

Frog Dissection

To identify the various arteries and veins in a frog (or other vertebrate), you must first be familiar with the major organs and organ systems. This is required because many arteries and veins are named according to the organs to which they attach. Knowing this, it is then possible to trace the flow of oxygenated and deoxygenated blood through the circulatory system.

PROCEDURE:

1- **Major Organs.** Turn your frog ventral side up, lift the skin with forceps, and make a slightly off-center incision in the skin from the abdomen to the jaw to expose the underlying musculature (use scissors for the cut, not a scalpel). Next, cut through the body wall and shoulder girdle to expose the heart (hold the shears high to avoid damaging the viscera or heart). Make lateral incisions so the skin can be laid back. If you have a gravid female, the body cavity will be filled with a dark mass of eggs. Carefully remove most of the ovarian mass before continuing. CAUTION: Don't cut or remove any structures until told to do so or you will not be able to identify the major arteries and veins.

§ **Lungs-** The lungs are most-likely deflated in your specimen. Open the mouth and slip a medicine dropper into the slit-like glottis at the back of the throat and see if you can inflate them.

§ **Liver-** The liver is the large 3-lobed structure near the anterior portion of the body cavity. Lift the lobes to locate a thin sac (the gall bladder). If your specimen is not preserved, the gall bladder will probably be filled with a green fluid (bile).

§ **Stomach-** Find the stomach and trace it forward to locate the flattened esophagus. Gently squeeze the posterior portion of the stomach (at the junction of the intestine to find the pyloric valve. If you have a live specimen, the stomach may be moving slightly. If so, gently pinch the upper portion (fundus) with your forceps. What reflex did you induce? Note the thin membrane (mesentery) attached to the stomach and intestines. Blood vessels and nerves run through the mesentery to the organs.

§ **Pancreases-** Gently lay back the stomach to expose the yellow-white pancreases (look in the curve of the stomach). This is a dual-purpose gland (producing both digestive enzymes and hormones). The spleen is also located within the mesentery.

§ **Colon-** Locate the thin, sac-like colon (or "cloaca") at the bottom of the body cavity (at the end of the intestine). Near the base of the colon you will find the urinary bladder. It will probably be empty and will therefore have a wrinkled appearance. The cloaca serves as a common collecting area and receives material from the intestines, kidneys, and gonads.

§ **Kidneys-** Carefully push the small intestine and mesentery aside to expose the kidneys on the rear wall of the abdominal cavity. Note the adrenal glands (the yellow bands of tissue) on the surface of the kidney. If you have a male, the pale yellow oval bodies at the top of the kidneys are the testes; also note the bright yellow fat bodies.

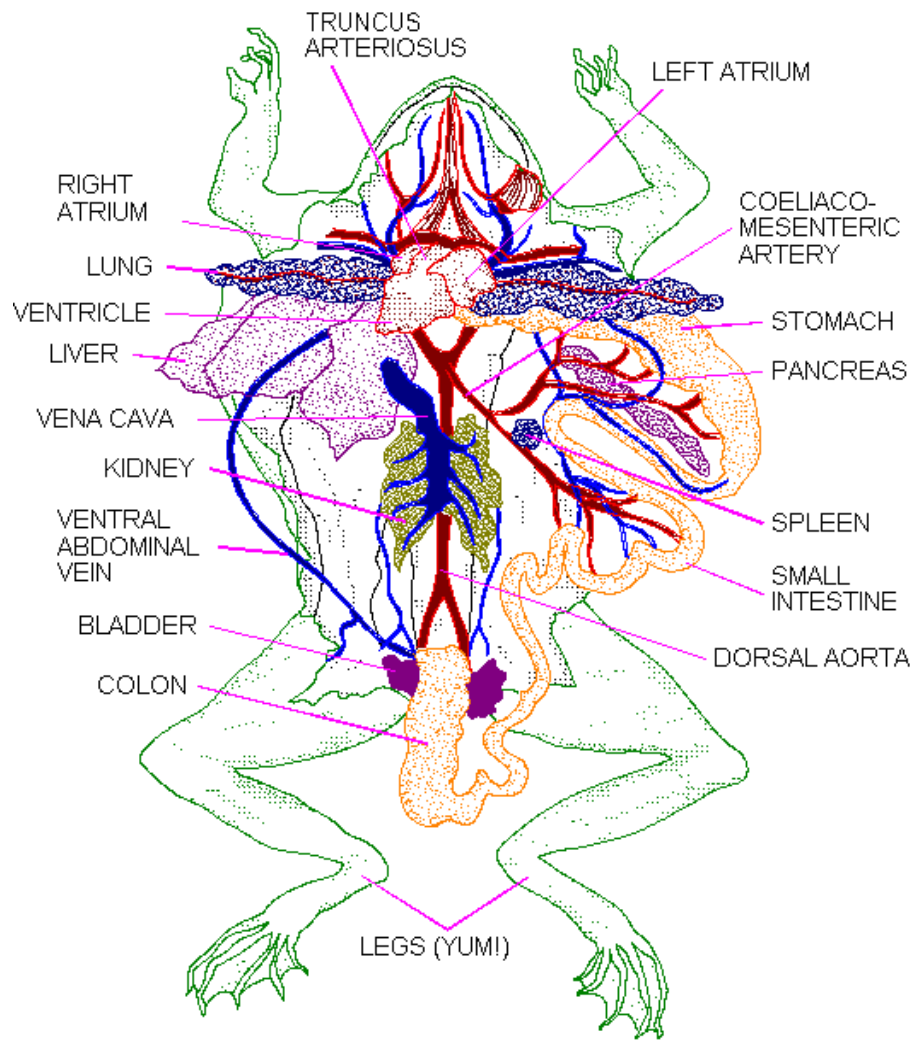
2- **Arterial and Venous Systems.** If you are working with a preserved specimen, arteries and veins are distinguished by their color (arteries red, veins blue). Identifying the vessels in a fresh specimen is a little more difficult and is best determined by their position. In addition, you will find that the arteries are thicker-walled than the veins (use your forceps and gently pinch them). For fresh specimens, continue to add frog Ringer's solution to the heart (try to maintain a heart beat), and be careful not to cut the major arteries and veins. Work through your dissection in the prescribed sequence and identify the circulatory structures.

§ **Arteries of the Head and Upper Torso.** Locate the truncus arteriosus on the anterior surface of the heart. Use forceps and a sharp scalpel to carefully dissect away the tissue surrounding the truncus arteriosus and locate the first branch (pulmo-cutaneous arch). most arteries, this vessel carries deoxygenated blood (to the skin via the cutaneous artery; and lungs by the pulmonary arteries)., respiration is carried out by the lungs and skin. Remove more of the tissue near the pulmo-cutaneous and locate the left and right branches of the systemic arch (that carry oxygenated blood to the posterior portions of the body). Do not expose the entire systemic arch at this time; instead, continue working forward from the truncus arteriosus to identify the carotid artery. Further work in the area of the head and neck will uncover the carotid body (monitors blood pressure), external- and internal carotids (carrying blood to the tongue and brain) and the lingual artery (feeding the tongue and hyoid).

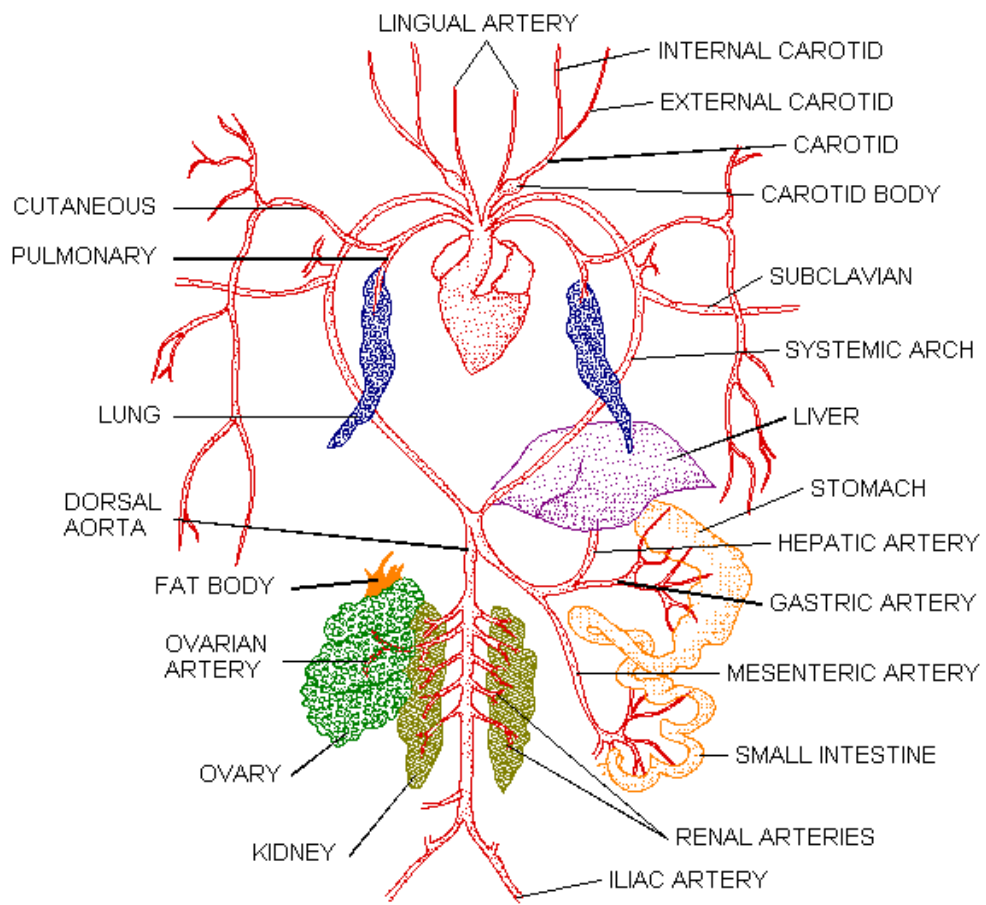
§ **Veins of the Head and Upper Torso.** Gently lift the heart and clear away the underlying pericardium. Deoxygenated blood is carried from the general body circulation to the heart by the large posterior vena cava (locate this vessel but be gentle moving the lungs and liver). The posterior vena cava connects to the heart at the sinus venosus (on the back of the heart). Note also the anterior vena cavae (attached to the sinus venosus). Follow one branch of the anterior vena cava toward the head and locate the first vein (subclavian vein; carrying blood from the skin and arms). The subclavian vein is formed by the union of the brachial (from the arms) and cutaneous (skin). Clear more of the tissue along the anterior vena cava to expose the innominate (carrying blood from the head) and jugular (from the mouth area). The pulmonary veins are located beneath the anterior vena cava (they carry oxygenated blood from the lungs). If you have difficulty finding the pulmonary veins, work back from the lungs (don't confuse them with the pulmonary arteries).

§ **Veins of the Abdominal Cavity.** Re-locate the posterior vena cava and trace its flow from the liver (hepatic vein). Continue posterior to the kidney. The ovarian or testicular veins (depending on the sex of your specimen) carry blood from the gonads while renal veins are connected to the kidneys. Locate the renal portal veins (lateral to the kidneys; you may have to clear away some fat bodies). Follow the renal portals down to the lower abdomen and locate the paired pelvic veins and ventral abdominal (attached to the underside of the abdominal musculature). Finally, follow the veins connecting the intestine to the liver (hepatic portal).

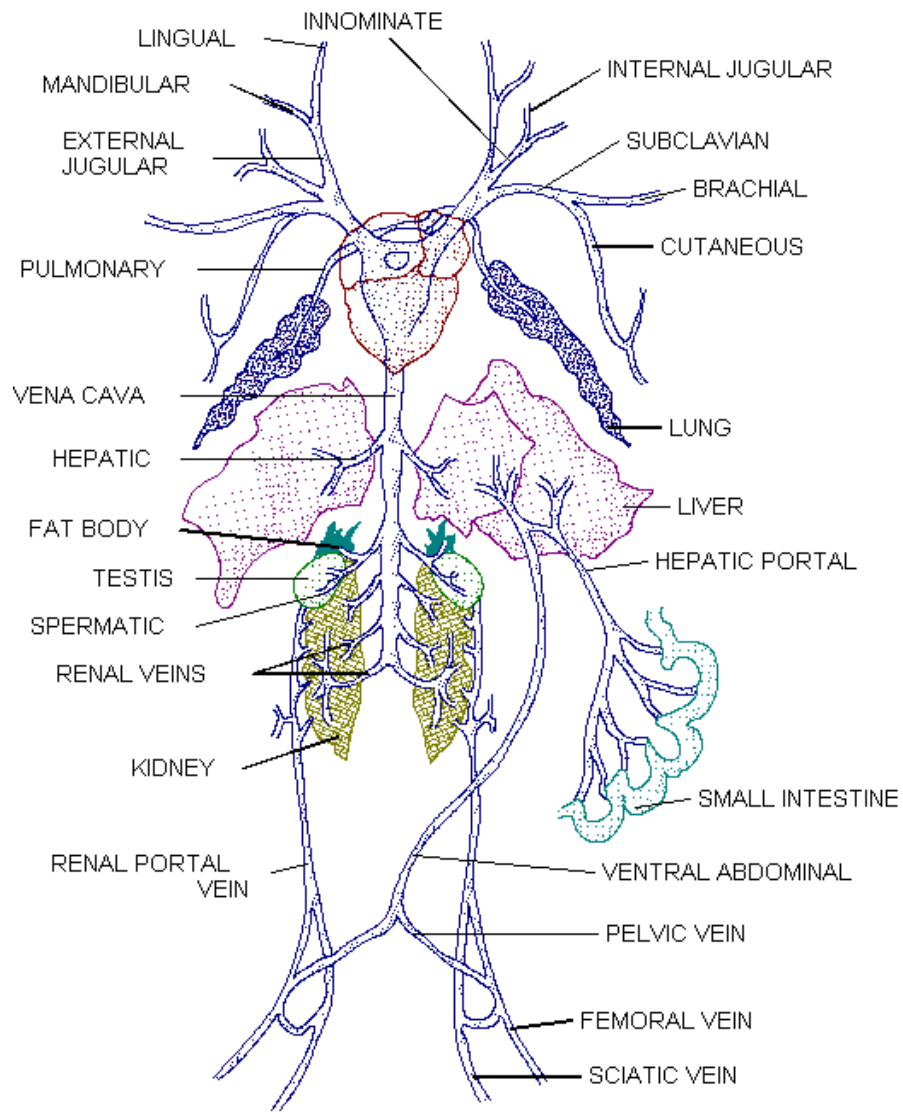
§ **Arteries of the Abdominal Cavity.** Re-locate the systemic arch (running from the truncus arteriosus) and follow both branches under the lungs and liver to the point where they join in the mid-abdominal cavity. One branch (the dorsal aorta) carries blood to the lower abdominal cavity (you will probably have to move the vena cava aside). The second branch, the coeliaco-mesenteric artery provides oxygenated blood to the liver, stomach and intestine (via the hepatic, gastric, and mesenteric arteries). To locate each you may have to trace back from the organs. To make sure you haven't confused them with veins, verify that they all lead to the junction of the dorsal aorta and systemic arch. Between the kidneys and under the ventral abdominal vein the dorsal aorta branches into several renal arteries. Below the kidneys it divides into a pair of iliac arteries (providing blood to the bladder, ventral body wall, and legs).



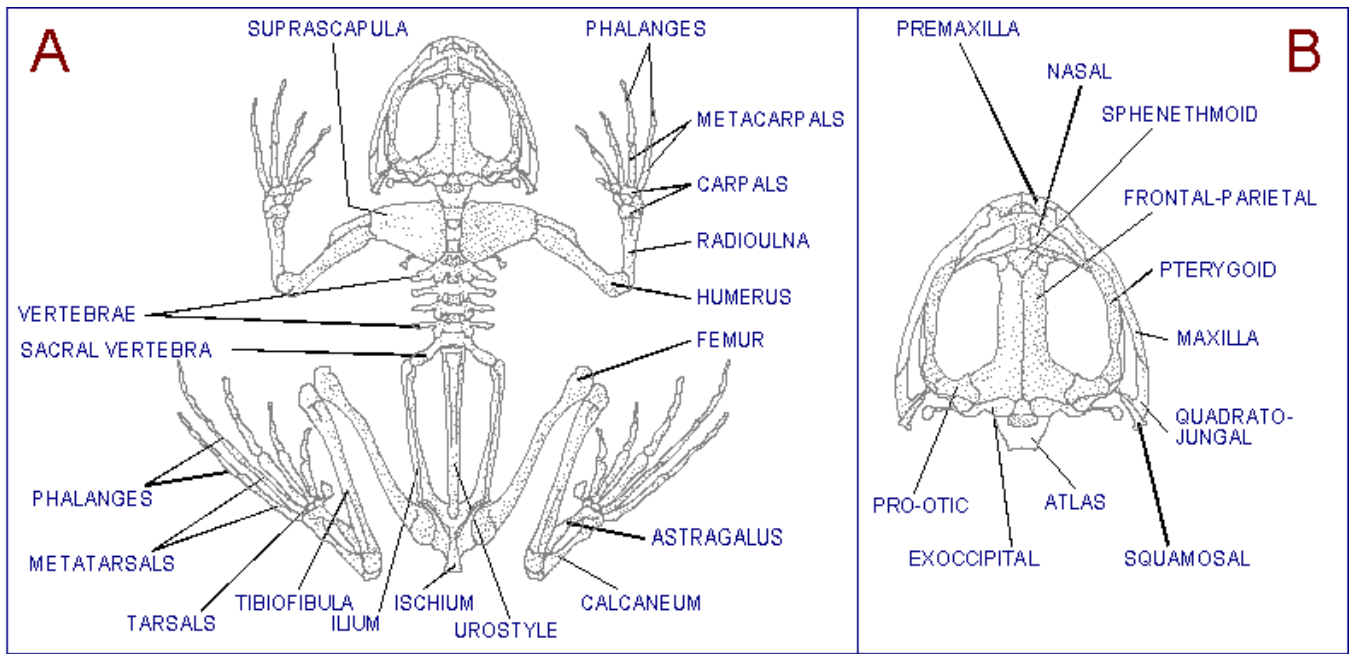
Frog Gutz



Frog Arteries



Frog Veins



Tis the Skeleton of a Frog!