August 2017

Night Hike

Theme:
Walking in the forest at night provides opportunities for learning and exploration of the senses.

Concepts:
1) The low light environment can best be explored by using all senses.
2) Nocturnal animals have specific adaptations allowing them to survive in the dark.
3) Darkness and nocturnal animals are often unappreciated and misunderstood by people.

Outline:

I. Preparation Before Activity (30 min.)

II. Introduction (10 min.)
A. Greeting, Grabbing, and Purpose
B. Names and Introductions
C. Activity Description
D. Behavior Guidelines
E. Task Analysis/Learner Assessment

III. Sensory Observation (20 min.)
A. Feel Your Way Around
   1. Featured Tonight
   2. Night Sensory Trail
   3. Blindfold Hike
B. Don't You See It?
   1. Light and Color
   2. The Brightest Light in the Universe
   3. Lifesavers
C. Natural and Un-natural Sounds
D. Are You "Scent"sible

IV. Individual Exploration (10 min.)
A. Solo Sit
B. Story Telling

V. Nocturnal Animals and Other Creatures (20 min.)
A. Eyes That Glow in the Night
B. Animals of the Night
   1. Owls
   2. Bats
   3. Rattlesnakes
   4. Frogs
C. Adaptation Games
   1. Owl/Prey

2. Bat/Moth
3. Firefly Tag

VI. Star Gazing (20 min.)

A. Using the Planisphere
B. Constellations of the Season
C. Make your own Constellation

VII. Conclusion (10 min.)

VIII. Clean Up (15 min.)

IX. Fact Sheet

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B. Glossary
C. Activity and Safety Management
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Night Hike

I. Preparation Before Activity

Talk to your liaison before leading the night hike; the liaison is an excellent resource that is able to explain activities and discuss the route. If time permits, plan the route ahead of time and hike it during the day to look for potential problem areas (trail intersections, low branches, uneven trails, roots, stumps, etc.) and interesting features along the planned route. If you don't have time for the day hike, there is a suggested route marked on an Eagle Bluff trail map included with the Night Hike kit. Choose and plan your activities from the suggested sections to make your night hike unique. (There are more activities than you will have time to do.) Because you will be stopping often to do activities, a short loop that ends where it begins is usually sufficient. The activity "Featured Tonight" requires a daylight walk to pick features. The leader will also want to have all materials gathered for the chosen activities.

Some of the activities require the use of the flashlight that is provided in the kit. Night hikes where students bring their own flashlights along generally end up being focused on the flashlights either by losing them, arguing about them, or shining them in each other's eyes rather than focusing on the night hike and the planned activities. The leader, however, should have a flashlight in case of emergency. A flashlight is included in the kit and there are directions attached to the Night Hike kit on how to use it. One minute of winding generates up to 30 minutes of light. The flashlight can be used to read the nine activity instruction cards located in the kit.

Because of seasonal daylight variation, some of your Night Hike may be done in daylight. For many of the activities, blindfolding students can simulate total darkness. However, the three sensory observation activities under the heading "Don't You See It?" should be done without blindfolds, and in as dark of conditions as possible. Save these activities until the end of the hike if daylight is an issue.

Here are a few tricks of the trade for leading hikes in the dark:

- Watch the sky. Wide trails have a slot opening in the treetops that can help you along the trail.
- Pay attention to the feel of the trail beneath your feet. Grass, leaves, dirt, twigs, and gravel all have their own feel.
- Appoint a "sweep" person. Pick an adult to be stationed at the back of the group. This person makes sure that no one has dropped behind or gotten lost. This also helps you know when everyone has caught up at a stopping point.
- Trail intersections are good places to stop for activities.

II. Introduction

A. Greeting, Grabbing, and Purpose. Introduce the "Night Fears Brainstorming and Poetry" activity by discussing some common fears about the night and how they might have come to be (i.e. some students may be afraid of the dark because they hear new, strange noises that they weren't aware of during the day). Have the students list one or two words or phrases on the board describing their feelings about the night. Read the words in random order as a poem. You

may have some things like: spooky, scary, quiet, dark, can't see, scurrying creatures, vampires, peaceful, etc.

As an extension at the end of the hike, use all the thoughts and words on the board and have students write a piece of poetry or a short story incorporating all the things on the board.

B. Names and Introductions. Tell the class a little bit about yourself and then go around the group to become familiar with each student. Be creative: learn names all at once or a few at a time. Use a method that suits your style. Explain that you will be teaching the class and that the other adult chaperones may be assisting at times.

C. Activity Description. Explain to the class that they will be going on a hike along the trails at night. There will be times when we stop along the way to do activities that will help us to better understand and appreciate night time, our senses, darkness, and the creatures that are active during the night.

D. Set Behavior Guidelines. Discuss clearly and specifically which behaviors you expect from your students during the class. Explain the need for respect: for you, for each other, for the equipment, and for Eagle Bluff itself. Mention the importance of keeping quiet so all students can hear directions and so that we might hear evidence of some of the nocturnal animals. You might decide on whisper voices through the duration of the hike. Reinforce the idea that in low-light situations, and especially when a student is blindfolded, actions and behaviors that may be appropriate during the day can be dangerous. Instruct students to stop and stay where they are if they become separated from the group. The best way to keep the group together is to have adult chaperones in the front and back of the group and not allow students to be in front of or fall behind the adults.

E. Task Analysis/Learner Assessment. Ask students to list some reasons why they or others might be afraid of hiking in the dark.

III. Sensory Observations

It is common that when one of our senses is diminished or taken away, the other senses are heightened to compensate for the loss. During a night hike, when sight (the sense we rely most heavily on to orient ourselves) is reduced, we must use our other senses to form a frame of mind in which we feel more comfortable. The following activities help students to use all of their senses to explore the nighttime environment and can enhance appreciation of the natural world around them.

A. Feel Your Way Around. Without our sense of sight, we often feel disoriented and have difficulty keeping a bearing of where we are. One way to compensate for the absence of sight is by using our sense of touch. If we can feel something with our hands or beneath our feet, it can be reassuring and provide us with a sense of where we are. Also, using our sense of touch can enhance our appreciation of the natural things around us. By feeling the texture of tree bark or a mossy rock, we can experience these natural objects in a way that is more intimate and insightful than simply looking at the object.

1. **Featured Tonight (10 min.)** Find a strange geological or biological feature (tree bending around another tree, rock, rotting log). Have the students approach it, touch it, and see if they can figure out what it is or why it is as it is. This is a quick activity to get students to realize that they cannot always trust their eyesight, especially at night where they must use as many of the senses as possible for investigating around them.

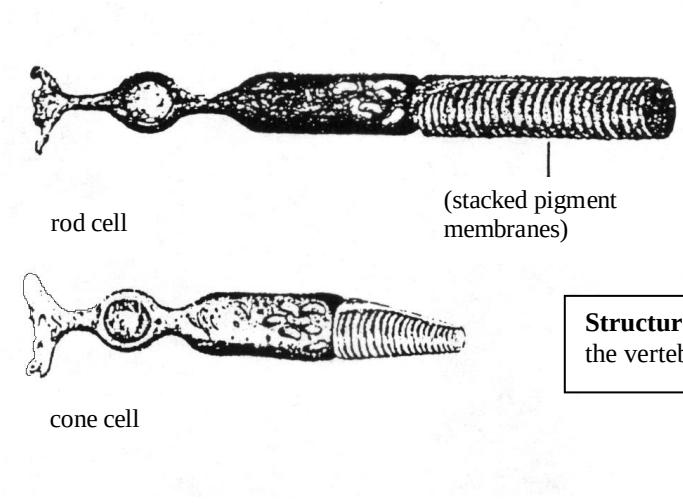
2. **Night Sensory Trail (15-20 min.)** Along the suggested night hike route, (southwest of Discovery Center on night hike map) a length of rope that travels along a tree, across a log on the ground, around a stump, etc. has been set up along the trail. Have students pair off and instruct one student to put on a blindfold. This student will grasp the rope and follow it along its path. The student's partner will follow closely along to prevent the blindfolded student from injury. They need to use their sense of touch to discern where they are and how to get through the course. Rules are posted at the entrance to the trail. Please follow all safety guidelines.

3. **Blindfold Hike (20 min.)** Have the students form pairs; the first student will be blindfolded (to explore and discover things in a new manner) and the other will be the guide (responsible for the safety of the blindfolded person). Lead the group over different types of terrain asking students to guess where they are going. Have them study a tree and tell all they can about it by using all their senses but sight, or ask them which direction they are traveling. Have the students switch roles.

B. Don't You See It? The human eye can see colors remarkably well during the day. Although our night vision is not as good as most nocturnal animals, our eyes are still able to adjust amazingly well to changes in light levels. These activities demonstrate some of the differences in how our vision works in light and dark conditions.

1. **Light and Color (10 min.)** Give each student a small scrap of paper and a crayon from the kit. Have them examine the crayon and determine its color. (Stick to dark, basic colors like blue, orange, red, brown etc. that have the wrappers removed.) Tell them to write their answer on the piece of paper. They will most likely be wrong. Have the students keep their paper for the duration of the hike, but collect the crayons. You can check to see who was right and who wasn't at the end of the hike back at the building. (The guess will be written in the color of the crayon.)

   Explanation: Colors are nearly impossible for humans to see at night. We have two types of cells in our eyes called rods and cones. Rods are light sensitive cells helpful with seeing at night and cones allow for seeing in color. Humans have many more cone (color) cells than rod (night vision) cells; therefore, our color vision is great (during the day) and our night vision is poor. The only other animals that can see colors nearly as well as humans are diurnal (active during the day) birds. How do we know this? Many female birds choose their mates by the bright coloration of the males. Owls on the other hand, have mostly rods in their eyes so their low-light vision is very good.



Structure of Rods and Cones. The photoreceptors of the vertebrate eye.

2. **The Brightest Light in the Universe (5 min.)** Tell the students that they are going to see the brightest light in the universe. Have them stand in a circle and cover one eye - it doesn't matter which one. (Tell them to cover it well so that no matter what, no light will enter that eye.) Students should leave the other eye open. Explain that you are going to light a match (or candle) and you want them to stare at the flame until you blow it out (10 - 15 seconds). Light the match. After you blow it out, have the students open and close each eye, switching from side to side. Ask students to describe any differences between what they can see with the eye that was covered and with the uncovered eye.

   Explanation: Looking with what had been their covered eye; things should appear clearer and brighter. This is due to a chemical called rhodopsin. Our eyes produce this chemical in low-light situations to improve our night vision. In fact, within five minutes of being in the dark, we can see 1000 times better than when we initially went into the dark. When our eyes are exposed to light, all of the rhodopsin we have been producing is instantly destroyed, making our night vision poor again. Our eyes will not be able to produce the rhodopsin again until we are out of the light.

3. **Lifesavers (5 min.)** Have the students form a circle. Pass one (please use only one per student) wintergreen lifesaver to each student. Tell them to put the lifesaver in their mouth and chew with their mouths open. Look in each other's mouths and observe what is happening.

   Explanation: The lifesavers will spark. Why? The following explanation is from Discover Magazine, December 1988: The sparks, which are essentially bolts of lightning in your mouth, have been studied by Linda M. Sweeting, a chemist of Towson State University in Baltimore. Plenty of other substances (most you wouldn't want to put in your mouth) also give off light when they are rubbed, crushed, or broken.

   This is called triboluminescence (try-bo-loom-in-es-cents; 'tribein' means "to rub" in Greek). Some crystals of quartz and mica triboluminesce. So does adhesive tape when torn from certain surfaces. (Have you ever peeled a wrapper off of a Band-Aid in the dark? Try it!)

   When sugar is fractured (in the case of chewed lifesavers), separate patches of charge, either positive or negative, form on the new surfaces or on opposite sides of cracks. The difference in charge compels electrons to leap across the gap, back and forth, and neutralize the patches. When these jumping electrons come in contact with nitrogen in the air (our air is 78% nitrogen), they cause the nitrogen to emit tiny blue-white bolts of light at the same wavelength as natural lightning.

   Sweeting discovered that when candies containing both sugar and wintergreen are crushed, an additional wavelength is emitted. Wintergreen, however, is not triboluminescent. It is fluorescent, like the paint on a black-light poster. It absorbs ultra-violet light and re-emits it as light our eyes can see. When the candies are cracked, some of the light emanating from the sugar is ultra-violet, which gets absorbed by the wintergreen and re-emitted as bright, blue-green light. A more simple way to explain this phenomena is when the sugar crystals break, they release a weak burst of ultra-violet energy. This energy excites the molecules of the wintergreen oil in the lifesavers and causes the oil to glow, or fluoresce. A similar effect can be seen when two pieces of quartz are struck together.

C. Natural and Un-natural Sounds (5 min.) For many animals, keen hearing is essential to their survival. Nocturnal animals, especially, often have a highly developed sense of hearing to help them locate prey or to warn them of approaching predators. In the dark, humans tend also to depend more heavily on sound. We are able to hear many things around us at night that we are not able to see. For example, it is common to hear the hooting of an owl in the woods around Eagle Bluff, but it is a rare treat to actually see one.

1. **Listening Ear (10 min.)** On the side of the trail, along the suggested night hike route, is a parabolic listening ear that allows us to hear even quiet sounds from a far distance (the location is marked on the night hike map.) Allow students to listen through the ear for a short while, one at a time. The rest of the group should be assembled on the trail quietly listening. After identifying sounds, have the students decide whether the sounds are natural (made by animals or plants) or un-natural (made by people). Next, point out sounds the students may have missed. Listen for natural sounds like owls hooting, trees squeaking, wind in trees or grass, water gurgling, ice cracking, falling objects, etc. Some un-natural sounds are radios, cars, people talking, airplanes, etc. Another option is to define boundaries in a safe area that was selected in the daytime and have students determine where the sounds are coming from and follow them.

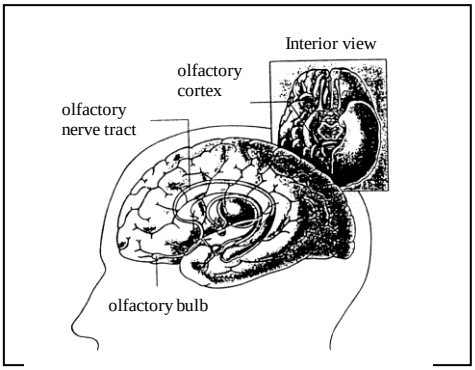
   Explanation: Sound travels more easily through the cool, calm, moist night air. Also, we are more acutely aware of sounds as our attitudes and perceptions change due to the darkness.

D. Are You "Scent"sible? (5 min.) Many animals, especially predators, have developed an acute sense of smell to help them locate prey. Predators that are active during the night such as wolves and coyotes depend heavily on smell to locate food or prey that may be too far away to see. At night, we may be able to recognize the smells of familiar natural features to help give us a sense of where we are. The refreshing smell of pine or the infamous scent of a skunk are just a few of the familiar scents you may encounter on your night hike.

Encourage students to smell the night air and see if they can identify any scents. Be alert for the scent of animals such as skunk or fox musk. Have them find and describe various smells around them such as soil, a rotting log, or different plants.

1. **Scent Containers (10 min.)** Pass around the numbered scent containers in the night hike kit. When all of the students have had a chance to test the scent, have the group share their guesses. An answer card is included with the scent containers.

   Explanation: The following explanation is from National Geographic, September 1986:
   Odors are volatile molecules. They float in the air. When you sniff, they rush through your nostrils, over spongy tissue that warms and humidifies the air, and up two narrow chambers where, just beneath the brain and behind the bridge of the nose, they land on a pair of mucus-bathed patches of skin the size of collar buttons. Here, in a process that's still a mystery, the molecules bind to receptors on tiny hair-like cilia at the ends of the olfactory nerves, or neurons, which fire the message to the brain. The signal crosses a single neural connection, or synapse: at the olfactory bulbs. (Sensations of sight, sound, and touch reach the limbic lobe less directly, across more synapses.) The amount of brain tissue in humans devoted to smell is still very great. Although we don't seem to be very aware of smells, they have a very privileged and intimate access to those parts of the brain where we really live. (Dr. Michael Shipley, a neurobiologist at the University of Cincinnati College of Medicine.) (See appendix E.4.)



The Sense of Smell. The sensory pathway leading from olfactory receptors in the nasal cavity to primary receiving centers in the brain.

Assessment: The low light environment can best be explored by using all senses.

- Listen to student comments as the group first goes out into the dark. Are students afraid? Disoriented? Uncomfortable?
- During sensory activities, does the group rely on senses other than sight to explore and learn about their surroundings?

IV. Individual Exploration

Many times, the most profound and meaningful experiences that we have are due to the time spent alone. We all know the satisfaction of solving a problem or discovering something on our own. In addition, solitude in nature provides a more intimate connection with the environment around us. These activities encourage individual discovery and introspection.

A. Solo Sit. (10-15 min.) Ask a chaperone to wait on the trail for ten minutes. Instruct the chaperone that after they have waited for ten minutes to continue on the trail collecting all the students. Once the chaperone understands the directions have the students follow you. As you walk spread the students along the trail, sitting them alone in a place away from other students. After ten minutes the chaperone will continue on the trail gathering all the students. Count the students to make sure that all everyone has been collected. Once together ask each to share what they saw, heard, and how they felt.

B. Story Telling. (5-20 min.) Story telling is one of our oldest and most sacred human traditions. Be creative. There are many Native American legends dealing with stars, the moon, owls, night, etc. Use props and involve listeners for a more complete sensory experience. People of all ages LOVE stories. Tell a story that you know or share one of the stories included in the appendix. A story can be told along the hike or at the beginning or end. If there is time during the day, select a spot along the route that could serve as a natural theatre or backdrop for the story.

Perhaps you have a favorite story of your own to share or have students make up a story by going around in a circle and allowing each student to add a few sentences as you go. Start the story with an introduction such as …"It was a dark and stormy night…", "It was a long time ago, in a place not unlike this…", or even the famous "Once upon a time…". (If you have students that are very uncomfortable in the dark, you might want to remind students that the night hike is not a time for ghost stories and scaring people.) A few stories are provided in the Appendix. (X. E.)

V. Nocturnal Animals and Other Creatures

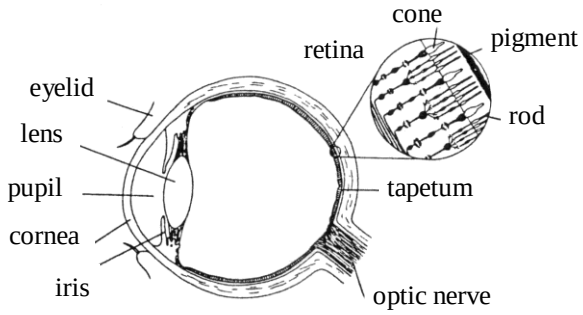
Spending time outside at night can make many people nervous, uncomfortable, or even afraid. This may be due to the fact that humans are not physically adapted to dark environments. Nocturnal animals, however, have developed specific physical and behavioral adaptations that allow them to be successful in the dark.

A. Eyes That Glow in the Night. Throughout the hike, periodically use a flashlight to try and catch the eyeshine of different animals. (Be aware that the use of a flashlight will affect the

night vision of the whole group.) Eyeshine is the ability of the tapetum lucidum (a part of the retina) to reflect light. (See Appendix E.3.) The light is reflected off of the back of the eye and passes back through the retina to increase the eye's efficiency in low-light levels. Eyeshine is stronger in nocturnal hunters than in diurnal ones. The following is a chart of relative eyeshine strengths:

Iris Color	Animal	Color of Eyeshine	Relative Strength
yellow	Screech Owl	red	weak
yellow	Great Horned Owl	red	medium
yellow	Long Eared Owl	slightly red	strong
yellow	Snowy Owl	slightly red	medium
brown	Barred Owl	red	strong
brown	Barn Owl	red	weak
Various	White-tailed Deer	silver-white	strong
Various	Fox	red	medium
Various	Rabbit	red	medium
Various	Cat	red	strong

Cross-section of the mammalian eye. The retina contains the rod and cone photoreceptor cells allowing us to see light and color. The tapetum lucidium reflects light back over the retina to improve night vision. This reflected light is what causes the eyeshine seen in nocturnal animals.



B. Animals of the Night. Nocturnal animals have all developed adaptations that help them to survive in low-light conditions. These adaptations may allow an animal to find prey, avoid a predator, find a mate, or succeed by avoiding competition with an animal that is active during the daytime (ex. owls and hawks).

1. **Owls.** Owls localize sound in an amazing but fairly simple manner. Of all land animals, owls are the best at locating a moving target in three-dimensional space. While a human is as good as an owl at identifying the source of a sound in one plane (e.g. to the right or left while standing on the ground), owls are far better at localizing sounds that come from above or below. This superior ability is based on the asymmetrical positions of the owl's outer ears. A person can tell if the sound comes from the right, left, or straight ahead because a sound from the left strikes the left ear first, and the brain interprets this as direction. Owls can do the same, but can also localize sounds above or below their heads because the left ear is much higher on the head than the right. Sounds from above will thus strike the left ear first while sounds from below will strike the right ear first. The brain compares the difference and interprets the source of the sound as above or below the owl.

2. **Bats.** Some bats employ the technique of echolocation to determine where things are in relation to themselves. They emit a steady stream of approximately ten clicking noises each second called ultrasounds. Bats hear extremely faint echoes of ultrasounds as they return from distant objects. When the bat hears a pattern of echoes from an airborne insect, it increases the ultrasounds to as many as 200 per second. There are only a few milliseconds of silence between clicks, but in that blip of silence the bat's receptors detect the echoes. The signals are sent to the brain where they are processed and decoded. The brain creates a "sound map" that the bat uses to maneuver and capture the insect without even seeing it.

3. **Rattlesnakes.** The rattlesnake and other "pit" snakes use thermoreceptors to help them hunt at night. The thermoreceptors are located in pit areas around the snake's mouth. The receptors are sensitive to the body heat (infrared energy) of its prey, which are much warmer than the night air. They notify the brain, which assesses the signals and determines the location of the prey. The snake can then strike with precise accuracy without even seeing the prey. The same snake, however, may slither past a motionless but edible frog. The frog's skin is cool and blends in with the background colors. The snake does not have receptors to detect it or a neural program responding to it.

4. **Frogs.** Certain species of frogs use sound frequency to communicate with local populations, even in the dark. The ears of the female cricket frog are sensitive only to a very narrow band of frequencies specific to their locality. The calls of the males also vary geographically (similar to different groups of humans having a particular dialect). A female's lack of response to a distant male's "dialect" may be due to a mismatch between her ears and his call. She may be deaf to the frequency of his calls. Thus, the males and females of the same locality are able to locate one another and communicate without disturbance or interference from frogs in a different locality even if they are the same species.

C. Adaptation Games. The adaptations of nocturnal animals are sometimes difficult to understand because they are so different than what we are used to experiencing as humans. Several of the unique strategies used by animals to survive in a dark environment can be modeled through games. These games can provide a break for students who have been quietly experiencing the nighttime world.

1. **Owl / Prey.** Discuss how owls use sound in locating prey. Select a volunteer to be the owl. Blindfold the owl and station the owl by the side of the trail with the flashlight. The other people are mice and will try to sneak past the owl. When they hear a mouse, owls flash their light on the sound. If the "mouse" is hit by the flashlight beam, they have been caught. (You may have to act as the official for any decisions.) This activity can also be done in the daylight with the owl pointing rather than using a flashlight. Discuss how different environmental conditions (rain, wind, snow, etc.) would affect the catch rate. Also, discuss the impact of noises from different ground cover (i.e. dry leaves versus hard-packed trail).

2. **Bat / Moth.** Choose a flat, open area free of obstructions for a playing area. Instruct the students to make a large circle finger tip to finger tip. Select one student to be the bat and one student to be the moth, give them both blindfolds. Bats and moths will have to make some sort of sound (clicking noise, hand clapping, finger snapping). The bat and moth will start inside the circle but away from each other. The bat will make the sound and then the moth returns the sound to simulate the sonar effect. After each sound, the moth can take one step. The bat can move two steps must close in on the moth for the capture. Touching the moth completes the capture.

3. **Firefly Tag.** Choose an open area for play. One player with a flashlight is the firefly and everyone else tries to catch them. The firefly must occasionally reveal its position by flashing the light. Whoever catches the firefly becomes the firefly in the next round.

Assessment: Nocturnal animals have special adaptations allowing them to succeed in the dark.

- Does the group search for any nocturnal animals? Are they especially quiet? Do they search for eyeshine?
- Ask the group to compare and contrast the senses and adaptations of nocturnal and diurnal predators.
- Review the adaptations the students used in the preceding games. Have the class connect the adaptations to the senses they are enhancing or for which they are compensating.

VI. Star Gazing

If the weather and time of year permits, star gazing can be a terrific addition to the Night Hike. If the stars are visible pick a spot to stop along the way free from lights and trees where much of the sky is unobstructed. The field by the Sensory Awareness Trail or the trail intersection by the boot shed are two suggestions.

A. Using the Planisphere. (From the back of the planisphere)

The Planisphere displays the positions of the stars on any day of the year at any time you choose. To use:

1. Rotate the Top Disc to align today's date with the time at which you want to observe. The Planisphere shows the sky as it will then appear.
2. Hold the Planisphere high in front of you. The gold border surrounding the map of the sky represents the horizon. Turn the **entire** Planisphere so that the direction you're facing is now at the bottom of the Planisphere.
3. Compare the map to the sky. The center of the map shows the stars directly overhead. The larger the star's symbol on the map, the brighter it appears in the sky.

Example: Face North. Hold the Planisphere over your head so that the arrow labeled ***North*** is pointing North. Can you find the seven-star pattern called the **Big Dipper (in Ursa Mayor)**? Or try **Cassiopeia**, the five-star pattern that resembles the letter "W"? ***Don't forget***: Between April and October, when Daylight Saving Time is used, Planisphere times are one hour behind your clocks!

The Planisphere also has a chart that predicts the location of the visible planets. Venus, Jupiter, Saturn, and sometimes Mars can be very bright and easily stand out among the stars in the sky.

B. Constellations of the Season. Due to the rotation and revolution of the Earth, the stars seem to change with the seasons. From our perspective the stars seem to rotate around the star Polaris (the North Star). The constellations closest to Polaris can be seen year round and are called the circumpolar (because they circle the pole star, Polaris). Other constellations rise and set with the changing seasons.

Circumpolar constellations
(visible year round):

- Ursa Minor (the Little Dipper)
- Ursa Major (contains the Big Dipper)
- Cepheus – SEE-fee-us
- Cassiopeia – KAS-ee-oh-PEE-ah
- Draco – DRAY-ko

Winter Constellations:

- Orion – oh-RYE-un
- Taurus – TOR-us
- Auriga – oh-RYE-gah
- Gemini – GEM-in-eye
- Canis Major – KAY-niss MAY-jer
- Canis Minor – KAY-niss MY-ner
- Pleiades – PLEE-ah-deez

Spring:

- Leo – LEE-oh
- Bootes – bo-OH-teez
- Corona Borealis – kor-OH-nah bo-ree-ALICE
- Hercules – her-Q-lees

Summer

- Sagittarius – saj-ih-TAIR-ee-us
- Scorpius – SKOR-pee-us
- Cygnus – SIG-nus
- Lyra – LYE-rah
- Aquila – A-quill-ah

Fall

- Pegasus – PEG-uh-sus
- Andromeda – an-DROM-eh-du

C. Find Your Own Constellation. While looking through the sky the imagination can easily pick out other shapes and patterns in the stars. Ask the students to be creative and make their own constellation. Have them give their constellation a name and ask them to come up with their own story to share with the rest of the group.

VI. Conclusion

One of nature's most spectacular daily events takes place as day turns into night. When the sun sinks down below the horizon, the familiar becomes something mysterious. A large number of seemingly strange and unfamiliar animals awaken and begin their preparations for the night's activities of gathering food, hunting, mating, or calling to one another. These nocturnal animals live in a world that may seem frightening or unusual to us, but they are superbly adapted to life in the dark of night. Their bodies and habits are perfectly suited to survival at night.

Human exploration and observation of the nocturnal world can lead to insight and appreciation of nature. However, it can be a challenging task as we find ourselves in a dark and uncomfortable world that we are not used to experiencing. Our sight is diminished and we must use all of our other senses to simply walk, let alone observe the creatures of the night and their habits.

Review the activities in class. Ask the group how they feel about the night and the dark. Did some students' personal feelings change? Encourage students by telling them that it is natural to feel uneasy when you are in an environment that you are not accustomed to. However, understanding the night time and nocturnal animals can open doors to a new world full of wonder, mystery, and enjoyment that most people do not take the time or effort to understand and appreciate.

Assessment: Darkness and nocturnal animals are unappreciated and misunderstood by many people.

- Does the group's comfort level seem to increase as the hike progresses?
- After the last activity, tell the group to search for as many signs of nocturnal animals as they can find. Do the students look in different places than before? Do they listen quietly without moving?

VII. Clean Up

Make sure that all materials taken along on the hike are accounted for and haven't been left on the trail. This may involve walking the trail the next day if anything is missing. Return all the materials to the Night Hike kit. Inform the liaison of any of the supplies that are low (i.e. wintergreen lifesavers, paper squares, matches, etc.) If you've used classroom space, be sure to stack chairs, erase the board, etc.

VIII. Fact Sheet

- Although we cannot hear bat cries, the sound waves produced are not weak. The cries have been measured at 100 decibels (about the same intensity as thunder booming overhead or a freight train rumbling past.)
- Unlike brain neurons, which last a lifetime, olfactory neurons turn over every one or two months.
- How We Hear - Sound waves vibrate the eardrum, then three small inner ear bones, and finally, fluid in the coiled cochlea. Stereocilia on the hair cells of the cochlea move in response to sound, and the hair cells convert this mechanical movement into an electrical signal that crosses a synapse and triggers a sensory neuron. This neuron, in turn, sends a message to the brain that a sound has been received.
- One might suspect that the large eyes are responsible for the owl's hunting prowess (the great gray owl in particular). In fact, the owl's night vision is no better than that of some people with particularly good night vision. A simple experiment disproves the primacy of vision in the owl: If an experimenter ties a dry leaf to a mouse's tail and places the rodent in a dimly lit room with an owl, the rodent will scurry about and the bird will pounce - not on the prey but on the rattling leaf.
- An experimental subject tends to recall the visual details of a given painting with almost 100 percents accuracy, but will forget the details within three months. The same subject will recall a series of odors with only 80 percent accuracy, but the accuracy remains at that level for a year or more. An odor, once remembered is rarely forgotten!
- Different senses and different behaviors can be localized to specific regions or groups of regions in the brain. The human brain is the most intricately organized entity in the universe, and it is this structural organization that allows the brain to work.
- Sense organs contain bare nerve cell endings modified in ways that increase their sensitivity to one physical aspect of the environment.
- Sensory Reception and the Brain - Some brain regions that play key roles in memory include sensory reception areas. Sensory input is processed by the cerebral cortex and sent to parts of the limbic system and the forebrain. The limbic system, or "emotional brain," includes regions called the thalamus, hypothalamus, amygdala, and hippocampus.
- Rods and Cones are the photoreceptors of the vertebrate eye
- Sense of Smell can be defined as the sensory pathway leading from olfactory receptors in the nasal cavity to primary receiving centers in the brain.

IX. Appendix

A. Equipment

- Dynamo flashlight
- Blindfolds (10) in bag
- Eagle Bluff trail map (with suggested route)
- Scent containers (4) in bag
- Planisphere
- Activity Instruction Cards (9)
- Plastic box containing:
  - Crayons (at least 25; various colors)
  - Lifesavers (2 rolls of 14)
  - Paper squares (at least 25)
  - 1 Candle
  - 2 Matchbooks

Also in Tub:

- Folder with paper squares
- Lesson plans (5)

B. Glossary

Cones: light receiving cells found in mammalian eyes that respond to bright light and contribute to sharp daytime vision and color reception.
Diurnal: relating to the daytime, referring to animals that are active during the daytime.
Echolocation: process of sending out signals and receiving their echoes to determine the location of an object.
Electrons: very light particle associated with the charge of negative electricity, a part of an atom.
Eyeshine: the ability of an animal's eyes to reflect light frequency (the number of vibrations or cycles in a unit of time).
Olfactory: of, pertinent to, or connected with the sense of smell.
Neuron: nerve cell with all of its processes, basic unit of communication in the nervous system.
Nocturnal: relating to the night time, referring to animals that are active at night.
Retina: sensitive membrane of the eye that receives the image formed by the lens and is connected with the brain by the optic nerve.
Rhodopsin: chemical created in the eye to increase the clarity of night vision.
Rods: long rod-shaped sensory bodies in the retina, sensitive to faint light and responds to coarse reception of movements (by detecting changes in light intensity across the field of vision).
Synapse: the point at which a nervous impulse passes from one neuron to another.
Tapetum lucidum: clear membranous layer found at the back of the eye that reflects light back over the retina to improve night vision (responsible for the reflection of light that we see as eyeshine)
Thermoreceptors: sensory cell that can detect radiant energy associated with temperature.
Triboluminescense: luminescence resulting from friction.
Ultrasounds: sounds emitted by bats, higher frequency than humans can hear.

C. Activity and Safety Management. Check students for proper clothing before leaving for the hike. Bring at least two bottles of water. Check the Dynamo flashlight before class. Set clear and concise boundaries. Encourage students to remain within sight of you while exploring. Choose a route within your group's abilities. Have adults in the front and back of the group. Instruct students to stay where they are if they become lost and to call out so that people can follow the sound. Periodically count the number of students to make sure that all are present. Emphasize the need for safety precautions due to the dark. If students are blindfolded there should always be someone assigned to keep the person away from danger. Keep track of equipment you are using during the hike and make sure that it is returned to the liaison when you are finished.

D. References/Resources

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