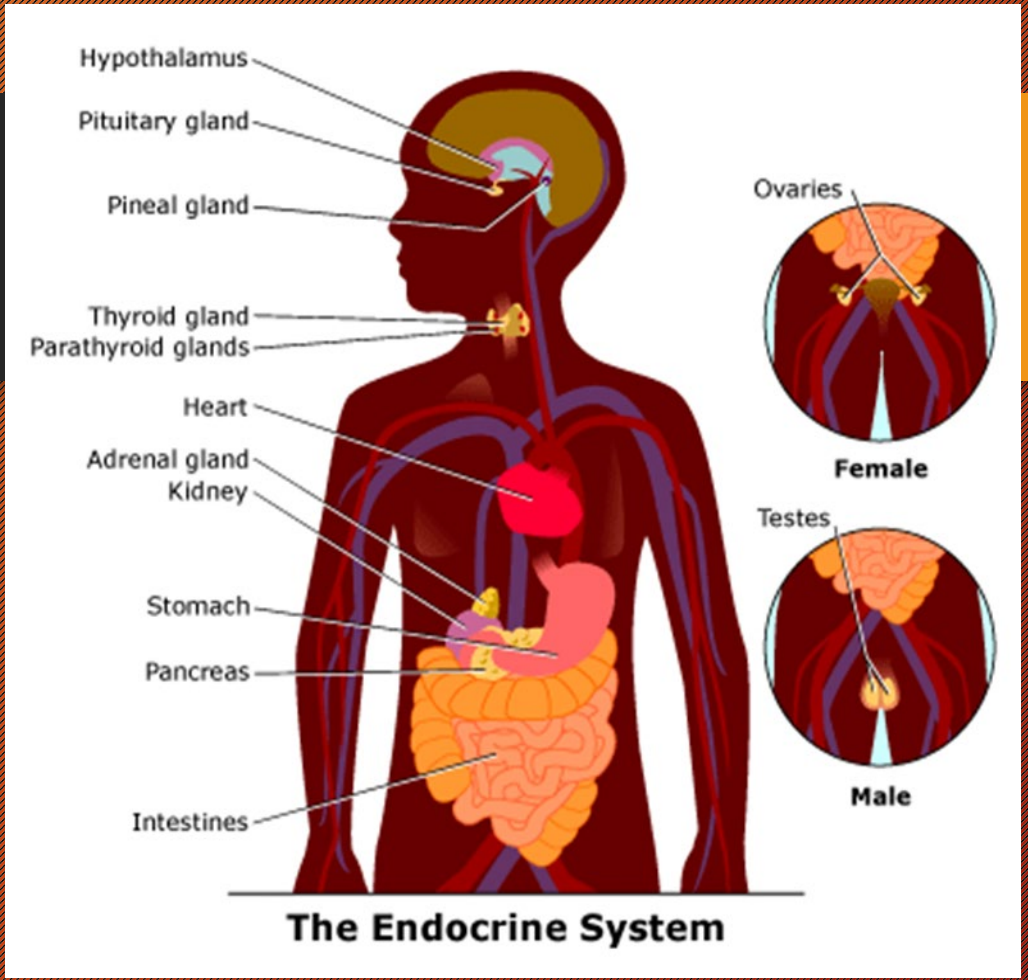
Histological Structure of the Endocrine System



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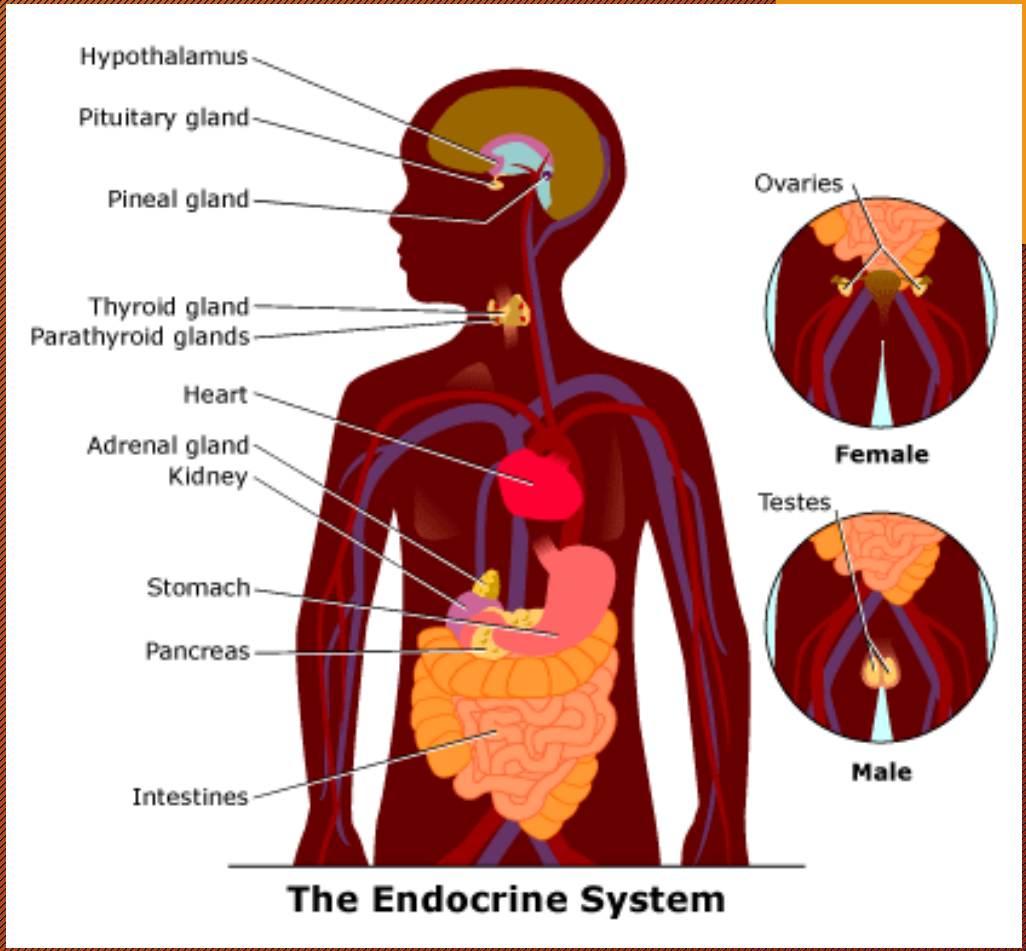
What is the endocrine system?

The endocrine system is made up of glands and the hormones they secrete. The endocrine glands are the pituitary (the master gland), pineal, thyroid, parathyroid, islets of Langerhans, adrenals, ovaries in the female and testes in the male.



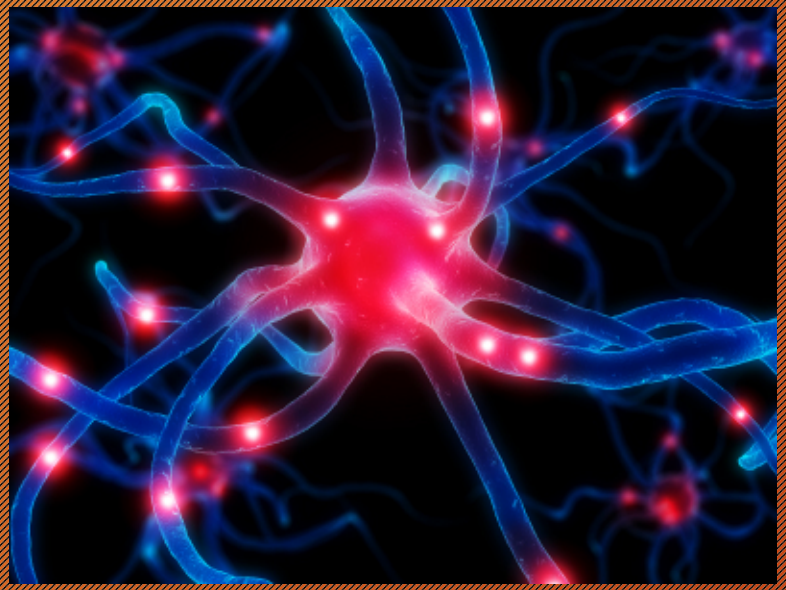
Endocrine glands don't have ducts. Their secretions (hormones) are secreted into the blood stream.

The function of the endocrine system is the production and regulation of chemical substances called hormones.

The Endocrine System (11.0)

- **Endocrine System**: A collection of glands of an organism that secrete hormones to regulate your metabolism, chemical reactions, water balance, reproductive functioning, and your body's growth and development.
- Includes all endocrine cells and tissues of the body.

Hormones…

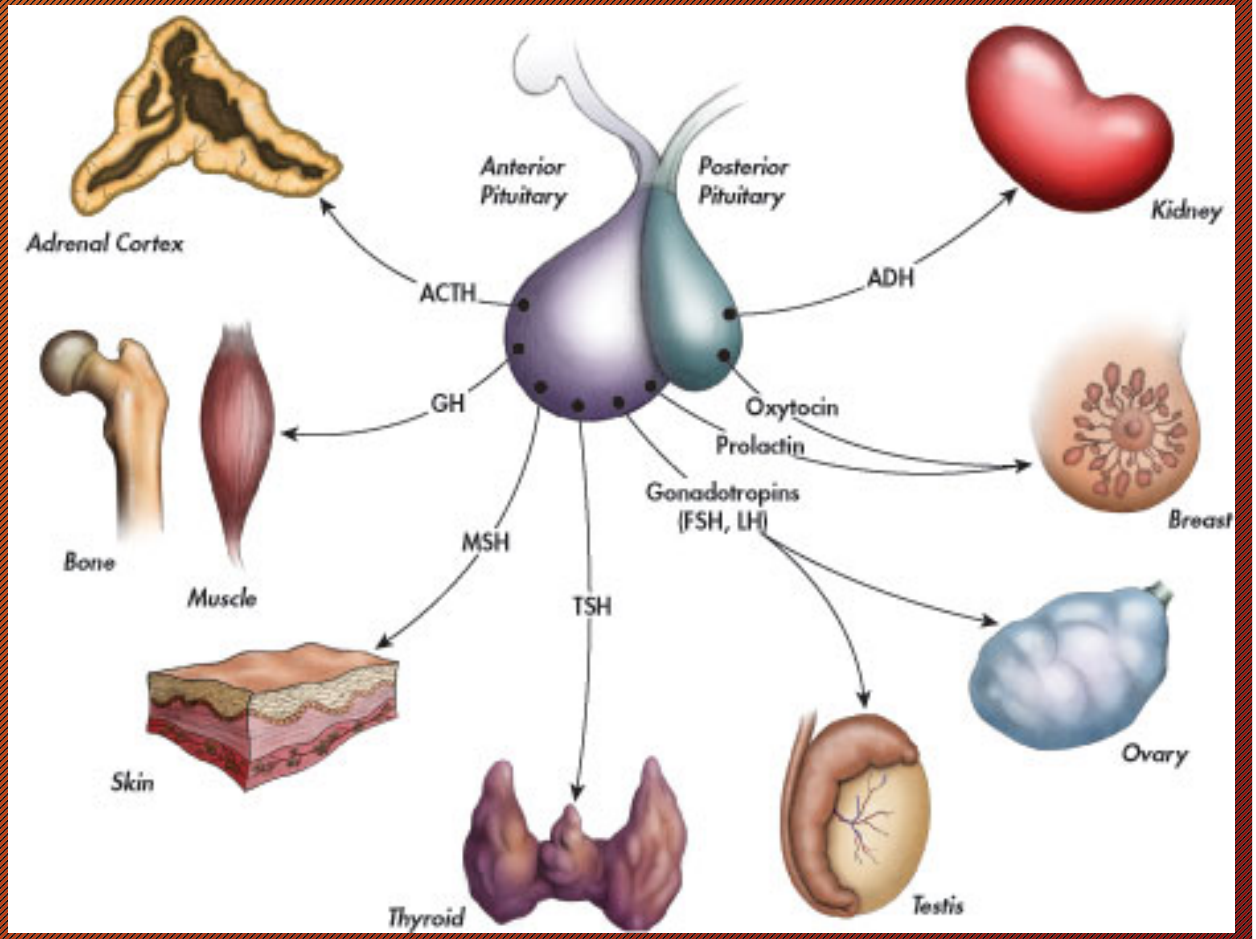


A hormone is a chemical transmitter. It is released in small amounts from glands, and is transported in the bloodstream to target organs or other cells. Hormones are chemical messengers, transferring information and instructions from one set of cells to another.

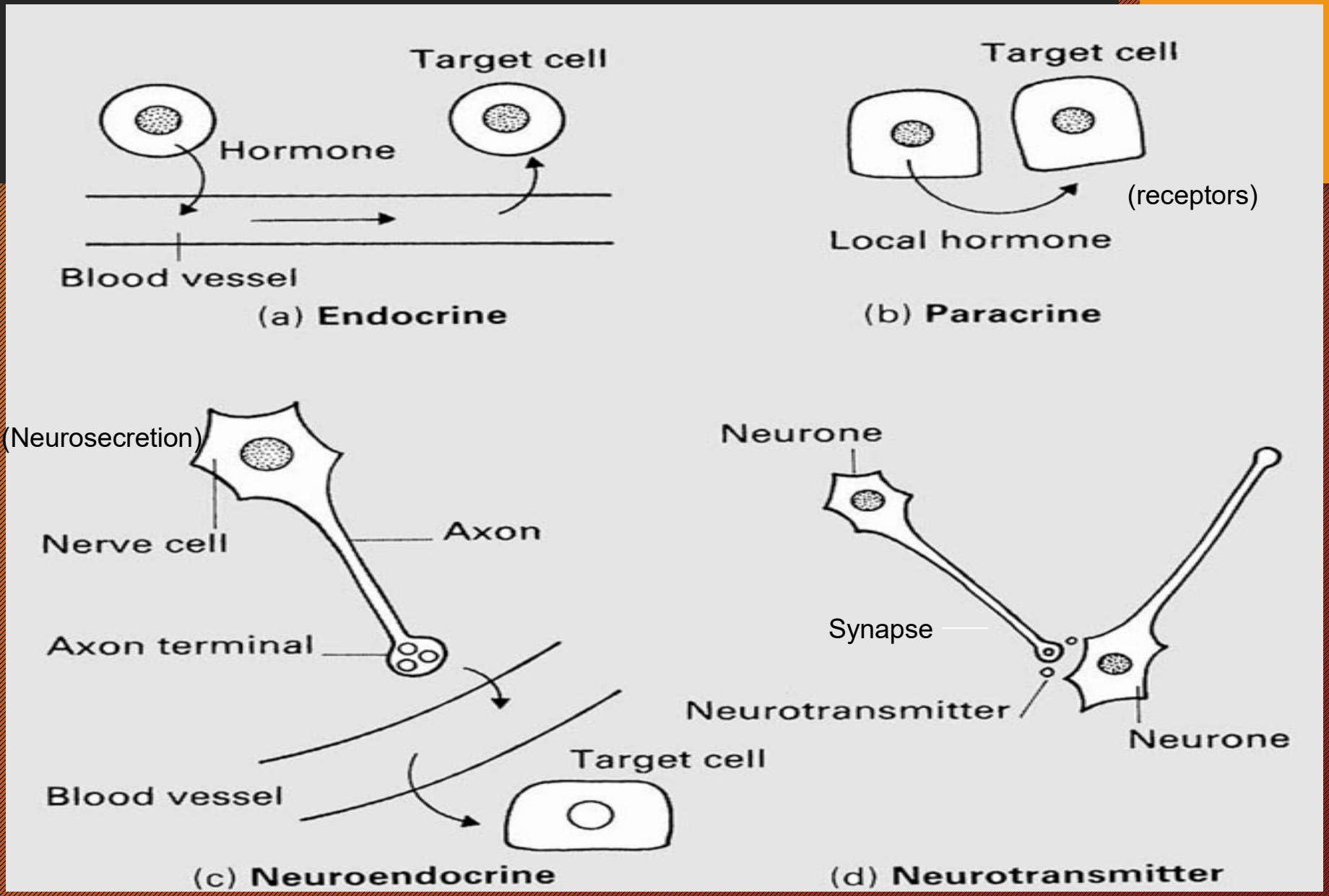
Hormones…

Hormones regulate growth, development, mood, tissue function, metabolism, and sexual function.

Hyposecretion or hypersecretion of any hormone can be harmful to the body. Controlling the production of hormones can treat many hormonal disorders in the body.



Comparison of endocrine, paracrine, neurosecretory and neurotransmission.



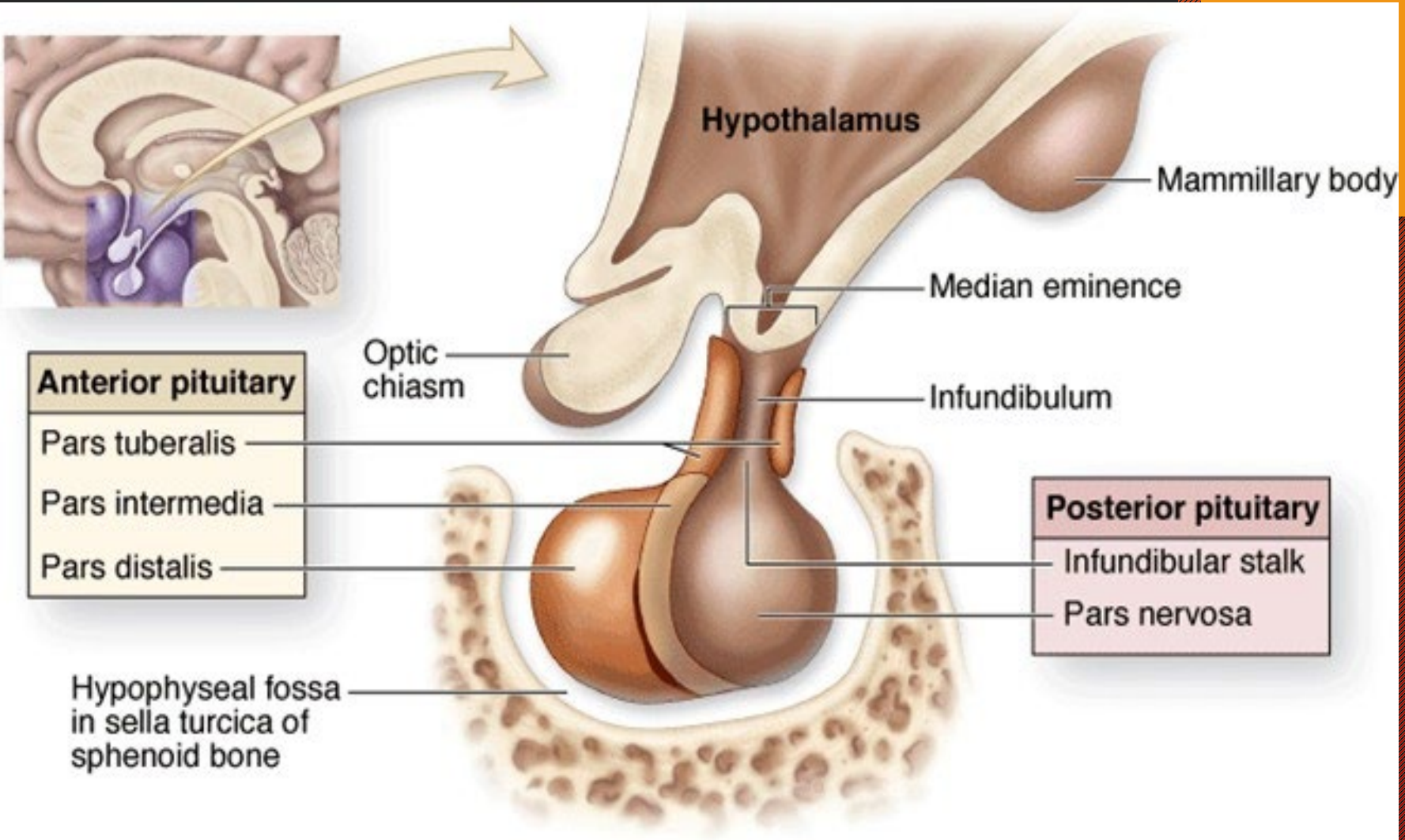
Endocrine system composed of :

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

- Pituitary Gland (Hypophysis)
- The pituitary (also known as the hypophysis) is found at the base of the brain, about 1cm in diameter, lying beneath the third ventricle in a bony cavity .
- The pituitary gland produces hormones that regulate growth, metabolism, and reproduction. Composed 2 part:
- 1-The posterior part (Neurohypophysis) of the pituitary has its embryological origins in nervous tissue.
- 2-The anterior part (Adenohypophysis) is derived from an upgrowth from the oral ectoderm of the primitive oral cavity called Rathke's pouch.

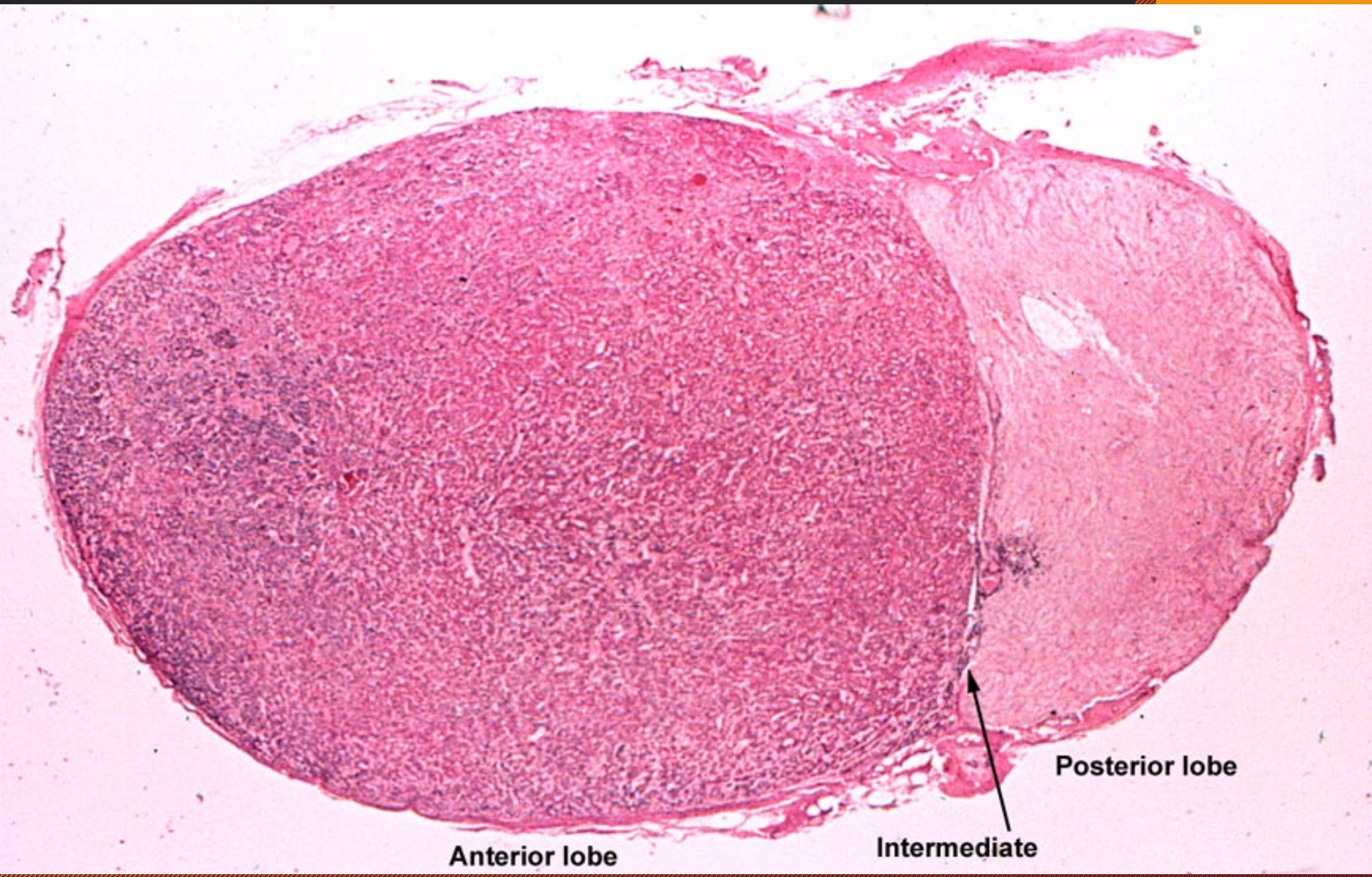
- pars intermedia, which also has its embryological origin in Rathke's pouch.
- The pars intermedia is poorly developed in humans. The glandular epithelial part of the pituitary is also called the adenohypophysis - (anterior pituitary, pars intermedia and pars tuberalis).
- The neurohypophysis, the part of the hypophysis that develops from nerve tissue, consists of a large portion, the pars nervosa, and the smaller infundibulum or neural stalk.

• Pituitary (hypophysis)



Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition:* http://www.accessmedicine.com

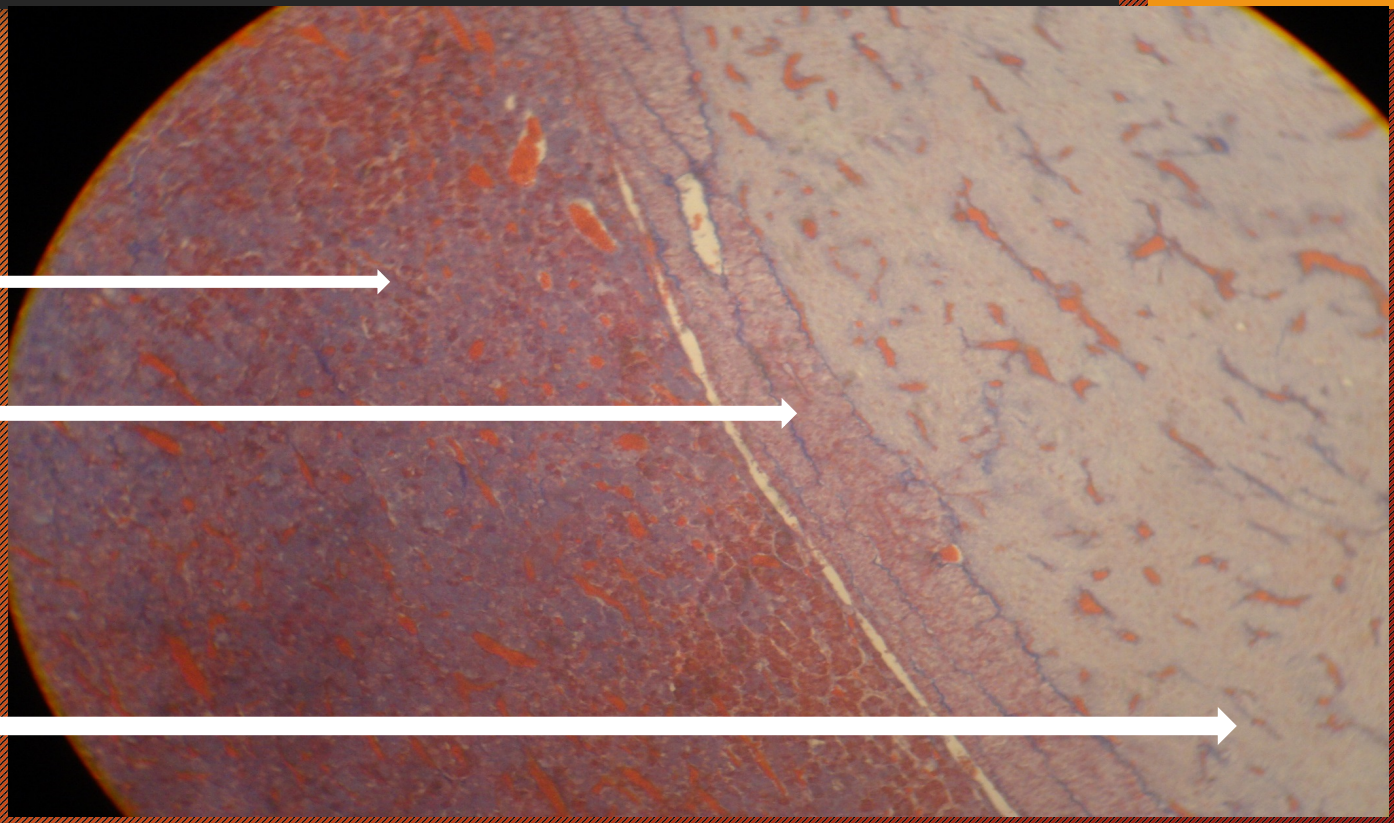
Pituitary, low power

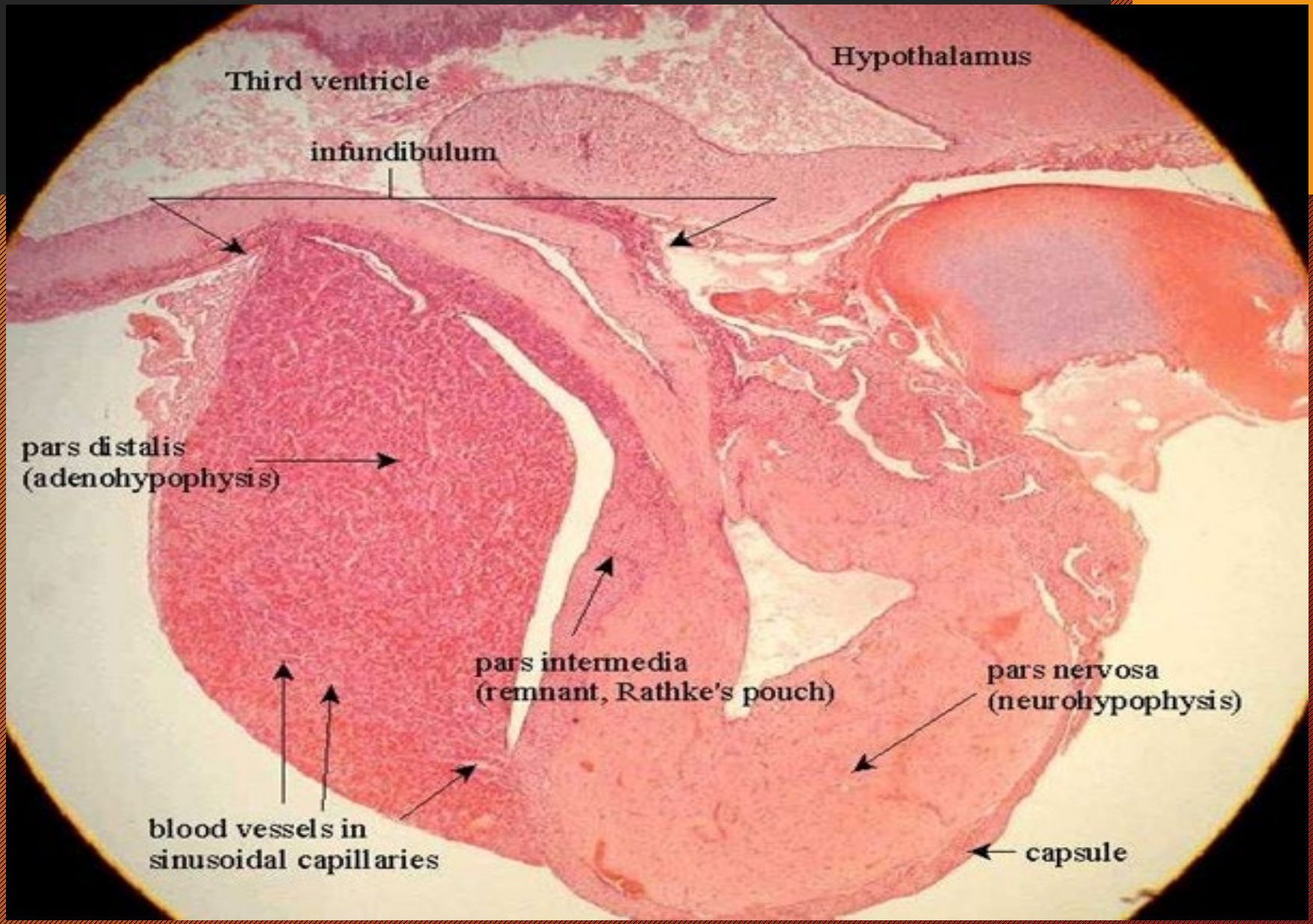


Hypophysis (Pituitary gland)

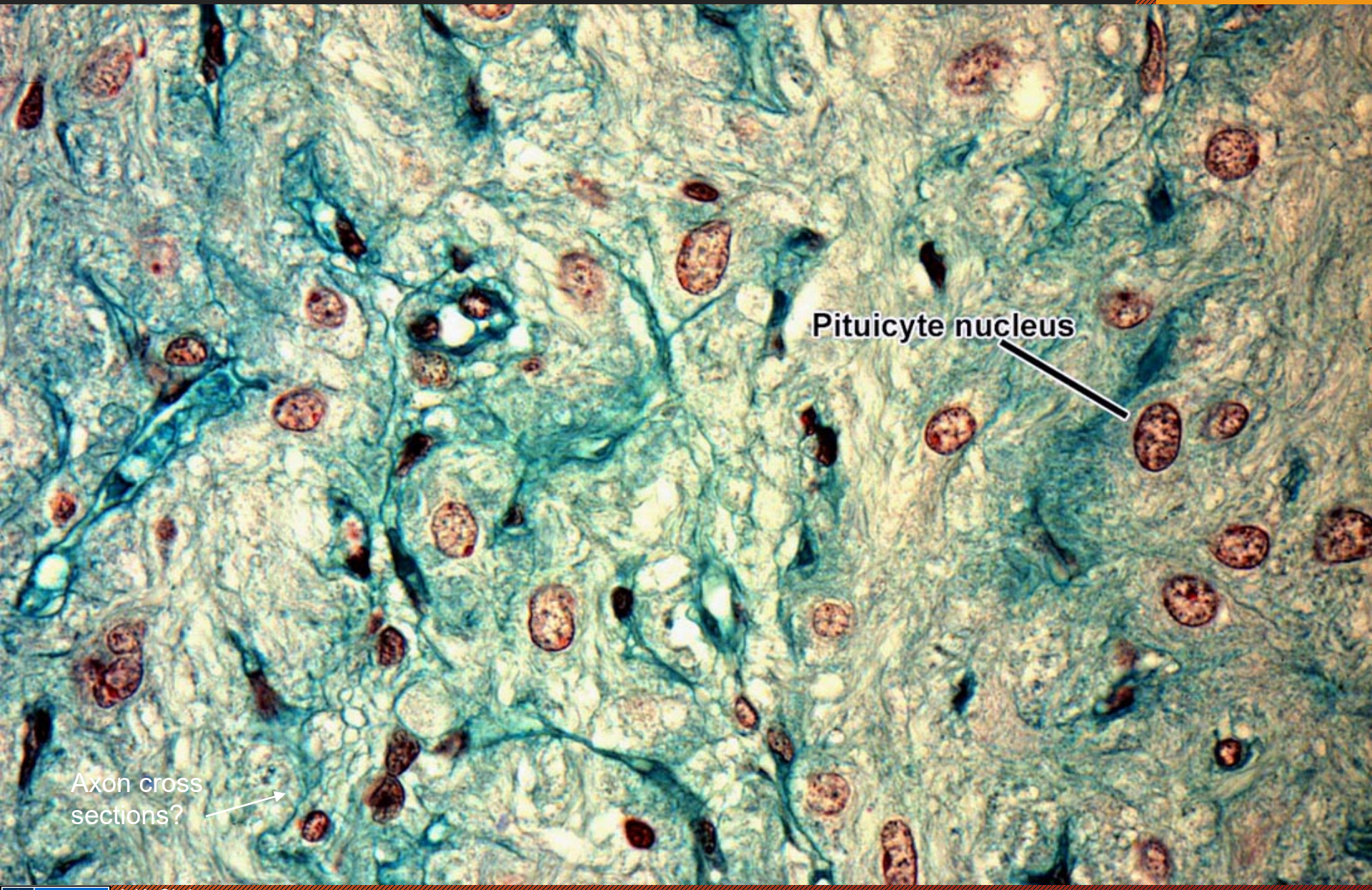
1- Pars distalis
or pars anterior
Pars intermedia
lies between
distalis and
nervosa
it are vesicles
filled with colloid

Pars nervosa

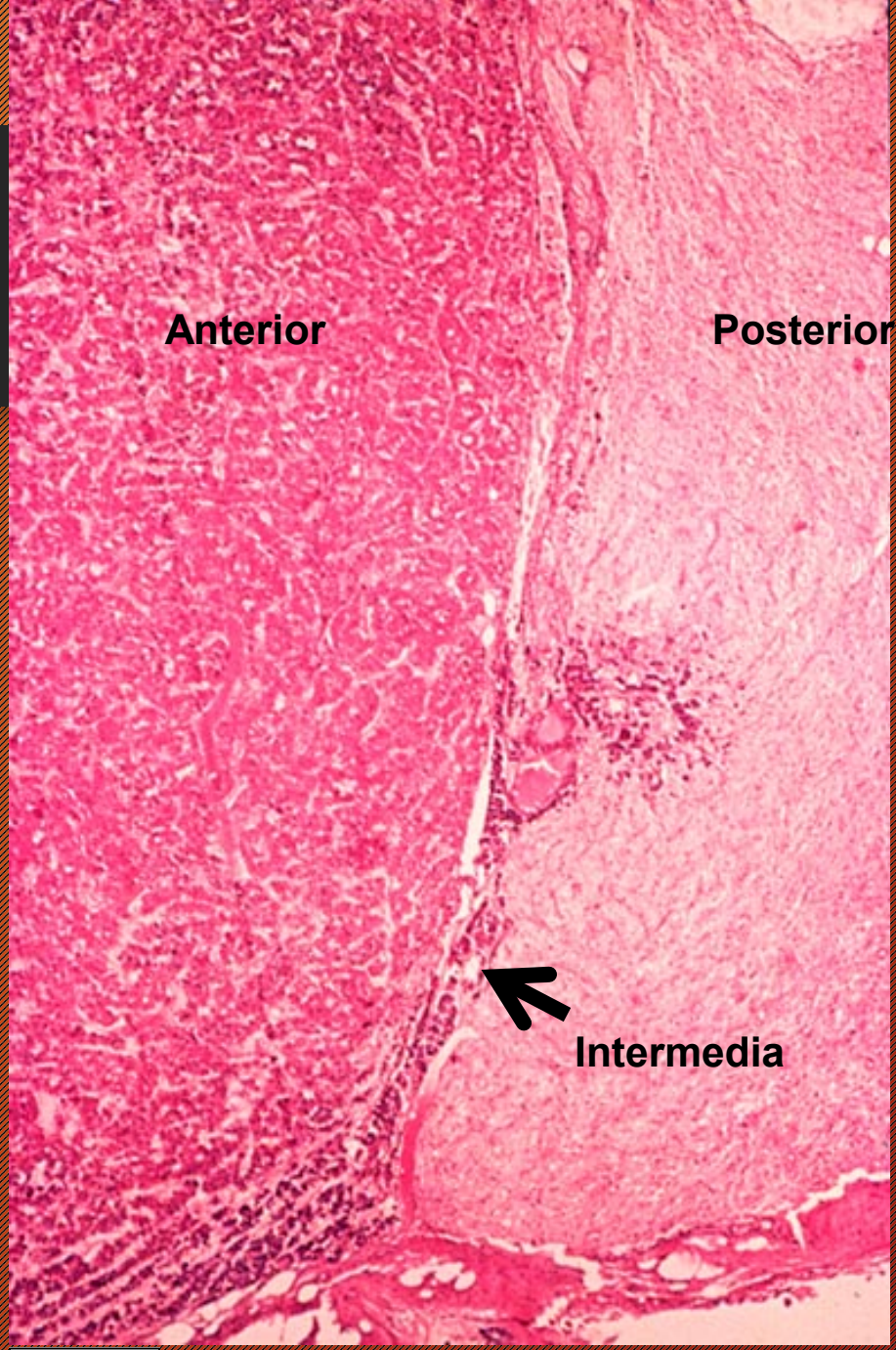



Hypothalamus
Third ventricle
infundibulum
pars distalis
(adenohypophysis)
pars intermedia
(remnant, Rathke's pouch)
pars nervosa
(neurohypophysis)
blood vessels in
sinusoidal capillaries
capsule

Posterior pituitary



Pars intermedia, between anterior and posterior pituitary
it are vesicles filled with colloid

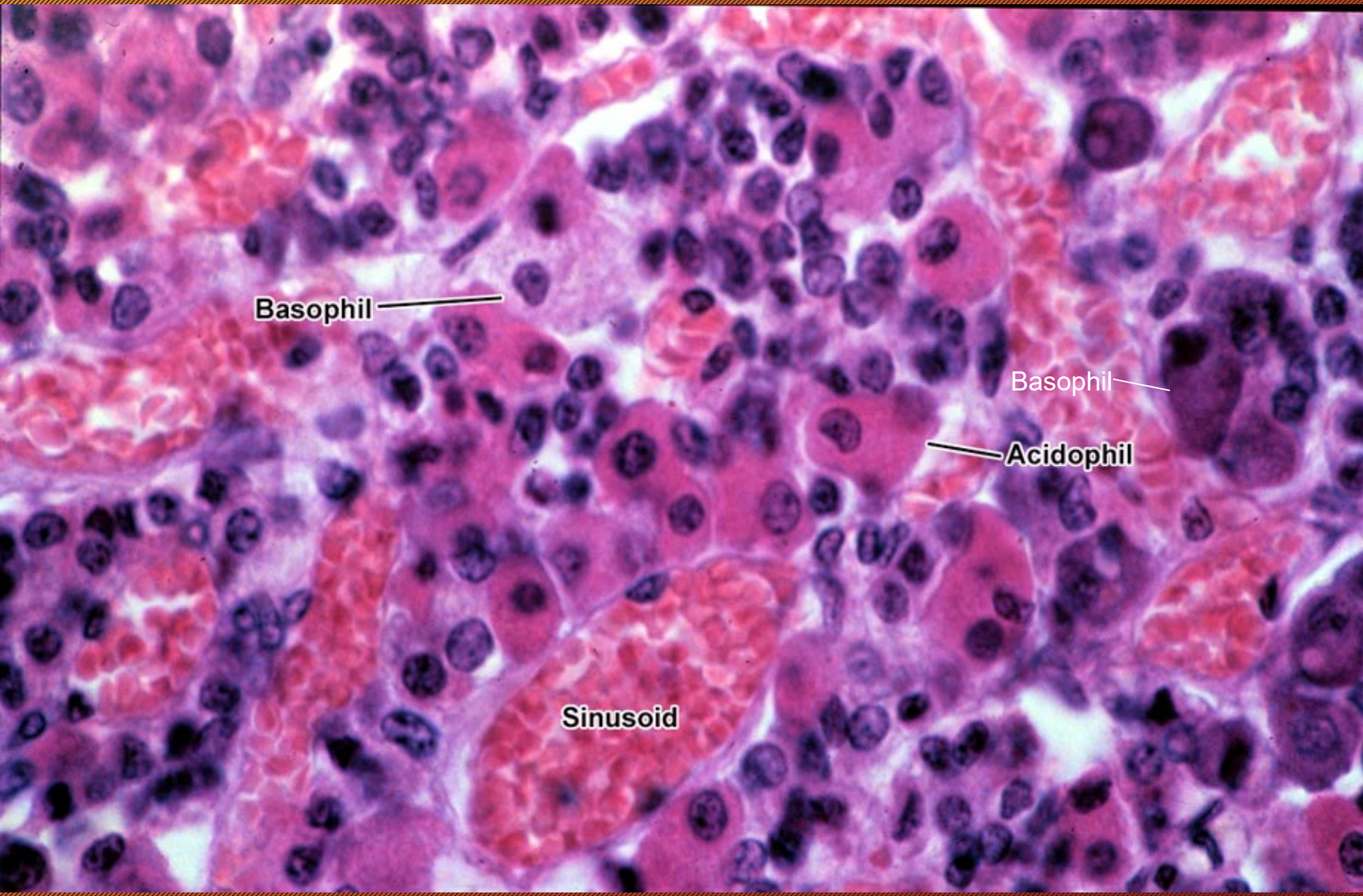


 Humio Mizoguti, Kobe Univ Sch Med, slide 516

- A. Adenohypophysis – subdivided into:
  - Pars distalis (Anterior lobe)
  - Pars tuberalis (Cranial part)
  - Pars intermedia (Intermediate lobe)
- B. Neurohypophysis – subdivided into:
  - Pars nervosa (Posterior lobe)
  - Stalk (Infundibulum)

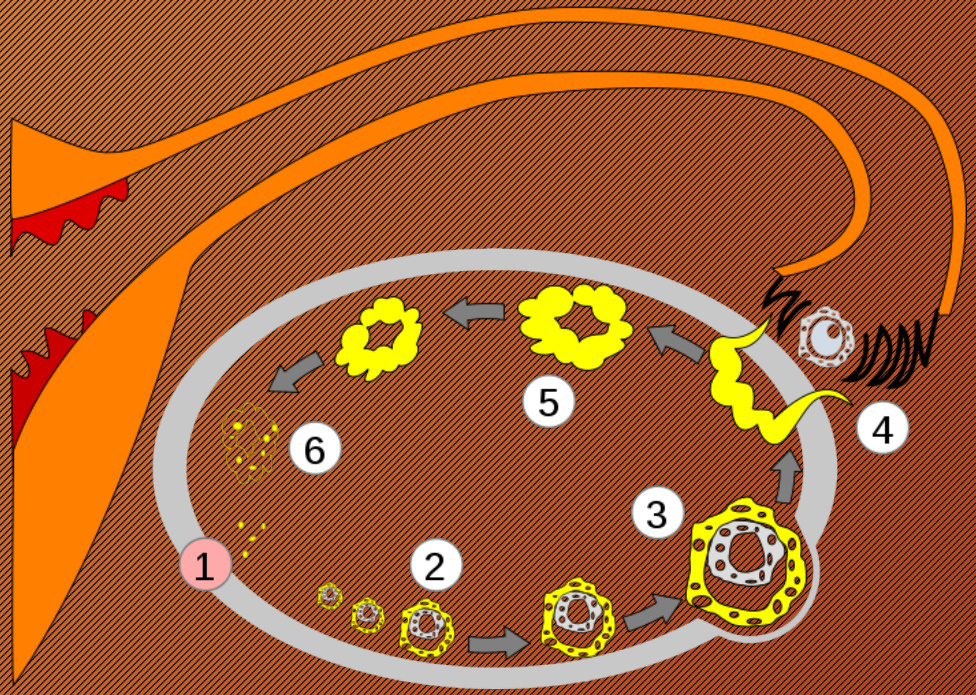
- **Pars distalis (Ant. Lobe): composed of two types of cells:**
- **a) Chromophobes (50%) Their function is unknown,**
- **b) Chromophils – subdivided into basophils and acidophils called according to their affinity for basic and acid dyes,**
- **i. Acidophils (40%)**
- **ii. Basophils (10%)**

Anterior pituitary, LM, H&E stain



- Acidophils –
- 1. Somatotrophs – (hormone (GH) secretion.
- (childhood and adolescent leads to gigantism,
- in adults, leads to acromegaly.
- The reduction in GH in childhood leads to dwarfism.
- 2. Mammotrophs for prolactin secretion.

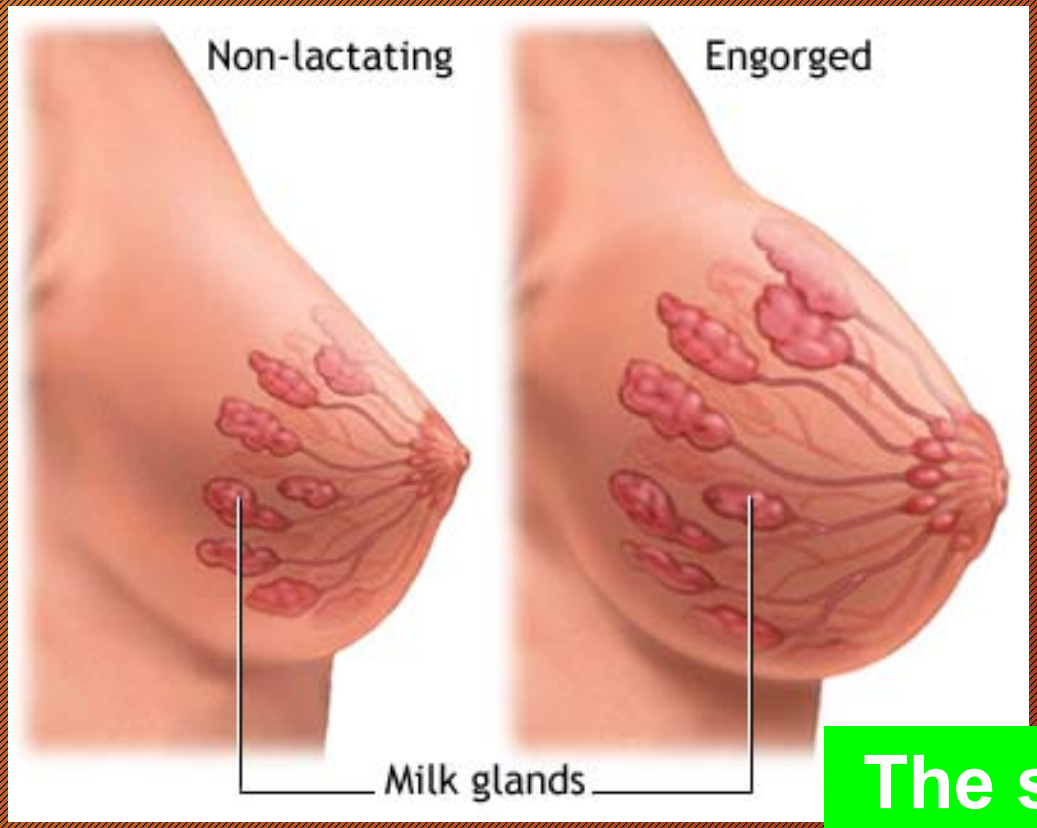
Secretions from the anterior pituitary gland...



Luteinizing Hormone (LH): is a gonadotropic hormone stimulating the development of corpus luteum in the female ovarian follicles and the production of testosterone in the male.

The yellow corpus luteum remains after ovulation; it produces estrogen and progesterone.

Secretions from the anterior pituitary gland...



Prolactin (PRL): stimulates the development and growth of the mammary glands and milk production during pregnancy.

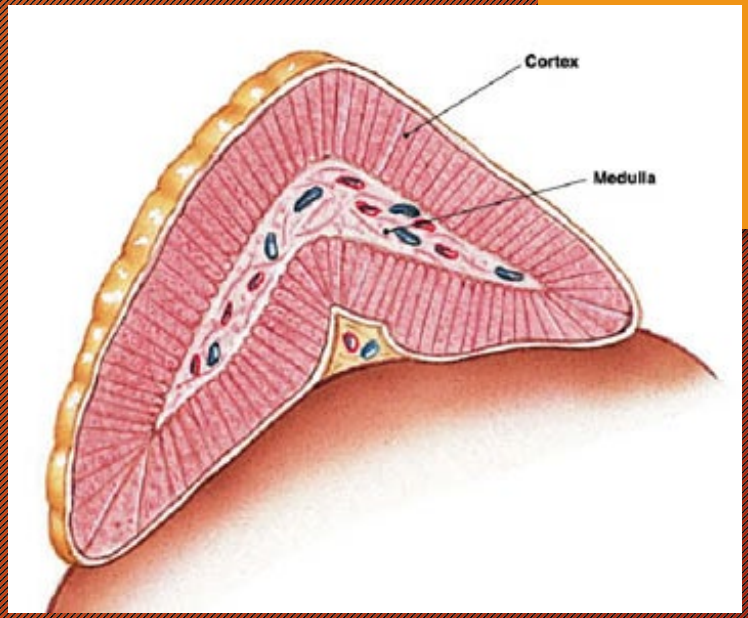
The sucking motion of the baby stimulates prolactin secretion.


GIANTS AND GIRLS

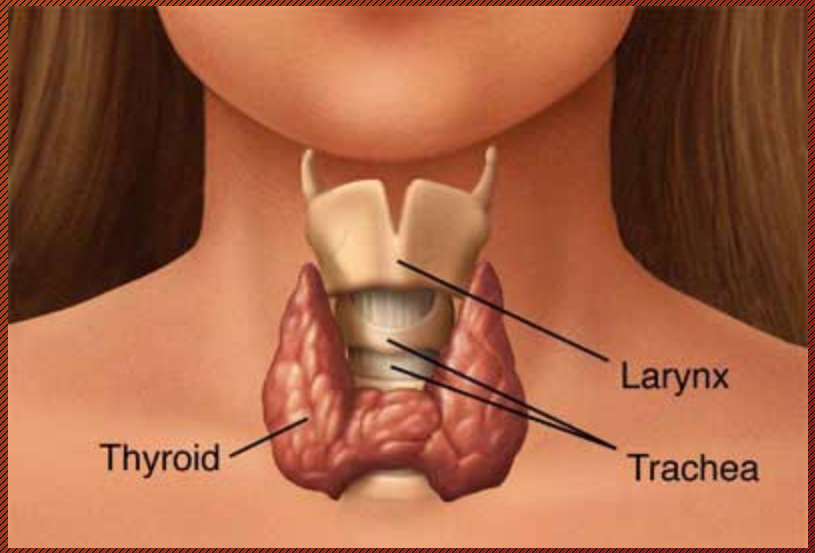
- Basophils – are subdivided into:
- 1) Gonadotrophs -▫ Follicular – stimulating hormone (FSH) -▫ Leuteinizing hormone (LH)
- 2) Thyrotrophs (TSH)
- 3) Corticotrophs – (ACTH)

Secretions from the anterior pituitary gland…

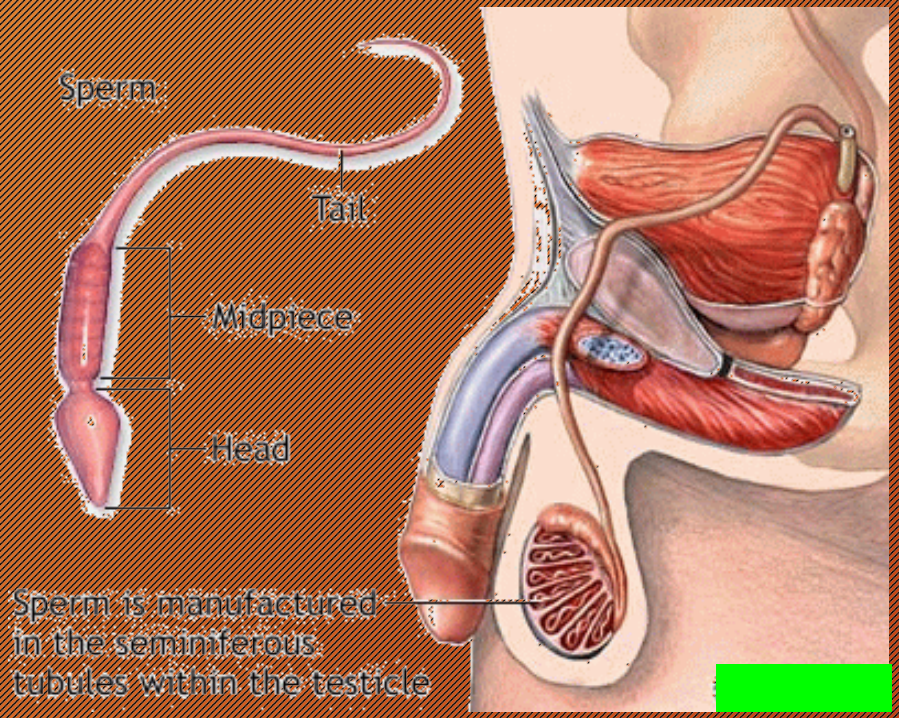
Adrenocorticotropin (ACTH): essential for the growth of the adrenal cortex.



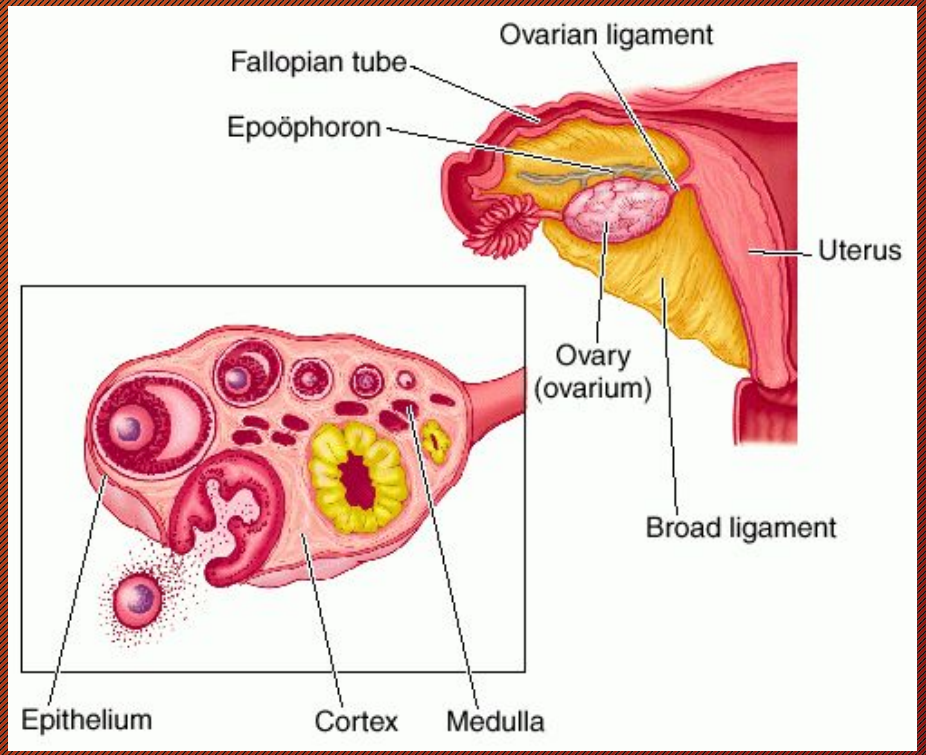
Thyroid-Stimulating Hormone (TSH): essential for the growth and development of the thyroid gland.



Secretions from the anterior pituitary gland…



Follicle-Stimulating Hormone (FSH): is a gonadotropic hormone.



It stimulates the growth ovarian follicles in the female and the production of sperm in the male.

Secretions from the anterior pituitary gland…

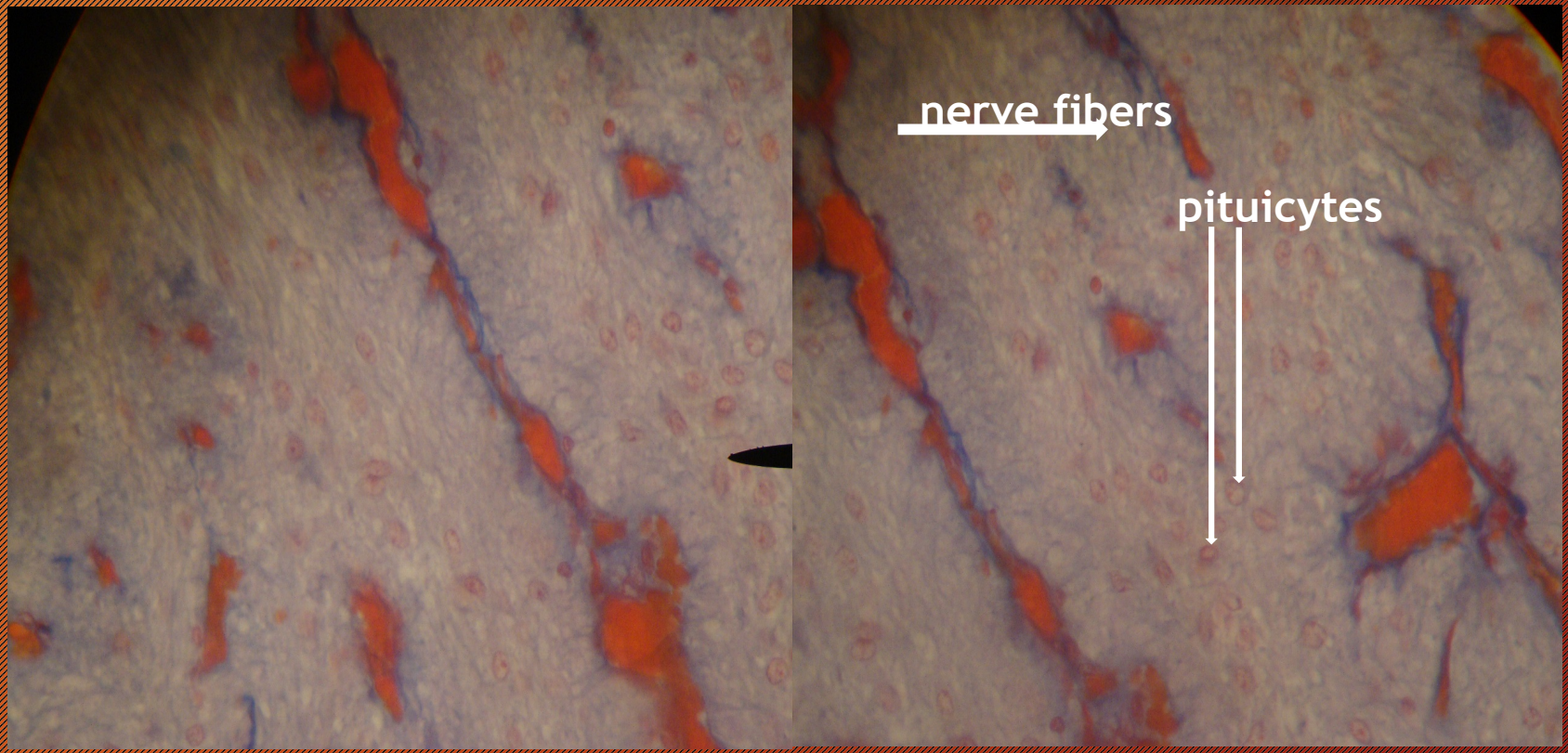
Melanocyte-stimulating hormone (MSH): regulates skin pigmentation and promotes the deposit of melanine in the skin after exposure to sunlight

Pars nervosa

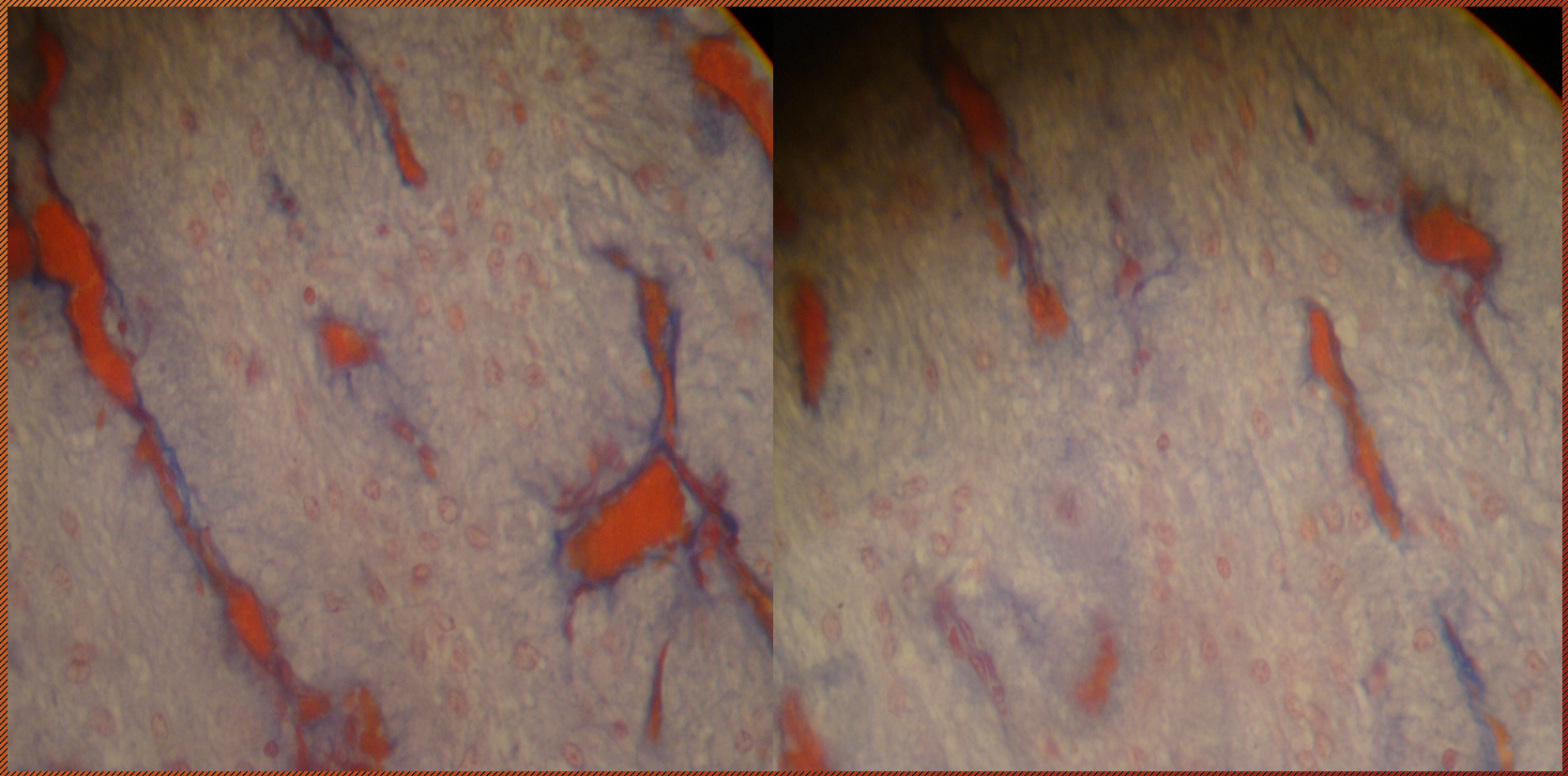
The pars nervosa is the second largest of the four divisions, together with the pars intermedia it forms the posterior lobe of the hypophysis.

Contains pituicytes and nerve fibers.

pituicytes

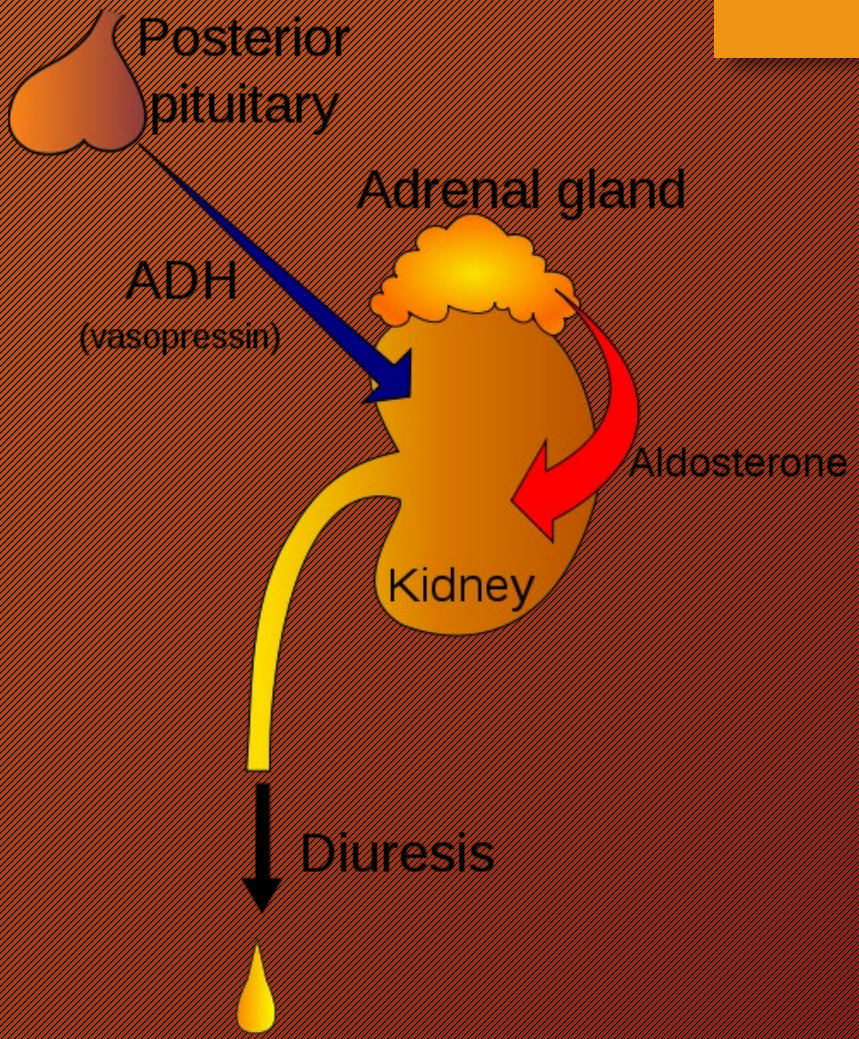


Nerve fibers



Secretions from the posterior lobe of the pituitary gland...

Antidiuretic Hormone (ADH): stimulates the reabsorption of water by the renal tubules. Hyposecretion of this hormone can result in diabetes insipidus.



Secretions from the posterior lobe Pars nervosa of the pituitary gland…

Oxytocin: stimulates the uterus to contract during labor, delivery, and parturition. A synthetic version of this hormone, used to induce labor, is called Pitocin. It also stimulates the mammary glands to release milk.

Thank you

Reference:

1- diFIORE'S Atlas of histology with Functional Correlations, eleventh edition,2008.

- *2- diFIORE'S Atlas of histology with Functional Correlations, twelfth edition,2013.*
- *3- Jonquiere's basic histology text and atlas 13th edition (2013) by Anthony L. Mescher ; Di Fiore's Atlas of Histology 12th ed. (2013) Victor P. Eroschenko*
- *4- سلايدات تعليمية نسيجية مصورة*