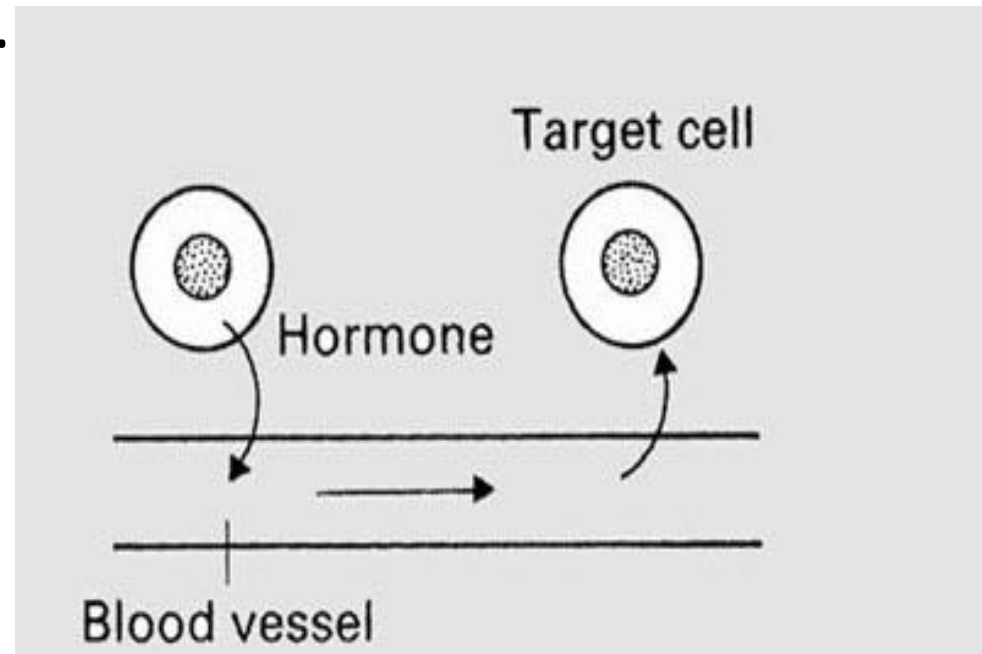


ENDOCRINE SYSTEM

INTRODUCTION

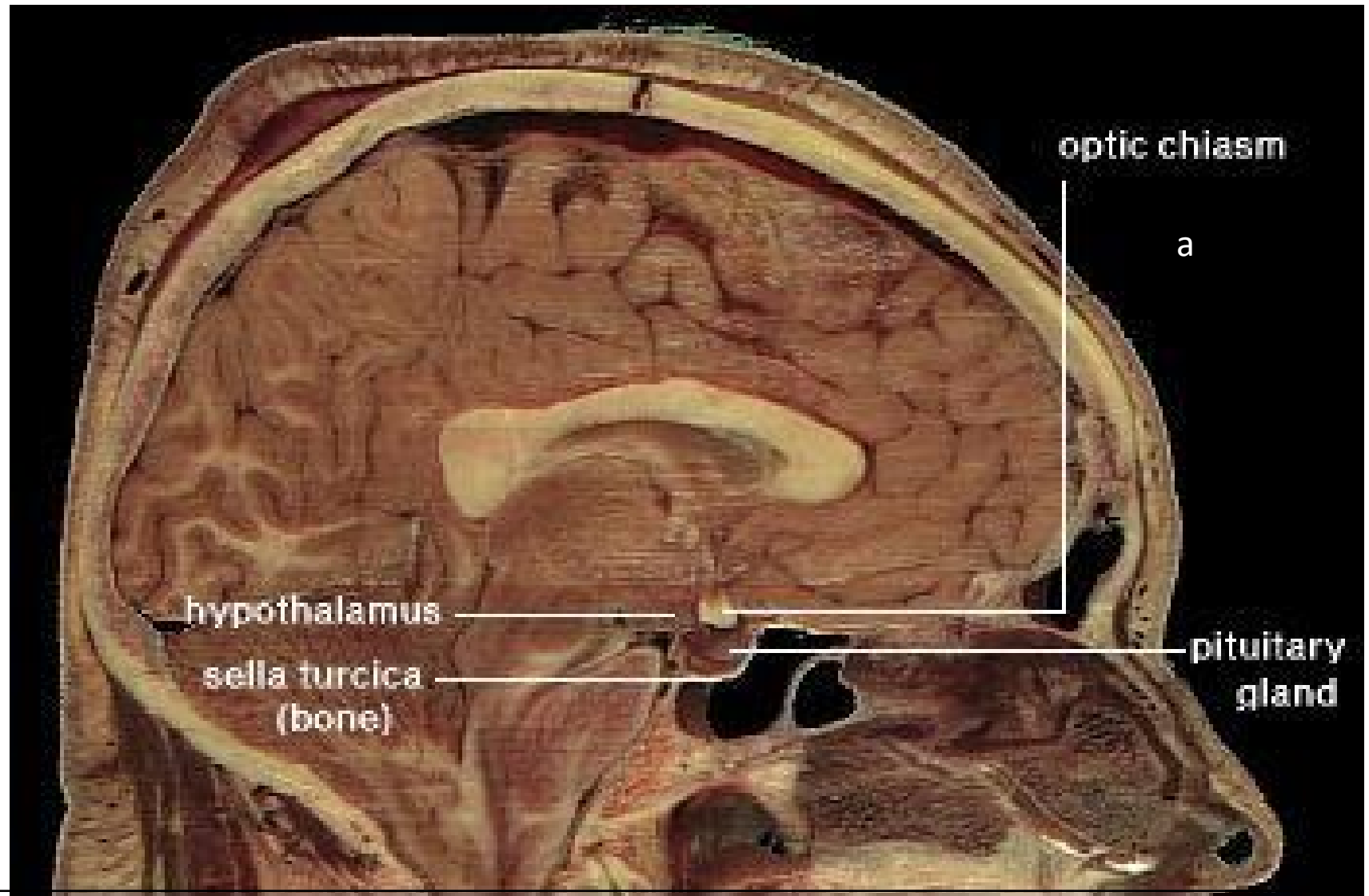
- Endocrine tissue is made up of cells that produce secretions which are poured directly into blood.
- Endocrine cells lie in close apposition to blood capillaries or sinusoids.
- Secretions of endocrine cells are called **hormones**.
- Hormones travel through blood to target cells and influence their function.



Endocrine Glands (Ductless gland)

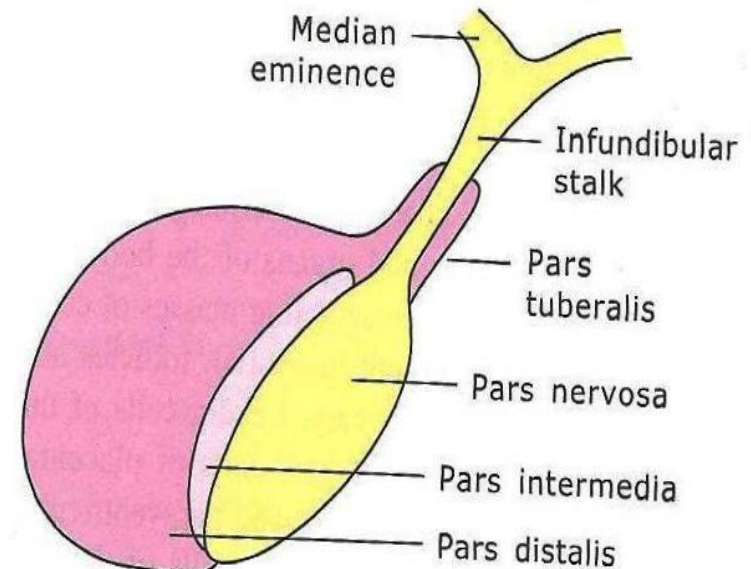
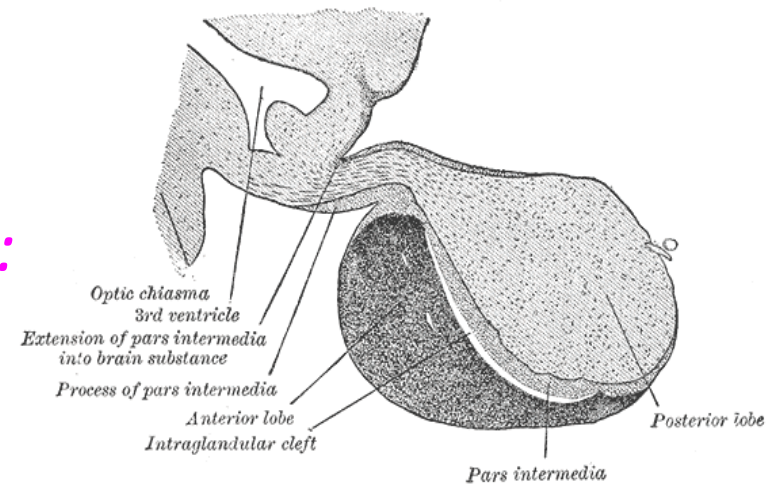
- **Pituitary (hypophysis)**
 - Anterior pituitary
 - Posterior pituitary
 - **Adrenal gland (suprarenal)**
 - Adrenal cortex
 - Adrenal medulla
 - **Thyroid gland**
 - Follicles
 - Parafollicular cells
 - **Parathyroid gland**
-

Pituitary Gland (Hypophysis Cerebri)



Pituitary Gland (hypophysis)

- “Master endocrine gland”.
- Parts—>
- **Adenohypophysis (Ant. Pituitary):**
- Pars distalis,
- Pars intermedia
- Pars tuberalis.
- **Neurohypophysis (Post. Pituitary):**
- Pars nervosa,
- Infundibular stalk
- Median eminence.



Adenohypophysis (Anterior pituitary)

Pars Distalis:

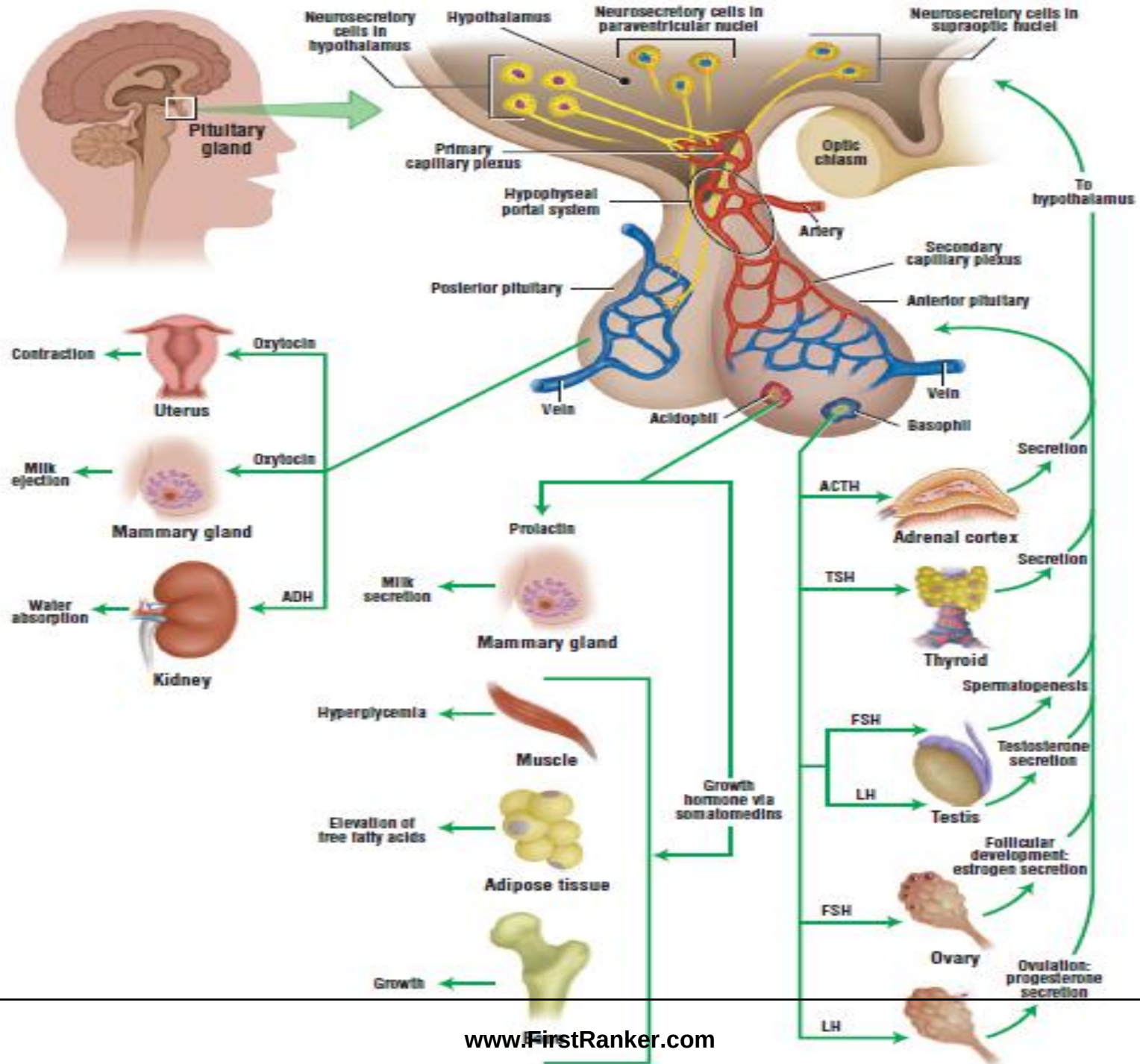
- Consists of 2 major group of cells:
- **Chromophils (secretory granules)→**
Acidophils (alpha cells) & Basophils (beta cells)
- **Chromophobes (few or no granules)**

Pars Intermedia:

- Consists mainly of basophils.
- Some cells produce *melanocyte stimulating hormone (MSH)*.

Pars Tuberalis:

- Consists of chromophilic (mostly basophilic) & chromophobic cells
 - ***Hormone secreted by chromophils→***
 - *Acidophils*—Growth hormone & Prolactin
 - *Basophils*— TSH
FSH, LH
ACTH
-



Neurohypophysis (Posterior pituitary)

Consists of:

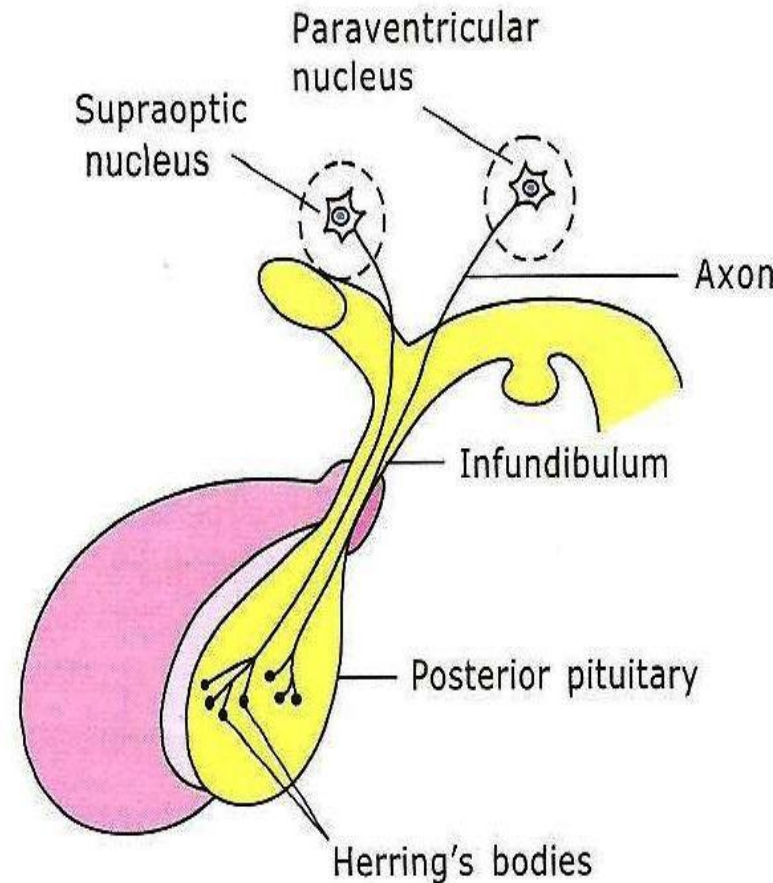
- Numerous non-myelinated nerve fibres
- Supporting cells (**pituicytes**)

Produce 2 hormones:

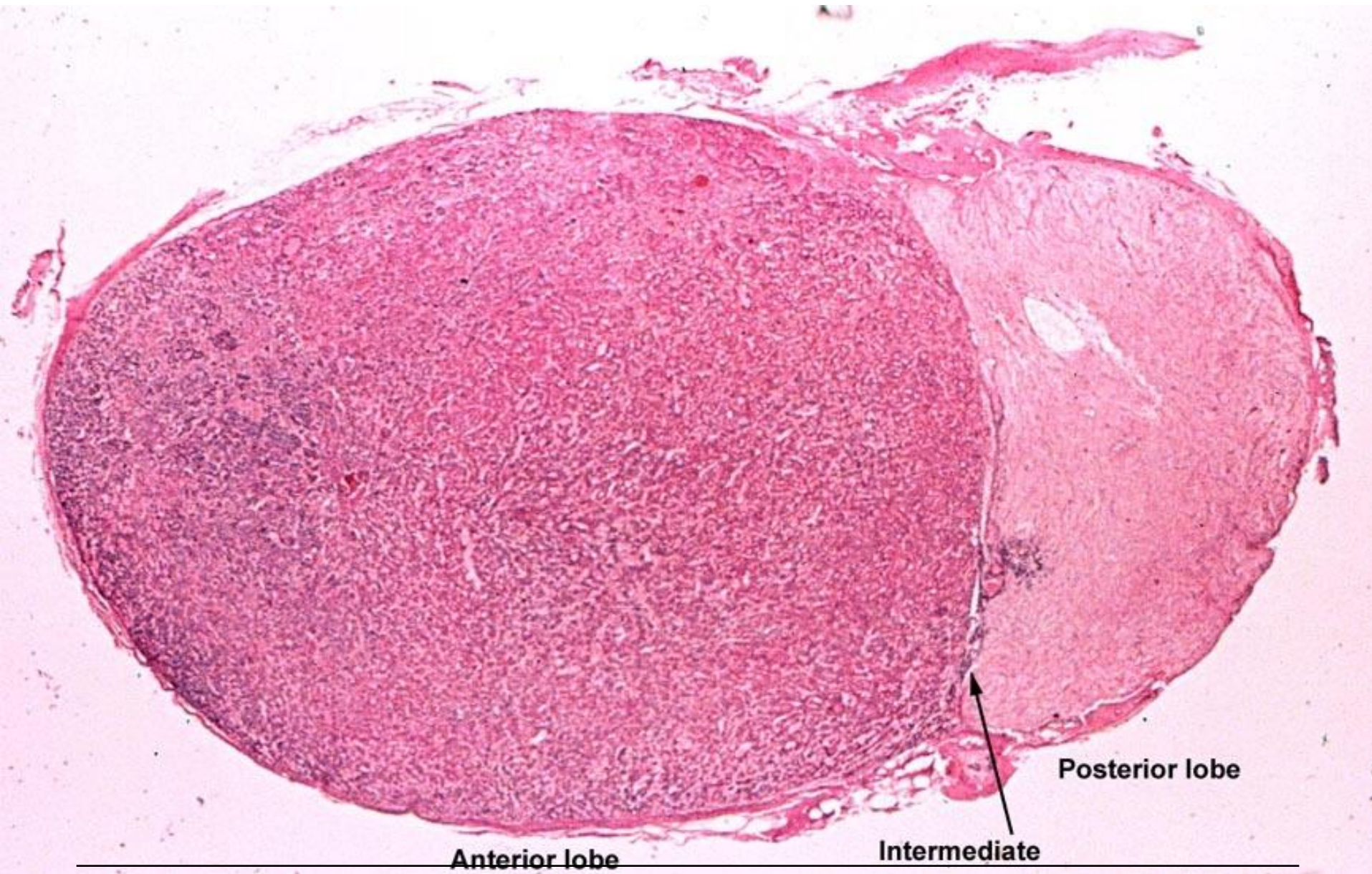
- **Oxytocin** [paraventricular nucleus]
- **Vasopressin (ADH)**[supraoptic nuc.]

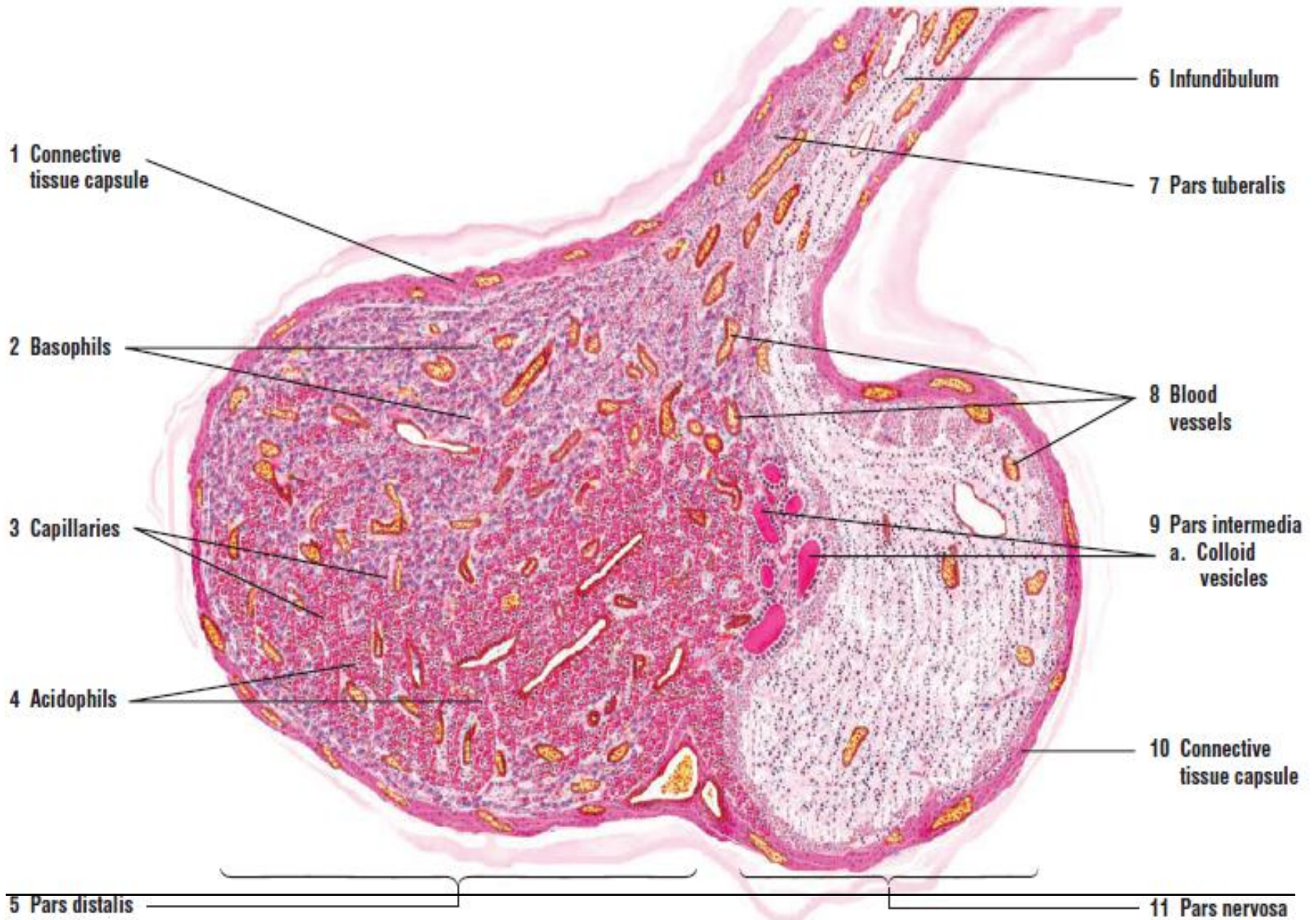
Herring bodies:→

Collection of secretory granules at the terminal portion of axonal processing.

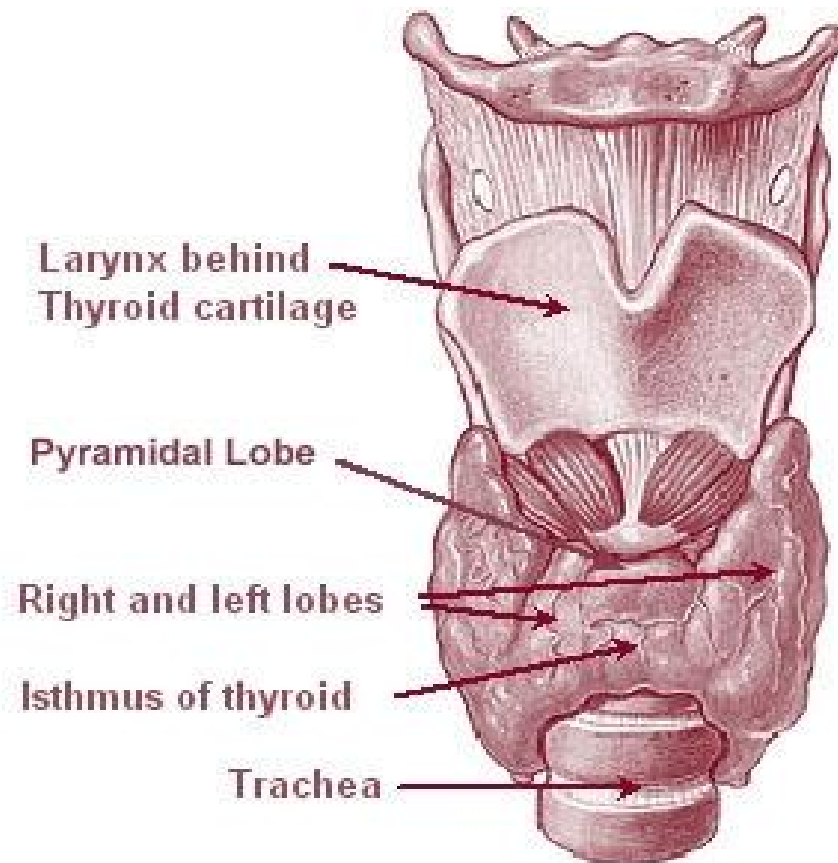


Pituitary gland



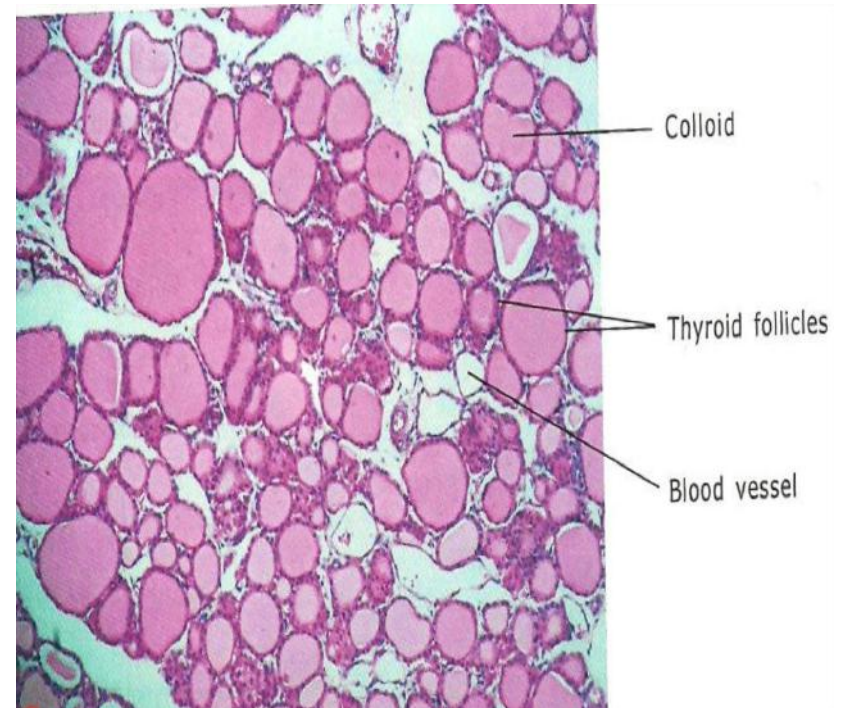


THYROID GLAND



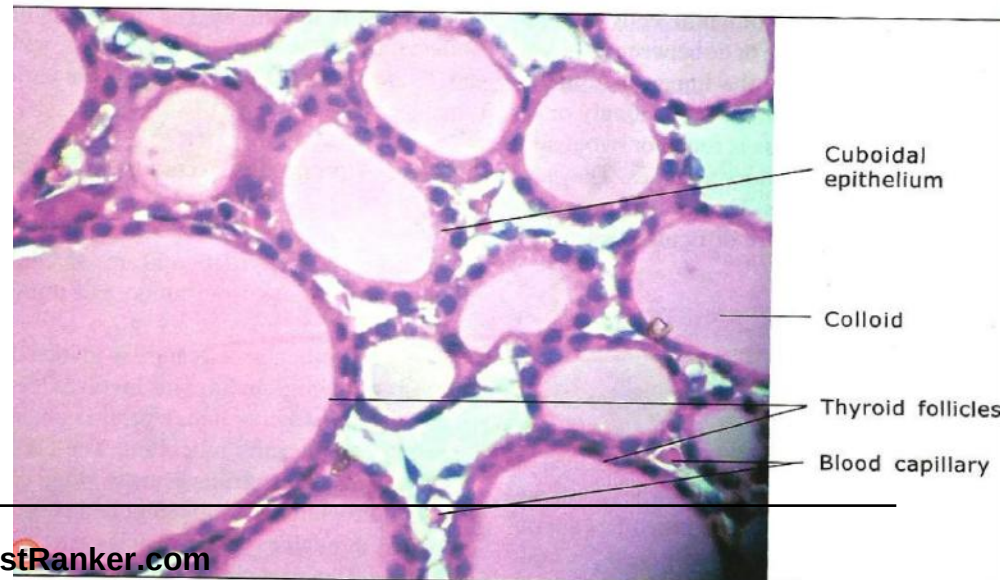
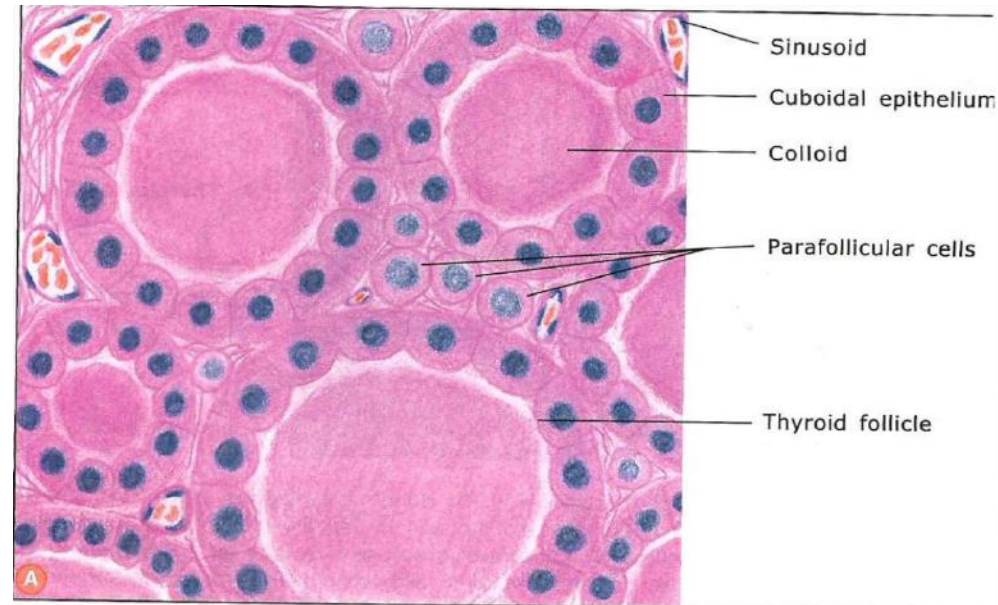
Microscopic structure

- The gland is surrounded by a thin fibrous **capsule**.
- Septa from the capsule extend into the gland & divide it into **lobules**.
- Lobules are made up of spherical masses called **follicles**.
- Follicle has a cavity filled with homogenous material called **colloid**.
- **Follicular cells**— cuboidal
- **Secrete 2 hormones:**
- *Tri-iodothyronine (T3)*
- *Tetra-iodothyronine (T4) or thyroxine.*



Parafollicular cells (C-cells):

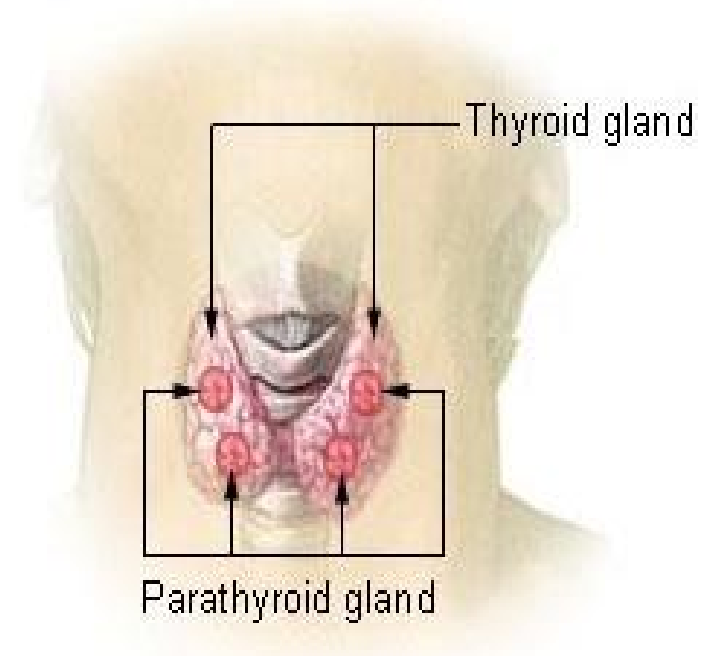
- Embedded within a follicle or lie between follicles.
- Singly or in groups.
- Cells are polyhedral with oval eccentric nucleus and cytoplasm contains secretory granules.
- Light staining cells.
- Secrete hormone → **calcitonin**.



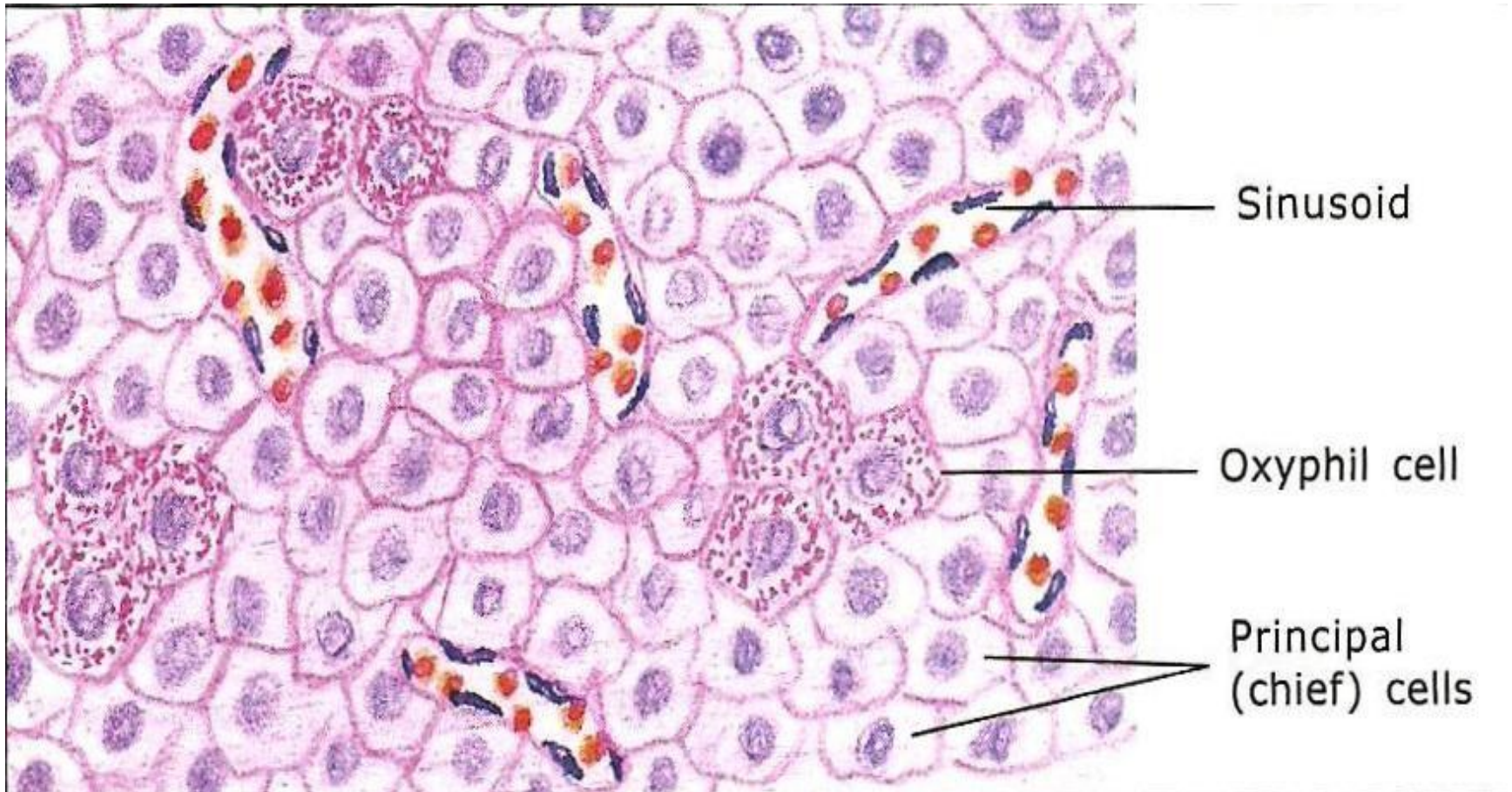
Parathyroid Gland

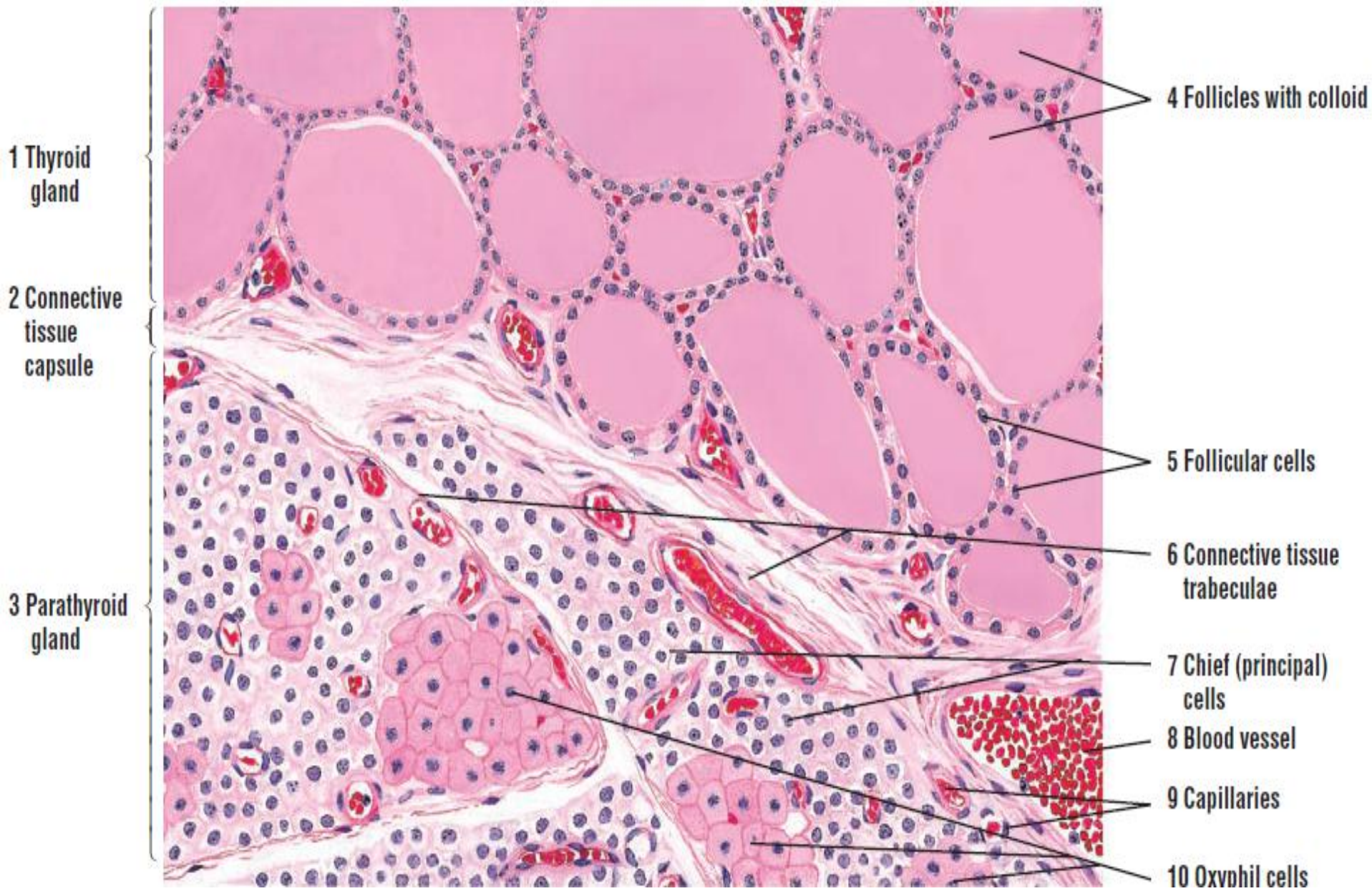
- Small ovoid bodies (4 in no.) embedded in the connective tissue capsule on the posterior surface of thyroid gland.
- Consists of 2 types of cells:
- **Chief cells (principal cells):** more numerous, polygonal, round centrally located nucleus.
- Secrete *parathyroid hormone (PTH)*.
- **Oxyphil cells:** larger in shape, inactive phase of chief cells.

Thyroid and Parathyroid Glands

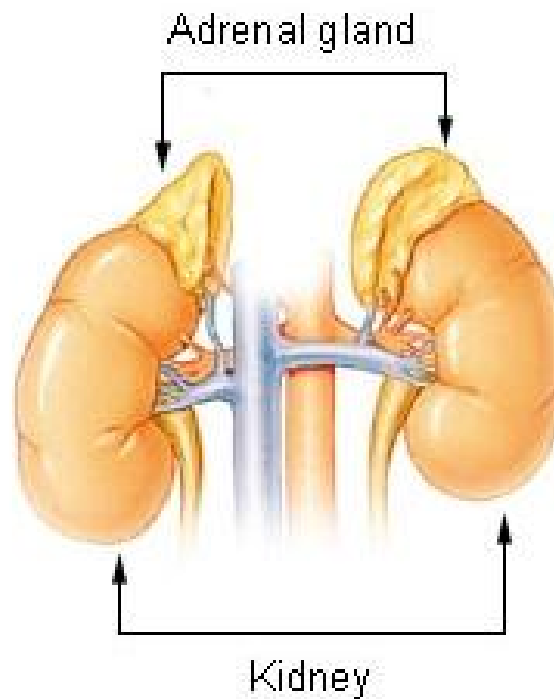


Parathyroid Gland



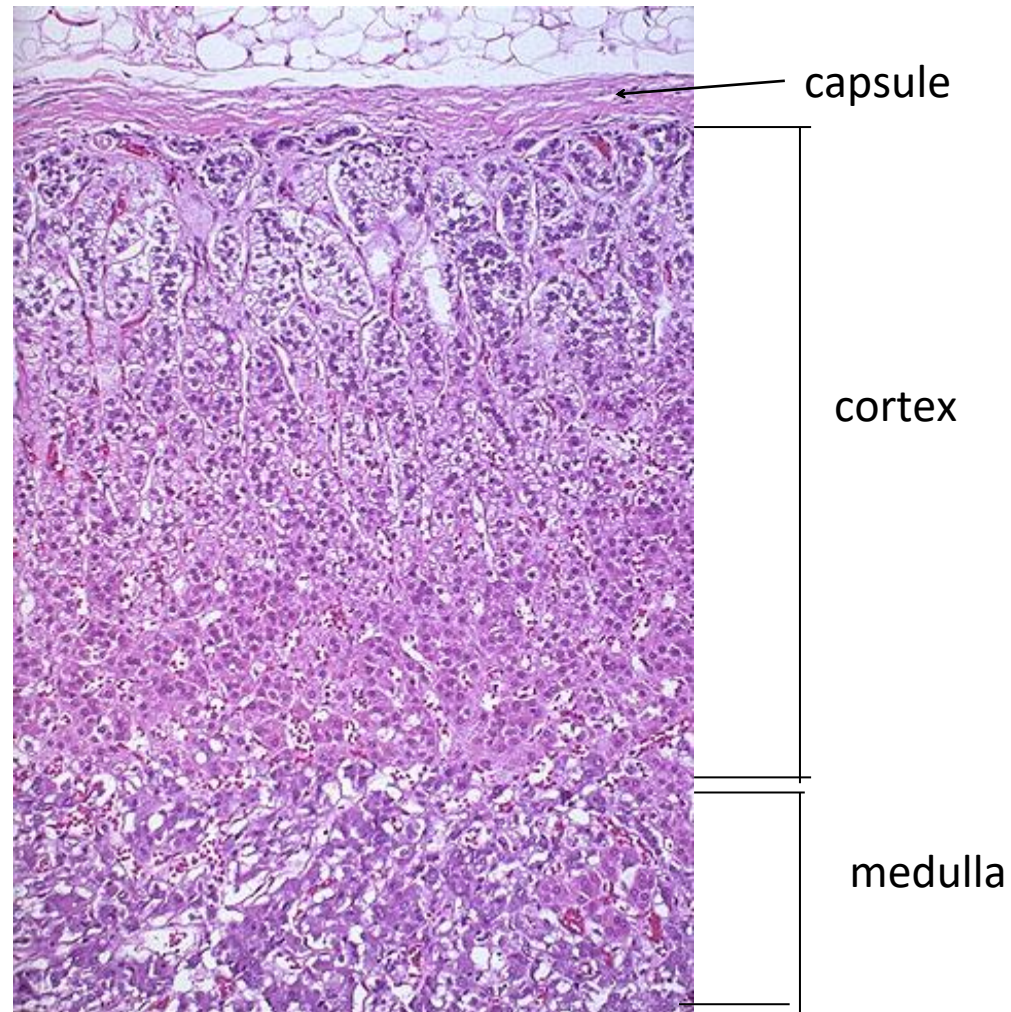


Adrenal Gland (Suprarenal Gland)

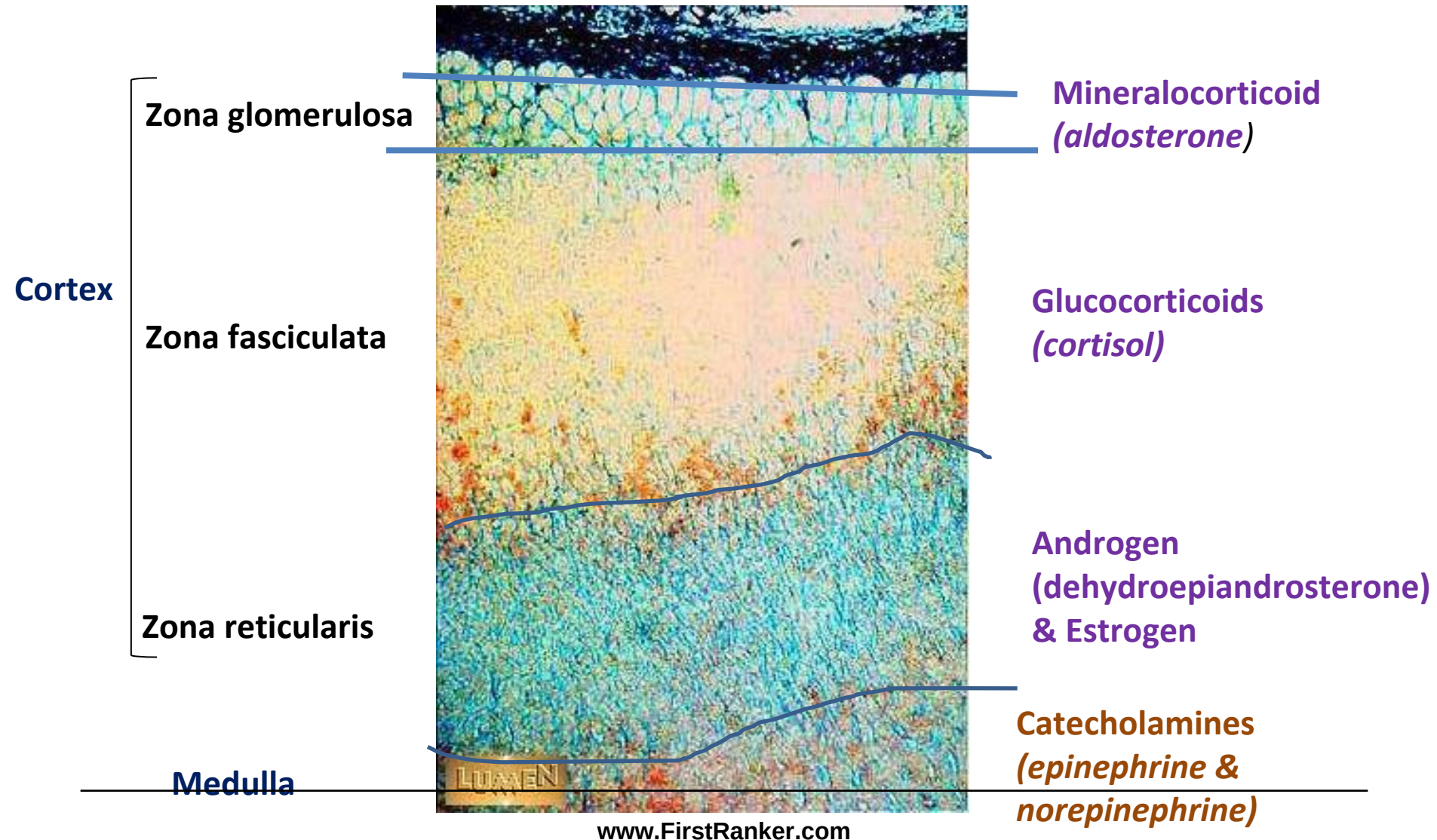


Microscopic structure

- The gland is covered by connective tissue capsule.
- Capsule sends septa inside the gland.
- 2 parts →
- **Cortex**
- **Medulla**



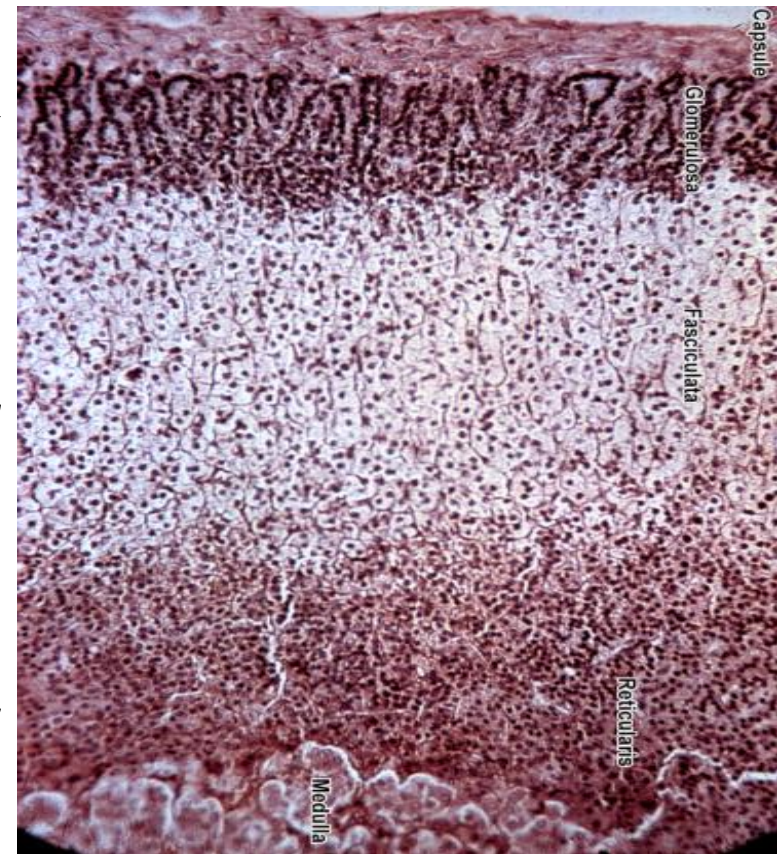
Microscopic structure



Adrenal Cortex

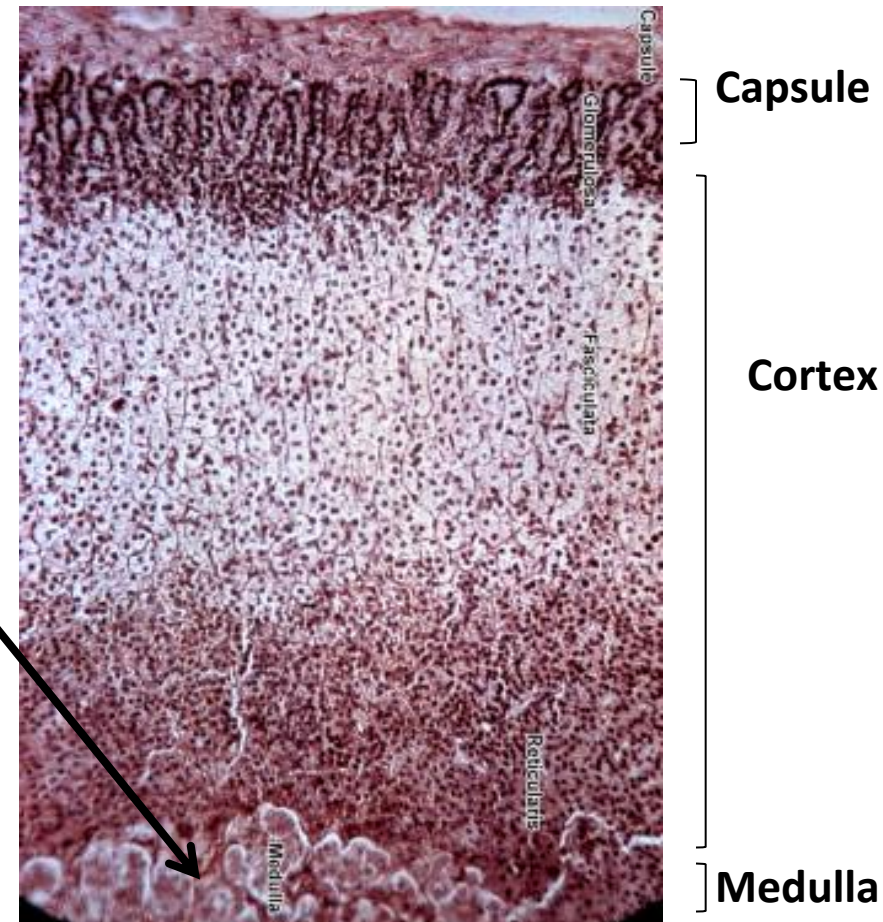
3 layers:

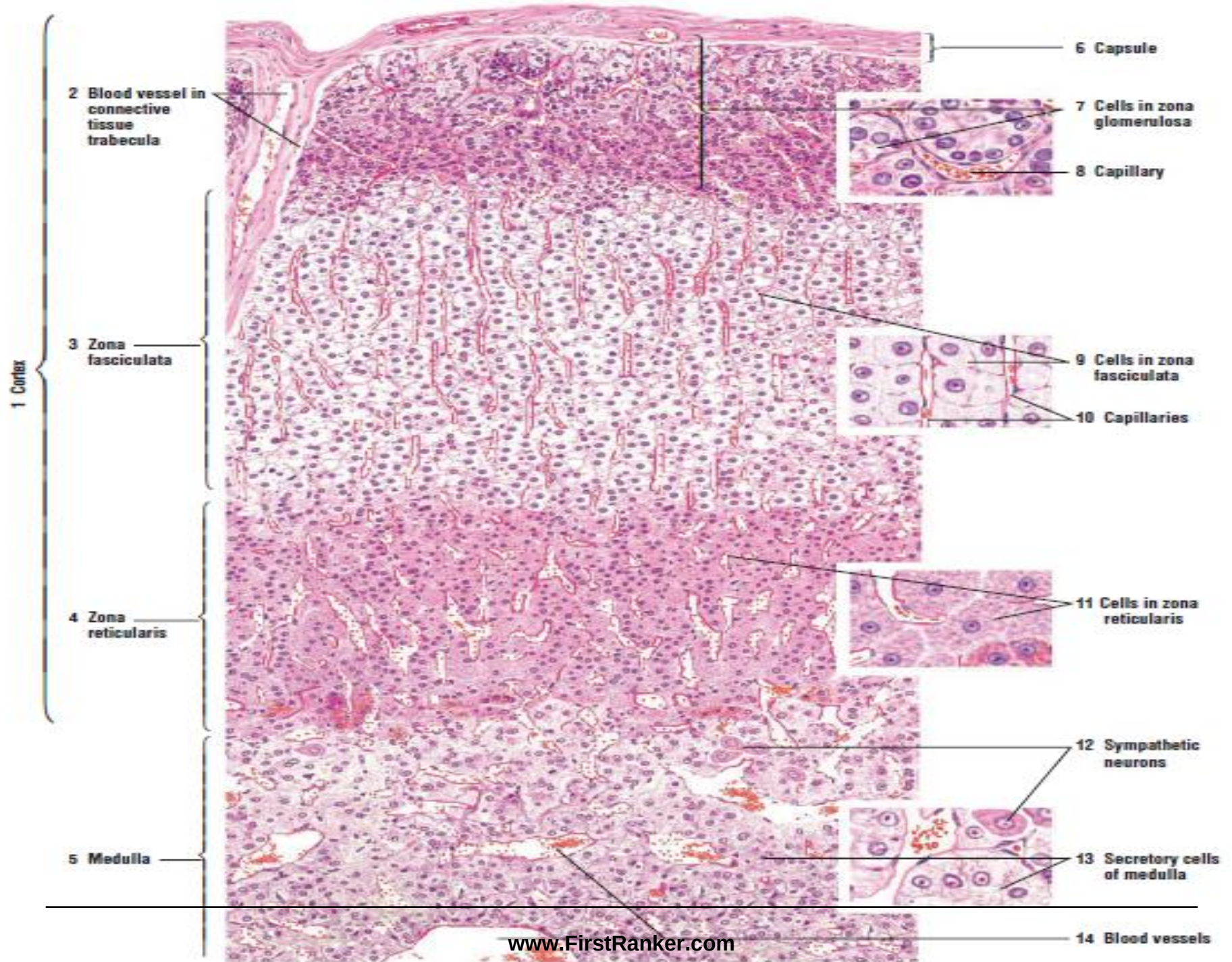
- **Zona Glomerulosa:** cells are arranged as *rounded clusters*. Cells are *columnar* with dark staining nuclei. →
- **Zona Fasciculata:** *thick zone*, large pale staining **polyhedral cells** arranged into *parallel columns*. ↗
- **Zona Reticularis:** small rounded deep staining cells arranged in *branching & anastomosing* cords. ↗



Adrenal Medulla

- Consists of chromaffin cells
- Cells are large, epitheloid & arranged in groups.
- Cells are closely related to sinusoidal capillaries.
- Cytoplasm is light basophilic.
- **Chromaffin reaction—**
- Tissue fixation with potassium dichromate shows fine brown granules in the cells of medulla





SELF-ASSESSMENT

(URINARY SYSTEM)

1. Transitional epithelium is present in:

- a. Renal pelvis
- b. Loop of Henle
- c. Terminal part of urethra
- d. PCT

2. Urothelium does not line:

- a. Collecting ducts
- b. Minor calyx
- c. Ureter
- d. Urinary bladder

3. Which cell type comprises the visceral layer of Bowman capsule?

- a. Endothelial cells
- b. Juxtaglomerular cells
- c. Mesangial cells
- d. Podocytes

4. Which type of epithelium lines the thick ascending limb of the loop of Henle?

- a. Pseudostratified columnar
- b. Simple columnar
- c. Simple cuboidal
- d. Simple squamous

5. Which cell is a modified smooth muscle cell in the wall of afferent arteriole ?

- a. Macula densa cells
- b. Mesangial cells
- c. Podocytes
- d. Juxtaglomerular cells

6. Cortex of the kidney contains the following structures except

- (a) Proximal convoluted tubule (PCT)
- (b) Distal convoluted tubule (DCT)
- (c) Renal corpuscle
- (d) Thin segment of loop of Henle

7. Macula densa is present in

- (a) PCT
- (b) DCT
- (c) afferent arteriole
- (d) efferent arteriole

***8.Components of the Juxtaglomerular apparatus
are all EXCEPT***

- (a)Macula densa
- (b)Extra mesangial cells
- (c)Epithelium of PCT
- (d) Juxtaglomerular cells

- 1.(a). Renal pelvis
- 2.(a). Collecting ducts
- 3.(d). Podocytes
- 4.(c). Simple cuboidal
- 5.(d). Juxtaglomerular cells
- 6.(d). Thin segment of loop of Henle
- 7.(b). DCT
- 8.(c). Epithelium of PCT