WONDER WIRE

October 2004 — ideas to inspire curious children — Volume 2

CURIOSITY ZONE
•ever wonder?•

C-ZONE NEWS

Curiosity Zone to open soon in Ashburn (near Safeway on Claiborne Parkway)

Classes and birthday parties to begin January 17!

Registration to begin November 1

Join us October 16 for tons of fun at the Expo at Dulles Town Center! Demonstrations, hands-on experiments, and cool stuff to give away!

Hey Kids:
Become a Secret Science Agent now @ www.curiosityzone.com/SSA. Complete your mission each month and earn C-Zone bucks! (See back for this month's mission.)

Register to get the Wonder Wire™ by email @ www.curiosityzone.com/wonderwire

EVER WONDER . . . WHY LEAVES CHANGE COLOR?

WONDER. Nowhere is the cycle of nature more obvious than in the changing leaves of fall. Year after year October in Virginia brings the reds, yellows and oranges of trees preparing for winter. Take some time this fall to talk to your kids about the cycle of nature – about how all living things must prepare to endure the months of cold weather and limited sunshine that lie ahead. It's not just the trees that are changing – look for the squirrels gathering nuts, the birds flying south, the little critters seeking warmth in your toasty, cozy house. (Too bad spiders and mice aren't more pleasant house guests!)

Take the opportunity this month to go for a long walk in the woods with your kids – try Great Falls or Skyline Drive -- and ask as many questions as you can. How do the trees know when to drop their leaves? Why do they turn different colors before they fall to the ground? How do the birds know when it's time to fly south, and why do they fly in a "v"? And why does the moon look so big and orange in the fall when it first comes up in the sky? You may not know the answers, but you'll have a great time thinking up the possibilities – and that's really what science is all about.

EXPLORE. This month's experiment is all about exploring the colors in leaves. It requires adult supervision!

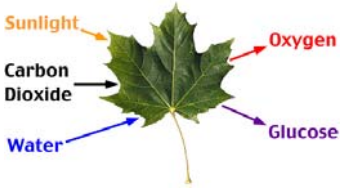
Ingredients: Colorful fall leaves, small jars or glasses (baby food jars work well), covers for the jars (lids, foil or plastic wrap), chopping knife, rubbing alcohol, white paper coffee filters, a shallow pan, hot tap water, tape, pen, paper, a plastic utensil, and timer. This experiment will take about 15 minutes of prep time and about 2 hours of wait time. During those two hours, read through this month's Wonder Wire together, or read a great book about fall, like *It's Fall (Celebrate the Seasons)*, by Linda Glaser and Susan Swan, or make a leaf collage by pressing leaves between sheets of waxed paper with a warm iron.

Directions: Collect at least three large, colorful leaves from three different trees, and one that's still green (if you can find one!). Have your kids draw a picture of each leaf, and write beside each picture the colors they think are in the leaf. One by one, chop each leaf into very small pieces and put it into its own jar. Be sure to label the jars. Now add just enough rubbing alcohol to cover the leaves. Using a plastic utensil, carefully chop and grind the leaves in the alcohol. Cover the jars loosely and place in a shallow pan containing about one inch of hot tap water.

Leave the jars in the water until the alcohol has become colored (at least 30 minutes -- the darker the better), twirling each jar gently about every five minutes. Replace the hot water if it cools off. In the meantime, cut a strip of coffee filter paper for each of the jars – about 4" long and a least 1" wide -- and label it. Remove the jars from the water and uncover them. Insert a strip of filter paper into each jar, with one end in the alcohol and the other end bent over the top of the jar and taped in place. The colored alcohol will begin to travel up the paper. In about 30-90 minutes (or longer), as the alcohol evaporates, you will notice that different colors have traveled different distances up the paper. Depending on the type of leaf, you will see different shades of green, and possibly yellow, orange or red. Match the results with the hypotheses you wrote down for each leaf. How close were your guesses?

WORD OF THE MONTH: AUTUMN. USE IT IN A SENTENCE AT LEAST ONCE A DAY!

LEARN. Leaves are like tiny food machines. They take water (H_2O) gathered by the tree's roots and carbon dioxide (CO_2) carried in the air (this is the same gas that we humans breathe out!), and use the energy from sunlight to change them into glucose (a type of sugar). Just like animals and people, plants use sugar for energy and growth.



This process of converting water and carbon dioxide into glucose is called photosynthesis – which literally means "putting together with light." A key ingredient in photosynthesis is chlorophyll – and chlorophyll is green. So when leaves are actively producing sugar, they are a lush green color.

During the winter in Virginia, however, there is not enough sunlight for photosynthesis to occur. So during the fall months, as the days get shorter and shorter (because of the earth's changing position relative to the sun), trees, like animals, start preparing for a season with little food. As the trees start to shut down their food engines, the first thing to disappear is the chlorophyll. As this green stuff disappears, the orange and yellow colors – which were there all along but hiding behind the green -- begin to appear.

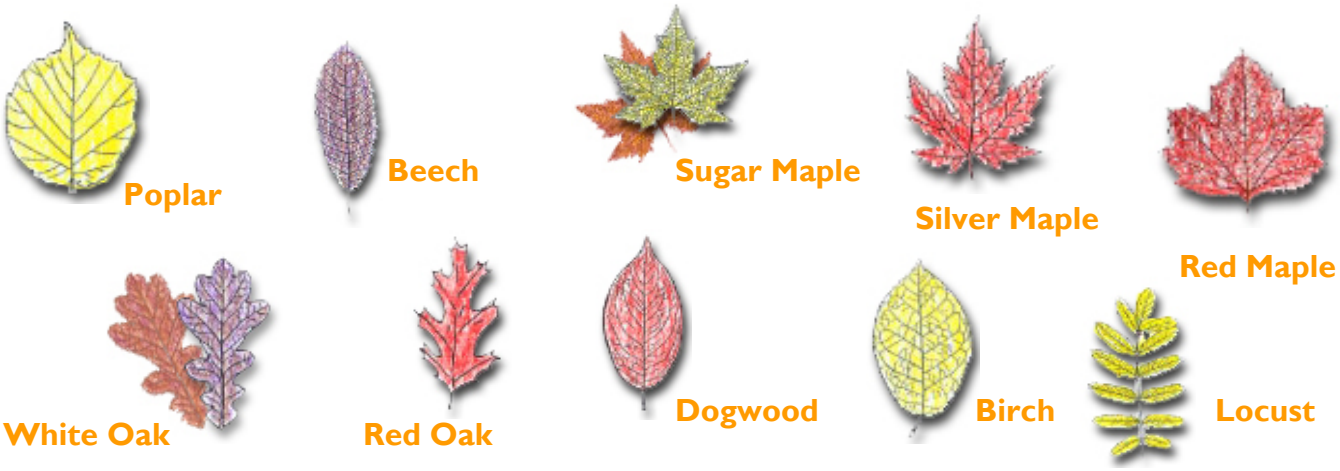
Unlike orange and yellow leaves, the colors in bright red and purple leaves (like those on maple trees) are not present in the leaves until fall arrives. These colors come from sugar that is still trapped in the leaves when photosynthesis stops. This sugar turns red or purple from sunlight and the cool fall nights. The brown in other leaves, like those on oak trees, comes from waste left behind in the leaves.

In our experiment, to find the colors in the leaves you gathered, you used a scientific technique called "chromatography." In this technique, a liquid (like rubbing alcohol) is allowed to flow through a uniform, stationary substance (like coffee filter strips). Because the different ingredients in the liquid are different molecular sizes, they move along the strip at different rates. By examining where different ingredients end up, scientists can determine what was in the mixture to begin with.

"Chromatography" derives from the Greek word for color, "chroma," and writing, "graph." Scientists use chromatography to find out what is in a solid or a liquid, or to determine what an unknown substance is. Detectives also use chromatography to develop clues and solve crimes.

SECRET SCIENCE AGENTS: YOUR MISSION FOR OCTOBER

Nature is full of clues that winter is on the way. Your mission this month is to find five of these clues. Look outside your house – at the trees, the flowers, the animals, the sky. Write down your five clues and email them to the C-Zone at Mission@CuriosityZone.com. Also, be sure to bring your list to the C-Zone (when we open!) to collect your "agent pay" in C-Zone bucks!



COMING IN NOVEMBER: EVER WONDER WHERE TURKEYS LIVE? (AND OTHER THANKSGIVING MYSTERIES!)

Parents and Teachers: register to receive the Wonder Wire™ by email each month at www.curiosityzone.com/wonderwire.