Lecture Notes Chapter 14

I. Chordata- phylum
   A. 3 subphyla
      1. Urochordata
      2. Cephalochordata
      3. Vertebrata

II. Characteristics of all Chordates (found during some part of the life cycle)
   A. All have a dorsal nerve chord
   B. All have a notochord: a flexible, rod-like structure
   C. All have gill slits

III. Urochordates- Tunicates
   A. Soft-bodied, marine and sessile
   B. Obtains food and O_2 by filtering through gill slits
   C. Adult tunicates have gill slits but lack nerve chord and notochord
   D. Larval forms look like tadpoles are mobile and have all three chordate characteristics

IV. Cephalochordates- Lancelets: *Amphioxious* sp.
   A. All are marine
   B. Mobile, live in the sand with anterior end above for feeding
   C. Adults show all three chordate characteristics

V. Vertebrates- backboned critters
   A. Eight classes to know:
      1. Chondrichthyes
      2. Osteichthyes
      3. Amphibia
      4. Reptilia
      5. Aves
      6. Mammalia
   B. Most numerous and complex of the Chordates
   C. Additional characteristics of most vertebrates
      1. Spinal column aids in flexibility and internal support. Replaces the function of the notochord
      2. Anterior end of nerve chord enlarged as a brain
      3. Body usually divided into head, neck and trunk regions
      4. Tail present at some point of life cycle
      5. Two pairs of appendages
      6. Heart with between two and four chambers
      7. Aquatic critters use gills for respiration
      8. Land critters use lungs for respiration
      9. Exothermic- cold blooded or Endothermic- warm blooded
      10. Closed circulatory systems

VI. Fishes - water dwellers usually w/ gills, scales and fins
   A. 3 groups
      1. Jawless: lampreys and hagfish
      2. Cartilaginous fishes: Sharks, skates and rays
      3. Bony Fishes: Tuna, salmon and bass
   B. Jawless Fishes: lampreys and hagfish

1. Skeleton is cartilaginous
2. Notochord persists throughout the life
3. Lampreys are parasitic w/ a sucker-like mouth, both marine and freshwater
4. Hagfish are scavengers, opportunistic strictly marine
5. External fertilization

C. Chondrichthyes: Sharks, skates and rays
1. Skeleton is cartilaginous w/ traces of notochord present
2. Two chambered heart
3. Skates and rays
    a. Flattened wing-like bodies
    b. Whip-like tails, some with poisonous spines
    c. Electric rays
4. Internal fertilization

D. Osteichthyes: Bony Fishes
1. Largest class of vertebrates
2. Most have bony skeletons, paired fins and overlapping scales
3. Operculum is the hard bony gill covering
4. Air Bladder adjusts the density of the fish in the water column
5. Lateral line present in most
6. 2 chambered heart
7. External fertilization with spawning and milt
8. External Characteristics
    a. Dorsal fin with spines and/or rays
    b. Pectoral fins
    c. Pelvic fins
    d. Caudal Fins

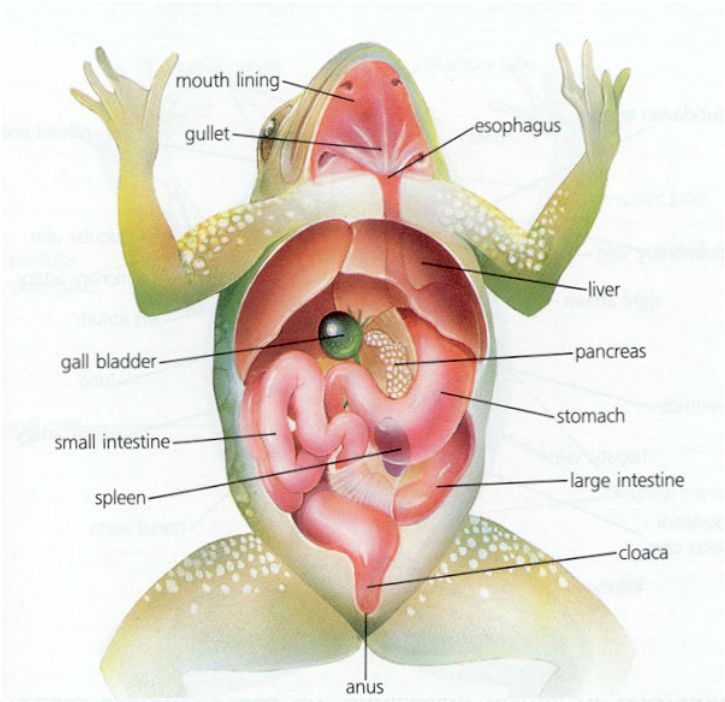
E. Amphibians – frogs, toads, newts and salamanders
1. Some aquatic, some terrestrial but most return to water to breed
2. Characteristics include
    a. Skin is thin and without scales
    b. Skin also used for respiration
    c. 2 nostrils connect to mouth cavity
    d. Juvenile usually present i.e. frogs and toads have tadpoles
    e. Larval forms with gills while adults usually have lungs
3. Salamanders and Newts
    a. Most have tails
    b. Most are 8 to 20 cm, Giant Japanese Salamander 5 feet long!
    c. Predatory and feed on bugs, worms and small fish
    d. Either entirely aquatic or require very moist habitat
4. Frogs and Toads
    a. Most adults are tailless

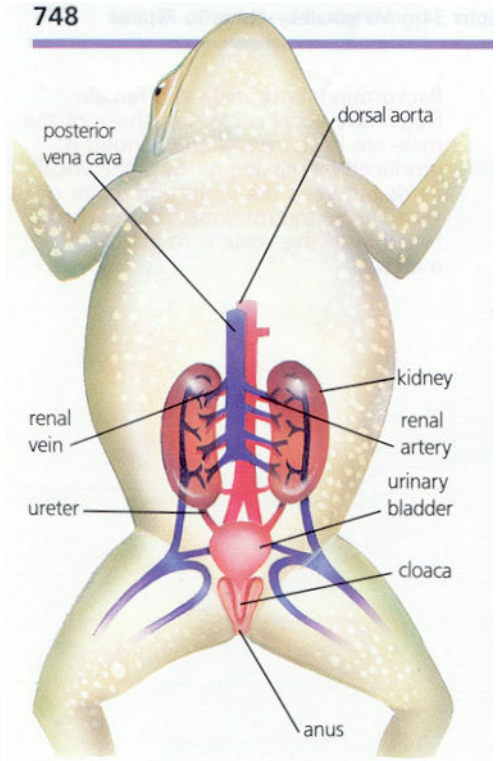
b. Frogs have smooth thin skin
c. Toads have dry rough warty skin
d. Hind limbs suitable for jumping
e. Adults are predatory, juveniles are vegetarians
f. External fertilization

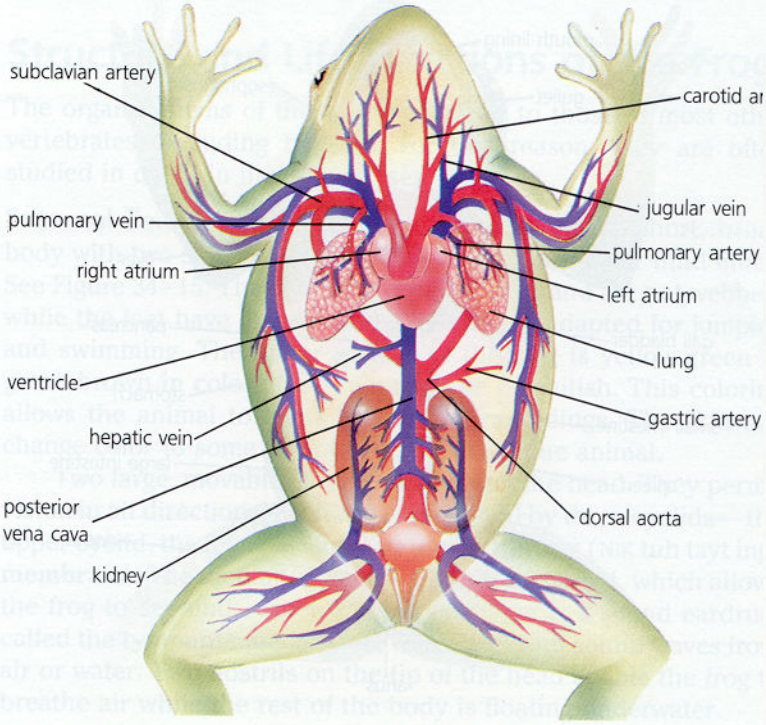
F. Reptiles- Crocodiles, Alligators, Turtles, Tortoises, lizards and snakes

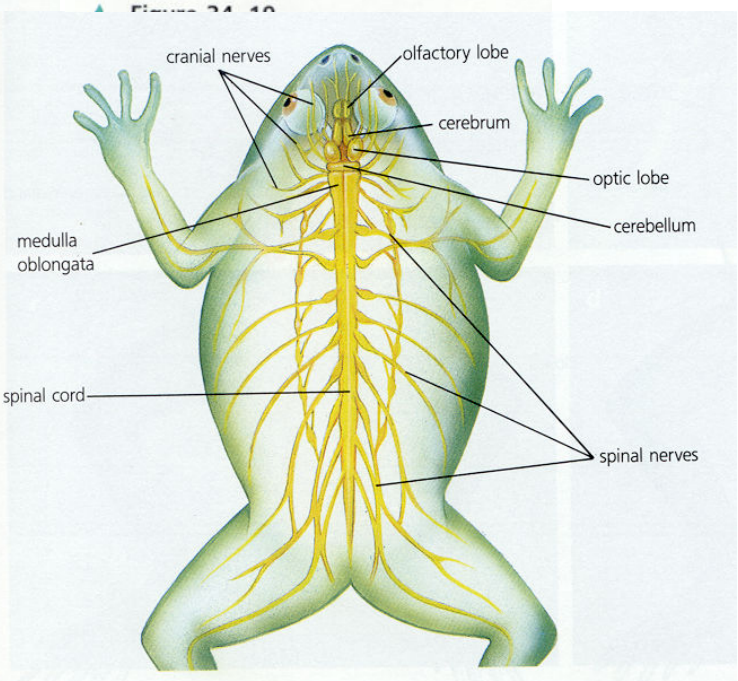
1. Well adapted to life on land
2. Don't need to return to water to breed
3. Internal fertilization
4. Leathery shelled eggs or live birth
5. No metamorphosis of juveniles to adults like amphibians
6. Well developed lungs with a protective rib cage
7. Crocodilians
   a. Largest living reptiles > 7 meters
   b. Snout and tooth arrangements for crocs and gators different
8. Turtles and Tortoises
   a. Turtles are mainly aquatic
   b. Tortoises are mainly terrestrial
   c. Shell
      i. Upper- Carapace
      ii. Lower – Plastron
9. Snakes and Lizards
   a. Lizards with movable eyelids snakes without
   b. Shed skin for growth
   c. Thick protective overlapping scales
   d. Very diversified group of critters
   e. Lizards shed tail for protection
   f. Legless lizards and snakes with legs are present!
   g. Largest lizard: Komodo Dragon
   h. Largest snake: Anaconda
   i. Lizards not poisonous except:
      i. Gila Monster
      ii. Mexican Beaded Lizard
   j. Only 200 of 2500 species are poisonous

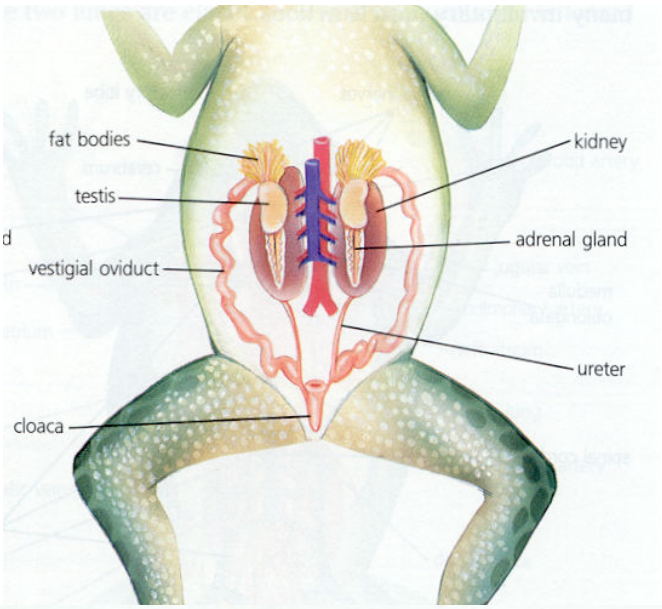
Vertebrate Internal Anatomy; Frog and Fish

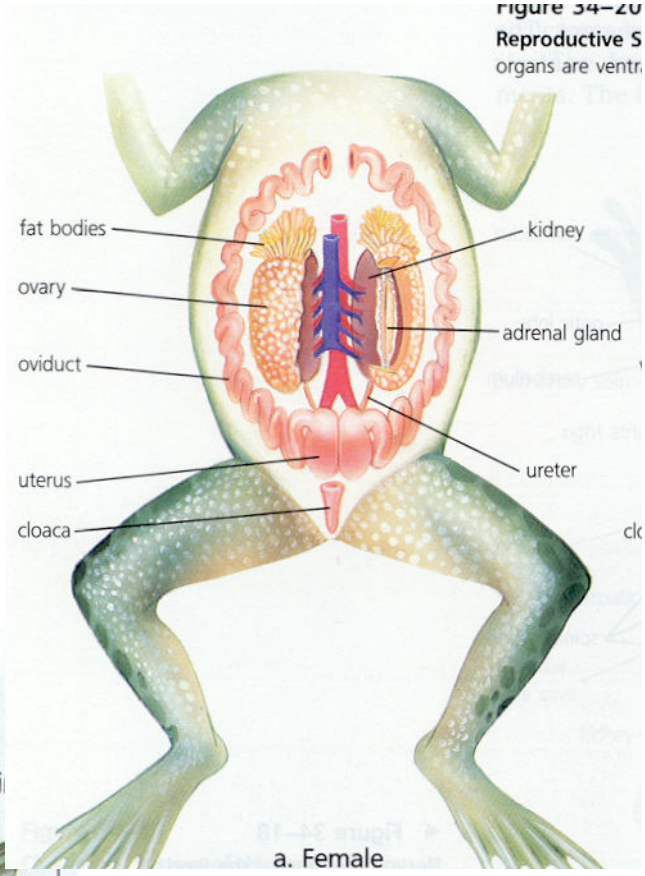


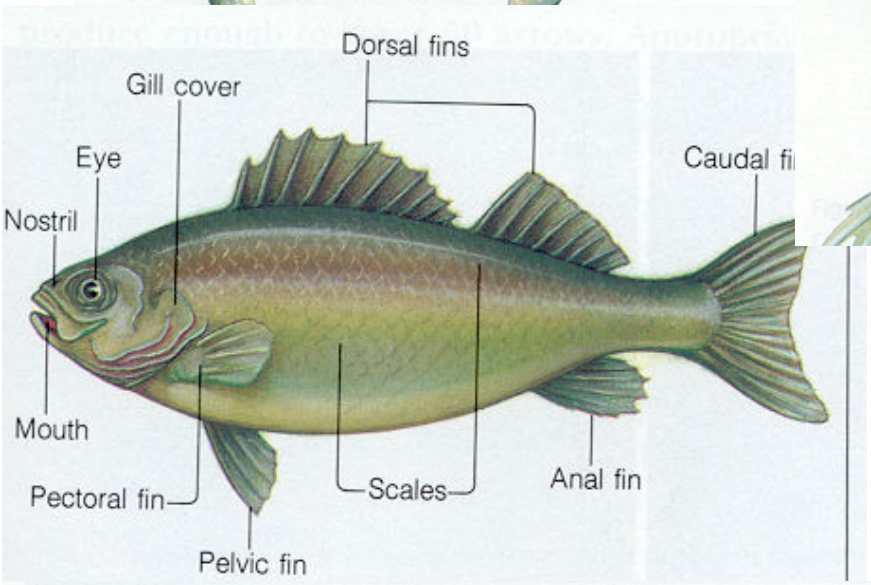












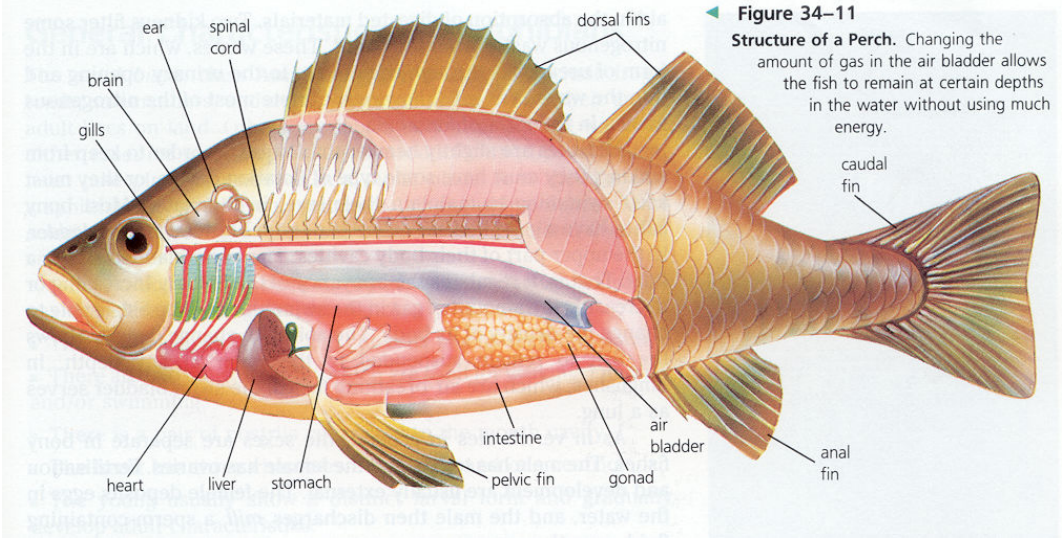


Figure 34–11
Structure of a Perch. Changing the amount of gas in the air bladder allows the fish to remain at certain depths in the water without using much energy.