

Fetal Pig Dissection Packet (2019)

Name _____ Period _____ [Each person will turn in his/her own packet]

[Final Score out of 166 points: _____]

You may use the Virtual Fetal Pig Dissection website from Whitman College as a visual reference for all stages of dissection. The URL is <http://www.whitman.edu/academics/courses-of-study/biology/virtual-pig/>

Section 1: External Anatomy

- 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 sex** is your pig?
- Make sure you are familiar with anatomical terms of reference. These are for communicating with others when discussing parts of anatomy.
 - Anterior:** toward the head
 - Posterior:** toward the tail
 - Dorsal:** toward the back-side
 - Ventral:** toward the belly-side
 - Medial:** toward the midline or middle of the body
 - Lateral:** away from the midline or toward the side of the body
 - Proximal:** close to a point of reference
 - Distal:** farther from a point of reference



- Open the pig's mouth. You may need to cut the muscle that holds the jaws together on both sides. Locate the **hard palate** 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? Are humans born with teeth? Locate the **epiglottis**, a cone-shaped structure at the back of the mouth, a flap of skin helps to close this opening when a pig swallows. The **pharynx** is the cavity in the back of the mouth – it is the junction for food (esophagus) and air (**trachea**).
- 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 | 17 mm – 35 days | 2.8 cm – 49 days | 4 cm – 56 days | 22 cm – 100 days | 30 cm -- birth
How old is your fetal pig?
- **Observe the toes** of the pig. How many toes are on the feet? Do they have an odd or even number of toes?
- 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**?
- 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 kind of look like chewing gum and are often lost if you cut too deeply.

[Teacher Initials: _____ Section 1 points out of 30: _____]

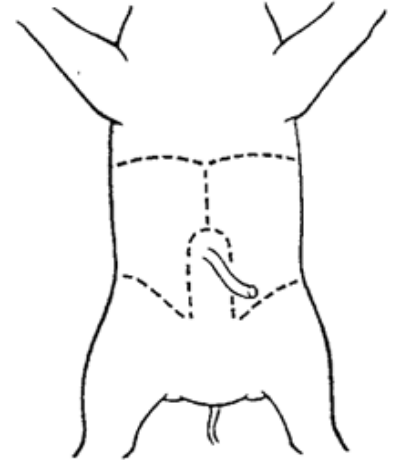
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Section 2: Abdominal Cavity

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. Massage muscles and spread legs open. Use scissors to **cut through the skin and muscles** according to the diagram. Do not remove the umbilical cord. In the first section, you will only examine the abdominal cavity (the area below the ribcage, do not try to open the chest cavity or ribcage at this point).
- 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 the abdominal cavity.
- Your pig may be filled with water and preservative, drain over the sink and **rinse organs**.



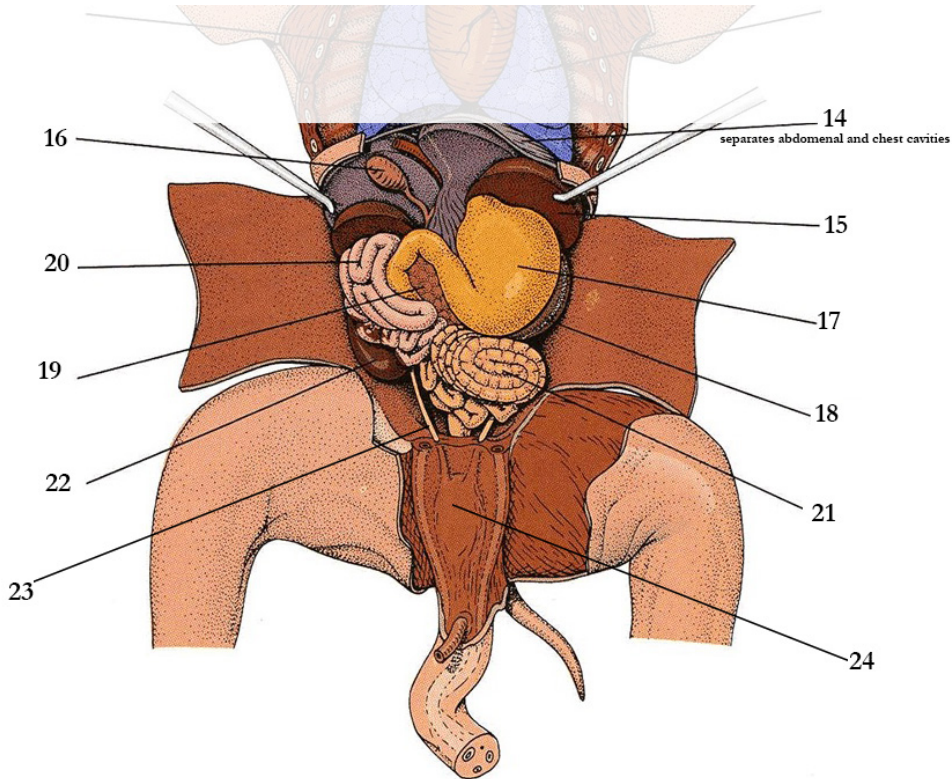
Structure Identification

- **Diaphragm.** This muscle divides the thoracic and abdominal cavity and is located near the ribcage. The diaphragm aids in breathing.
- **Liver.** This structure is lobed and is the largest organ in the body. The liver is responsible for making bile for digestion.
- **Gall bladder.** This greenish organ is located underneath the liver; the **bile duct** attaches the gall bladder to the duodenum. The gall bladder stores bile and sends it to the duodenum, via the bile duct.
- **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 lining produces hydrochloric acid and digestive enzymes. The muscles of the stomach walls churn food with these digestive fluids, which begin breaking down food.
- 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.
- The stomach leads to the **small intestine**, which is composed of two parts: the **duodenum** (straight portion just after the stomach) and the **ileum** (curly part).
- **Pancreas:** a bumpy organ located along the underside of the stomach. The pancreas is a gland. One part of the pancreas makes insulin, which is necessary for the proper uptake of sugars from the blood. The other part of the pancreas produces digestive enzymes (pancreatic juices) which are secreted into the duodenum through the **pancreatic duct**.
- **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**.
- 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. In humans, this structure is much smaller and is called the appendix.

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● The **large intestine** is a larger diameter digestive tube that runs from the cecum to the **rectum**. The large intestine reabsorbs water from the digested food, any undigested food is stored in the rectum as feces. The rectum is a muscular tube that lies toward the back of the pig and will not be moveable. The rectum opens to the outside of the pig, or the **anus**.

Label the Organs Shown in the Diagram Below



Function Identification

- Opening (valve) between stomach and small intestine. _____
- Stores bile, lies underneath the liver. _____
- A branch of the large intestine, a dead end. _____
- Separates the thoracic and abdominal cavity; aids breathing. _____
- Membrane that holds the coils of the small intestine. _____
- The straight part of the small intestine just after the stomach. _____
- Empties bile into the duodenum from the gall bladder. _____
- The last stretch of the large intestine before it exits at the anus. _____

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- Bumpy structure under the stomach; makes insulin _____
- Lies between the two umbilical vessels. _____

[Teacher Initials: ____ Points out of 44: ____]

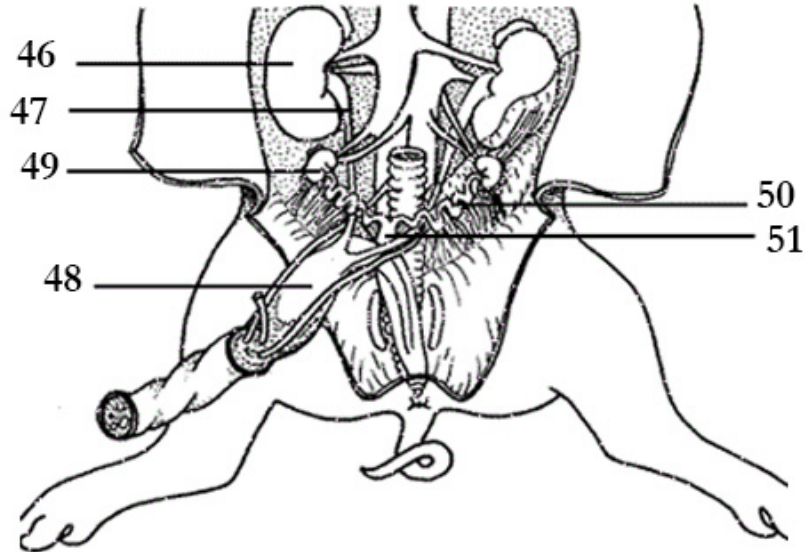
Section 3: Urinary and Reproductive Systems

- In the dorsal (back side) of the abdominal cavity a membrane covers two bean shaped organs that rest on either side of the spine. These are the **kidneys**. Remove this membrane to visualize them. The kidneys are connected to the body's blood supply via the **renal arteries and veins**. The kidneys are responsible for filtering metabolic wastes from the blood, which are excreted as urine.
- ● Two **umbilical vessels** can be seen in the umbilical cord. The flattened **urinary bladder** lies between them and runs parallel to these blood vessels.
- Locate the kidneys again. The **ureters** are delicate tubes that carry urine from the kidneys to the urinary bladder. You probably cut these by accident when moving the umbilical cord to see inside the abdomen.
- Follow the bladder to locate the **urethra**, the tube that carries urine out of the body.
- Male Pigs: Find the **scrotal sacs** at the posterior end of the pig (between the legs). A **testicle** is located in each sac. Open the scrotal sac to locate the testicles. On each find the coiled **epididymis**. Sperm cells produced in the testicles pass through the epididymis and into a tube called the **vas deferens** (in humans, a vasectomy involves cutting this tube). 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**.
- Female Pigs: In the female pig, locate two bean shaped **ovaries** located inside the abdomen, just posterior to the kidneys and connected to the curly **oviducts**. The oviducts are called fallopian tubes in humans. Trace these toward the posterior to find that they merge at the **uterus**. Trace the uterus to the **vagina**. The vagina will appear as a continuation of the uterus that connects to the outside of the body near the anus.

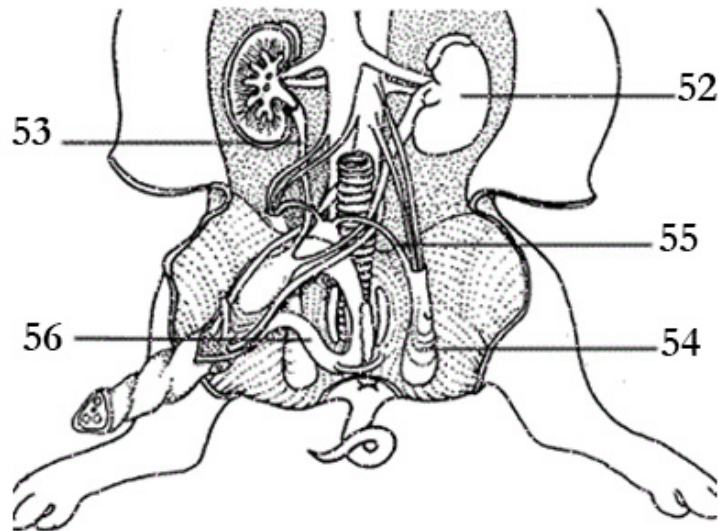
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Label the diagrams (Identify the male and the female)

Which Sex is This Pig?



Which Sex is This Pig?



[Teacher Initials: _____ Points out of 29: ____]

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Section 4: Thoracic Cavity

- Find the **diaphragm** again (sheet of muscle that separates the abdominal and chest cavities). This is the primary muscle that causes breathing. Cut the diaphragm away from the base of the ribcage.

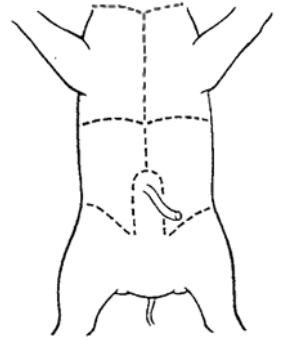
- Cut through the pig's **sternum** (breast bone) to view the inside of the chest/thoracic cavity. You will need to cut all the way up into the pig's neck, almost to the chin. Crack the ribs near the spine so they stay open for viewing inside the chest cavity.

- Above the diaphragm in the center of chest is the **heart**. It is enclosed in a membrane called the **pericardial sac**.

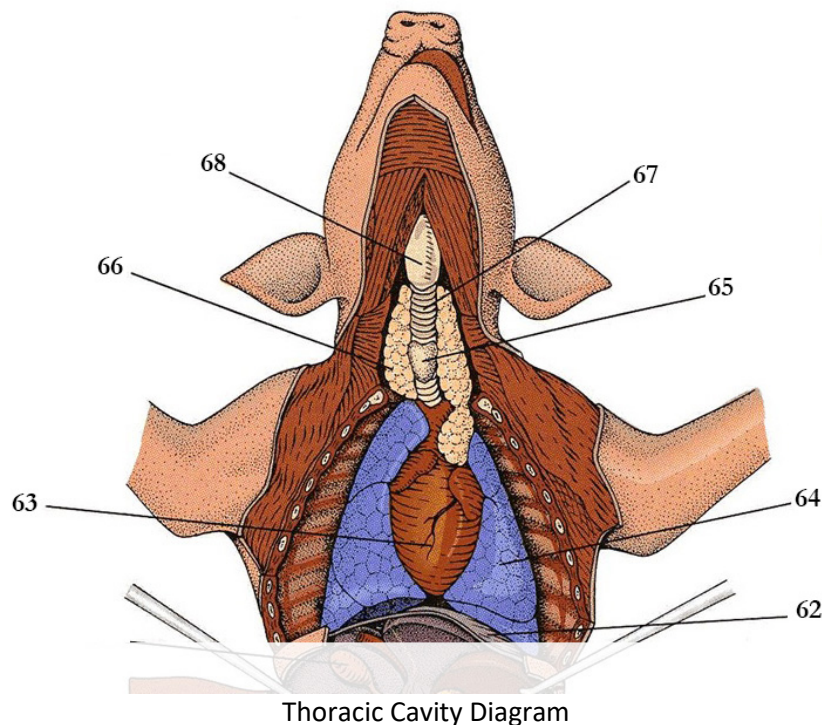
- To either side of the heart are the spongy **lungs**. The lungs are connected to **bronchial tubes** which connect in a Y shape to the **trachea** (aka windpipe). The trachea is easy to identify due to the **cartilaginous rings**, which help keep it from collapsing as the animal inhales and exhales. The cranial/anterior end of the trachea should be located in the chin area above the heart, and connects to the nasopharyngeal cavity at the epiglottis in the back of the throat.

- Laying ventral to the trachea, locate the pinkish-brown V-shaped structure called the **thyroid gland**. This gland secretes hormones that control growth and metabolism.

- At the anterior (toward head) of the trachea, you can find the hard, light-colored **larynx** (or voice box). The larynx allows the pig to produce sounds - grunts and oinks.



Identify and label the structures of the thoracic cavity



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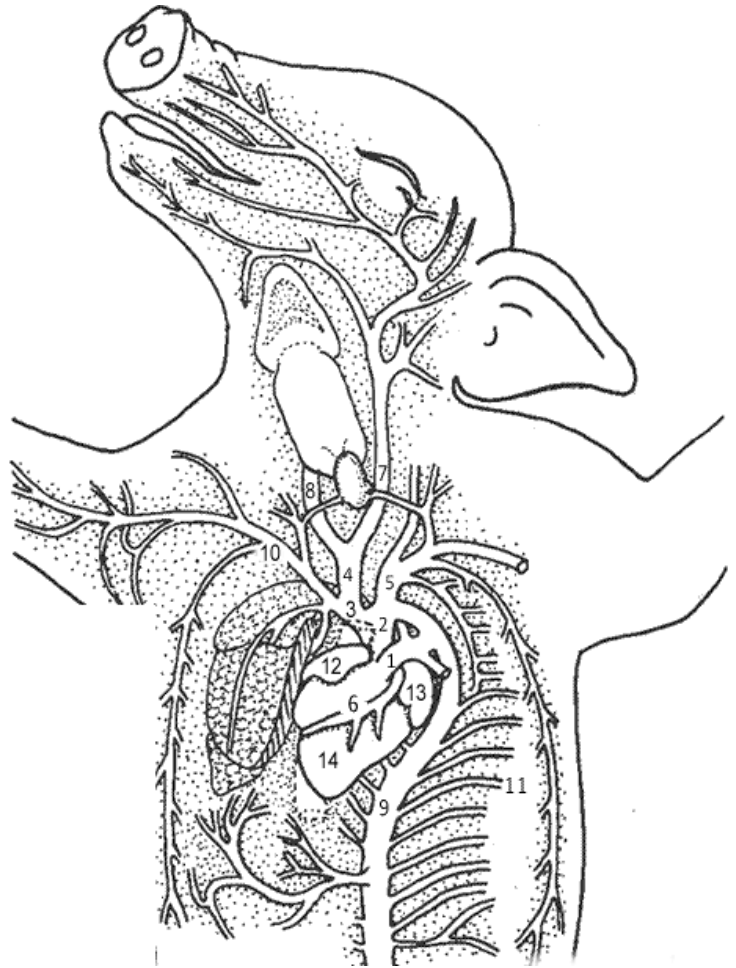
Section 5: Thoracic Arteries

- Remove the **pericardium**, the thin membrane that surrounds the heart.
- The structures visible on the heart are the two **atria** and the **ventricle** which has two chambers not visible from the outside (4 chambers total).
- The most obvious vessel on the front of the heart is the **pulmonary trunk**. It curves upward and joins the **aorta** – the largest artery in the body which arches from the heart and curves around to go to the posterior of the body. In the abdominal cavity, this vessel is called the **abdominal aorta**. The aorta supplies the body with oxygenated blood from the heart.
- The aorta curves back and branches in two spots – the **right brachiocephalic** and the **left subclavian** arteries.
- The right brachiocephalic then branches into the **common carotid** and the **right subclavian** arteries. The subclavian arteries supply blood to the front legs (arms in humans) and follow the clavicle bone.
- The **common carotid** branches into the **left and right carotid arteries**. The carotid arteries supply blood to the head and neck.
- Observe the **coronary vessels** on the outside of the heart - these vessels supply blood to the muscle of the heart itself.
- Find the arteries that run near the ribs. These are the **intercostal arteries**.
- Lift the heart to look on its dorsal side (toward the back), you should be able to see the **anterior and posterior vena cava**, the largest vein in the body which brings blood from the body back to the heart.
- In addition, you should also be able to find the **left and right jugular veins** that drain blood from the head and run parallel to the carotids.

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Identify the following parts of the circulatory system by their number

- #1 is the _____
- #2 is the _____
- #3 is the _____
- #4 is the _____
- #5 is the _____
- #6 is the _____
- #7 is the _____
- #8 is the _____
- #9 is the _____
- #10 is the _____
- #11 is the _____
- #12 is the _____
- #13 is the _____
- #14 is the _____



Thoracic Arteries Diagram

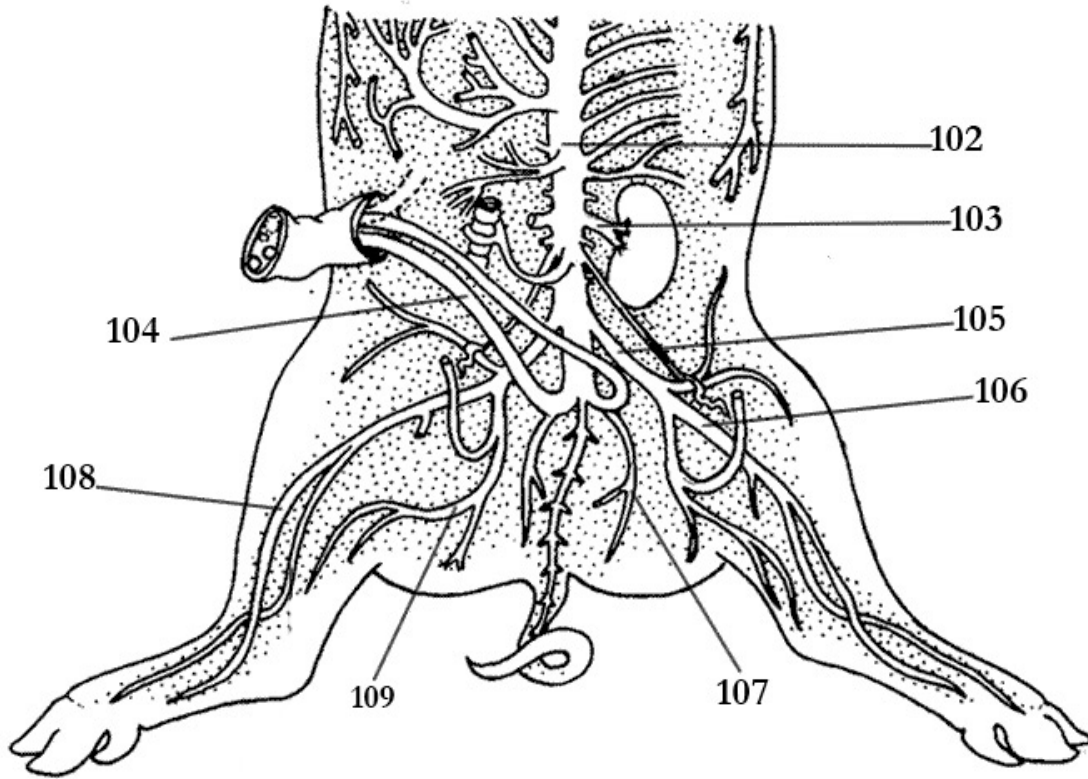
[Teacher Initials: _____ Points out of 29: ____]

Section 6: Posterior Arteries

- 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.
- The **hepatic artery** leads to the liver, the **splenic artery** leads to the spleen, the **renal arteries** lead to the kidneys, and the **mesenteric artery** leads to the mesentery.
- Trace the abdominal aorta and note where it joins the **umbilical arteries**.
- You will need to cut the muscle in the leg to trace the next vessels, which branch from the abdominal aorta. Use a pin to carefully tease away the surrounding muscle and tissue. The abdominal aorta splits into two large vessels that lead to each leg - the **external iliac arteries**. These branch again. The anterior branch is the **femoral artery** which supplies blood to the lower legs. The posterior branch is the **deep femoral**.

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Identify and label the lower arteries



Lower Arteries Diagram

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