

# **HUMAN ANATOMY AND PHYSIOLOGY-II**

## **UNIT-V**

### **Reproductive system**

### **Anatomy and Physiology of Male Reproductive System**

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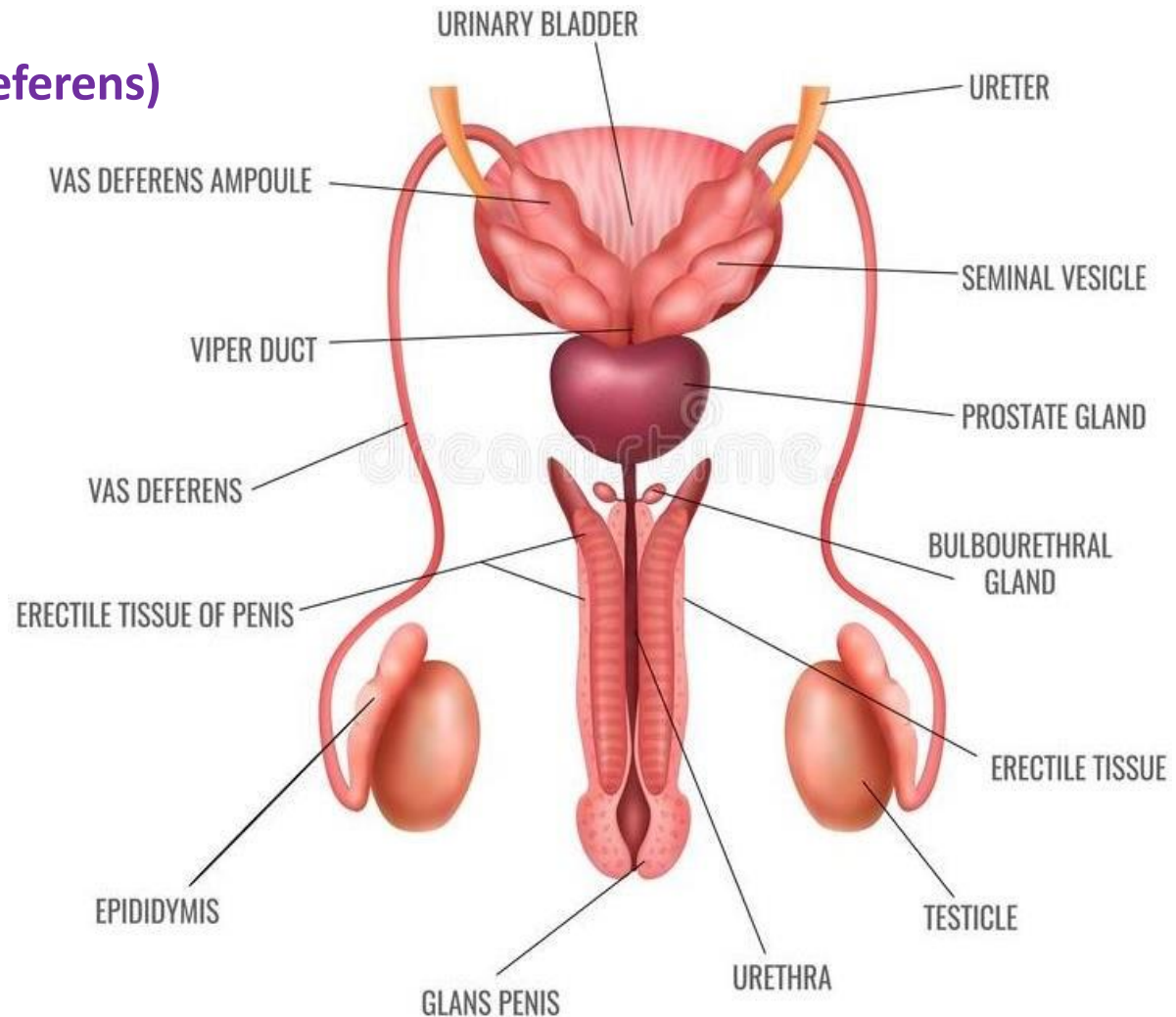


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# MALE REPRODUCTIVE SYSTEM

The male reproductive system consists of the following organs

- ✓ 2 testes } in the scrotum
- ✓ 2 epididymis }
- ✓ 2 deferent ducts (vas deferens)
- ✓ 2 spermatic cords
- ✓ 2 seminal vesicles
- ✓ 2 ejaculatory ducts
- ✓ 1 prostate gland
- ✓ 1 penis.



## Scrotum

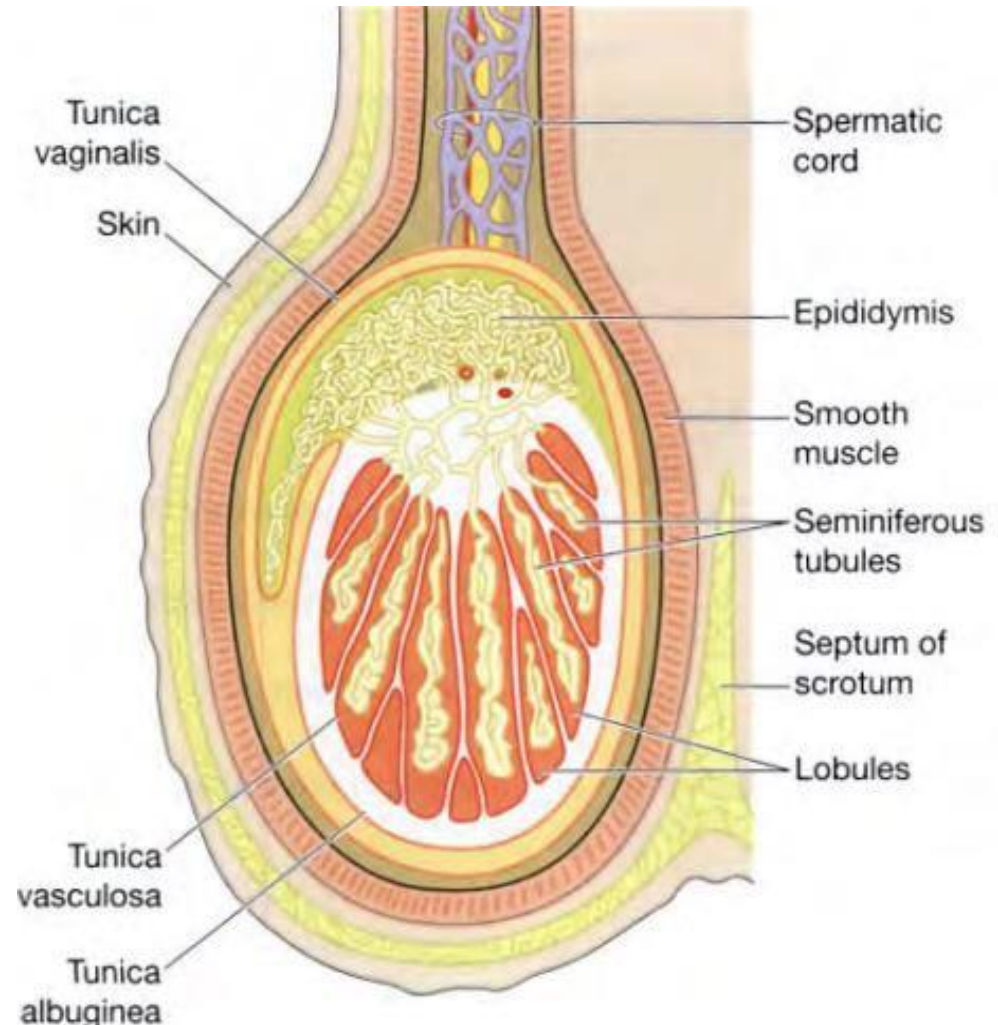
The scrotum is a **pouch of deeply pigmented skin, fibrous and connective tissue and smooth muscle**. It is divided into two compartments each of which contains one testis, one epididymis and the testicular end of a spermatic cord.

## Testes

The testes are the reproductive glands of the male and are the equivalent of the ovaries in the female. They are about 4.5 cm long, 2.5 cm wide and 3 cm thick and are suspended in the scrotum by the spermatic cords. They are surrounded by three layers of tissue.

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- tunica vaginalis.
- tunica albuginea.
- tunica vasculosa.

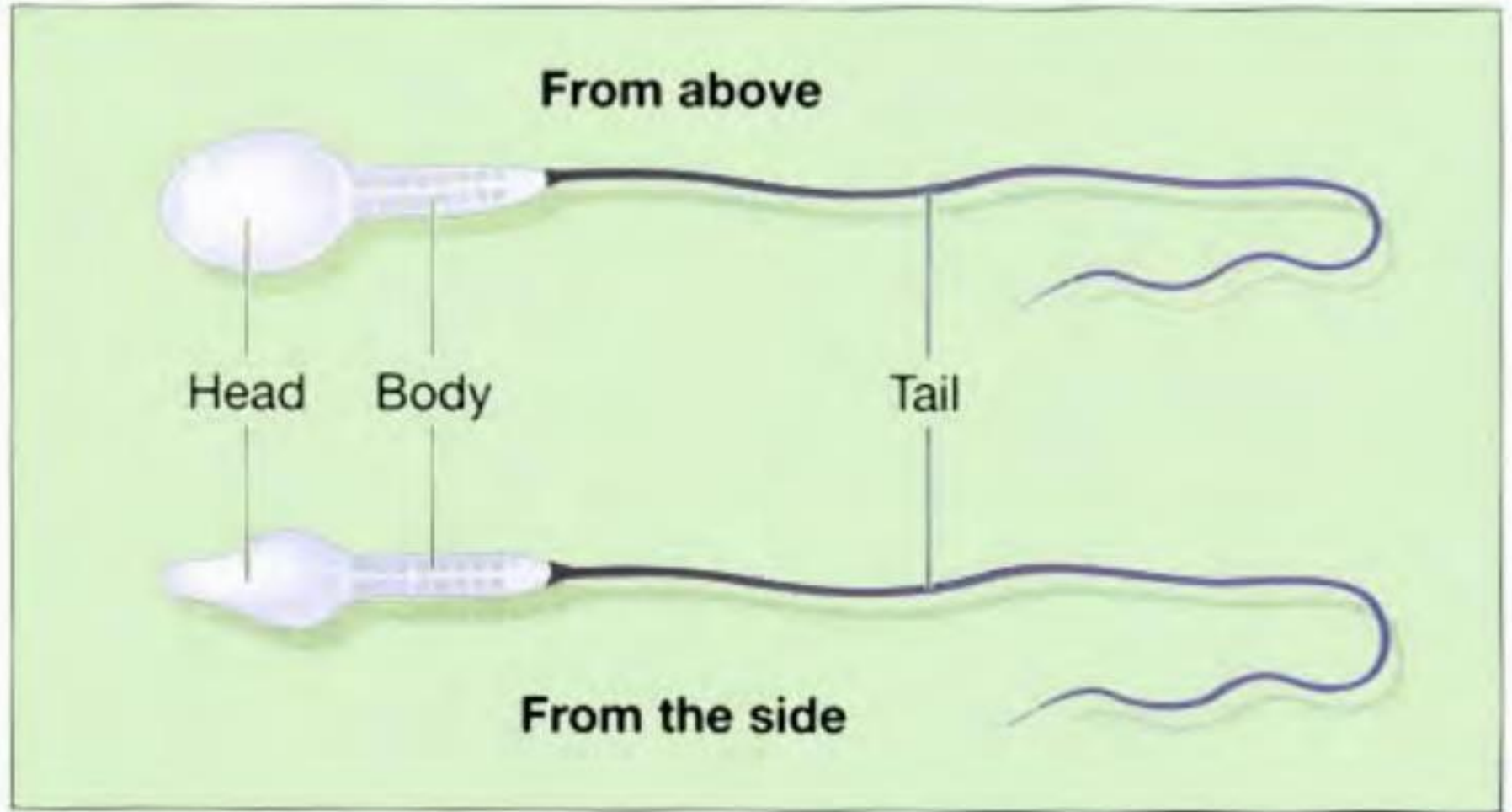


## Structure of the testes

- In each testis are 200 to 300 lobules and within each lobule are 1 to 4 convoluted loops composed of germinal epithelial cells, called **seminiferous tubules**.
- Between the tubules there are groups of **interstitial cells** (of **Leydig**) that secrete the hormone **testosterone** after puberty.
- At the upper pole of the testis the tubules combine to form a single tubule. This tubule, about 6 m in its full length, is repeatedly folded and tightly packed into a mass called the **epididymis**.
- It leaves the scrotum as the deferent duct (vas deferens) in the spermatic cord.
- Blood and lymph vessels pass to the testes in the **spermatic cords**.

## Functions of the testes

- **Spermatozoa (sperm)** are produced in the **seminiferous tubules** of the testes, and mature as they pass through the long and convoluted **epididymis**, where they are stored.
- The hormone controlling sperm production is **FSH** from the **anterior pituitary**.
- A mature sperm has a **head**, a **body**, and a long whip-like **tail** that is used for motility.
- The head is almost completely filled by the **nucleus**, containing its **DNA**. It also contains the enzymes required to penetrate the outer layers of the **ovum** to reach, and fuse with, its nucleus.
- The body of the sperm is packed with **mitochondria**, which fuel the propelling action of the tail that powers the sperm on its journey into the female reproductive tract.
- Successful spermatogenesis takes place at a temperature about 3°C below normal body temperature.
- The testes are cooled by their position outside the abdominal cavity, and the thin outer covering of the scrotum has very little insulating fat.



**Figure 19.14** A spermatozoon.

## The spermatic cords

- The spermatic cords suspend the testes in the scrotum.
- Each cord contains a testicular artery, testicular veins, lymphatics, a deferent duct and testicular nerves, which come together to form the cord from their various origins in the abdomen.
- The cord, which is covered in a sheath of smooth muscle and connective and fibrous tissues, extends through the inguinal canal and is attached to the testis on the posterior wall.
- **The deferent duct.**

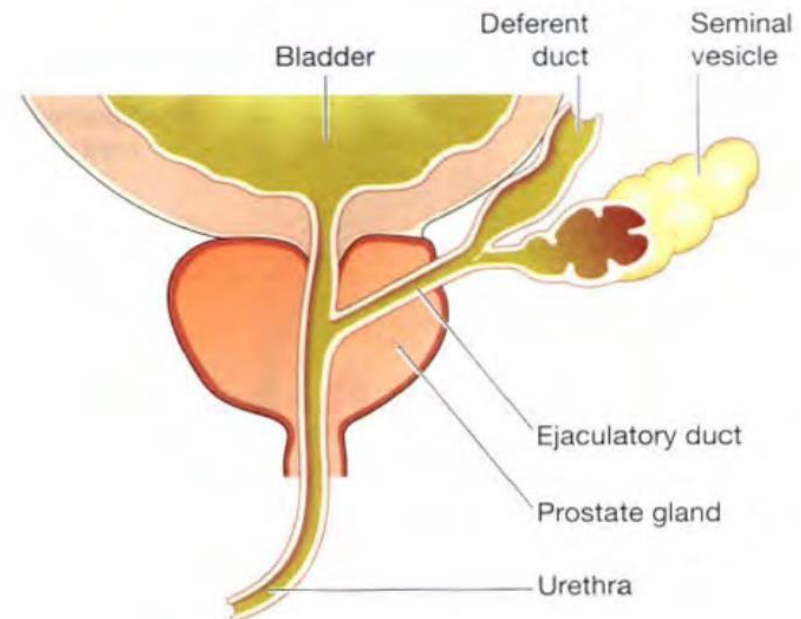
This is some 45 cm long. It passes upwards from the testis through the inguinal canal and ascends medially towards the posterior wall of the bladder where it is joined by the duct from the seminal vesicle to form the ejaculatory duct.

## Seminal vesicles

- The seminal vesicles are two small fibromuscular pouches lined with columnar epithelium, lying on the posterior aspect of the bladder.
- At its lower end each seminal vesicle opens into a short duct which joins with the corresponding deferent duct to form an ejaculatory duct.

## Functions of the seminal vesicles

- The seminal vesicles contract and expel their stored contents, seminal fluid, during ejaculation.
- Seminal fluid, which forms 60% of the bulk of the fluid ejaculated at male orgasm, contains nutrients to support the sperm during their journey through the female reproductive tract.

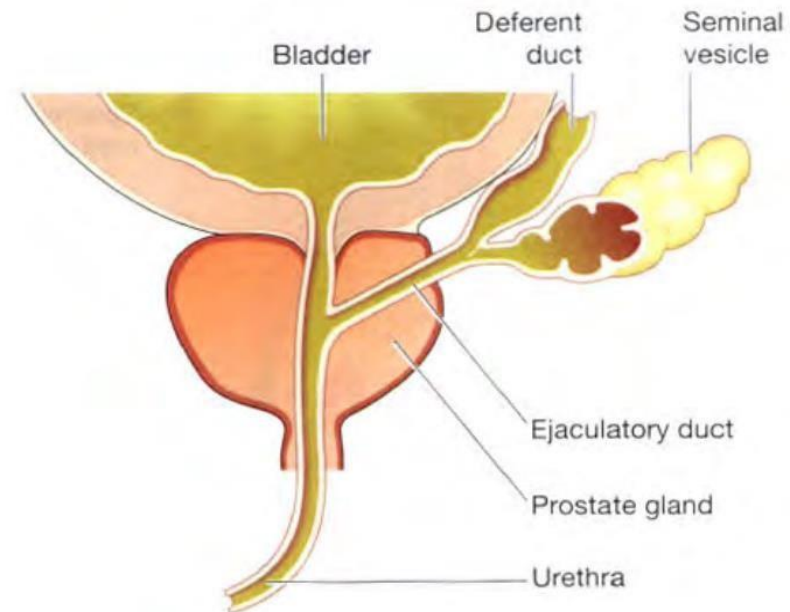


**Figure 19.15** Section of the prostate gland and associated reproductive structures on one side.



## Ejaculatory ducts

- The ejaculatory ducts are two tubes about 2 cm long, each formed by the union of the duct from a seminal vesicle and a **deferent duct**.
- They pass through the prostate gland and join the prostatic urethra, carrying seminal fluid and spermatozoa to the urethra.
- The ejaculatory ducts are composed of the same layers of tissue as the seminal vesicles.



**Figure 19.15** Section of the prostate gland and associated reproductive structures on one side.

## Prostate gland

- The prostate gland lies in the pelvic cavity in front of the rectum and behind the symphysis pubis, surrounding the first part of the urethra.
- **It consists of an outer fibrous covering, a layer of smooth muscle and glandular substance composed of columnar epithelial cells.**

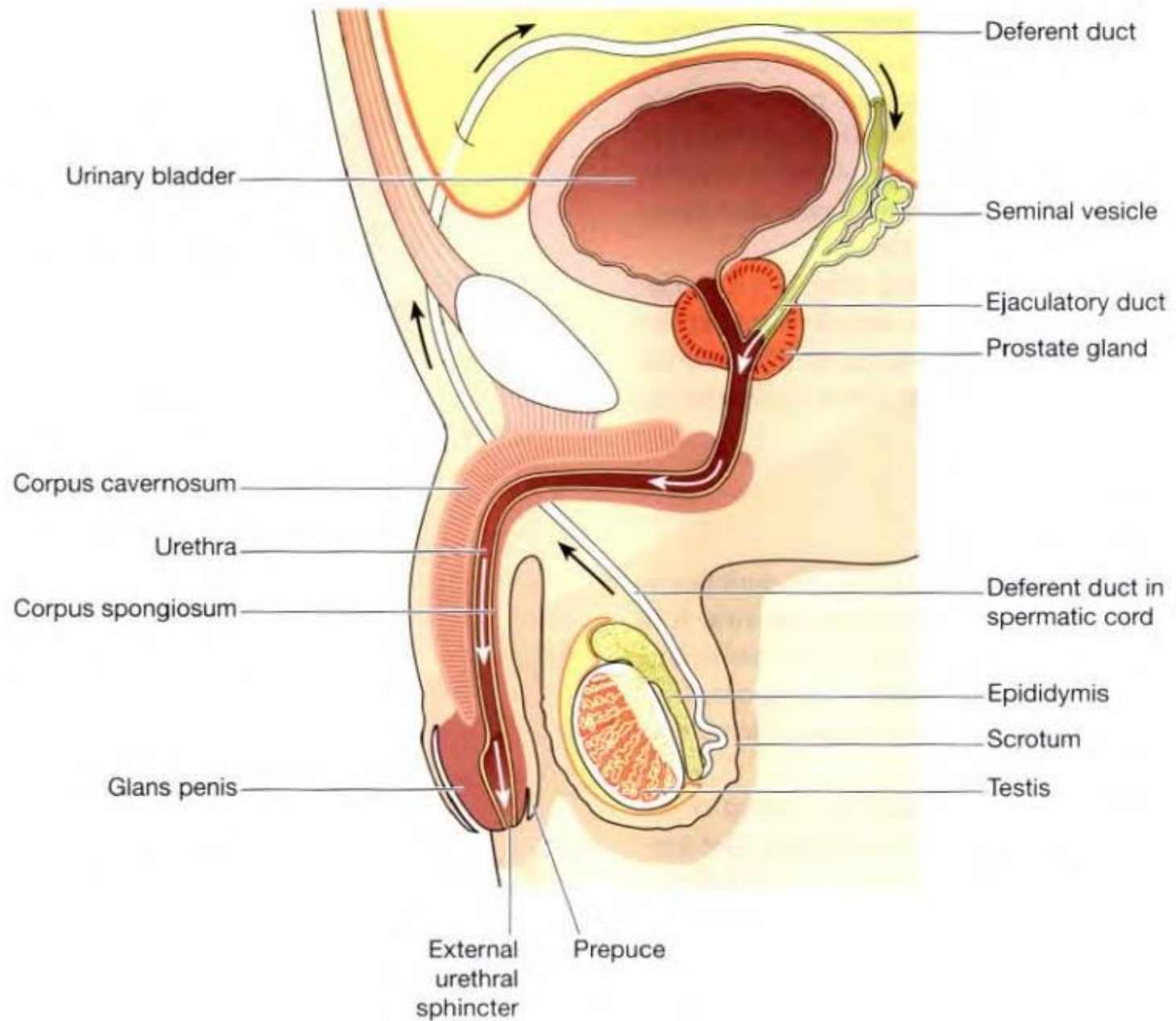
## Functions of the prostate gland

- The prostate gland secretes a thin, milky fluid that makes up about **30% of semen**, and gives it its milky appearance.
- It is slightly alkaline, which provides a protective local environment for sperm arriving in the acidic vagina. It also contains a clotting enzyme, which thickens the semen in the vagina, increasing the chance of semen being retained in the vicinity of the cervix.

## Urethra and penis

### Urethra

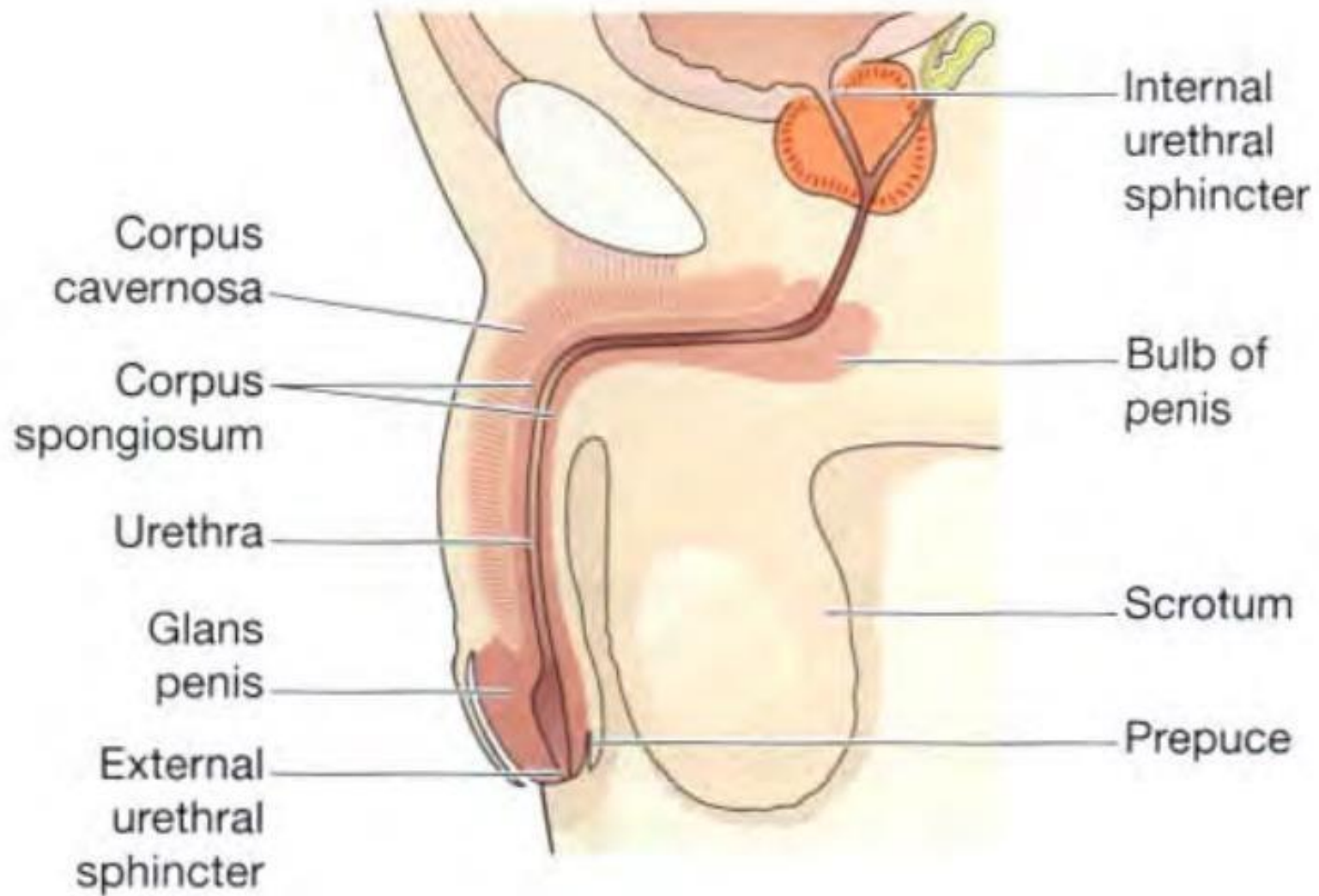
- The male **urethra** provides a common pathway for the flow of urine and semen, the combined secretions of the male reproductive organs.
- It is about 19 to 20 cm long and consists of three parts. The **prostatic urethra** originates at the **urethral orifice** of the bladder and passes through the prostate gland.
- The **membranous urethra** is the shortest and narrowest part and extends from the prostate gland to the bulb of the penis, after passing through the perineal membrane.
- The **spongiose or penile urethra** lies within the **corpus spongiosum** of the penis and terminates at the external urethral orifice in the glans penis.
- There are two **urethral sphincters**.
- The **internal sphincter** consists of smooth muscle fibres at the neck of the bladder above the prostate gland. The **external sphincter** consists of skeletal muscle fibres surrounding the membranous part.



**19.17** Section of the male reproductive organs. Arrows show the route taken by spermatozoa during ejaculation.

## Penis

- The penis has a root and a body. The root lies in the perineum and the body surrounds the urethra. It is formed by three cylindrical masses of erectile tissue and **involuntary muscle**.
- The erectile tissue is supported by fibrous tissue and covered with skin and has a **rich blood supply**.
- The two lateral columns are called the **corpora cavernosa** and the column between them, containing the urethra, is the **corpus spongiosum**.
- At its tip it is expanded into a triangular structure known as the glans penis. Just above the glans the skin is folded upon itself and forms a movable double layer, the foreskin.
- Arterial blood is supplied by deep, dorsal and bulbar arteries of the penis which are branches from the **internal pudendal arteries**.
- A series of **veins drain blood** to the internal pudendal and internal iliac veins. The penis is supplied by autonomic and somatic nerves.
- **Parasympathetic stimulation** leads to filling of the spongy erectile tissue with blood, caused by **arteriolar dilatation** and **venoconstriction**, which increases blood flow into the penis and **obstructs outflow**.
- The penis therefore becomes engorged and erect, an essential prerequisite for coitus to occur.



B

**Figure 19.16** The penis: A. Viewed from below. B. Viewed from the side.

## Puberty in the male

- This occurs between the ages of **10 and 14**.
- **Luteinising hormone** from the anterior lobe of the pituitary gland stimulates the **interstitial cells** of the testes to increase the production of **testosterone**.
- This hormone influences the development of the body to **sexual maturity**. fertility and sexual ability tend to decline gradually with ageing.
- The secretion of testosterone gradually declines, usually beginning at about **50 years** of age.