. Ask each group to describe to the class how different things in their drawing can depend on each other. Encourage them to think about food, shelter, nutrients, pollination, seed dispersal - the whole range of ways that plants, animals, and the non-living parts of the environment interact. Encourage the rest of the class to add their ideas.

Extension - Give each group two colors of yarn and some tape. They will use the yarn to show the relationships between the different parts of the community. Students should choose one color of yarn to represent food chain connections – connect plants and animals with pieces of yarn to show who eats what. They should use the other color of yarn to show how different parts of the community are connected in different kinds of relationships (homes, pollination, hiding places, pest control, etc.)



**I saw many living things when I visited the
San Francisco Botanical Garden.
Here is a picture of one living thing that I saw:**

This living thing is called a _____

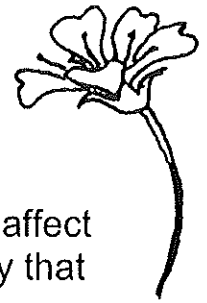
It gets the food it needs to live and grow by _____

It protects itself by _____

Some other living things that depend on it are _____

Living things like this live in _____

My name is: _____



Classroom Conservation

Sometimes we forget to think about how our everyday activities can affect the world around us. Here is an activity to help students see one way that their daily lives can affect one part of the natural world – trees!

Talk about trees and what they do for other living things and what they do for us. Trees provide homes for all kinds of animals, from spiders and termites to squirrels and birds. Larger animals like deer and bear find shelter underneath them. Do we use trees to make our homes? Trees provide food to animals that eat their fruit, leaves, seeds, even twigs and wood! What do we eat that comes from trees? Trees also make oxygen and can help clean the air of pollutants, provide shade on a sunny day, and help protect other plants and animals from the wind.

What are some things people make out of trees? There's one tree product we use every day in our classroom – paper. How much do we use? Let's find out by saving all our paper for a week. Collect it in two boxes – paper that has been used up, and paper that could be used again (blank on one side, color paper that could be cut up for art project, etc.)

At the end of the week, how much paper is in each box? Which has more? How much does it weigh? How many pounds would your class use in a year? If all the classrooms in your school use the same amount of paper, how much paper would your whole school use in a week? In a year? It takes one tree 100 feet tall and 1 ½ feet in diameter to make 750 pounds of paper. That's how much paper one American person uses in a year (not just for school, of course)! How many trees do all the people in your classroom/school use in a year?

How could you reuse some of the paper you saved? How could you cut down on the amount of paper you use? Save all your paper for another week, see if you can reduce the amount of paper you use, or increase the amount that can be reused.

If your class can use less paper, how do you think that may affect the rest of the natural world?

Bibliography

If you cannot find these in your school library, you can read them at the Helen Crocker Russell Memorial Library at the SFBG.

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Explains the interrelationships of nature with attractive color photos of the author's backyard.

The Hidden Life of the Pond. David Schwartz, Crown Publishers, Inc. NY, New York, 1988.

Photographs and text introduce the animals, insects, and plants in a pond.

The Hidden Life of the Meadow. David Schwartz, Crown Publishers, Inc. NY, New York, 1988.

Photographs and text introduce the animals, plants, and ecology of a meadow.

