

# NEWS FROM THE PIT

Arizona Poison and Drug Information Center



## Don't Be Rattled by Venomous Snake Identification

By: Anne Marie Guthrie, PharmD, BCCCP

Our best advice to take away from this article is that snake identification is dangerous and superfluous.

When you see something new or unusual, do you want to know what it is and get a closer look? Cool, we have that in common. Whether it's a beautiful flower next to the trail or a new jam on the radio, the mystery of finding out what it is can almost be intoxicating at times. What if the creature you are trying to identify could hurt you? It is probably best to keep your distance in that case. For example, the US Fish and Wildlife Service recommends staying at least 100 yards away from grizzly bears. While it can be hard to see a snake from 100 yards away, the same principle applies. If you come across a snake, take at least three large steps back to avoid any interaction with it.

If you are bitten by a snake, rest assured that identification of the specific species is NOT necessary for treatment. Most venomous snake bites in the United States are treated with the same antivenom, with an exception for coral snakes that have their own antivenom. Just like any injury or illness, signs and symptoms of envenomation should be taken seriously with prompt evaluation by a medical professional. If no one has been bitten, it's best to leave the snake alone and give it plenty of space by staying at least twice the snake's length away. Remember, curiosity killed the cat!

### NEWSLETTER HIGHLIGHTS

Identification of venomous snakes

**Image 1: Eastern Diamond-backed Rattlesnake**

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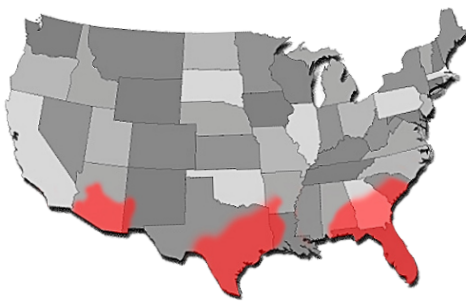
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Trying to identify specific species is not only unnecessary but very complex and should be left to the experts. Since most EMS and emergency department staff are not herpetologists, it is also dangerous to bring a live (or recently killed) snake into an ambulance or ED.

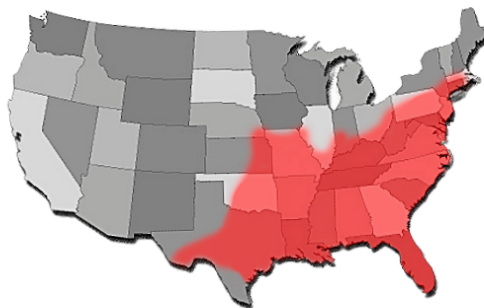
In the unlikely event that you are bitten in a very remote area without cell phone service or easy access to emergency services AND you are unsure if the snake is venomous. In this event, you could consider attempting to identify distinguishing features to avoid a dangerous and expensive wilderness evacuation. The method described below helps to make this distinction, but it is dangerous and involves intentionally interacting with a snake. Purposefully interacting with a snake causes a high number of bites every year, so the risk of identifying a snake must be thoughtfully weighed against the potential benefit.

Most of the venomous snakes in the country are commonly referred to as pit vipers due to the heat sensing pits on their face between the nostril and eye. Pit vipers include rattlesnakes, copperheads, and cottonmouths. Rattlesnakes are found throughout the United States while copperheads and cottonmouths (also called water moccasins) live in the eastern portion of the country. In addition to heat-sensing pits and elliptical (cat-like) pupils, people are told to look for a triangular head. The trouble with looking for these features is that it requires close examination of the snake's face. Even if the snake is dead, the biting reflex often remains intact for hours, which makes getting this close, and especially handling the animal dangerous.

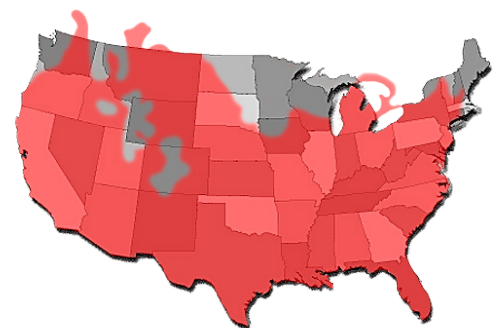
In the western US, the task of identifying a dangerous snake is relatively easy. Do you hear or see a rattle on its tail? Or does it have a tapered and pointed tail? If you see or hear a rattle, stay away. But if it does not have a rattle, it is not a rattlesnake. There have been rare reports of rattlesnakes missing their rattle due to a trauma or genetic malformation of their tail, but these are incredibly rare and result in a short, blunt stub where the tail should be.



**Image 2:**  
**Distribution of Coralsnakes in the United States**



**Image 3:**  
**Distribution of cottonmouths and copperheads in the United States. Except for Coralsnakes, any wild snake with a tapered pointed tail outside of this area is not a native dangerous species.**



**Image 4:**  
**Distribution of Rattlesnakes in the United States**

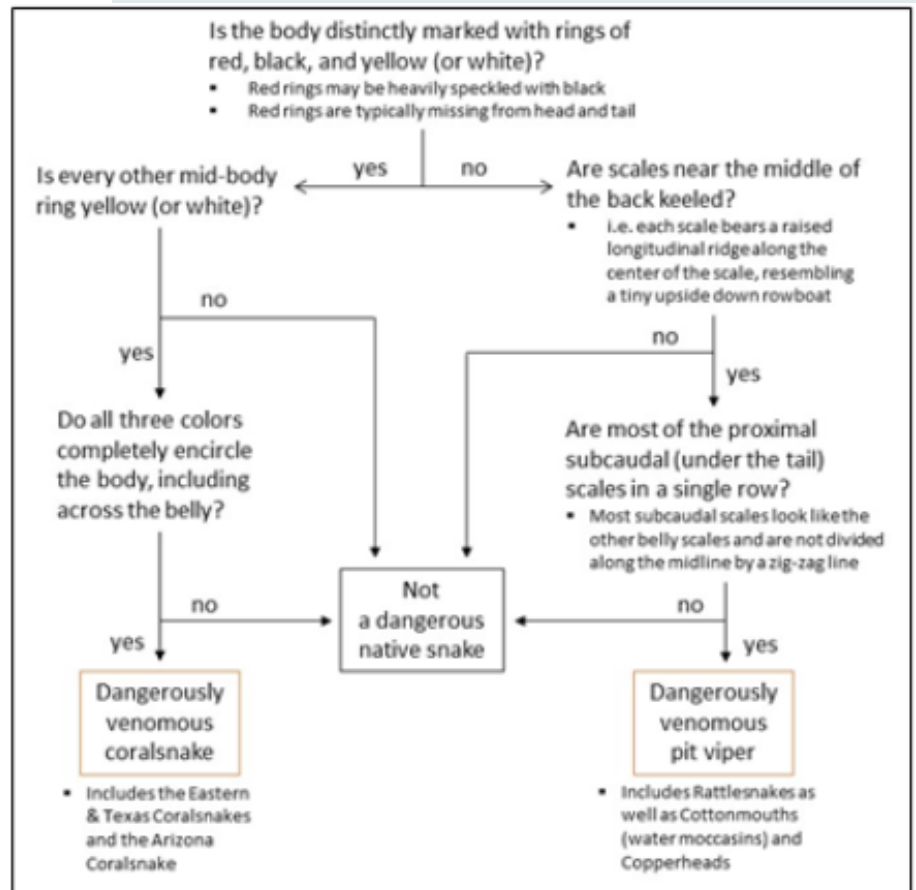
# Don't Be Rattled by Venomous Snake Identification

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However, in the eastern US, copperheads and cottonmouths have tapered and pointed tails like harmless snakes. Although this complicates identification, do not fret! This is where a three-step process lends a helping hand (Figure 1) by looking at the snake's color, pattern, scales, and belly. It can be used by first-responders and outdoorsmen to quickly recognize snakes whose bites need immediate medical attention. This process requires close examination of the snake. Thus, it should only be resorted to if someone has been bitten and the need to decide if the snake is venomous or not is imperative. Remember that intentionally interacting with the snake for any reason significantly increases the chance of another bite.

While this three-step method does not require a close inspection of the snake's face and head, it does require close inspection of the body. If someone has been bitten and you are unsure if the snake is dangerous (i.e., you are in the southeastern US where cottonmouths and copperheads may be found) safely kill the snake using a walking stick, shovel, or other long-handled tool while remaining at least one length of the snake away from it. Once you believe the snake is dead, decapitate it without handling it (even with gloves) or stand on its head with a sturdy shoe (no sandals) and closely examine the body. Once again, a freshly killed snake is still capable of biting and envenomating, so safely isolate the head.

Step one: does the snake have vibrant rings of red, black, and yellow (or white) on the body? The first step separates possible coral snakes from pit vipers, whose colors are usually more muted to "match" their environment and increase their ability to camouflage. The left side of the flow chart helps distinguish a dangerous coral snake from other harmless snakes with similar color patterns by looking at the color sequence and belly of the snake. If you find yourself looking at a tri-colored snake with every other ring that is yellow or white and the rings completely encircle the snake's body, it is time to call EMS and get to a hospital as soon as possible for treatment.



**Figure 1: Flow chart of the three-step process. Adapted from Cardwell MD. Recognizing dangerous snakes in the United States and Canada: a novel 3-step identification method. PMID:21962716**



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If the snake in question is not ringed in bright colors, the next step (right side of the flow chart) is to look closely at the scales on the middle of the snake's back. Does each scale have a raised line running down the center of the scale? The ridges on keeled scales feel rough with the finger and can be observed visually. If the dorsal scales are keeled, what do the scales under the tail look like? Is there a single scale row covering the width of the underside or is the width covered by two scales across? The combination of keeled scales AND a single row of subcaudal (under the tail) scales is indicative of a pit viper in the United States. If the snake in question has both features, a trip to the emergency room is necessary for medical evaluation.

It is worth noting that the three-step process only applies to snakes that are native to the United States and Canada. Most exotic snakes (in captivity or escaped) will not fit into the parameters established by the flowchart.

There are also three species of coral snakes in the US, which belong to the elapid family. These vibrantly tri-colored snakes live in the southern and southeastern states. Their rings of red, black, and yellow (or white) have given rise to the saying "red on yellow, kill a fellow; red on black, venom lack" to assist with remembering the order of colors. However, this saying alone may not eliminate all harmless look-alikes, which is where the left side of the flowchart can be applied.



**Image 5:** Both FDA-approved pitviper antivenoms are licensed for treatment of all native rattlesnake, cottonmouth, and copperhead envenomations; in other words, all native venomous snakes except coralsnakes. Thus, identification of the snake species, or even to genus, is not necessary to choose the correct antidote.

Arizona is home to a variety of rattlesnake species that live throughout the state. Almost all venomous snake bites in the state each year are caused by rattlesnakes. The Arizonan (or Sonoran) coral snake lives in the southern part of the state, but bites are rarely reported. This coral snake has very light yellow to white rings compared to the saturated yellow rings of the Texas and Eastern coral snake.

**Image 6:** Arizona coralsnake (*Micruroides euyxanthus*). Coralsnakes in the United States are easily recognized by their bold rings of black, red, and yellow (or white in Arizona), with every other being yellow or white and all the rings completely encircling the body, including across the belly. In most harmless look-alikes, every other ring is black, separating the red and yellow/white rings, or the belly is colored differently--usually white. All other clinically significant snakes north of Mexico are pitvipers and their bites are treated with the same two antivenoms.



# A Note From The Editor

By Geoffrey Smelski, PharmD, DABAT

Snakes aren't discriminatory in who they envenomate. Because of this, I have provided talks regarding the dangers and complications of snakebites to AZ citizens around the state. My audiences have ranged from elementary schools to retirement homes, as well as hospital staff. Regardless of the audience, someone will almost certainly start asking a string of questions as they attempt to construct some type of circumstantial perfect storm. The purpose of these questions is always the same, to get me to say that it is ok to do something, right after I just finished saying that it should never be done. Typically, this manifests as some drawn-out scenario regarding tourniquet use following a rattlesnake bite. Clinical evidence and basic science both support a considerable potential for harm following application of a tourniquet. If you look at it from a risk-benefit perspective, to outweigh the harm caused by the tourniquet, the harm from the snakebite itself would need to be life-threatening. Considering that our mortality rate is 0.18% among all cases the AzPDIC is consulted on, there is no rationale reason to advocate for a tourniquet following a rattlesnake bite.

I mention all of this, because we are discussing another such doomsday scenario in this newsletter, a specific set of circumstances whereby someone may "benefit" from killing and identifying a potentially venomous snake. To be clear, there is NO MEDICAL BENEFIT to identifying the snake. The only potential benefit would be that if you are able to successfully kill and accurately identify a non-venomous snake, you can avoid an unnecessary trip to the hospital. Which means that you need to be capable of killing a venomous snake in the wild without getting bitten again, as an additional bite equals more venom, equals more toxic effect. You will also need to be confident enough in your ability to identify a venomous snake from a non-venomous snake, that you are quite literally willing to bet your life on it.

For the doomsday crafters and the 0.1% of snakebite victims possessing these skills, we hope you find this newsletter to be a helpful reference. For the rest of us, I suggest doing what I would do, and just assume the snake is venomous. Your time and efforts will be better spent working towards getting to a healthcare facility.