

Chapter Sixteen: Fishes, Amphibians, and Reptiles

Teacher Notes

Lesson One: Fishes: The First Vertebrates

- Vertebrates-an animal that has a backbone.
- Chordates
 - phylum that vertebrates belong to
 - make up the largest group of chordates
 - two other groups of chordates – lancelets and tunicates
 - all chordates have four particular body parts at some point in their life
 - Tail, notochord, hollow nerve cord, pharyngeal pouches
- Vertebrate Characteristics
 - fishes, amphibians, reptiles, birds, and mammals are vertebrates
 - differences between vertebrates and other chordates
 - have backbone that is strong and flexible column of bones called the vertebrae
 - head is well developed skull made of cartilage or bone
- Are Vertebrates Warm or Cold?
 - Staying Warm
 - Endotherm-an animal that can use body heat from chemical reactions in the body's cells to maintain a constant body temperature. (Warmblooded animals)
 - Cold Blood?
 - Ectotherm-an organism that needs sources of heat outside of itself.
 - depend on surrounding to stay warm because body temperature changes with environment temperature changes. (Coldblooded animals)
- Fish Characteristics
 - come in many shapes, sizes, and colors
 - more than 25,000 species
 - all fish live in water, have a strong body and brain
 - Born to Swim
 - things that help them swim-strong muscles attached to backbone; fins help steer, stop, and balance and move; also have scales for protection and provide less friction in the water.
 - Making Sense of the World
 - fishes have brains to take in information
 - all have vision, hearing, and smell
 - most have lateral line system-a faint line visible on both sides of a fish's body that runs the length of the body and marks the location of sense organs that detect vibrations in water.
 - Underwater Breathing
 - gills-a respiratory organ in which oxygen from the water is exchanged with carbon dioxide from the blood.
 - Making More Fish

- most fish use external fertilization-female lays unfertilized eggs in water and the male drops sperm on them.
- some use internal fertilization-male deposits sperm inside the female who then lays fertilized eggs that have embryos inside.

-Kinds of Fishes

- There are five classes of fish (two are extinct)

-Jawless Fishes

- first fishes

- two kinds of modern jawless fish are hagfish and lampreys
 - skeleton made of cartilage, have a notochord, skull, brain, and eyes

- do not need jaws to eat

-Cartilaginous Fishes

- includes sharks, skates, and rays (cartilage never changes to bone)

- in most the cartilage is changed to bone

- fully functional jaws, strong swimmers, and expert predators

- to float-store a lot of oil in their liver making them more buoyant

- they have to keep moving to stay afloat

- some also keep moving to keep water moving over their gills so they don't suffocate

- some can lie on ocean floor and pump water across their gills

-Bony Fish

- have a skeleton made of bone, scales, and can rest in one place without swimming.

- swim bladder-a gas-filled sac that is used to control buoyancy

- two main groups of bony fish

- most are ray-finned fishes-have paired fins supported by thin rays of bone.

- include eels, herrings, trout, minnows, and perch

- lobe-finned fishes have fins that are muscular and thick

- seven living species of lobe-finned fish

- six are lungfishes that have air sacs

Lesson Two: Amphibians

-Moving to Land

- Amphibians are animals that can live in water and have lungs and legs.

- Scientists think they may have developed from lungfish

- lung-a respiratory organ in which oxygen from the air is exchanged with carbon dioxide from the blood.

-Characteristics of Amphibians

- Amphibian means "double life"; most live part of their lives in water and part on land

- eggs don't have a shell so they usually develop in wet environments

- Thin Skin

- so thin that they can lose water through their skin and easily become dehydrated. They absorb water instead of drinking.
 - reason that most live near water
- can breathe by gulping air into their lungs but may also absorb oxygen through skin.
- many have brightly colored skin which usually means they contain poison
- Leading a Double Life
 - Tadpole-the aquatic, fish-shaped larva of a frog or toad
 - Tadpole goes through metamorphosis by losing tail and developing lungs and limbs to live on land.
 - some hatch as tiny forms of adult but have gills
- Kinds of Amphibians-more than 5,400 species alive today
 - Caecilians
 - not very familiar; more than 160 species
 - live in tropic areas of Asia, Africa, and South America
 - look like earthworms or snakes with a thin, moist skin
 - don't have legs and some have bony scales
 - Salamanders
 - about 500 known species
 - most live under stones and logs in woods of North America
 - have long tail and four strong legs
 - do not develop as tadpoles and most lose gills as they grow
 - Frogs and Toads
 - About 90% of all amphibians
 - live all over the world (except very cold places)
 - highly adapted for life on land with strong legs, ears, and a long, sticky tongue
 - Singing Frogs
- Amphibians as Ecological Indicators
 - Amphibians are often called ecological indicators or early signs of changes in an ecosystem
 - when large numbers start dying scientists can look for environmental problems.

Lesson Three: Reptiles

- Living on Land
 - After moving to land they grew thick, dry skin that reduced water loss, legs grew stronger, and laid eggs on dry land
 - first animals to live out of the water
 - many are now extinct including dinosaurs
- Characteristics of Reptiles
 - Thick Skin
 - important for life on land
 - forms water tight layer that keeps cells from losing water by evaporation

- most can't breathe through skin and depend on lungs
- Body Temperature
 - nearly all are ectotherms; can't keep body temperature stable
 - are active when it is warm; slow down when it is cool
 - most live in mild temperatures and not at the poles
- The Amazing Amniotic Egg
 - Amniotic Egg-a type of egg that is surrounded by a membrane, the amnion, and that in reptiles, birds, and egg-laying mammals contains a large amount of yolk and is surrounded by a shell.
 - protects embryo and prevents it from drying out
 - can be laid under rocks, in the ground, or in the desert
- Parts of the Amniotic Egg
 - shell-protects egg from damage and keeps it from drying out; has small pores that allow oxygen and carbon dioxide to pass through
 - albumen-provides water and protein
 - amniotic sac-surrounds and protects
 - allantois-stores the embryo's wastes; also passes oxygen from the pores in the shell
 - yolk-gives embryo a rich supply of food
- Reptile Reproduction
 - usually reproduce by internal fertilization
 - after fertilization; a shell forms around the egg
 - egg is laid
 - a few reptiles don't lay eggs
 - these develop inside of the mother and young is born alive
 - embryos are born looking like tiny adults; don't go through metamorphosis
- Kinds of Reptiles
 - today about 8,000 species are known to exist
 - Turtles and Tortoises
 - are distantly related to other living reptiles
 - tortoises usually live on land; and turtles live mostly in the water
 - shell makes them unique because it makes them slow and inflexible
 - used as a form of protection
 - Crocodiles and Alligators
 - spend most of their time in the water
 - eyes and nostrils are on top of flat head so they can watch for prey body hidden underwater
 - are meat eaters
 - difference between
 - crocodile-narrow head and pointed snout
 - alligator-broad head and rounded snout
 - Snakes and Lizards
 - most common reptiles
 - snakes

- carnivores with special organs in mouth to sense prey
- snake flicks tongue out tiny molecules in the air stick to it
 - snake then touches tongue to the organ which tells them if prey is nearby.

- some kill prey by squeezing; others have poison
- to eat they open mouth wide and swallow prey whole

- lizards

- most eat small insects and worms; some eat plants
- Komodo dragon eats deer, pigs, and goats
- have loosely connected jaws but don't eat prey whole
- many can break off tail to escape predators

- Tuataras

- live only on a few islands off New Zealand
- look similar to lizards but grow large
- don't have visible ear openings
- are most active when temperature is low
- during the day they absorb sunlight and search for food at night