

Frog Dissection



Classification

Kingdom	Animalia
Phylum	Chordata
Subphylum	Vertebrata
Class	Amphibia
Order	Anura ("without a tail")
Family	Ranidae



Scientific Name:	<i>Rana pipiens</i>
Common Name:	Grass Frog or Leopard Frog

External Anatomy



* Draw External Dorsal View

Skin

- smooth and loosely held to the body
- dark on top and light on the bottom (camouflage)
- patches of color due to pigment cells called **chromatophores**
- **mucus cells** produce a secretion that
 - a) prevents underlying skin from drying out
 - b) keeps it moist for respiration
- **poison cells** produce a bitter secretion in some (protection)
- rich supply of blood vessels for gas exchange (respiration)



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a toad funny!



Limbs

- hind legs (hind limbs)
 - long and muscular with 5 toes which are webbed
 - positioned on side of body
 - used for hopping and swimming
- front legs (forelimbs) *note thumbpads of males!*
 - short and stubby with 4 toes which lack claws/nails
 - positioned on side of body
 - used as shock absorbers when landing

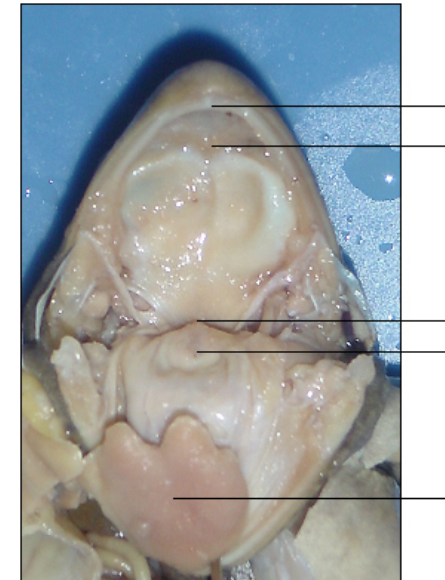
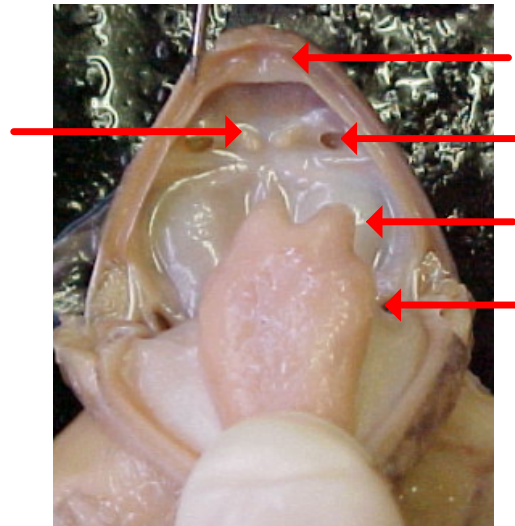


Head

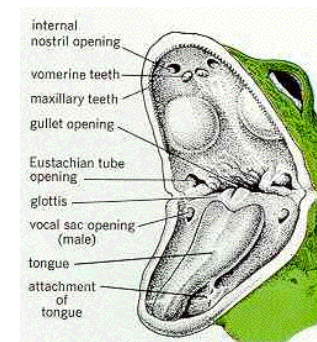
- two bulging eyes to see above water
- paired nostrils for smelling and breathing
- **tympanic membrane** for hearing
- 3rd eyelid (**nictitating membrane**) to protect the eye



Mouth Cavity



- large so they can swallow food whole
- 2 sets of teeth on upper jaw used to hold prey (not for chewing)
 - maxillary teeth** are very small along outer edge of jaw (many)
 - vomerine teeth** are larger pair in roof of mouth
- two internal nostrils (internal nares) used for smelling and breathing
- two eye orbits used to help swallow food
 - (eyes push down and squeeze food to back of mouth)
- **eustachian tube openings** let air enter/leave ear to equalize pressure
- **glottis** is the opening to trachea (found on lower jaw)
- **vocal sacs** are found in males (help produce sound to attract females)
- tongue is long and sticky; attached at front and flips out to catch food



Internal Anatomy

Opening up the Frog

- 1) Lay frog on dorsal side (on its back)
- 2) Insert scissors just above anal opening
- 3) Make incisions as shown, but NOT TOO DEEP!
- 4) Pin skin back putting pins at 45° angles
- 5) Repeat incisions for muscle layer
- 6) Keep slightly to the right of the midsagittal line
- 7) Angle scissors to cut through breastbone (to avoid heart!)
- 8) Reinsert pins to hold skin and muscles back
- 9) Draw the first internal view as you see it



Do the **FIRST INTERNAL VIEW** drawing now before moving anything!

NOTE: Remove fat bodies, oviducts and eggs **on one side only** if you have them.
If you're not sure at any point, ask!

Body Systems

Digestive System

- **carnivores**; usually feed on worms and insects
- use teeth to hold food while swallow it whole
- sticky tongue flips out from back to catch food



- **mouth**
- **pharynx**
- short **gullet (esophagus)**
- **stomach (pyloric valve** controls flow out)
- **sm intestine** (duodenum + ileum)
supported by **mesentery**
- 3-lobed **liver** produces bile which is stored in the gall bladder
- **gall bladder** releases the bile through bile duct into duodenum
- **pancreas** is flat and located in mesentery btw stomach and sm intestine
- secretions from pancreas enter duodenum (enzymes act on 3 major nutrients)
- cells of intestine also secrete enzymes to complete breakdown of food
- end products of digestion are absorbed from small intestine
- wastes pass into **large intestine**
- then into the **cloaca** and out through the **anus / cloacal opening**

Cloaca - space that receives the following and releases them into the environment:

- wastes from digestive system (**feces**)
- wastes from excretory system (**urine**)
- sex cells from sex organs (**eggs** or **sperm**)

Urinary System

2 kidneys - long, dark, along back (dorsal) surface



ureters (tubes that carry liquid waste from kidney to bladder)



urinary bladder (stores liquid waste until time of elimination)



cloaca



* Draw Urogenital System (Show urinary system on 1 half, reproductive on other)

Reproductive System

Male

- two bean-shaped **testes**; creamy white
- located one on each side of the spine on anterior end of kidney
- sperm leave testes through vasa efferentia and enter kidneys
- sperm then travel down ureter into cloaca
- during amplexus, sperm are released from cloaca over eggs of female

Female

- 1 pr large bi-lobed **ovaries**
- eggs burst through the ovary wall and enter body cavity
- muscles push eggs to top of abdominal cavity where they enter **oviduct**
- eggs pass down oviduct and are released out cloaca
- eggs can be stored in **ovisac** or **uterus** until mating

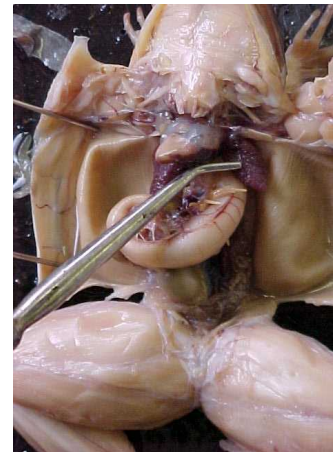
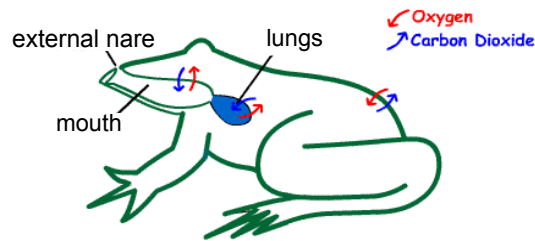
Amplexus

- male frog approaches female from behind
- uses **enlarged thumbpads** on forelimb to push eggs out of female
- male releases sperm over eggs as they are released from female
- increases the chances of fertilization occurring!



Respiratory System

- gas exchange through their **skin** (O₂ diffuses into capillaries, CO₂ out)
- **lungs** are thin walled sacs that assist in mouth breathing when active
- **lining of mouth** is thin and moist with lots of blood vessels for respiration



View the animation



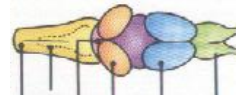
Steps in Breathing

- 1) with mouth closed, mouth floor lowers, drawing air in through nares
- 2) nares close and mouth floor rises, forcing air through glottis into lungs
- 3) mouth floor drops again, pulling air back into mouth from lungs
- 4) air is passed back and forth several times to allow more gas exchange
- 5) nares open and mouth floor forces air back out into atmosphere

Nervous System

The Brain

- found inside cranium (skull)
- protected by 3 membranes as well as cerebrospinal fluid
- divided into 5 specific regions starting from the anterior end



- 1) **olfactory lobes** (2) - detect smell; connected to nostrils by olfactory nerves
- 2) **cerebrum** (2 long lobes) - center of instinct and intelligence
- 3) **optic lobes** (2) - center of sight; connected to eyes by optic nerves
- 4) **cerebellum** (1) - controls coordination
- 5) **medulla oblongata** (1) - joins the spinal cord; controls life support activities

The Nerves

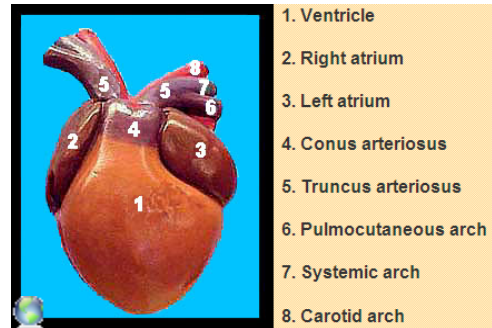
- 10 pr cranial nerves; these do not enter spinal cord, but go directly from brain
- spinal nerves branch off spinal cord, going to and from muscles, glands, etc.

 * Draw Brain (head region)

Circulatory System

The Heart

- has 3 chambers; 1 ventricle + 2 atria (right atrium and left atrium)
- protected by fluid filled sac called the **pericardium**



Circulation in the Frog

- **right atrium** receives blood from the body (except lungs)
- **left atrium** receives blood from lungs
- both atria contract when full and force blood into **ventricle**
- ventricle contracts to push blood into the **conus arteriosus**
- conus arteriosus divides into right and left **truncus arteriosus**
- each truncus divides into three arches to supply body tissues:



- (8) **carotid arch** - supplies head region
- (7) **aortic / systemic arch** - join to form dorsal aorta - supplies rest of tissues
- (6) **pulmocutaneous arch** - forms branches that go to pick up oxygen

Some of the Major Vessels

Arterial System

Each Truncus Arteriosus Divides into:

1) **carotid arch**

- carries blood to head region

2) **aortic arch / systemic arch**

- loop around heart and join
- form dorsal aorta

dorsal aorta has several branches

a. **brachial / subclavian artery** - front limbs

b. **coeliacomesenteric artery** branches into:
coeliac artery - stomach, liver, pancrea
mesenteric artery - intestines and sple

c. **testicular or ovarian artery** - reproductive c

d. **renal arteries** - kidneys

e. **iliac arteries** which divide into:

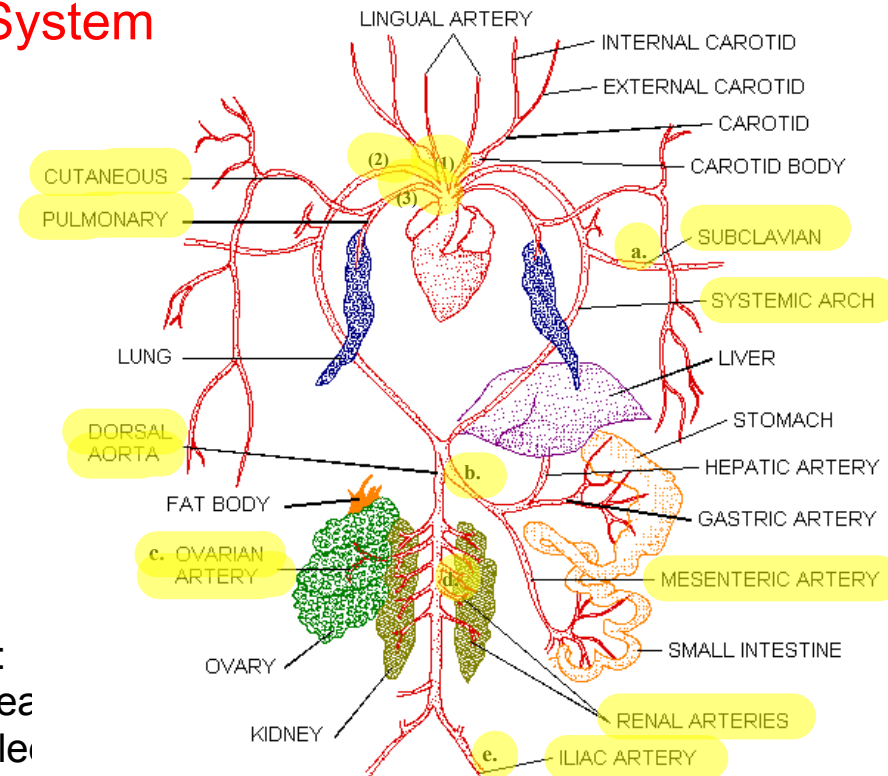
femoral artery - thigh region

sciatic artery - lower leg

3) **pulmocutaneous arch** - splits into two branches that go to pick up oxygen (resp)

a. pulmonary artery - lungs

b. cutaneous artery - skin



Some of the Major Vessels

Venous System

You should be able to find:

abdominal vein- drain blood from lower leg region into hepatic portal system

renal veins- drain kidneys, empty into inferior vena cava

inferior vena cava- drains blood from lower body tissues into sinus venosus

superior vena cava (left and right) drain blood from head region into sinus venosus

