FETAL PIG III
Anatomy of the Urinary and Reproductive Systems

Introduction:

This exercise is designed to provide you with an opportunity to observe the organs and organ systems of the urinary and reproductive systems. We will be utilizing a fetal pig as a specimen because of the similarities between mammals. In many cases the fetal pig organs lie in a similar position in a human, however, take note of those structures that are unique to a human and the fetal pig.

Specimen: Fetal Pig (1 specimen per pair of students, continuation from previous dissections)

Materials: dissection tray, blunt probe, sharp probe, scissors, forceps, razor

Lab Safety All students are required to wear goggles and nonlatex gloves while working with their specimens. Exercise caution while using sharp instruments.

Biohazard All students are required to wash their hands, tools and bench with soap and water after they have completed the dissection activities. Razor blades are always disposed of in the biohazard container.
Activity I: Urinary System Dissection

The urinary system consists of the kidneys, ureters, bladder, urethra. The kidney is divided into two general regions: the outer renal cortex and the inner renal medulla. The renal medulla is the site of renal pyramids which collect urine formed within tiny tubules, the nephrons. The renal pyramids drains urine into a larger opening, the renal pelvis where it collects until it travels through the ureters that take the urine out of the kidney at the hilus (indentation) to the bladder.

The bladder temporarily stores the urine where it is eventually released by sphincter muscles into the urethra which carries the urine out of the body.

Procedure:

1) Before Lab, practice identifying the structures of the urinary system in the photographs provided or the Fetal Pig Photoalbum Online.

2) Observe the model of the human kidney in lab. Identify the different structures of the kidney. (Refer to the diagrams in your textbook to help in your identifications).

3) Observe the kidneys in your fetal pig. At this point in your dissection activities, both kidneys should be free of the peritoneum that covers them and you should be able to follow the renal artery to the aorta and renal vein to the posterior vena cava. (Refer to Fetal Pig II for information regarding the location and identification of the renal blood vessels).

4) Connecting the renal pelvis at the hilus (indentation) of the kidney to the base of the bladder are large whitish, kinky, tubes—these are the ureters. Gently dissect these from the adjacent tissues so that you can pass your blunt probe from the ureter at the hilus to the bladder. NOTE: Review the reproductive structures of your specimen—these must remain intact.

5) The urethra carries urine from the bladder out of the specimen. The urethra is internal to the pubic symphysis (pelvic girdle). In order to follow the urethra from the bladder to the external environment we will cut through the pelvic girdle as part of the reproductive system dissection.

6) As time permits, you may section your kidney in order to view the renal pelvis and renal pyramid located within the renal medulla.

7) Record your dissection steps, observations and answers to the questions in your lab notebook.
Activity 2: Reproductive System Dissection (Male)

Note: All students are required to observe and identify structures of the urinary and reproductive system on both a male and a female fetal pig.

We have already identified the scrotum (or scrotal sac) which contains the testes, the male gonad. The testis is composed of the seminiferous tubules, long coiled tubular network which is the site of spermatogenesis. The sperm move through the seminiferous tubules of the testes into the epididymis for maturation on the dorsal surface of the testis. From the epididymis, sperm may travel through the vas deferens and out of the penis through the urethra.

At the base of the bladder in the male, the vas deferens should be easily identified. These tubules pass through the inguinal canal along with the spermatic blood vessels, and lymphatic vessels that together make up the spermatic cord. At the base of the bladder, the sperm enter into the urethra from the vas deferens.

Procedure:

1) Before lab, practice identifying the reproductive structures on the photographs available.

2) Observe the model of the human male reproductive system and identify the structures on the model. (Refer to the diagrams in your textbook).

3) To dissect out the testes from the scrotal sac, follow the vas deferens from the bladder until it disappears into the inguinal canal. Place your blunt probe on top of the vas deferens to protect it from incisions, and insert it into the inguinal canal gently. Cut on top of the blunt probe, following the vas deferens into the scrotal sac. All incisions should be made laterally to prevent accidentally transecting the penis along the midline.

4) Once you have accessed the testis, remove the membrane cover to observe the testis and the (canoe-like) epididymis. Place the testis lateral to the penis.

5) The penis lies between the peritoneum and the ventral skin. Cut the peritoneum to remove the penis from the skin. The penis should be dissected away from the skin from the urogenital opening to the posterior skin along the midline of the scrotal sac.

6) Once the penis has been dissected free from the skin you are ready to transect the pubic symphysis in order to view the urethra that connects the bladder to the penis. Position your specimen, such that, the bladder is in its correct anatomical position within the abdominopelvic cavity but the dissected penis is moved from the midline.

7) Place the blunt probe on the bladder and move it caudally, internal to the pelvic girdle to that it protects the underlying urethra. Cut through the pubic symphysis of the pelvic girdle to expose the urethra. You should be able to follow the urethra from the base of the bladder to the penis to the urogenital opening as in the photograph above.

8) Once the urethra is exposed (deep to the pubic symphysis), locate the seminal vesicles dorsal to the prostrate gland and the bulbourethral gland (Cowper’s gland) located on either side of the urethra. These glands produce secretions that contribute to semen formation and sperm function.

9) Dissect the urethra from the underlying rectum.

10) Record your dissection steps, observations and answers to the questions in your lab notebook.
Reproductive System Dissection (Female)

In previous dissections, you have already identified the female gonad or ovaries and uterine horns of your specimen which lie at the base of the bladder. The ovaries are held in place by ligaments (which may have been transected during your other abdominal dissection activities). The ovaries are attached to the uterine horns by an oviduct or fallopian/uterine tube; the oviduct is a very tiny tube which often require a magnifying glass/hand lens for adequate viewing.

The uterus is ‘V’ shaped in mammals that produce litters. The extended horns (‘curly’ in immature specimens) allow multiple progeny to develop. As the mammal reaches reproductive maturity, the curly uterine horns would lengthen losing the ‘curliness’ and forming the ‘V’-shape.

The body of the uterus in the fetal pig is quite thin and deep to the base of the bladder. The uterus narrows into the cervix (neck of the uterus) and connects directly to the muscular tube of the vagina (deep to the urethra) and opens into a small space, the urogenital sinus. The urogenital sinus also provides an opening to the urethra. Externally, the urogenital opening leads to the urogenital sinus through the urogenital papilla.

Procedure:

1) Before lab, practice identifying the female reproductive structures on the photographs here and through the Fetal Pig Photoalbum Online.

2) Observe the model of the human female reproductive system and identify the structures on the model. (Refer to the diagrams in your textbook).

3) Position your specimen, such that, the bladder is in its correct anatomical position within the abdominopelvic cavity.

4) Place the blunt probe on the bladder and move it caudally, internal to the pelvic girdle to that it protects the underlying urethra. Cut through the pubic symphysis of the pelvic girdle to expose the urethra. You should be able to follow the urethra from the base of the bladder to the urogenital sinus.

5) Once the urethra is exposed (deep to the pubic symphysis), dissect the urethra from the underlying vagina and uterus. The cervix should be easily identifiable by the dramatic change in tissue density from the muscular vagina to the extremely thin and delicate uterus deep to the bladder.

6) Dissect the vagina from the dorsal rectum.

7) Record your dissection steps, observations and answers to the questions in your lab notebook.