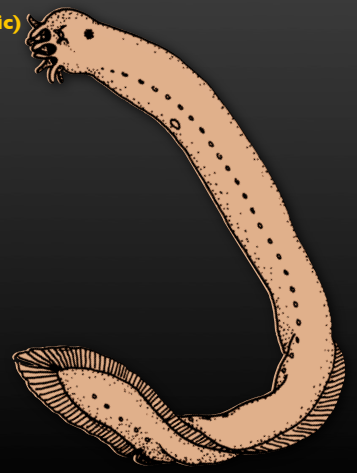
FISH AND AMPHIBIANS

agnatha, chondrichthyes, osteichthyes, amphibia

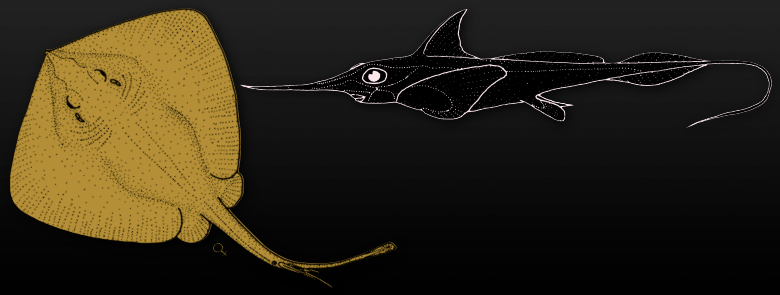
JAWLESS FISH

- **SUPERCLASS AGNATHA (not monophyletic)**
  - Retain notochord as adults with jointed cartilaginous vertebrae
  - 2 chambered heart, no jaws, 1st and 2nd gill bars can manipulate food, homologous to lower jaws in gnathostomes
  - CLASS MYXINI - HAGFISH
    - Scavengers, slimy with mucus for defense and feeding
  - CLASS PETROMYZONTES – LAMPREYS
    - Scavengers and parasites, migrate from fresh to saltwater for breeding



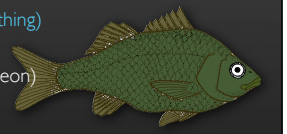
SHARKS ET AL

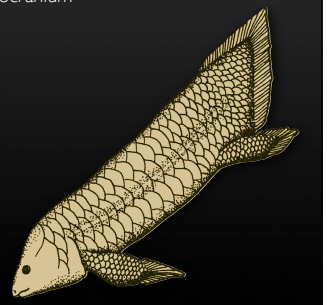
- CLASS CHONDRICHTHYES (CARTILAGINOUS FISH)
  - Jaws, placoid scales, internal fertilization, males with claspers
  - No swim bladder, live-bearing or egg-laying
  - SUBCLASS ELASMOBRANCHII – SHARKS, SKATES, AND RAYS
    - Separate gill slits, 1st gill slit is a spiracle, heterocercal tail
  - SUBCLASS HOLOCEPHALI – RATFISH
    - Upper jaw fused to chondrocranium, gills covered by operculum



BONY FISH

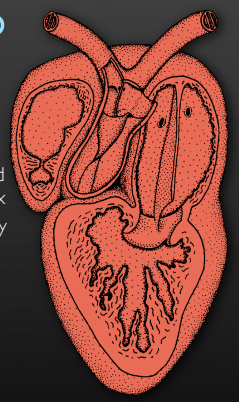
- **group OSTEICHTHYES (NOT monophyletic)**
  - Bony fish with external fertilization, operculum over gills
  - Lungs evolved into swim bladder (some retain lungs for air breathing)
  - CLASS ACTINOPTERYGII – RAY-FINNED FISHES
    - SUBCLASS CHONDROSTEI -- Ganoid scales (gar and sturgeon)
    - SUBCLASS NEOPTERYGII – MODERN BONY FISH
      - Ctenoid or cycloid scales
      - All with swim bladders, complex jaws free of chondrocranium
      - Very diverse group - mostly infraclass teleostei
  - CLASS SARCOPTERYGII – LOBE-FINNED FISHES
    - Tetrapod ancestors
    - Lungfish – Dipnoi
    - Coelocanth – Crossopterygii





AMPHIBIANS

- CLASS AMPHIBIA
  - Functional limbs
  - Breathe air (paired lungs)
  - Sensory mechanism shift
  - 3-chambered heart allows for increased metabolism and blood pressure since oxygenated and de-oxygenated blood don't mix
  - Primitive amphibians were like huge crocodiles with polydactyly
  - Need water for reproduction (Amphibian means "two lives")
  - SUBCLASS LISSAMPHIBIA – EXTANT AMPHIBIANS MONOPHYLETIC GROUP



- ORDER ANURA – FROGS AND TOADS
  - Very diverse group with variable life histories, external fertilization
- ORDER URODELA – SALAMANDERS
  - "Ancestral" body plan, internal fertilization, neotenic in some cases
  - highest diversity in North America
- ORDER GYMNOPHIONA – CAECILIANS
  - Fossorial, limbless, unique sensory tentacles, internal fertilization, dermal scales