



THE ENDOCRINE SYSTEM REVISION



The Pituitary gland

The gland is made up of two lobes:

Anterior lobe

It is highly vascular and stains brightly acidophilic.

It consists of:

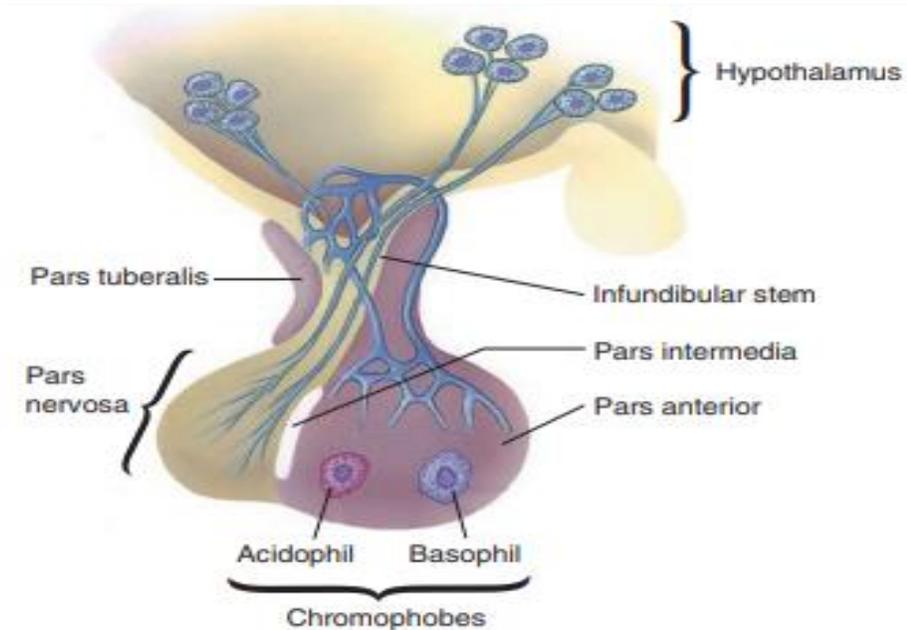
- Pars distalis.
- Pars tuberalis.
- Pars intermedia

Posterior lobe

It is whitish in colour and stains pale.

It consists of:

- Infundibular process (pars nervosa).
- Infundibular stalk (pituitary stalk)





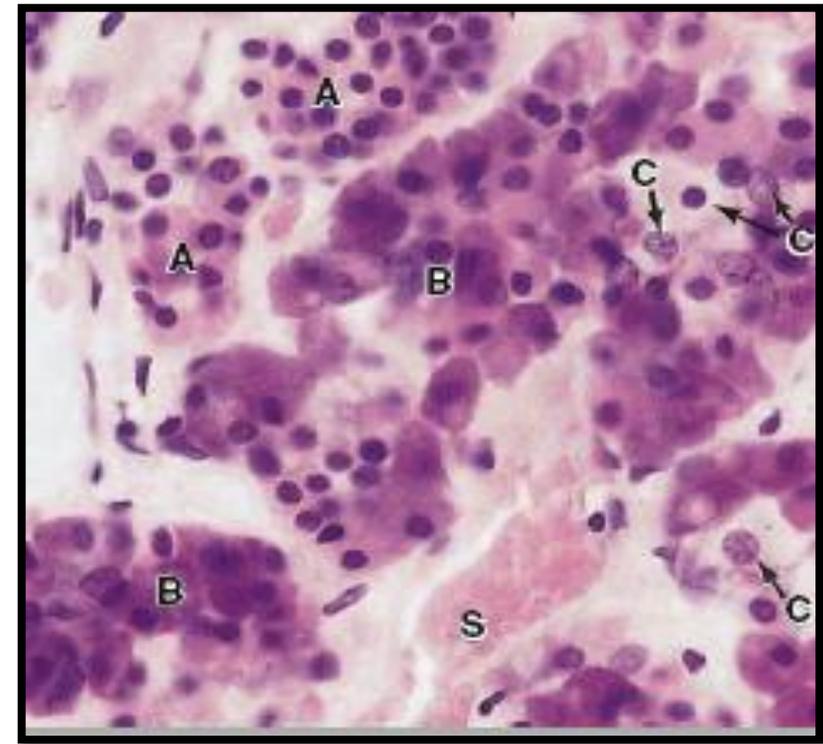
Cells of pars distalis:

They are classified on the basis of their affinity or lack of affinity for dyes of routine staining into:

1. Chromophilic which are differentiated into:

- 1-Acidophilic cells (37%).
- 2-Basophilic cells (11%).

2. Chromophobic they are smaller in size and are lightly stained.



B. Chromophobic cells



i) Acidophilic cells (acidophils or alpha cells):

- They are numerous, appear **large in size** and stain well with **eosin**.
- They are larger in size than chromophobes but smaller than basophils.
- Their granules are **protein** in nature.

Somatotrophs:

They are stained with **orange G** (called **orangophils**).

They secrete the **growth hormone (somatotropin)** which has a role in the growth of long bones.

Mammotrophs (prolactin cells)= Lactotroph cells:

Their granules are stained with **azocarmine** (**carminophils**).

They secrete **prolactin**, which initiates and promotes milk secretion.

- Tumours of somatotrophs:
 - Before puberty → gigantism.
 - After puberty → acromegaly.
- Impaired function of somatotrophs: → dwarfism.



ii) Basophilic cells (basophils or β cells):

<u>Thyrotrophs</u>	<u>Corticotrophs</u>	<u>Gonadotrophs or (FSH-LH cells)</u>
<ul style="list-style-type: none">• They secrete thyrotrophic hormone TSH	<ol style="list-style-type: none">a. ACTHb. Melanocyte stimulating hormone and endorphin.	<ul style="list-style-type: none">➤ follicle stimulating hormone (FSH)➤ luteinizing hormone (LH)



Pars Nervosa

Mention 4 components of Pars Nervosa?

1. Pituicytes: (neuroglia cells)

2. Nerve fibres: (unmyelinated axons of neurosecretory neurons in the hypothalamus)

3. Herring bodies (hyaline material formed of accumulation of neurosecretion)

4. Fenestrated capillaries.

5. Neuroglia cells.

6. Reticular fibres: around the capillaries.

Function of Pars nervosa:

It is the **reservoir** for the neurosecretion, which is formed by the hypothalamus.



The secretion is fractionated into:

Oxytocin

Vasopressin or
antidiuretic hormone

N.B

Destruction of the pituitary stalk or pars nervosa →
diabetes insipidus.



MCQ

1. Mammotrophs secrete which of the following hormones

- a. Growth hormone
- b. Thyroid hormone
- c. Calcitonin
- d. Prolactin
- e. Cortisone

d

2. Destruction of pars nervosa leads to

- a. Addison disease
- b. Cushing disease
- c. Diabetes insipidus
- d. Acromegaly
- e. Dwarfism

c



MCQ

Thyrotrophs primarily secrete:

- a) ACTH
- b) TSH
- c) GH
- d) Oxytocin
- e) Vasopressin

b

The Thyroid gland

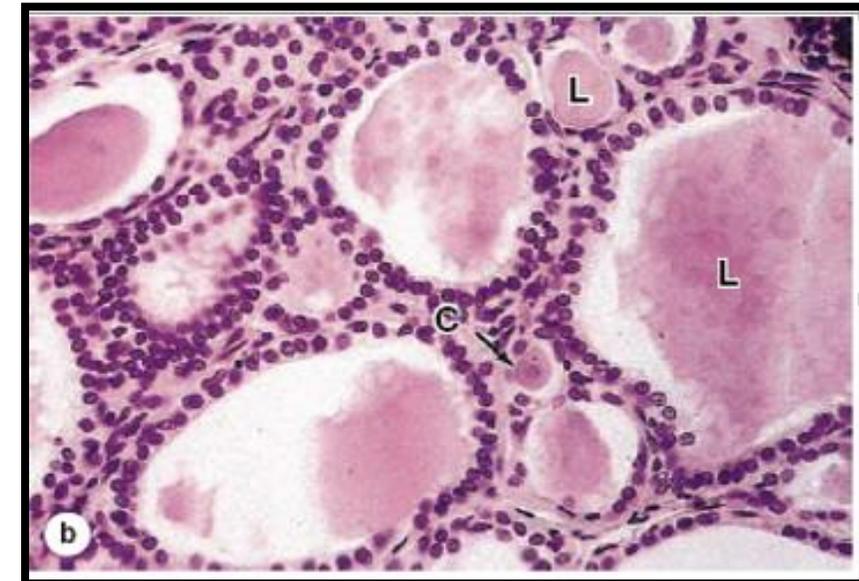
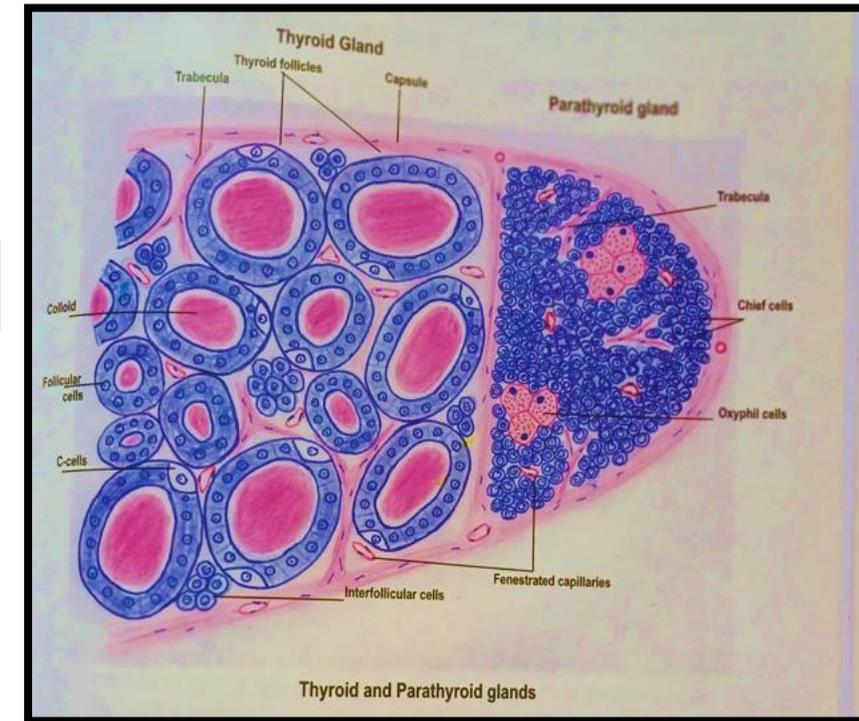
- It consists of thyroid follicles and interfollicular cells.

The thyroid follicles:

- They are the structural and functional unit of the gland.
- They may be round or oval in shape.
- they are lined with cuboidal epithelium.
- The follicles contain colloid in their lumen.

The colloid:

- Is a homogenous acidophilic material formed of thyroglobulin (a glycoprotein containing various iodinated amino acids; T4 & T3).
- It stains intensely with **PAS** and is eosinophilic with **H & E**.



The cells lining the follicles are of two types

The follicular cells

They constitute the majority of the cells (98%).

With LM they are cubical secretory cells with basophilic cytoplasm and central rounded nucleus.

Function: synthesize and release the **thyroid hormone**.

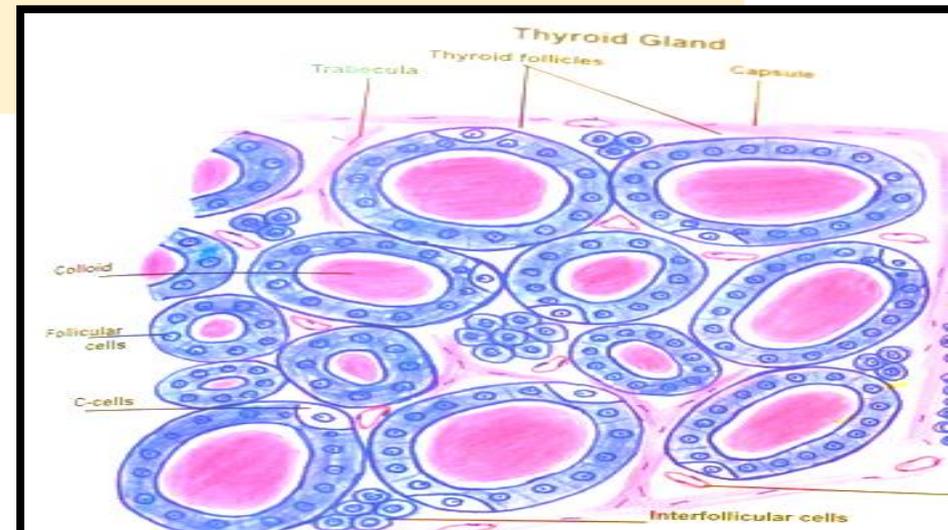
The para-follicular cells (C cells or light cells or clear cells):

They form the minority of the cells (2% of the cells).

- They are larger and paler than the follicular cells.
- They are rounded or oval in shape.
- They do not reach the lumen of the follicle and is enclosed between the follicular cells and the basement membrane surrounding the follicle.

secrete **calcitonin**

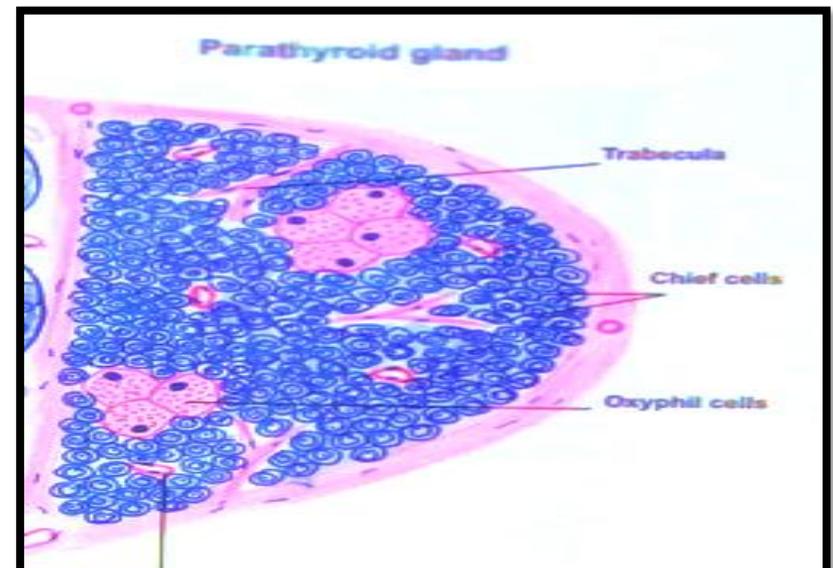
List 2 cells of thyroid gland and mention their hormonal secretion?





The Parathyroid glands

List 2 cells of parathyroid gland and mention their hormonal secretion?



A- Chief cells (principal cells)

- They are the most numerous cells in the gland.
- They are smaller in size than oxyphil cells.

Function:

- They secrete parathormone (parathyroid hormone)

B- Oxyphil cell:

- They are few in number.
- larger in size than the chief cells.

Function:

- secrete calcitonin.

The thyroid follicles contain colloid, which is rich in:

- a. Thyroid-stimulating hormone (TSH)
- b. Thyroglobulin
- c. Parathormone
- d. Calcitonin
- e. Insulin

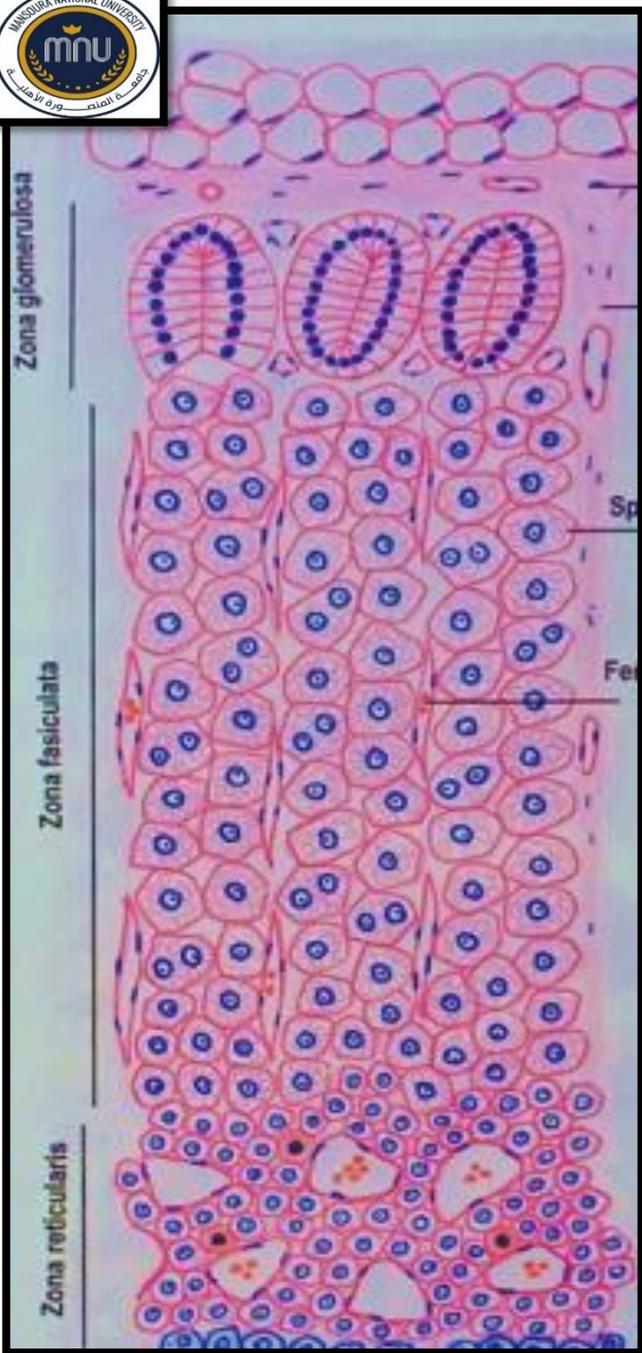
- Correct Answer: b

Chief cells in the parathyroid gland secrete:

- a. Calcitonin
- b. Parathormone
- c. Thyroxine
- d. Insulin
- e. Aldosterone

Correct Answer: b

The Suprarenal cortex



Zona glomerulosa:

The cells are **columnar** and have spherical deeply stained nuclei and few lipid droplets.

Function: The cells secrete mineralo-corticoid (aldosterone)

Zona Fasciculata

- The cells are **polyhedral**, with large vesicular nuclei, binucleated cells are frequently seen.
- Their cytoplasm is vacuolated (due to dissolved lipid droplets) and has a spongy appearance; called **spongiocytes**.

Function: The cells secrete gluco-corticoids (Cortisol and hydro-cortisone).

Zona reticularis

- The cells are small, **polyhedral** with few lipid droplets.
- Some cells are darker (**dark cells**) as they contain lipofuscin pigment.

Function: The cells secrete **sex hormones** and small amounts of **gluco-corticoids**.

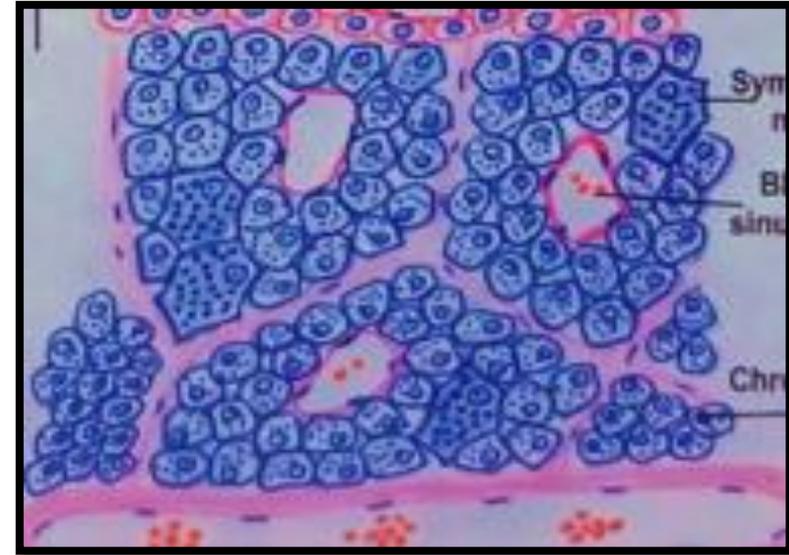
The Suprarenal Medulla

Chromaffin cells

[secretory cells in the medulla]

The cells are large, pale-staining polyhedral cells, with **eccentric nucleus**.

The cytoplasm is **basophilic** containing fine granules of adrenaline and nor-adrenaline.



- Destruction of the suprarenal cortex → Addison's disease.
- Hyperfunction of the suprarenal gland → Cushing syndrome (↑ glucocorticoids).
- → Conn syndrome (↑ aldosterone).



The Pancreas

- It performs both exocrine and endocrine functions.

Islets of langerhans

Definition: non capsulated masses of endocrine cells scattered in the pancreatic lobules especially at the tail region.

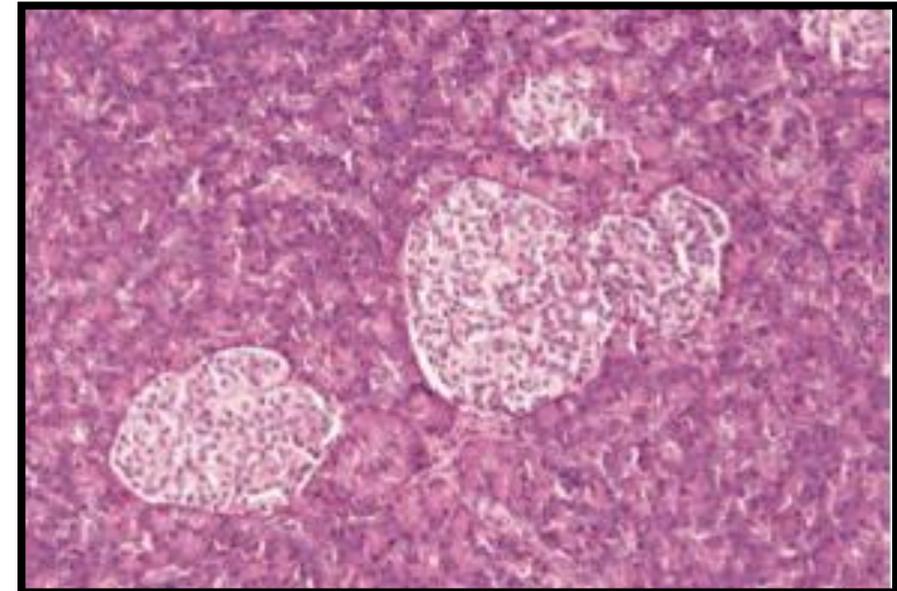
Number: about $\frac{1}{4}$ - $\frac{3}{4}$ million (in human).

Structure:

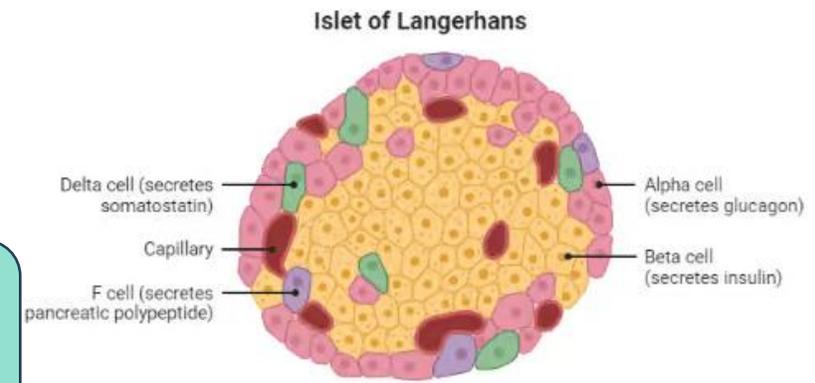
In H. & E. stained sections they appear as lighter non capsulated areas surrounded by darker acini.

Differentiation of the islet cells depends on:

- a. Special stains.
- b. E/M features.
- c. Immunohistochemical techniques.



The endocrine cells forming the islets of Langerhans are:



List 4 cells forming islets of Langerhans and mention their hormonal secretion?

A (α) cells	B (β) cells	D (δ) cells	F or (PP) cells
Can be stained by immunohistochemical technique using a primary antibody against glucagon hormone.	Can be stained by immunohistochemical technique using a primary antibody against insulin hormone.		
<u>Function:</u> Secretion of glucagon	<u>Function:</u> Secretion of insulin	<u>Function:</u> Secretion of somatostatin	<u>Function:</u> Secrete pancreatic polypeptide hormone.

What is the largest zone in the adrenal cortex?

- a. Zona glomerulosa
- b. Zona fasciculata
- c. Zona reticularis
- d. Chromaffin cells
- e. Capsule

Correct Answer: b

Which cells in the adrenal medulla secrete adrenaline and noradrenaline?

- a. Chromaffin cells
- b. Spongiocytes
- c. Ganglion cells
- d. Delta cells
- e. Beta cells

Correct Answer: a

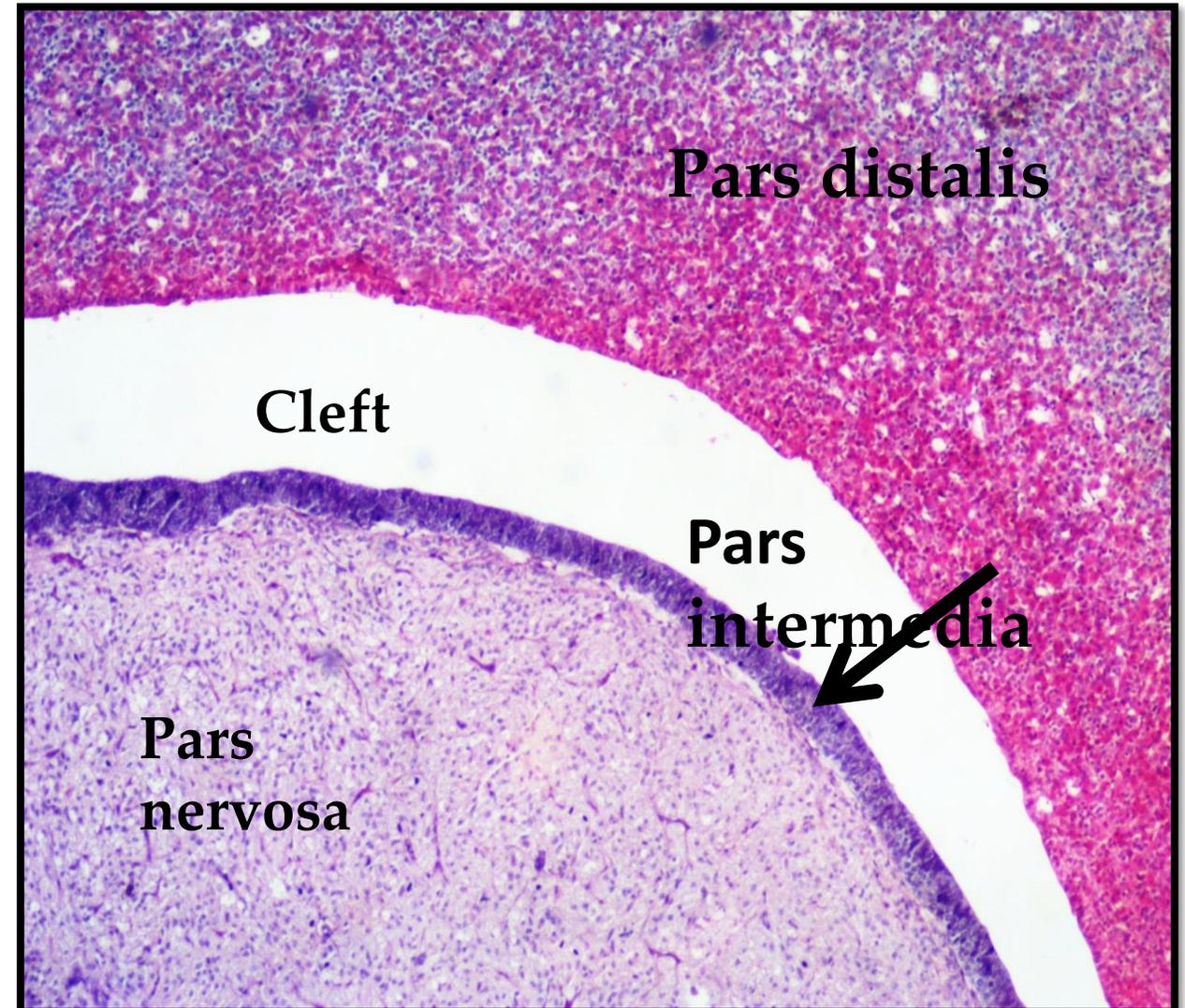


Histology Practical Revision



Pituitary gland

- **Pars distalis** (Acidophilic anterior lobe) and **pars nervosa** (pale posterior lobe) separated by **cleft**.
- **Pars intermedia** is a narrow strip of short basophilic cords of cells over **pars nervosa**.

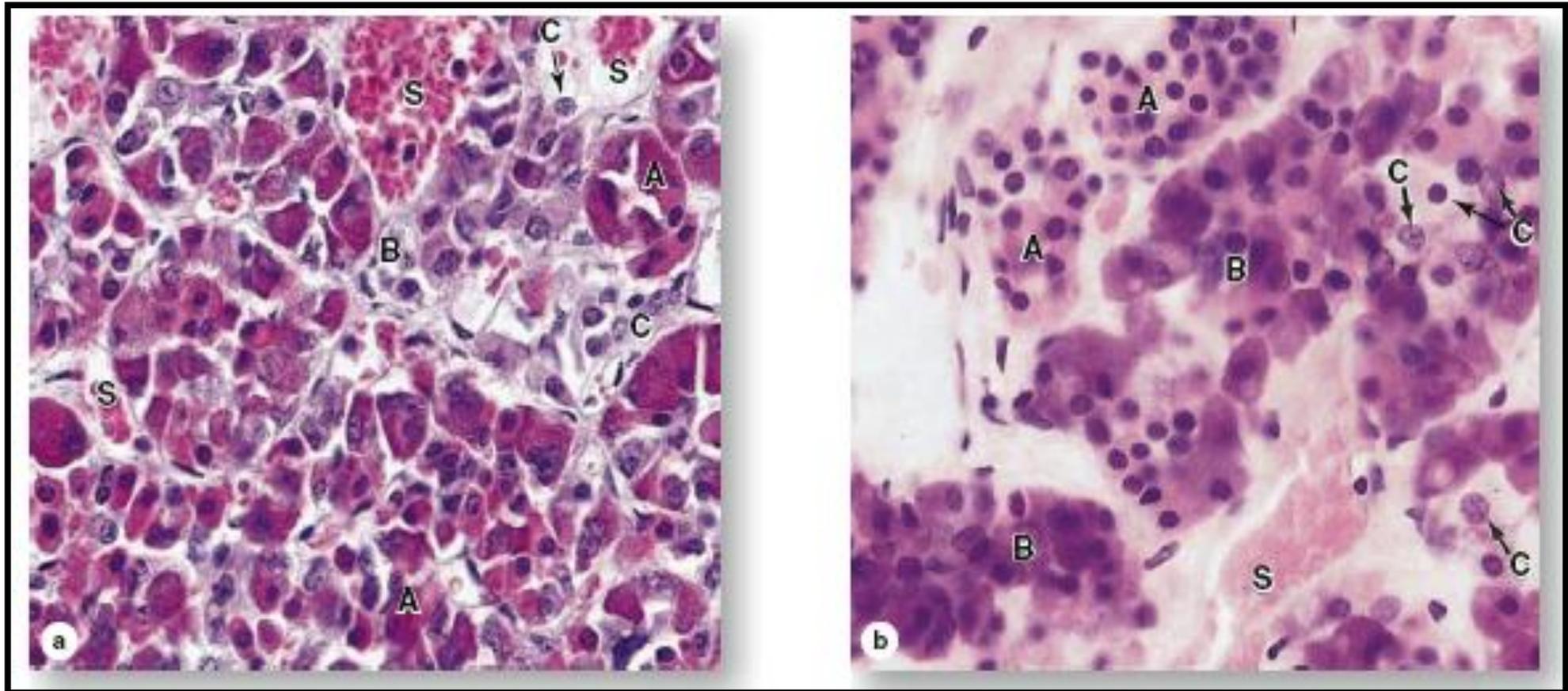




Pars distalis

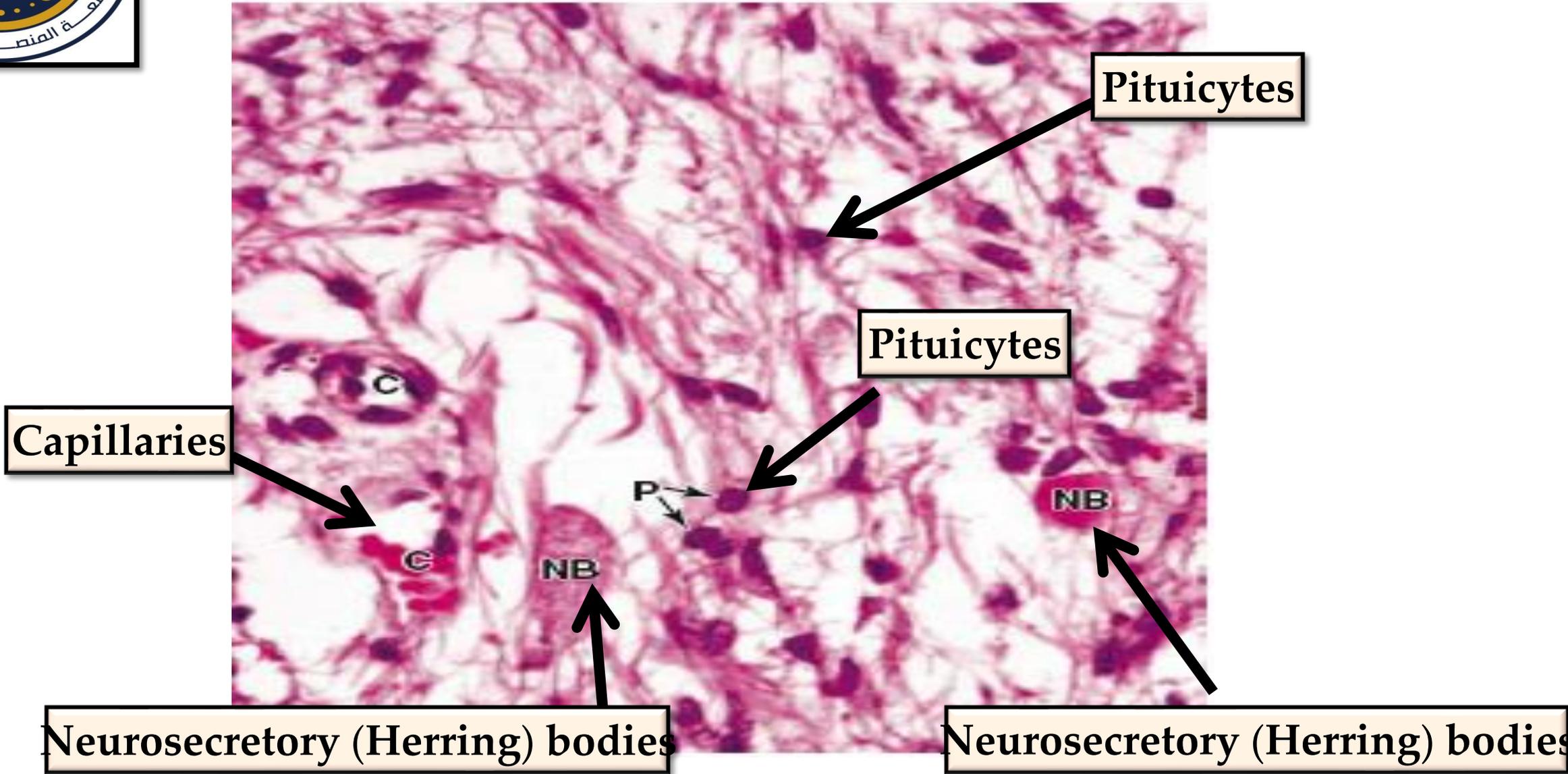
Pars distalis is subdivided into acidophils (A), basophils (B) and chromophobes (C)

(C)



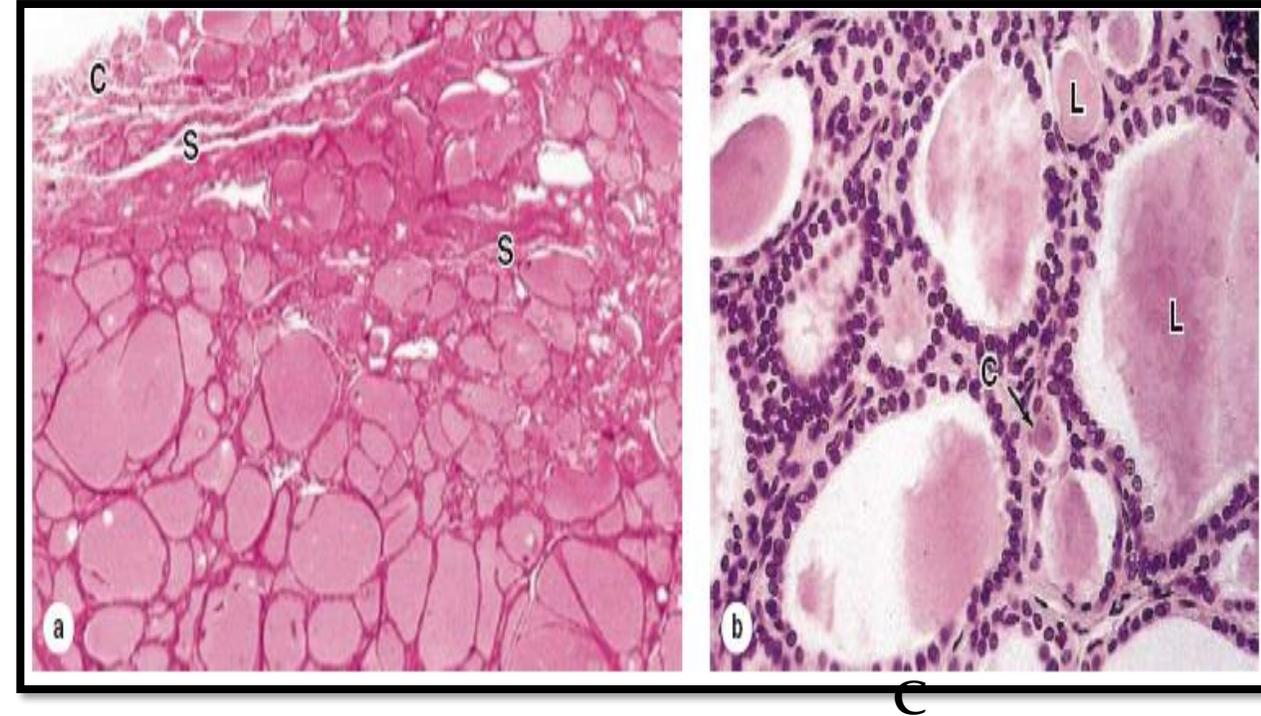
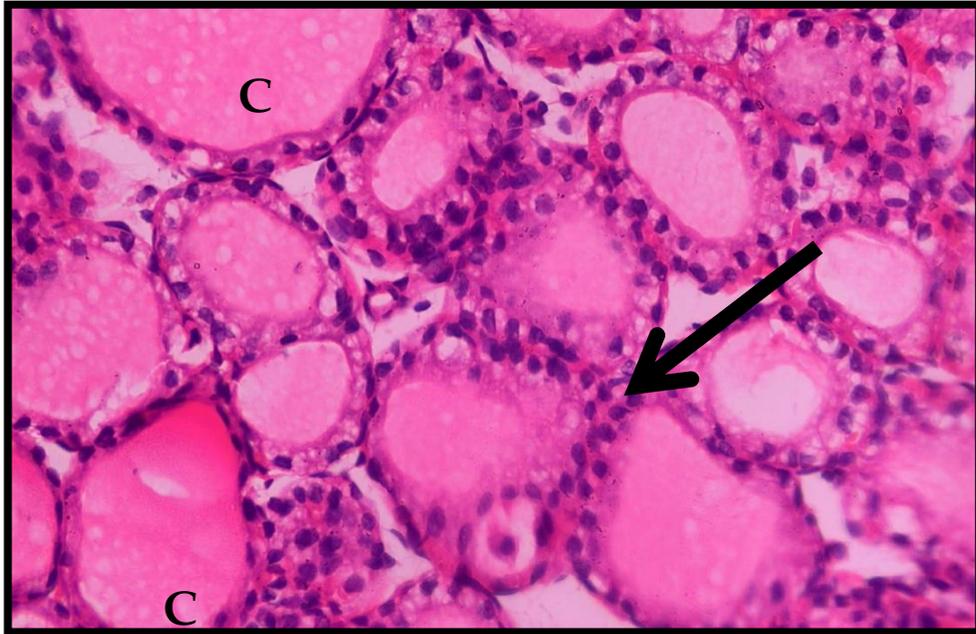


Pars nervosa





Thyroid gland

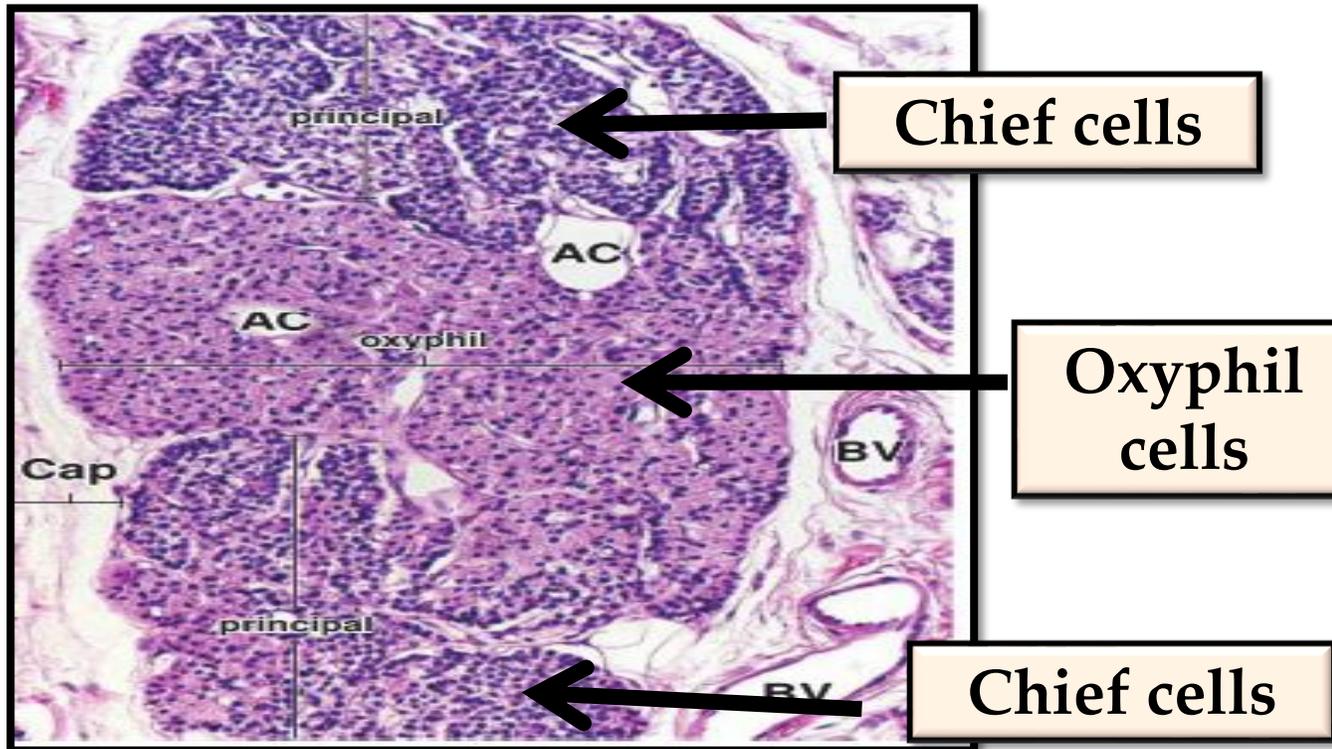


- It consists of thyroid follicles which are variable in size and separated by loose connective tissue septa.
- Higher magnification showing the thyroid follicles lined by **cuboidal basophilic cells (follicular cells)**.
- The follicles contain homogenous acidophilic **colloid**.



Thyroid and parathyroid gland

- **Thyroid gland** formed of thyroid follicles full of colloid.
- **Parathyroid gland** formed of basophilic mass surrounded by thin capsule.



Thyroid gland

Parathyroid gland

Chief cells

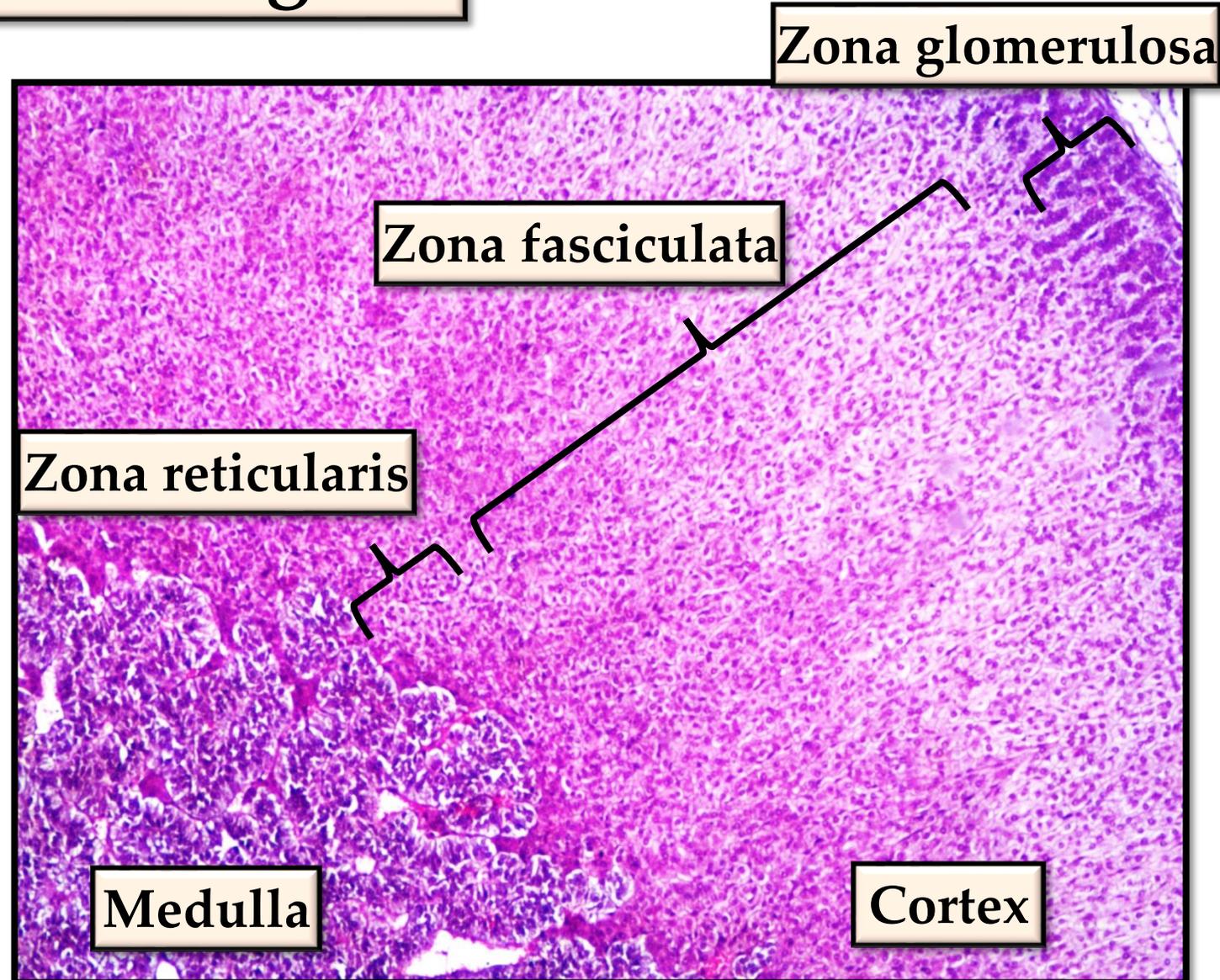
Oxyphil cells

Chief cells



Suprarenal gland

- It is differentiated into outer thick pale acidophilic cortex and a thin inner basophilic medulla
- The cortex shows 3 zones
 - ❑ Zona glomerulosa
 - ❑ Zona fasciculata
 - ❑ Zona reticularis.

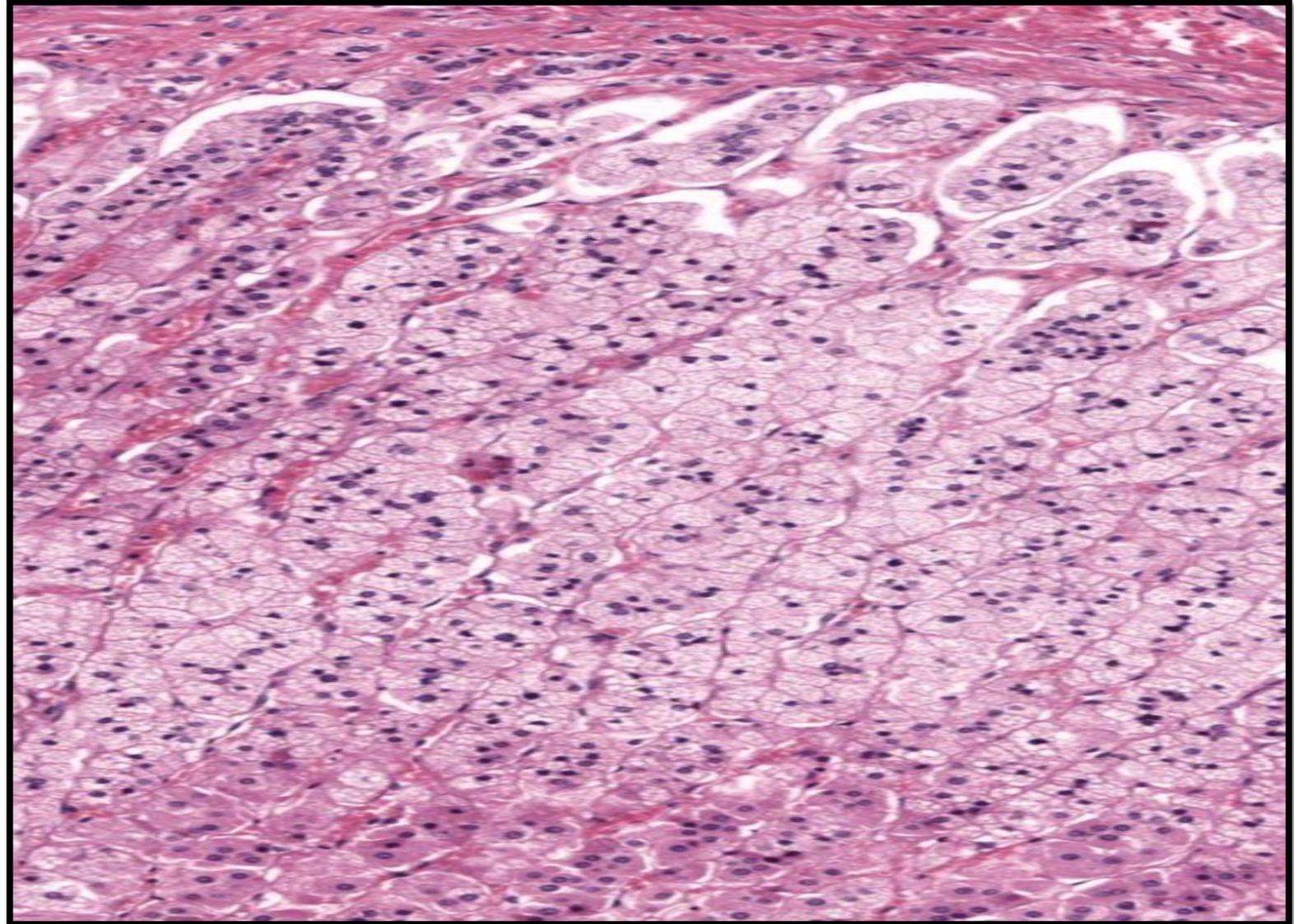


Suprarenal Cortex

Zona glomerulosa

Zona fasciculata

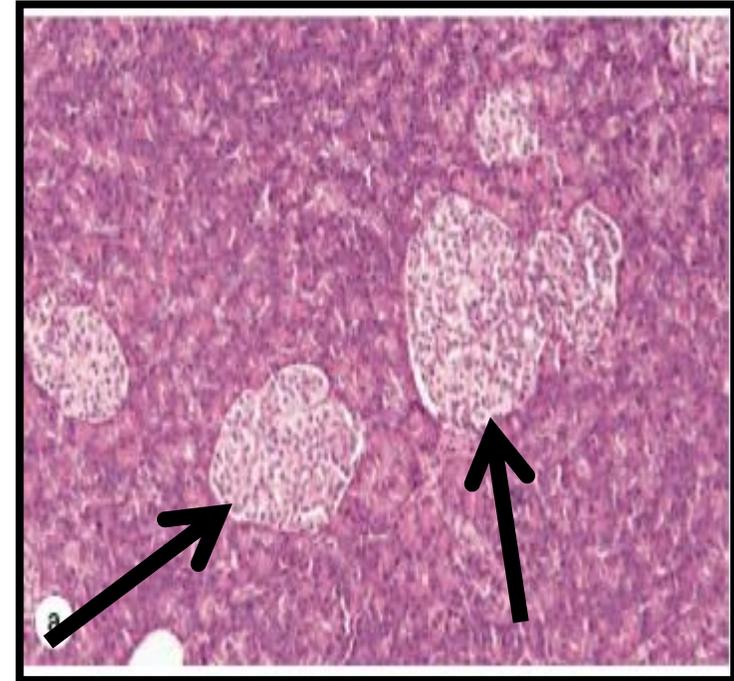
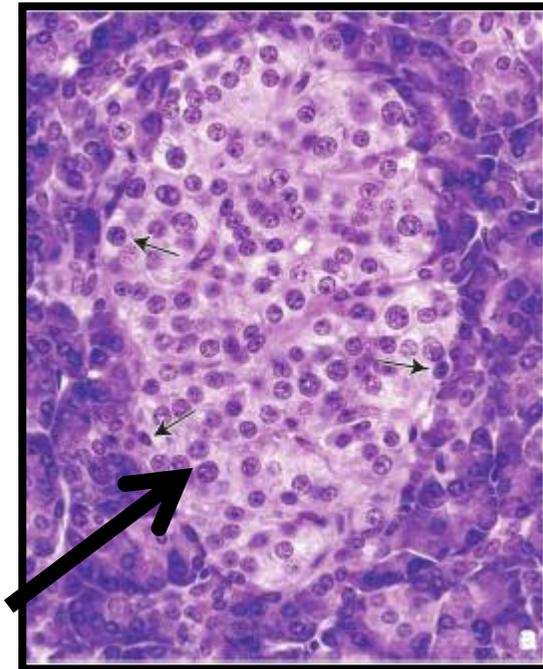
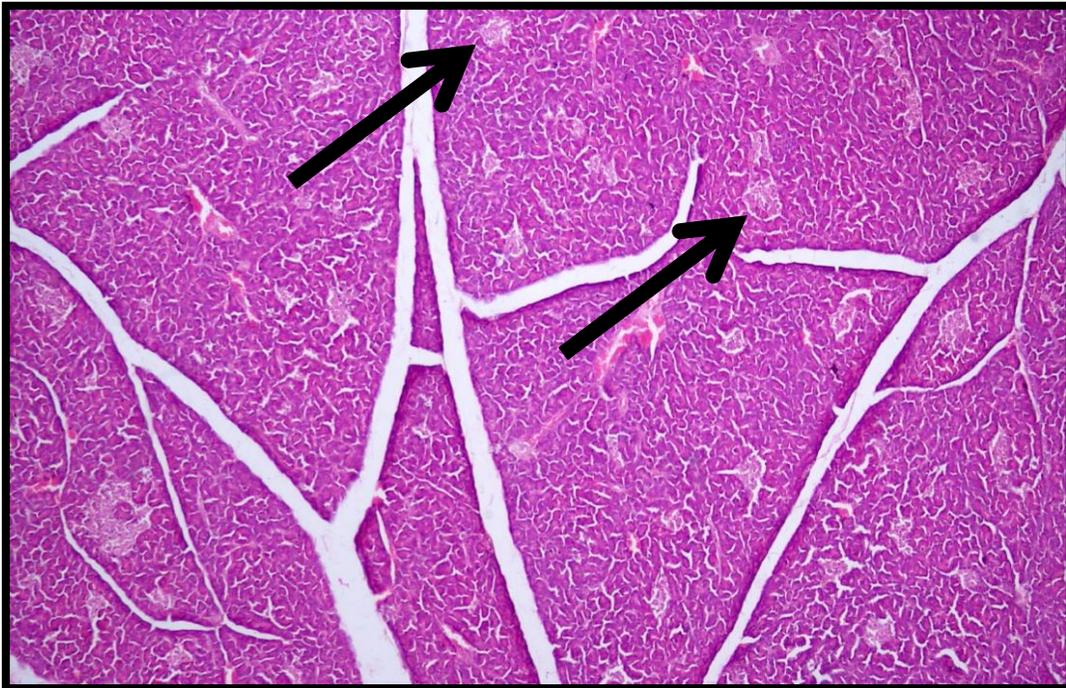
Zona reticularis





Endocrine part of the pancreas

Islets of langerhans are non capsulated masses of endocrine cells scattered in the pancreatic lobules especially at the tail region.





*Thank
you*