Male Reportative Anatomy

The male human reproductive system is responsible for producing, storing, nourishing, and transporting reproductive cells. These reproductive cells are galled *gametes*. The reproductive systems of both males and females contain numerous analogous structures: two reproductive organs known as *gonads*, which produce gametes and hormones; *ducts* to receive and transport the gametes; *accessory gland and organs* that secrete fluids into the ducts; and a number of external structures associated with the reproductive process and collectively known as *external genitalia*.

The Testes

The **testes** (1) are the male organs of reproduction. Their function is to produce sperm cells and hormones associated with male reproductive processes. Each testis is a flattened oval body, and is about 2 inches (5cm) in length and about 1 inch (2.5cm) in width.

The testes are contained within the **scrotum** (2), a fleshy pouch suspended below the perineum and anterior to the anus. The scrotum is divided into two separate chambers, one chamber for each testis. A thin layer of smooth muscle called the **dartos** (3) lies in the dermis of the scrotum. Sperm is optimally produced when the testicles are 2-4°C below body temperature. When the dartos contracts to warm the tests with body heat, it gives the characteristic wrinkled appearance of the scrotal surface.

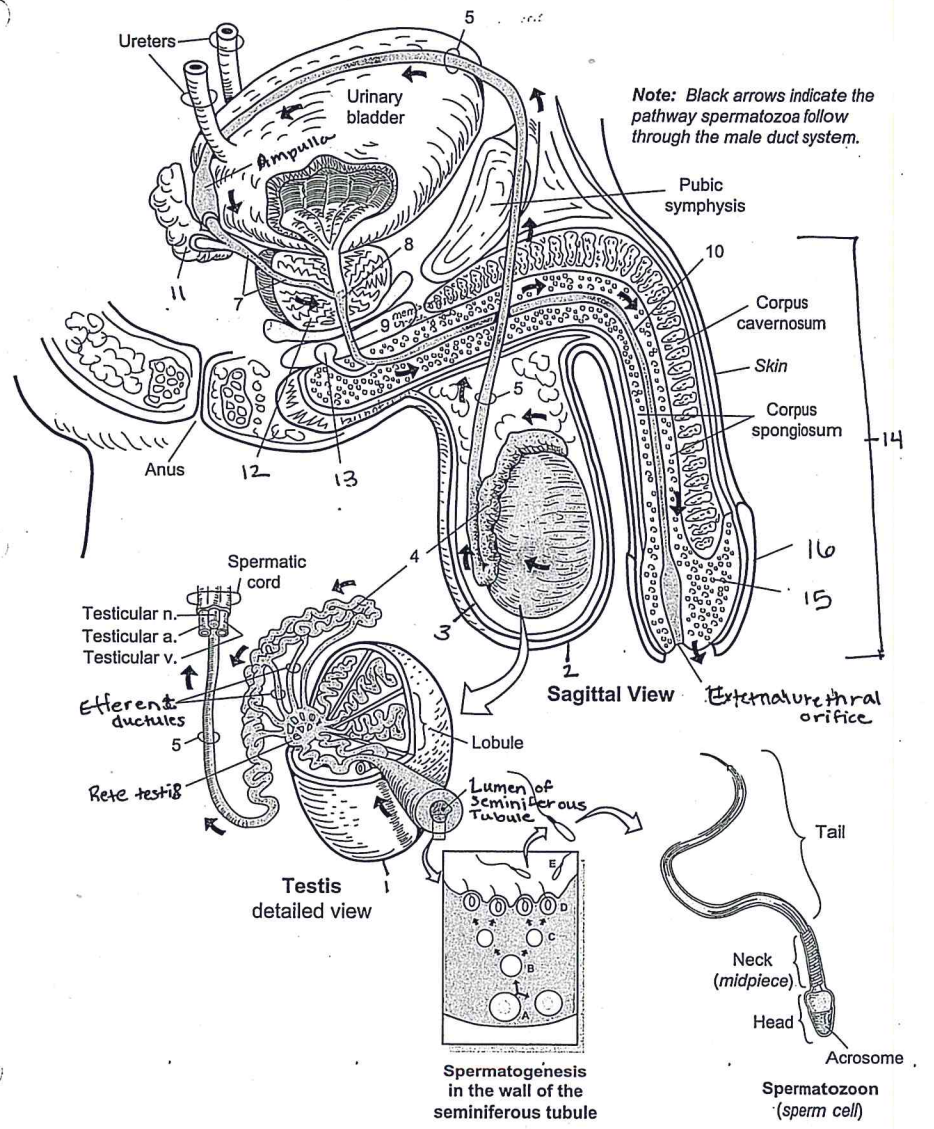
Male Reproductive Ducts

To reach the external environment, the mature sperm cells pass through a duct system having several subdivisions. The first subdivision of the duct system is the **epididymis** (4). The epididymis lies along the posterior border of the testis and consists of an elongated tubule twisted and coiled. Cells lining the epididymis adjust the composition of the semen by adding secretions. The overall pH of the fluid is acidic due to the waste products produced by the stored sperm cells. The epididymis is where the damaged sperm cells and debris are absorbed. Moreover it is the site of sperm cell maturation occurring over a period of about two weeks.

After leaving the epididymis, sperm cells enter the next duct, the **vas deferens** (5), also called the ductus deferens. The vas deferens is a tubular extension of the epididymis extending through the inguinal canal into the abdominal cavity. In the abdominal cavity, the vas deferens passes over the top and posterior surface of the urinary bladder toward the superior and posterior margin of the prostate gland. The function of the vas deferens is to propel and conduct seminal fluid from the epididymis of each testis. At the *ampulla* the two vas deferens ducts join with the duct leading from the seminal vesicle. The merge forms the **ejaculatory duct** (7). This relatively short duct penetrates the wall of the prostate gland and unites with the **urethra**. The urethra extends from the urinary bladder to the tip of the penis. It is divided into three portions: the prostatic (8), membranous (9), and penile (10) portions.

Accessory Organs

There are several accessory orange that contribute fluid to the sperm cells or serve as organs for delivery of sperm cells during fertilization. Once such organ is the **seminal vesicle** (11). The



seminal vesicle consists of paired saclike structures drained by ducts merging with the vas deferens. The seminal vesicle secretes hormones known as *prostaglandins* and adds nutrient fluids (especially fructose) to support the sperm cells during the ejaculation process. The fluid produced is alkaline (basic) to neutralize the acidity developing in the epididymis, and the vesicle fluid represents about 60% of the total seminal fluid known as semen.

Another important accessory organ is the **prostate gland** (12). This is a single gland that secretes a slightly alkaline fluid, which contributes to the sperm motility by neutralizing the natural acidity of the vagina. The prostate gland contains muscle to support and encircle the urethra. Its enlargement in older males may interfere with urination. The prostate gland contributes approximately 30% of the volume of semen.

The **bulbourethral gland** (13) are also called the Cowper's glands. They are two small glands situated near the base of the penis. The glands secrete lubricating mucus and alkaline substances that neutralize vaginal acids and activate the sperm cells. Secretions of the bulbourethral glands, prostate gland, and seminal vesicle, and testes combine with the sperm cells to form the *semen*.

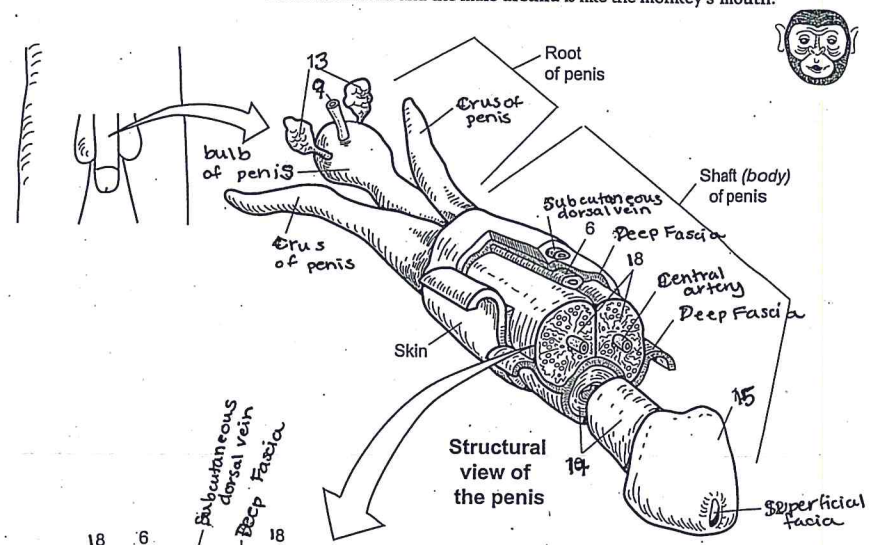
Another accessory organ is the **penis** (14). The penis is the male organ of urination and copulation. It consists of a *root*, *body (shaft)*, and glans. The **glans** (15) is the portion that surrounds the external urethral meatus. A fold of the skin called the **prepuce** (16) (or foreskin) surrounds the tip of the penis. Circumcision removes the prepuce.

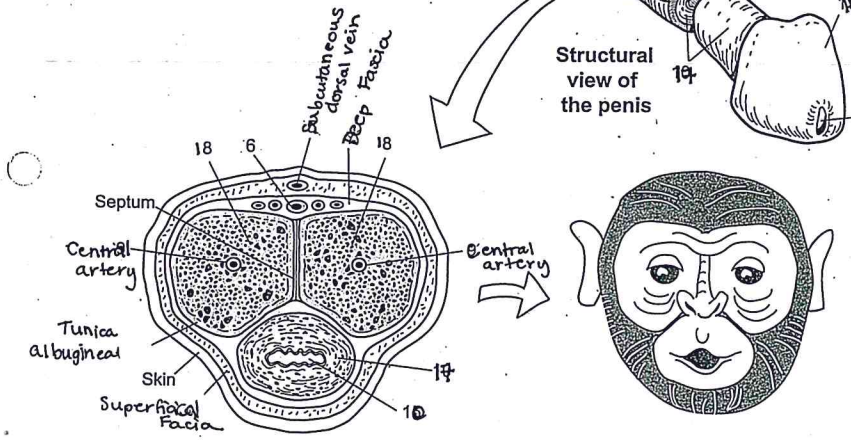
Most of the body of the penis consists of three masses of erectile tissue. Erectile tissue contains a maze of vascular channels separated by partitions of connective tissue and smooth muscle fibers. Two of the erectile tissue masses are called the **corpora cavernosae** (singular **corpus cavernosa**) (18) constituting the bulk of the penis. The third mass is called the **corpus spongiosum** (17) which surrounds the urethra. Sexual stimulation causes these tubules to fill with blood during a normal erection. Impulses from the parasympathetic branch of the nervous system cause arterioles (small arteries) in the erectile tissue to dilate, and blood flow to these tissues increases substantially, collapsing veins. The vascular network becomes engorged with blood, and erection occurs. At sexual climax, the semen passes through the urethra to the external urethral meatus. After ejaculation of semen, impulses from the sympathetic nervous system produce arteriole constriction and the blood supply diminishes. As veins carry blood away from the erectile tissue, the penis becomes flaccid. Continued sympathetic stimuli maintain the vasoconstriction (narrowing of blood vessels) and the flaccid condition.

A typical ejaculation of the semen measures about two to five milliliters with a speed of 28 miles per hour (45 kilometers per hour). This volume, called the *ejaculate*, contains sperm cells, seminal fluid, and enzymes. The sperm cell count is approximately 20 million to 100 million sperm per milliliter or semen. The fluid is a mixture of glandular secretions from the accessory organs. Enzymes in the fluid include protease and other enzymes to assist fertilization. Peristaltic contraction (a radially symmetrical contraction and relaxation of muscles that propagates in a wave down a tube) in the reproductive ducts move semen during ejaculation. Contractions in the respective glands augments the sperm cells with fluids.

Analogy

In cross-section, the penis is like a monkey's face. The corpus cavernosa are like the mask around the eyes of the monkey's face. The central arteries are like the eyes. The corpus spongiosum is like the area around the mouth and the male urethra is like the monkey's mouth.





The penis in cross-section looks like...

...a monkey's face.

1. _____
2. _____
3. _____
4. _____
5. _____
6. Deep dorsal Artery
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8. _____
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10. _____
11. _____
12. _____
13. _____
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