

## Squamata



Snakes  
Lizards  
Worm Lizards

## We will talk snakes...but...

- There are 7200 known species.
- Found on all continents except Antarctica
- They are cold-blooded (ectothermic)
  - meaning their inner temperature varies with the temperature in the environment.
- The order Squamata is divided into 3 suborders
  - Sauria for lizards
  - Serpentes (or Ophidia) for snakes
  - Amphisbae for worm lizards
- The main (obvious) difference between snakes and lizards is legs/no legs.
- Worm lizards are usually limbless but can have 2 front legs just behind the head.

## More differences...

- Worm Lizards have eyes that are often invisible.
  - spend most of their lives underground
  - often have very small eyes, which are sometimes invisible under their scales.
- The majority of lizards have eyelids that close and open.
  - A lizard noticeably blinks
- Snakes have a spectacle over their eyes.
  - A spectacle is a clear scale, which looks much like a contact lens.
  - A snake always appears to have its eyes open.



## Lizards:

- All lizards have at least a vestige of a pectoral girdle (skeletal supports for the front limbs) and sternum (breastbone).
- The lizard's ribs are never forked
- The lizard's brain is not totally enclosed in a bony case.
- The lizard's kidneys are positioned symmetrically and to the rear.
- Most lizards have short bodies and four limbs.
- The two halves of the lower jaw are united.
- ...largest extant lizard, the Komodo dragon (*Varanus komodoensis*) contains approximately 50 types of bacteria that together cause blood poisoning in their prey.

## Worm Lizards

- Have external ears and has reduced eyes, a compact skull, and skin with rings of scales.
  - Look like worms, but have scales.
- Only one kind in USA:
  - In Florida

Rhineura floridana



## Snake Basics

- There are 2,700 known snake species
- Live in almost all habitats.
- They have thin, linear and limbless bodies.
- They are carnivores.



### Basics Cont...

- Hearing:
  - Sound waves from the air hit their skin and are transferred from muscle to bone then it is transferred to the inner ear and on to the brain for interpretation.
- Vision:
  - Snakes do not see colors
  - Eyes are equipped with a combination of light receptors:
    - Rods: provide low-light but fuzzy vision
    - Cones: produce clear images.
  - Secondary visual tool: Pit organs on their heads see heat sources in their surroundings like infrared goggles
    - Ability for nocturnal hunters of warm-blooded animals.

### Basics Cont...

- Smell:
  - Snakes breathe airborne smells into nasal openings that lead to an olfactory chamber for processing
  - A secondary system: When a snake flicks its tongue, it is gathering odor particles for transfer to two fluid-filled sacs at the roof of the mouth -- **Jacobson's organs** -- that lead to a second, smaller olfactory chamber.
    - The tongue is used only to assist in this process
- Taste: snakes do not have a sense of taste.

### Basics Cont...

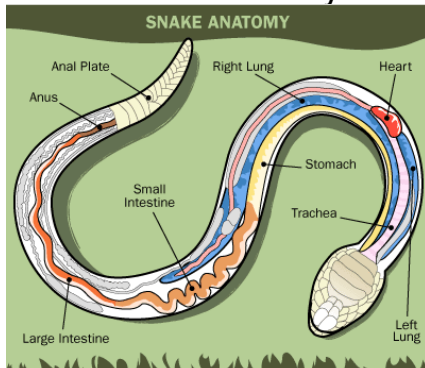


- Digestion:
  - The digestive tract runs nearly the entire length of the body
  - Includes the mouth, esophagus, stomach, small intestine, large intestine and anus
    - Each structure is stretchable to digest prey larger than a snake's diameter.
    - When the snake's mouth is full, it has to extend its trachea (breathing tube) below the food and out in order to keep breathing.

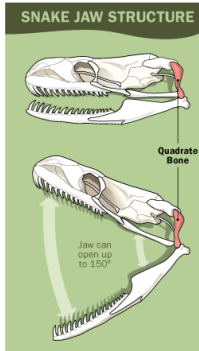
### Basics Cont...

- Respiration:
  - Snakes do not have a diaphragm
    - » They circulate air in and out of the lungs by narrowing the rib cage to push air out and then widening it again to create a vacuum to suck air in.
    - » After each breathing cycle, snakes experience apnea -- a stop in breathing -- that lasts from a few seconds to as long as a few minutes.
    - » To process the oxygen, all snakes have an elongated right lung; many also have a smaller left lung, and a few even have a third lung along the trachea.

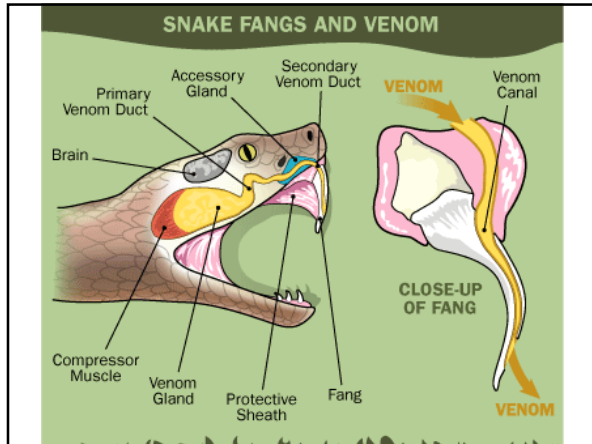
### Snake Anatomy



### Snake Jaw Structure



- A snake's upper jaw is attached to its braincase by muscles, ligaments and tendons, allowing it some front-to-back and side-to-side mobility.
- The upper jaw connects to the lower jaw by the **quadrato bone**, which works like a double-jointed hinge so the lower jaw can **dislocate**.
  - This allows the mouth to open as wide as **150 degrees**.
- Also, the bones that make up the sides of the jaws are not fused together at the front like the human chin, but instead are connected by muscle tissue, allowing the sides to separate and move independently of one another.



## Snake Venom

- **Venomous snake species**
  - Make up only one fifth of all snakes
  - Each have their own special venom
  - The three most important types of toxins found in snake venom:
    - Neurotoxins - Affect the nervous system by seizing up the nerve centers, often causing breathing to cease
    - Cardiotoxins - Deteriorate the muscles of the heart, causing it to stop beating
    - Hemotoxins - Cause the blood vessels to rupture, resulting in widespread internal bleeding
  - Some venom may also include **agglutinins**, which make the blood clot, or **anticoagulants**, which make the blood thin.
    - Most snake venom makes use of several of these compounds for a deadly combined effect.

