

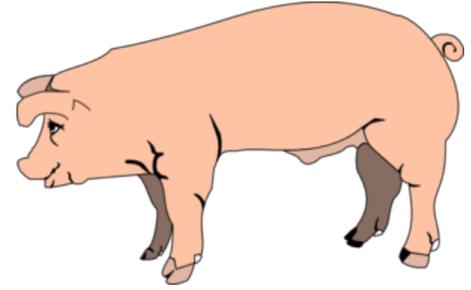
## Fetal Pig Dissection

### External Anatomy of the Fetal Pig

(Check the box as you complete each step)

1. Determine the sex of your pig by looking for the urogenital opening. On females, this opening is located near the anus. On males, the opening is located near the umbilical cord.

If your pig is female, you should also note that urogenital papilla is present near the genital opening. Males do not have urogenital papilla.



Both males and females have rows of nipples, and the umbilical cord will be present in both.

What is the sex of your pig? \_\_\_\_\_

2. Make sure you are familiar with terms of reference: **anterior, posterior, dorsal, ventral**. In addition, you'll need to know the following terms

**Medial:** toward the midline or middle of the body | **Lateral:** toward the outside of the body

**Proximal:** close to a point of reference | **Distal:** farther from a point of reference

3. Open the pig's mouth and locate the **hard** and **soft palate** on the roof of the mouth. Can you feel your own hard and soft palates with your tongue?

Note the **taste buds** (also known as **sensory papillae**) on the side of the **tongue**. Locate the **esophagus** at the back of the mouth. Feel the edge of the mouth for teeth.

Does the fetal pig have teeth? \_\_\_\_\_ How many? \_\_\_\_\_ Are humans born with teeth? \_\_\_\_\_

4. Use a scalpel to cut the angles of the jaw so that you can open the mouth up far enough to view the back of the throat. Locate the **epiglottis**, a cone-shaped structure which closes when a pig swallows. The small opening in the center of the epiglottis is the **glottis** and it leads to the trachea and then to the lungs. Make sure that you can distinguish the glottis from the **esophagus**.

5. The **pharynx** is the cavity (space) in the back of the mouth – it is the junction for food (esophagus) and air (trachea).

5. Gestation for the fetal pig is 112-115 days. The length of the fetal pig can give you a rough estimate of its age.

11mm – 21 days | 2.8 cm – 49 days | 4 cm – 56 days | 22 cm – 100 days | 30 cm -- birth

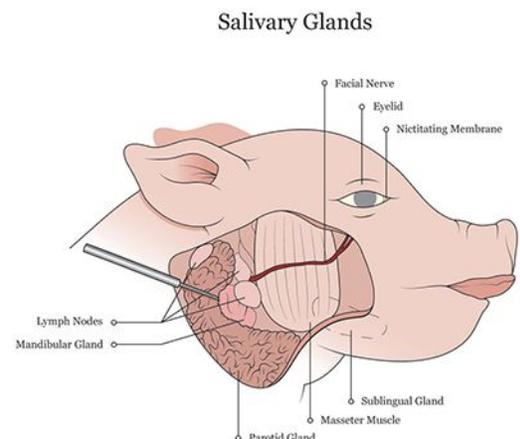
How old is your fetal pig? \_\_\_\_\_

6. Observe the toes of the pig. How many toes are on the feet? \_\_\_\_\_

7. Observe the eyes of the pig, carefully remove the eyelid so that you can view the eye underneath. Does it seem well developed? Do you think pigs are born with their eyes open or shut? \_\_\_\_\_

8. Carefully lay the pig on one side in your dissecting pan and cut away the skin from the side of the face and upper neck to expose the **masseter muscle** that works the jaw, **lymph nodes**, and **salivary glands**. The salivary glands have an appearance like chewing gum, and are often lost if you cut too deeply.

(Salivary glands image credit: [Fetal Pig Dissection Manual, Alexandra Altamura](#))



# Internal Anatomy of the Fetal Pig

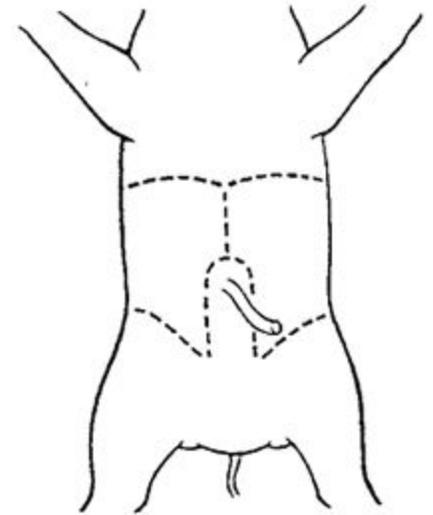
In this activity, you will open the abdominal and thoracic cavity of the fetal pig and identify structures. Remember, that to dissect means to "expose to view" - a careful dissection will make it easier for you to find the organs and structures. Be sure to follow all directions.

## The Incision

Place your fetal pig in the dissecting pan ventral side up. Use string to "hog-tie" your pig so that the legs are spread. Use scissors to cut through the skin and muscles as shown on the diagram. Do not remove the umbilical cord. In the first section, you will only examine the **abdominal cavity** (the area below the ribcage).

After completing the cuts, locate the **umbilical vein** that leads from the umbilical cord to the liver. You will need to cut this vein in order to open up the abdominal cavity.

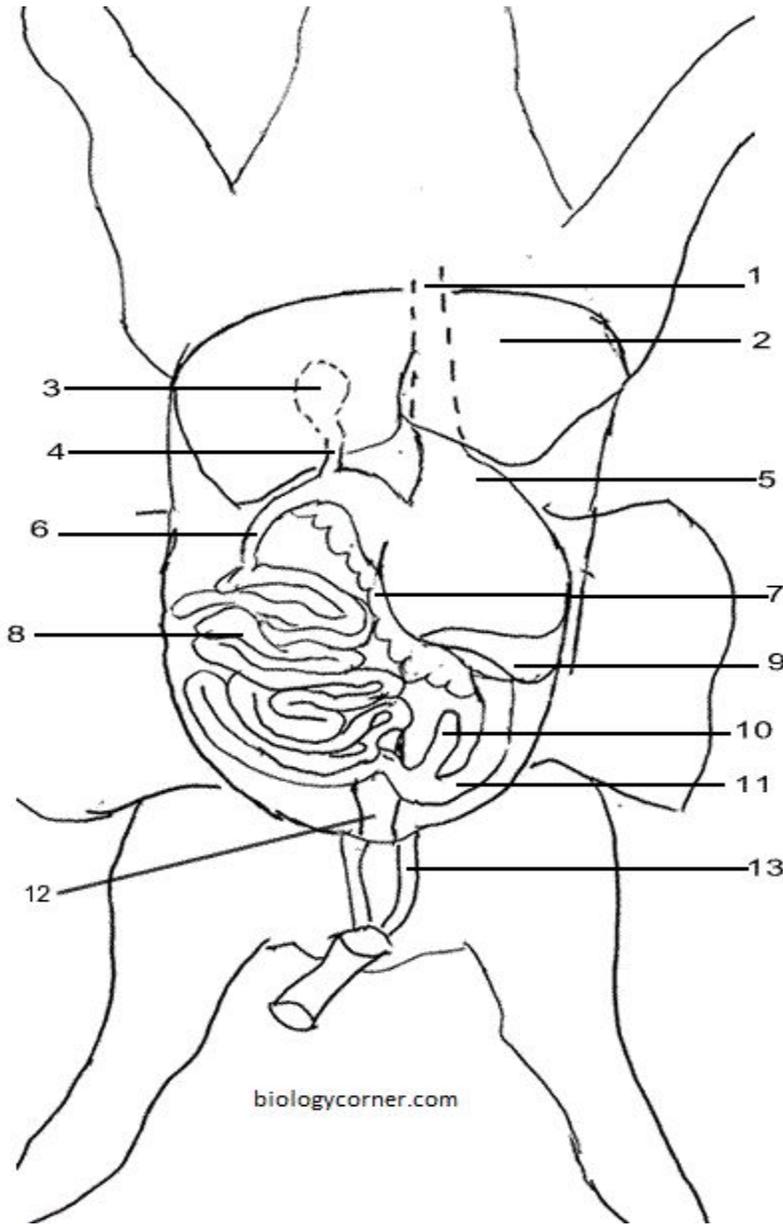
Your pig may be filled with water and preservative, drain over the sink if necessary and rinse organs. Locate each of the organs below, check the box. ✓



1. **Diaphragm.** This muscle divides the thoracic and abdominal cavity and is located near the ribcage. The diaphragm aids in breathing.
2. **Liver.** This structure is lobed and is the largest organ in the body. The liver is responsible for making bile for digestion.
3. **Gallbladder.** This greenish organ is located underneath the liver; the **bile duct** attaches the gallbladder to the duodenum. The gallbladder stores bile and sends it to the duodenum, via the bile duct.
4. **Stomach.** A pouch shaped organ that rests just underneath and to the pig's left. At the top of the stomach, you'll find the **esophagus**. The stomach is responsible for churning and breaking down food.
5. At each end of the stomach are valves that regulate food entering and leaving the stomach. At the esophagus is the **cardiac sphincter valve**, and at the duodenum is the **pyloric sphincter valve**. View the inside of the stomach by slicing it open lengthwise.
6. The stomach leads to the **small intestine**, which is composed of the **duodenum** (straight portion just after the stomach) and the **ileum** (curly part).
7. The ileum is held together by **mesentery**. In the small intestine, further digestion occurs and nutrients are absorbed through the arteries in the mesentery. These arteries are called **mesenteric arteries**.
8. **Pancreas:** a bumpy organ located along the underside of the stomach, a **pancreatic duct** leads to the duodenum. The pancreas makes insulin, which is necessary for the proper uptake of sugars from the blood.
9. **Spleen:** a flattened organ that lies across the stomach and toward the extreme left side of the pig. The spleen stores blood and is not part of the digestive system. On the underside of the spleen, locate the **splenic artery**.
10. At the end of the ileum, where it widens to become the large intestine, a "dead-end" branch is visible. This is the **cecum**. The cecum helps the pig digest plant material.
11. The **large intestine** can be traced to the **rectum**. The rectum lies toward the back of the pig and will not be moveable. The rectum opens to the outside of the pig, or the **anus**. The large intestine absorbs water from the digested food, any undigested food is stored in the rectum as feces.
12. Lying on either side of the spine are two bean shaped organs: the **kidneys**. The kidneys are responsible for removing harmful substances from the blood, these substances are excreted as urine. (more on this later)
13. Two **umbilical vessels** can be seen in the umbilical cord, and the flattened **urinary bladder** lies between them.

Identify the structures on the diagram.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_



**Identify the organ (or structure)**

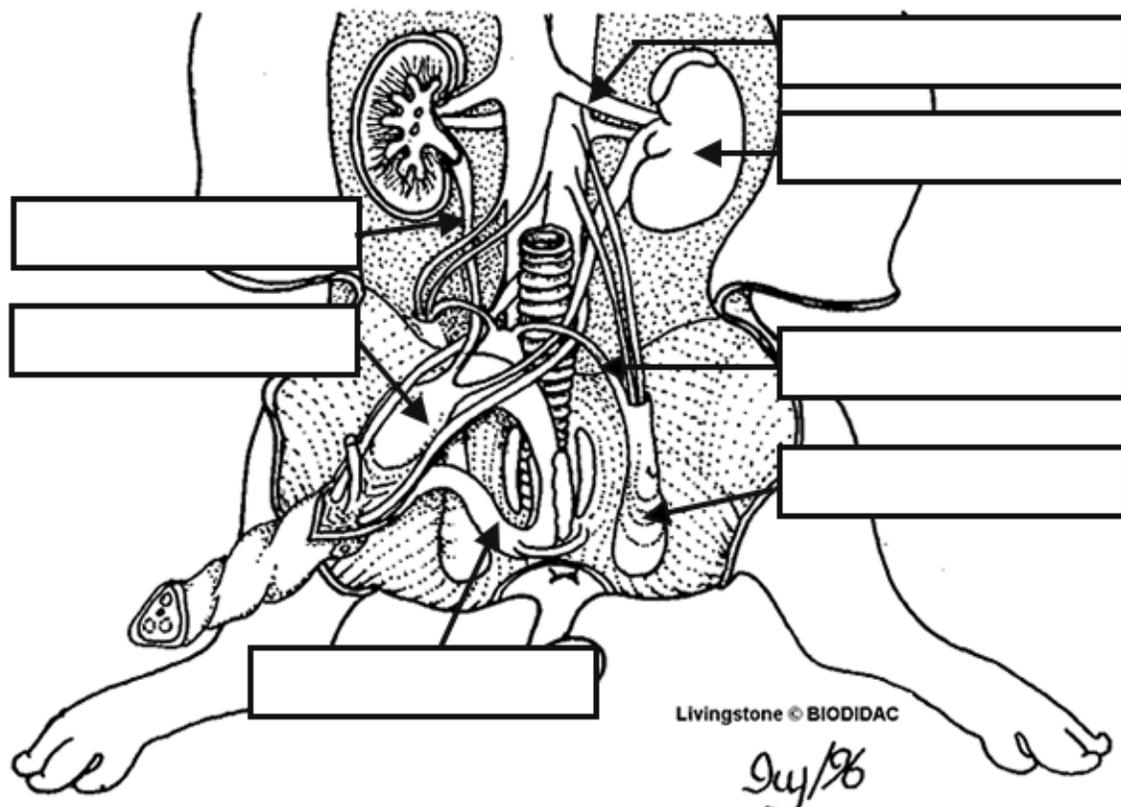
14. \_\_\_\_\_ A branch of the large intestine, a dead end.
15. \_\_\_\_\_ Stores bile, lies underneath the liver.
16. \_\_\_\_\_ Opening (valve) between the stomach and small intestine.
17. \_\_\_\_\_ Empties bile into the duodenum from the gallbladder.
18. \_\_\_\_\_ The last stretch of the large intestine before it exits at the anus.
19. \_\_\_\_\_ Bumpy structure under the stomach; makes insulin
20. \_\_\_\_\_ Separates the thoracic and abdominal cavity; aids breathing.
21. \_\_\_\_\_ Membrane that holds the coils of the small intestine.
22. \_\_\_\_\_ The straight part of the small intestine, just after the stomach.
23. \_\_\_\_\_ Lies between the two umbilical vessels.

## Urinary and Reproductive Systems (Urogenital)

1. Locate the **kidneys**; which are bean shaped structures lying toward the back of the abdomen.
2. The **ureters** are tubes carry urine to the **urinary bladder**. To find these, you may need to wiggle the kidneys.
3. The urinary bladder is located between the **umbilical vessels** and stores urine.
4. Lift the bladder to locate the **urethra**, the tube that carries urine out of the body.
5. Note the vessels that attach to the kidney – these are the **renal vessels**

### Male

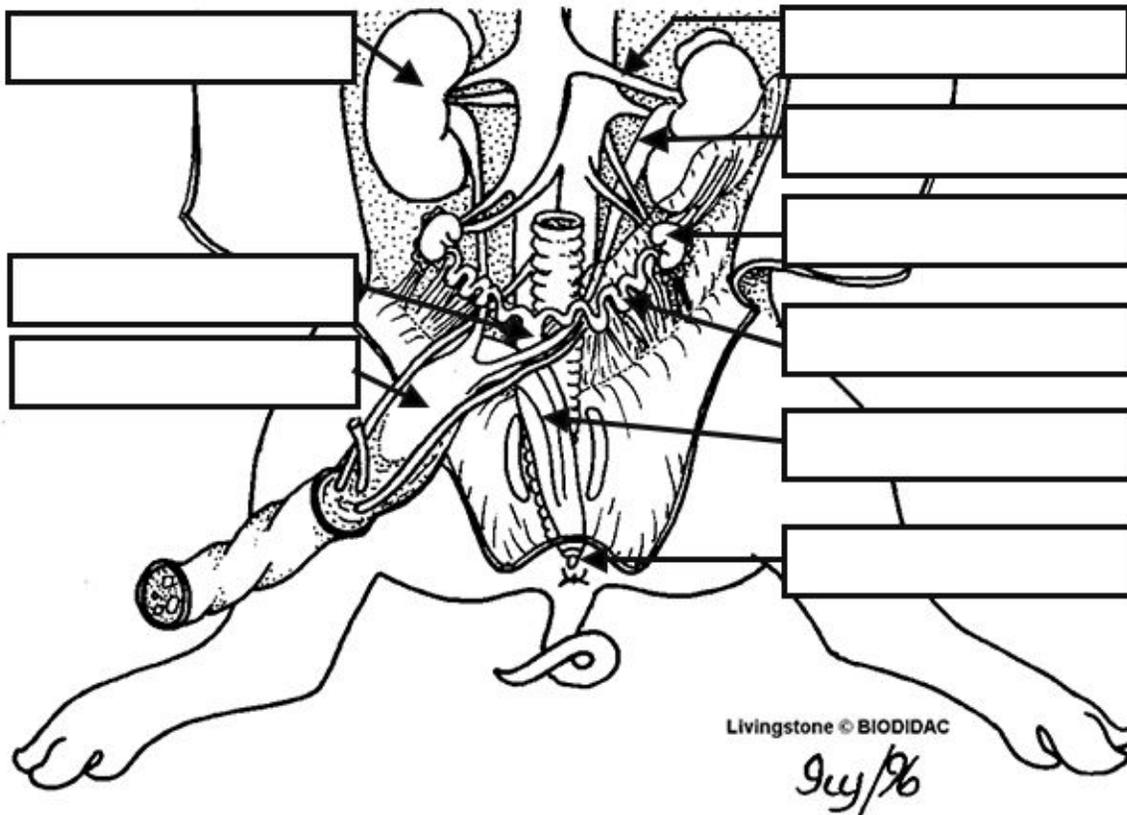
6. Find the **scrotal sacs** at the posterior end of the pig (between the legs), testes are located in each sac. Open the scrotal sac to locate the testes.  (Testes is plural, testis is singular.)
7. Coiled around the testis is the **epididymis**. Sperm cells produced in the testes pass through the epididymis and into a tube called the **vas deferens** (in humans, a vasectomy involves cutting this tube).
8. The **penis** can be located by cutting away the skin on the flap near the umbilical cord. This tube-like structure eventually exits out the urogenital opening, also known as **the urethra**.
9. Use the bold structures above to label the diagram:



10. Why does a vasectomy not affect urine flow? (Be specific with your answer using anatomical terms)

## Female

11. In the female pig, locate a bean shaped **ovary** located near the kidneys and connect to the curly **oviducts**. The pig has a left and right ovary.
12. The curled oviducts are also referred to as **uterine horns**, which eventually merges at the **uterus** and then becomes the **vagina**.  Piglets develop in the uterine horns, where a female can produce 12 or more piglets.
13. The **urethra** exits near the anus at the **urogenital opening** at the **urogenital papilla**.
14. Use the bold structures above to label the diagram:

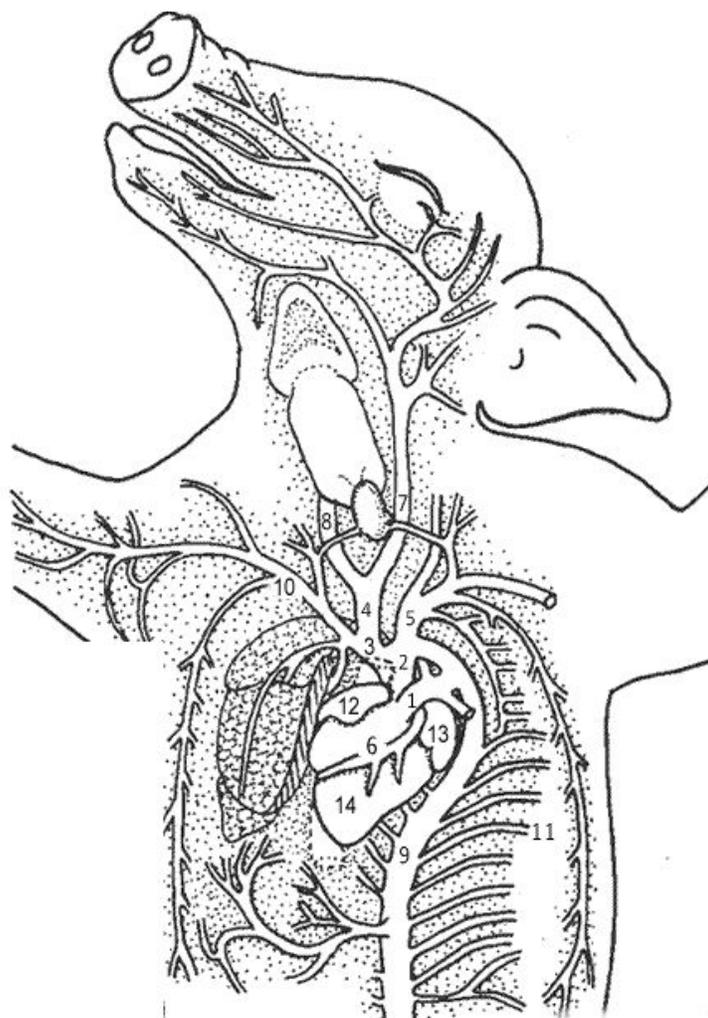
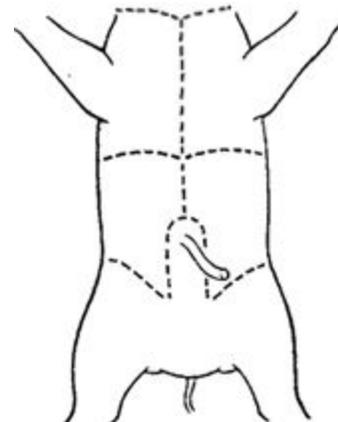


15. What structures can be found in **both** the male and female urogenital systems?
16. In humans, eggs form in the ovary and then travel into the Fallopian tube where they are fertilized. The egg eventually implants into the uterus. What part of the pig anatomy is comparable to the Fallopian tube in humans?
17. Compare the location of the urogenital opening in female pigs to the urogenital opening in male pigs.
16. Consider a pig that has only one fully formed ovary. How would this affect the pig's future reproduction?

## Dissection of the Thoracic Cavity

You will need to cut through the pig's sternum and expose the chest cavity (thoracic cavity). →

1. Find the **diaphragm** again. The diaphragm separates the abdominal cavity from the thoracic cavity and it aids in breathing. Above the diaphragm, is the heart and lungs.
2. Remove the **pericardium**, which is a thin membrane that surrounds the heart.
3. The structures visible on the heart are the two **atria** (12,13), and **ventricles** (14)
4. The most obvious vessel on the front of the heart is the **pulmonary trunk** (1) . It curves upward and joins the **aorta** (2) - a vessel which arches from the heart and curves around to go to the lower part of the body where it is called the **abdominal (dorsal) aorta** (9). The aorta supplies the body with blood.
5. The aorta has two branches above the heart: the right **brachiocephalic** (3) and the left **subclavian** (5)
6. The right brachiocephalic then branches into the **common carotid** (4) and the **right subclavian** (10) The subclavians supply blood to the arms and follow the clavicle bone
7. The **common carotid** (4) branches into the left (7) and right carotid arteries (8). The carotid arteries supply blood to the head and neck.
8. Locate the **coronary vessels** (6) on the outside of the heart - they supply blood to the muscles of the heart.
9. Easy arteries to find are the ones that run near the ribs. These are the **intercostal arteries** (11).
10. Lift the heart to look on its dorsal side (toward the back), you should be able to see the **superior and inferior vena cava**  , which brings blood back to the heart.
11. Find the left and right **jugular veins**  in the neck near the carotid arteries, these drain blood from the head.
12. Locate two spongy **lungs** on the left and right side of the heart.
13. The **trachea** is the airway to the lungs and is easy to identify due to the cartilage rings, which keeps it from collapsing. The trachea can be located in the neck area.
14. Lying atop the trachea, locate the pinkish-brown, V shaped structure called the **thyroid gland**. This gland secretes hormones that control growth and metabolism.
15. At the anterior (toward head) of the trachea, you can find the **larynx** (or voice box). The larynx allows the pig to produce sounds - grunts and oinks.



### Identify by number and Label on the Image

Aorta \_\_\_\_ Dorsal Aorta \_\_\_\_ Pulmonary Trunk \_\_\_\_ Common carotid \_\_\_\_ Left & Right Carotid \_\_\_\_  
 Coronary vessels \_\_\_\_ Left Subclavian \_\_\_\_ Right Subclavian \_\_\_\_ Right Brachiocephalic \_\_\_\_  
 Right Atrium \_\_\_\_ Left Atrium \_\_\_\_ Intercostal \_\_\_\_ Ventricle \_\_\_\_

1. \_\_\_\_\_ Membrane over the heart.
2. \_\_\_\_\_ Airway from mouth to lungs
3. \_\_\_\_\_ Blood supply to head and neck
4. \_\_\_\_\_ Lower heart chambers
5. \_\_\_\_\_ Blood supply to lower body
6. \_\_\_\_\_ Large veins that return blood to the heart
7. \_\_\_\_\_ Vessel that leaves the heart and joins aorta
8. \_\_\_\_\_ Used to make noises (voicebox)
9. \_\_\_\_\_ Arteries on heart surface.
10. \_\_\_\_\_ Supplies blood to the arms
11. \_\_\_\_\_ Drains blood from the head and brain (returns to the heart)
12. \_\_\_\_\_ Splits into the left and right carotid arteries
13. \_\_\_\_\_ Muscle to aid breathing (separates abdominal and thoracic cavity)
14. \_\_\_\_\_ Gland that secretes hormones



### Fetal Pig – Dissection of the Lower Arteries

1. Trace the abdominal aorta (also called the dorsal aorta) to the lower part of the body, careful tweezing of the tissue will reveal several places where it branches, though some of the arteries may have been cut when you removed organs of the digestive system.
2. The renal arteries supply blood to the kidneys.
3. The mesenteric artery leads to the mesentery and branches into many smaller vessels. Look in the small intestine to find this artery.
4. Trace the abdominal aorta and note where it joins the umbilical arteries.
5. The abdominal aorta splits into two large vessels that lead to each leg - the external iliac arteries will turn into the femoral arteries as they enter the leg. (You may need to cut the muscle to locate these arteries.)
6. Follow the umbilical artery toward the pig, you'll find that it branches and a small artery stretches toward the posterior of the pig - this is the ilio-lumbar artery.
7. The deep femoral branches from the femoral artery and goes toward the back of the leg.

Label the lower abdominal arteries on the pig.

