

UGS Lecture – 6

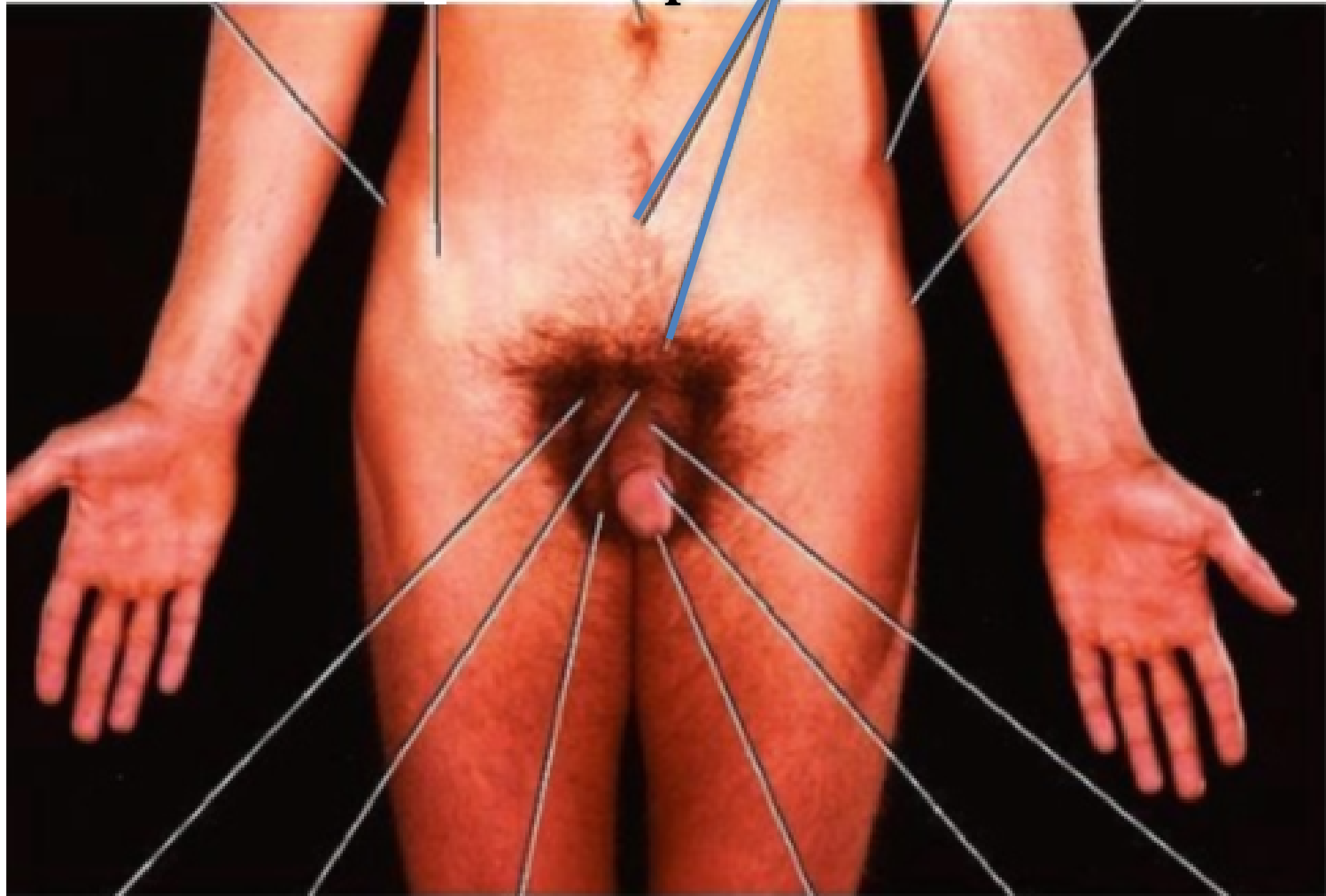
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Mons Pubis

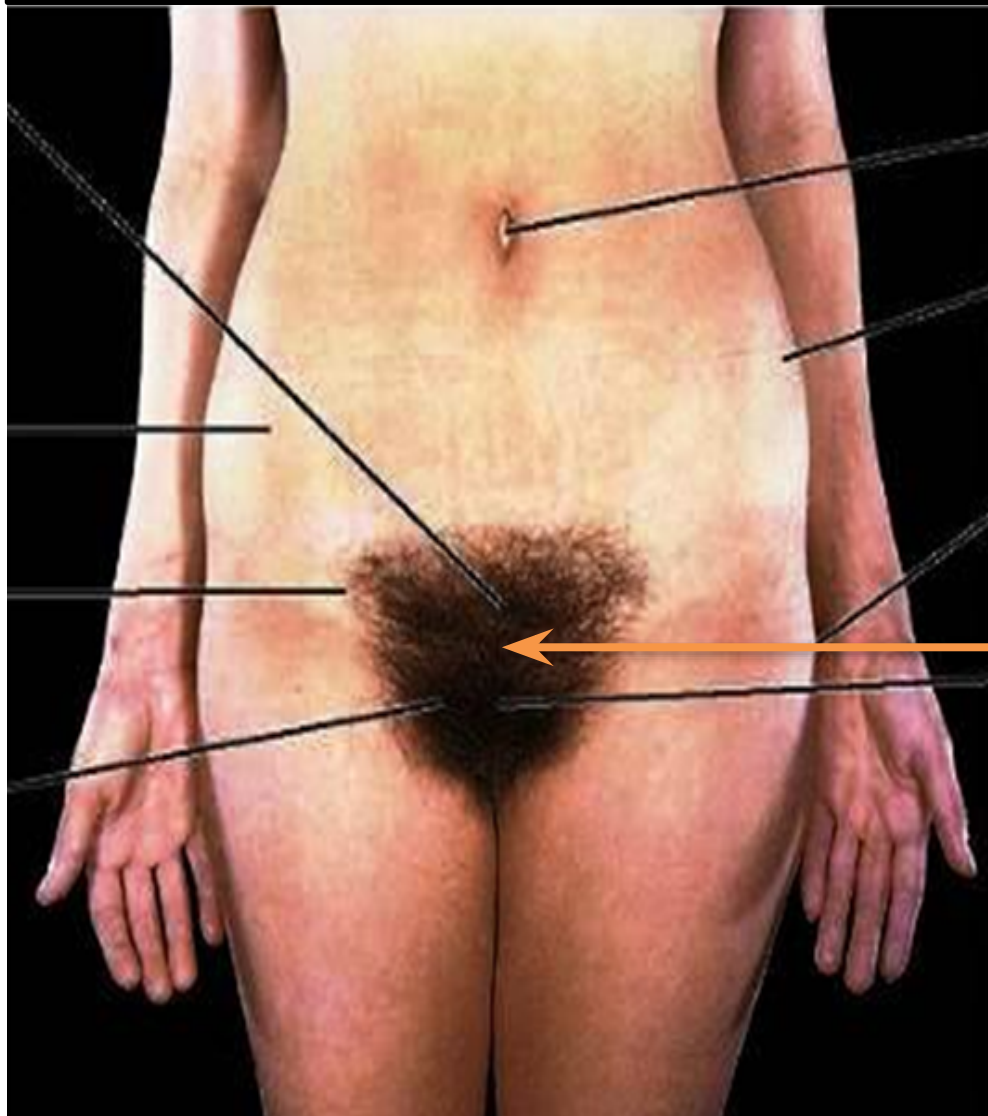
- **Rounded eminence found, in both sex anterior to pubic symphysis, pubic tubercle, and superior pubic rami.**
- **Formed by a collection of subcutaneous adipose connective tissue.**
- **After puberty mons pubis becomes covered with coarse hair and amount of fat increases.**
- **The pubic hair in male extends upward to umbilicus.**

The Male Mons Pubis

Mons pubis showing the female distribution of pubic hair



The Female Mons Pubis



Mons pubis showing the female distribution of pubic hair

Penis

- It is composed of three cylindrical column of erectile cavernous tissue: the paired corpora cavernosa, dorsally placed and the single corpus spongiosum in middle, ventral to them.
- The three cylindrical masses of erectile tissue are enclosed within, and separated by a dense connective tissue, tunica albuginea.
- Superficial to tunica albuginea is deep fascia of penis, Buck fascia, which contains prominent blood vessels.

- **The corpus spongiosum contains penile urethra.**
- **The corpora cavernosa are closed to each other except proximally where they diverge to form crura of penis.**

The penis has a fixed part termed root, and a free pendulous part known as body.

A. Root: Lies in superficial perineal pouch.

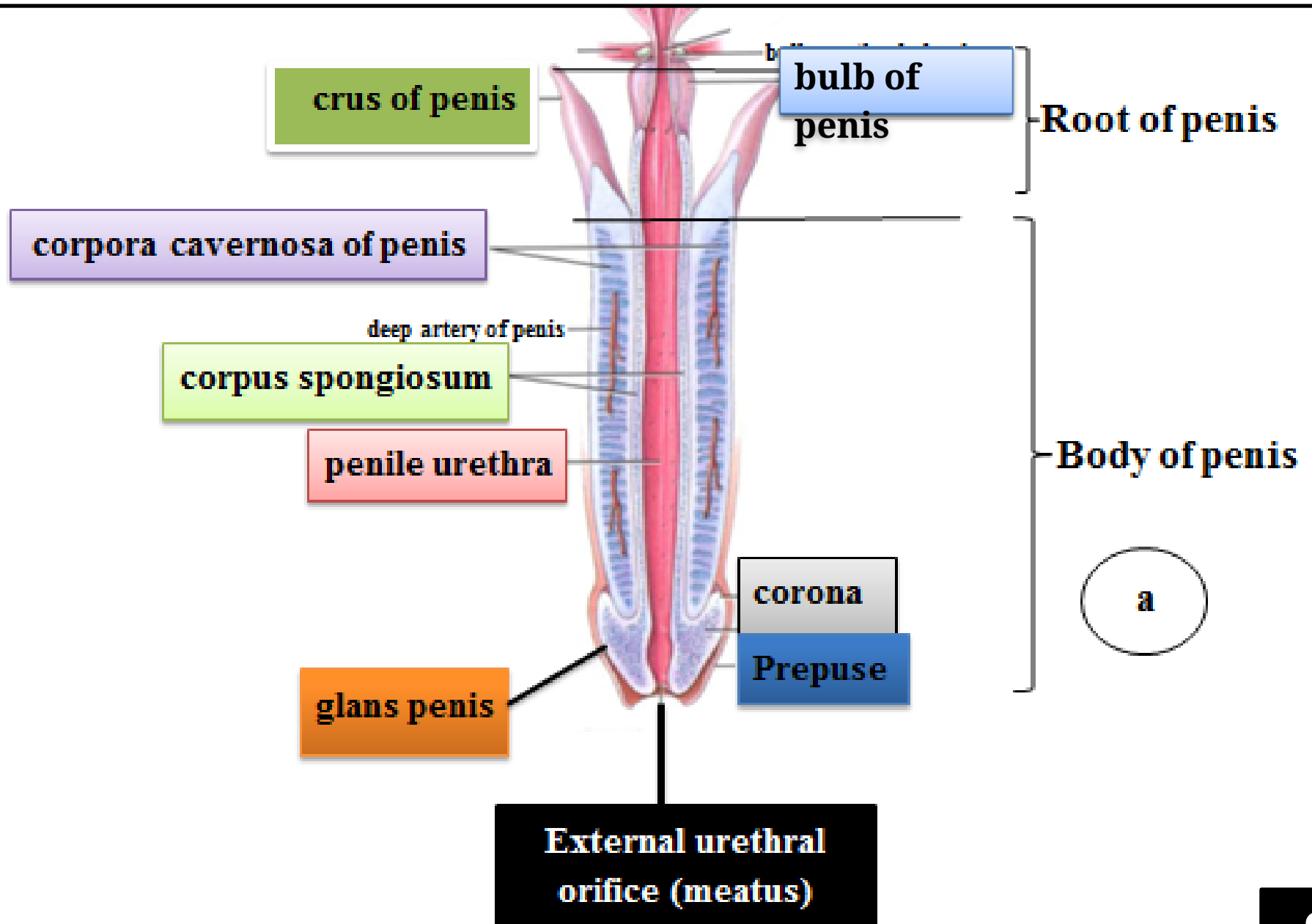
B. Body:

- **Is the free part that is suspended from pubic symphysis.**

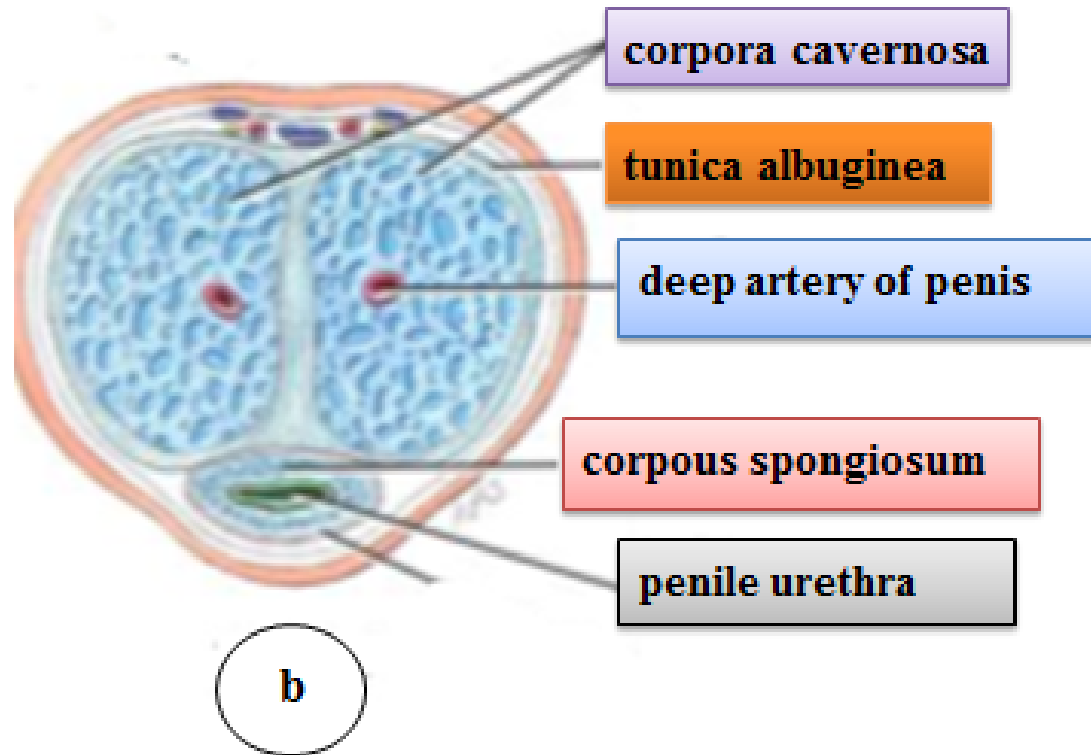
- **The corpora cavernosa form greater part of body, and are placed in dorsal part.**
- **Proximally, each is continuous with corresponding crus of penis.**
- **The corpus spongiosum lies in middle ventral to corpora cavernosa.**
- **Proximally, it is continuous with bulb of penis.**
- **Distally, it expands in front of corpora cavernosa forming glans penis (head of penis).**

- **The margin of glans projects beyond end of corpora cavernosa to form corona of gland.**
- **The corona overhangs the neck of glans.**
- **Neck separates the glans from body of penis.**
- **The penile urethra traverses bulb of penis and corpus spongiosum and opens on tip of glans penis forming external urethral meatus, which is a slit-like orifice.**
- **The thin skin and fascia of the penis are prolonged as a hood like double layer (fold) of skin, the prepuce (foreskin) that covers glans to a variable extent.**

The Penis – Longitudinal Section



The Penis – Cross Section



- **It is connected to glans penis just below external urethral meatus by a median fold known as frenulum of penis.**

The body of penis is supported by two condensations of deep fascia:

(1) Fundiform ligament of penis:

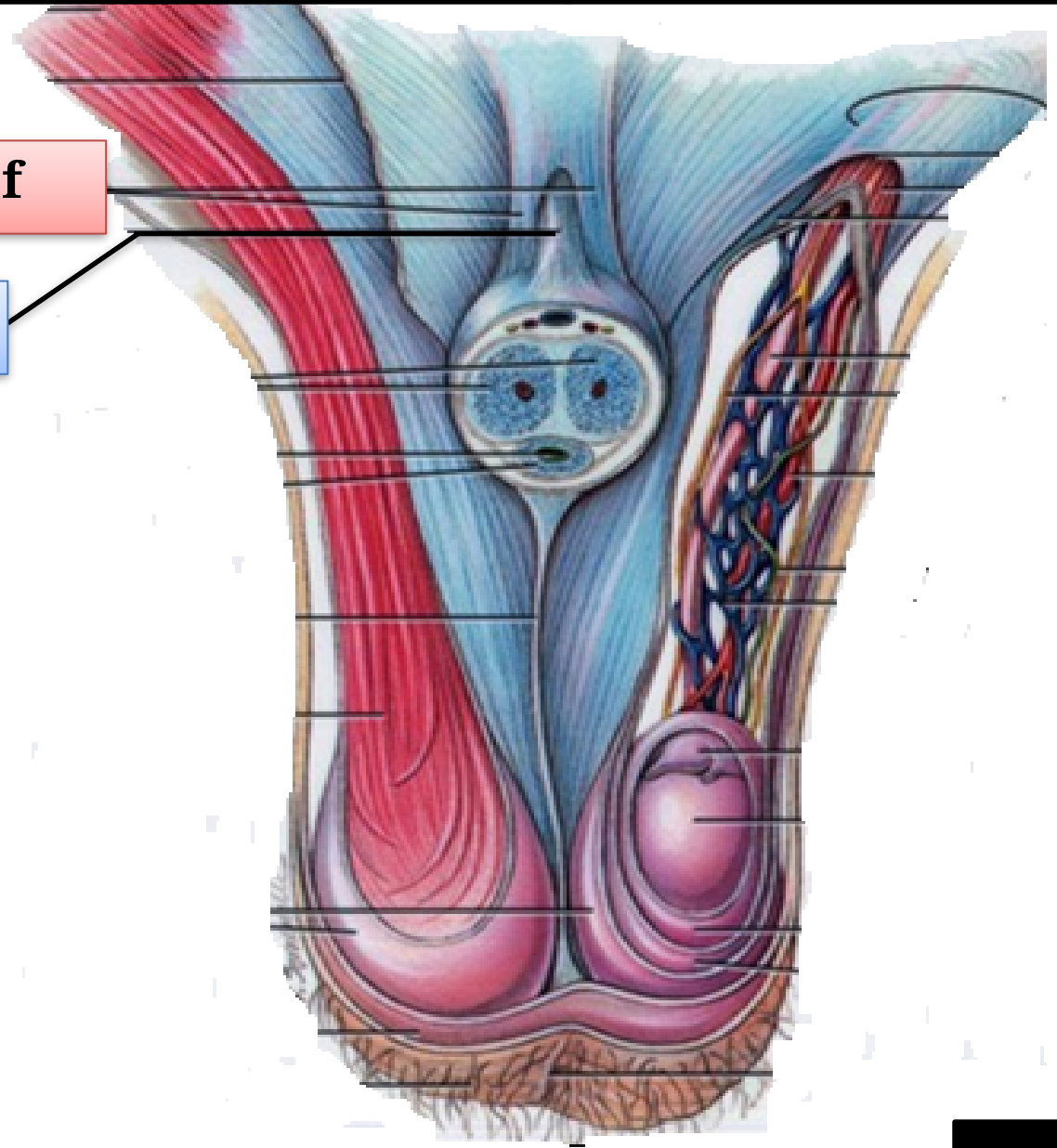
- **Descends in midline from linea alba just above pubic symphysis.**
- **Inferiorly, it splits to surround penis and then unite to form scrotal septum.**

(2) Suspensory ligament of penis: Descends from anterior surface of pubic symphysis and splits to form a sling that is attached to deep fascia of penis at junction of its root and body.

Ligament that support the penis

Fundiform ligament of penis

Suspensory ligament



Blood Supply of Penis

The internal pudendal artery gives off the following branches:

- a. Artery of bulb: Supplies the corpus spongiosum.**
- b. Deep arteries of penis: Supply corpora cavernosa.**
- c. Dorsal arteries of penis: Supply remaining areas of penis.**

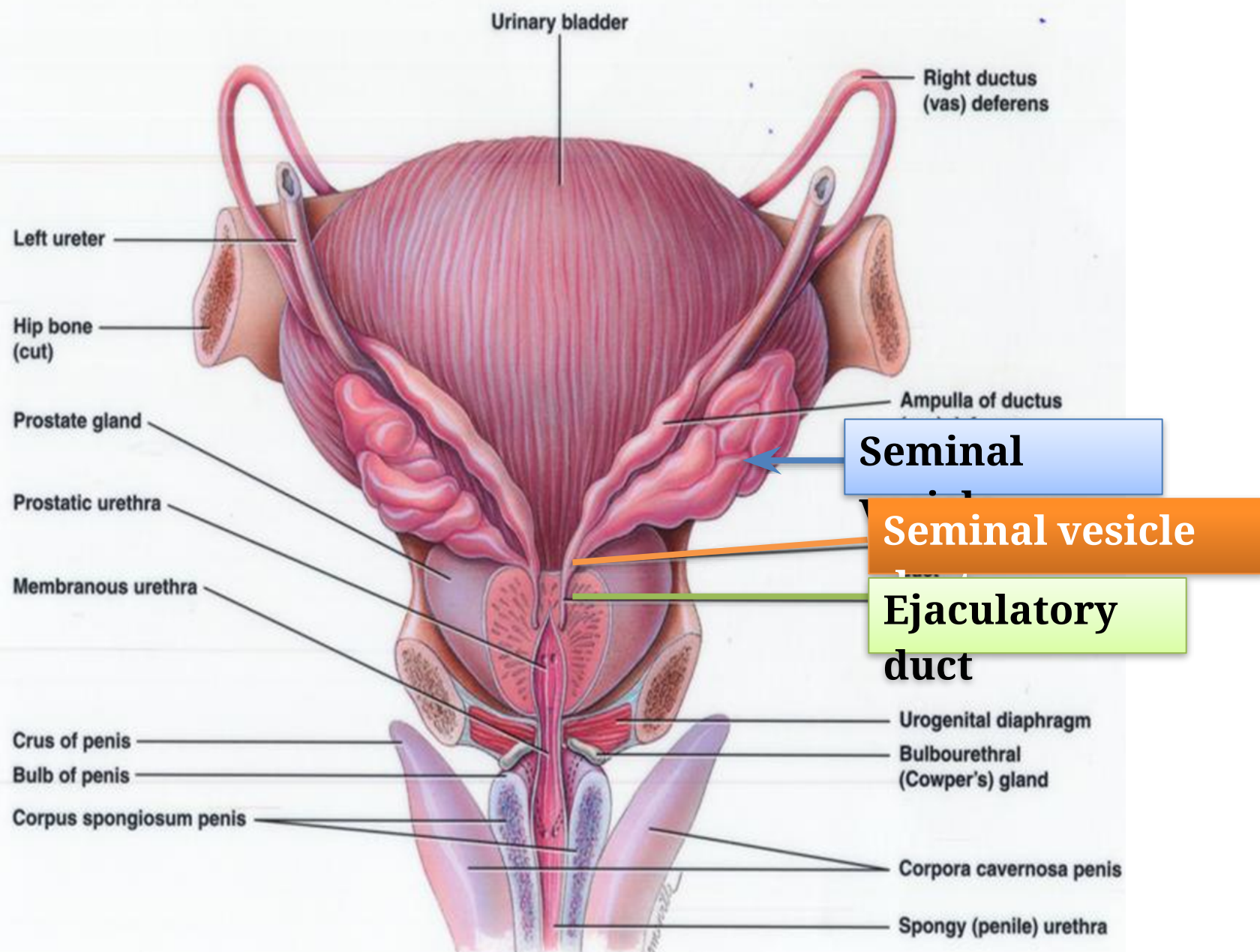
Veins from penis drain into internal pudendal veins.

Accessory Genital Glands

A. Seminal Vesicles:

- The seminal vesicles are two symmetrical lobulated organs situated obliquely on posterior surface of bladder.**
- Each seminal vesicle is about 5 cm long extends from the termination of ureter to base of prostate.**
- It is related posteriorly to rectum, from which it is separated by rectovesical fascia, and medially to vas deferens.**

- **The vertical axis of each seminal vesicle is directed downwards and medially, so that their lower ends are closer than upper.**
- **The inferior end of each seminal vesicle joins vas deferens of same side to form ejaculatory duct.**
- **The seminal vesicles secrete up to 85% of total volume of seminal fluid, most of rest being secreted by prostate.**



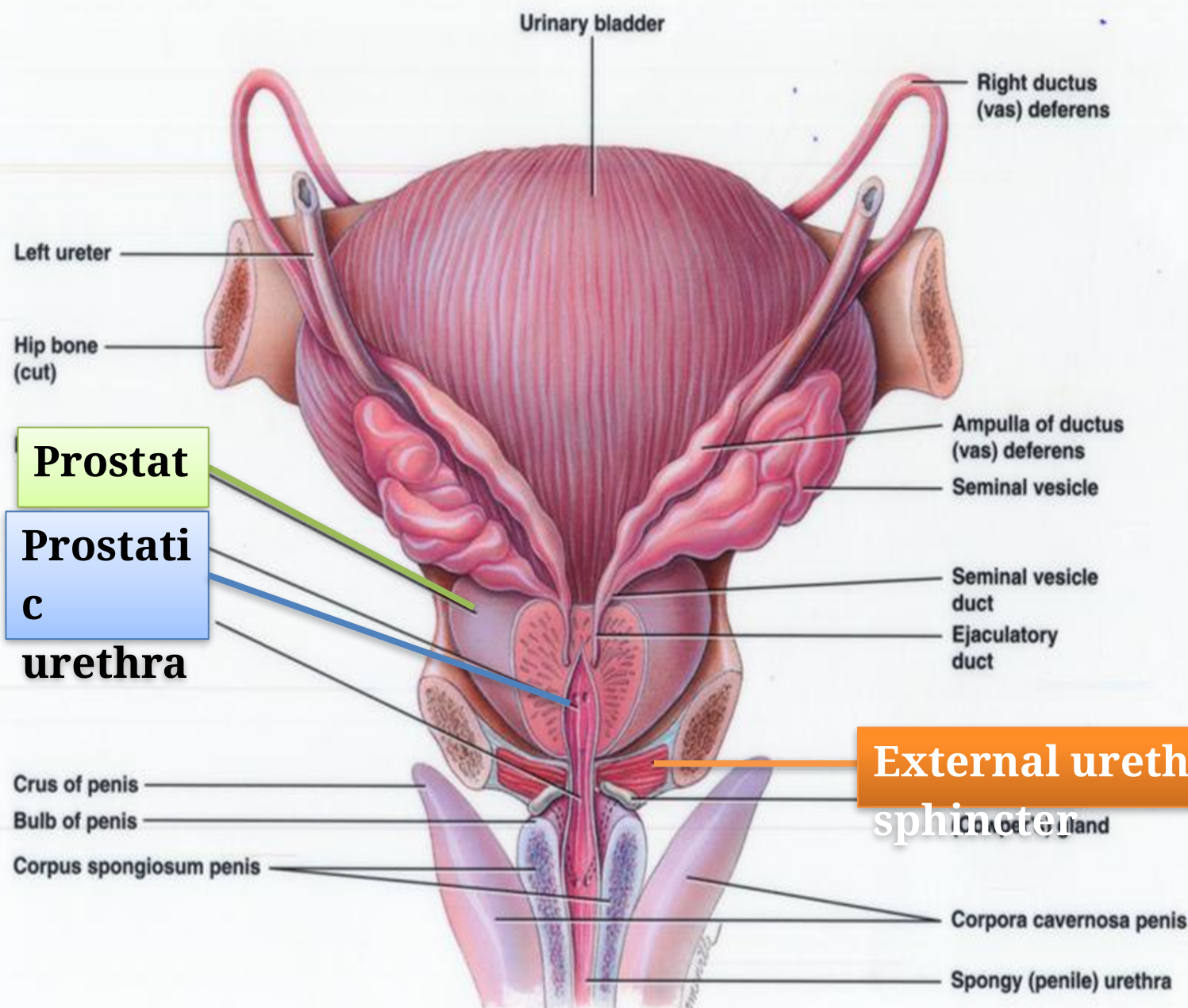
The Seminal Vesicles

B. Prostate:

- It is a walnut size gland that surrounds prostatic part of urethra.**
- The organ is enclosed by a dense fibrous capsule that incorporates prostatic plexus of nerves and veins.**
- The capsule is surrounded by visceral layer of pelvic fascia, which is continuous anterolaterally with puboprostatic ligaments, and posteriorly with rectovesical septum.**
- It is somewhat conical in shape, consists of an apex, a base, and four surfaces: anterior, posterior, and two inferolateral.**

- **The anterior muscular surface is connected to pubic bone by the puboprostatic ligaments.**
- **It is separated from pubis symphysis by retropubic pad of fat in retropubic space.**
- **The posterior surface is separated from ampulla of rectum by rectovesical septum.**
- **At upper border of this surface, the two ejaculatory ducts enter prostate.**

- Each inferolateral surface is clasped by the anterior fibers of the corresponding levator ani muscle (levator prostate), which forming a sling around prostate.
- The base of the gland being applied to neck of bladder and is perforated near its center by urethra.
- The urethra traversed gland from base to apex.
- The apex (inferior aspect) lies against superior aspect of sphincter urethrae and deep transverse perineal muscles (urogenital diaphragm).



Prostat

Prostati
c

urethra

External urethral
sphincter

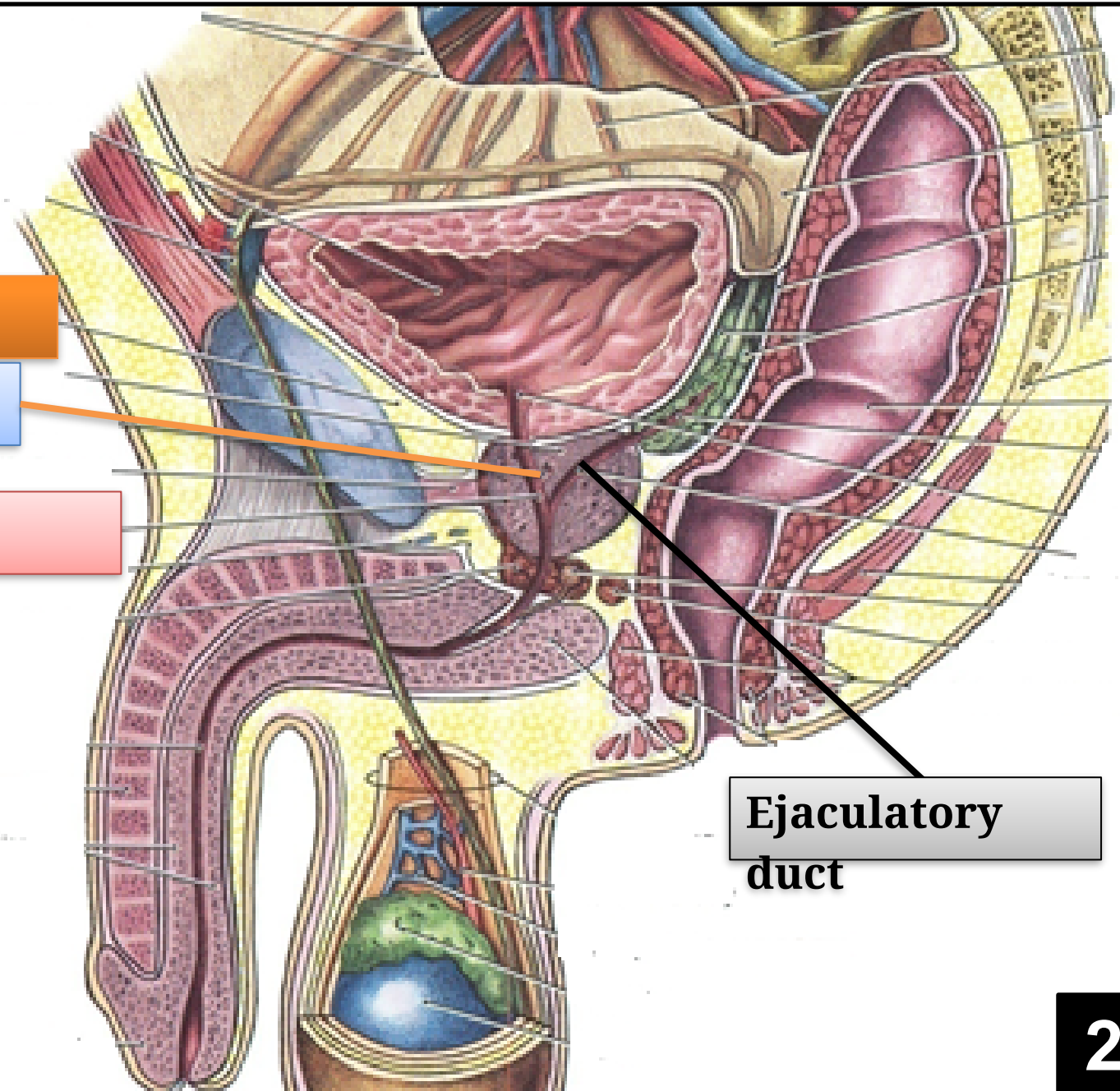
The Prostate Gland

Retropubic pad
of fat

Prostate

Prostatic
urethra

Ejaculatory
duct



The prostate is completely divided into five lobes:

a. Anterior lobe (Isthmus):

- Lies in front of urethra.**
- It is primarily muscular and represents superior continuation of urethral sphincter muscle.**
- It contains no glandular tissue.**

b. Middle lobe: Lies behind urethra and above ejaculatory duct. 22

C. Posterior lobe:

Lies behind urethra and below ejaculatory duct.

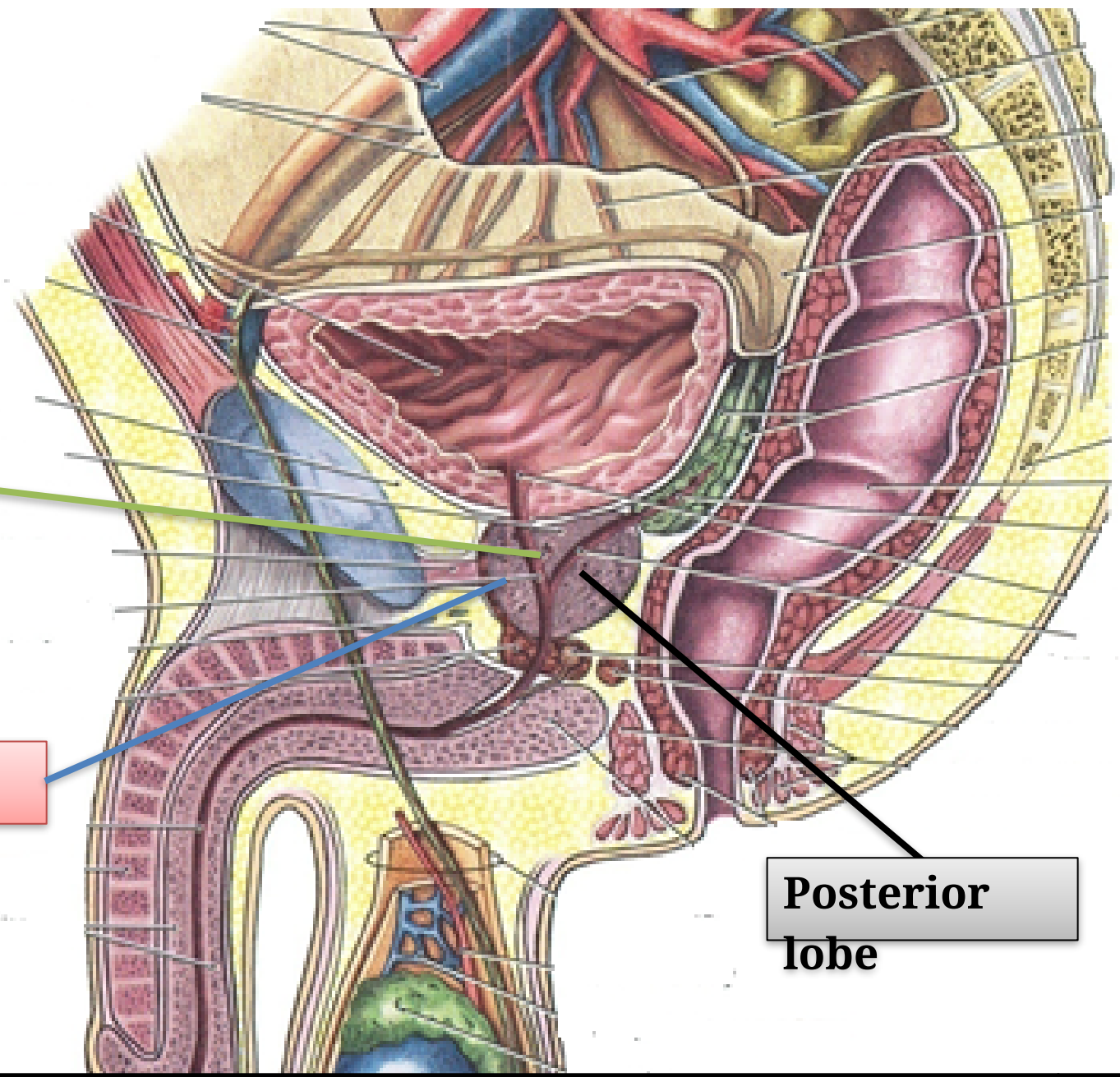
d. Right and left lateral lobes:

- Lie on either side of urethra.**
- They form major part of prostate.**

**Middle
lobe**

**Anterior
lobe**

**Posterior
lobe**



Prostatic Lobes

Blood Supply of the Prostate

The prostate is supplied by inferior vesical, middle rectal and internal pudendal arteries.

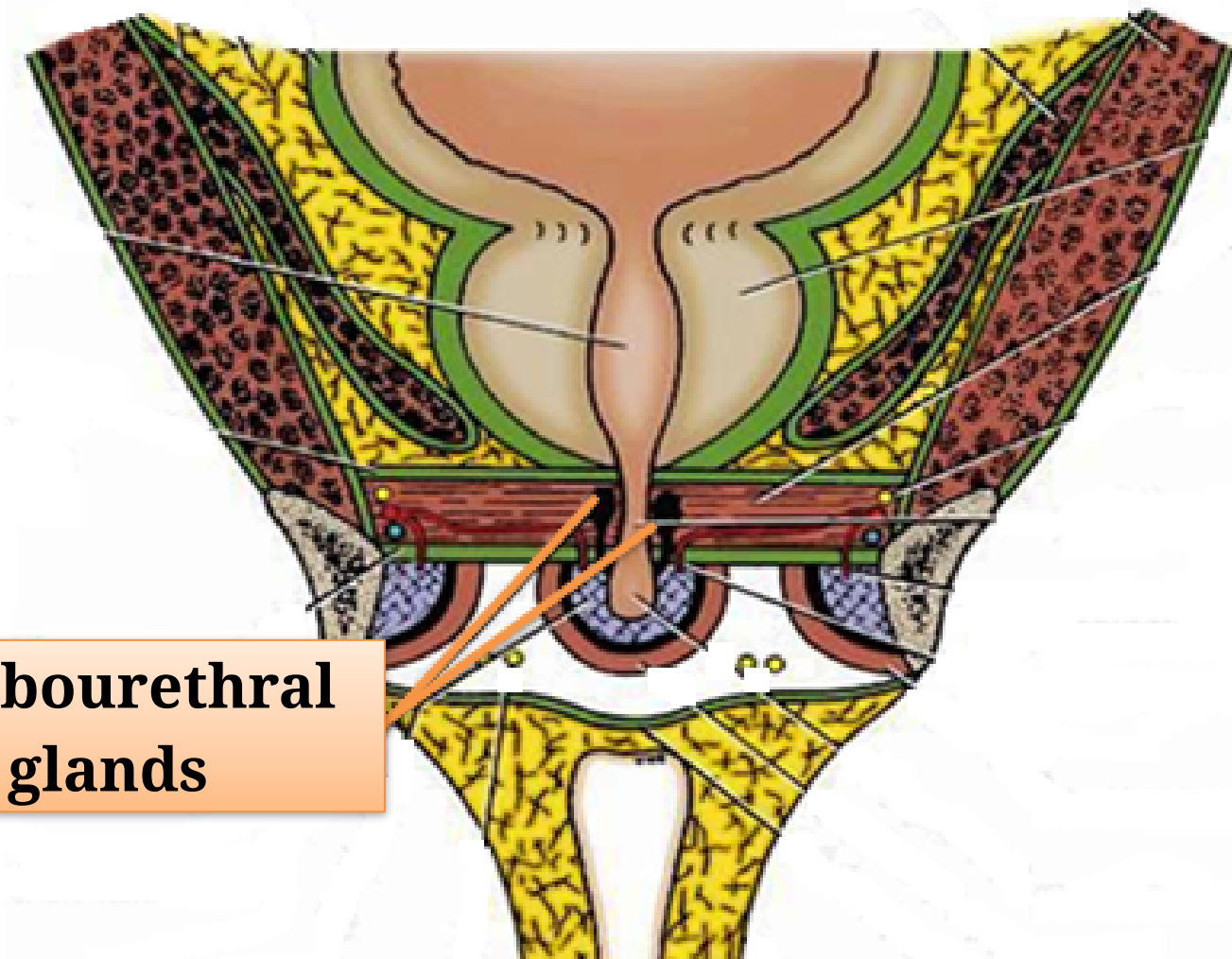
Veins form plexus within the capsule called the prostatic venous plexus, which drains into internal iliac veins.

Lymph Drainage of the Prostate

- Lymph vessels from prostate end in internal iliac and sacral lymph nodes.**
- Few vessels however drain into external iliac lymph nodes.**

C. Bulbourethral Glands or Cowper's Glands:

- Are two pea-size glands that lie posterolateral to membranous part of urethra, largely embedded within external urethral sphincter.**
- Their ducts pierce perineal membrane and open on posterior wall of penile urethra in bulb of penis.**



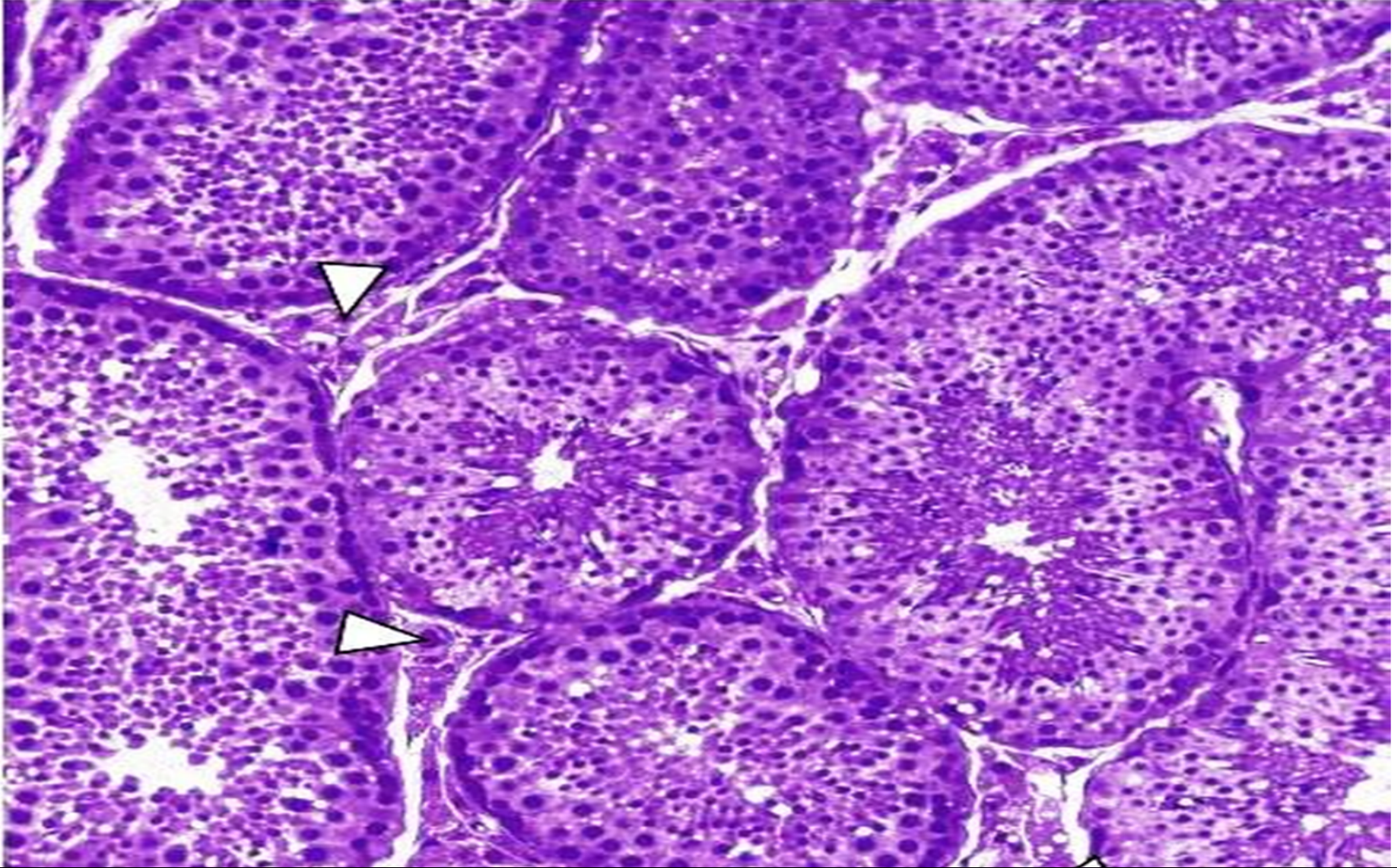
**Bulbourethral
glands**

Histology of the Male Reproductive System

Testes

- The spaces between adjacent seminiferous tubules are filled with connective tissue, blood capillaries, extensive network of lymphatic vessels, and nerves. The connective tissue contains various cell types, including fibroblasts, undifferentiated connective cells, mast cells, and macrophages.
- During puberty, an additional cell type becomes apparent, which is either rounded or polygonal in shape, and has a central nucleus and an eosinophilic cytoplasm rich in small lipid droplet. These cells are called the interstitial (leydig) cells.

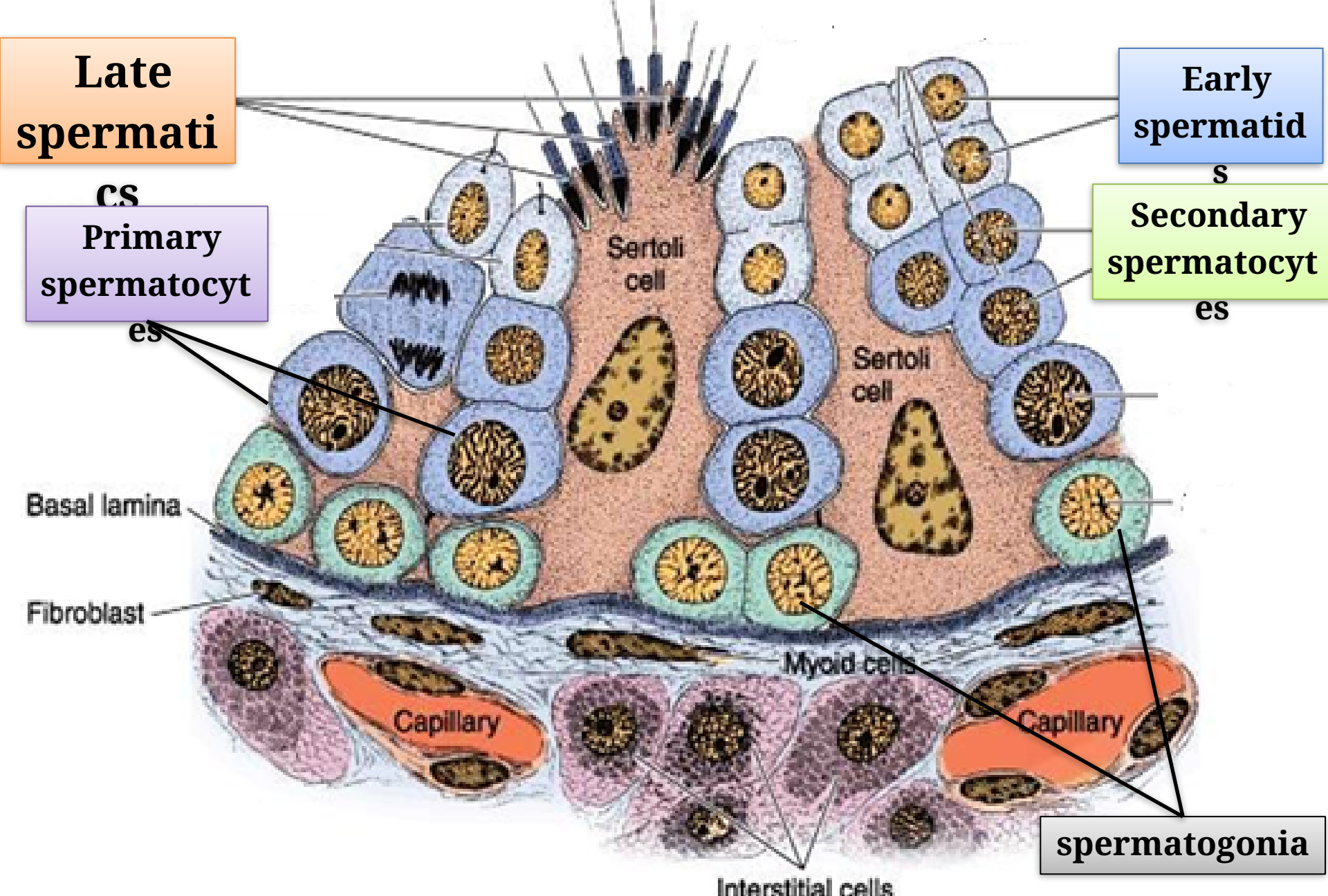
- **The seminiferous tubules produce, spermatozoa, whereas leydig cells secrete testosterone.**
- **The seminiferous tubules are coiled, about 30 – 70 cm long.**
- **Each tubule has the following walls:**
 - a. **Tunica propria:**
 - **It is a fibrous connective tissue enveloping seminiferous tubules, composed of several layers of fibroblasts.**
 - **The most inner layer adherent to basal lamina consists of flattened myoid cells, which have the characteristics of smooth muscle.**



Low power of a section through the seminiferous tubules. Note the spaces between the tubules are filled with connective tissue containing Leydig cells

b. Seminiferous (germinal) epithelium:

- Composed of two types of cells: sertoli or sustentacular cells, and spermatogenic cells (spermatogenic lineage).**
- The latter are stacked in 4 – 8 layers, consists of the following types of cells:
spermatogonium, primary spermatocytes, secondary spermatocytes, and spermatids.**
- Their function is to produce spermatozoa. The seminiferous epithelium rests on a well-defined basal lamina.**



Late spermatozoa

Early spermatids

Primary spermatocytes

Secondary spermatocytes

Basal lamina

Fibroblast

Capillary

Capillary

spermatogonia

Interstitial cells

Seminiferous (germinal) epithelium

Spermatogenesis

- **Spermatogenesis is the process by which spermatids are formed.**
- **Sperm production begins at periphery of seminiferous tubules in primitive germ cells called spermatogonium, which are situated next to the basal lamina of epithelium.**
- **These cells begin dividing by mitosis, producing successive generations of cells.**
- **The newly formed cells can follow one of two paths:**

- (1) they can continue dividing as stem cells called spermatogonia type A, or,**
 - (2) they can differentiate during progressive mitotic division to form spermatogonia type B.**
- Spermatogonia type A, characterized by a large round or oval nucleus with condensed chromatin; peripheral nucleoli and a nuclear vacuole may be prominent.**
 - Spermatogonia type B have dispersed chromatin, central nucleoli, and no nuclear vacuole.**

- **Spermatogonia type B undergo further mitotic divisions to produce primary spermatocytes, which have 46 (44 + XY) chromosomes.**
- **These migrate towards the lumen of seminiferous tubule.**
- **Soon after their formation, the primary spermatocytes enter the prophase of the first meiotic division, which takes about 22 days.**

- The primary spermatocytes are the largest cells of spermatogenic lineage and are characterized by presence of chromosomes in various stages of coiling within their nuclei.
- From first meiotic division arise smaller cells called secondary spermatocytes, which have 23 chromosomes ($22 + X$ or $22 + Y$).
- The smaller secondary spermatocytes rapidly undergo second meiotic division to form spermatids and are therefore seldom seen.
- Each secondary spermatocyte divides into two spermatids that contain 23 chromosomes.

Spermatogoni

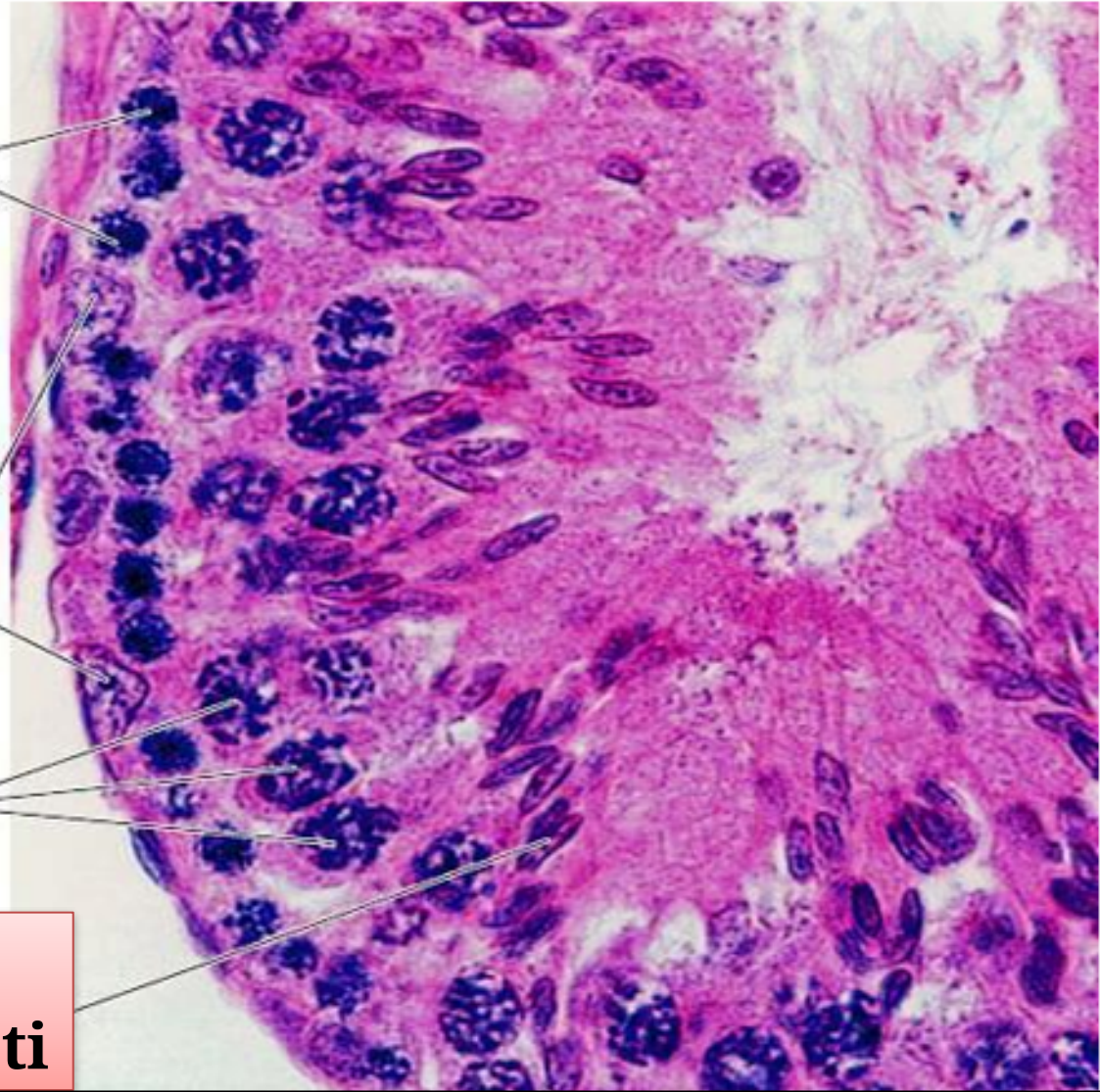
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Sertoli cells

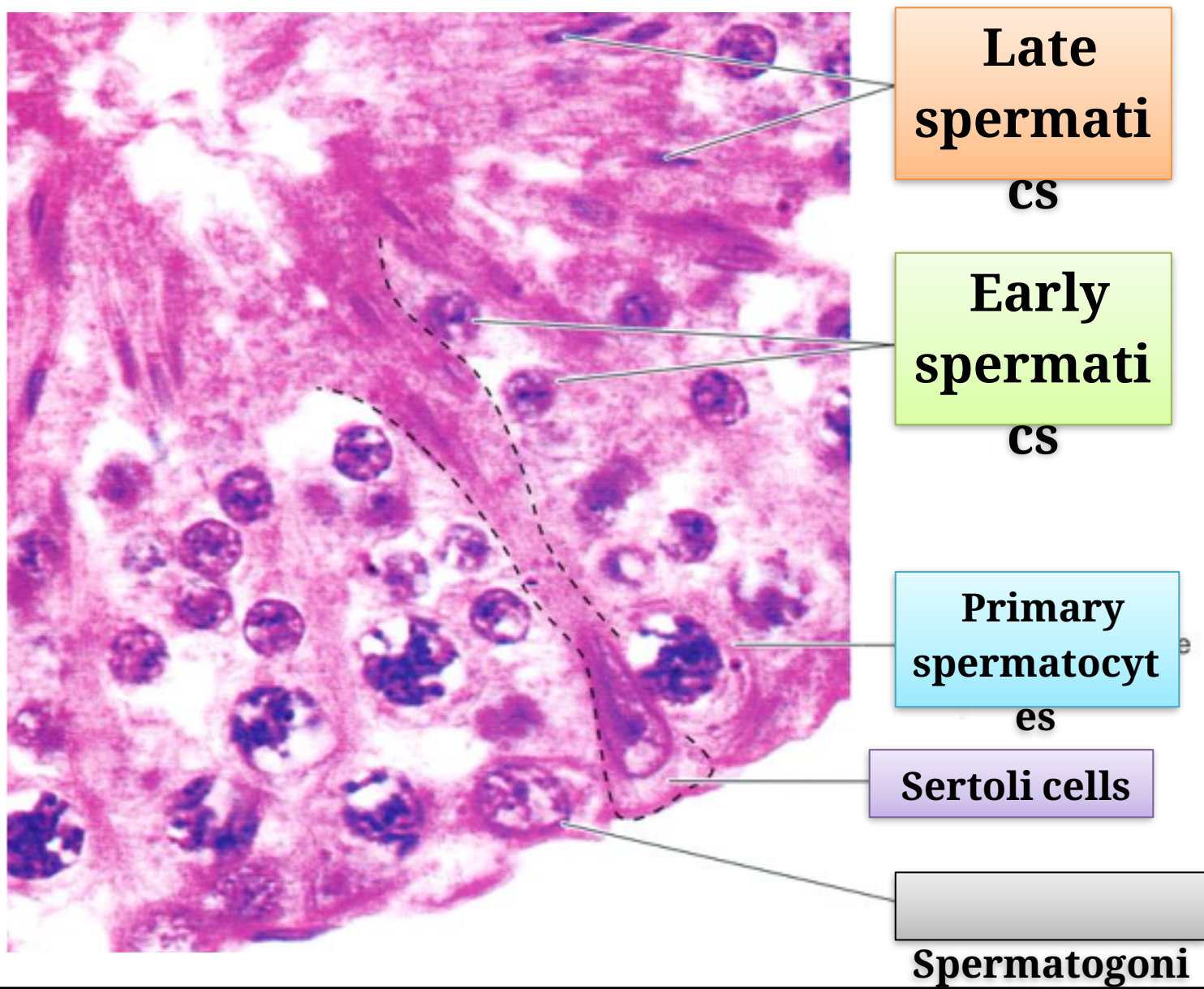
Primary
spermatocyt

es

Late
spermati



High power of section through a seminiferous tube showing the various cell types.



High power of section through a seminiferous tube. Note the extent of the sertoli cell.

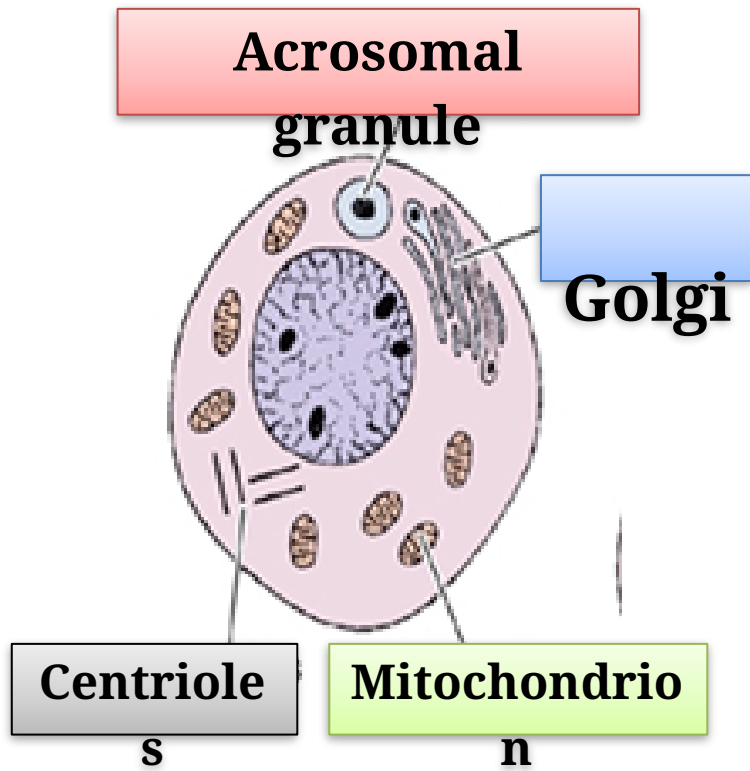
Spermiogenesis

- **Is process by which spermatids are transformed into motile mature spermatozoa.**
- **It involves the following major stages:**
 - (1) The Golgi complex elaborates a large vesicle, acrosomal vesicle, which accumulates carbohydrates and hydrolytic enzymes.**
 - (2) The acrosomal vesicle spreads to cover anterior half of progressively elongating and condensing nucleus to form acrosomal head cap.**

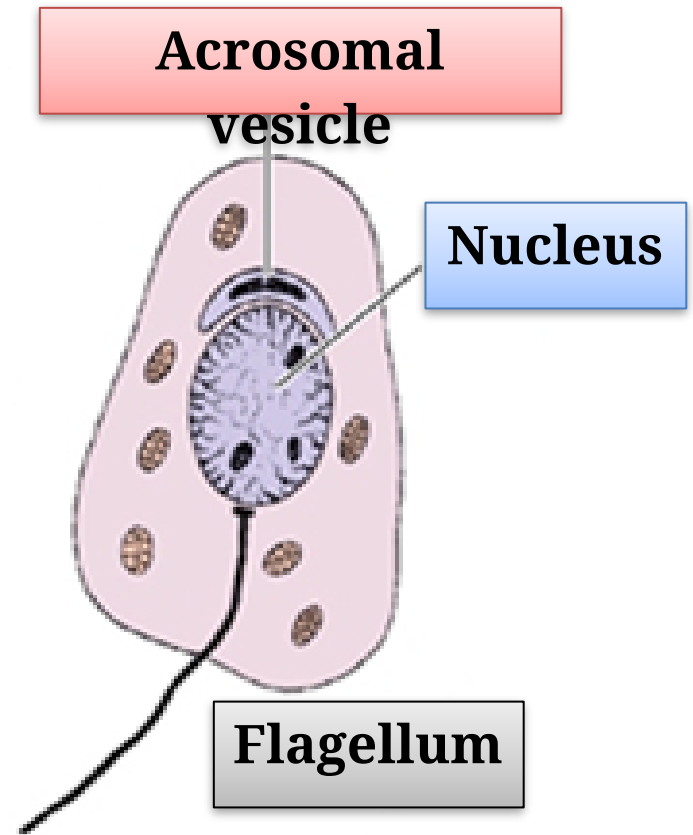
(3) Meanwhile, both centrioles migrate to end of cell opposite to acrosomal head cap. One of the centrioles elongates to form a flagellum.

(4) The cytoplasm migrates to surround the proximal part of flagellum forming a thickened region known as middle piece. Mitochondria aggregate around flagellum in this region.

(5) As the flagellum elongates, excess cytoplasm is shed and phagocytosed by Sertoli cell prior to release of sperm into lumen.

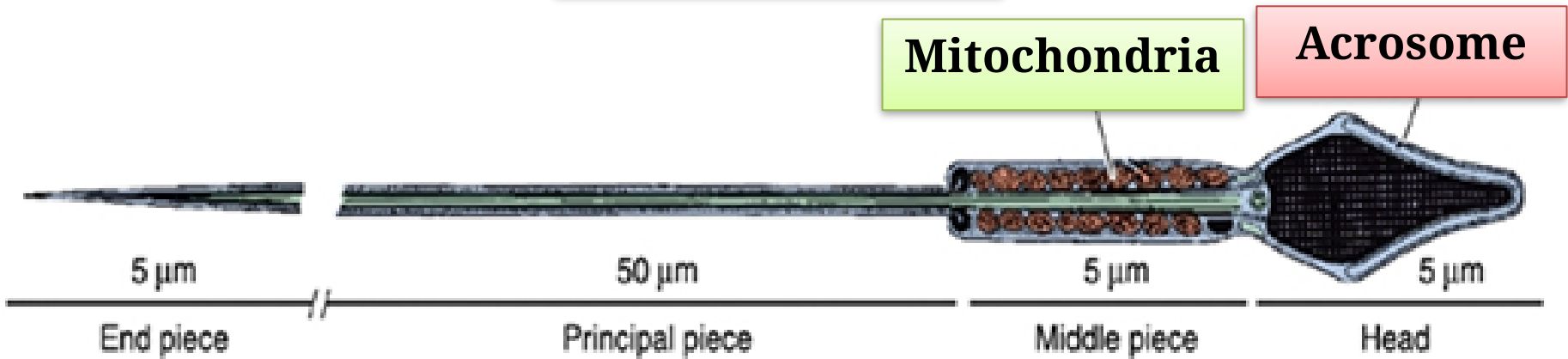
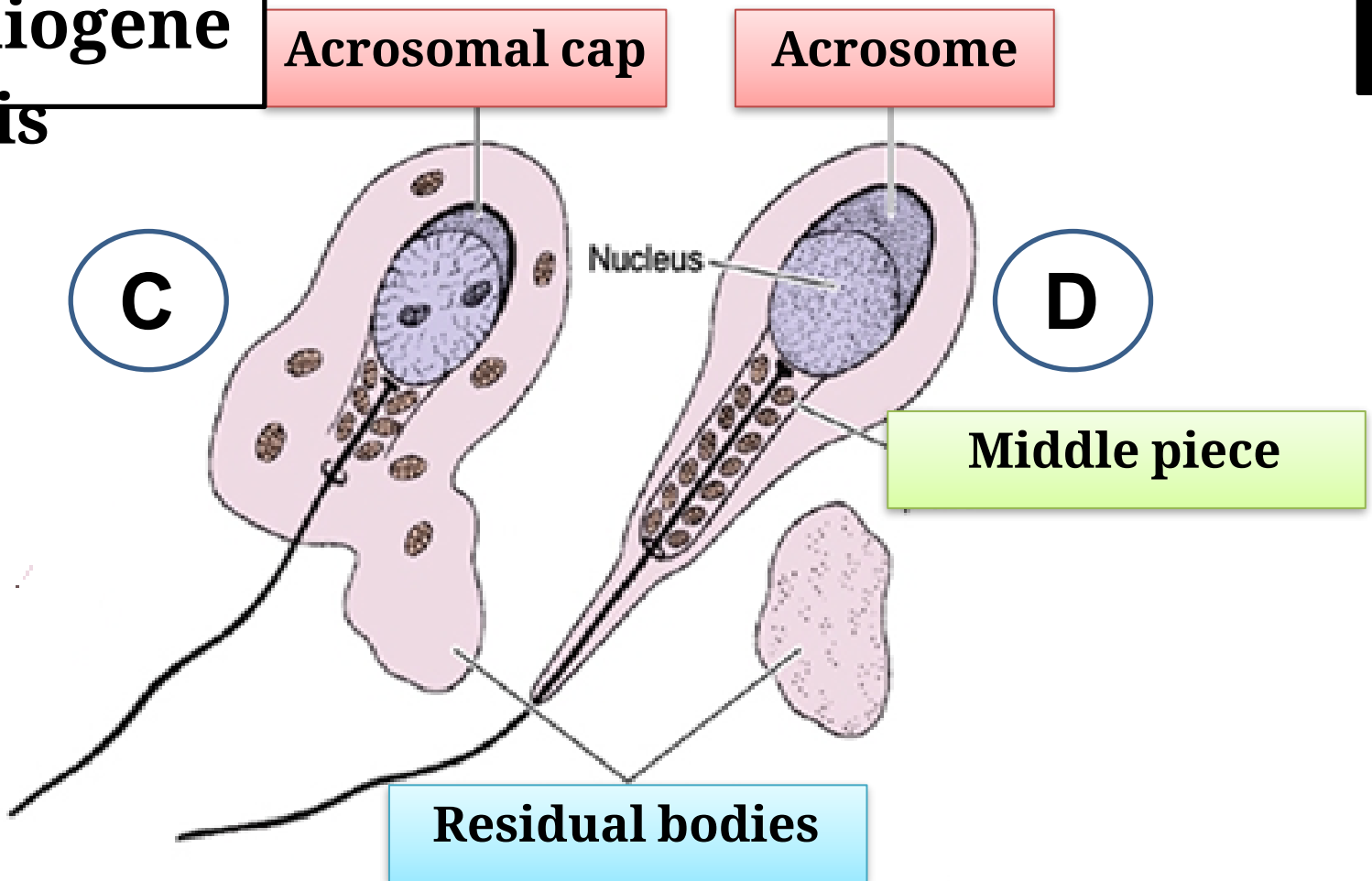


A



B

Spermiogenesis



Sertoli cells

- Are large cells, which extend from basement membrane to lumen of tubule.**
- They are elongated pyramidal cells having an extensive cytoplasm that envelop cells of spermatogenic lineage.**
- In light microscope, their outline appear poorly defined because of the numerous lateral processes that surround spermatogenic cells.**

- **Studies with electron microscope reveal that these cells contain abundant smooth endoplasmic reticulum, a small amount of rough endoplasmic reticulum, a well develop Golgi complex, and a moderate number of mitochondria.**

Functions of Sertoli cells:

- (1) Support and protect developing spermatogenic cells: Sertoli cells provide support and protection to developing spermatogenic cells in several ways. They nourish spermatocytes, spermatids, and sperm; and control movements of spermatogenic cells and release of sperm into lumen of seminiferous tubule.**
- (2) Produce blood-testis barrier: Adjacent Sertoli cells are bound together by occluding junctions at basolateral part of the cell, forming a blood-testis barrier.**

- **(3) Phagocytoses: They phagocytize excess spermatid cytoplasm, which shed as residual bodies during spermiogenesis.**
- **(4) Secretion of factors that regulate spermatogenesis and spermiogenesis.**
- **(5) Secretion of factors that regulate the function of Leydig cells.**
- **(6) Secretion of inhibin, which suppresses synthesis and release of FSH in the anterior pituitary gland.**
- **(7) Secretion of tubular fluid, which is used for sperm transport.**