

Chapter XX

מסכת ברכות פרק ה', משנה א'

וּאֶפִּילוּ נָחַשׁ קָרוּדָה עַל עֵקְבוֹ - לֹא יִפְסֵיק :

...And even if a snake is wrapped around his heel, he should not interrupt [his prayer by speaking]

What makes a snake dangerous?

The Gemara (33a) explains that the Mishna is referring to a non-dangerous situation. If the snake is dangerous (e.g., it is a venomous snake, or it is agitated), or if it were another type of aggressive, harmful creature (e.g., a scorpion), then one may interrupt his prayer to protect himself from harm. [Note: the interruption which the Mishna prohibits is to speak while praying (e.g. to call out for help). To simply move away or to move so the creature will fall off, without speaking, is permitted for any type of snake (Mishna Berurah 104:10).]

So, what makes a snake dangerous, and how can one tell the difference between a dangerous and harmless snake? First, we will look at the amazing ways snakes find their **prey**, and then how they kill their prey.

How do snakes find their prey?

Snakes have various ways to detect their prey. They have eyes, of course, but their eyesight isn't great. On the other hand, their underside is very sensitive to vibrations in the ground, so they can detect the vibrations of a small creature walking nearby. They also have two unusual senses that may surprise you. These senses make snakes experts at finding prey—and at avoiding you.

- 1) Snakes can determine the direction in which an animal is located by using their forked tongue to smell it (see Fig.XX.1). How does this work? Most animals give off small amounts of **molecules** into the air that have a smell or scent. Your nose has special receptors in it, called **Receptor Nerve cells**, that can detect some of these chemicals, but you cannot tell from which direction the smell came. When a snake's tongue is out, these molecules in the air stick to it. If a smell is coming from the left side of the snake, then there will be slightly more of the molecule causing the smell on the left-fork of the tongue. When a snake retracts its tongue, the tongue wipes against a special organ on the roof of their mouth (called a **Vomer nasal organ** or **Jacobson's organ**, see Fig.XX.2), which analyzes both sides of the forked tongue and determines the direction from where the scent came based on which fork has more of the scent molecule. This, by the way, is not so different from the way you determine which direction a sound comes from using your two ears. Snakes are continually flicking their forked tongues in and out so they can understand the **environment** around them and from which direction scents are coming.



Fig.XX.1 Forked tongue of a carpet python

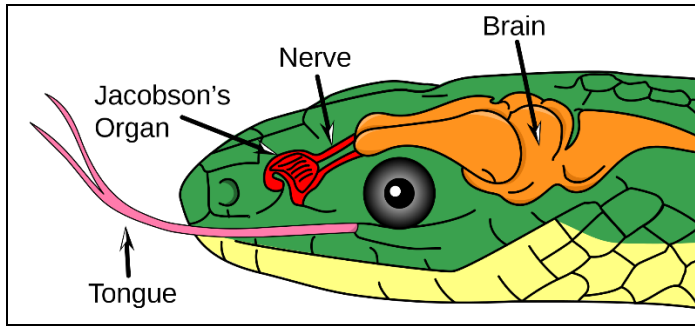


Fig.XX.2 Picture showing where the Jacobson's organ is in the snake's head.

2) Some snakes have a special organ called a **pit organ** that enables them to detect heat (see Fig.XX.3). So even if an animal has perfect camouflage or the night is pitch black, the snake can still locate it because it is hotter than its surroundings. What does the world look like to a snake with pit organs? We can get an idea by using a thermal camera, which is a special type of camera that is sensitive to heat. Fig.XX.4 shows a picture of two ring-tailed lemurs taken with a thermal camera. A snake's pit organs are less sensitive than a thermal camera, but they are accurate enough to enable a snake to see a blurry image similar to this and then strike its prey.

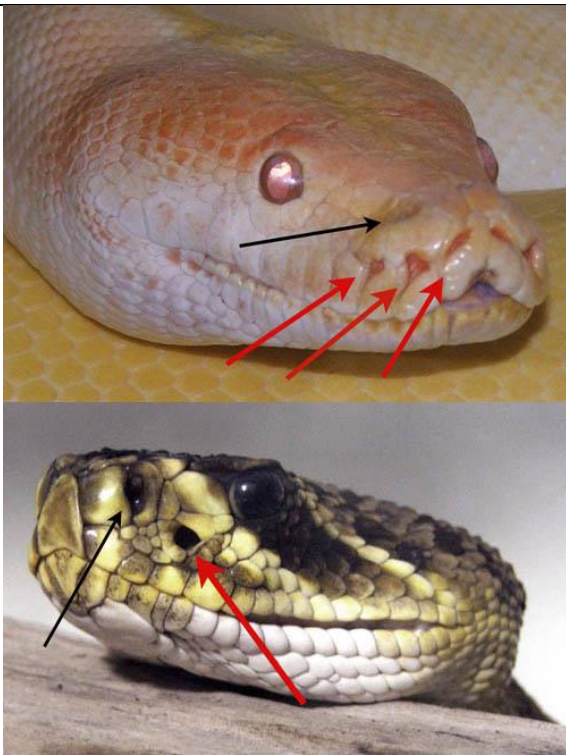


Fig.XX.3 These are the heads of a python (top) and a rattlesnake (bottom). The arrows pointing to the pit organs are red; a black arrow points to the nostril.



Fig.XX.4 Thermal (heat) image of two ring-tailed lemurs taken with a thermal camera. The temperature scale is on the right. You can use it to see which parts of the animal are the hottest.

How do snakes kill their prey?

Most snakes are not venomous and kill their prey by **constriction** (or swallow them whole without killing them at all). Constriction involves the snake wrapping itself tightly around its prey, ever tighter until either breathing becomes impossible or the heart can no longer push blood around the body (see Fig.XX.5). Small

constrictor snakes are not dangerous to humans. Giant **tropical** snakes can kill large prey such as deer and even alligators this way (see Fig.XX.6).



Fig.XX.5 A Rainbow Boa snake constricting and swallowing a mouse



Fig.XX.6 Indian Python constricting and swallowing a Spotted Deer

There are more than 3,000 species of snakes. Only 600 are **venomous**, and of those, only about 200 are able to kill or severely harm a person. Almost all venomous snakes kill their prey by delivering venom with specialized hollow fangs in their mouths that inject the venom into the victim. Fig.XX.7 shows a rattlesnake with its hollow fangs.



Fig.XX.7 Rattlesnake fangs

Snake venom is a mixture of different **proteins** that do one of the following, depending on the type of snake:

- 1) The venom causes the victim's **nerves** to stop working, especially the nerves that control breathing. Death is usually very fast.

- 2) The venom causes the victim's red blood **cells** to fall apart, blocking the blood vessels, leading to organ failure. Death is usually long and painful.
- 3) The venom attacks the walls of the blood vessels. allowing blood to leak out into the internal organs and outside the body. The victim dies slowly from loss of blood.

Venomous snakes kill tens of thousands of people every year—mainly in tropical countries. So, if you live in an area where there are dangerous snakes, it is definitely worthwhile knowing how to recognize the dangerous ones so you can stay well away from them. There are no rules for easy identification—you just have to learn what the dangerous ones look like. In all cases, where you are not absolutely certain that the situation is safe, stay away from snakes and other potentially dangerous animals.

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