Snakes

SDH 2017

OVERVIEW:
Snakes are an important part of the ecosystem, and an integral part of biodiversity. Students will learn about snake adaptations and the importance of biodiversity.

OBJECTIVES:
Students will be able to:
- Describe snake adaptations
- Summarize the interdependence between snakes and other organisms in the ecosystem
- List the major parts of snakes.
- Demonstrate the proper techniques for touching snakes

VOCABULARY:

Adaptation	Constrictor	Ectothermic	Endothermic
Infrared vision	Jacobson's Organ	Low frequency hearing	Poisonous
Reptile	Scales	Shedding	Venomous

NEXT GENERATION SCIENCE STANDARDS:
- Organization for Matter and energy flow in organisms (LS1.C) : Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. *(secondary to 5-PS3-1)*
- Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. (MS-LS1-4)
- Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. (MS-LS1-5)

MATERIALS:
Optional: one small, calm snake (to be held while speaking)
Ruler/Cardboard with playing cards taped overlapping to simulate roof shingle-style arrangement of scales
Sock with eyeball and mouth drawn on the side to simulate shed
One complete snake shed

PROCEDURES
1. Introduction:
   A. Seat students in cabin circles throughout the dining hall, direct them to be able to see the presenter's seat.
   B. Outline the evening for the group: tell them that they are going to hear a short presentation about snakes, and then get the option to handle some of our High Trails snakes.
   C. Define **adaptation**. Explain there are adaptations of a snake that makes it a **reptile**.
2. Characteristics of a Reptile
   A. Backbone-snakes can have 300-500 vertebrae, many more than the 24 in human adults.
   B. **Scales**-made of keratin, the same protein as your fingernails. Scales protect the organs inside their bodies and help conserve water by limiting evaporation.
      i. **Demonstration: Scale Orientation** Show playing cards attached to a thin, long piece of plastic (ruler works great). Demonstrate how scales are like roof shingles: all are positioned in the same direction and are connected by a soft flexible tissue that can expand easily when the snake eats large prey.
      ii. Debrief**:** What could happen if snake scales are rubbed the wrong way? Why is it important to pet a snake from head to tail?
   C. As snakes grow, their outer scale layer does not, so they shed about once a month.

i. **Demonstration: Snake Shedding** Put a sock on one hand. Describe how snakes crawl out of their skin, through a split near the nose. Pull sock off inside out, as though your arm and hand is a fresh layer of skin being revealed. Hold up the sock next to an example of a real snake shed.

D. Reproduction- Snakes Reproduce (the 'R' in FWARPS) by laying eggs

E. Temperature Regulation- Explain how reptiles regulate their body temperature. Snakes are **ectothermic,** meaning they cannot maintain a constant temperature without the help of their environment.
   i. For example: They are more active when it is warm and less active when they are cold. You might find snakes sunning themselves on a rock to warm up or hiding underneath a log on a hot summer afternoon to stay cool.
   ii. Our snakes at High Trails have heaters in their cages to keep them active and healthy, even through our cold winters.

3. Snake Survival
   A. Snakes eat much less often than humans since they do not need constant energy for temperature regulation. In fact, we only feed our snakes about once every other week.
      i. **Constrictors**: All of our snakes at High Trails hide and wait patiently to ambush prey. They quickly strike the prey animal, then they coil around it and squeeze until it suffocates.
      ii. **Venomous** snakes: Other snakes inject venom into prey with fangs, like the rattlesnakes found throughout Southern California.
      iii. Venomous vs. **poisonous**. Poison can touch your skin, like poison oak, or be ingested (eaten) like when a rat eats rat poison. Venomous snakes, must inject directly into an animal to take effect.
   B. Snakes will swallow food whole. A prey animal can be three times the size of a snake's head. For humans, that would be like eating a watermelon whole. Snakes can unhinge their jaw on the upper sides and front middle. With small, backward facing teeth and muscle convulsions, the snake slowly pulls the prey animal into its body for digestion. When you look at our Chinese Water snake skeleton, look for where it disartiulates on the bottom jaw right up front.
4. Snakes Senses
   A. Smelling: Humans use vision more than any other sense, but snakes choose a direction to hunt by *tasting.* They taste smells in the air using a forked tongue and **Jacobson's organ**. That organ, located in the throat, interprets smells and tells the snake what prey animals are around. The forked tongue can even tell which direction the prey has gone. Snakes do not use their tongue for tasting, in fact they have no sense of taste!
   B. Vision: Some snakes see clearly and with depth perception, others have blurry vision. Some snakes have heat receptors located near their eyes. This **infra-red vision** can sense differences in temperature and can "see" **endothermic** (warm-blooded) animals, like mice, rabbits, birds, etc.
   C. Hearing: Snakes' ears differ from mammals, too. Snakes have no external ears, but instead sense or "hear" vibrations in the ground as sound. A snake sets its jaw bone on the ground to feel vibrations generated by animals walking nearby. This **low frequency hearing** helps to catch prey and to escape predators.
      i. **Demonstration: Sensing Vibrations** Ask students to put their hands over their chest and close their eyes. Tell them their hands are like the lower jaw of of a snake. Have them hum or sing "lalala" and feel the vibrations resonating through their chest cavity.
5. *Experiment: Snake Pass*
   A. This is now the time for you to excuse instructors to get snakes while you continue with the snake pass discussion.
   B. Discuss proper touching techniques
      i. Touch from head to tail
      ii. Be gentle, avoid squeezing snakes
      iii. Avoid the head, keep the part that could bite away from small fingers
      iv. One student at a time touches any snake
   C. Discuss proper behavior
      i. Camera flashes must be turned off and covered
      ii. Voices should be kept low
      iii. Bottoms must remain on the ground
      iv. If students feel frightened, ask them to the tell instructor, rather than cause a scene.

6. Class Wrap Up
   A. Ask students to raise their hands if they touched a snake for the first time. Ask them, “Why it is important to build an appreciation for snakes?” Ask, “What role do snakes play in the ecosystem?”
   B. Talk about disease control through rodent management. Make sure all students’ hands are sprayed to prevent the spread of salmonella bacteria, and dismiss them to cabin instructors.
7. Dismissal
   A. Students will be dismissed by cabin, one cabin at a time by the snakes instructor.
   B. Once cabins have been called the students will stand up and immediately meet cabin instructor outside by the tree.
   C. Students will keep their jackets and sit on them during the class**.**

THINGS TO THINK ABOUT:

Special Needs: Some students will be frightened of the snakes and maybe react unsuitably. Remind students to remain calm, and try to alleviate any fears students may have of venomous snakes, snakes that bite, etc. Other students may find snakes disgusting, thinking them slimy and gross. Have another student describe to them how the snake feels, soft, warm, smooth, compare snake texture to that of a basketball: something most students have felt before.

Time Fillers: Fish for students’ background knowledge on snakes.

Weather: Not a problem as Snakes Class takes place inside.

Snakes Lecture (10 Minutes or Less)

1. Introduction:
   A. **Adaptation**
   B. **Reptile**
2. Characteristics of a Reptile
   A. Backbone
   B. **Scales**
      i. Demonstration: Scale Orientation
      ii. Debrief: What could happen if snake scales are rubbed the wrong way? Why is it important to pet a snake from head to tail?
   C. Shedding
      i. Demonstration: Snake Shedding
      ii. Debrief: How can you tell if a snake is ready to shed? How do snakes shed? Let students know they will get to hold a snake skin later.
   D. Reproduction
   E. Temperature Regulation- **ectothermic**
3. Snake Survival
   A. Frequency of eating
      i. **Constrictors**
      ii. **Venomous** snakes
      iii. Venomous vs. **poisonous**
   B. Swallowing prey
4. Snakes Senses
   A. Smelling: **Jacobson's organ**.
   B. Vision: **infra-red vision** sees **endothermic** animals.
   C. Hearing: **low frequency hearing**
      i. Demonstration: Sensing Vibrations (Cue instructors to begin retrieving snakes).
      ii. Debrief: Can they feel the vibrations from their voice? How can they best behave to keep from disturbing snakes during the snake pass?
5. Experiment: Snake Pass
   A. 4 proper touching techniques
      i. Touch from head to tail
      ii. Be gentle, avoid squeezing snakes
      iii. Avoid the head, keep the part that could bite away from small fingers
      iv. One student at a time touches any snake
   B. 4 behavior expectations
      i. Camera flashes must be turned off and covered
      ii. Voices should be kept low
      iii. Bottoms must remain on the ground
      iv. If students feel frightened, ask them to the tell instructor, rather than cause a scene.
6. Class Wrap Up
   A. Ask students to raise their hands if they held a snake for the first time. Ask them, "Why it is important to build an appreciation for snakes?" Ask, "What role do snakes play in the ecosystem?"
   B. Talk about disease control through rodent management. Make sure all students' hands are sprayed to prevent the spread of salmonella bacteria (from what the snakes eat), and dismiss them to cabin instructors.