TEACHERS ACTIVITIES

Theme:

Although the night is a time of rest for many animals, it is also a vital, active time for other animals—and some people.

Topics For Discussion:

Before viewing the program, brainstorm what the students know about bats. Retain their ideas on a chart so that as they acquire more information, they can cross off some of the myths and misconceptions.

Have the class generate a list of animals that people are often afraid of. Discuss reasons why people are afraid of them.

Discuss what it means to be a friend. How could Stellaluna be friends with the birds when they were so different from her? In what ways did Stellaluna and the birds show their friendship?

Discuss with the students what they feel is necessary for a "good night's sleep." What bedtime routines do they have? Do they have to fall asleep a special way? Do they sleep with a stuffed animal, special blanket or pillow?

The name "Stellaluna" means "beautiful moon." Discuss why it is an appropriate name for Stellaluna and why her mother might have chosen that name for her.

Curriculum Extension Activities:

Have the students compare and contrast bats and birds, using a Venn diagram to record their information.

Have the children illustrate the story of Stellaluna's life on a timeline.

Have students plot areas where bats live on a map of the world.

Adapt the story of Stellaluna into a play for the children to perform.

Write a class letter to Bat Conservation International (P. O. Box 162603, Austin, TX 78716) requesting information about bats. Have the children brainstorm what kinds of information they would like to have and put their questions in the letter.

Have the class collect "bat facts" from books they have read or heard about bats, and write them on cutouts of bats. Hang these in the classroom, upside down. Make sure the children record their bat facts upside down on the cutouts. The information in the back of the book *Stellaluna* will be helpful with this activity.

Brainstorm a list of nocturnal animals. Have students research the activities of these animals and collect the information into their own class-made book. Some are mentioned in program segments. *Animals of the Night* by Merry Banks (Scribner's) will also be a useful resource.

Not all people work during the daytime. Have the class identify some occupations in which work is often done at night. Kathy Henderson's *In the Middle of the Night* (Macmillan) will provide some ideas. Invite a parent who works at night to come in and talk about the advantages and disadvantages of his/her different daily schedule.

Have students share a dream they have had and then have them draw pictures of their dreams. Discuss the difference between nightmares and dreams.

Supplemental Books:

BY THE DAWN'S EARLY LIGHT
by Karen Ackerman, illus. by Catherine Stock (Atheneum)

ANIMALS OF THE NIGHT
by Merry Banks, illus. by Ronald Himler (Scribner's)

SHADOWS OF NIGHT
by Barbara Bash (Sierra Club Books for Children)

THE BAT IN THE BOOT
by Annie Cannon (Orchard)

ZIPPING, ZAPPING, ZOOMING BATS
by Ann Earle, illus. by Henry Cole (HarperCollins)

IN THE MIDDLE OF THE NIGHT
by Kathy Henderson, illus. by Jennifer Eachus (Macmillan)

BATS
by Sylvia A. Johnson, photographs by Modoki Masuda (Lerner)

BATS, NIGHT FLIERS
by Betsy Maestro, illus. by Giulio Maestro (Scholastic)

DISCOVERING BATS
by Jane Mulleneux (Bookwright Press)

A FIRST LOOK AT BATS
by Millicent Selsam and Joyce Hunt (Walker)

BATS: MYSTERIOUS FLYERS OF THE NIGHT
by Dee Stuart (Carolrhoda)

NIGHT CREATURES
by Susanne Santoro Whayne, illus. by Steven Schindler (Simon & Schuster)

Atmosphere Of Togetherness

Key Words: acids, bases, indicator, ammonia

Concept: Ammonia, including ammonia gas created from bat droppings, is a base.

Ammonia gas created from bat droppings, or guano, is a strong base. Strong bases, like strong acids, can severely burn skin and lungs. This is why the scientist on this episode, Dr. Merlin Tuttle, had to wear a gas mask while in the cave. Although it doesn't make for good air for people, bat droppings are used as fertilizers which do make for healthy plants.

You can find some common bases in your home, such as ammonia, using red cabbage juice as an acid and base indicator (or pH indicator). Cabbage juice, like litmus paper which is a pH indicator made from a lichen, will turn blue when mixed with a base. If you mix it with a strong base, the cabbage juice will turn green, or if very strong, even yellow. If you mix it with an acid, it will turn red. If mixed with a substance that is neutral (neither an acid, nor a base), the cabbage juice will not change color.

Materials: Red cabbage, pan, stove, water, chart paper, clear plastic cups, spoons, vinegar, lemon juice, household ammonia, baking soda.

1. Boil 1 cup of chopped red cabbage in 2 cups of water for 30 minutes to create a violet-blue indicator liquid. (Increase the amounts if you are planning to conduct the activity with several groups of students.) Strain this liquid off into a bowl and let it cool. If necessary, it can be stored in a refrigerator for a day or two.

2. Make three columns on a sheet of chart paper. At the top of the first column write "Base-Blue, Green, or Yellow". At the top of the middle column write "Neutral-No color change." At the top of the last column write "Acid-Red."

3. Show students the indicator liquid and explain how it was made and how it will change colors when mixed with things that are either an acid or a base. Discuss the chart and the color changes for bases and acids.

4. Pour about 1/4 cup of the indicator liquid into a clear plastic cup. Have students predict what will happen when you add ammonia (a base) to the indicator. *(It will turn blue, green, or yellow depending on the amount and strength of the ammonia.)* Add about a teaspoon of household ammonia and stir gently. Write the word ammonia on the chart under the word base.

5. Each time using a clean cup and spoon, repeat step 4, once adding a teaspoon of lemon juice which is an acid *(the indicator will turn red)* and again using plain water which is neither an acid nor a base *(the indicator will not change).* Record each on the chart.

6. Have groups of students test for bases and acids by giving them the following items:
    - a cup with 1 teaspoon of baking soda mixed with 3 tablespoons of water
    - a cup with 1 teaspoon of vinegar mixed with 3 tablespoons of water
    - 3 cups, each with ¼ cup of the indicator liquid (one will be used for comparison).

Ask students to predict what will happen when they combine the baking soda and the indicator. Then have them mix them together. Discuss and record the results (baking soda is a weak base and will turn the indicator blue). Next, have them predict and then combine the vinegar and the indicator. Discuss and record the results. (Vinegar is an acid and will turn the indicator red.) If students have trouble seeing the color differences, have them compare the changed indicator to the liquid in the third cup.

Extension: Have students check other common household powders or liquids. Be sure to select only items that are safe for students to handle.

One In A Thousand

Key Words: bats, senses, memory

Concept: Mother bats use their sense of smell to help identify their babies.

Stellaluna's mother used her sense of smell to identify Stellaluna upon their reunion. Many bats leave their babies, called pups, in a bat nursery (a particular part of the cave or building that the bats are living in) when they go out hunting for food. Because so many bats live together, a mother bat often has to find her pup among hundreds or thousands of other baby bats when she returns. She uses her keen sense of smell along with memory of position and hearing to find her own special baby.

Materials: 6 cotton balls, a few drops each of 6 scented extracts and oils (such as oil of cinnamon, oil of cloves, extract of vanilla, extract of mint, extract of lemon, witch hazel) 6 film canisters with lids, 6 copies of bat pups made from the pattern, tape, scissors, an egg carton, 6 blindfolds.

1. Place a cotton ball, scented with a different extract or oil in each of 6 canisters. Put the lids on the canisters.

2. Take the top off an egg carton and tape the carton down on a tabletop.

3. Have six students sit together at the table with the egg carton. Ask each student to color a picture of a bat pup. Tape each picture onto a film canister trying to tape each in the same way so students will not be able to tell them apart by feeling the tape. Tell students they will be pretending to be mother bats and that the canisters represent their babies. The egg carton will be the bat nursery where they will leave their babies when they go hunting for food. Explain that because the cave in which they live is very dark, they will be wearing blindfolds.

4. Help each child put on a blindfold. Then have students remove the lid from their canisters. Give students a minute to get familiar with their pup's scent. Then, leaving the lids off, ask students to place their pup in the nursery (egg carton). Have students imagine they are going to look for food. Discuss what they might eat and how they might find it.

5. One at a time, ask students to pretend to return to the nursery to find their pup. Once they have found their pup, they should remove it from the nursery and hold it. If a student can't find their pup, ask the student to wait until the others have selected pups and then try again. If the student still isn't sure (it is possible that another student may have taken their pup), encourage them to select one of the remaining pups and be ready to describe how it differs from theirs.

6. Have students take off their blindfolds and look at the pups. Discuss how they found their pup *(using their sense of smell and position)* or why they might have found the wrong pup *(they couldn't remember the pup's smell or position, someone had already taken their pup.)* Ask how real mother bats might find their babies in a dark cave or barn with hundreds of pups to choose from. *(In the same way, using their sense of smell and position. Real bats also use their sense of hearing.)*

Right Hear

Key Words: bats, echoes, echolocation, sound, listening

Concept: Some bats use echolocation to find food.

Some bats, unlike Stellaluna, really do prefer to eat insects. These bats hunt for insects at night using their ears rather than their eyes. They do this by making a high-pitched sound and then listening for the sound waves to bounce back off of an insect. Because this is like listening for an echo, it is called echolocation. Bats are so good at echolocation that from it they can determine an insect's size, direction, and distance. In this activity, you can try simulating echolocation.

Materials: Blindfolds, large open area.

1. Practice echoing by clapping a simple musical pattern with your hands and asking students to repeat it after you. Explain that echoes sound like this, but are made by a noise that is bounced or reflected back. Tell students that some insect-eating bats make a sound while flying. When an insect is near by, the sound bounces off the insect, making an echo. The echo helps the bat locate the insect.

2. Tell students that they will be playing a game in which students will pretend to be a bat using echoes to find insects. Select one student to play the part of a bat and two or more students to play insects.

3. Have the remaining students stand in a large circle with the students playing the bat and insects inside. Blindfold the bat.

4. Explain that the bat must try to find an insect using echolocation. The bat claps and the insects must echo back with a clap. After they clap, the bat and insects may each move two steps. The insects may move around in the circle, but not outside it. Remind students in the circle to be quiet so the bat can hear the echoes. Once the bat touches or "catches" one of the insects, the bat and that insect each choose a student from the circle to take their place.

Alternative: Give students percussion instruments, such as castanets, to use instead of clapping.

Dance To The Music

Key Words: bats, energy, sound waves, vibrations, sense of hearing

Concept: Sound waves cause tiny bones inside our ears to vibrate, allowing us to sense sound.

Bats have a very specialized sense of hearing. Although we cannot hear the high-pitched sounds that bats make or the returning echoes, we do hear in much the same way as bats. As sound energy passes through an object, some of the energy is absorbed by the object which causes it to vibrate. It is these tiny vibrations that our ears sense when we hear a sound. Bat ears are so sensitive that they can hear vibrations that our ears can't. We often can't see the vibrations caused by sound waves, but sometimes we can see the motion they cause.

Materials: Small radio that can be laid down so that the radio speaker is horizontal, table or other flat surface, piece of black paper about 3" X 5", tape, salt.

1. Lay the radio down on a table so that the speaker is horizontal and is facing up.

2. Tape the black paper over the radio speaker. Make sure the paper is as flat and level as possible.

3. Pour about 1/2 teaspoon of salt onto the center of the paper.

4. Turn on the radio and watch what happens to the salt. The salt will seem to start dancing to the beat of the music. As the sound waves move out from the speaker they cause the paper and the salt to vibrate. Try turning the radio volume up and down. What happens to the salt ? *(Increasing the volume increases the amount of energy, so the salt moves more. Decreasing the volume decreases the amount of energy, so the salt moves less.)* Just like the salt and the paper, the sound waves cause tiny bones inside your ears to vibrate. That's how we hear sound.

Wave Good-bye

Key Words: bats, energy, waves, echolocation, sound

Concept: Waves, including sound waves, travel out in all directions.

When a bat makes its high-pitched screech, the sound waves from the squeak travel out in all directions. The way the bat knows the location and size of an insect is by the direction and other properties of the returning wave.

Materials: Rectangular clear container at least 8" x 13" such as a sheet cake pan, water, blue food coloring, sheet of aluminum foil (about 12" X 12"), small empty milk carton, drawing paper, crayons.

1. To make a wave tank, cover the bottom of a clear plastic container with about 1/2 " of water that has been dyed with blue food coloring.

2. Fold a sheet of aluminum foil several times until you have a stiff rectangular strip that is about 1-1/2" by 4".

3. Stand the strip in the water at one end of the wave tank so that a long edge of the strip is down. Quickly push the strip along the bottom of the tank for several inches to create a wave in the water. Lift the strip out of the water and watch the movement of the wave. After it reaches the end of the tank, it will bounce back and move in the opposite direction. This is like the returning sound waves that bats use in echolocation. You can try it again, but wait until the water is completely still.

4. Make a drawing of a moth. Tape the drawing to the top of a small empty milk carton. Then partially fill the carton with water to weigh it down. Set it in a corner of the container of water.

5. Starting at the end of the tank opposite the milk carton, use the strip to create a wave as in step 3. Watch the movement of the wave. Part of the wave will hit the moth (milk carton) and be bounced back earlier than the rest of the wave. The rest of the wave will keep moving until it hits the end of the tank. This creates two returning waves of different sizes and from different locations; one bouncing back off the moth, and the other from the end of the tank.

There And Back Again

Key Words: bats, sound, energy, waves, echolocation

Concept: An echo is a reflected sound wave.

Sound is one kind of energy that travels in waves. If sound waves hit a solid object, some of the energy is absorbed by the object and some of the energy is reflected back. In echolocation, bats are listening for this reflected energy.

Materials: 20 feet of rope, door with a door knob, drawing paper, crayons, tape.

1. Tie a rope securely to a door knob or other stable object.

2. Make a drawing of a moth. Tape the drawing to the door knob at the end of the rope.

3. Holding the other end of the rope, stand far enough away from the door so that the rope dips down slightly. Hold your end of the rope at about the same level as the door knob.

4. Pretend that you are a bat. Say "squeak" and give the rope a single, quick flip up and down using your wrist. Watch the wave move along the rope to the moth drawing. When the wave reaches the moth (door knob), some of the energy is absorbed into the door knob and some of the energy is reflected back. Watch and you will see a smaller wave bounce back towards you. This is like the returning sound waves that bats hear in echolocation. Wait until the rope is completely still and make another wave. It may take you several trials to create a good wave—not too small, not too big. It may also take a little time for your eye to be able to follow the wave down the rope and back. Keep trying, each time perfecting your technique.