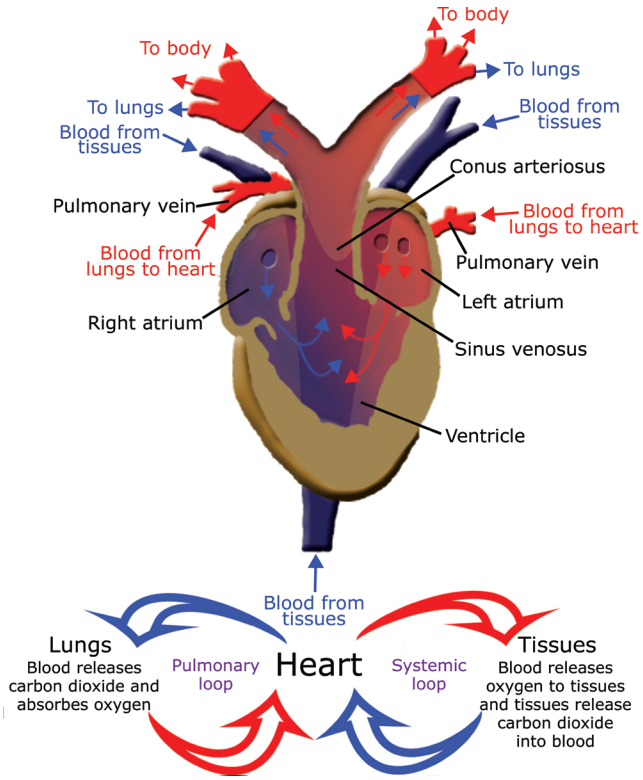

Figure 28.7.4

Adult frog circulation
As tadpoles, frogs have a one-loop system and a two-chambered heart. Adult frogs gave a two-loop system and a three-chambered heart. De-oxygenated blood returns from the tissues through veins and enters the heart through the right atrium. The blood then enters the single ventricle and is pumped through the pulmonary loop. The blood enters the pulmonary artery and is oxygenated in the lungs. It then returns to the left atrium of the heart, and the pulmonary loop is completed. The blood moves into the ventricle, and the systemic loop. It is pumped from the ventricle into the arteries and the rest of the systemic tissues. When the blood gets to the capillaries, gas and nutrient exchange occurs, then the blood is carried back to the right atrium through veins. The systemic loop is completed.

Upon arriving at the heart, the oxygenated blood first passes through the left atrium, then into the ventricle. The heart pumps and the ventricle squeezes the oxygenated blood from the heart to the tissues. In the tissues, oxygen is taken from the blood into the tissues, and carbon dioxide is released from the tissues into the blood. The blood then flows back to the heart, arriving in the right atrium. This completes the second loop, which is the systemic loop. **The way this two-loop system works is consistent for all vertebrate species with lungs (amphibians, reptiles, birds, and mammals), so be sure to be familiar with it**.

Hopefully, you are thinking, "Wait a minute! If there is only one ventricle and it has to pump both oxygenated and deoxygenated blood, why don't the two mix together? How does the blood know where to go?" That is an excellent question. The inside surface of the ventricle is irregularly shaped, which helps to direct the blood in the proper direction. Also, the atria contract in such a way as to prevent significant mixing of the oxygenated blood from the lungs with the deoxygenated blood from the tissues.

Figure 28.7.5

Summary of Characteristics of Amphibia

Characteristic	
Developmental/ Reproductive	bilaterally symmetric; some species have four legs and a tail, some four legs, and some no legs at all; both direct and indirect development exhibited; eggs generally hatch several days after fertilization
Neurological	cephalization with coordinating brain and specialized areas of brain function; spinal cord carries information from/to brain; good eye sight with **nictitating membrane** (a clear eyelid to close and cover the eye so organism can see under water)
Mobility	swim via the tail in the larval stage; adults with legs can walk, hop, or swim well
Nutrition/Digestion	all amphibians are carnivores eating insects, worms, other small amphibians, etc.; complete one-way digestive system with esophagus, stomach, liver, small intestine, and **vent** (common opening that cloaca uses to eject products of reproductive system and waste from digestive and excretory systems
Circulatory	Three-chambered heart pumps blood through closed circulatory system with "Two loops"
Respiratory	either through the skin or lungs and skin depending on the species
Excretory	kidneys convert ammonia to urea before excreting to conserve water
Skeleton	bone in all species