Name _____

# Fetal Pig Dissection Pre-Lab

1. How will you determine if you pig is male or female?

2. Describe the incision which will be made in the abdominal cavity.

3. How many lobes will the liver have? Which end of the abdominal cavity will the liver located on? Why is the anterior end of the stomach called the cardiac stomach and the other end the pyloric stomach?

4. How can you tell the difference between the large and small intestine?

5. Where will you find the diaphragm?

6. Where is the gallbladder located? What color is it?

7. Which end of the neck is the larynx located?

8. In which part of the heart will you look to find the superior and inferior vena cava?

INVESTIGATION

# 39-1 The Fetal Pig— A Placental Mammal

## Introduction

Mammals are warm-blooded vertebrates that feed their young milk from mammary glands and have hair or fur on their bodies. The largest single group of mammals is the placental mammals. A placental mammal develops inside its mother, where it is connected to her by the placenta, a large organ filled with blood vessels. These blood vessels allow the mother's blood to supply the fetus with nutrients and oxygen while removing wastes and carbon dioxide. Humans are placental mammals and so are most domesticated animals, such as dogs, cats, horses, and cows. The fetal pig is an excellent placental mammal to study because it is relatively small, easy to acquire, and exhibits all mammalian characteristics as well as special fetal structures.

### Purpose

To dissect and observe the major structures and organ systems of the fetal pig

### Objectives

- *Identify* the basic mammalian characteristics of the fetal pig.
- *Relate* the structures found in the fetal pig to their functions.

## Materials

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|---|---|---|
| Fetal pig, preserved | Disposable gloves | Dissecting pins |
| Twine | Dissecting pan | Dissecting probe |
| Scalpel | Dissecting scissors | |

## Procedure

### Part A: External Structures

1. Make a drawing of the umbilical cord of your pig. Label the two arteries and the vein. After birth, the umbilical cord drops off.
*What is the scar that remains on the abdomen called?*

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2. Determine the sex of your pig. The female will have a urogenital opening just ventral to the anus. The male will have a urogenital opening just posterior to the umbilical cord. Although small sacs containing the testes may be found, they are not always present at this stage of development.

*What is the sex of your pig?* _____

3. Locate the *mammary papillae*. These are the nipples on the abdomen. They are present in both male and female pigs.

*How many papillae are there on your pig?* _____

*What is the function of these papillae?*

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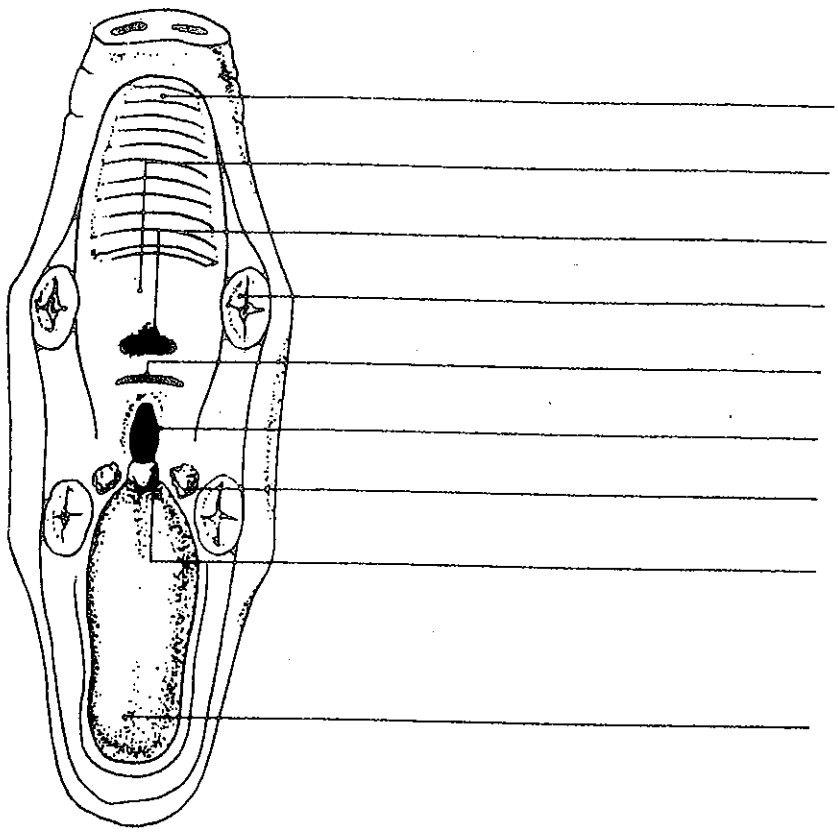
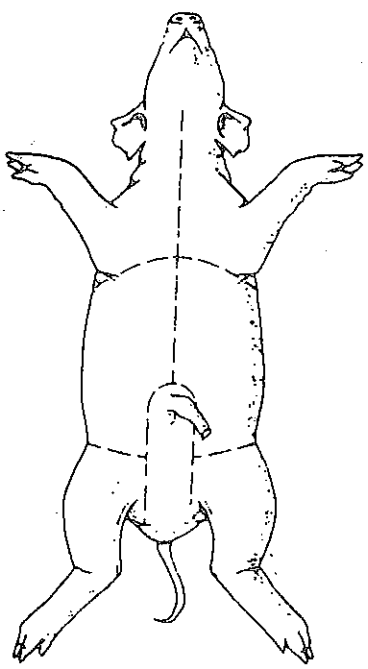
4. CAUTION: **Dissecting implements are very sharp. Use extreme care.** Using your scissors, cut the corners of the jaw so that the mouth will remain open. Locate the following structures and label them on the diagram below: *tongue, teeth, nasopharynx, glottis, epiglottis, hard palate, soft palate, salivary glands,* and the opening of the *esophagus*.





## Part B: Preparing for Dissection

1. You will be dissecting and observing the internal organs system by system. **Do not remove any organ before you are directed to do so.** Take care not to damage any structures when locating and dissecting other structures. Also, remember that no system functions alone. It is important to be aware of how each system relates to the others.

2. Place your fetal pig in the dissecting pan, ventral side up. To secure the pig for dissection, use two pieces of twine. Tie one piece of twine securely around one wrist of your pig. Take the twine under the dissecting pan and tie it to the other wrist. Repeat this procedure with the ankles. Tighten the strings so that the legs will stay apart.

3. Study the diagrams carefully to help you locate all the structures printed in italics. Throughout this investigation italic type will indicate major structures that need to be located, drawn, and labeled on your diagram in the space provided.

4. Begin the dissection of the abdominal cavity by making cuts with your scalpel as shown in the diagram on the left. Cut through the skin and muscle tissue, but be aware of the depth of your scalpel, so as not to injure the underlying organs.

5. After making these cuts, pin back the flaps of skin and tissue to expose the coelomic cavity.

### Part C: The Digestive System

1. Follow the large vein at the base of the umbilical cord.
*Where does it go?*

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Cut the vein so that the flap of skin with the umbilical cord can be turned back.

2. Below is an explanation of the structures to locate and observe in the abdominal cavity. After each structure has been located and observed, label it on the diagram. Find the large, three-lobed *liver* at the anterior end of the abdominal cavity. Under the liver is the *stomach*, a large pouch-like organ with two parts. The large, anterior end is the *cardiac stomach* and the smaller end is the *pyloric stomach*.
*Why is the anterior end of the stomach called the cardiac stomach?*

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The point at which the stomach and the small intestine meet is called the *pyloric sphincter*.
*What is a sphincter?*

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3. Posterior to the sphincter is the *small intestine*. Follow it to where it enlarges to become the *large intestine* or *colon*. In some cases it is difficult to tell the difference between the two sections of the intestine. The difference is that the large intestine is slightly larger in diameter and has a small, blind pouch called the *caecum*. The caecum ends in the appendix in humans and in the pig. Closely observe the membranous, net-like tissue that can be found over the intestines. This is the *mesentery*.
*What is the function of the mesentery?*

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The large intestine continues and enlarges, forming the *rectum*. The point at which the rectum opens to the outside of the body is the *anus*.

Relocate the liver. Lift it up and trace the stomach anteriorly to the *esophagus*.
*Why does the esophagus appear to be short?*

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4. Observe the dome-shaped muscular wall at the most anterior end of the abdominal cavity just above the liver. This is the *diaphragm*.
*To what systems does the diaphragm belong?*

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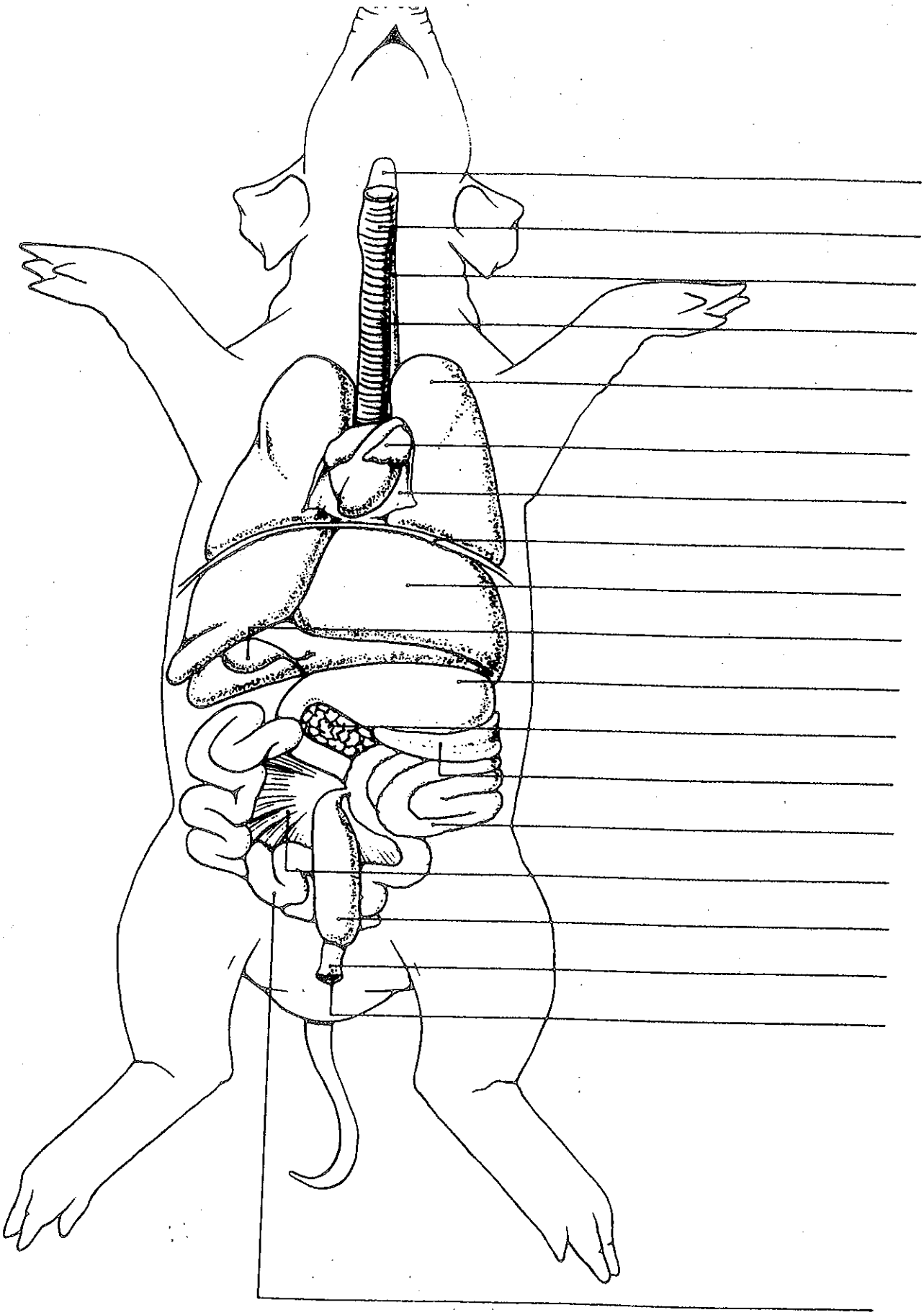

5. Embedded in the underside of the right central lobe of the liver is the greenish *gall bladder*. Locate it and then find and trace the *bile duct*, a small, tube-like structure that is attached to the gall bladder. Directly below the gall bladder, on the underside of the stomach, you will find a granular-looking organ, the *pancreas*. Both the gall bladder and the pancreas release enzymes through a duct into the small intestine to aid in digestion. Attached to the left edge of the stomach is a reddish, smooth organ. This is the *spleen*.

*To what system does the spleen belong?* _____

*What is the function of the spleen?*

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**Part D: The Respiratory and Circulatory Systems**

1. Open the *thoracic cavity*, using scissors to cut through the bone. The bones are very soft, therefore, when cutting through them, be careful not to cut too deeply or you will damage the heart and lungs. Using scissors, carefully cut the diaphragm on either side of the body, and fold it back over the liver.

2. Beginning at the top of the stomach, trace the *esophagus* as it passes through the diaphragm and under the heart. At the anterior end of the esophagus on the ventral side is the *trachea*. Notice the rings of cartilage that surround the trachea.
*What is their function?*

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These rings give the trachea the appearance of a vacuum cleaner hose. Trace the trachea to the point at which it branches to each *lung*.

3. Continue the dissection of the neck anteriorly to find an enlarged area of cartilage. This is the *larynx*, often called the voice box. At the top of the trachea is the *epiglottis*, which you located when observing the mouth structures.
*What is the function of the epiglottis?*

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4. Using the diagram, locate and label the *right lung*, *left lung*, and the *heart*, which is enclosed in the *pericardium*.

5. Remove the pericardium from the heart. On the diagram on the next page, locate and label the following structures on the ventral side of the heart: *right atrium, left atrium, right ventricle, left ventricle, coronary blood vessels*.
*What is the function of the coronary blood vessels?*

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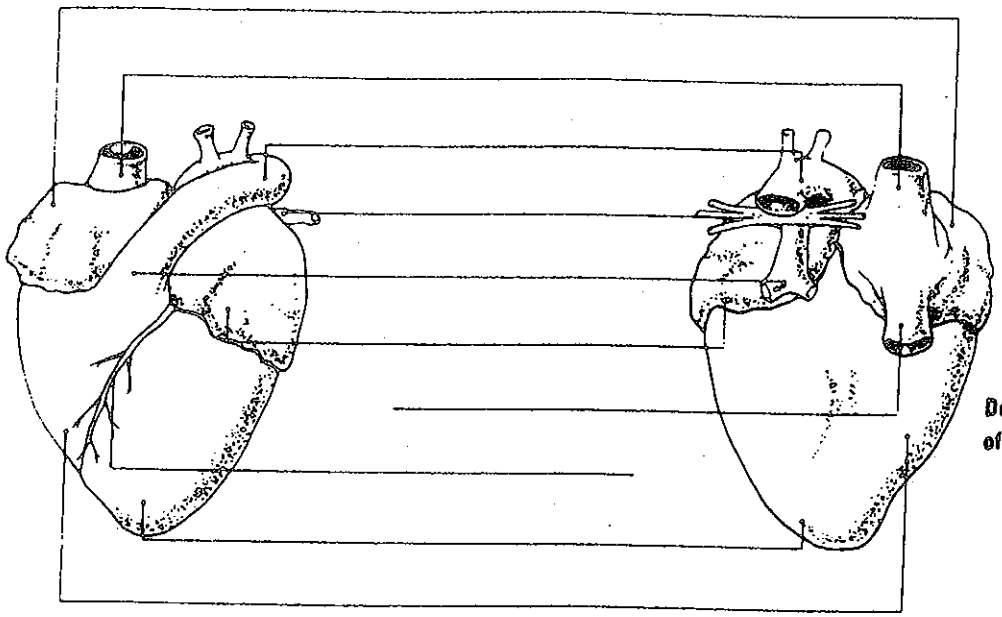
6. Turn the heart onto the dorsal side without removing it. Locate and label the two major veins that bring blood back to the heart, the *superior vena cava* and *inferior vena cava*. Locate and label the *right* and *left pulmonary veins*. This is the pair of veins that brings blood back to the heart from the lungs. Both of these empty into the left atrium.




7. Carefully dissect around the heart, picking away the connective tissue between the blood vessels. Locate and label the *pulmonary artery*, on the ventral side of the heart, as it leaves the right atrium. The *aorta*, the largest and most important artery, can be found just beneath the pulmonary artery as it leaves the left ventricle. Very careful dissection will allow you to find the *ductus arteriosus*, a short connecting vessel that functions in the fetus to shunt blood from the pulmonary artery directly into the aorta. This vessel allows most of the blood to bypass the lungs.
*Why would this be important?*

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8. Check your diagram to be sure that the heart is labeled with all 12 structures that have been examined.

### Part E: The Urogenital System

1. Carefully remove the organs of digestion from the abdominal cavity. The organs of the excretory and reproductive systems will now be exposed. As the organs of the urogenital system are described and located, label each of them on the diagram. The *kidneys* are the pair of dark, bean-shaped organs lying on the dorsal wall, behind the *peritoneum*. The kidneys are supplied with blood by the *renal arteries*. The *renal veins* take blood away from the kidneys. They are located just below the renal arteries. Remove these blood vessels very carefully.

2. Coming from the posterior end of the kidney is the *ureter*. This is the tube that drains urine from the kidney into the *urinary bladder* for storage. Trace the ureter to the bladder. Cut through the cartilage of the pelvic girdle with scissors. Spread the legs and pelvic girdle as far apart as possible. Locate the *urethra*, which comes from the urinary bladder to the *urogenital opening*, through which urine is eliminated from the body.

**3. The Male Reproductive System:** Depending on the age of the male fetus you will find the oval-shaped *testes* either in the abdominal cavity or inside the scrotal sacs at the posterior of the pig. On each testis find the coiled *epididymis*.

*What is the function of the epididymis?*

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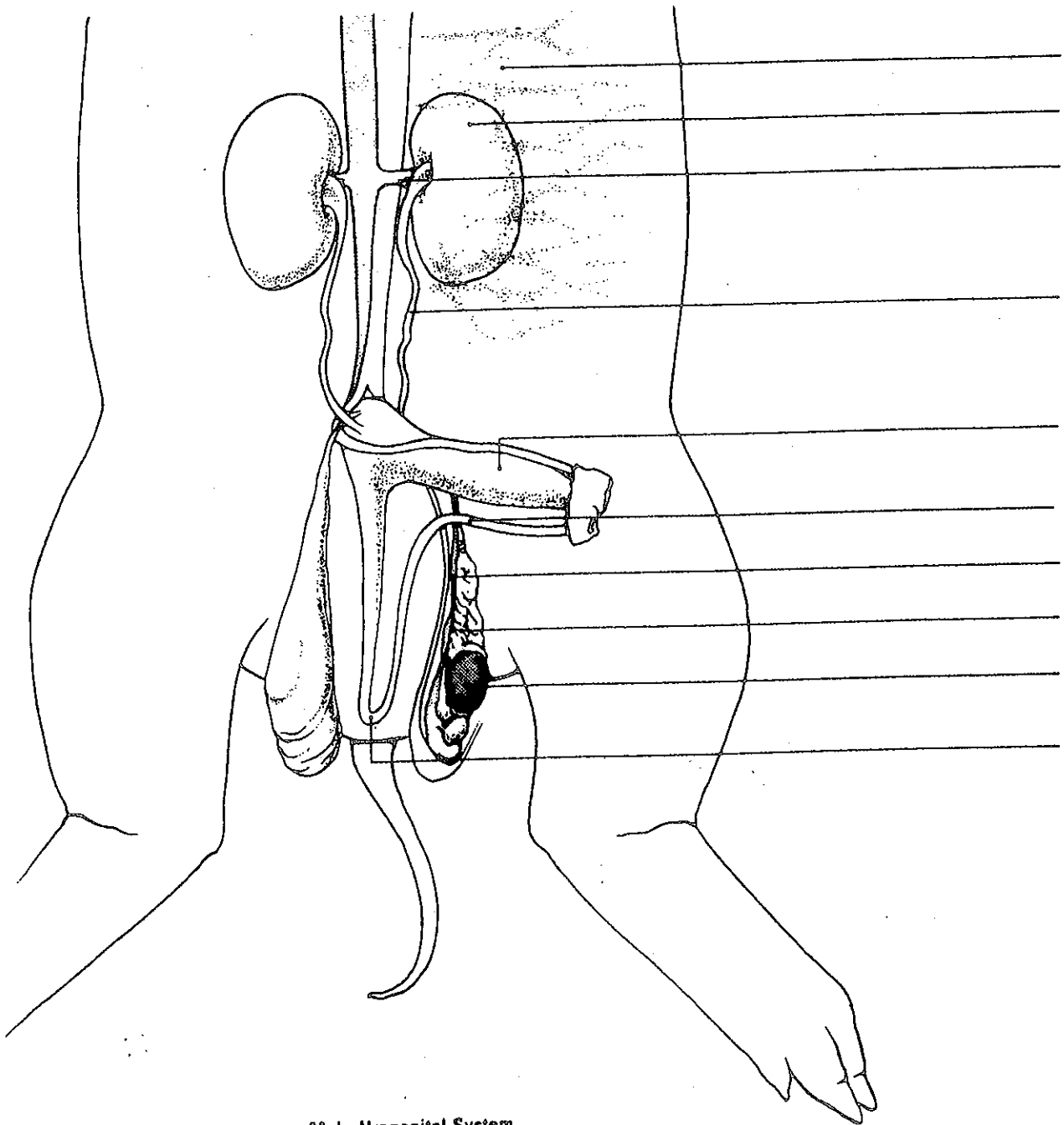
The *vas deferens* carry the sperm from the epididymis to the *urethra*. Follow the urethra to the *penis*, a muscular tube carrying both reproductive cells and liquid wastes out of the body. The urethra goes all the way through the inside of the penis.



**Male Urogenital System**

**4. The Female Reproductive System:** Locate the two *ovaries* at the posterior end of the abdominal cavity of the female fetus. Each ovary has a coiled, tube-like structure called the *oviduct*.
*What is the function of the oviduct?*

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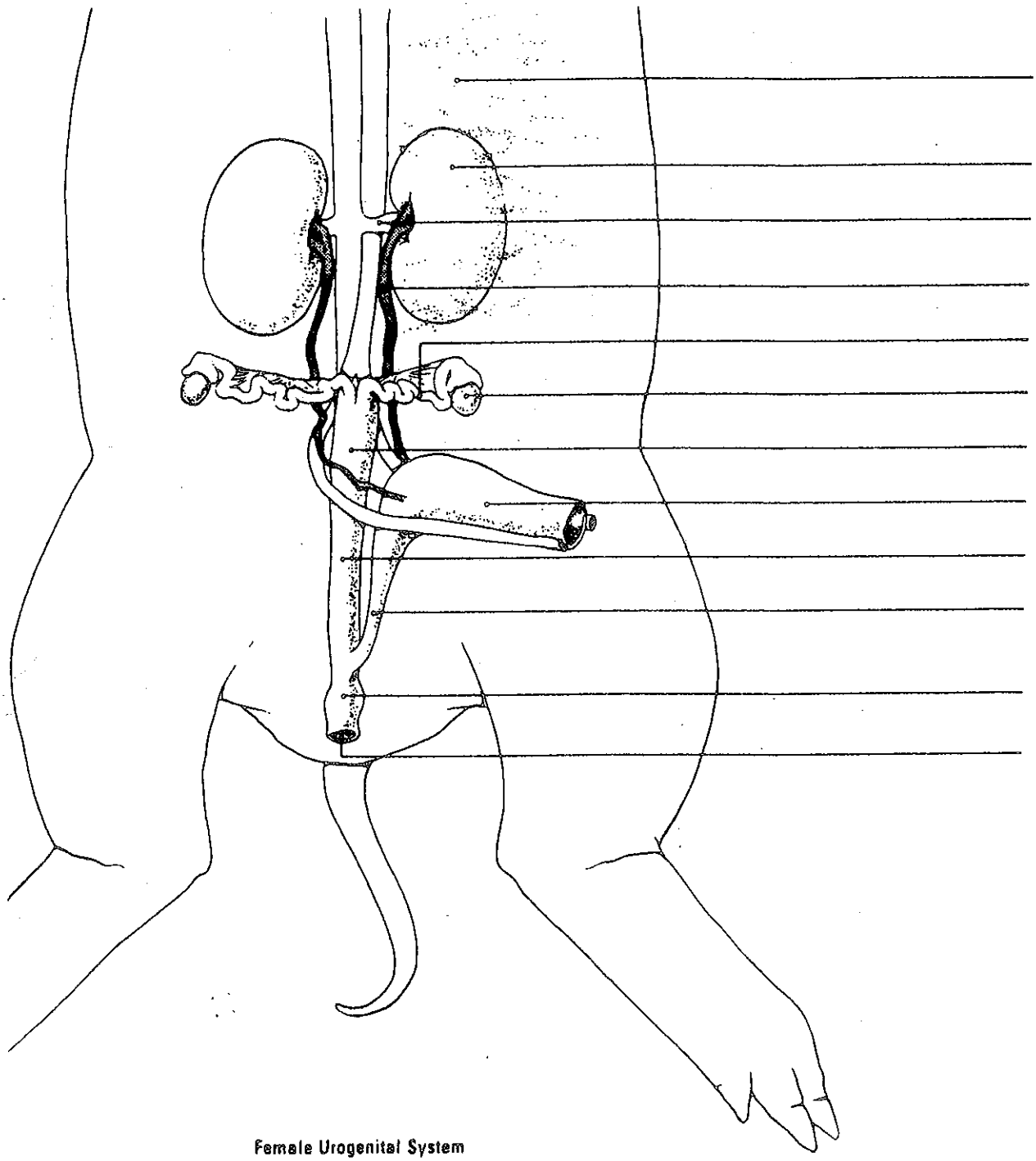
Trace the path of the oviduct to the *uterus* where the fertilized egg develops into an embryo and later a fetus. The muscular tube just posterior to the uterus is the *vagina*. In the pig the vagina opens into an area called the *urogenital sinus* that opens to the outside of the body through the urogenital opening, just ventral to the anus.



Female Urogenital System

## Analyses and Conclusions

1. Name the major mammalian characteristics that are exhibited by the fetal pig.

2. Name the organs and structures of the digestive system in the order that food moves through them.

3. What other organs and structures are part of the digestive system?

4. Name the organs and structures of the respiratory system in order, from the mouth to the lungs.

5. Name the blood vessels and heart structures that make up the circulatory system in order, beginning with the superior vena cava and inferior vena cava.

## Going Further

Dissect the heart by cutting it into dorsal and ventral halves. Draw a diagram and label parts of interior view of heart, both dorsal and ventral halves. Show each of the major blood vessels either leaving or returning to the heart.