THE OLD WHITE SHEET TRICK

BACKGROUND

More flying, creeping, and crawling animals than you would ever hope to find can be attracted to light at night. From spring until fall in most areas, favorable environmental conditions and ample food sources allow millions of insects and other animals to reproduce and grow. Some are attracted to certain colors of light, but most are attracted to white. By increasing the amount of white light (the target), you can usually attract more animals.

In this activity, the students find out which animals are out at night, and investigate some aspects of their behavior. The activity works well with groups or individuals. You can attract the animals by shining a white light onto a white surface such as a section of an old sheet, white plaster board, paper or painted surface. The technology focus areas would be determined by the NSTF director in consultation with an advisory board and revisited every four years, though the bill establishes an initial set of 10:

- artificial intelligence and machine learning
- high performance computing, semiconductors, and advanced computer hardware
- quantum computing and information systems
- robotics, automation, and advanced manufacturing
- natural or anthropogenic disaster prevention
- advanced communications technology
- biotechnology, genomics, and synthetic biology
- cybersecurity, data storage, and data management technologies
- advanced energy
- materials science, engineering, and exploration relevant to the other key technology focus areas

Students can then observe which animals come first, where they land, where they crawl, and how they can be manipulated by changes in light conditions.

There is no magic sequence of sub-tasks. The best procedure is one that allows the participants to first observe the animals. These observations will then give the students ideas on what to investigate and experiment with. Action Cards are available for those who do not think of experiments.

CHALLENGE

Using a large flashlight or light source, attract all the night animals you can.

PREPARATION

A warm, relatively windless night should be ordered for best results. Select an outside area near foliage, but in a place relatively free of objects that may cause children to trip or fall. Avoid competition from street lights, cabins, and other light sources. Find the best place to suspend the white sheet. It should hang freely (as opposed to hanging flat against a wall), so you can shine the light through the sheet. Let part of the sheet lie on the ground to catch falling animals.

Duplicate the action cards and cut them apart.

MATERIALS

For the group:

- Junk box containing such things as: paper and cloth of various colors, tape, scissors, felt pens, various smelly things (onions, fingernail polish, vinegar, garlic, diluted ammonia, etc.), cotton swabs, popsicle sticks, soda straws, colored gels or cellophane.
- 1 old white sheet (best) or white butcher paper, tag board, or cardboard painted white.
- Materials for hanging the white surface (sheet – clothesline, cardboard – nails, tacks or tape, etc.)
- Electric lamps, flashlights of various types and intensities, auto headlights, and camp lanterns. A blacklight such as the one described in *Who Goes There*? (Set I) will produce a strange effect to see but will not attract many animals. You can use any safe source of light you can find. For safety reasons, we discourage the use of flame.
- Action Cards (duplicated)

Optional:

-hand lenses*
-clear containers with caps*

ACTION

1. Tell the students they are going to attract all the night animals they can by using light.
2. Ask a few of the students to set up some lights so they shine on the sheet. Animals will probably appear either near the light sources or on the sheet soon after the lights are turned on.

3. Encourage the students to discover which kind of animal comes first, and to compare this type with the latecomers. Allow some observation time. Watch for bats, spiders, and other animals that may come to prey on the animals attracted to the light.
4. As the students talk or raise questions about what they see, encourage them to use materials in the junk box to experiment. They may see one animal staying near the edge of the light ring and wonder aloud if it will move when the light is moved. Encourage them to follow up on their ideas. If no ideas come from the students, distribute the action cards.
5. Distribute one action card to each child or team and show the students the junk box containing the materials they can use to investigate the animals' behavior around light.
6. When the students complete their first action cards, they can get additional ones from you or trade with the other students.

What Do You Think?

The time to stop is when interest begins to wane. If ideas, results, and excitement haven't been shared already, you might want to ask the students what they found out about the animals.

- How do late-arriving animals differ from the first ones to arrive?
- What factors other than light may have attracted the animals?
- What color clothes should be worn to attract the least number of night animals?
- What levels of brightness attract most animals?
- How do smells affect the behavior of these animals?
- Do you think attraction to light is beneficial to these animals? Why?
- When the animals gather at the lighted area, how do they interact (mate, fight, ignore, bump, avoid, circle each other)?
- Do you suppose man could control insect populations by using light? How?

Follow Through

-Compare animals that do not come to the light with those who do by using sweepnets to collect animals from the grass, field, and bushes. Then take the collected animals to the white sheet area and compare them to the animals attracted to the light. Are non-attracted animals bigger, longer, of a different color, lacking wings or eyes? Do they have fewer legs?

-Catch some spiders or other known predators of insects. Bring them to the area below the sheet and see which animals they hunt, how they capture, and how many animals they eat. (Warn the children to be careful of any that might harm them.)

-Try the *Old White Sheet Trick* in a different location. How do the results differ?

What To Do Next

Animal Diversity
Attract a Fish
Who goes there?

THE OLD WHITE SHEET TRICK
Action Card #1

Use light to get one type of animal to move where you want it.

THE OLD WHITE SHEET TRICK
Action Card #2

Shine the light through the sheet. How does moving the light around affect the animals? (Move the light slowly.)

THE OLD WHITE SHEET TRICK
Action Card #3

Check the descriptions below that apply to animals that spend most of their time flying around.

-Big	-6-legged
-Small	-4 legged
-Long	-Big eyes
-Short	-Small eyes
-Bright colored	-Big wings
-Plain	-Small wings

THE OLD WHITE SHEET TRICK
Action Card #4

How do the animals act when they are:

a. in the brightest spot?
b. On the sheet, but away from the brightest spot?
c. Captured and released one, two, and three meters away from the lighted sheet?

Off_____

THE OLD WHITE SHETT TRICK
Action Card #5
Place different colors of gel or cellophane over a flashlight and see which colors attract animals.

Color Tried	Attracts	Doesn't Attract

THE OLD WHITE SHEET TRICK
Action Card #6
Do smelly things such as vinegar, onions, sweaty socks, assorted human foods, perfume, etc., attract animals that come to light?

Smelly things	Made-up name of animal

THE OLD WHITE SHEET TRICK
Action Card #7

Change the brightness of your light by masking it with paper or cloth. How does a change in brightness affect the light's ability to attract animals? If the lamp is hot, don't let the mask touch the bulb.

Bright_____
Less Bright_____
Dull _____
Very Dull_____

THE OLD WHITE SHEET TRICK
Action Card #8

Using aluminum foil, make a mask for your light. Poke a small hole in the foil so a small ray of light shines through. Move the ray of light across the sheet and see if you can get an animal to follow the light.

Try other sized holes.

THE OLD WHITE SHEET TRICK
Action Card #9

Of all the animals on the sheet, can you find any that seem to be staying away from other kinds?

Try getting them together to see if they separate again.

THE OLD WHITE SHEET TRICK
Action Card #10

Catch several nighttime animals and keep them in a ventilated container until morning. How do they act when released in the light?

THE OLD WHITE SHEET TRICK
Action Card #11

Use a marking pen to trace the path of a walking animal as it moves around the sheet. Have an animal art contest.

THE OLD WHITE SHEET TRICK
Action Card #12

Turn the light off for the length of time it takes you to count to ten. Then turn it on. What do the animals do?

Try longer and shorter counts to see how long it takes for the animals to go away.