FISHES

1. SUPERCLASS PISCES

3 classes - earliest evolved vertebrates, also most diverse, numerous, dominant in oceans (esp. bony fishes)

ectothermic - match ocean temperature
- sharks & tunas 'hot-blooded'

paired fins - pectoral vs pelvic

gills - extract 85% O_2 from water

lateral line - detects prey, salinity, pressure, currents, etc.

electricity - shark, ray, eel, catfish
- 200 volts, defensive & stuns prey

urine - ammonia toxic but diluted

2. JAWLESS FISHES

Class Agnatha - really 2 different groups
- eel-like, no scales or paired fins
- cartilaginous skeleton (no true bone)
- no jaw so mouth always opened
- pumps water thru gill pouches

hagfish - more primitive, single nostril
- photophores but mostly blind
- suffocate weak prey with mucus
- also scavenge for dead food

lampreys - more advanced, 2 decent eyes
- exoparasites suck flesh from fish
- returns to ocean to spawn

3. CARTILAGINOUS FISHES

Class Chondrichthyes - cartilage skeleton reinforced by Ca
- 5-7 pairs gills (thru mouth & spiracle, exit gill slits)
- oil stored for buoyancy (no bladder, swim or sink)
- spiny scales like sandpaper

rays - flat, ±ovoid or extra-wide fins
- flat plate-like teeth to crush shells

- some with sharp tail spines

skates - pointed teeth like sharks
- flat, ±rhomboid with blunt fins

sharks - fusiform (torpedo-shaped)
- most predatory (exc. basking sharks filter-feed)
- heterocercal tail (vertebrae into long upper lobe, pushes downward, flat ventral surface compensates)
- powerful jaws with rows of sharp enameled teeth
- sensory crypts (skin, olfaction)
- ampullae of Lorenzini (electric sensing pit)
- pelvic claspers in males to transfer sperm
- eggs laid in cases or retained in body

ratfish - unusual, toxic dorsal spine

4. BONY FISHES

Class Osteichthyes - bony skeleton hard but light
- 2 pairs of fins, homocercal tail (lobes equal)
- adjust vol gas in swim bladder to control buoyancy
- operculum covers 4-5 pairs of gills

ray-finned fishes - almost all fish species
- all fins supported by fin rays (cartilage or bone)
- salmon returns to freshwater to spawn

others - coelacanth - leg-like fins, lungs
- lungfish - freshwater only, single lung

5. OSMOREGULATION

marine organisms
- seawater more concentrated than tissue
- so body loses water + gains salt
- inverts & jawless fishes - retain salt to match
- cartilaginous fishes - retain chloride or urea to match
- bony fishes - drink lots of water
  - gills & salt gland secrete salt
  - little urine but very concentrated

freshwater fishes (jawless & bony)
- tissue more concentrated than freshwater
- so body gains water + loses salt
- drink little, gills absorb salt, lots of dilute urine