

Envenomators
The Venomous Snakes
of North America



Exhibit Inventory & Text

Envenomators: The Venomous Snakes of North America

Exhibit Inventory & Text

<u>Item</u>	<u>Size</u>
1. Simulated Stone Entrance Walls	2@ 3'x10'
2. Snakes in Mythology	3'x5'
3. Snakes as Food Diorama	3'x7'
4. Snake Charming Diorama	3'x7'
5. Snakes in Religion Diorama	3'x7'
6. Man and Snakes Today (video display)	3'x7'
7. Rock Arroyo Walk-Over-Bridge	7'x18'
8. Cottonmouth Habitat	3'x7'
9. Coral Sake Habitat	3'x7'
10. Copperhead Habitat	3'x7'
11. Rattlesnake Habitat	3'x7'
12. Coral Snake vs. Milk Snake Cabinet	3'x5'
13. Variations Cabinet	3'x7'
14. Canyon & Winter Den Walk thru	12'x12'
15. Rattle Model Cabinet	3'x7'
16. How fast are you? Display	3'x5'
17. Rattlesnake Skull Model Cabinet	3'x7'
18. Infrared Vision Display	4'x4'
19. Anatomy from Inside (crawl thru)	8'x28'
20. Snakebite Cabinet	3'x5'
21. Prevention & Treatment Cabinet	3'x5'
22. Milking and Antivenin Cabinet	3'x5'
23. Benefits of Snake Cabinet	3'x5'
24. Itch-A-Snake Activity	3'x3'
25. Misc. equipment/props	
Misc. rocks	2'/4'
Cave dividers	3@ 'x12'

* There are no live snakes included in this inventory

Section one: Snakes in World Mythology

(1) Simulated Stone Entrance Walls

An entrance of simulated cave walls and ancient ruins with displays depicting many of the worldwide icons and motifs related to snakes. Included in this component are pictographs and pictographs from several continents, as well as base reliefs and carved sculpture. Photos and graphics illustrate the wide variety and longevity of man's relationship with snakes.

(2) Snakes in Mythology Cabinet

Visitors then encounter a cabinet with a reproduction of these symbols and a push button. When the button is pushed a light illuminated on the vertical display panel showing the myth behind the symbol, another light glows in the map showing the country of origin. Listed below are the myths displayed on this panel.

Legends of Creation & Destruction

Worldwide

The Orobouros, the image of a serpent eating its own tails a universal symbol of immortality and renewal—believed to have originated in the snake's ability to shed its own skin.

Australia

The aborigines believe that the world was created by a huge supernatural snake named Kurrichalpongo, from whose eggs the mountains, trees and animals were born.

Scandinavia

An enemy of the Norse thunder god Thor, the Midgard Serpent lived in the sea. The mythology tells of Thor finally slaying the serpent at the end of the world, but losing his own life in the battle.

Forces of Evil

Judeo-Christian Tradition

The snake is portrayed as a tempter, or Satan, who tricked Adam and Eve into eating the forbidden fruit from the Tree of Knowledge of Good and Evil thereby committing the original sin and causing mankind's exile from Paradise.

Symbols of Power and Divinity

Africa/Haiti

Damballah-wedo, originally an all-powerful python-god of West Africa, was brought to Haiti by slaves and became part of the Voodoo religion. This sacred serpent is said to inhabit worshippers during ceremony, causing a "loa" state of religious frenzy.

India

The Nagas, and their wives the Naginis, of Hindu legend were serpent gods which inhabited underground palaces filled with treasure. These gods had both good and evil qualities, and were also believed to control the weather.

Egypt

Ejo, a cobra goddess, served as protector of the Nile Delta and guardian of the Pharaohs. The appearance of the cobra in the Pharaohs crown symbolized the power and divinity of Egypt's monarchs.

Mexico

The feathered serpent-god Quetzalcoatl, a combination of bird and snake, represented the totality of heaven and earth. Though often seen as a symbol of life and civilization, the god personified forces of nature and could cause evil as well as good.

Rome

In a story shared with Greek mythology, the god Mercury separated two battling snakes with his staff, around which the reconciled snakes entwined themselves. This symbol of peace, known as a caduceus, later became the symbol of the medical profession.

Section Two: Man and Snakes

WonderWorks has created three diorama cabinets with manikins that depict another of mans relationship to snakes. We chose to show an Aboriginal using snake as food, the North American Hopi Indian using snakes in religious ceremony and an Eastern Indian snake-charmer for economic gain.

(3) Snakes as Food Diorama

Snakes as Food (Aboriginal Manikin)

Snakes are eaten today in most parts of the world by certain peoples. Science smaller snakes yield very little meat; the most popular species are large constrictors, such as the python and boa constrictor.

In a ceremony designed to increase the number of edible snakes, tribesmen are decorated as divine serpents giving them power over ordinary snakes. (Photo, Aboriginal men painted to form a continuous snake pattern on their upper bodies.)

Snakes for Supper

Japan: sea snakes, vipers

China: Indian & reticulated pythons, cobras and vipers

Australia: all non-poisonous snakes

West Africa: rock python

Hong Kong: krait, rat snake, cobra, Indian python, vipers

Thailand: cobra, pythons, vipers, non-poisonous snakes

North America: rattlesnake

Some Snake Recipes

Snake are eaten for both nutritional and medicinal purposes. There is a primitive belief, still existing in some cultures that eating the flesh of an animal allows the eater to take on the animals abilities.

Australia

Roll one python, up to ten feet in length, into a coil and wrap in clay. Slowly bake clay-wrapped snake in an open fire until flesh is moist and tender.

kin one large rattlesnake (3 to 5 pounds live weight) and cut into 3" to 4" segments. Roll segments in a mixture of flour, cornmeal, milk and egg. Salt and pepper to taste. Deep fry in hot oil. Serve hot. (Close up photo of the Western Diamondback Rattlesnake.)

(4) Snake Charming Diorama

Snake Charming in the Far East (Indian Snake Charmer Manikin)

Though it has roots in magic and religion, today's snake charmers in the Far East carry on their trade mostly to entertain and make a living.

Burmese women pass the secrets of snake charming down through their families for generations. The ritual is begun by injecting the charmer with a small amount of cobra venom, and climaxes with the charmer kissing the serpent on the head. (Photo: Burmese woman kissing a cobra.)

In a village in India, the cobra is celebrated annually with a parade and gathering. Many cobras are collected and brought into the village to be honored. Afterwards, the snake are returned to the exact locations where they were captured. (Photo: Indian street scene).

Secrets of Snake Charming

Since snakes cannot be trained, snake charmers must have a great understanding of the animal's behavior and physiology. Most charmers treat their snakes liked beloved pets, because the animals represent their livelihood. (Photo: Indian snake charmer with cobra.)

Snakes cannot be "charmed" by the music of a snake charmer, because they are deaf. They respond, not to the music, but the motions of the charmer's swaying body, hands and flute. (Photo: Cobra in the grass.)

It is widely believed that many charmers remove the fangs or milk the venom from their snakes prior to performances. While this may be true in some cases, there is much evidence that some charmers' snakes can still deliver a deadly bite.

(5) Snakes in Religion Diorama

The Hopi Snake Dance (North American Hopi Indian Manikins)

The purpose of this elaborate Indian ritual is to bring rain and a bountiful harvest, with the belief that snakes will carry pueblo's prayers for rain back to the gods.

Performed in northern Arizona, the Hopi snake dance comes at the end of a nine-day cycle of ceremonies which takes place in late August. On the third day of the cycle, tribesmen go out and collect 15-60 snakes, including the Hopi rattlesnake (*Crotalus virridis nuntius*). Several days of preparation follow, during which the snakes are ceremonially washed. The snake dance is performed on the ninth and final day of the cycle.

Dancing in groups, one dancer in each group takes a snake and holds it between his lips. Once all of the snakes have "danced", they are placed in a circle drawn with corn flour, sprinkled with white

cornmeal, carried out to designated spots and released to perform their function as messengers to the rain gods of the underworld. (Photo: Hopi snake dance at the Pueblo, circa 1920's)

Snake Handlers of the Southeastern U.S.

Another modern-day ritual involving live snakes takes place in the Southeastern U.S. where fundamentalist Christian groups handle venomous serpents in a religious frenzy, believing their faith in God will protect them from harm.

The practice dates back in 1909, when a Tennessee evangelist named George Went Hensley considered this text from the Bible: "And these signs shall follow them that believe; In my name they shall cast out devils; they shall speak with new tongues; They shall take up serpents; and if they drink and deadly thing, it shall not hurt them" (Mark 26:17-18). Hensley caught a large timber rattlesnake, and began to use it in spreading his message of faith.

Although evangelical snake-handling continues to this day in some areas, Hensley died in 1955, at the age of 70, from rattlesnake poisoning after refusing medical attention. (Photo: Follower with a snake wrapped over his head.)

Article from the AP dated Thursday, January 19, 1995

Bitten Worshipper dies, Enigma, GA – A man died after being bitten by a rattlesnake, which he had taken to church because the Bible says believers "shall take up serpent."

Dewey Bruce Hale, 40, was bitten during Sunday services at New River Free Holiness Church and died at home late that night, the sheriff's office said. The death was ruled accidental.

"The Sheriff's Department was not called by family or church," said Sheriff Jerry Brodon. "Nothing was reported. If he had gone to the hospital, it would've been different."

Martha Hale, a cousin of the victim said church members take the Bible literally, particularly a passage in Mark saying that one sign of those who believe in Jesus is that "they shall take up serpents."

"Many have been bitten and were healed at the church," she said. "They feel he didn't die because of the snake, but that he died because it was his time to do."

(6) Man & Snake Today Cabinet/Video

This cabinet contains a five-minute video display expanding on the relationship of man and snakes in our current time.

A Snake Glossary

Venom: the poisonous fluid secreted by certain snakes, usually delivered by biting

Envenomation: to inject venom

Evenomator: any snake capable of injecting venom

Herpetology: the study of snakes

Ophidiophobia: fear of snakes

Viper: any of the various poisonous snakes

Loreal pit: the distinctive facial pit located below and behind the nostril of pit vipers, actually a temperature-sensing organ that helps the snake locate a prey

Popular Myths About Snakes and the Truth

Myth: Venomous snakes like to bite people

Truth: No snake “likes” to bite, unless it is capturing prey. A venomous snake will only bite a human if caught by surprise, or in self defense.

Myth: Snakes are slimy to the touch.

Truth: A snake’s skin is very dry and clean. Even after being in the water, they dry off very quickly.

Myth: You can tell a venomous snake by its cat-like slitted pupils and triangular-shaped head.

Truth: There are many harmless snakes who share these properties with venomous ones; and the coral snake, which produces a potent venom, has round pupils and a bullet-shaped head.

Myth: Snakes can sting you with their tongue.

Truth: Snakes do not “sting”, they can only bite. The snake’s tongue actually aids in their sense of smell.

Section Three: Snake Identification & Habits

In this section WonderWorks has recreated typical habitats of the four venomous snakes of North America. On each cabinet the visitor is given specific information about each species. Other features in this section include cabinets exploring Variation and the often miss-identified coral and milksnakes. Visitors enter the area walking over a snake pit and leave the area

(7) Rock Arroyo Walk Over

Lexan panels under and alongside a swinging suspension plank bridge span a simulated rock creekbed. At your feet, beneath the glass, is an area 10 inches deep which is full of rattlesnakes, creating the illusion of walking over a snake pit. Handrails and rope railing on each side of the bridge provide support and keep traffic off the clear surfaces. Includes a path around this section for the “faint-hearted” with a “safer” view into the exhibit. Low light levels within the exhibit area and indirect lighting within the “pet” create the illusion of no glass between the snakes and the visitor.

(8) Cottonmouth Habitat Cabinet

Identification

Each of the three common species of cottonmouth has been graphically displayed and painted to show their color variations.

Eastern Cottonmouth (*Agkistrodon piscivorus piscivorus*) –graphic depiction

Western Cottonmouth (*Agkistrodon piscivorus leucostoma*) – graphic depiction

Florida Cottonmouth (*Agkistrodon piscivorus conanti*) – graphic depiction

Icons of a diamond-shaped head and pit viper head are shown to assist in the identification information.



Fact

The Cottonmouth earned its name due to the white lining of its mouth

Reproduction

Number of Young per Brood: 1-15

Size of Young at Birth: 7” to 13”

Live Birth



Fact

Once the female gives birth to her brood, she immediately leaves them to fend for themselves.

Habitat

Swamps, Lakes, Rivers, Mountains

Active

Night



Food

Frogs, fish, snakes, birds



Facts about Cottonmouths

When confronted, a cottonmouth is likely to stand its ground and gape at the intruder, baring the white lining of its mouth.

Unlike other water snakes, the cottonmouth keeps its head and upper body on the water's surface when it swims.

Stay away from the cottonmouth! Its bite is very dangerous!

Distribution

A graphic of a U.S. map with a colored area showing the cottonmouth's distribution.

Interactive Panel

Question: Why is the cottonmouth called a "cottonmouth"?

Answer: Because the lining of its mouth is white, like cotton.

Question: What makes a cottonmouth different from other water snakes?

Answer: When it swims, it keeps its head and upper body on the water's surface.

(9) Coral Snake Habitat Cabinet

Identification

Each of the three common species of coral snakes has been graphically displayed and painted to show their color variations.

Eastern coral snake (*Micrurus fulvius fulvius*) --- graphic depiction

Texas coral snake (*Micrurus fulvius tenere*) -- graphic depiction

Sonoran coral snake (*Micruroides euryxanthus euryxanthus*) -- graphic depiction

Icons of a bullet-shaped head and non-pit viper head are shown to assist in the identification information.



Fact

The eye of the coral snake has a round, not slitted, pupil.

Reproduction

Number of Young per Brood: 3 to 12

Size of Young at Birth: 7” to 9:

Eggs



Facts

The coral snake is the only dangerous venomous snake in the U.S. to lay eggs.

Habitat

Woods, Plains, Lakes, Swamps, Hillsides

Active

Day and Night



Food

Frogs, snakes, lizards



Facts About Coral Snake

Of the five genera of dangerously venomous snakes in the U.S., three are in the family Viperidae; the exception are the two species of coral snake which belong to the family Elapidae.

When confronted, the coral snake often raises its tail and curls it into a ball, which may be momentarily mistaken for its head.

The coral snake has short, peg-like front fangs, one on either side of the upper jaw, that do not retract like those of a pit viper.

Distribution

A graphic of a U.S. map with a colored area showing the coral snake’s distribution.

Interactive Panel (Flip Lids)

Question: What are some qualities of a coral snake that make it different from pit vipers?

Answer: Coral Snake...

- | | |
|--------------------------|--------------------------|
| Fangs do not retract | lays eggs |
| Eyes have rounded pupils | has a bullet-shaped head |
| Has no loreal pits | is in family Elapidae |

Question: Is a coral snake as dangerous to humans as a rattlesnake?

Answer: The coral snake’s venom is very dangerous, but its short fangs are less likely to deliver a dangerous bite to a human.

(10) Copperhead Habitat Cabinet

Identification

Each of the five common species of copperhead has been graphically displayed and painted to show their color variations.

Broad-banded Copperhead (Agkistrodon contortrix laticinctus) ---graphic depiction

Northern Copperhead (Agkistrodon contortrix mokeson) __ graphic depiction

Osage Copperhead (Agkistrodon contortrix phaeogaster) __ graphic depiction

Southern Copperhead (*Agkistrodon contortrix contortrix*) __ graphic depiction

Trans-Pecos Copperhead (*Agkistrodon contortrix pictigaster*) – graphic depiction

Icons of a diamond-shaped head and pit viper head are show to assist in the identification information.



Reproduction

Number of Young per Brood: 1-14

Size of Young at Birth: 7” to 10”

Live Birth



Fact

The young copperhead is born with a bright yellow tail. Some believe the snake wriggles this bright tail-tip like a worm in order to lure prey – a technique known as “caudal luring”.

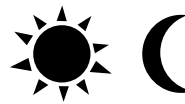
Habitat

Swamps, Canyons, Woods



Active

Day and Night



Food

Mice, Lizards, Frogs, Insects



Facts About Copperheads

Though the bite of the copperhead can be very painful, it is rarely fatal, except for cases of very large snakes biting small children or people with health problems.

The copperhead’s disposition is more relaxed than many vipers; it is most likely to retreat or lie still rather than confront an intruder.

When confronted, the copperhead may rapidly vibrate its tail just like a rattlesnake. If it hits against a leaf or other object, the tail can produce an audible sound.

Distribution

A graphic of a U.S. map with a colored area showing the copperhead’s distribution.

Interactive Panel (Slip Lids)

Question: True or False? The copperhead is one of the most aggressive snakes in North America?

Answer: False. The copperhead would rather retreat or hide than attack a human.

Question: “Caudal luring” refers to:

(A) A copperhead vibrating its tail when it faces an intruder.

(B) A young copperhead twitching its tail to attract prey.

Answer: “Caudal luring” refers to the action of a snake twitching its tail, like a worm, to attract prey.

(11) Rattlesnake Habitat Cabinet

Identification

Each of the five most common species of rattlesnake has been graphically displayed and painted to show their color variations.

Eastern Diamondback Rattlesnake (*Crotalus adamanteus*) – graphic depiction

Prairie Rattlesnake (*Crotalus viridis viridis*) – graphic depiction
Sonora Sidewinder (*Crotalus cerastes*) – graphic depiction
Timber Rattlesnake (*Crotalus horridus*) – graphic depiction
Western Diamondback Rattlesnake (*Crotalus atrox*) –graphic depiction

Icons of a diamond-shaped head and pit viper head are shown to assist in the identification information.



Reproduction

Number of Young per Brood: 4-25
 Size of Young at Birth: 6” to 21”



Fact

Though all rattlesnakes in the U.S. give live birth to their young, there are certain species elsewhere in the world that lay eggs.

Habitat

Woods, Meadows, Swamps, Desert, Canyons Mountains



Active

Day and Night



Food

Mice, Rabbits, Lizards, Squirrels, Birds



Facts About Rattlesnakes

There are many species and subspecies of rattlesnake in the U.S.; listed here are only five from among the more than 25 known species.

The Eastern diamondback rattler is the largest in the U.S., measuring up to eight feet in length; the Western diamondback is the second largest recorded at nearly seven feet.

Of all the U.S. rattlers, the Western Diamondback is the most irritable and aggressive; they inflict more snakebites than any other species.

Distribution

A graphic of a U.S. map with a colored area showing the rattlesnake’ broad distribution.

Interactive Panel (Flip Lids)

Question: True or False? The rattlesnake is the most common venomous snake in the United States?

Answer: True. With over 25 known species and territory stretching from coast to coast, the rattlesnake is the most populous of North American venomous snakes.

Question: True or False? The western diamondback rattlesnake is considered the most dangerous snake in the U. S. because it likes to bite humans?

Answer: False. It may be very aggressive, but it will still only bite a human in self-defense -- not because it “likes” to bite.

(12) Coral Vs. Milksnake Cabinet

With photos and graphic illustrations a detailed study in identification of the coral snake and milksnake is offered. To reinforce the information an interactive device is used to have the visitor experience tactually the color patterns of both the coral snake and the milksnake.

Poisonous or Harmless: Can You Tell the Difference?

The phenomenon of mimicry explains the amazing similarity between the venomous coral snake and certain harmless snakes. It's believed that the imitators evolved this coloration to scare away predators, who see the pattern as that of a dangerous snake. There are several ways to tell the difference among real and false coral snakes that live in the U.S. (Photo: large color images of the coral and milksnake to show the similarities.)

Three ways to Tell False from Real:

The coral snake's three colored bands all wrap completely around the body; in false coral snakes, some or all of the bands terminate at the belly. (Illustration showing how the coral snake bands encircle the body; milksnake color bands are shown stopping at the belly.)

Red and yellow are next to each other in the coral snake; in the milksnake, the colors are separated by black bands. (Some other false coral snakes do have adjacent red and yellow bands; the best rule is, stay away!) (Illustration showing the different placement of the black bands on the two snakes.)

The coral snake has a solid black head that goes all the way around the body; its imitators have partially blackheads often interrupted by other colors. (Illustration of the two snakes heads showing that the black on the coral snake head is completely covering the nose.)

Remember: "Red and Yellow kill a fellow!"

Interactive Panel (Turning tubes)

A 40 inch cylinder divided into six segments; in each segment is a drawing of snake scales which are colored red, yellow and black. As the visitor spins these colors into the correct order for a coral snake a signal light is triggered rewarding the visitor for correct identification. This also happens when the visitor assembles the coloration for the milksnake.

(13) Variations Cabinet

This cabinet has been designed to show that snakes vary greatly within their own genus. The text tells of these variations and the illustrations show the variations in three genus.

Age Variation (test)

Many snake species undergo change in color and pattern with age. The young cottonmouth is strongly patterned, with a bright yellow or light green-tipped tail; as it ages, the coloration grows darker and the pattern less distinct. Most adult cottonmouths display faded body markings or none at all.

Interactive (Turn tubes)

A cylinder with illustrations of a young cottonmouth on one side and an adult cottonmouth on the other side.

Habitat Variation (test)

Snakes within the same species may show pattern or color variations depending on their habitat. The timber rattlesnake (*Crotalus harridus*) has four major variations recorded, although all have a basic pattern of dark crossbands on a lighter background color. The differences can be subtle, but become obvious when you look carefully.

Interactive (Turn tubes)

A second cylinder has three illustrations of the timber rattlesnake. Coloration and patterning typical to its northernmost range, a coloration and patterning more common in the mid-section of the range, and the third illustration is the coloration found in Florida.

Genetic Variation (text)

Genetic variations in pigment can create individual snakes that are completely different in appearance from the rest of their species. A deficiency of the brown pigment, melanin, will create an albino individual; in snakes where melanin-bearing cells are dominant, an all-black or “melanistic” specimen may occur.

Interactive (Turn tubes)

The third cylinder contains three illustrations of the western massasauga. The coloration depicted indicates a standard coloration, one that is the result of melanin, and the third is a coloration of an albino. To see anyone of the three illustrations the visitor rotates the cylinder, and reads the labels on each panel.

Interactive Panel (Flip lids)

Question: What is the name of the pigment that causes both albinism and melanism?

Answer: Melanin, a brown pigment, causes both albino and melanistic snakes.

Question: True or False? All snakes within a single species look exactly the same?

Answer: False. There can be subtle variations in appearance due to differences in habitat, age or other factors.

(14) Canyon and Winter Den Walk Thru

This display is a naturalistic canyon of rugged limestone with many cracks and crevasses. At ground level and in some of the ledges angled glass seem to disappear. In these recesses are live rattlesnakes of several species. The public can experience the snakes in their natural setting. As the canyon turns, duck your head under the rock overhang and enter the cave. A large plexiglass dome accommodates several visitors who can literally see the serpents face to face. Small steps allow people of all heights to experience the same view.

Section Four: Snake Anatomy

(15) The Rattle Model Cabinet

An enlarged rattle is displayed in this cabinet, along with a collection of shed skins and detached rattles. To further explain the rattle there are three additional photos showing a rattle cur-a-way.

Shedding the Skin

The rattlesnake’s rattle is formed mainly of keratin, just like fingernails and hair. A new segment is usually added to the rattle “string” when a snake sheds its skin. Depending on its active season, habitat, species, and other variables, a snake may shed its skin from one to four times per year. A young snake sheds more frequently than an adult if food is available and the snake is growing quickly.

A snake sheds by rubbing its lips against a rough surface, like a tree or rock, to help start the skin rolling backwards. It then wriggles out of its skin so that the skin peels backwards over the snake’s body, turning inside out as it goes – like a sock being pulled off.

The Use of the Rattle

The rattlesnake uses its rattle as a warning mechanism to scare off approaching intruders. It is thought that this unique structure evolved to help the rattlesnake safely share its territory with large herd animals such as buffalo, cattle and javalina.

The rattlesnake vibrates its tail very rapidly – an average of 50 times per second – and for this reason, the sound produced is more like a continuous hissing than a series of clicks. When a

rattlesnake is especially nervous, it will rattle longer, louder and faster. A young rattlesnake, having fewer rattle segments than an adult, produces a softer “buzzing” sound.

Thanks to a rattlesnake’s built-in warning buzzer, the chances of humans being bitten are greatly reduced. There are still two ways to be bitten by a rattlesnake: by accidentally stumbling across a sleeping or concealed snake, or by deliberately provoking one into striking. Always be watchful in rattlesnake territory – surprisingly, rattlesnakes will not always rattle before they strike. To be safe, the best strategy when you see a rattlesnake or hear its rattle is to move away as quickly as possible!

_____? (Housed in the cabinet with the model of rattle)

Rattlesnakes are born with a small nub at the end of their tail, called a “prebutton”. When the young snake sheds for the first time, usually a few days after birth, he sheds the prebutton and develops his first rattle segment, known as the button.

With each shedding of the skin, another rattle segment is usually added where the rattle joins the body. Eventually, the rattle string will break and lose several end segments, including the original button. Most adult rattlers in the wild have 6-8 rattle segments, and this is enough for the snake to vibrate and make its warning sound.

By looking at a rattle that has lost its original button, we can see the way the rattles are constructed in interlocking segments, with just enough looseness to move and hit against each other.

Interactive Panel (Flip Lids)

Question: A rattlesnake shakes its rattle in order to:
(A) Attract prey.
(B) Scare away intruders.
(C) Communicate with other rattlesnakes.

Answer: (B) A rattle snake shakes its rattle to warn away intruders.

Question: True or False? You can tell how old a rattlesnake is by counting its rattles.

Answer: False. A rattler may grow from one to four new rattle segments a year each time it sheds; also parts of the rattle may break off because of wear and tear.

(16) How Fast Are You? Cabinet

This interactive display is designed to test the nerve of the visitor. A series of five backlit photographs are linked to an infrared light beam that when interrupted signals the visitor that there is a potential of being bitten. If the visitor responds quickly and removes their hand they are given a message that they have avoided a snake bite. Should the visitor choose to leave his/her hand on the marked location a message is lit that says they have been bitten.

How Fast Are You (text)

Are you fast enough to beat a striking rattlesnake? Test your reflexes and find out!

Hints:

- Learn to recognize the sound of an agitated rattler
- Note the coiled, S-shaped posture of a rattler preparing to strike
- Don’t give the snake enough time to strike
- Most important, don’t give the snake any reason to strike.

Emergency!

You have been bitten by a venomous snake. Seek medical attention immediately!

Congratulations!

You have avoided a dangerous snakebite the smart way -- by leaving the snake alone!

(17) Rattlesnake Skull Model Cabinet

The bones of the skull have been enlarged about 700 times. This piece is to show that there are replacement fangs in the viper's mouth, and the mechanics of the strike and ingestion of food.

Fangs & Envenomation

A pit viper's fangs curve backwards and are long, sharp and hollow, like twin hypodermic needles. Folded up against the roof of the mouth until needed, the fangs extend during a strike so that the snake can "stab" the prey and inject its venom. Replacement fangs are held in reverse to move into place when the working fangs are periodically shed.

The process of envenomation involves several mechanisms. As the jaw opens, the maxillary bones to which the fangs are attached rotate forward. In a combination of muscular and skeletal action, the fangs swing forward and down.

When the fangs strike their target, the venom glands are compressed and squirt venom into the venom ducts, down through channels in the fangs, and into the prey.

The compression of the venom gland is a voluntary action; therefore, it is possible for a snake to deliver a bite without injecting any venom.

Illustration

The rattlesnake head is drawn in an open striking posture and also closed. Calling out the various key points in the mechanism of the strike and injection of venom.

The Rattlesnake Strike (text)

Starting from the familiar coiled "S" position, a striking rattlesnake will hurl its upper body at the prey while extending its jaws. The fangs fold out as the jaws open extremely wide, to nearly 180 degrees. The fangs are either in with a stabbing motion, or the jaws close over the prey.

Unlike many other types of snakes, vipers envenomate their prey and then stay back, waiting for the prey to die so they can safely ingest it. (Photo; a rattlesnake head skeleton posed in the full striking position.)

Interactive Panel (Flip Lids)

Question: True or False? You can make a pit viper harmless by breaking off its fangs.

Answer: False. A pit viper has several pairs of replacement fangs, which move into place when the working fangs are shed or broken.

Question: How does a snake eat something that is bigger than its mouth?

Answer: The snake's jawbones spread apart to allow large prey to be swallowed.

(18) Infrared Scanning

WonderWorks has chosen to enlarge the head of a rattlesnake to show the function of the loreal pits. Contained in the fiberglass head is an infrared camera and computer which allows the visitor a visual reference to the snakes ability to sense his world in the spectrum of infrared.

With the aid of an electronic display panel and a mirror the visitor is instructed in a method of seeing the visual captured with the infrared camera.

Infrared Scanning! (Text)

The electronic display panel is programmed to read as follows:

Infrared Scanning!

A snake sees you. A snake feels your temperature.

Infrared Scanning!
Step on the red "X"
Look in the mirror
You are being scanned by the snakes loreal pits.
Infrared Scanning!

This image is a man understands of a snakes infrared scanning or a method of sensing food.

On the stand for the head is a descriptive of the location of the loreal pit. It is also advisable to have a staff person here to answer questions and give explanations.

(19) Anatomy from the Inside (Crawl Through)

This interactive was created to give all ages an opportunity to have fun with a snake. By crawling through the snakes belly the visitor has an opportunity to view the internal organs and also get a detailed look at the ribs that comprise the snake's skeleton. This feature has no text, it is experiential only.

Section Five: Snake Education

(20) Snakebite! Cabinet

This display is to tell the visitor to be wary of very common areas that snakes may be startled by man's intrusion. We also give information on action to be taken in the event of a snakebite.

The 6 Best Ways to Get Bitten By a Venomous Snake

Poke at it with a stick, kick it, or find some other way to make it feel angry and threatened.

Reach under woodpiles, into caves, and under old piles of garbage or large rocks without looking first. Pick up firewood at dusk or at night.

When you hear a rattlesnake sound its rattle, get closer to investigate.

Walk through tall grass or swampland wearing shorts, tennis shoes, sandals or bare feet, and don't watch where you're stepping.

Deliberately play with a venomous snake to show your fiends you aren't afraid.

Handle an injured or apparently dead snake – one that has been run over by a car, for example – because you figure it can't hurt you anymore. (Photo; a rattlesnake hidden in the rocks; a rattlesnake hidden in a wood pile; a copperhead camouflaged in leaves; a striking rattlesnake; and three photos of snakebite injuries.)

What To Do If You Are Bitten

Take a good look at the snake that bit you, and try to remember what it looks like.

Get medical attention immediately. Nearly any bite from a native North American venomous snake can be effectively treated if it is seen by a doctor soon enough.

Don't waste time trying to kill or capture the snake. It will leave you alone if you leave it alone.

Don't panic! Don't run! Accelerated heart action can speed up the spread of venom through the body.

A snake's venom is a complex mix of enzymes, proteins, and toxins. Its effects on a human can range from localized swelling, bruising and minor pain to paralysis, severe pain, and death. Remember: almost any bite from a venomous snake in North America is treatable with prompt, proper medical attention!

Interactive (Flip Lids)

Question: The best way to avoid a dangerous snakebite is to:

- (A) Stay away from venomous snakes.
- (B) Chase the snake away by jumping up and down, and making loud noises.
- (C) Kill any snake you see.

Answer: (A) Stay away from venomous snakes.

Question: True or False? If you are bitten by a snake, you should run to the nearest doctor.

Answer: False. – Don't run. Get to a doctor as quickly as possible, but stay calm.

(21) Prevention & Treatment Cabinet

This cabinet emphasizes the extreme lengths one should go to before attempting to handle a venomous snake. WonderWorks also offer the most widely used methods in the treatment of snakebite. An illustration of a fully dressed and prepared snake hunter. Labels calling out all of the equipment needed to hunt snakes in reasonable safety, but again stressing the best prevention is to leave venomous snakes alone.

(Illustration of a well outfitted snake hunter)

Prevention & Treatment

A professional snake handler takes great precautions to avoid being bitten. More important than all the equipment, however, is the extensive training a handler must receive to understand the dangers of handling venomous snakes.

The best way to prevent a dangerous snakebite is simple:

Stay away from snakes that you think may be venomous!

Snakebite Treatment

There are many folk remedies for the treatment of snakebites – but none of them work. Most of these false “cures” probably arose from “effective” treatment of a harmless snake bite, or a bite from a venomous snake that involved little or no venom. They range from applying poultices of “snakeweed” or chicken liver, to drinking large amounts of whiskey, to the ridiculous idea of letting the snake bite you a second time!

In the U.S. only a small percentage of snakebite victims die without medical treatment. In many cases, the victim causes serious damage to himself or herself by attempting to treat the bite on the spot – by cutting it open, tying a tight tourniquet, trying to freeze or burn the bite, or applying electrical shocks to the wound. These methods do not work, and can be very harmful!

In case of a snakebite, follow these simple rules:

- (1) Victims and helpers should stay calm.
- (2) The bitten extremity should be put at rest (splinting is best) and be kept in a dependent position (below heart level).
- (3) Physical activity should be decreased as much as possible.
- (4) The victim should be moved to a medical facility as soon as possible.

Use of a certain high-quality suction pumps may help by removing some venom from the wound, but such devices should not be used in the place of proper medical treatment. The sooner the victim sees a doctor, the smaller the chance of a snakebite causing permanent damage! (Photos; old photographs of methods not indorsed in the treatment of snakebite.)

Treatment with antivenin, an antidote prepared from snake venom, is the only treatment known that can neutralize the toxic effects of a snakebite. Two antivenins are used in the U.S. for coral snake venom and one for pit viper bites.

So if you do get bitten by a venomous snake, get to a medical facility as soon as possible!

Interactive (Flip Lids)

Question: The best way to treat a snakebite is to:

- (A) Cut an “X” and suck the poison out.
- (B) Burn or freeze the bite to neutralize the venom.
- (C) Get to a medical facility as soon as possible.

Answer: (C) Get to a medical facility. Other treatments don't work, and can make the bite worse.

Question: What should you do with a bitten extremity?

Answer: Putting a bitten extremity in a relaxed position, below the heart, slows down the movement of venom through the bloodstream.

(22) Milking & Antivenin Cabinet

Text and photos have been used to show the important work that is done in medical labs to acquire and process antivenin.

Venom Extraction and "Milking"

Snake venom – a potent mix of proteins, toxins and enzymes – is used in the preparation of a variety of medical products for humans. The main product is antivenin, which is an antidote for snakebites. In order to make these products, venom must be extracted from the snake. (Photo; close-up of a rattlesnakes head being held over a collection vile.)

The snake's head is gently grasped, and its mouth opens. By lightly bumping the snake's nose, the snake is encouraged to bite through a diaphragm and inject its venom into a sterile collection vial. The old practice of "milking" – in which the venom glands are squeezed to force the venom out – is harmful to the snake and also contaminates the venom being collected, making it unusable for scientific purposes. (Photo' a broader view of the laboratory set-up for collection of venom.)

Antivenin Production

Contrary to popular belief, antivenin is not snake venom. Rather, it is a serum made from antibodies in the blood of a large animal – generally a horse or donkey – that has been immunized by a series of small injections of snake venom.

It has been long known that injections of snake venom can create immunity to snakebites; however the immunity does not last very long. By injecting a large animal with small, harmless amounts of specially treated venom, and then building up the injections to what would otherwise be lethal levels, the animal develops a tolerance to the venom. (Photo; horse in a field)

The immune animal's blood is then extracted in small amounts and serum, which carries the venom immunity, is separated out for preservation.

A good antivenin-producing animal is very well treated, with great care taken to maintain its good health and protect it from harm. In return, the animal performs a very beneficial service to mankind.

A three minute video of the actual "milking" process is shown in a continuous loop in this display. Milking Video Provided by: Jim Glen, Venom Research Lab

Veterans Administration Medical Center, Salt Lake City, Utah

Interactive (Flip Lids)

Question: True or False? Antivenin is made of pure snake venom, because it neutralizes snake venom.

Answer: False. Antivenin is a serum which neutralizes the effects of snake venom, and it is made from the blood of an immunized animal.

Question: Why don't scientists extract venom by squeezing it out of the snake's venom glands?

Answer: This old-fashioned practice called "milking" hurts the snake and makes the venom unusable for science.

(23) Benefits of Snakes Cabinet

This display is to give visitors a look at the many aspects of snake that are not often considered.

Snakes Have a Tough Life...

Although they are feared by some people, snakes are just animals trying to survive. They face many dangers on a daily basis

- like cars that run over them (Photo of a road killed rattlesnake.)
- or their numerous natural predators (Photo; a bird of prey)
- or the worst enemy of all – man (Photo; housing development construction site)
- destroying snakes' natural habitats to make room for human development
- cruelly exploiting snakes for profit, in "Rattlesnake Roundups" and trade in all kinds of genuine snake "souvenirs" (Photo; products made from snake skins)

and in general, abusing and killing even the most harmless or beneficial snakes because we don't know better, don't understand, or just don't care.

The harm caused to man by the few types of venomous snakes is nothing compared to the irreparable harm man has caused to snakes – mostly by destroying or altering the natural homes of these sadly misunderstood creatures.

Snakes Help Make Our Lives Easier

Mankind can benefit from snakes in several ways. Even venomous snakes have made contributions that help improve the quality of human life...such as the use and study of snake venom in medical science, which has led to a number of breakthroughs – particularly in evaluating blood coagulation in humans (Photo; research laboratory)

...a valuable source of food for certain indigenous peoples... (Photo; Aboriginal men in ceremony)

Recognizing snakes as a food source.)

...and, most important, population control of animal pests like rats and mice, thereby protecting man from the many diseases carried by vermin, including bubonic plague and hantaviruses... (Newspaper articles about the spread of disease from infected mice.)

...helping to protect our supplies of grain from predation by these rodents. (Illustration of one snake, equaling consumption of 140-150 mice, equaling several tons of grain saved.)

Next to birds of prey, snakes are among nature's most efficient mousetraps! One snake can consume several dozen mice annually – preserving a significant amount of grain for human consumption.

Interactive (Flip Lids)

Question: What animal is a snake's worst enemy?

Answer: People are more harmful to snakes than any natural predator, mostly because we destroy their natural habitats to make room for more people.

Question: What is the greatest benefit of snakes to mankind?

Answer: Snakes help to control the rodent population, preventing disease in humans and preserving our grain supply.

(24) Itch-A-Snake Activity

(25) Misc. equipment/props