

# **Animal Kingdom Vertebrates**

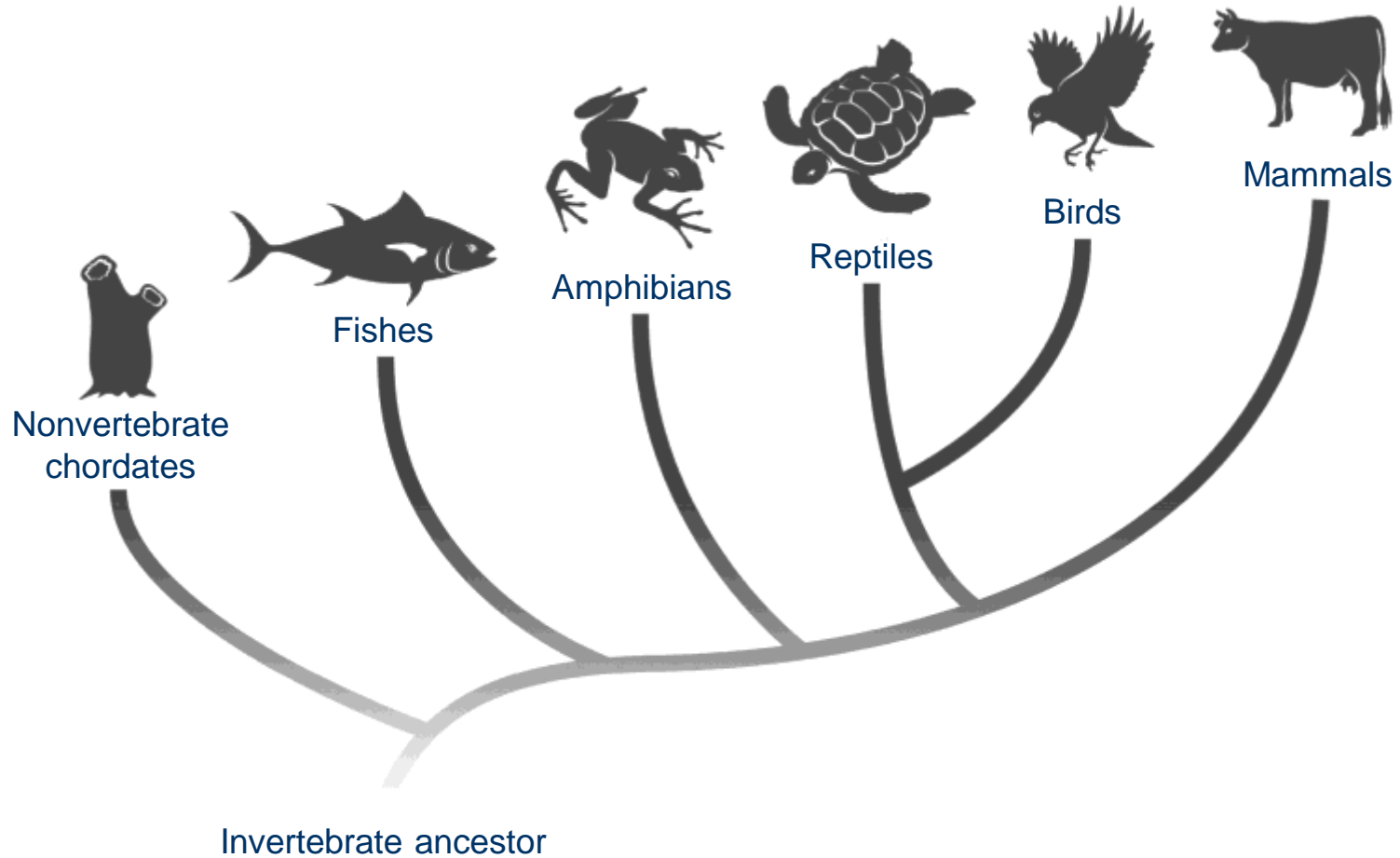
Biology 1



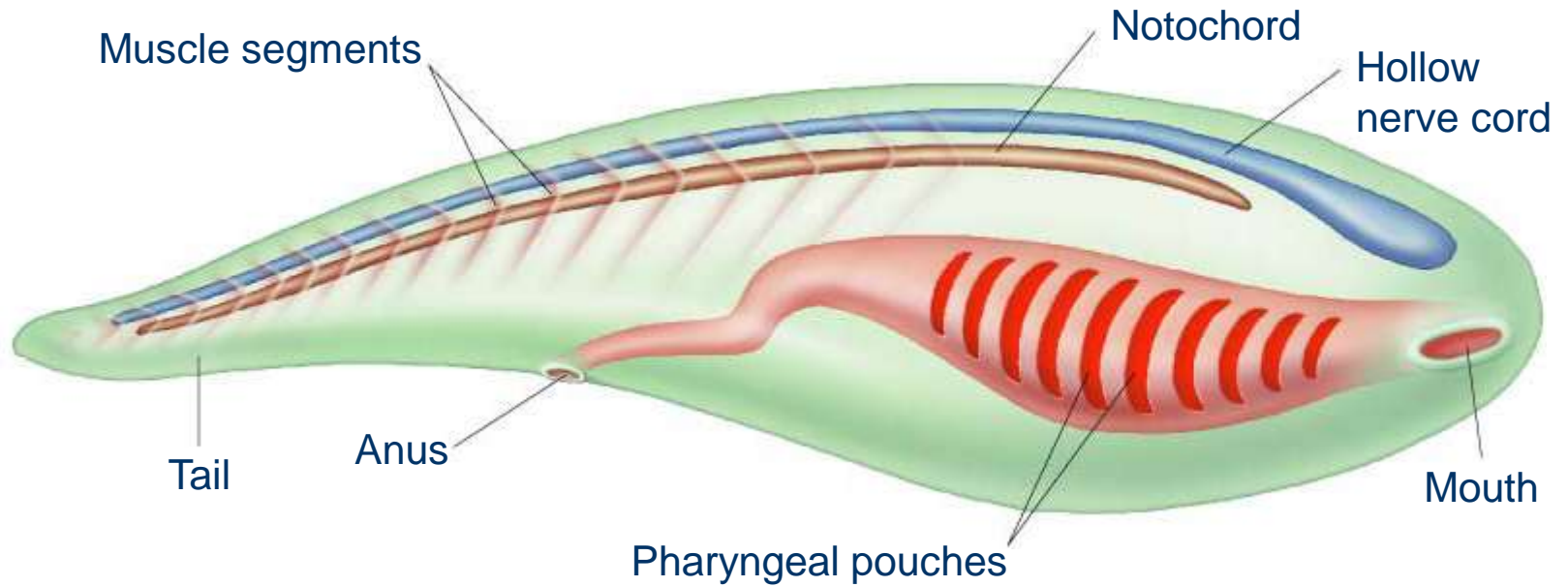
# What is a Chordate?

- All chordates have 4 basic features that are present at some point during their life cycle
  - Hollow Nerve Cord – Nerve cord in which nerves branch out at regular intervals
  - Notochord – Long supporting rod that runs throughout body
  - Pharyngeal Pouches – Paired structures in throat
  - Muscular Tail – Extends beyond anus
- Only 4-5% of animals are chordates
- Examples = Fish, Amphibians, Reptiles, Birds

# Chordate Cladogram



# The Generalized Structure of a Chordate



# Fish – Basic Facts

- Fish live in nearly every single aquatic habitat imaginable
- Fish are aquatic vertebrates characterized by fins, scales, and gills
- Fish were the first vertebrates to evolve.
- Fish bring in Oxygen rich water through gills and remove oxygen poor water through gill slits
- Closed circulatory system
- Four chambered heart
- Swim bladder controls buoyancy
- Most are egg laying
- Most move by contracting opposite muscles (S Shaped)

# Groups of Fish

- Jawless Fish –
  - Have mouths of soft tissue with no true teeth.
  - Have no bones
  - Only vertebrates with no vertebral column as adults
  - Lampreys, Hagfish
- Chondrichthyes –
  - Skeleton built entirely of cartilage
  - Sharks, sea rays
- Osteichthyes –
  - Bony Fish
  - Majority of fish fall in this order
  - Carp, sea horse, perch, etc.



Lamprey – Jawless Fish



Sea Ray - Chondrichthyes



Catfish - Osteichthyes



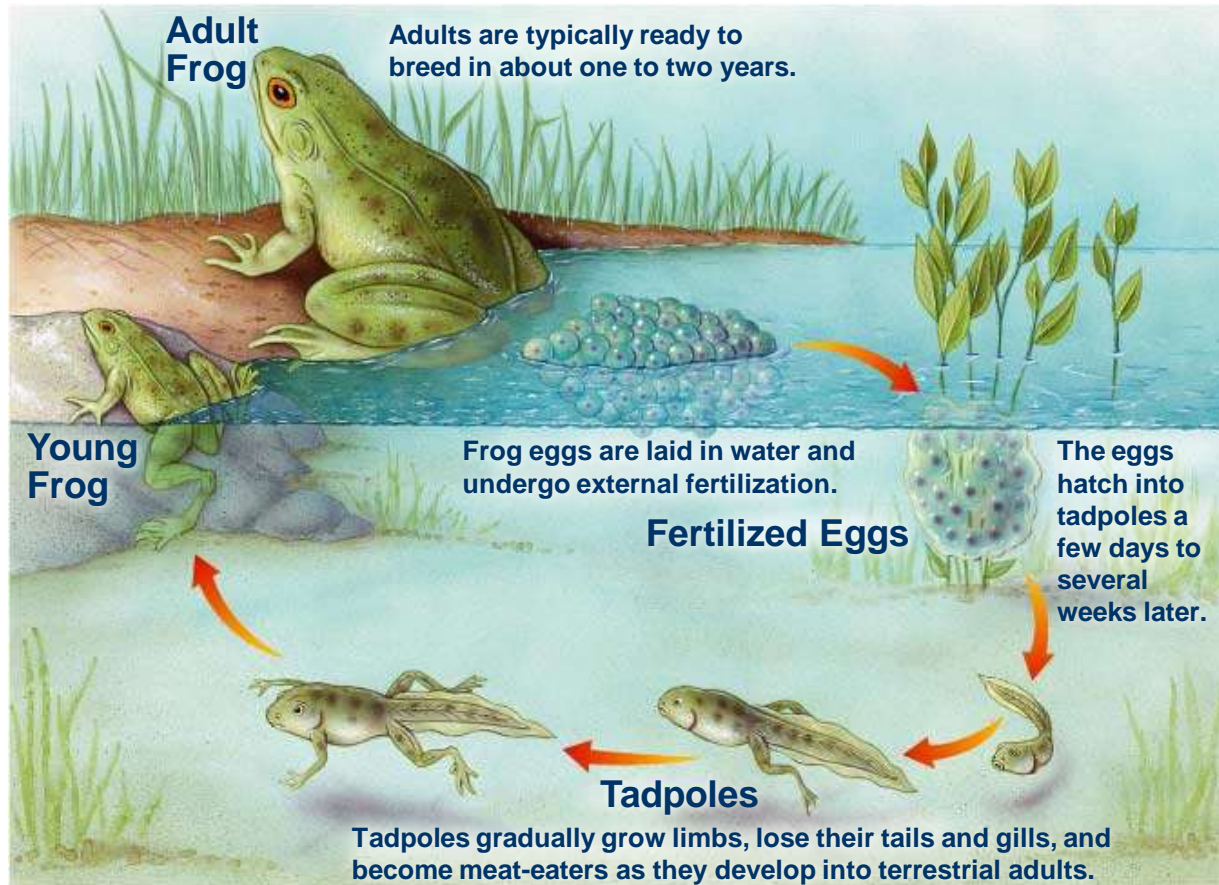
Whale Shark - Chondrichthyes

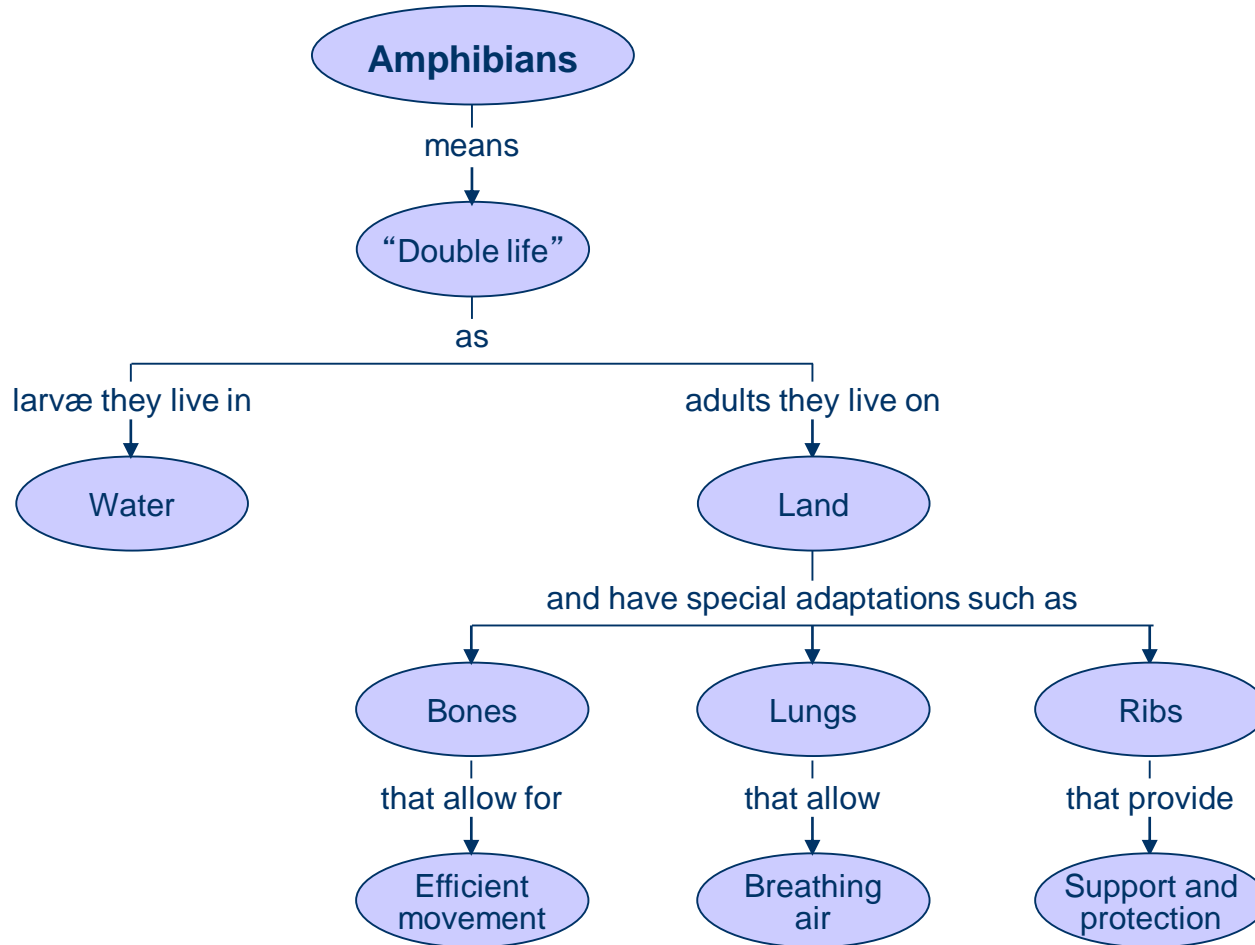
# Amphibians – Basic Facts

- Amphibian = “double life”
- Live in both water and land
- Most larvae are fishlike; adults are terrestrial carnivores
- Larvae respire through skin/gills; Adults use lungs
- Descendants of ancestral organisms that evolved some, not all, adaptations for life on land
- First appeared 360 million years ago
- External fertilization
- Closed circulatory system; three chambered heart



# The Life Cycle of a Frog





# Groups of Amphibians

- Salamanders –
  - Long bodies and tails
  - Adults are carnivorous
  - Usually live in moist woods
- Frogs and Toads –
  - Lack tails
  - Frogs have long legs and are usually tied to water
  - Toads have shorter legs and not as closely tied to water
- Caecilians –
  - Legless animals that burrow in moist soil
  - Have fishlike scales



Spotted Salamander



Poison Dart Frog



Fire Bellied Toad



Mundica ©2001

Caecilian

# Reptiles – Basic Facts

- All reptiles have:
  - Dry, scaly skin – helps prevent loss of body water in dry environments
  - Terrestrial eggs – first animals to develop amniotic eggs that didn't need to be deposited in water
- Breathe using lungs
- Internal Fertilization; Most are egg-laying
- Ectotherms – cannot internally regulate body temperature; cannot live in cold climates
- Behavior controls body temp. (swimming, burrowing, basking, etc.)
- Closed circulatory system; double loop;
- Heart = two atria/one or two ventricles

# Groups of Reptiles

- Lizards and Snakes
  - Have legs & clawed toes (lizards) external ears, moveable eyelids
  - Highly evolved specialized forms (venom)
- Crocodiles and Alligators
  - Long, typically broad snout and squat appearance
  - All are carnivorous
  - Protective of young; carry hatchlings in their mouth
  - Live in tropics and subtropics
  - Alligators live in freshwater
  - Crocodiles live in fresh or saltwater

# Groups of Reptiles (con.)

- Turtles and Tortoises –
  - All are shelled
  - Turtles are aquatic; tortoises are terrestrial
- Tuatara –
  - Primitive reptiles found on small, remote islands



Coral Snake



Sea Turtle



Galapagos Tortoise



Tuatara





Nile Crocodile



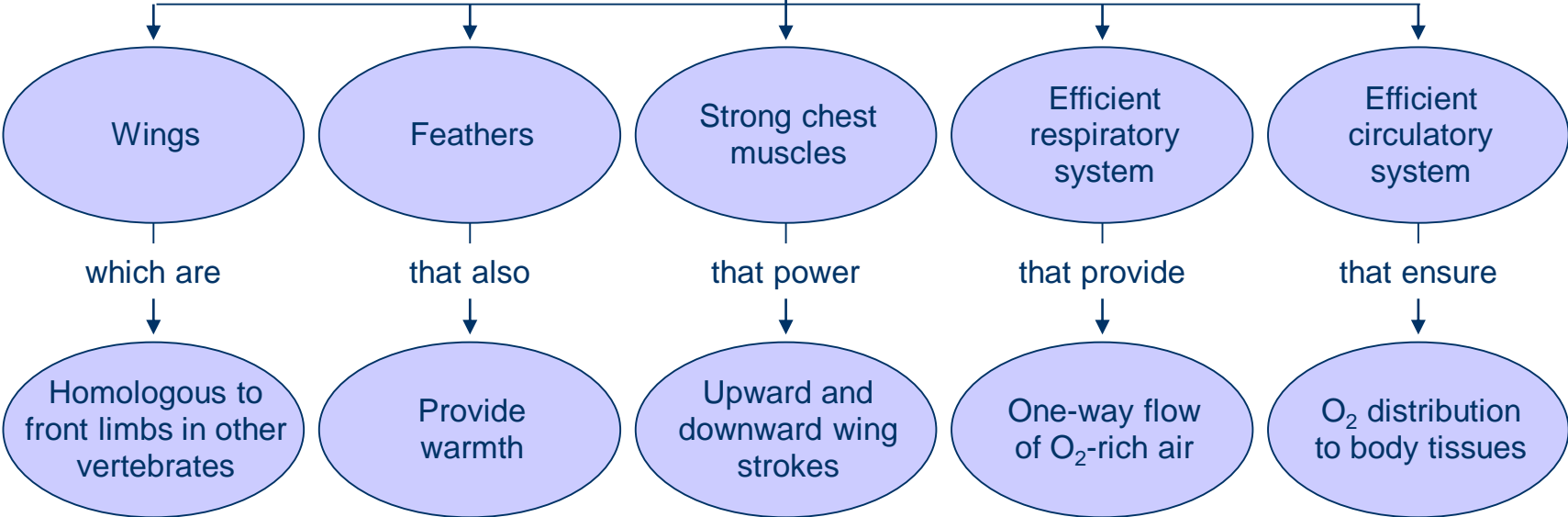
North American Alligator

# Birds – Basic Facts

- Nearly 10,000 modern bird species
- Birds are closely related to reptiles (scales on legs)
- Have outer covering made of feathers, two legs used for walking or perching, and forelimbs modified into wings
- Feathers separate birds from all other animal species
- Feathers provide insulation for warmth; can generate on body heat
- Beak/Bills adapted to type of food they eat
- Highly efficient respiratory system; lungs only exposed to Oxygen rich air
- Internal fertilization; amniotic eggs; many mate for life

**Birds**

have the following adaptations to flight



# Groups of Birds

- More than thirty orders of birds
- Some of the most common
  - Perching Birds – largest order; many are songbirds (sparrows, crows, cardinals, etc.)
  - Birds of Prey – fierce predators with hooked bills; large talons (condors, hawks, owls, eagles, etc.)
  - Herons & Relatives – Wade in aquatic habitats (storks, herons, cranes)
  - Ostriches & Relatives – flightless birds move by running or swimming (ostriches, emus, etc.)



Purple Finch



Stork



Red-Tailed Hawk



Emu

# Mammals – Basic Facts

- First true mammals appeared 220 million years ago
- Mammals flourished after dinosaurs became extinct – 65 million years ago
- Basic characteristics
  - Hair
  - Mammary glands – produce milk to nourish young
  - Breathe air
  - Four chambered heart
  - Endotherms – can generate own body heat
  - Internal fertilization; care for young

## Orders of Placental Mammals

<b>Order</b>	<b>Characteristics</b>	<b>Examples</b>
<b>Insectivores</b>	Long, narrow snouts, sharp claws	Shrews, hedgehogs, moles
<b>Sirenians</b>	Water-dwelling, slow-moving	Manatees, dugongs
<b>Cetaceans</b>	Live and breed in ocean, come to surface to breathe	Whales, dolphins
<b>Chiropterans</b>	Winged, capable of true flight	Bats
<b>Rodents</b>	Single pair of long, curved incisor teeth in upper and lower jaws	Mice, rats, voles, squirrels, beavers, porcupines, chinchillas

## Orders of Placental Mammals

Order	Characteristics	Examples
<b>Perissodactyls</b>	Hoofed, with an odd number of toes on each foot	Horses, tapirs, rhinoceroses, zebras
<b>Carnivores</b>	Sharp teeth and claws	Tigers, hyenas, dogs, foxes, bears, raccoons, walruses
<b>Artiodactyls</b>	Hoofed, with an even number of toes on each foot	Cattle, sheep, goats, pigs, ibex, giraffes, hippopotami, camels
<b>Proboscideans</b>	Trunks	Asian and African elephants, mastodons and mammoths



## Orders of Placental Mammals

Order	Characteristics	Examples
<b>Lagomorphs</b>	Two pairs of incisors in upper jaw, hind legs allow leaping	Snowshoe hares, rabbits
<b>Xenarthrans</b>	No teeth (or very small teeth in the back of the jaw)	Sloths, anteaters, armadillos
<b>Primates</b>	Highly developed cerebrum and complex behaviors	Lemurs, tarsiers, apes, gibbons, macaques, humans