SNAKES

GENERAL DESCRIPTION:
Like all reptiles, snakes have scales made of keratin, that shed; develop within an egg either inside or outside the female; have internal fertilization; breathe with lungs; and have variable body temperatures.

The term cold-blooded is not a correct adjective to describe a snake. Snakes have no internal means to regulate their body temperature. This kind of physiology is called poikilothermic and not cold-blooded. Seven minutes in the hot desert sun will kill them as well as ice or snow will freeze them to death.

MODERN SNAKES VERSUS OLD WORLD SNAKES:
Most modern shakes live as surface creatures in the cover of grass, brush or under stones and logs. Some snakes (like the shovel-nosed snake) are part-time burrowers in sand or loose dirt. Other (the blind snakes particularly) spend almost all their lives as burrowers or dwellers in crevices and cracks.

Modern snake species tend to have no vestige of limbs. No shoulder or hip girdles and no remnants of legs. However, there are a few exceptions such as the snakes with vestigial limbs, some of which actually protrude from the body as tiny spurs as seen in members of the Boidae family.

GENERAL SNAKE ANATOMY:
The body inside is supported by stationary ribs. Nearly every individual vertebra along the snake's spinal column bears a set of ribs, including some near the tail that actually are fused to the vertebra itself. A snake has from 175 to more than 400 vertebrae in its backbone.

The epidermis, or outer layer, is formed of keratin. This is the same material that forms nails, claws, and hair in mammals as well as claws and beaks in birds. It provides the snake with the extraordinarily tough covering that it needs to protect its internal organs and to reduce friction as it moves over rough ground. Parts of this keratin covering are thicker in some places than others. It is folded back to make the snake's scales. This keratin covering is why a snake is dry and not slimy like most amphibians.

WHAT DO SNAKES EAT ?
Snakes eat a variety of animals. Some will eat rodents of almost any type, rabbits, lizards, eggs, and even other snakes. At Liberty Wildlife, like the birds, our snakes are fed mice or rats which are already dead. This helps discourage the strike instinct and prevents injury by aggressive rodents.

HOW DOES A SNAKE KILL ITS PREY ?
Non-venomous snakes may simply grasp their prey and swallow it alive. This is known as grab and swallow predation. A good example of this technique is the garter snake with a frog.

Non-venomous snakes also may be classified as constrictors, which is not to be confused with the constrictor species. The process of constriction entails the throwing of two or three loops around the prey to kill or immobilize it by constriction. As the prey exhales, the snake tightens its grip so that oxygen intake becomes less and less. Finally, the prey expires due to the lack of oxygen.

Venomous snakes strike at the prey. Fangs are embedded into the prey allowing venom to be injected. The snake then withdraws as it waits until the prey drops dead.

HOW IS THE PREY EATEN ?

Whatever the snake's method of killing, all snakes approach the actual feeding process the same way. They swallow their pretty whole. The snake will normally approach its food so that it can be swallowed head first. The Quadrate bone connects the lower jaw loosely to the skull (like a double-jointed hinge), so the snake can widely open its mouth. Also, the lower jaw is not solid bone but is connected in front by an elastic ligament that allows the sides of the jaw to stretch apart. Sharp, recurved teeth hold the prey while one side of the haw moves forward and then the other side. During this process, the snake releases enzymes in its mouth that begin the digestive process even as the food is being swallowed.

Once the food has passed through the mouth, the eating process is continued by a process of alternate muscular contractions and relaxation which forces the food through the esophagus into the stomach.

To permit breathing while swallowing large prey, snakes extend the glottis (a tube-like structure) beyond the lower jaw to suck in air.

MOVEMENT:

Snakes move by the following four methods:

1. *Rectilinear or Caterpillar or Belly Scale Crawl:* This movement consists of sliding on the skin. The snake inches forward along the ground in a straight-line manner. The ventricle scales (scutes) are used as feet. A muscular ripple moves from head to tail, along the belly. Each scute is moved forward slightly and pressed firmly against the earth. The scute then appears to move back as the snake's bulk moves ahead over it. Large, heavy snakes often use this method.
2. *Serpentine:* This is a movement in which the snake moves forward in a series of side-to-side undulations as in a string of S's. This most common method requires a surface that is irregular, such as rock, sticks, ridges of earth, etc. The snake needs to press its sides against these irregularities to push itself forward.
3. Concertina: The snake acts like an accordion. The greater part of its length is compressed into flattened, ground-hugging loops from which the snake's head and upper portion of the body are thrust forward. The ventral scutes then grip the ground as the body is compressed again for a new thrust forward. The snake requires a rough surface with something to thrust back against it when it springs forward.
4. *Sidewinding:* The sidewinder moves forward by throwing a loop of its body forward and then bulling itself upon it. The snake gets leverage by pressing the head and neck down against the sand as the body loop is thrown forward. Then the snake straightens out and presses its body against the ground. The snake throws its head and neck forward and sideways to start the next thrust. The head-neck combination and the body loop are in effect the two feet upon which the snakes walks.

ALL SNAKES CAN MOVE BACKWARD USING SORT OF A REVERSE CONCERTINA AND ALL SNAKES ARE VERY GOOD SWIMMERS. Most snakes may use a combination of movement types depending on the terrain involved.

SHEDDING OR MOLTING OF THE SKIN:

A snake will molt or shed its skin depending on diet and environment. This is a result of the snake growing and not a seasonal shedding process)as with dogs and cats). Snakes in captivity will shed more often than wild snakes, since their diet and environment is consistent.

HOW CAN YOU TELL IF A SNAKE IS BEGINNING TO SHED ?

Watch for the following shedding signs when checking the snake before or during a show:

1. The eyes, under normal circumstances appear clear and bright. Watch for the eyes to have a milky or white ring appearance. The shedding process starts at the head first as the skin breaks away from the eyes.
2. Watch for the skin to appear dull or broken scales.
3. A snake that is going to shed is many times found lying in its water dish.

The shedding period will last several days. DURING THIS TIME, DO NOT HANDLE THE SNAKE. After the shedding process, the snake's skin will appear with its most brilliant coloration.

BEHAVIOR:

As temperatures become colder, the snake will become less active. The opposite happens when the temperatures become warmer, unless the degrees are too high, where the snake must conserve energy, finding a cool shade as relief from extreme heat.

Snakes are normally cautious and defensive. Very often they will flee from an unpleasant confrontation. However, if they feel they are being threatened, they will act aggressively and appropriately use self-defense adaptations.

SEXES:

A snake's sexual organs are carried internally. Although it is very easy for snakes to identify each other as male or female, we humans must resort to surgical sexing.

The process of surgical sexing involves a veterinarian making a small incision in the location of the ventral scale. A microscope is then used to examine the sex of the snake.

REPRODUCTION:

Fertilization in snakes normally takes place in spring or early summer just before eggs mature with the female's body. Mating takes place while intertwined. The vents are pressed together and internal fertilization takes place. The process may be very short or several hours long with courtship. Many snakes are oviparous meaning after fertilization they lay eggs that subsequently hatch. Other snakes are ovoviviparous, where after fertilization the eggs remain inside the female's body until they hatch. The young are born alive.

The oviparous snakes lay their eggs (generally 7 to 10) in the sand, humus, moist earth or rotting logs. This depends on the habitat of the species. The eggs are always laid in material that will provide warmth from exposure to the sun or from internal heat generation and will also ensure sufficient moisture to keep the eggshell pliable.

A few species of snakes (such as Garter) are viviparous. The young are connected to the mother by primitive placenta which provides nourishment to the developing young before they are born alive.

GROWTH CYCLE:

The growth of a snake depends totally on how much food it has consumed. It will not automatically grow to be a certain length or thickness. There are normal ranges the average snake will obtain; however, its food consumption directly affects its growth.

PIT VIPERS (EXTRA SENSES):

Pit vipers (found in rattlesnakes and their relatives) have all the sense organs of other snakes as well as additional aids of this particular use in the hunt for pretty. These pits are special heat receptors which are located on either side of the head between the nostrils and the eyes. The pits look like an extra pair of nostrils. All snakes have the ability to sense warmth for the snakes have "touch" receptors and "heat" receptors scattered over the surface of their skin. The pit is made of two separate cavities.

The larger one lies on the snake's nose just behind and generally below the level of the nostril and opens forward. Behind this larger cavity is a smaller one. The two cavities are connected, internally extraordinarily sensitive to warmth that pit vipers can detect minute differences in temperature between the air in the front cavity and the air in the rear cavity. The forward-pointing pits on either side of its face produce overlapping fields, thus the pit viper can sense an object whose temperature differs from its surrounding and accurately judge the distance between itself and the object. The heat-sensing ability of a pit viper is so great that it can react to differences of temperature as small as one-fifth of a degree centigrade. Blindfolded, the snake will still strike with uncanny accuracy at warm-blooded prey.

Pythons and boas, including the Rosy Boa of the American West have the same kind of organs in pits among their labial scales.

REGURGITATION AND DEFECATION:

Handling notes: Snakes have a tendency to regurgitate and/or defecate if they are handled a day or two after they have eaten. This could alarm the public as well as become awkward for the volunteer. If you note any of these symptoms while handling your snake, place it back into its container for observation. If a snake is about to regurgitate or defecate it will: * tense up, * it will tremble many times.

If the snake does regurgitate or defecate while you are holding the snake, DO NOT PANIC ! Reassure the public of what is happening and that the snake is neither getting ready to strike (in case of regurgitation) or is sick (in both cases). If the snake has regurgitated, replace it into its container and return it to the animal room. Inform whoever is in charge, either verbally or by a note, and made notation on cage. As for defecation, simply clean up with paper towels.

SENSES:

VISION: Most snakes have lidless eyes which are protected only by the spectacles of the outer skin. Snakes have a lack of "fovea," the special region of the retina just in front of the optic nerve that allows the eye to see sharp images. Only a few snakes like the tree snakes for example have this fovea. Snake's eyes are located on either side of the head. This makes it impossible for them to judge distances in the manner of animals with binocular vision. Some snakes like the racers have vision through triangulation. This is a moving of the head from side to side as they focus on an object. It has been hypothesized that some animals including some snakes have grooves or lines from eye to nostril that allows accurate sighting of fast-moving prey.

HEARING:

Snakes have no outer or middle ear. What they have is an inner ear. Two separate and wholly independent systems receive both airborne and earthborne sound frequencies. One of these systems, the Somatic, involves transmission of frequencies through ventral skin receptors via the spinal cord. The other system through the snake's attenuated lung to the 8th cranial nerve and then to the inner ear. A snake's sensitivity to vibration is extremely high. In a quiet room, a snake can hear a person speaking with a soft voice from a distance of about 10 feet.

SMELL:

The Jacobson's organ is located in the roof of the snake's mouth and is composed of two cavities lined with the same kind of cells that line the sensing part of the nose. The flickering tongue picks up small samples from water, earth, and air. As the tongue is withdrawn into the mouth, the forked tip of the tongue is pressed into the cavities of the Jacobson's organ. The organ then analyzes the smells and tastes of the particles the tongue has picked up.