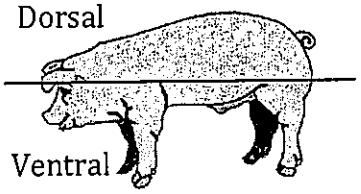
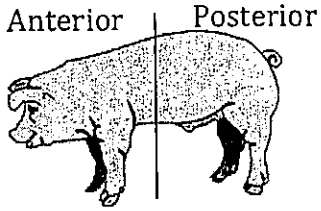
DISSECTION OF THE FETAL PIG

LABORATORY MANUAL

MANUAL NUMBER _____ -DO NOT WRITE ON THIS MANUAL. ALL ANSWERS AND DRAWINGS SHOULD BE CONFINED TO THE QUESTION WORKSHEET.

You will need to know these terms associated with position on the body.
Anterior: The top or front end of an organism's body, or at or towards the front.
Posterior: The behind or end of an organism, or at or towards the rear.
Dorsal: The back of an organism, or on or towards the back.
Ventral: The bottom of an organism, or on or at the bottom.
Lateral: The sides of an organism.





EXTERNAL ANATOMY:
Obtain a fetal (unborn) pig from your instructor. Rinse the pig with cool water. Place the pig in a dissecting pan. Notice the cut in the neck region where pink latex was injected into the arteries and blue latex was injected into the veins.

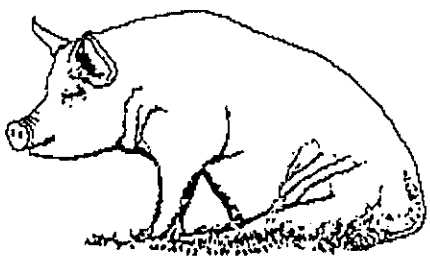
Identify and label the following external body parts:

1) Umbilical Cord
2) Umbilical Arteries (Make a fresh cut across the umbilical cord 2 cm from the abdomen of the pig to observe these structures.)
3) Umbilical Vein
4) Ear
5) Hair on the chin
6) Nostrils (Nares)
7) Eyes
8) Tail
9) Toes (Count how many) Notice that a pig walks on his toenails.
10) External reproductive structures (Identify the sex of your pig. Be sure you observe both sexes.)

Just under the tail is the posterior opening of the digestive tract, the anus. In females, an opening that serves both genital and urinary systems, called the urogenital opening, is located just ventral to the anus, and a small, fleshy papilla can be seen projecting from it. In females, the urinary and genital systems separate later in development, and the single opening becomes two. In males, the single urogenital opening is located just posterior to the umbilical cord; the *duct* leading to it runs forward from between the legs in long muscular tube, the penis, which can be felt under the skin. They also can be identified by the two sac-like swellings, the scrotal sacs, situated at the posterior end of the body.

LABEL the above external body parts on DIAGRAM 1. ANSWER questions 1) - 6).

The period of gestation (conception to birth) for the pig is 112-115 days. The age of the fetus can be estimated by measuring the body length from the tip of the snout to the attachment of the tail. Compare this length to the data given on relative sizes of the pig at different times of gestation.



21 days - 11 mm	56 days - 40 mm
35 days - 17 mm	100 days - 220 mm
49 days - 28 mm	115 days - 300 mm.

You can't put a hog in a zoo-
There's no telling what he will do.
He may get loud
And charge at the crowd
Or just lie there not looking at you.

INTERNAL ANATOMY:

In carrying out your dissections be careful to follow the directions in this guide and those given verbally by your instructor. Dissection is to be undertaken with great care and is a procedure to help you locate, expose, and learn the anatomy of this animal. IT IS NOT THE RANDOM CUTTING -UP OF A CARCASS! Always remember that you should do as little cutting as possible, because the more you cut, the more you will alter the structural relationships among the parts. It is your objective always to learn the original organizational patterns, not some new arrangements created as artifacts of your dissection. You will have to cut out connective tissues, in order to see the relationships between organs, but you should always know what you are cutting and why you are cutting. If you keep this rule in mind, you should not have any difficulty preparing a good dissections at the same time avoiding unnecessary damage to your specimen.

MOUTH CAVITY:

Open the jaws as widely as you can without cutting, and observe the oral (mouth) cavity, with the tongue on its ventral surface and the hard palate forming its dorsal surface. The hard palate separates the oral cavity from the nasal cavities.

With scissors, starting at one corner of the mouth, cut through the tissue and bone posteriorly to the tongue, along a line from the corner of the mouth to the bottom of the ear. Repeat this operation on the other side, and spread the jaws so that the oral cavity is exposed. Examine the tongue and note the papillae scattered over its surface; these contain taste buds.

Examine the hard palate in more detail, and locate its posterior border. Posterior to the hard palate is the soft palate, which contains no bone.

Locate the upper and lower gums and the few teeth that have probably erupted. Remove a molar and observe its shape.

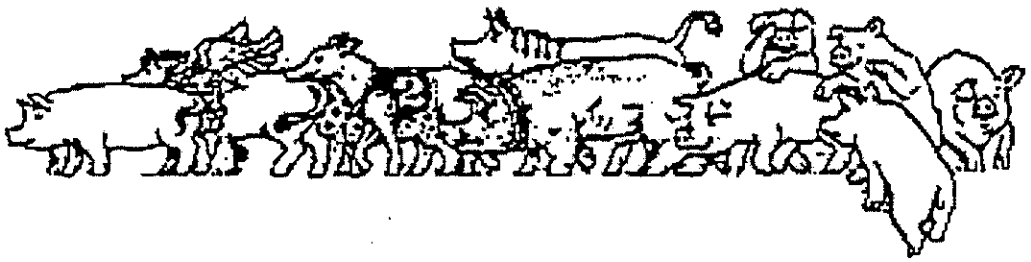
The most posterior part of the oral cavity is known as the pharynx. This cavity, a common passageway for the food and respiratory canals, is back of the tongue and the soft palate. Be sure you have cut far enough into the jaw, or you will not be able to spread the jaws to see the pharynx.

Identify the epiglottis a median flap at the base of the tongue. The epiglottis partially covers an opening, the glottis, which is the entrance into a passageway leading to the lungs. Posterior and dorsal of the glottis, find the opening into the esophagus, the tube of the digestive system that leads through the neck and thorax to join the stomach. Pass the end of your probe into the glottis and into the esophagus, and try to tell them apart.

DRAW and LABEL the following structures on Diagram 2 of your Lab Sheet.

1) Teeth
2) Tongue
3) Soft Palate
4) Hard Palate
5) Epiglottis
6) The opening to the esophagus
7) The opening to the trachea or windpipe
8) Nasopharynx (opening in posterior end of soft palate.)

ANSWER QUESTIONS 7) - 14)



NECK REGION:

Turn the pig ventral side up and remove a skin and fat layer along a 3 cm wide area from the hair on the chin of the lower jaw posteriorly to the breastbone. Refer to picture in page 4. When the skin is off, you will have exposed muscles and glands. The muscles in this region occur mostly in the form of thin ribbons. A pair of large thymus glands will be exposed lying among the muscles. You should be able to distinguish stringy muscle from spongy gland tissue in any future dissection.

The thymus glands function in the young mammal to produce the cells that enable the animal to manufacture antibodies as a defense against disease.

Using a probe or forceps, separate the muscles and glands without cutting them. Locate the reddish thyroid gland. This gland produces thyroxin, which helps regulate cellular metabolism.

Locate the trachea and note the enlarged portion of the trachea, which is the larynx or voice box.

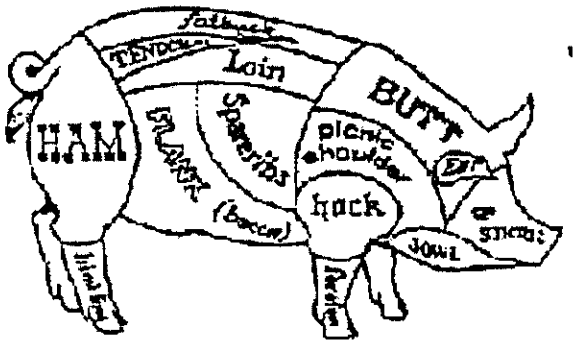
If possible locate the esophagus which is located on top of the trachea.(from the pig's point of view.)

In the neck region you should also be able to locate the jugular veins and carotid arteries. The veins proceed into the skull cavity to drain the vessels of the brain and the arteries pass into the cranial cavity to supply the brain with oxygenated blood.

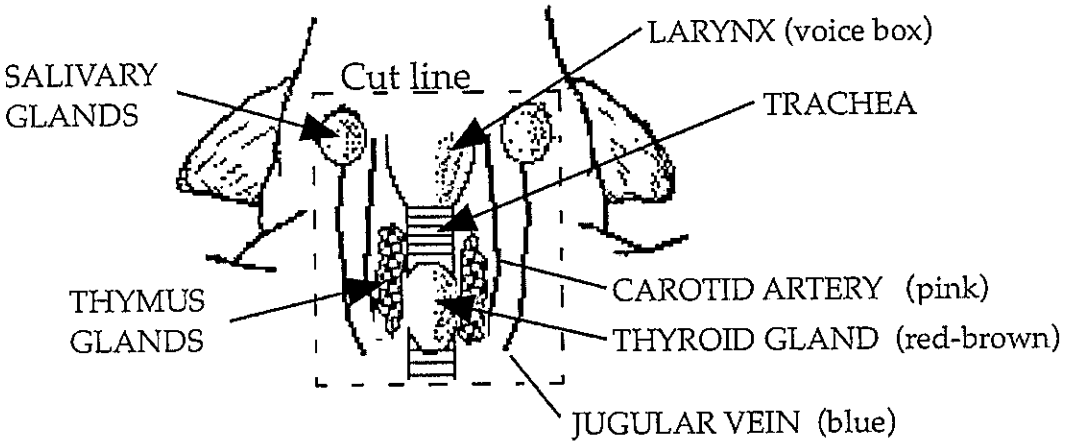
Be sure you understand the relationships of the food and air passages in the head and neck.

DRAW and LABEL the following structures on DIAGRAM 3

1) Larynx
2) Thyroid Gland
3) Thymus
4) Trachea
5) Carotid arteries
6) Jugular veins

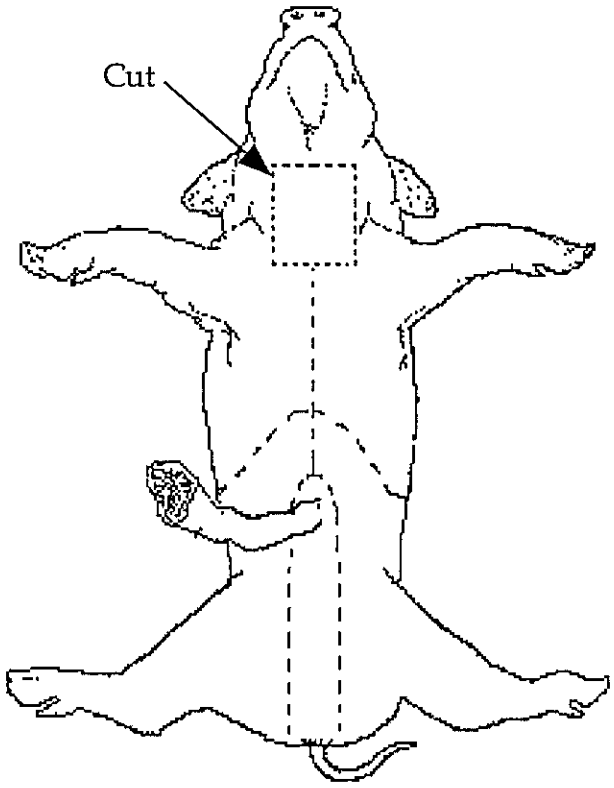


Answer questions 14) - 22).



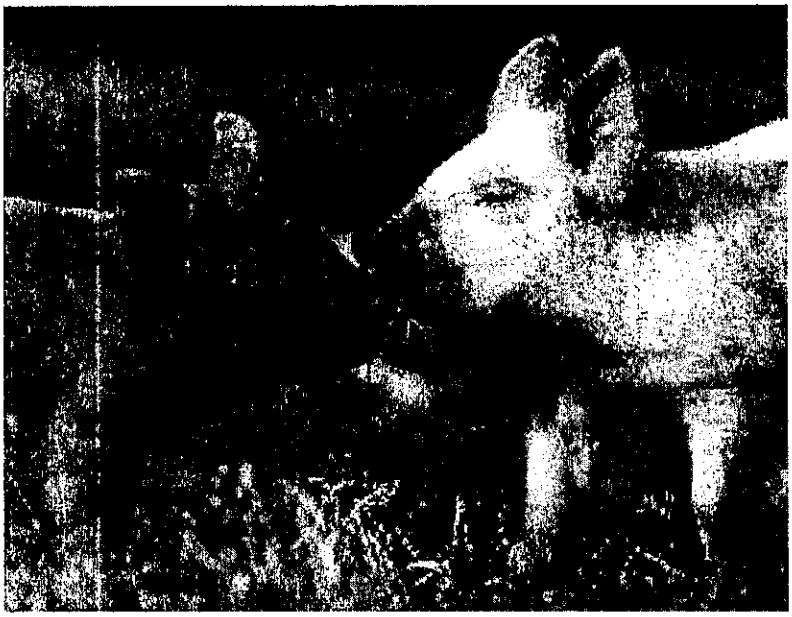
THE BODY CAVITY:

Opening the body cavity; From this point on, the legs of the pig should be tied with string and the string wrapped around the dissection pan to hold the pig in place. This technique will be demonstrated by the instructor. Expose the organs in the thoracic and abdominal cavities by making the incisions through the body wall as shown in the diagram to the right. First, continue the incision you made in the neck back toward the umbilical cord. Cut all the way through the body wall with a pair of scissors but lift the body wall toward you as you do so to prevent cutting the internal organs. Continue back by making a pair of cuts to each side of the umbilical cord and back toward the hind legs. This middle strip of tissue between this pair of cuts contains the umbilical arteries, urinary bladder, and, in the male, the penis. It can be turned back by cutting the umbilical vein that extends from the umbilical cord to the liver. Make a cut in the vein so that you can locate this vein at a later time.

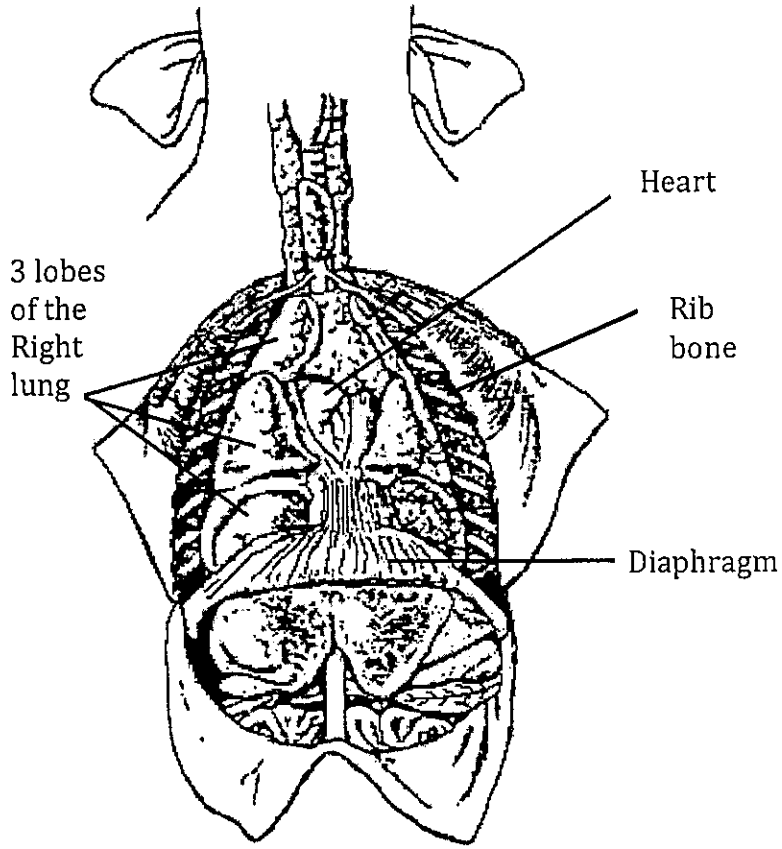


Look into the abdominal cavity and notice the muscular diaphragm that separates the thoracic and abdominal cavities.

Make lateral incisions through the body wall just back of the attachment of the diaphragm. Do this on both sides of the body. Finally, carefully cut through the membranes that bind the thoracic organs to the ventral thoracic wall. You can now bend back the flaps of the body wall, wash out the coagulated blood and preserving fluid, and got a good view of the internal organs.



Whispering little porcine secrets nose go nose. In all of nature, hogsnouts are unique.



THORACIC REGION:

Find the trachea leading from the pharynx. Note that the trachea consists of rings of cartilage covered by connective tissue. It branches from the paired bronchi leading directly to the lungs. Within the lobes of the lungs they will divide to form secondary bronchi. These in turn will branch to form bronchioles - each terminating in a blind air sac or alveoli. Describe the consistency of the lungs.

Study the orientation of the heart as it appears in the thoracic cavity. Note the roughly cone shaped bulk of the ventricles, an anterior to them, the smaller atria. Examine the groove across the ventricular muscle. A coronary artery and vein travel in this groove, supplying the heart itself with the oxygenated blood necessary for survival. Compare the thickness of walls in the heart chambers, as well as volume capacity. Keep in mind that it is neither contracted nor distended. Each of the four heart chambers connecting with a large blood vessel. Try to locate them with the probe and follow its path. From the left ventricle leaves the thick-walled aorta, one of the widest vessels in the body.
From the right ventricle emerges the pulmonary artery, also large and thick walled. Into the right atrium enters the vena cava coming from the head region and the inferior vena cava coming from the posterior, region of the body. Into the left atrium opens the pulmonary vein carrying blood from the lungs to the heart. Try to trace the path of blood as it is pumped through a living heart.

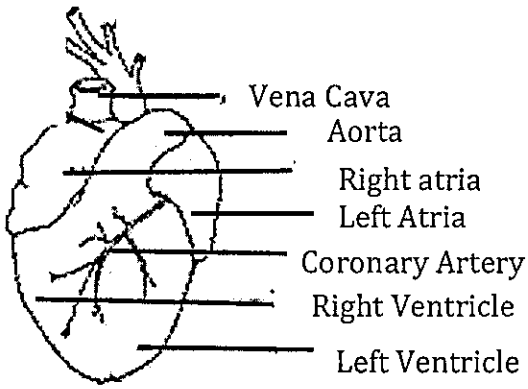
In the fetal pig there it a short but large vessel branching off the pulmonary artery and leading directly to the aorta. This is the ductus arteriosis and is found in the fetus for the purpose of short-circuiting the blood around the still nonfunctional lung.

Instead of going to the lungs the bulk of blood from the right ventricle passes directly into the aorta from which it is distributed throughout the body. At birth the ductis arteriosis shrivels and at the same time an open pathway between the right and left atria of the fetal heart closes off. Thereafter all blood from the right ventricle must go to the lungs where it is oxygenated. This fetal condition is advantageous because the placenta not the lung, supplies oxygen. The fetal condition in humans is similar.

DRAW and LABEL the following structures on DIAGRAM 4 of your lab sheet.

1) lungs
2) diaphragm
3) right atrium
4) left ventricle
5) coronary artery

ANSWER question 23) - 31)



ABDOMINAL CAVITY:

Note the thin sheets of tissue called mesenteries, which suspend and support the organs and serve as bridges (between body wall and organs) for the passage of blood vessels, nerves, and other ducts.

Examine the umbilical cord and make a fresh cut across it if the end is damaged. The umbilical vein runs from the umbilical cord to the liver. You cut this vein when you opened the body cavity. The liver is the largest organ in the abdomen. Push the liver aside and examine the diaphragm.

Push the liver aside and identify the stomach, a large sac dorsal to the liver on the left side (note that it is not full because the fetal pig has not eaten). Locate the point at the anterior end of the stomach where the esophagus penetrates the diaphragm and then almost immediately joins the stomach. At its posterior end the stomach makes a curve to the right and narrows to join the anterior end of the small intestine. The constriction between the stomach and small intestine is the pylorus. Attached to the stomach by mesentery is a long, flat reddish organ (spleen) which stores red blood cells and functions in immunity. Notice the whitish pancreas (dorsal).

Examine more closely the anterior end of the small intestine, called the duodenum. The liver and the duodenum are connected in the pyloric region by the bile duct, which runs in the mesentery stretching between the two organs. Underneath the liver is the gall bladder, a small greenish sac. The liver secretes a substance called bile. The bile is stored in the gall bladder before it goes to the small intestine to aid in the digestion of fats.

With a razor blade, make an incision into the posterior end of the stomach, and carry the cut through the pylorus a short distance into the duodenum. Find the pyloric sphincter muscle. This muscle regulates the amount of food that enters the small intestine from the stomach.

From the pyloric region, the small intestine runs posteriorly for a short distance and then becomes an irregular mass of bends and coils held together by a common mesentery. Locate the pancreas in the mesentery between the stomach and the small intestine.

The far end of the small intestine joins the large intestine in the left side of the abdominal cavity. A blind sac, the caecum, will be found projecting from the large intestine near the point of the junction. This is similar to your appendix.

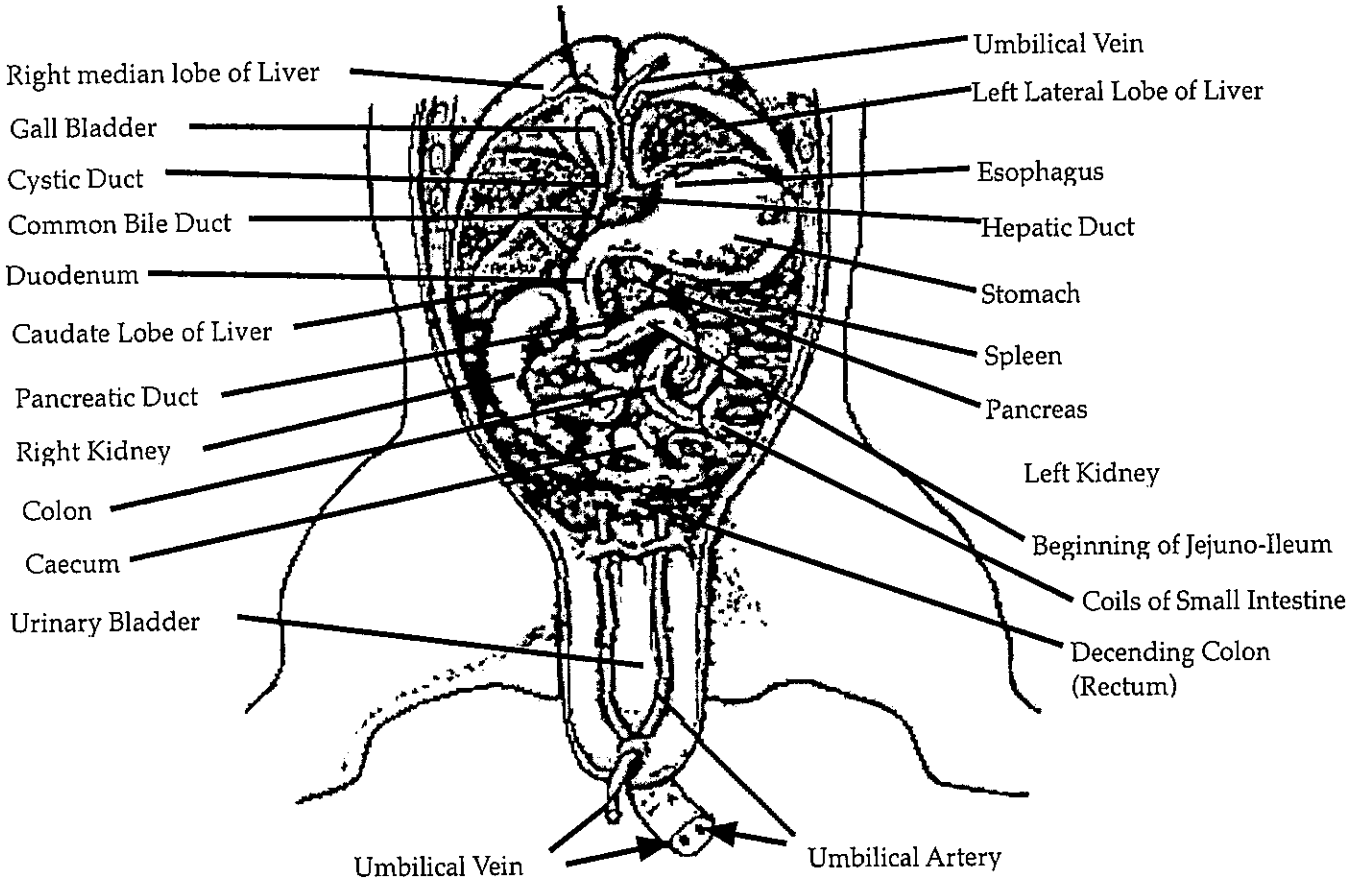
An extremely effective method of increasing the digestive and absorptive area in the intestine is the presence of finger-like extensions of the layer of the small intestine. These projections are called villi (singular villus). Open up the small intestine slightly and remove some of the villi to observe them.

Follow the main portion of the large intestine, known also as the colon, as it goes into the pelvic region and is then called the rectum. Posteriorly, the digestive tract opens to the outside through the anus. The kidneys are embedded in membranes between the body cavity and the dorsal body wall (against the backbone). Try to find the tubes called ureters, which lead from the kidneys to the urinary bladder. These ureters go into the umbilical cord with the posterior end of the bladder continuing as the urethra.

DRAW and LABEL the following structures on DIAGRAM 5

1) Liver
2) Spleen
3) Gall Bladder
4) Small Intestine
5) Right Kidney
6) Pancreas
7) Umbilical Vein
8) Large Intestine
9) Urinary Bladder
10) Stomach
11) Mesentery
12) Umbilical Arteries
13) Umbilical Vein

ANSWER questions 32) - 45)



Using the diagram of the male reproductive system below and the diagram of the female reproductive system on the next page, identify the parts of the reproductive systems.

LABEL these structures on DIAGRAMS 6 and 7

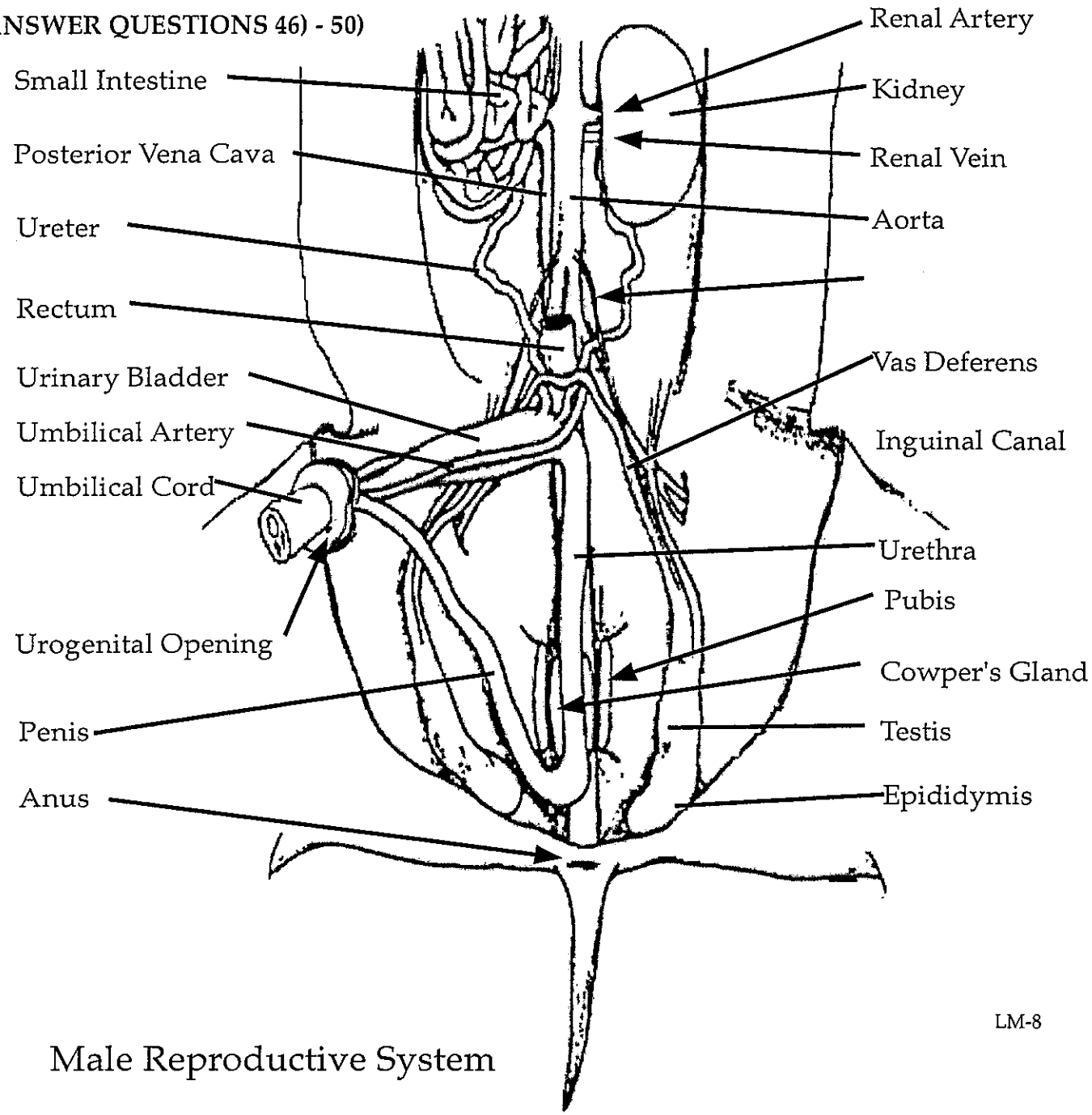
FEMALE REPRODUCTIVE SYSTEM:

1) Ovaries
2) Horns of the Uterus

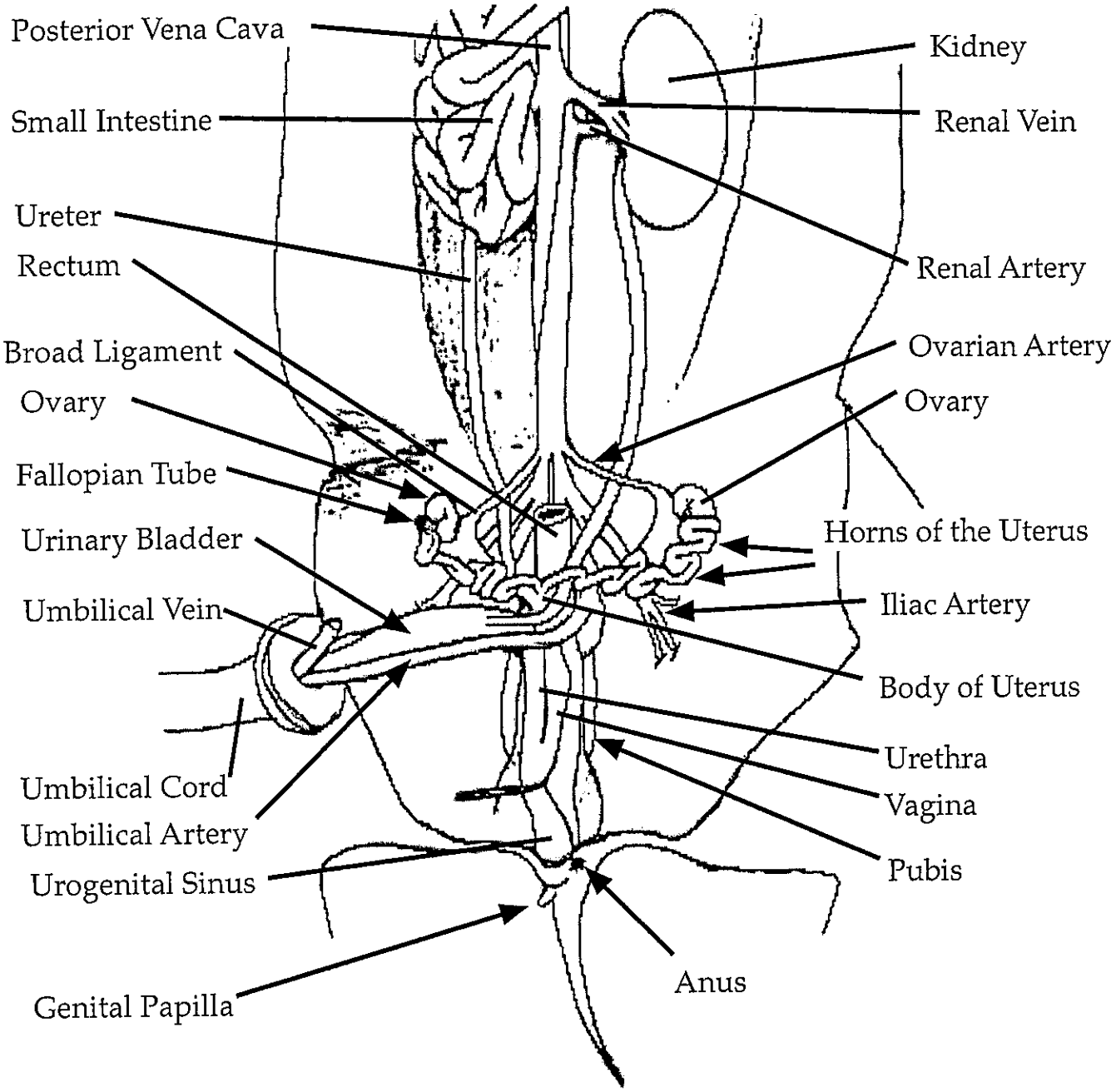
MALE REPRODUCTIVE SYSTEM:

1) Scrotal Sacs (Testes)
2) Vas Deferens
3) Inguinal Canal--This is where the testes and vas deferens pass through the body wall creating a weak spot. A protrusion of intestines at this point causes an inguinal hernia.

ANSWER QUESTIONS 46) - 50)



Male Reproductive System



FEMALE REPRODUCTIVE SYSTEM