

Investigative Lab 33

Name That Tube

Form and Function in Tubules of the Reproductive System

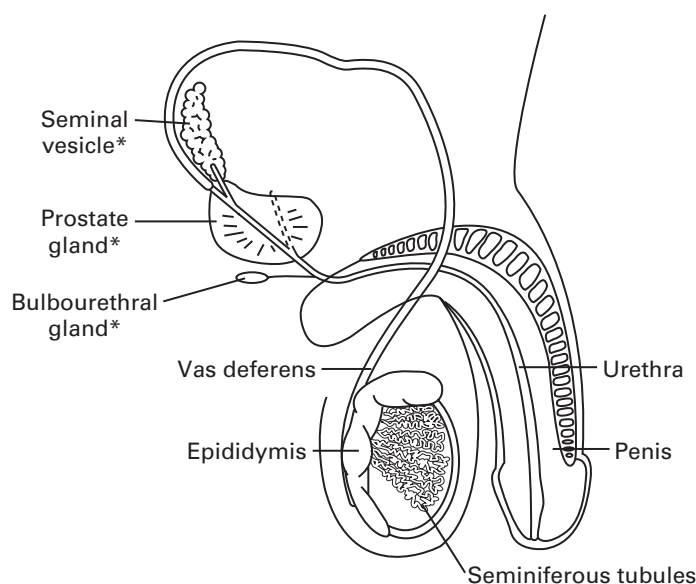
Questions How are the structural features of tubules (very thin tubes) involved in sperm and egg transport related to their functions? How can structural features help you identify these tubules under a microscope?

Lab Overview In this investigation you will use a microscope to view slides with cross sections of unidentified mammalian reproductive tubules, then use your observations of structural features to identify the male and female tubules.

Introduction To start your investigation, you will find out more about the functions of reproductive tubules in male and female humans and other mammals. In the male reproductive system, sperm cells are formed, stored, and transported within tubules. Fertilization occurs when a sperm penetrates an egg (oocyte) in a tubule within the female reproductive system. Each tubule has structural features that relate to its function in reproduction. In the lab, you will use a microscope to observe these structural features and identify different reproductive tubules.

Prelab Activity Study the diagram below and read the descriptions on the next page of tubules found in the male and female reproductive systems. Then answer the Prelab Questions.

Male Reproductive System

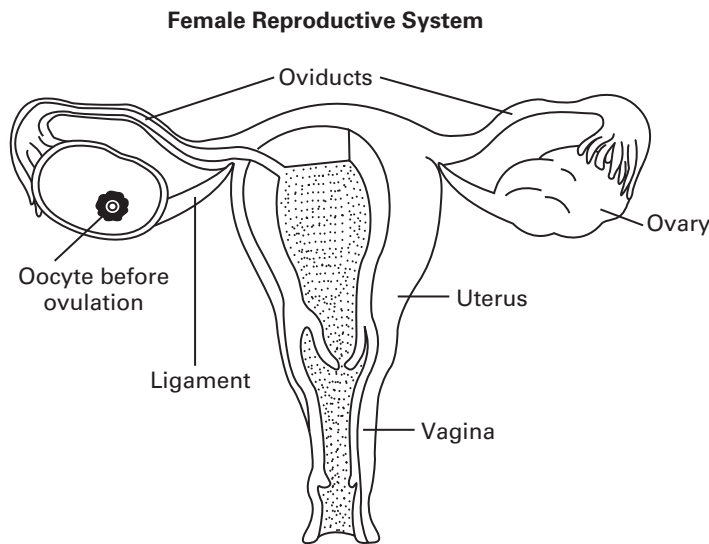


*The seminal vesicles, prostate gland, and bulbourethral glands secrete fluids that function in the transport and survival of sperm.

Seminiferous tubules Sperm are produced in the walls of the seminiferous tubules within the testes. Interstitial cells surrounding the tubules release testosterone, which stimulates sperm production. Cells in the walls of the tubules secrete fluids rich in nutrients and hormones (testicular fluid). Millions of cells go through mitosis and meiosis each day, producing millions of sperm. Sperm are released tail-first into the seminiferous tubules along with testicular fluid.

Epididymis When newly-formed sperm cells enter the tightly coiled epididymis tubules from the seminiferous tubules, the sperm are not yet fully mobile or capable of fertilization. Tiny hair-like projections called microvilli lining the epididymis gently circulate fluid containing nutrients and hormones that influence sperm development in the tubule. Muscular contractions slowly push the sperm along the tube toward the vas deferens.

Vas deferens This tubule has thick muscles that contract rhythmically during ejaculation. The muscle contractions rapidly propel semen (the substance containing sperm and fluids secreted by several glands) toward the urethra.



Oviducts These tubules are a passageway between the ovaries and the uterus. After ovulation, an oocyte is swept into an oviduct. There, muscular contractions and the beating of cilia push the oocyte toward the uterus. If a sperm fertilizes the oocyte, a zygote is formed. As the zygote divides and becomes an embryo, muscular contractions and cilia push the embryo through the oviduct toward the uterus. Fluids secreted by microvilli in the oviducts nourish the oocyte or the embryo during its journey through the oviduct.

Prelab Questions

- Based on the descriptions you have just read of the functions of the various reproductive system tubules, match each tubule listed below with the structural features you would expect it to have. There may be more than one type of structural feature per tubule. Match all that apply.

_____ Seminiferous tubules	A. thick muscular lining
_____ Vas deferens	B. cells with hair-like projections
_____ Epididymis	C. many dividing cells
_____ Oviduct	D. cells that secrete fluid
	E. surrounding cells that produce testosterone

- Which of the tubules found in the male reproductive system do you think is the most similar in function and structure to the oviducts? Explain.

- Describe the role of hair-like projections in the male and female reproductive systems.

Materials (per group)

- coded prepared cross-section slides:
 - mammalian oviduct
 - mammalian testis (seminiferous tubules and surrounding tissue)
 - epididymis
 - vas deferens
- microscope
- colored pencils

Procedure



- Record the color code of the first slide in Data Table 1 on the next page. Position the slide on the microscope stage so that the stained section is just over the light.

2. Focus on low power. Then, select a higher power so that you can easily see the layers of the tubule. Focus again. Use the diaphragm to adjust the lighting so that all the structures can be observed.
3. Make a detailed sketch of the tissue in Data Table 1. Label any structural features you can identify. Use the information in the Background and your observations to infer the identity of the tubule. Record the inferred identity in Data Table 1.
4. Repeat steps 1–3 with the other three slides. When you have finished, compare your tubule identifications with the actual ones provided by your teacher. Record the actual identifications in Data Table 1.

Data Table 1

Color Code	Sketch of Tubule	Inferred Identity and Reasoning	Actual Tubule Identity

Analysis and Conclusions

1. If you correctly identified one or more of the four slides, which structural features helped you with the identification? If you did not correctly identify the tubules on each slide, which structural features made identification difficult?

2. How are the structural features of the tubules you observed important to their functions? Give two examples.

3. The cilia in the oviduct help the oocyte move from the ovary end of the oviduct to the uterus. How might this make it difficult for sperm to reach the oocyte?

Extension

Study a prepared slide of a cross section of a mammalian ovary. Look for follicles at various stages of development. Look for the developing egg inside the follicle. Make a detailed sketch of what you observe. Label as many structural features as you can. See Figure 33-1 (p. 720) and Figure 33-5 (p. 725) in your text for reference.

