

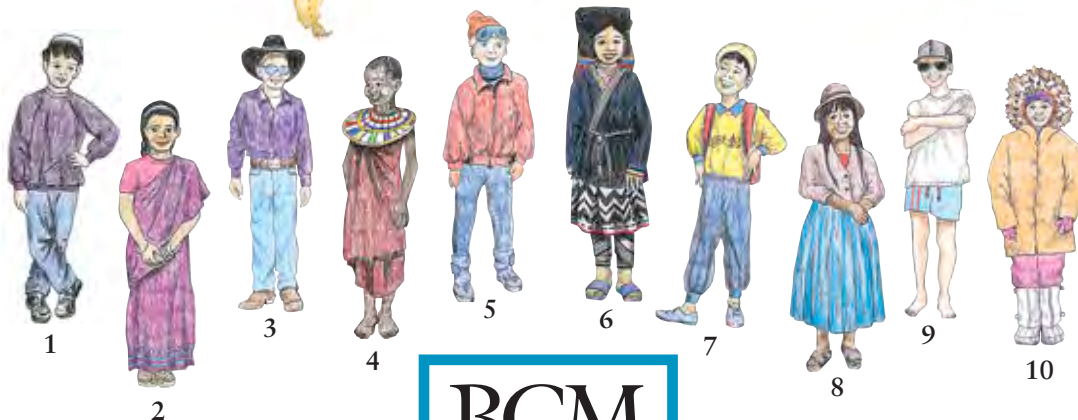
EXPLORATIONS

for *The Science of Global Atmospheric Change Teacher's Guide* and *Mr. Slaptail's Curious Contraption*

Can you tell where the children live?

The clothing that children wear depends on where they live. Some kinds of clothes are for sun protection. Other kinds are for warmth.

The countries where the children live are named next to each dot. Draw a line from each child to where you think he or she lives.



Let's Talk

about...

The



Have you ever wondered about the sky above you? When you look upward, you are seeing part of the Earth's atmosphere. The atmosphere is the layer of air around the Earth. Air contains nitrogen, oxygen and other gases like carbon dioxide, water vapor and ozone.



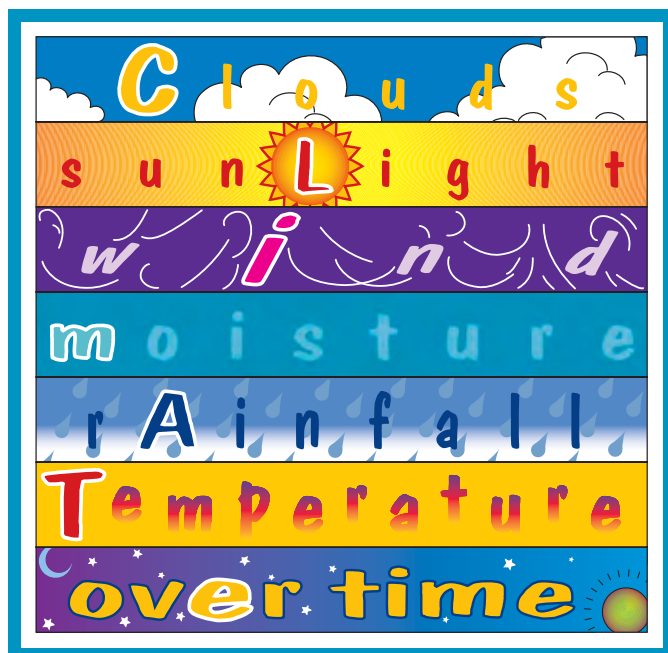
Energy from the sun.

Have you ever noticed how warm a car or bus can get inside when it's parked in the sun? Light energy from the sun goes through the windows and is trapped as heat inside the car. The same thing happens on Earth. Some atmospheric

gases, like carbon dioxide, act like the car windows and hold heat inside. It's a good thing they do, because otherwise Earth would be a lot colder! The only problem is that recently, our activities on Earth have begun to add extra heat-trapping gases to the atmosphere. Eventually, this might make the Earth warmer.

If the Earth gets even a little bit hotter, the climate in many parts of the world could change. Some places would get warmer and drier. Other places might get more rain. This would affect farms, forests, wildlife—just about everything on the planet. This warming process is called “the greenhouse effect.”

What is Climate?



Whoops! Some chemicals we use go up into the atmosphere and destroy part of the layer of ozone that protects us from UV radiation. Most of these are CFCs.

CFC stands for chlorofluorocarbon (KLOR-oh-FLOR-oh-KAHR-buhn). These chemicals can be used in air conditioners, refrigerators and some aerosol cans. Almost all countries on Earth have agreed to stop using CFCs.

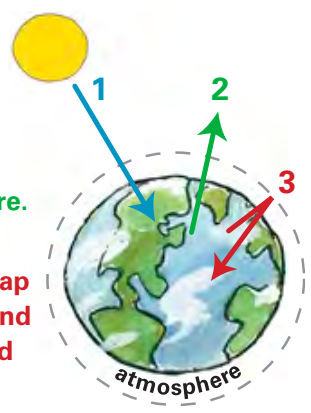


Atmosphere & Health



The Greenhouse Effect

1. Sunlight passes through the clear atmosphere and warms the Earth's surface.
2. The warm surface reflects heat back into the atmosphere.
3. Greenhouse gases and water vapor trap some of the heat and send it back toward the Earth.



The atmosphere is special. The atmosphere protects us from dangerous rays produced by the sun. We can see part of the energy from the sun as light and feel part of it as heat. But the sun also sends out other kinds of energy. Some of this energy, like ultra-violet—or UV rays, can be harmful to living things. UV radiation makes your skin turn red (sunburn) if you are in the sun too long. UV rays also can cause skin cancer in people who are in the sun too much. A gas in the atmosphere, called ozone, soaks up almost all of the UV rays from the sun, but some still get through.

Almost all the gas around our planet is in a thin layer, about 60 miles high. This is the same distance you might travel on a highway if you drive for an hour.

Tips for Healthy Living

Protect the atmosphere. Protect yourself.

- Use less fossil fuels — ride the bus, ride a bicycle or walk whenever it's safe and possible.
- Plant trees and other plants, which will take up carbon dioxide from the air.
- Try to save energy. Turn off lights and appliances when they are not in use.
- Save on heating and air conditioning by wearing sweaters when it's cold and short-sleeved shirts when it's hot.
- Add insulation to your house to keep warm air from escaping in winter and cool air from escaping in summer.
- Use coolants and spray can products that don't contain CFCs.
- When in the sun, wear a hat and a shirt with long sleeves.
- Always wear sunscreen and sunglasses that protect against UV radiation!

Fossil fuels, such as coal and gasoline, come from plants that died millions of years ago. These plants took in carbon dioxide from the air during photosynthesis. When we burn fossil fuels today, carbon dioxide goes back into the atmosphere.

Swirled World

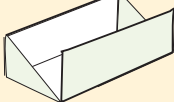
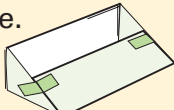
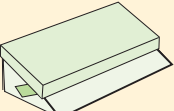
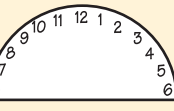
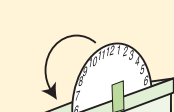
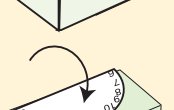
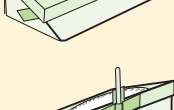
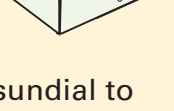


Weather and ocean currents are caused by heating and cooling of different parts of the Earth's surface.


Did you know that the greatest risk from sun exposure is between 10:00 in the morning and 4:00 in the afternoon? Find these times after you make the sundial in the “Sun Power” activity below.

SUN POWER

Use the sun to tell time by making a sundial. You will need a shoebox, a paper plate, tape, scissors and a popsicle stick or pencil.

1. Cut the sides of a shoebox as shown. 
2. Fold the long edge of the box down and tape into place. 
3. Place the shoe box lid over the box. 
4. Cut the paper plate in half. (You will only use one of the halves.) 
5. Make a mark at the center of the curved edge of the half plate. Label it “12.” 
6. Make 5 evenly spaced marks on each side of the “12” and label as shown. 
7. Tape the plate on the top of the lid, with the straight edge at the top of the box. Fold the plate over and tape down. 
8. Tape the popsicle stick so that it points straight up as shown. 
9. Put your sundial in the sun, facing North. Where does the shadow from the popsicle stick fall? Compare the time on your sundial to the time on a clock.

Try This! You can make a model of the way our Earth’s environment is affected by natural and man-made disasters. You will need a paper plate (wax coated works best), one fourth cup of whole milk, food coloring (red, blue, green and yellow), and dishwashing soap, preferably clear or light colored.

1. Mark the four directions (North, South, East and West) on the outer edge of your paper plate. Consider where the major continents would be in relation to the directions. (You can use the cover of this *Explorations* as a guide.) 
2. Pour the milk into the plate. This represents the atmosphere surrounding the Earth.
3. Place several drops of each color of food coloring randomly in the milk. Each drop will represent a different global disaster. For example, the red drops could represent a forest fire, green—volcanoes, and yellow—pollution due to car exhaust.
4. Look at the colors on your plate. Are they spreading and running into each other? Is each “disaster” isolated in its own area?
5. Now, put several squirts of dishwashing liquid randomly into the plate. This represents energy from the sun.
6. Observe. What happens to the disasters represented by the colors?

We Can Make A Difference!



We are students at Islands Elementary School in Savannah, Georgia. We are learning about the Earth's climate. We are part of the GLOBE program.

Every day we measure air temperature and rainfall near our school.

All of us together are looking for answers about the Earth's climate. We would like to know how our climate could be changing. What do you think?



We are measuring rainfall.



This is our weather station.



We are checking the air temperature.



We use computers and the Internet to share our measurements with other students and scientists.



Former U.S. Vice President Al Gore came up with the idea of a world-wide program on the Earth's environment. He thought that students and teachers in every country could get involved.

Students and teachers living in more than 95 countries are working with scientists to learn more about our planet. Find out how you can be a part of the worldwide GLOBE program. You and your teacher can call the GLOBE program at (800-858-9947). You also can visit the GLOBE World Wide Web site at <http://www.globe.gov/>.

WHAT IS IT?



It holds me tight,
won't let me go.

It covers me
from head to _____

It keeps my insides
safe and clean,
and keeps out germs
not even _____

It wrinkles up
each time I smile,
or cry or frown,
once in a _____

It goes with me
outdoors for fun.
But it can hurt
from too much _____

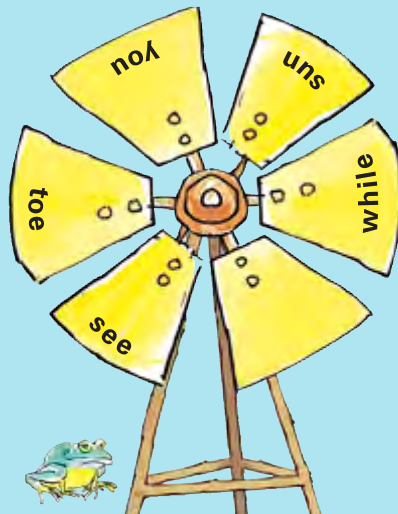
It comes in shapes
and colors, too.
Your own is special,
just for _____

Mine's on my face,
my arm and shin,
my front and back—
It is my _____



Here is a poem about an important part of your body. Some words have been left out. Read the poem, and fill in the missing words as you go.

Choose the right word for each space from the "Windmill of Words." The last word is not on the windmill. Guess what it is, and you will know the answer.



Not Such A New Issue . . .

Swedish scientist Svante Arrhenius was the first to use the phrase "greenhouse effect." He used it to describe how carbon dioxide and some other gases keep the Earth warmer than it would be otherwise.



Can you guess why he called it that?

Have you ever seen a greenhouse—a glass building or room where it is warm enough to grow summertime plants in cold weather?





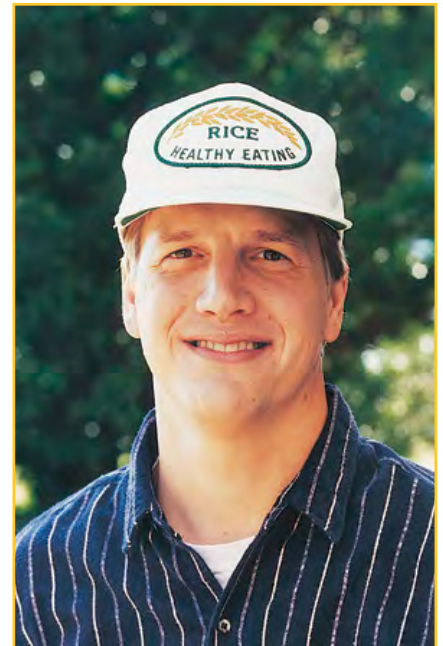
Rosie and Riff talk to... Lief Sigren, Ph.D. Ecologist

What do you do at your job?

I am a wetland ecologist. I study the release of methane gas from rice paddies, which are a type of wetland, since they are flooded during the growing season. We are interested in methane because it is a greenhouse gas, like carbon dioxide. This kind of gas traps heat in the atmosphere and adds to global warming. We would like to find ways to grow rice so that the fields give off little methane and produce as much food as possible. This is very important because the population of the Earth is growing.

How did you decide to do this kind of work?

I was a high school teacher for 10 years before I decided to go back to school and get my Ph.D. (a doctor's degree in science). I always have been interested in the environment, and I chose this kind of research because it affects the whole world.



Some of us are not wearing hats, but we always wear sun screen when we are in the field.

Have you always been interested in science?

Yes. I always enjoyed science. At first I thought I would study physics, but I decided that I liked biology better, especially ecology.

What do you like most about your work?

I like knowing that my work is important to the well-being of everyone, all over the world. I also find it fun!

We work hard in the rice paddies and in the lab, but we have fun at the same time. There are many birds, frogs, snakes and even alligators in our rice paddies.

Is there anything else you would like to tell our readers?

Science can be fun! For your life's work, choose something that you really like doing. Then you will enjoy working as hard as you can.

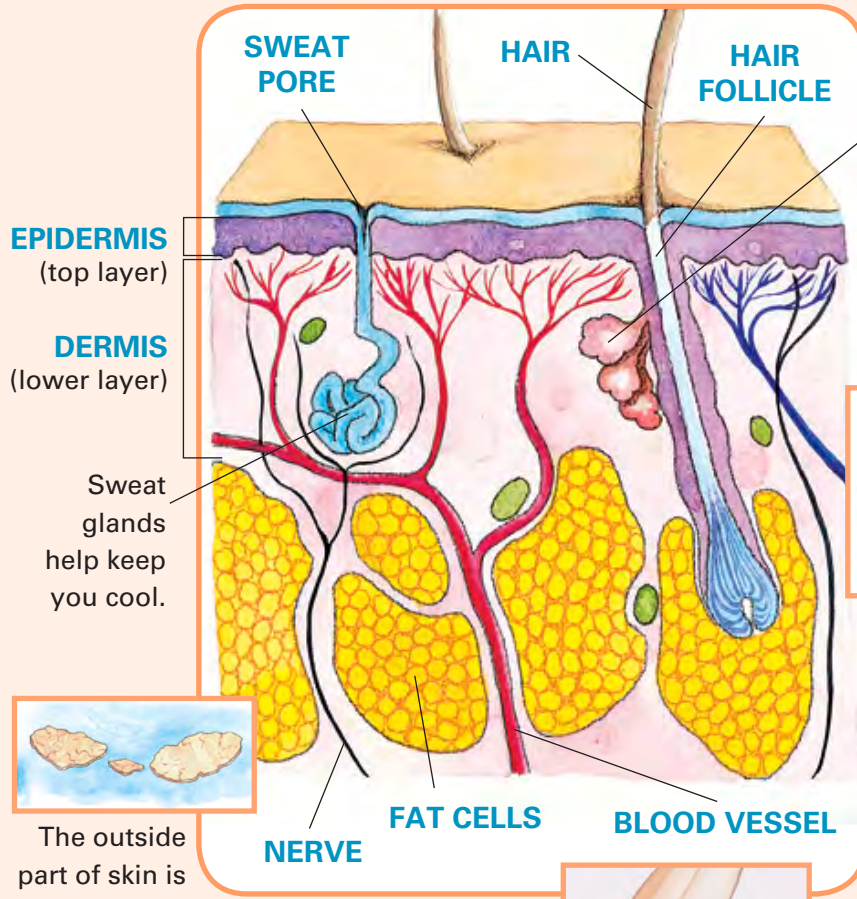


Are You Skin Wise?

You have around 5 million hair follicles on your body!



This is a drawing of skin from the human scalp.



Oil glands help keep your skin from getting dry.



The ancient Chinese used fingerprints to identify people more than 1,200 years ago.



The outside part of skin is made of tiny flakes of dead cells.

Look at your elbow. Can you figure out why it looks wrinkled sometimes?



Make a Thumbprint!

1. Rub a pencil on a piece of paper until you make a solid, dark spot about 2–3 cm in diameter.
2. Rub your fingertip or thumb over the spot.
3. Now, stick a piece of clear tape over the smudge on your fingertip.
4. Stick the tape onto a piece of paper.

ANSWERS TO MAP PUZZLE

- | | | | | |
|-----------|------------------|-------------|------------|--------------|
| 1. ISRAEL | 3. UNITED STATES | 5. FINLAND | 7. JAPAN | 9. AUSTRALIA |
| 2. INDIA | 4. TANZANIA | 6. VIET NAM | 8. BOLIVIA | 10. CANADA |

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