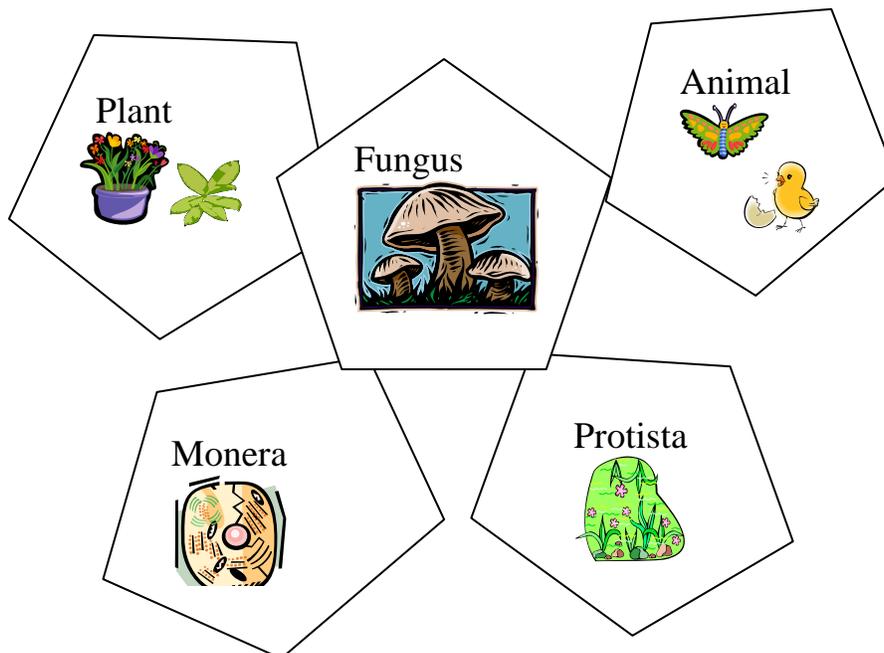


BIOLOGY

Biology is the study of life and living things. The scientists who study biology are called “biologists”. Biologists look at everything from the very smallest living thing to very big things, and how all these living things work together. To make things easier for the biologist, they divide all living things into five groups called “kingdoms”.

The five kingdoms are: Animal, Plant, Fungus, Protista, and Monera. Here are some examples from each kingdom:

K i n g d o m s



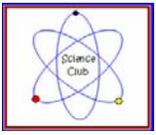
Monera = Bacteria (the plaque on your teeth has bacteria in it)

Protista = Plankton, algae (the green stuff growing in a lake)

Fungus = mushrooms

Plant = flowers, trees

Animal = butterfly, cat, bird, **you**



How do you know if something is alive?

Something that is alive can ...

-  Something that is **alive** can do **work**. No, not just going to work or school every day. Living things take in energy from the environment. This means a living thing takes the food, sunlight, or other types of energy and turns it into the energy it needs to survive. You do this every day when you eat breakfast. You eat the food then your body turns it into energy that allows you to run, play, and work.
-  Something that is **alive** can **grow**. This means more than just getting larger in size. Living things can rebuild and repair themselves when injured. Your body is repairing itself and growing when you get a cut and it heals.
-  Something that is **alive** can **reproduce**. Have you ever seen dirt have children? I don't think so. Life comes from other living things.
-  Something that is **alive** can **respond**. Think about the last time you accidentally stubbed your toe. You probably said “ouch!” and grabbed your foot. That is a response to the pain in your foot. Something that is alive can respond to what is happening around it.
-  Something that is **alive** can **adapt**. Think about a dog or horse in the winter time. The weather is colder, so the dog or horse grows a thicker coat. When the weather gets warmer, the dog or horse will shed this coat to stay cooler.

Here are the activities we'll do as we investigate Biology:

1. Where do Butterflies come from?
2. Grow and study seedlings-flower and tomato

The experiment kit contains:

1. five (5) popsicle sticks
2. one pipe cleaner
3. one sheet of heavy construction paper
4. a small bag of potting soil
5. four (4) small plastic cups
6. one packet of flower seeds
7. one packet of tomato seeds

****You will also need one toilet paper tube-this is not in your kit.****

****We also highly recommend a small plate or piece of tin foil that can be shaped into a little tray to hold the plastic cups with seedlings.**



Where do butterflies come from?

Ever wonder where a butterfly comes from? It comes from a **chrysalis** (KRIS-uh-liss) which is also called a pupa. A chrysalis looks like a tiny leathery pouch. You can find one underneath some leaves in the summer.

Some animals don't change much as they grow up. Think about it: someone your age looks a lot like a grown-up. Grown-ups have more wrinkles and gray hair. But they still have two arms, two legs and one head—just like you.

We're going to meet an animal that's very different—the butterfly. Butterflies go through four life stages, and they look very different at each stage.

Here's what you need:

- Toilet-paper tube
- popsicle stick
- Heavy paper
- A piece of pipe cleaner
- Markers or crayons
- Scissors and glue



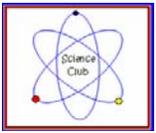
Here's what you do:

1. Cut out and color a butterfly from the heavy paper. Use any colors, but make both halves look the same. Put a small hole at the top of the butterfly's head.

2. Color the toilet paper tube to look like a chrysalis. (A monarch butterfly's chrysalis is green, but you can use any color.)



3. Take a piece of pipe cleaner and shape it like the letter "V". Put one point through the little hole in the butterfly's head and then twist it to look like antennae. Butterflies use these "feelers" to learn about their environment.



4. Glue the butterfly to one end of the tongue depressor or ice-cream pop stick. Let the glue dry.

5. Curl the butterfly's wings and slide it into the chrysalis.

6. Pull the stick to make the beautiful butterfly come out of the chrysalis.

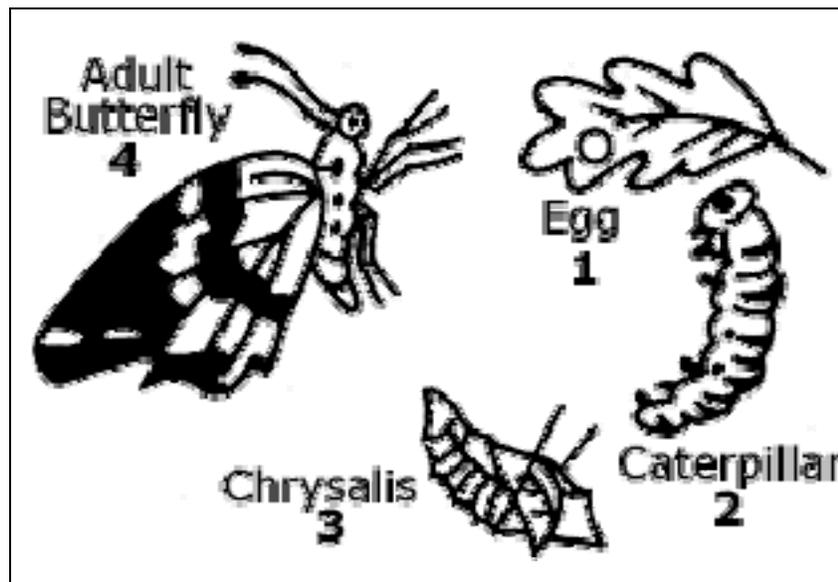
Fly your butterfly like a real one!



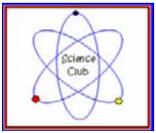
The butterfly's life cycle

Butterflies have four stages of life, but they only look like butterflies in the final stage. Birds, frogs, snakes and insects also change as they grow.

1. An adult butterfly lays an **egg**.
2. The egg hatches into a **caterpillar** or larva.
3. The caterpillar forms the **chrysalis** or pupa.
4. The chrysalis matures into a **butterfly**



Courtesy of the [Scotia-Glenville Children's Museum](#), Scotia, New York
Scotia-Glenville Children's Museum developed the **butterfly and chrysalis project** with funding from Howard Hughes Medical Institute.



Seedlings-Flower and Tomato

Seedlings-Flower and Tomato

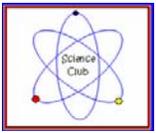
What you need:

1. Small bag of potting soil (we're using Miracle-Gro)
2. Four (4) popsicle sticks
3. Four small paper cups
4. Small packet of tomato seeds
5. Packet of flower seeds
6. a sunny place to keep your seedlings

NOTE TO PARENTS: It's a good idea to poke a small hole in the bottom of each cup so extra water can drain out (kids do tend to over-water). Be sure to put the cups on a dish or something to keep the water from making a mess. A small tray made from a little piece of tin foil with the edges turned up is just fine!

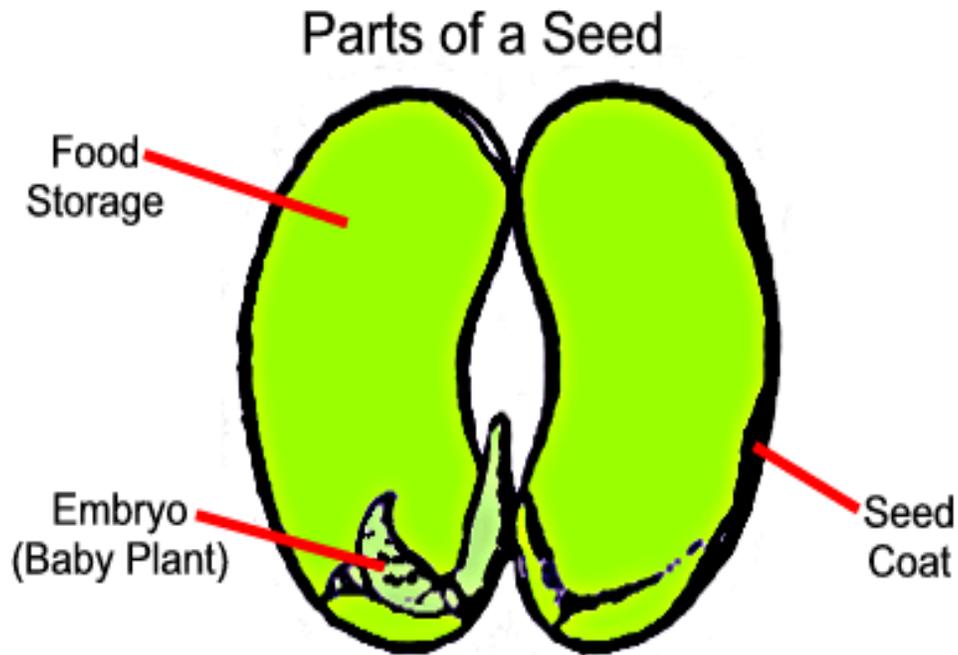
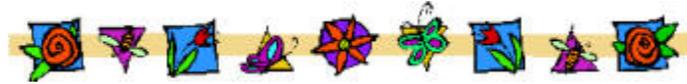
What to do:

1. Write "Flower" on two of the popsicle sticks
2. Write "Tomato" on the other two popsicle sticks
3. Ask your parents for a dish or something to put your seed cups in. **SEE NOTE ABOVE!!**
4. Poke a **tiny** hole in the bottom of each cup with the **tip** of your pencil. Try not to poke your pencil all the way through the cup!
5. Fill each plastic cup about $\frac{3}{4}$ full with potting soil.
6. Now plant your tomato seeds:
 - i. For two of the cups, use your little finger to poke a hole in the middle of the soil. Make the hole about $\frac{1}{4}$ inch deep- just the tip of your finger.
 - ii. Put one tomato seed in each hole and cover them lightly with soil.
 - iii. Put a "Tomato" stick into each of these cups.
7. Now plant your flower seeds:
 - i. Poke a few holes in the top of the soil in each cup and put a few flower seeds in each one.
 - ii. Cover all of the seeds with the soil.
 - iii. Place a "Flower" stick into each of these cups.
8. Water each of the cups with just enough water to make the soil moist (**not** soaking wet!)
9. Put all of the cups near a window so the seeds can get sunlight.
10. **REMEMBER!!** Your seeds need sun and water to grow! You must remember to check you plants every day. If the soil is still wet, then you do not need to add more water. If the soil is dry, then water your plant.
11. Check your seedlings every morning. You should see little plants growing in 7-10 days.

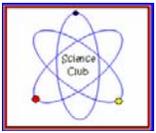


What is happening?

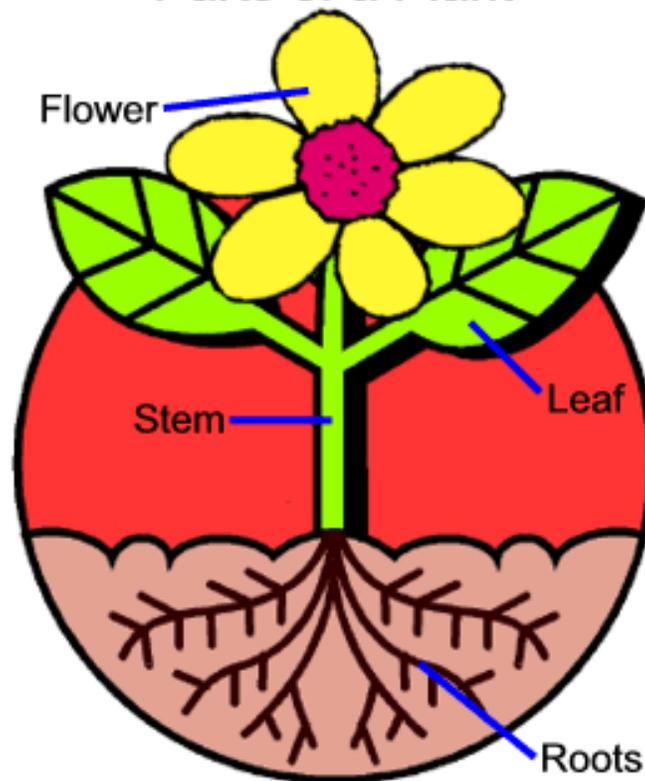
Plant & Flower Facts



Plants grow from [seeds](#). Inside each seed is an [embryo](#), or baby plant. The embryo is surrounded by a [food storage](#) area. Seeds have a protective outer layer called the [seed coat](#).



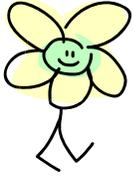
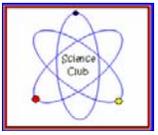
Parts of a Plant



Plant **roots** grow underground and are not seen. Roots help to hold the plant up and bring in food and water from the soil. Food travels up the roots through the **stem** of the plant. The stem holds up the leaves and flowers on the plant. The **leaf** is the food-making factory of a plant. Leaves are usually green and contain a substance called chlorophyll. Some plants, but not all, have **flowers**. Flowers are important in making seeds.

Neat words to remember:

Seed Root Stem Leaf Flower
Fruit Vegetable



Grow your mind!

Check out the library science section.

The following AR books are available at the school library-

- Stems*, by Gail Saunders-Smith
- How do Apples Grow?* By Giulio and Betsy Maestro
- From Seed to Plant*, by Allan Fowler
- How Plants Grow*, by Angela Royston
- Plants Without Seeds*, Helen J. Challand
- Strange Plants*, Angela Royston
- Wetland Plants*, by Ernestine Giesecke and Eileen Mueller Neill
- Plants and Us*, by Angela Royston
- Plants of the Rain Forest*, by Lynn M. Stone
- Trees are Terrific*, by Lisa Trumbauer
- Seed Surprises*, by Andrew Willett
- Seeds (Growing Flowers)*, by Gail Saunders-Smith
- Plant Experiments*, by Vera Webster

Credit where credit is due....

The experiments, discussions, and pictures in this handout were taken or adapted from the following websites and books:

1. www.hhmi.org/coolscience/scotia.htm
2. <http://www.primarygames.com/science/flowers/facts.htm>
3. <http://biology.about.com/od/apforstudents/a/aa082105a.htm>
4. <http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookintro.html>
5. <http://www.dot.state.ga.us/operations/maintenance/wildflower/wildflower-list.shtml>

Extra special thanks to:

URS

AND THE **Georgia Department of
Transportation**

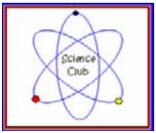
The URS Corporation office in Oak Ridge Tennessee helped us get the wildflower seeds donated by the Georgia Department of Transportation.

Coming soon: Science Club website

When the website is finally ready, we will post the web address in the school newsletter. You can still e-mail us scienceclub@discoveret.org

Pick up schedule for last kit -

May 1: second grade May 2: first grade May 4: kindergarten



Biology Questionnaire

Were the materials provided appropriate? Yes _____ No _____

Please explain. _____

1. Did you have enough materials for each experiment? Yes _____ No _____

Please explain. _____

2. Did the experiments work? Yes _____ No _____

If not, please explain _____

3. Please provide any suggestions for improvements or additional

experiments/explanations. _____
