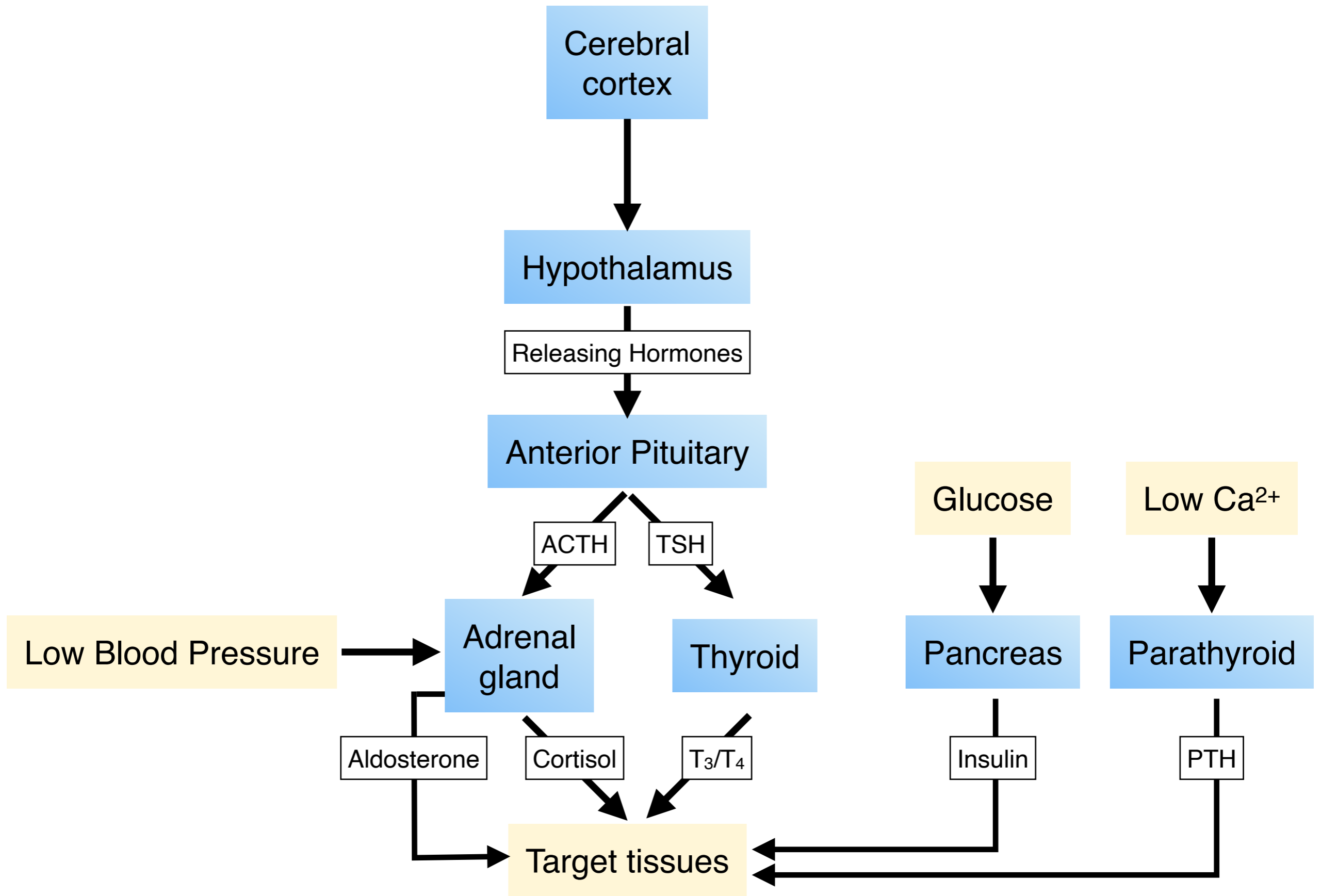


Endocrine System

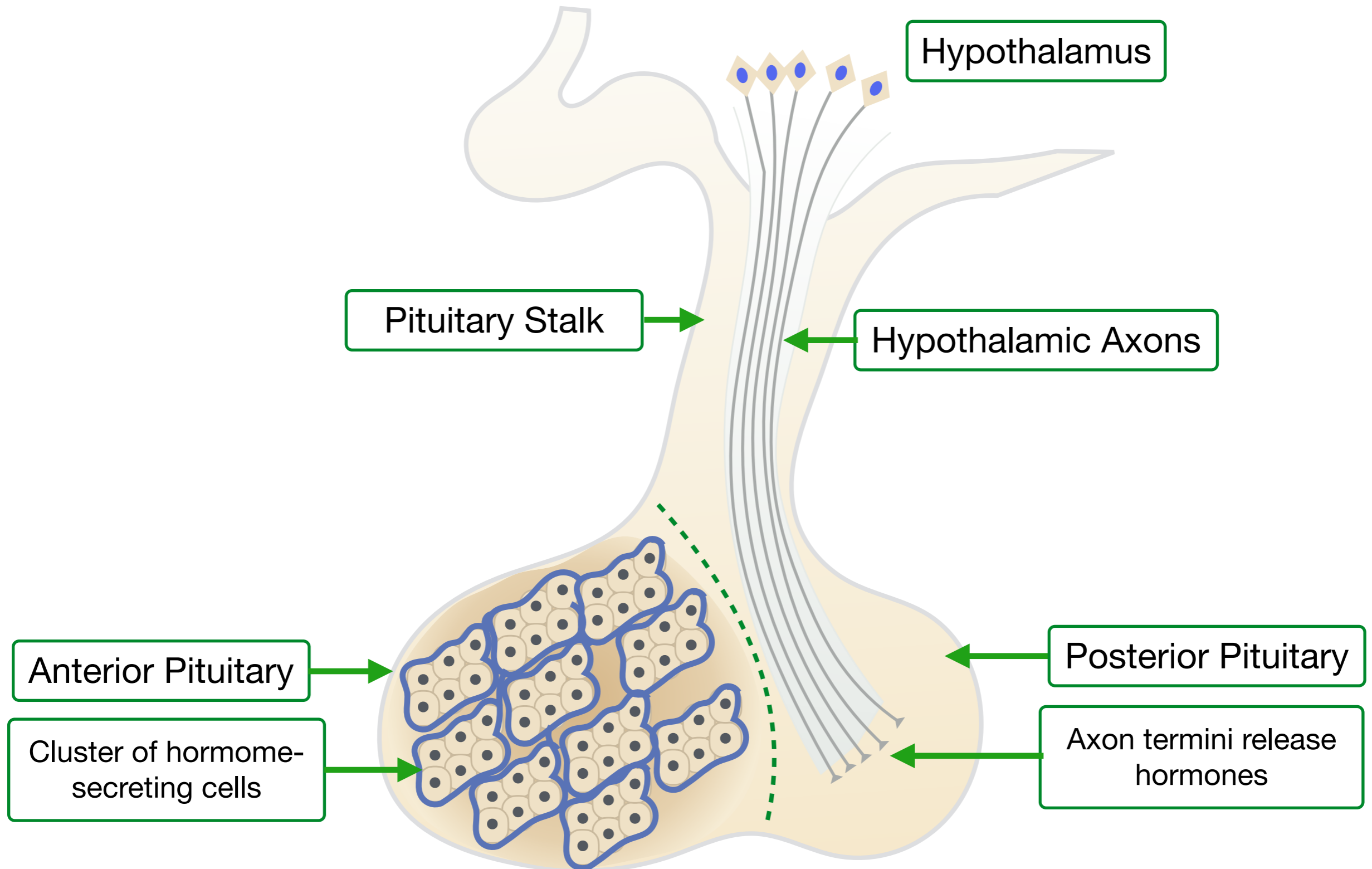
What we'll talk about...

- Hypothalamus and Pituitary Gland
- Adrenal Gland
- Thyroid Gland
- Parathyroid Gland
- Endocrine Pancreas



Pituitary Gland

The pituitary contains distinct anterior and posterior regions and interfaces with the hypothalamus.



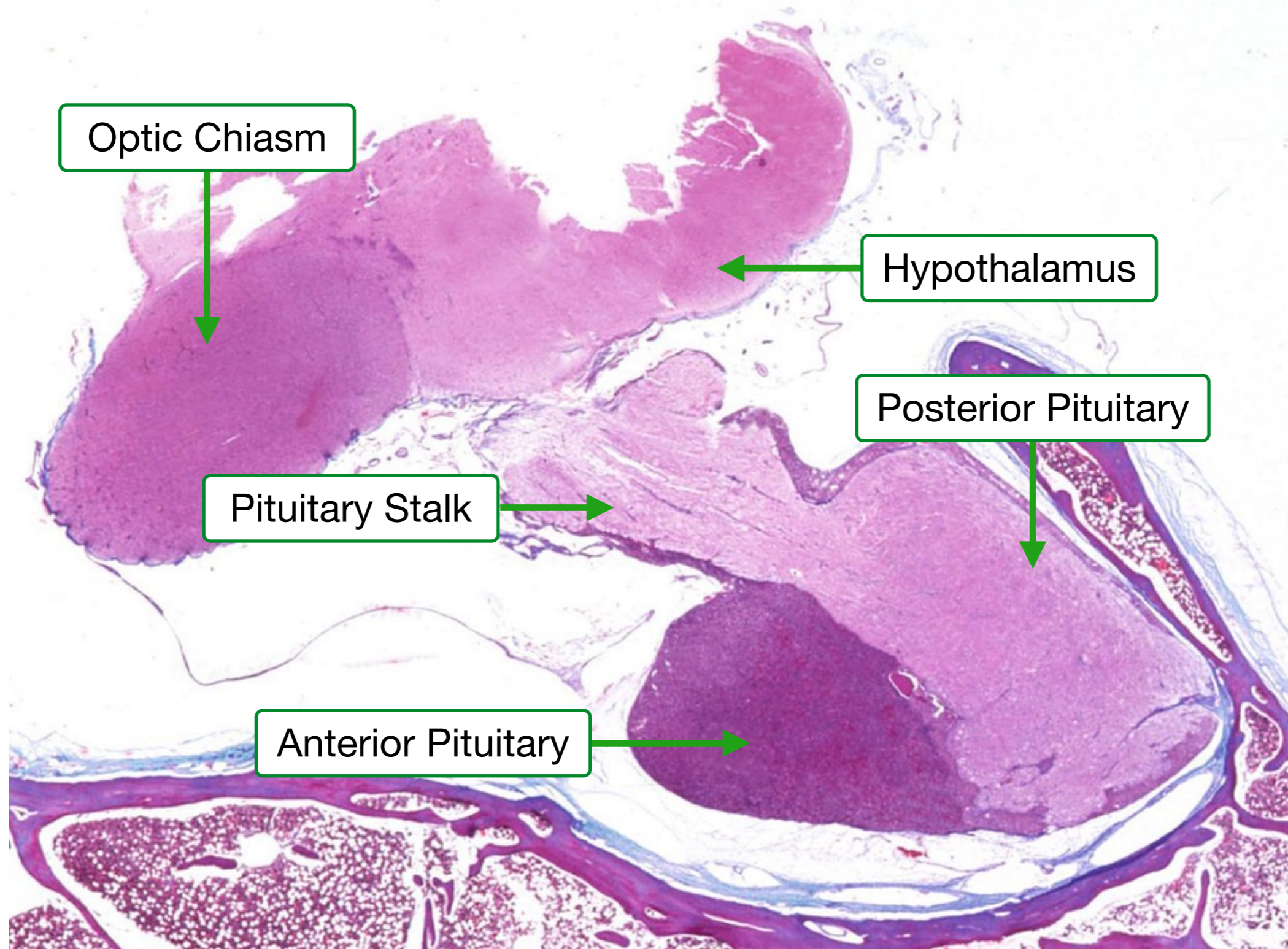
The anterior pituitary contains different cells that produce different unique hormones.

- Adrenocorticotrophic Hormone (ACTH) - Corticotrophs
- Thyroid-Stimulating Hormone (TSH) - Thyrotrophs
- Growth Hormone (GH) - Somatotrophs
- Prolactin - Mammotrophs
- Leutenizing Hormone (LH) - Gonadotrophs
- Follicle-Stimulating Hormone (FSH) - Gonadotrophs

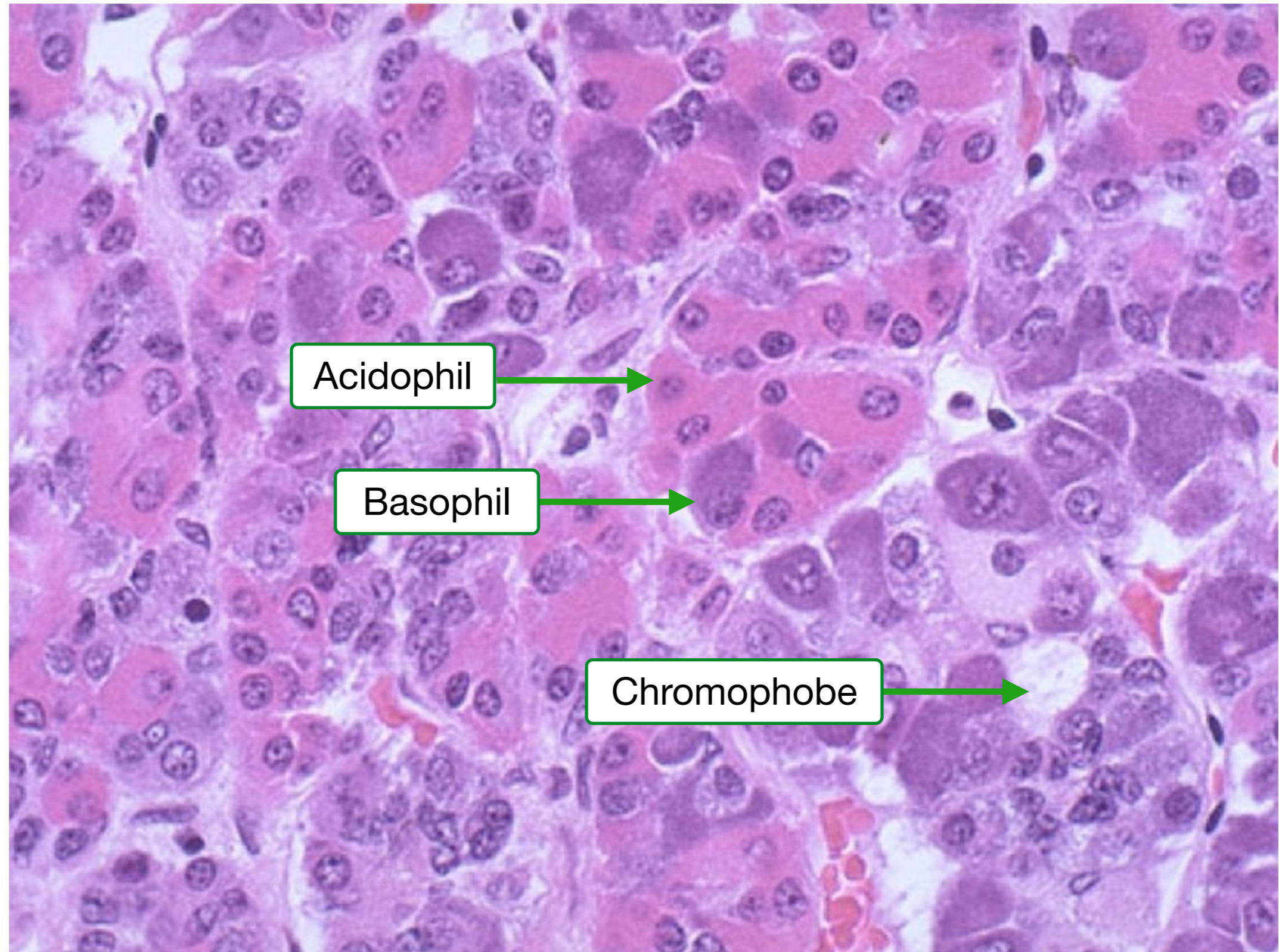
Hypothalamic neurons release oxytocin or vasopressin in the posterior pituitary.

- Oxytocin - induce uterine contraction and ejection of milk from mammary glands
- Vasopressin - increase water absorption in collecting ducts

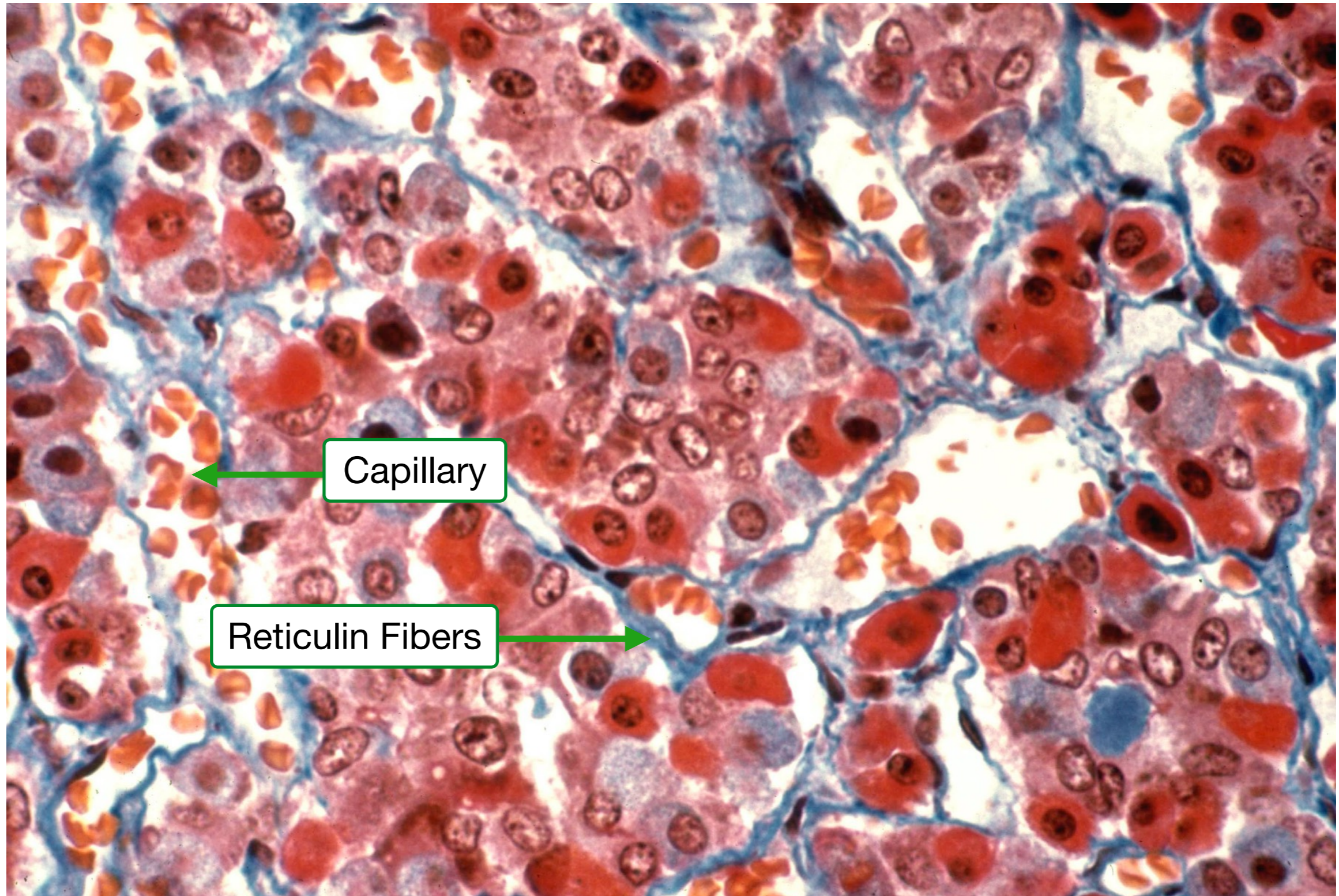
The anterior pituitary is highly cellular while the posterior pituitary connects to the hypothalamus.



H&E stain reveals a mix of acidophils, basophils, and chromophobes in the anterior pituitary.



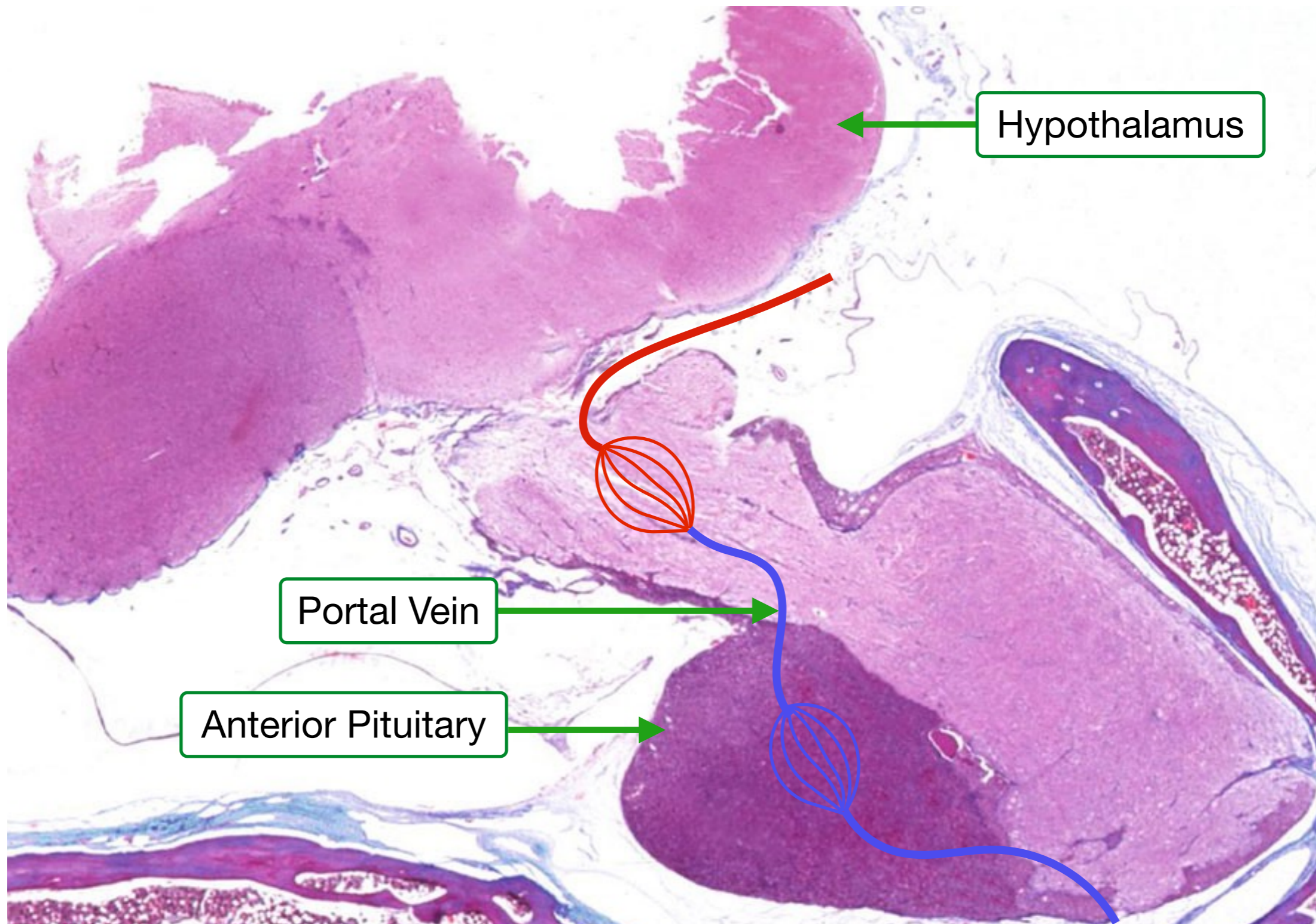
Reticulin fibers organize cells into clusters in the anterior pituitary.



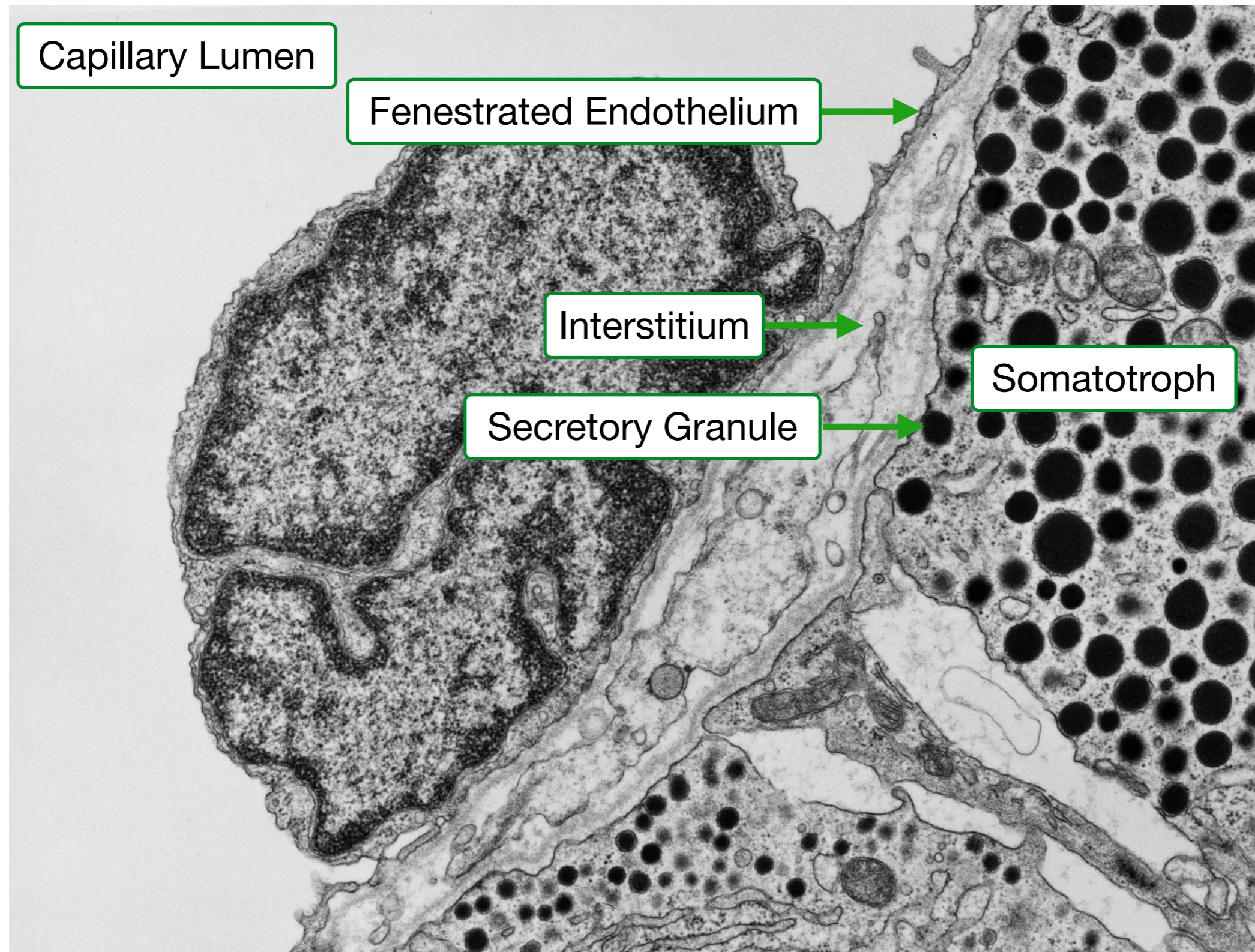
Releasing hormones trigger secretion of specific hormones by cells in the anterior pituitary.

- Corticotropin Releasing Hormone (CRH) -> ACTH
- Thyrotropin Releasing Hormone (TRH) -> TSH
- Growth Hormone Releasing Hormone (GHRH) -> GH
- Gonadotropin Releasing Hormone -> FSH and LH

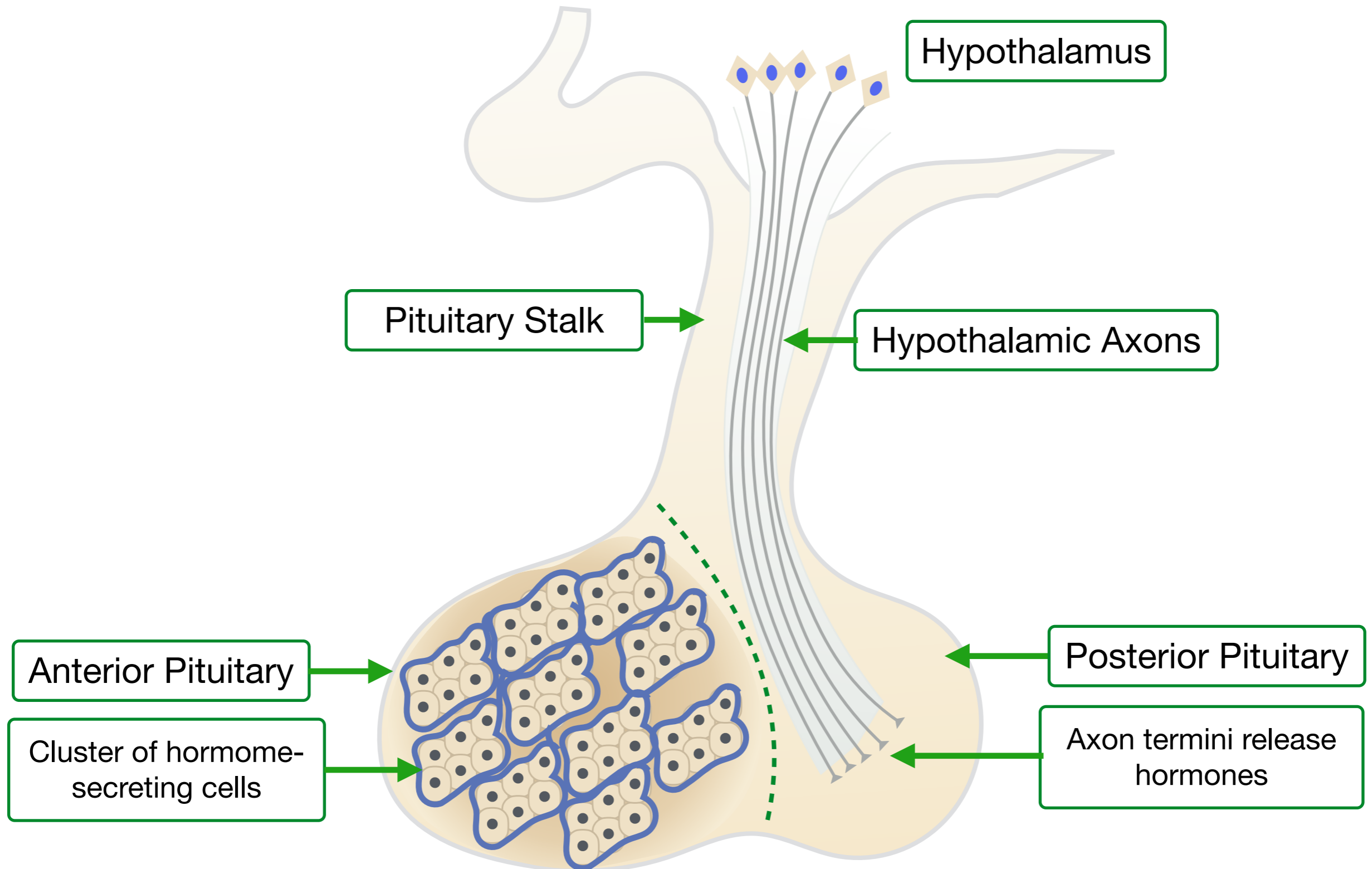
The hypothalamus produces releasing hormones which move through the portal vein to the anterior pituitary.



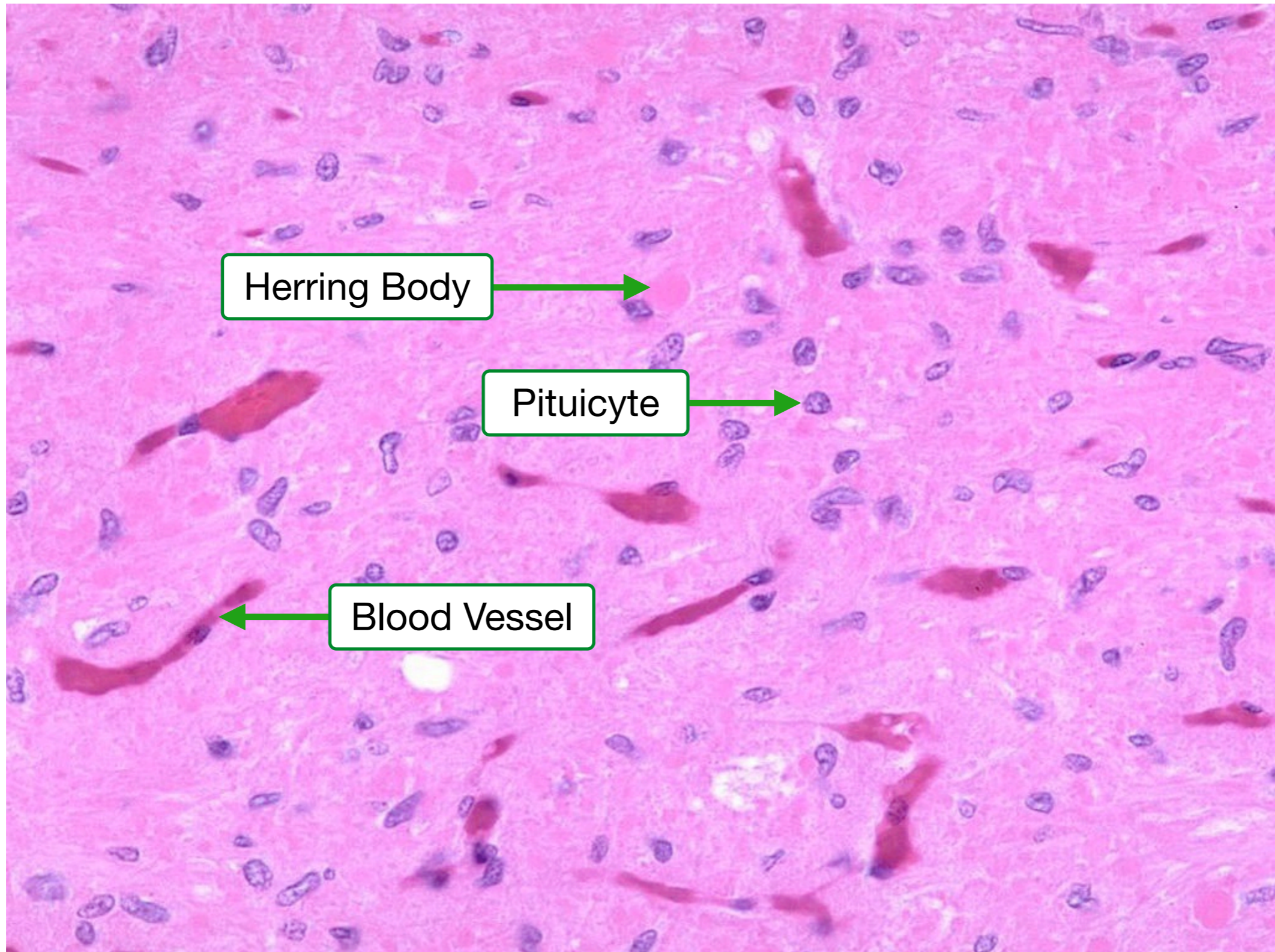
Cells in the anterior pituitary store hormones in granules and



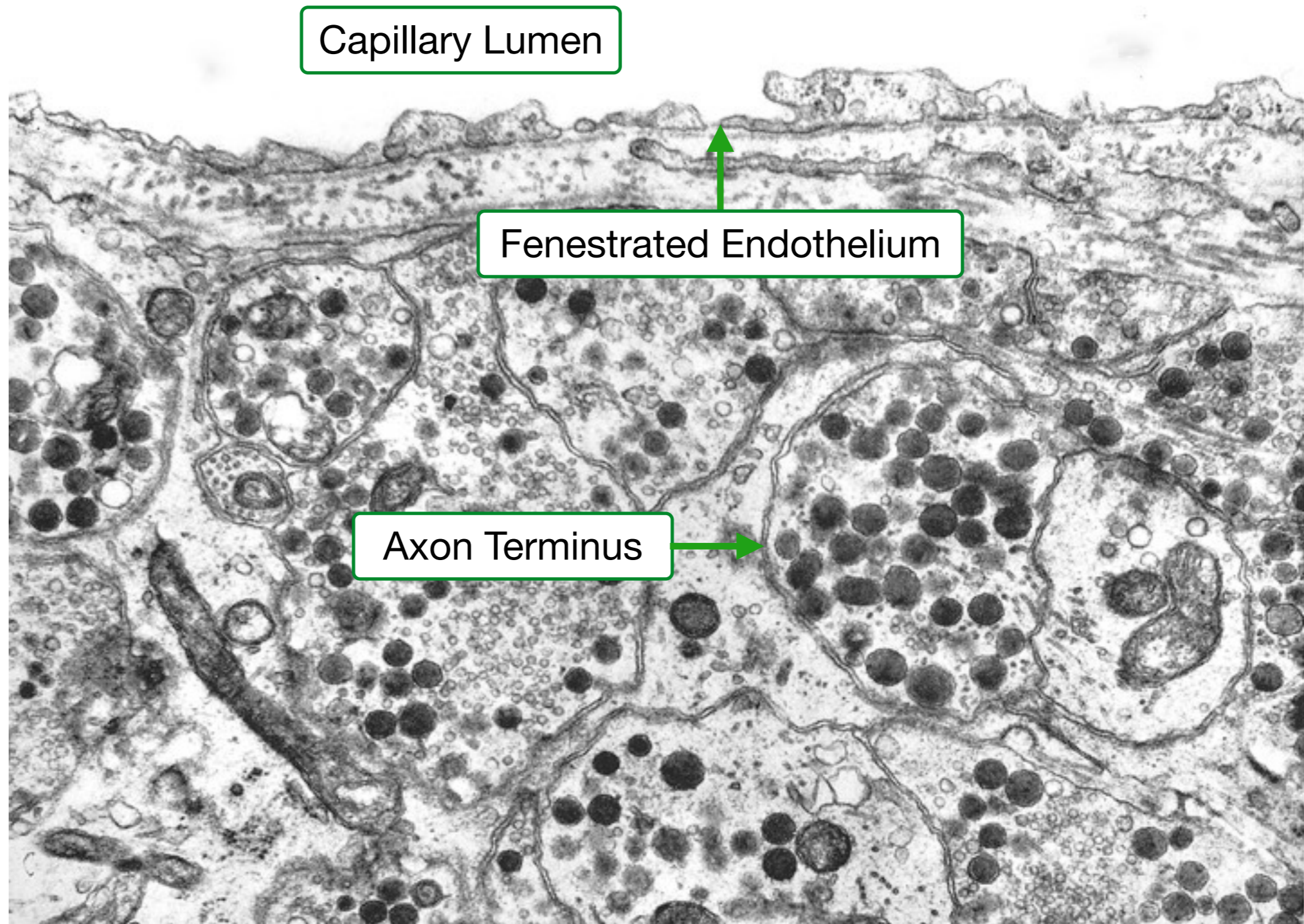
The posterior pituitary contains the axons of neurons whose cell bodies reside in the hypothalamus.



Pituicytes are support cells in the posterior pituitary.

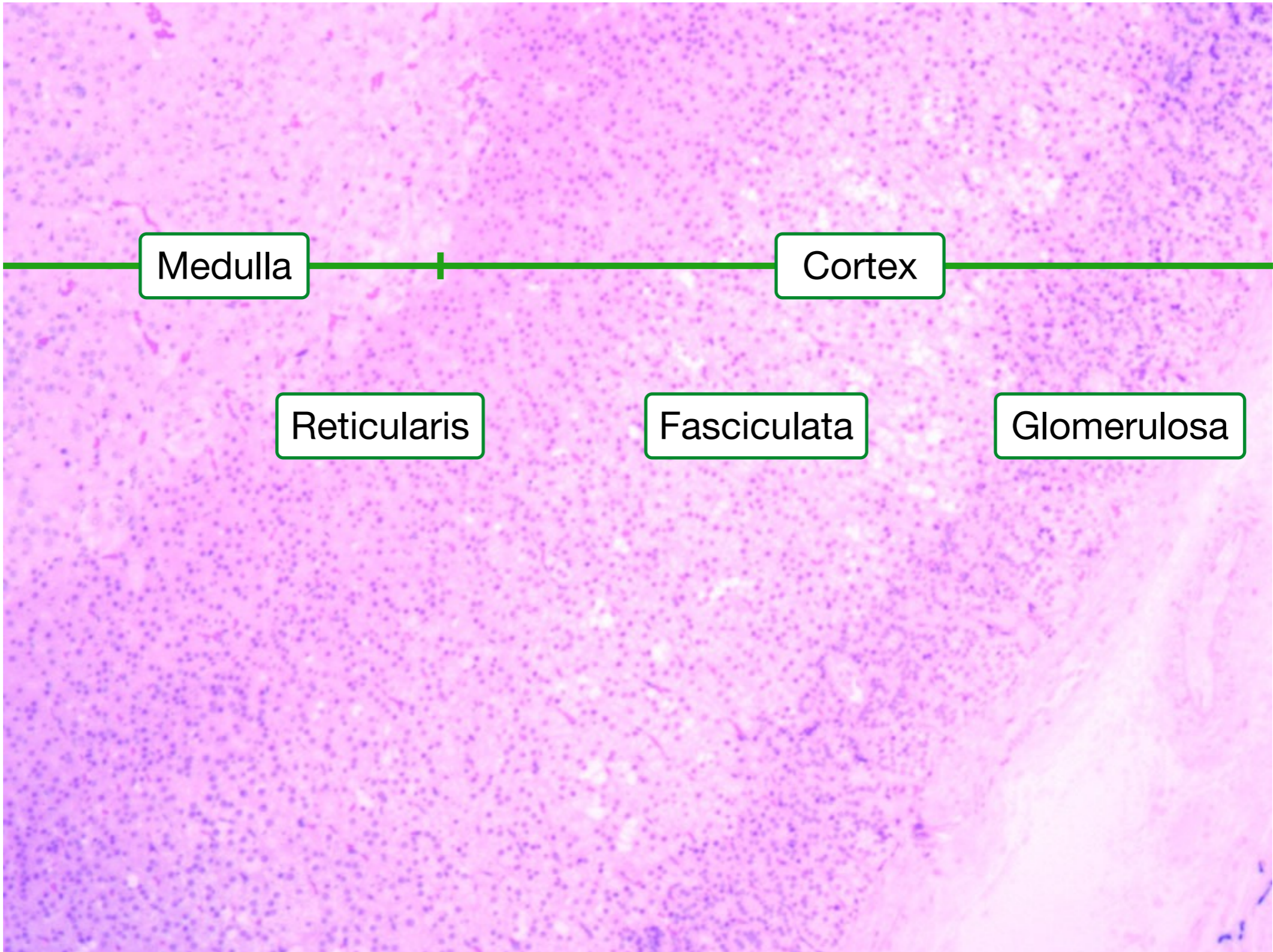


Hormones released in the posterior pituitary diffuse across a fenestrated endothelium.

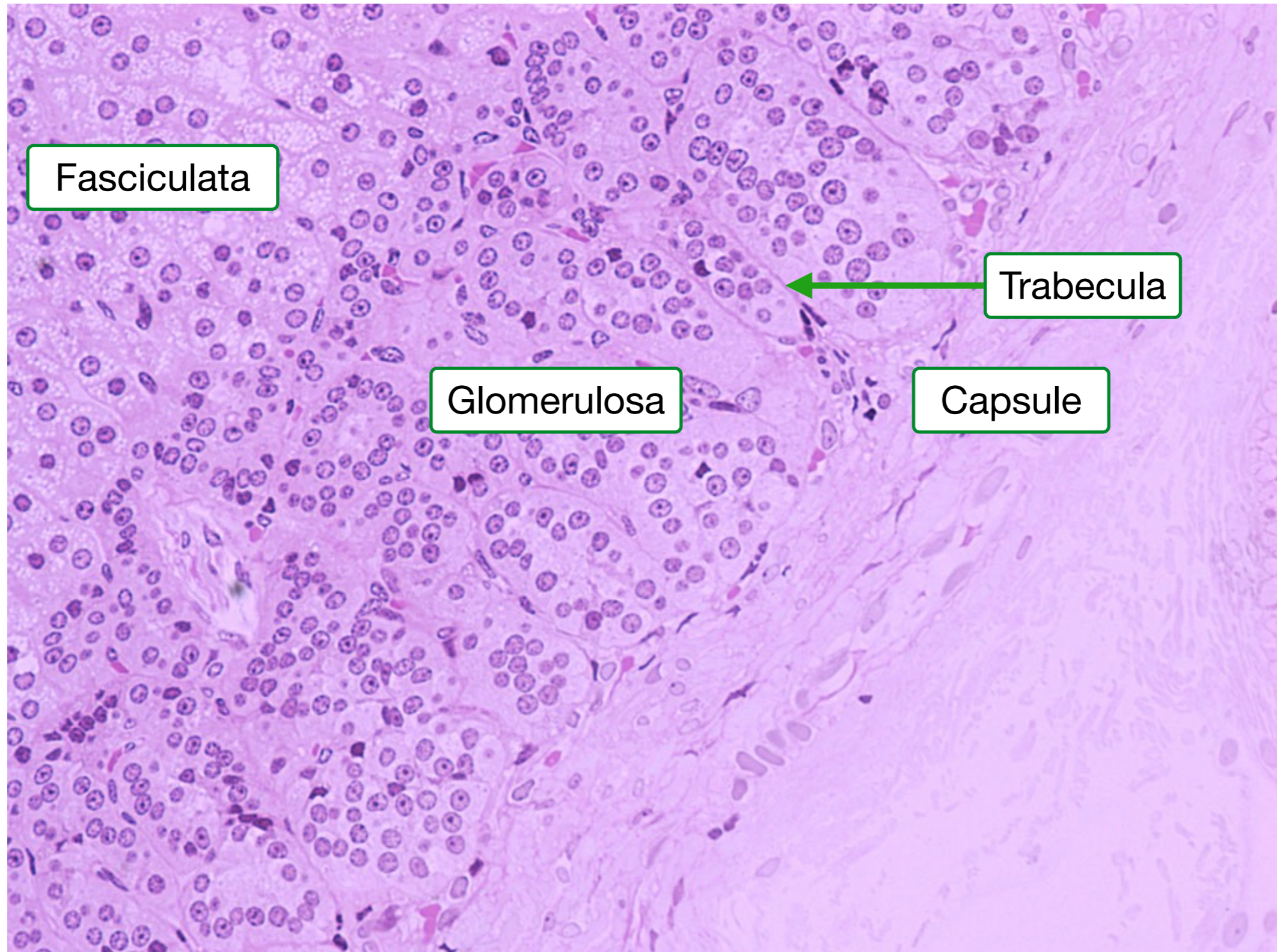


Adrenal Glands

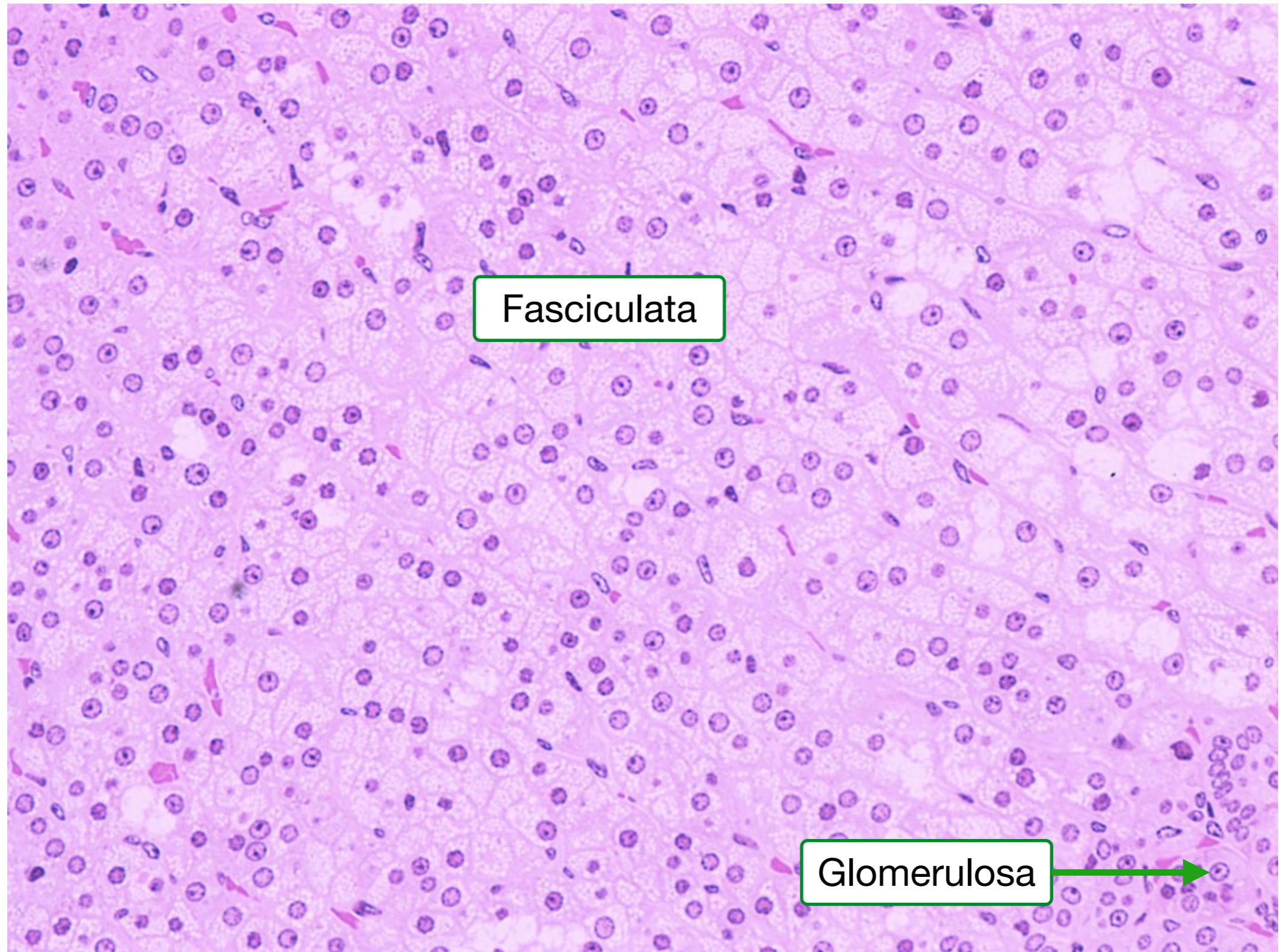
The adrenal gland is composed of glomerulosa, fasciculata, reticularis and medulla.



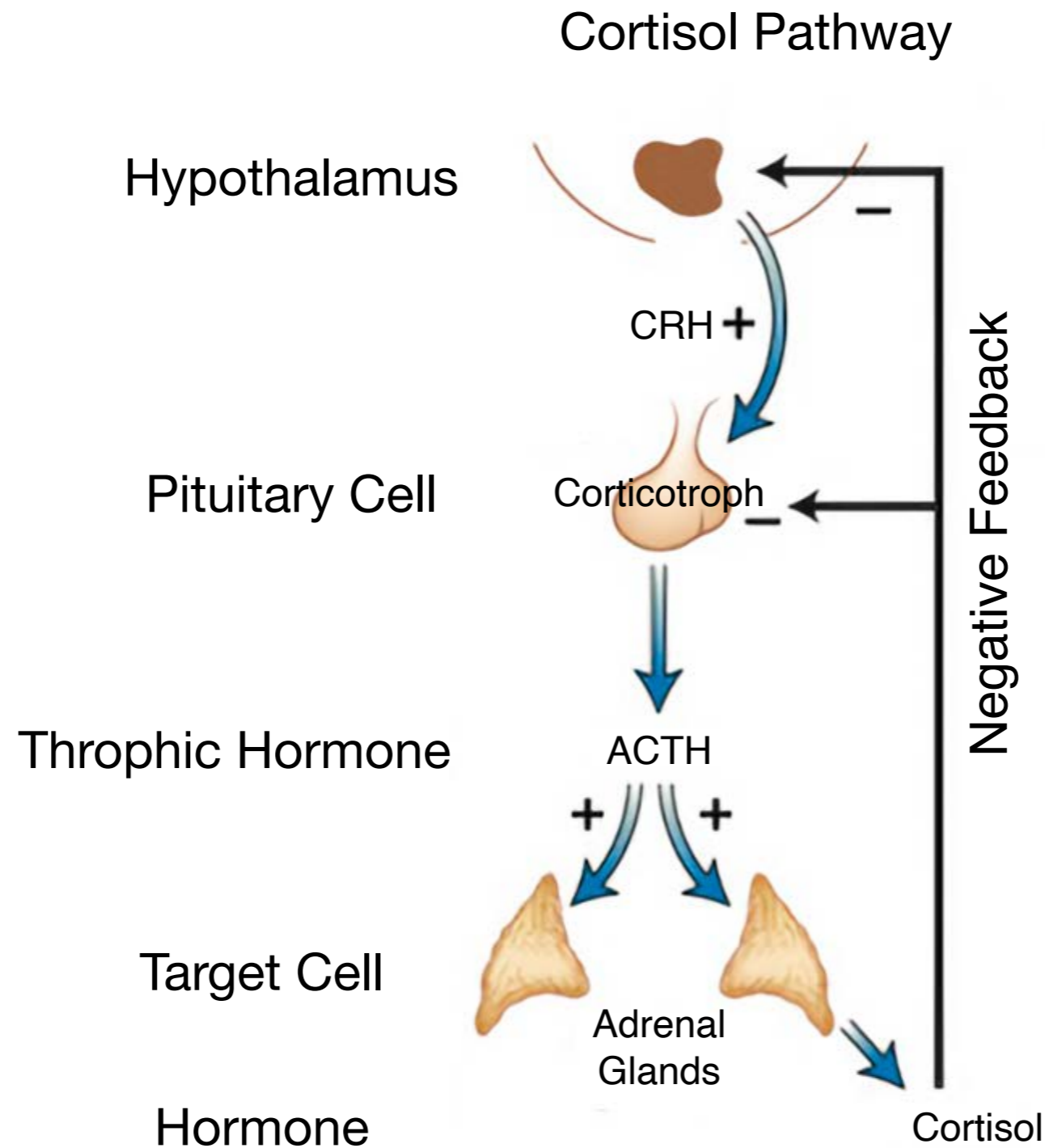
Cells in the glomerulosa secrete mineralocorticoids and are clustered by trabeculae.



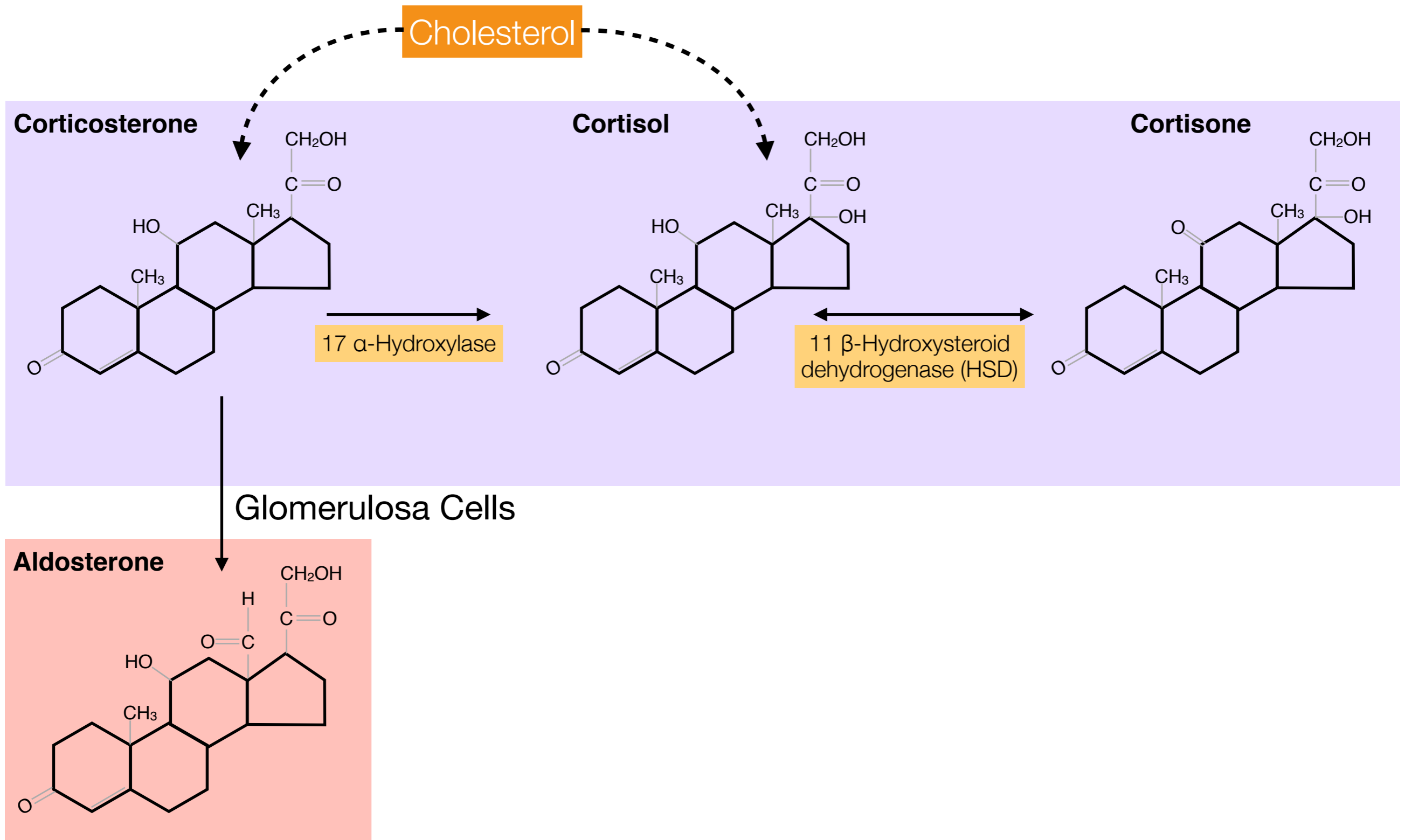
Cells in the fasciculata secrete glucocorticoids and stain more lightly than glomerulosa.



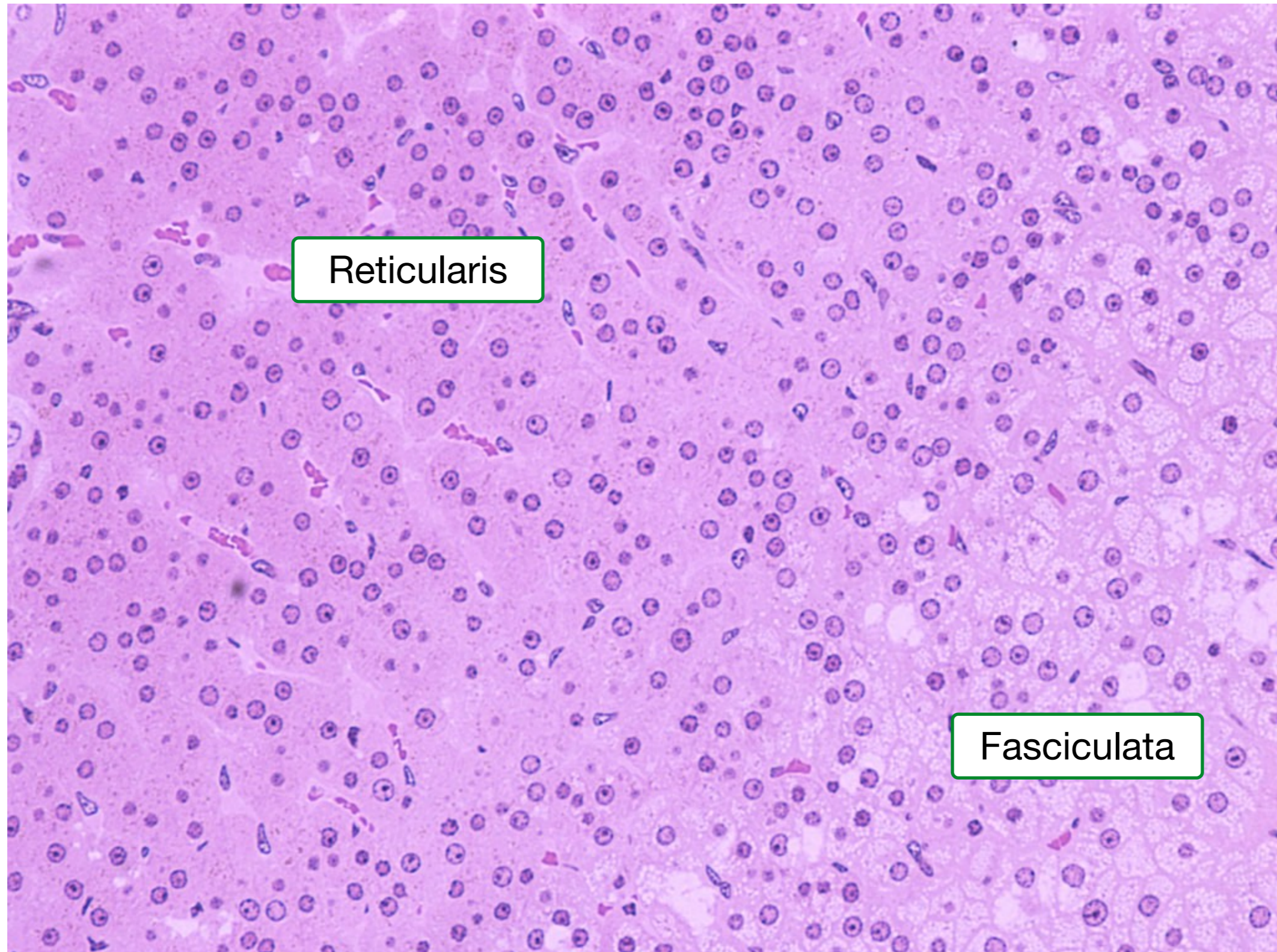
Cortisol generates negative feedback by inhibiting secretion of CRH and ACTH.



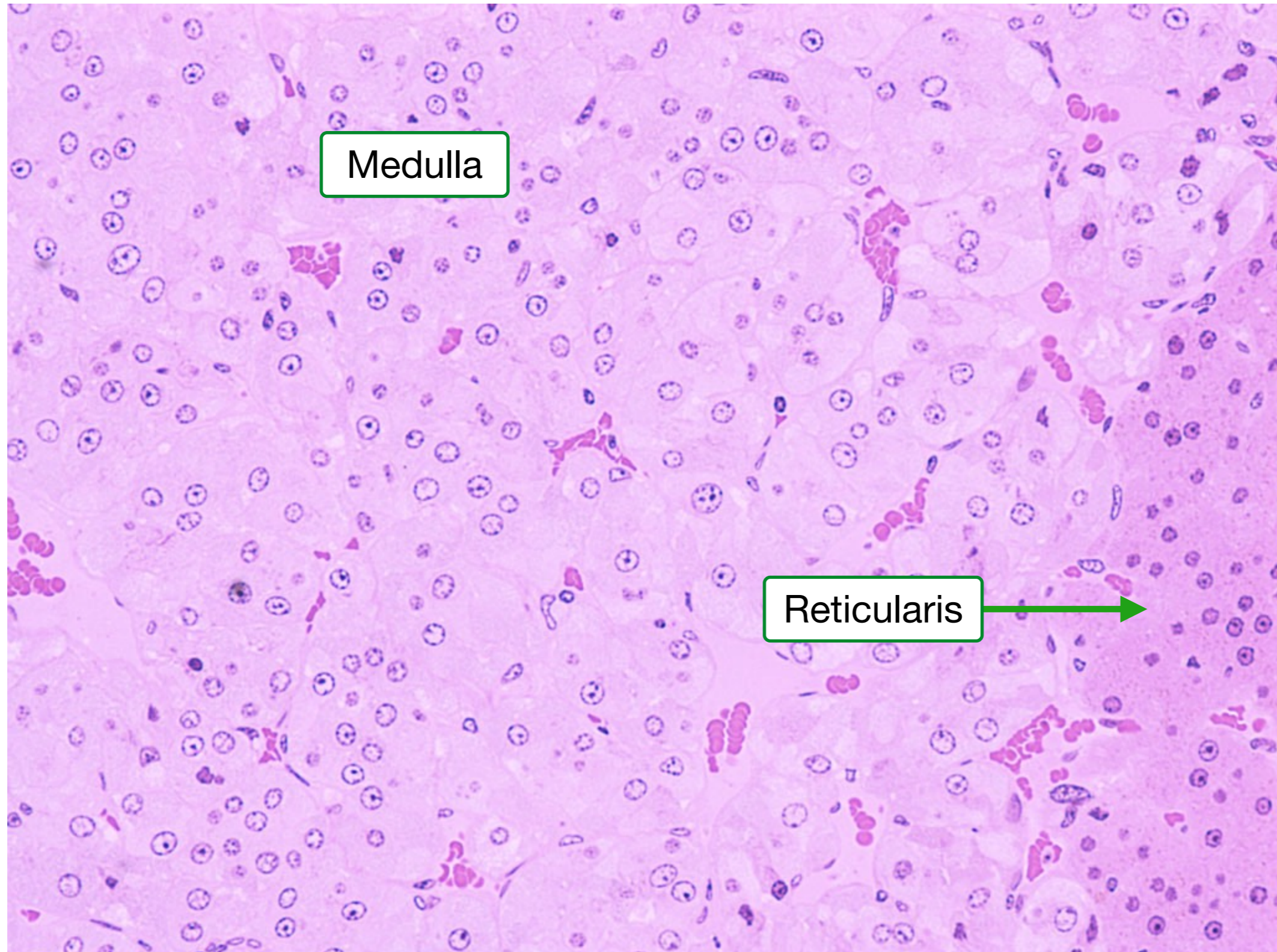
Cortisol and aldosterone are structurally similar and produced by the same biochemical pathway.



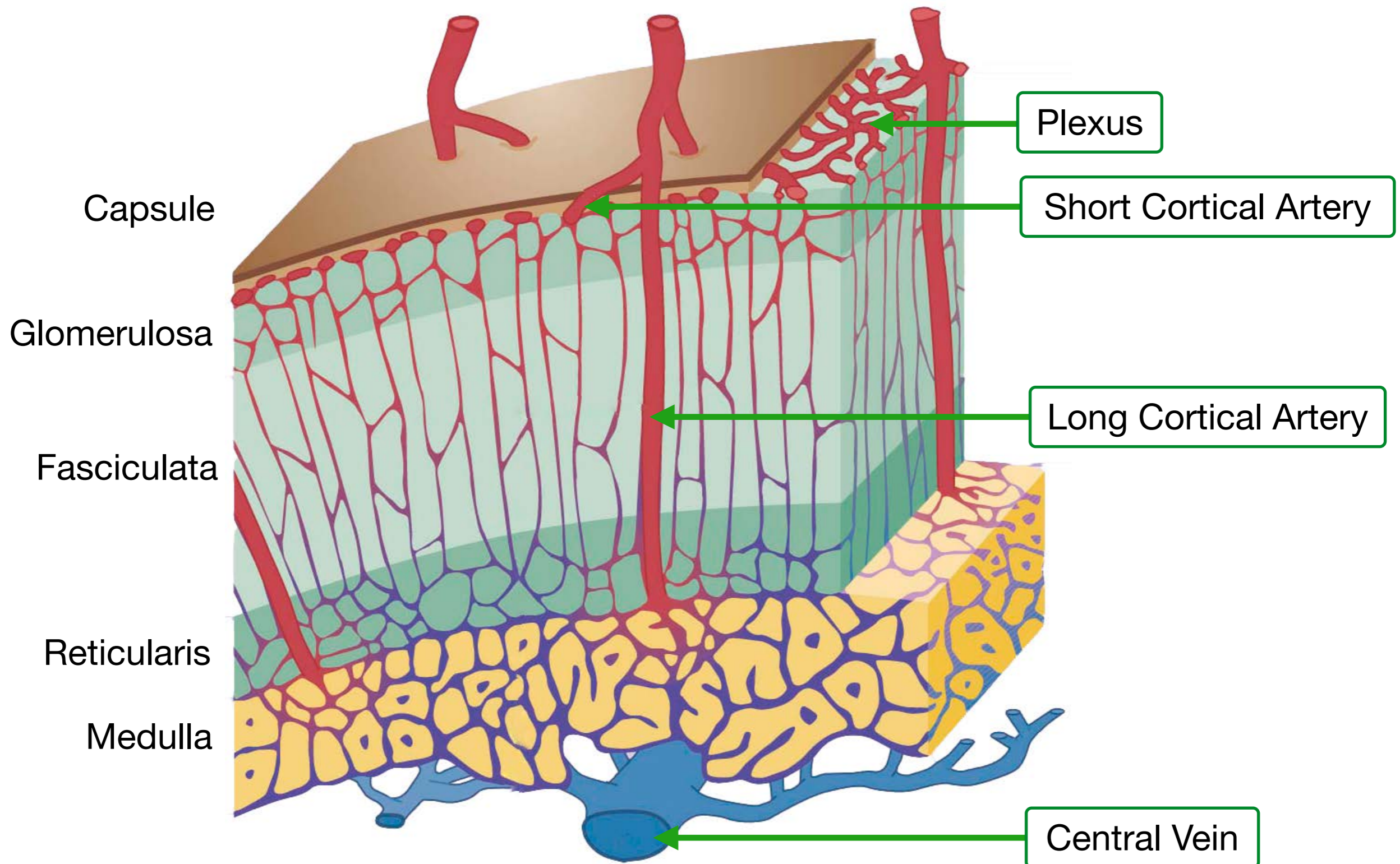
The reticularis is the inner most layer of the adrenal cortex and produces androgens.



Cells in the medulla secrete epinephrine and norepinephrine in response to external stress.

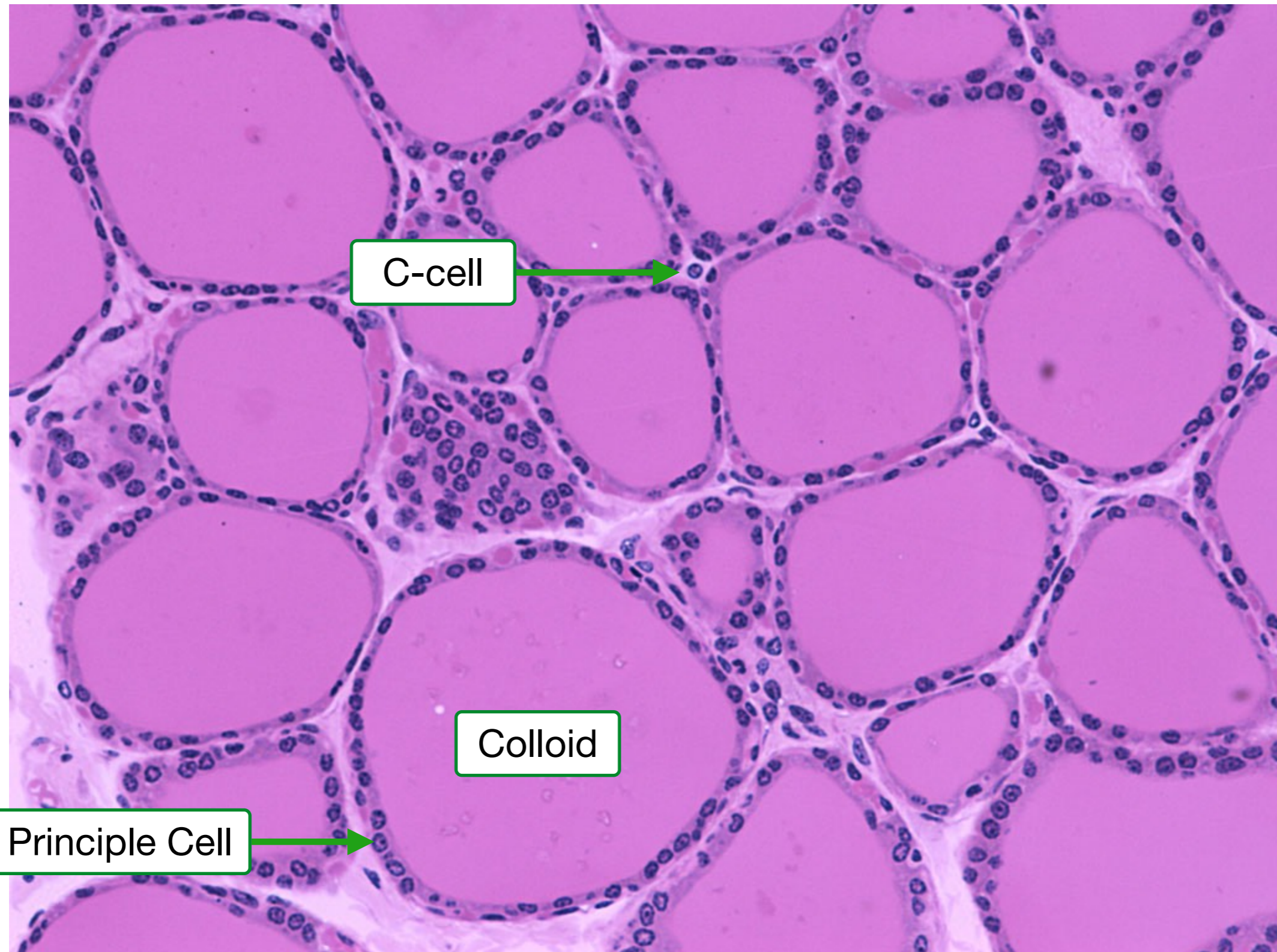


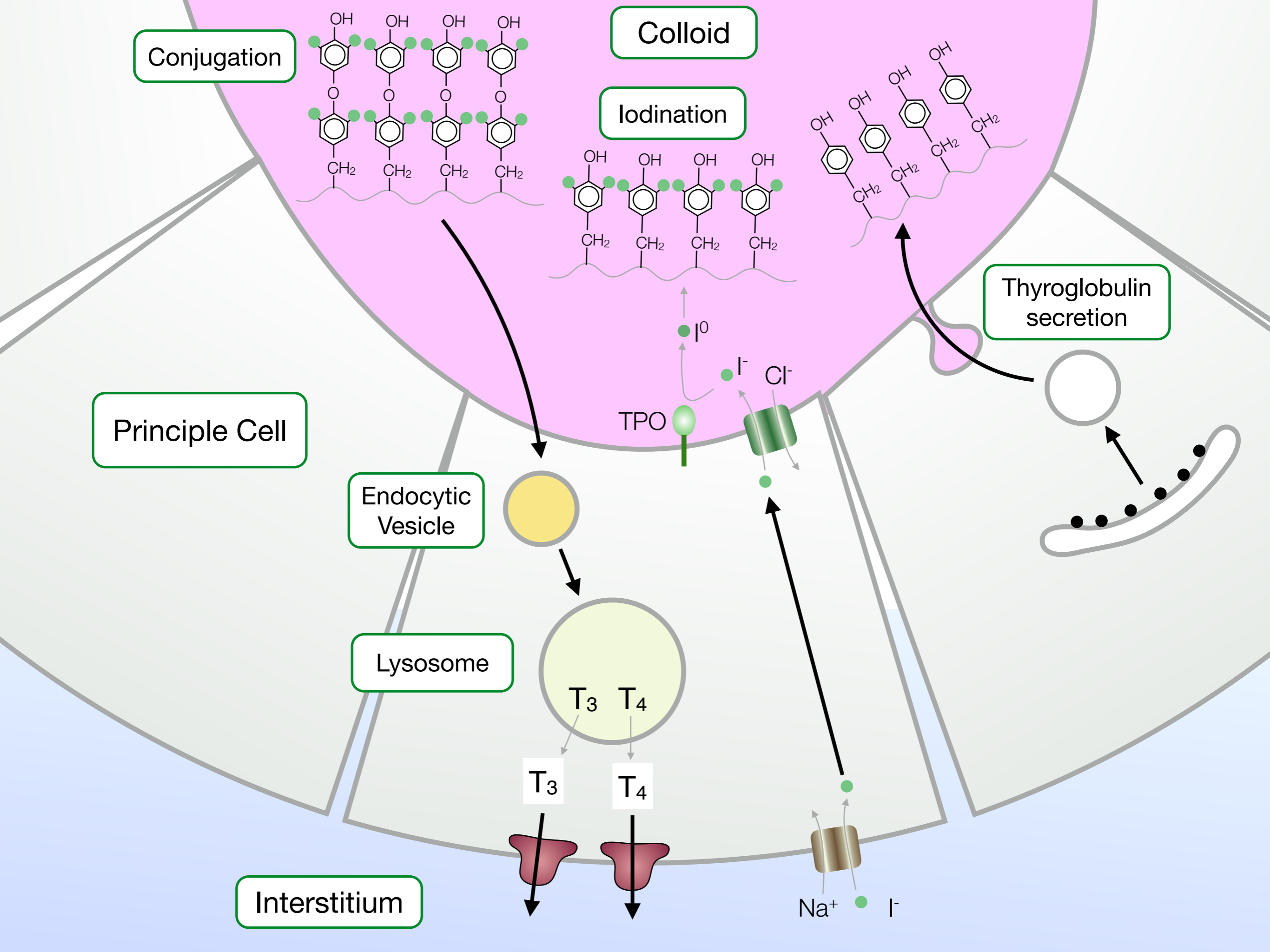
Blood can follow two different pathways through the adrenal gland.



Thyroid

The thyroid secretes and stores inactive hormone in large pools called colloid.





Conjugation

Colloid

Iodination

Thyroglobulin secretion

Principle Cell

Endocytic Vesicle

Lysosome

Interstitium

TPO

I^- Cl^-

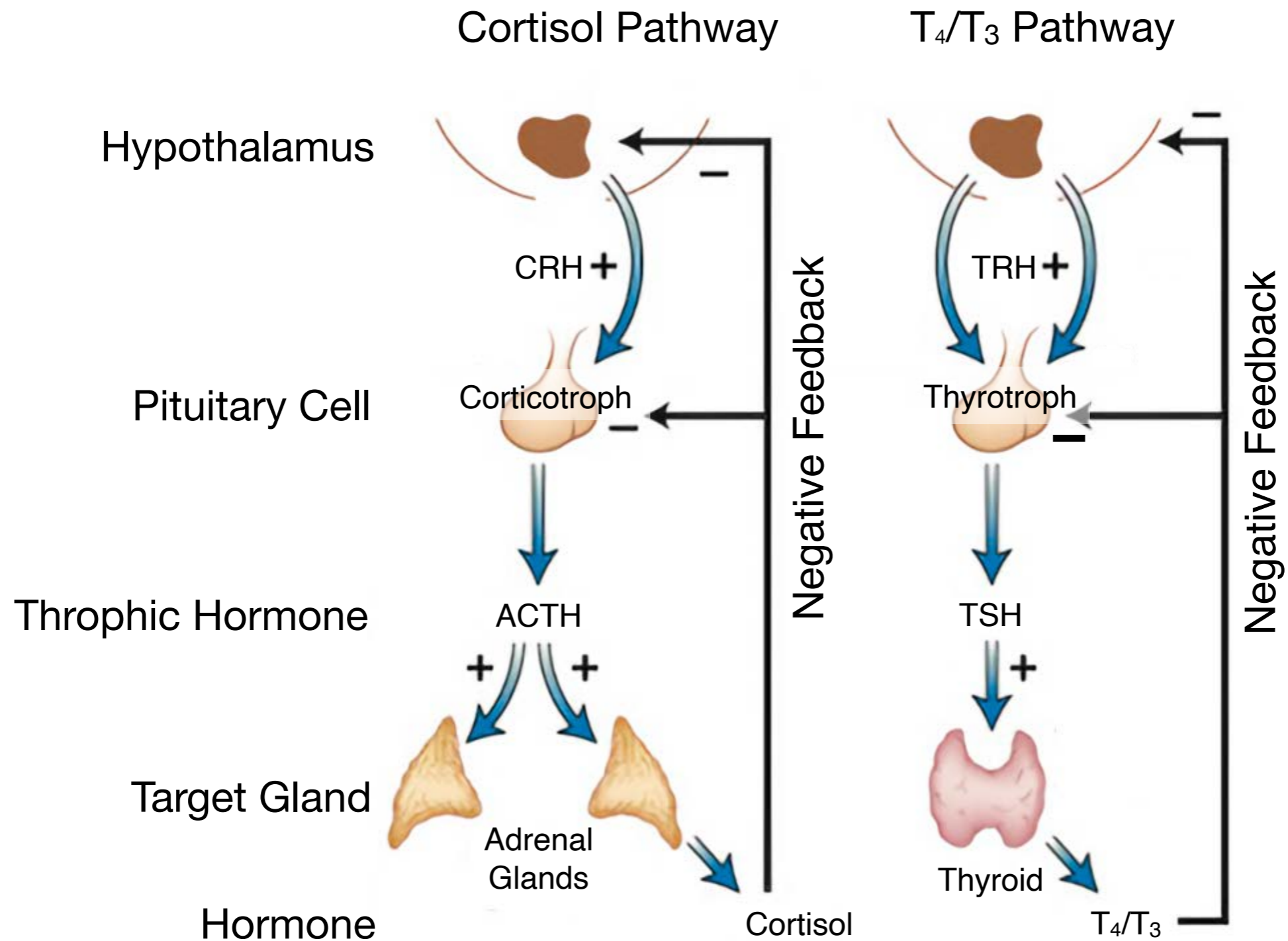
T_3 T_4

T_3

T_4

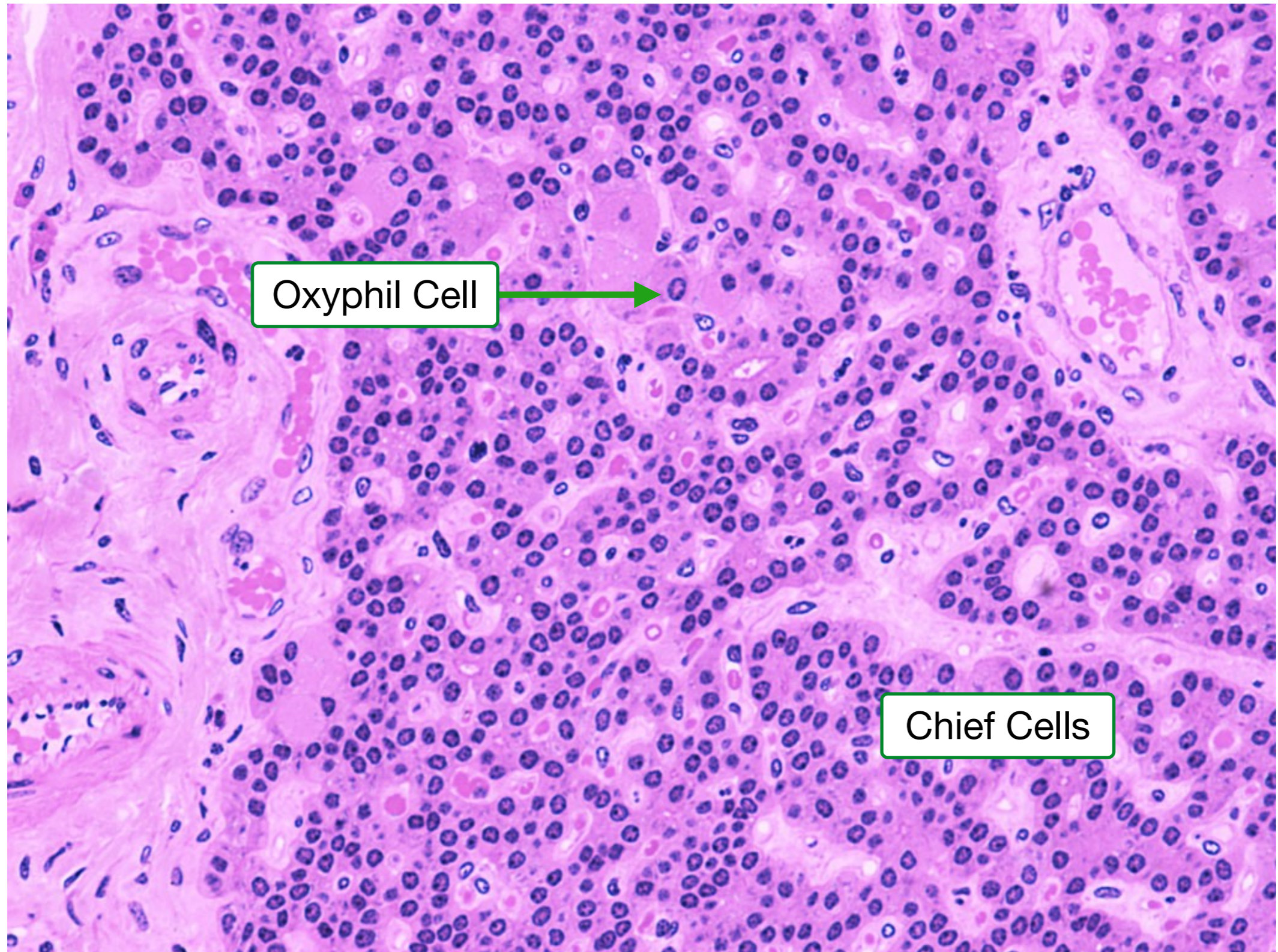
Na^+ I^-

T3 and T4 exert negative feedback on the release of TRH and TSH.



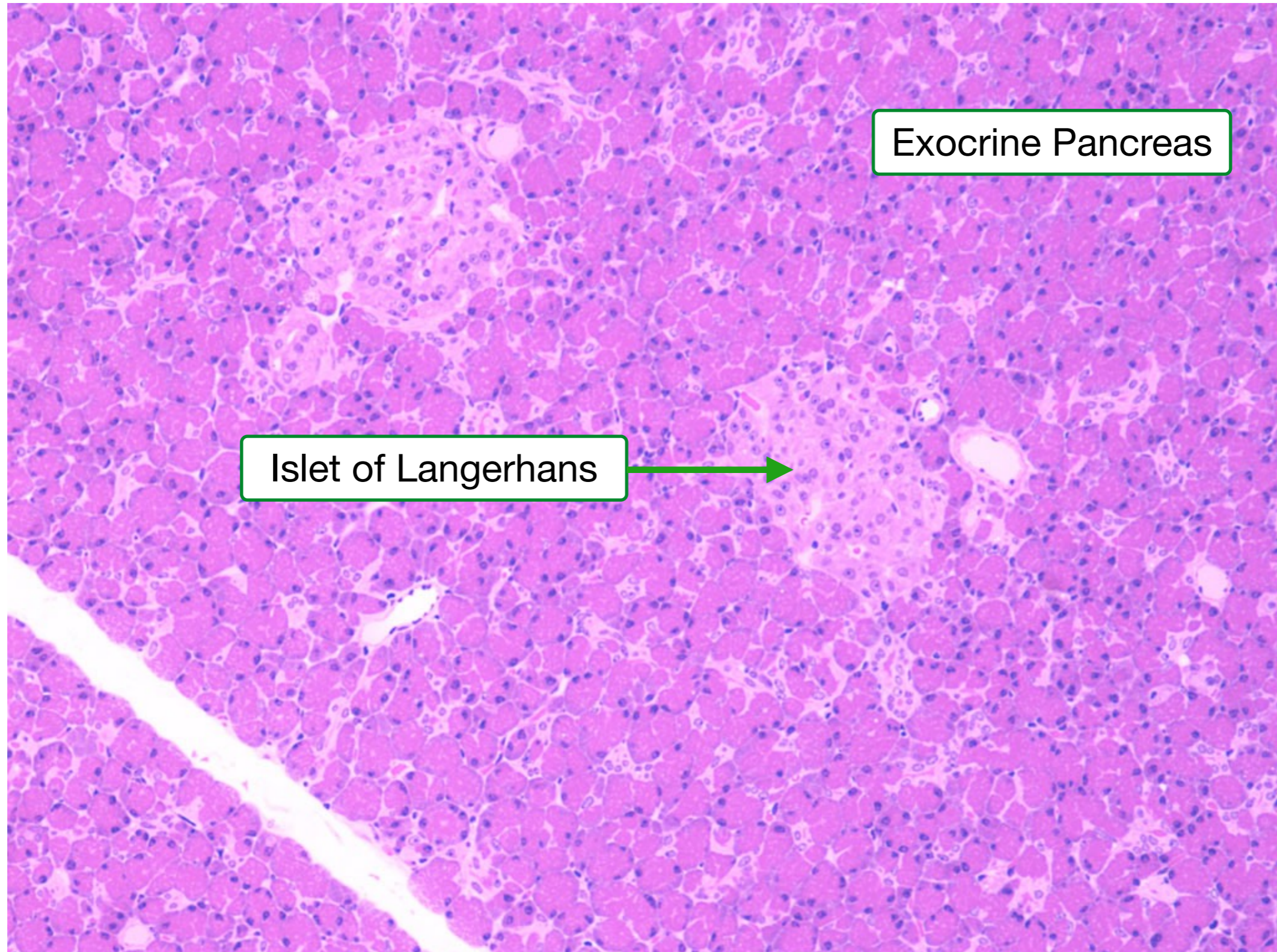
Parathyroid

Parathyroid contains chief cells that release parathyroid hormone when serum calcium is low.



Endocrine Pancreas

Cells in the endocrine pancreas secrete glucagon (α), insulin (β) or somatostatin (δ).



Take home messages...

- Hypothalamus regulates secretions from anterior pituitary.
- Hormones from anterior pituitary regulate cells in other organs.
- The adrenal gland generates mineralcorticoids, glucocorticoids, androgens and epinephrine from different regions.
- The thyroid gland produces T3 and T4 hormones.
- The hypothalamic-pituitary-adrenal axis produces cortisol in response to stress.