



# Amphibians, Reptiles & Birds



# Class Amphibia “Double-life”

EX: frogs, toads, salamanders, newts

- First vertebrates to colonize land during the Devonian Period
- Probably evolved from the Lobe-Finned Fish





# Habitat

- Require wet habitats for breathing, water for mating
- eggs fertilized externally



# Body Plan

- Bilateral Symmetry  
(**tetrapods**)
- Streamlined(**fusiform**) features for swimming
- Adaptations for living on land and in water (ex: hind feet webbed, front feet not)



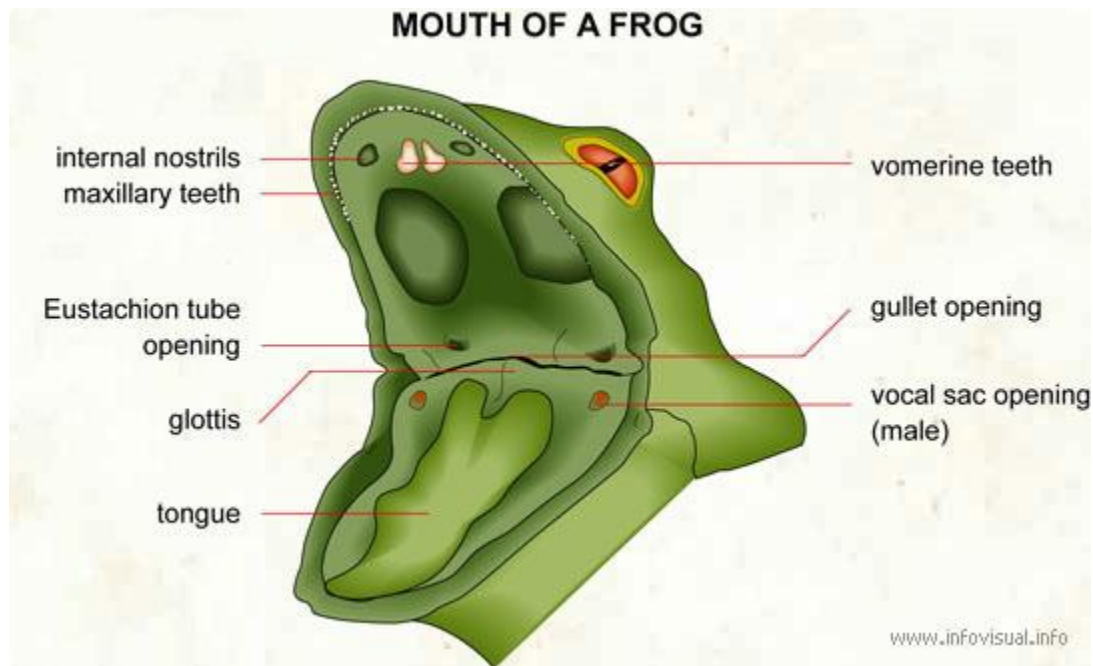
# Feeding

- Carnivores
- Tongues are attached at front of mouth



# Respiration

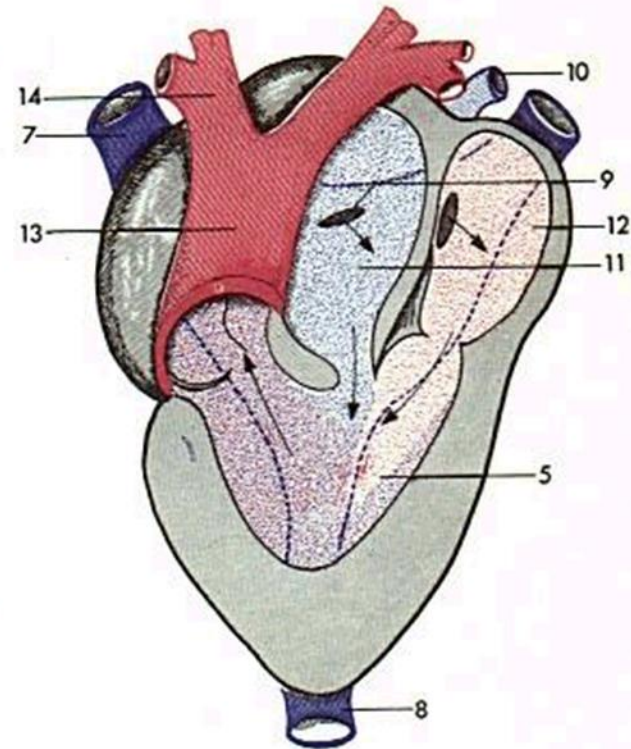
- Have **lungs** that allow them to breathe air instead of water
- Breathe through **skin, palate** of mouth
- Limited to damp environments





# Circulation

- Closed circulatory system—no water needed for blood flow
- Three - chambered heart keeps oxygenated and deoxygenated blood separated



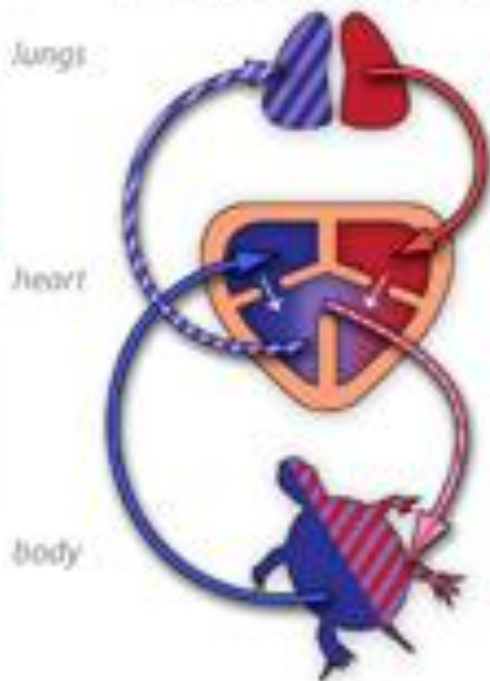
3 CHAMBERED FROG HEART

### 3-CHAMBERED



AMPHIBIANS

### 3-CHAMBERED (SEPTATED)



TURTLES

### 4-CHAMBERED

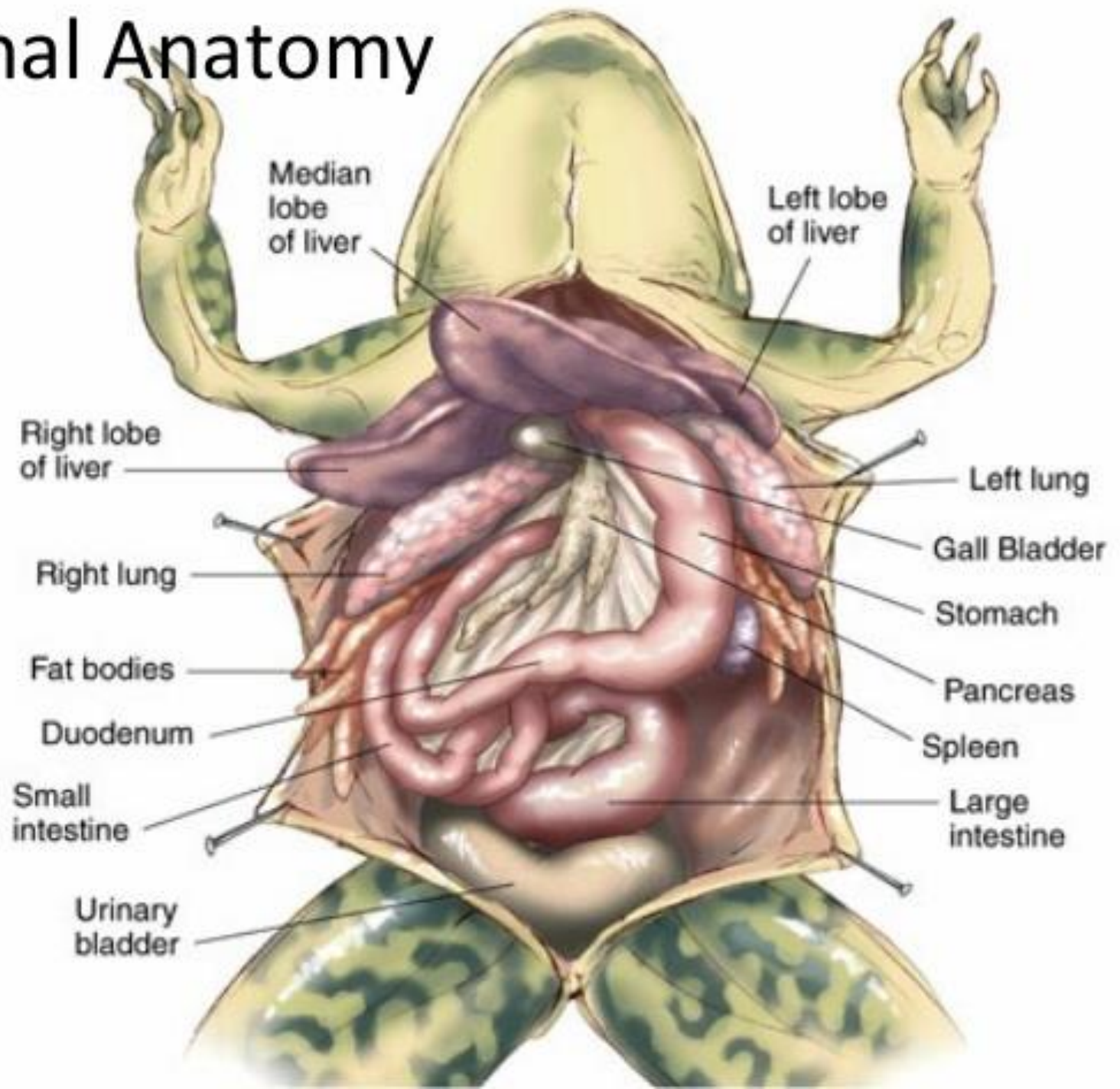


BIRDS AND MAMMALS



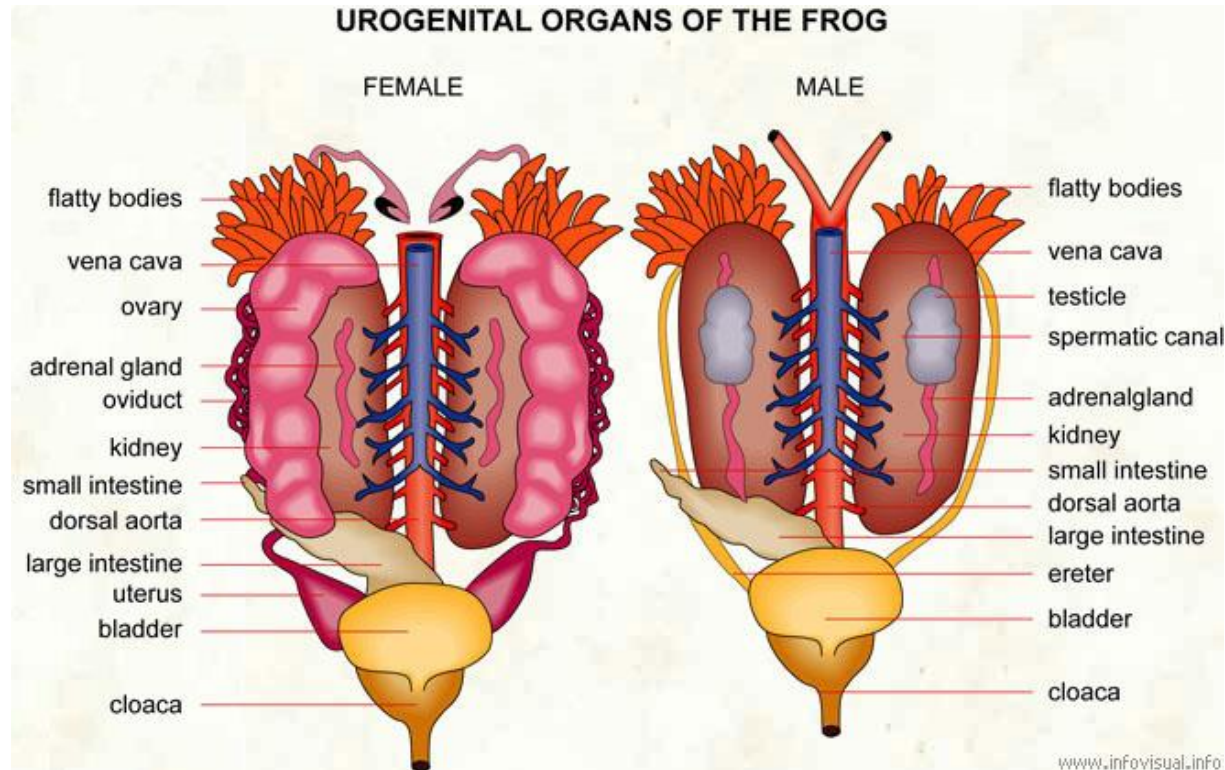


# Internal Anatomy



# Excretion/Waste

- Complete digestive tract
- **Cloaca** = common opening for digestive and reproductive systems
- Kidneys filter liquid waste (make **urea** from nitrogen waste)





# Reproduction = amplexus

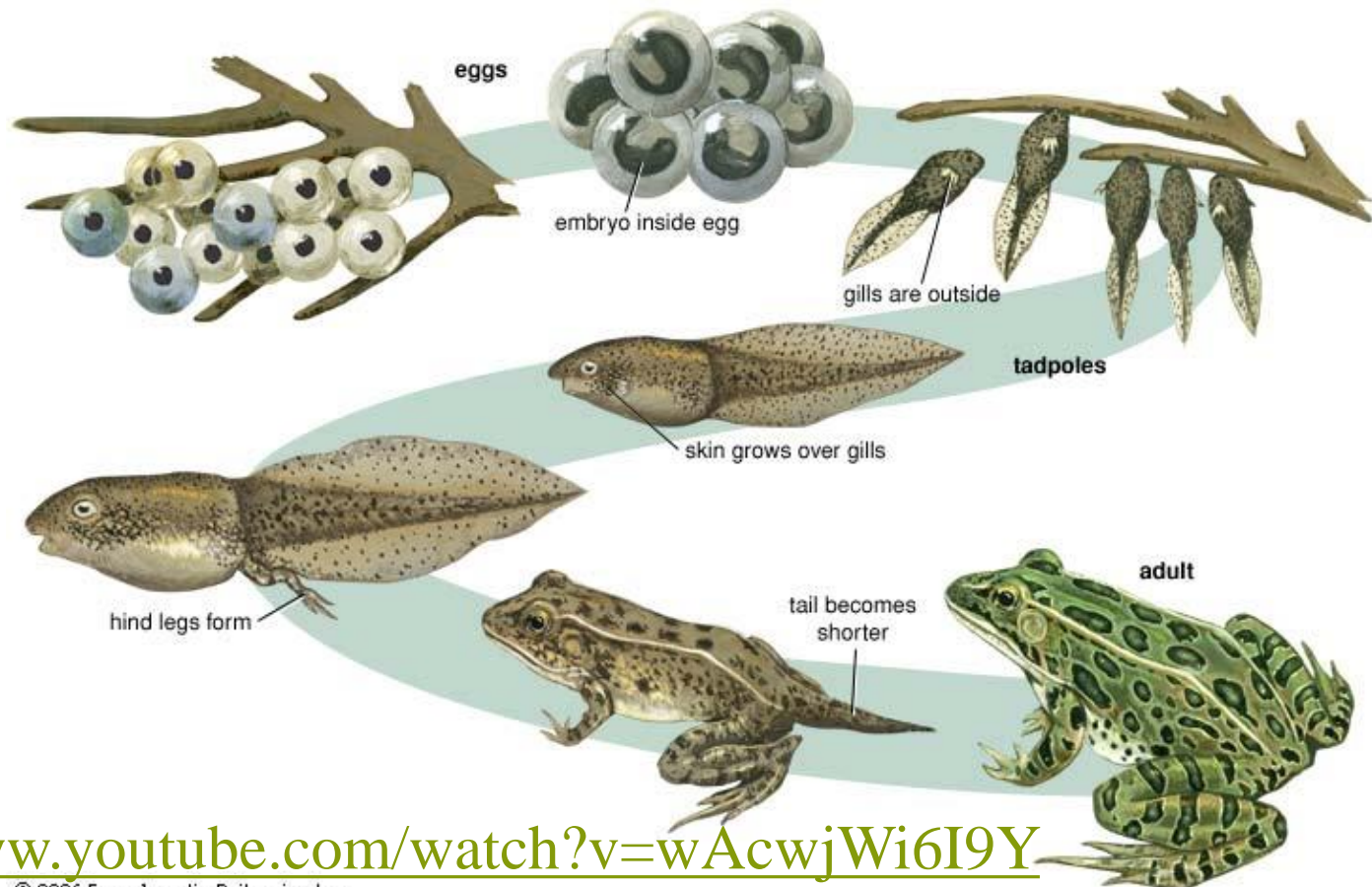
- External fertilization **requires water**.
- Males sing (using vocal sacs) to attract females, use thumbs to hug the females so they expel the eggs
- Eggs develop into tadpoles within a few days
- Ireland's Wild River: <https://www.youtube.com/watch?v=qtQ-J8AQow>





# Metamorphosis

- amphibians change during different stages.
  - Stage 1: Larvae (Aquatic: A-D)
  - Stage 2: Adult (Semi-Aquatic: E-F)



<https://www.youtube.com/watch?v=wAcwjWi6I9Y>

# Movement/Response

Forearms = feeding, walking

Hind feet = webbed for swimming

Hind legs = muscular for hopping, swimming

<http://www.youtube.com/watch?v=wXqK5QuIbJ8&NR=1>



# Hibernation in Winter

- Hibernation = “sleeping” in winter until spring. Some frogs actually freeze solid and thaw out in the spring!

Frog Thaw: <https://www.youtube.com/watch?v=dhUF5I6wr2A>

- Vernal Pools = spring/fall pools that form during rainy season. These are the main mating grounds for amphibians in many habitats like Montana



© Gary Nafis

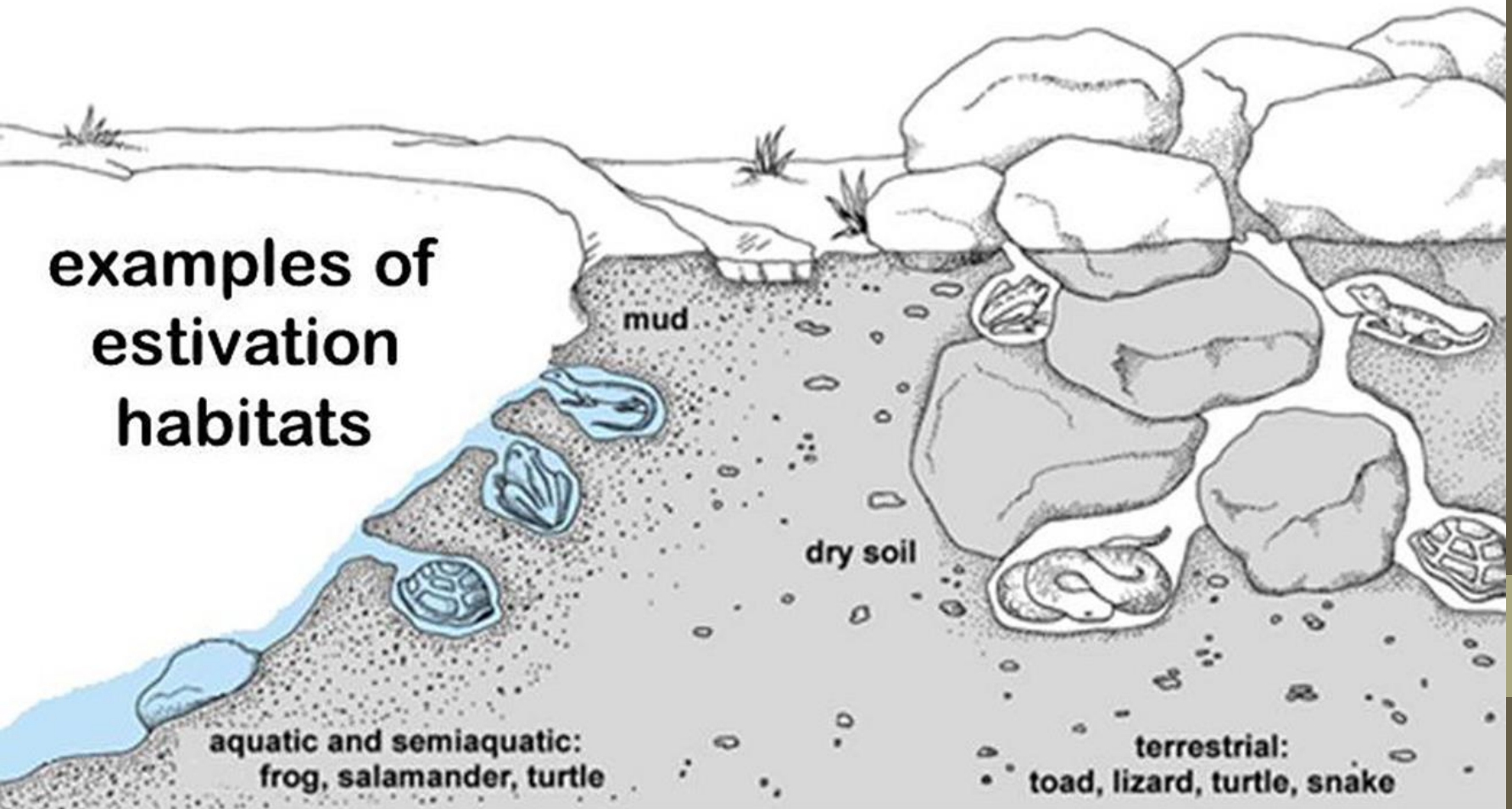




# Estivation in Summer

- Estivation = “sleeping” in summer when it gets too hot/dry

**examples of  
estivation  
habitats**



# Human Concerns

- Medicine
- Pets
- Food
- Indicators of Ecological Health

Nature: The Thin Green Line

<https://www.youtube.com/watch?v=mWptcZztVjA>



*Fire bellied toad*  
Bradykinin – reduces high blood pressure



*Whites tree frog*  
Caerin - blocks HIV transmission



*Waxy monkey frog*  
Dermaseptin –treats anti-biotic resistant *Staphylococcus*



*Phantasmal poison frog*  
Epibatidine - painkiller 200x more powerful than morphine

**EXTINCT**



*Gastric brooding frog*  
Prostaglandin – possible peptic ulcer cure



*African clawed frog*  
Magainin – diabetic foot ulcer cure

Kingdom Animalia

Phylum Chordata

Subphylum Vertebrata

Class Reptilia

Order Rynchocephalia  
(tuatara)



Order Squamata  
(snakes & lizards)



Order Chelonia  
(turtles & tortoises)



Order Crocodylia  
(alligators & crocodiles)



# Class Reptilia

- Evolved from Amphibians 320-310 million years ago (Carboniferous)
- Includes the extinct Dinosaurs and living lizards, snakes, turtles and crocodiles.



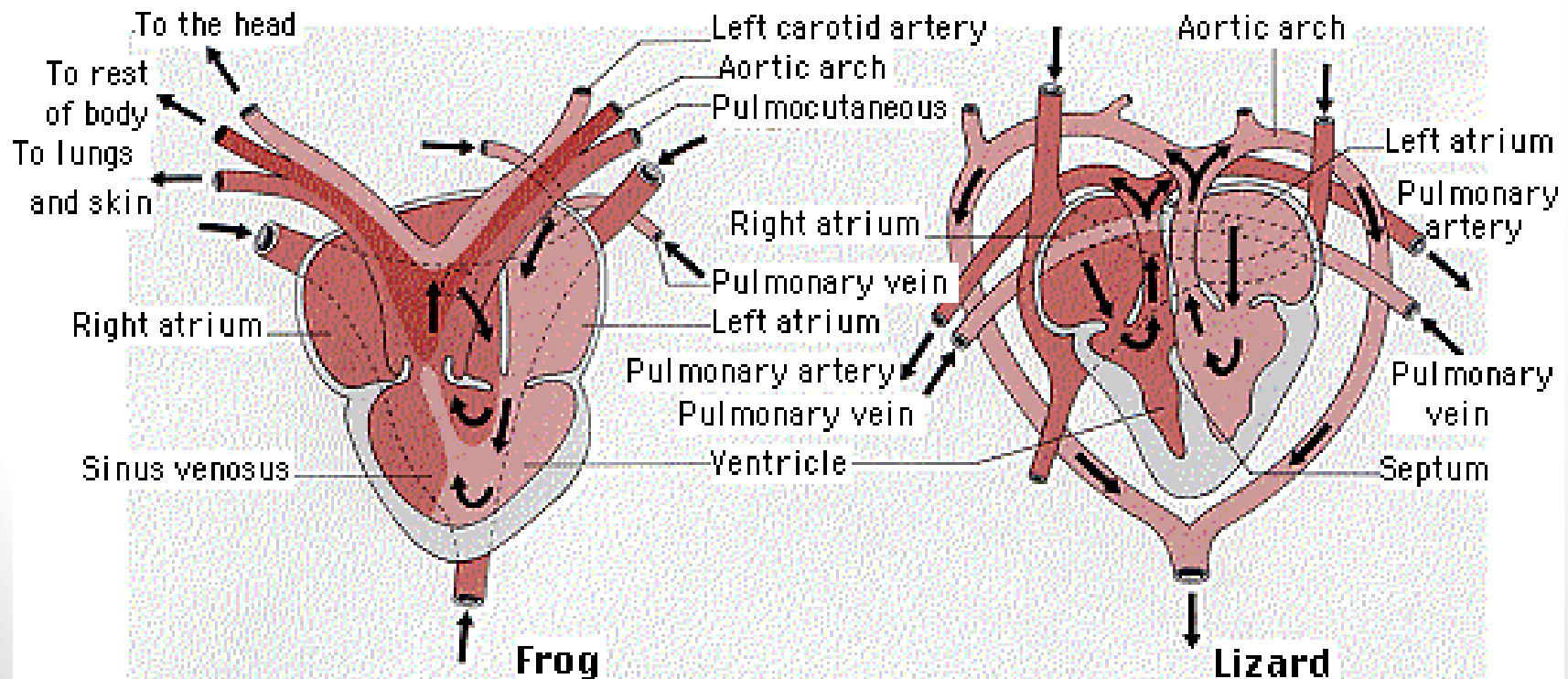
# Characteristics of Reptiles

- Habitat: Dry deserts to tropical
- Feeding: herbivores, omnivores, carnivores
- Body Plan: Tetrapod, Scales and claws for protection
- Respiration: Lungs—no gills (land adaptation)
- Excretion: Kidneys



# Reptile Circulation

- Reptiles have an advanced 4-chambered heart
- Most species are ectothermic, meaning their body temperature is determined by their external environment.



# Movement and Response

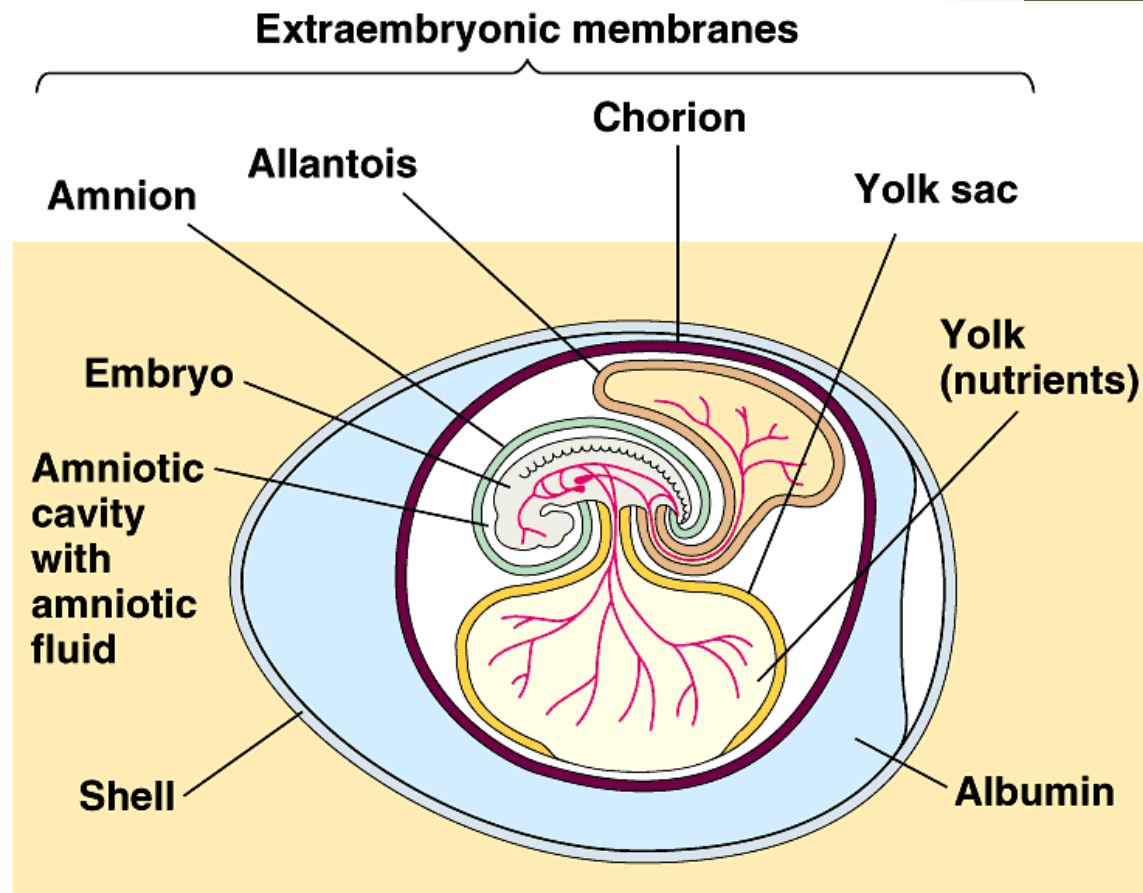
- vision is adapted to daylight conditions with color vision and depth perception than in other animals
- same basic parts of the amphibian brain, but the cerebrum and cerebellum are slightly large





# Reptile Reproduction

- Reproduce by internal fertilization, some can regenerate lost body parts
- **Oviparous**
  - lay eggs with soft water-resistant shells do not require external water for development
  - embryo protected by the amniotic membrane



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# Human concerns?

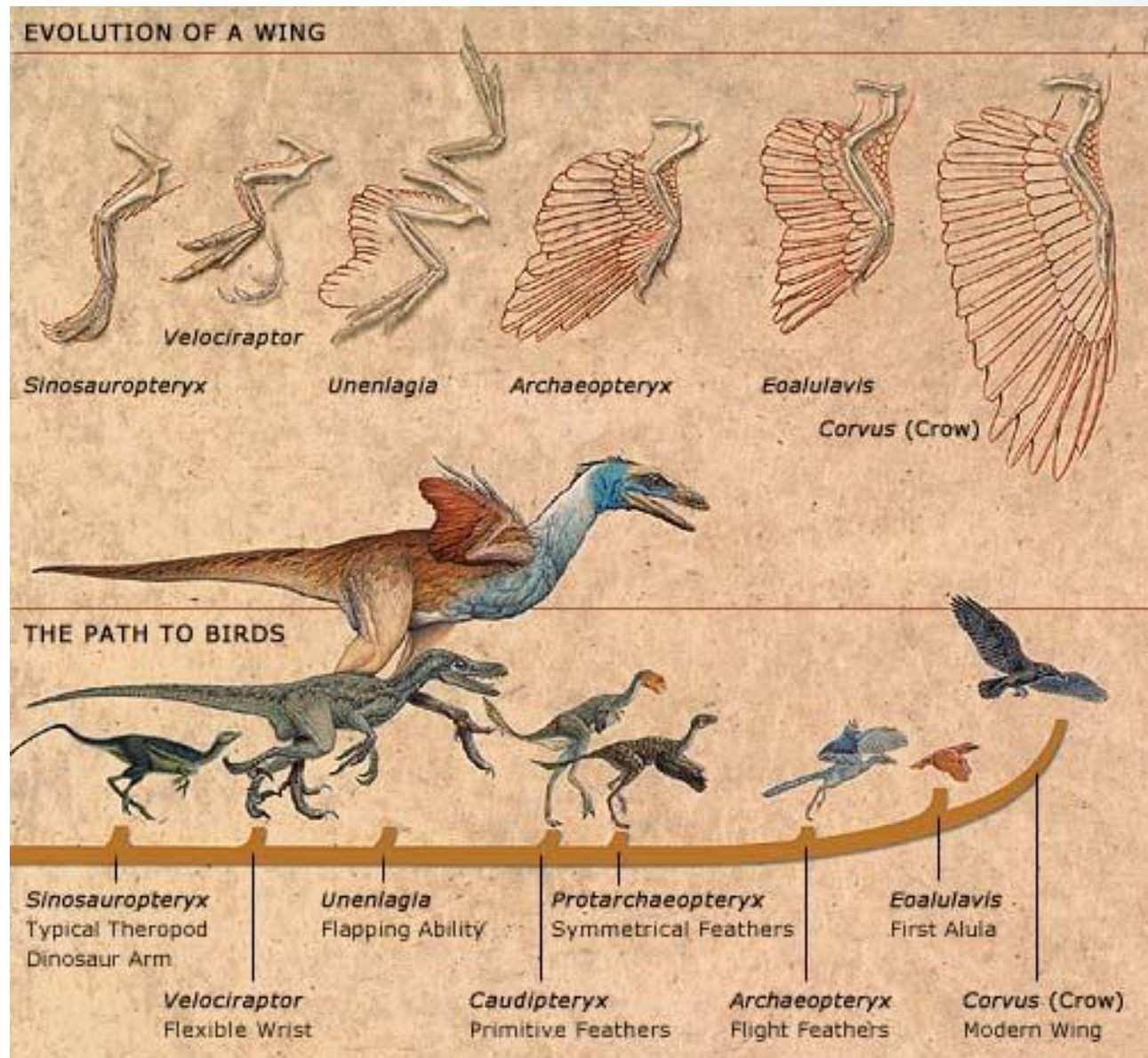
- Disease, poison, bites
- Pets
- Food?
- Invasive Species





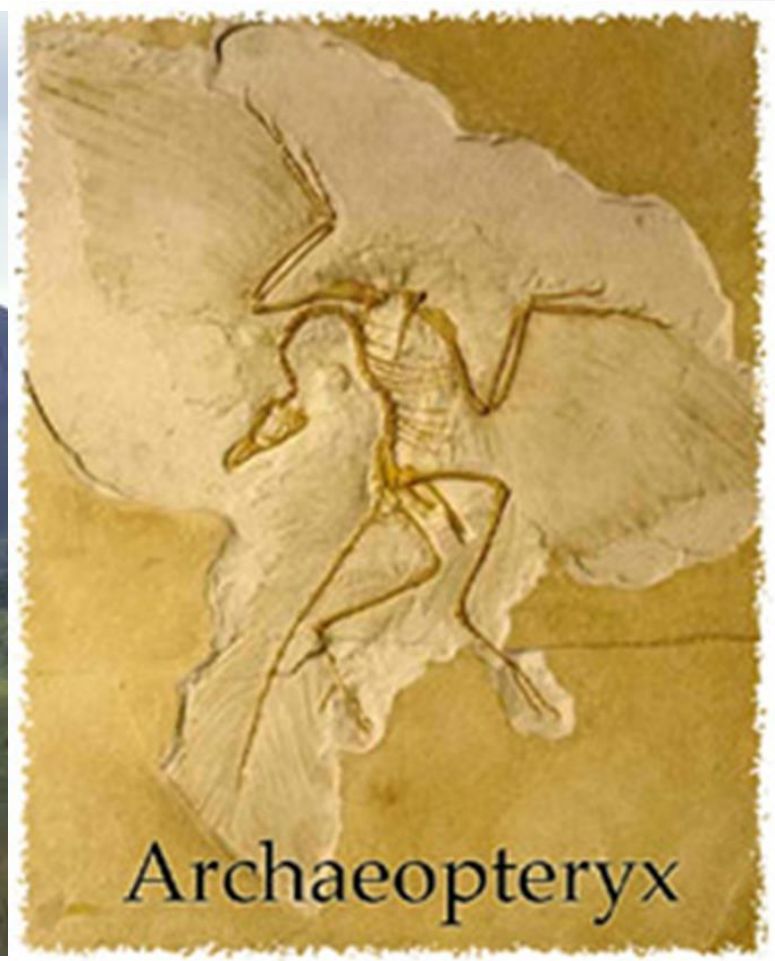
# Class Aves (Birds – *or ARE they?.....*)

- Believed to have evolved from the **theropod** dinosaurs during the Mesozoic Era
- Adapted for flight
- Bird feather may be a type of adapted reptile scale



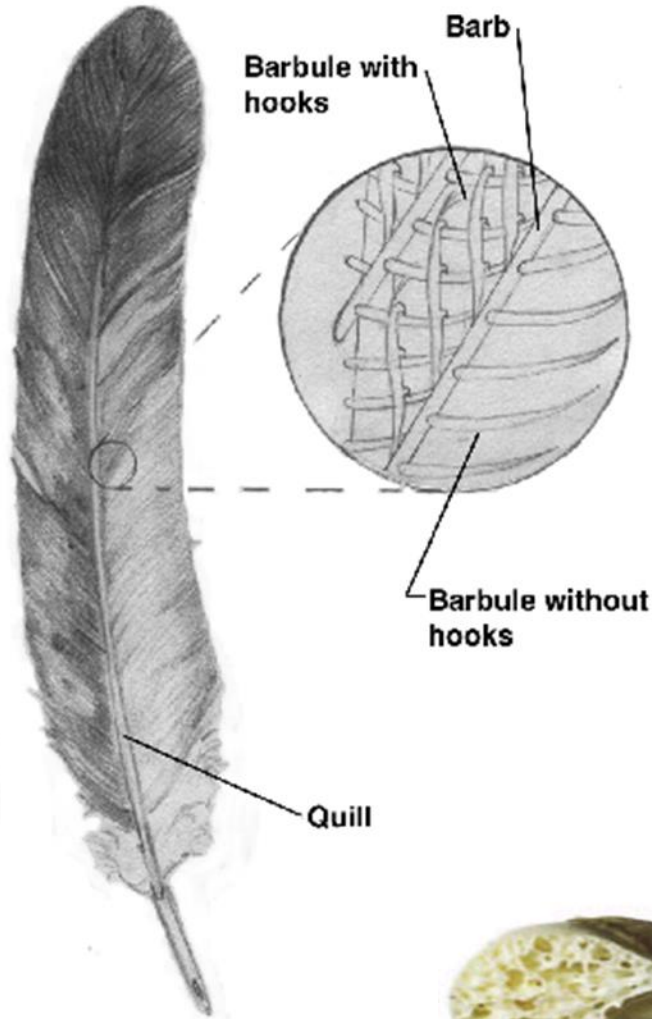


# Example: Miocene “Terror Cranes”



<http://www.arkive.org/shoebill/balaeniceps-rex/video-08.html>

# Body Plan: Flight Adaptations

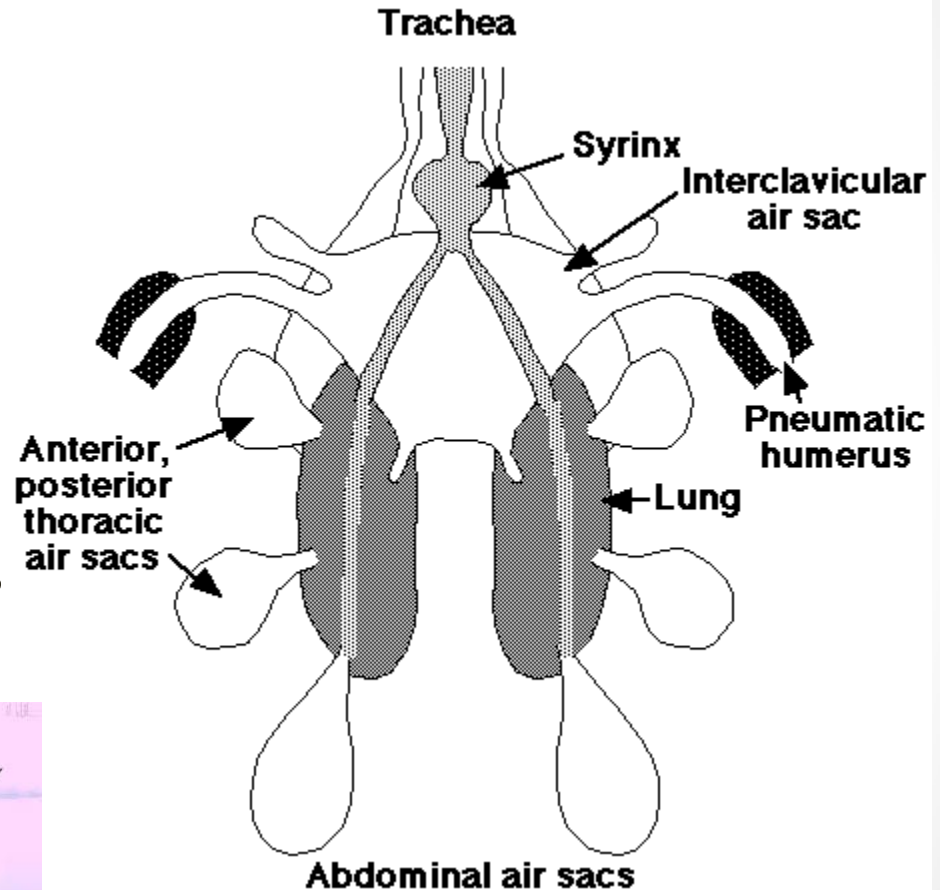


- Feathers attached to their skin
- Bones are very light and honey-combed in structure
- Body coloring used for camouflage and mate selection



# Respiration

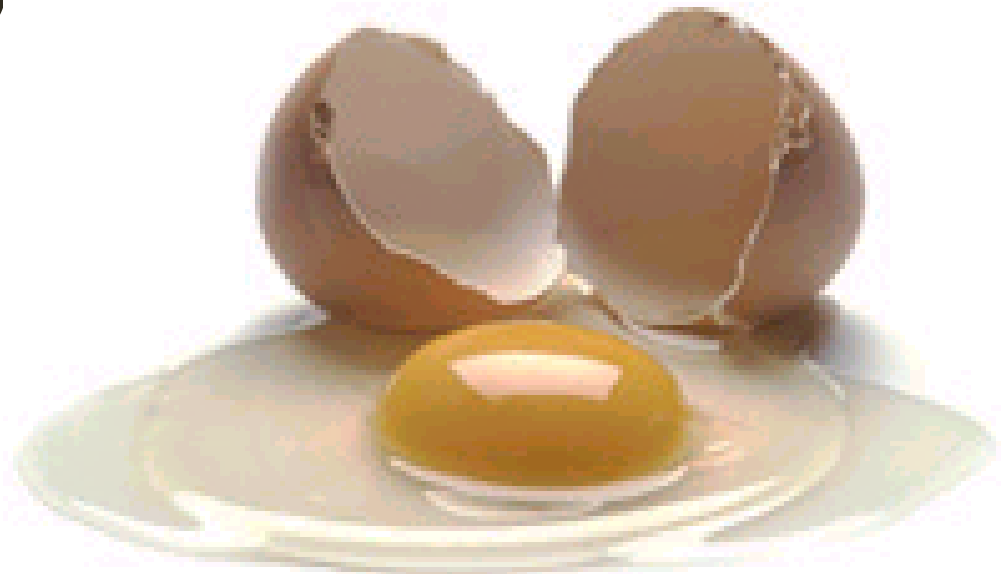
- Flight requires extra Oxygen. Birds ventilate their lungs more efficiently using air sacs which push air through the lungs
- Some dinosaur skeletons show spaces for air sacs





# Other Adaptations

- **Circulation:** 4-chambered heart (like reptiles & mammals) and are Endothermic (control their own internal temperature)
- **Feeding:** Have a Beak instead of teeth
- **Excretion:** Nitrogen waste as urea through cloaca—common opening for waste and reproduction
- **Reproduction:** internal fertilization and are oviparous (eggs have water-resistant shell)
- **Movement:** Flight



# Response/Senses

- Large nervous system relative to body size
- Large **Cerebrum** controls behavior patterns, navigation, mating rituals and nest building
- Most have a poor sense of smell but **excellent vision**; some can see in UV
- Some have learned to **use tools** to gather food and some can communicate with humans



[African Grey Parrot:](http://www.youtube.com/watch?v=O_Fpad20Zbk)

[http://www.youtube.com/watch?v=O\\_Fpad20Zbk](http://www.youtube.com/watch?v=O_Fpad20Zbk)

# Human concerns

- Food!
- Disease (Avian flu)
- Pets
- Wildlife watching
- Invasive Species

