DEVELOPMENT OF ENDOCRINE GLANDS

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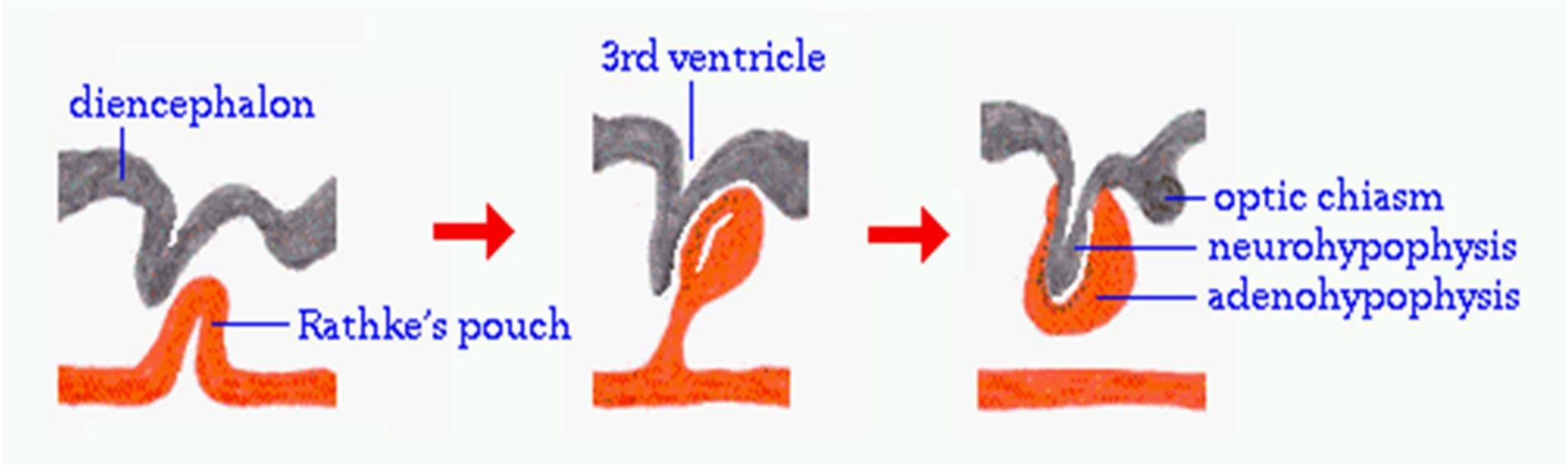
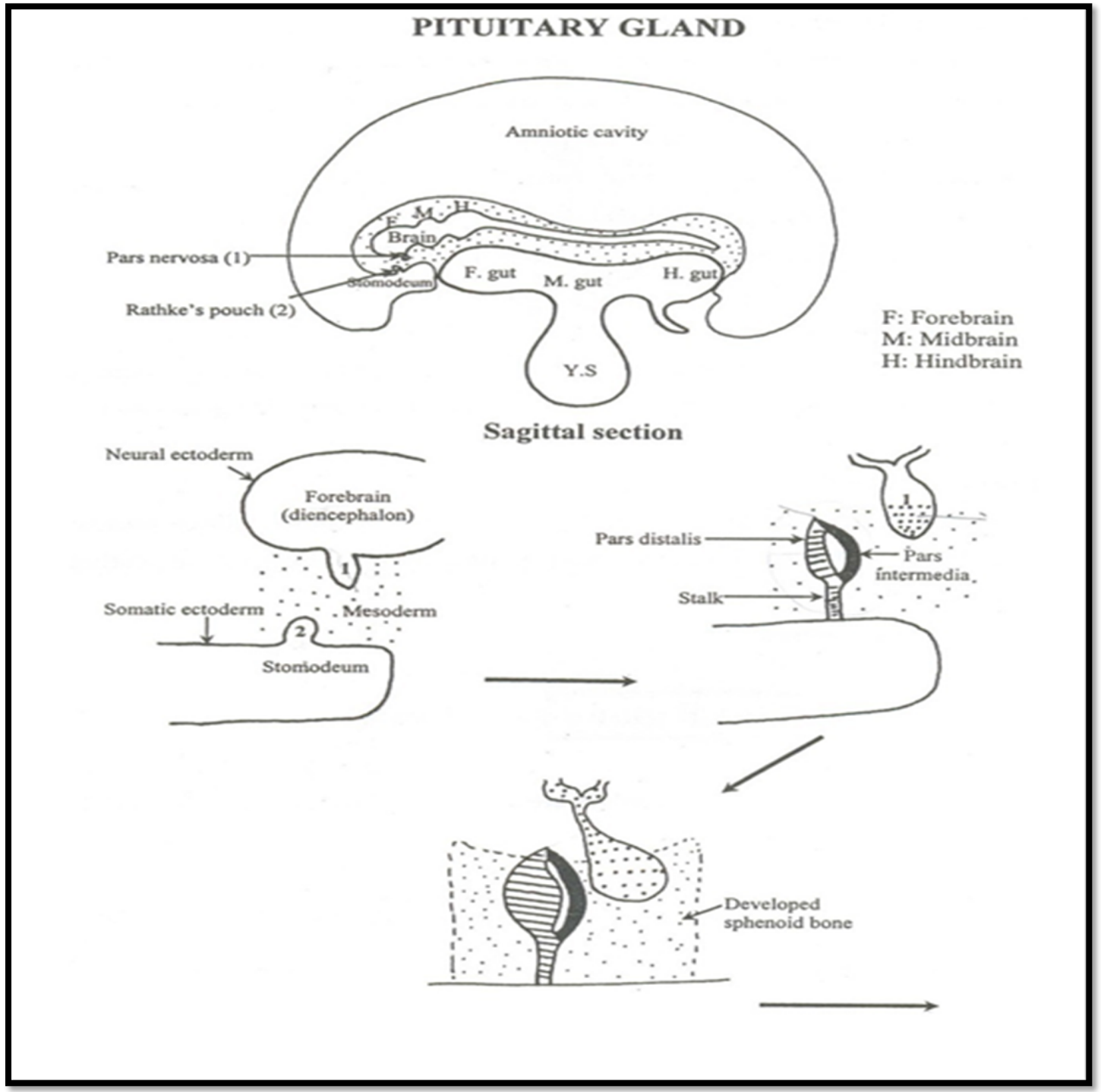
- **The hypophysis is an amalgam of two tissues. Early in gestation a bud of ectoderm grows upward from the roof of the mouth. This protrusion is called *Rathke's pouch* and will develop into the anterior pituitary or adenohypophysis.**
- **At the same time, another bud of neuroectodermal tissue evaginates ventrally from the diencephalon of the developing brain. This extension of the ventral brain will become the posterior pituitary or neurohypophysis. Ultimately, the two tissues grow into one another and become tightly apposed, but their structure remains distinctly different, reflecting their differing embryological origins.**



1- Cranial primordium:

- Give the Pars nervosa that grows caudally behind Rathke's pouch. Its stalk is called infundibulum.
- **2- Buccal primordium:**
- *Rathke's pouch→ grows DORSALLY→ Rathke's stalk→ degenerates.
- The anterior wall of the pouch→ thickened→ pars distalis & the posterior wall → thinner → pars intermedia.
- Pars distalis give extension surrounds the infundibulum→ pars tuberalis.



Adenohypohysis:

Pars distalis - the largest section

Pars tuberalis - a collar of tissue that usually surrounds the infundibular stalk

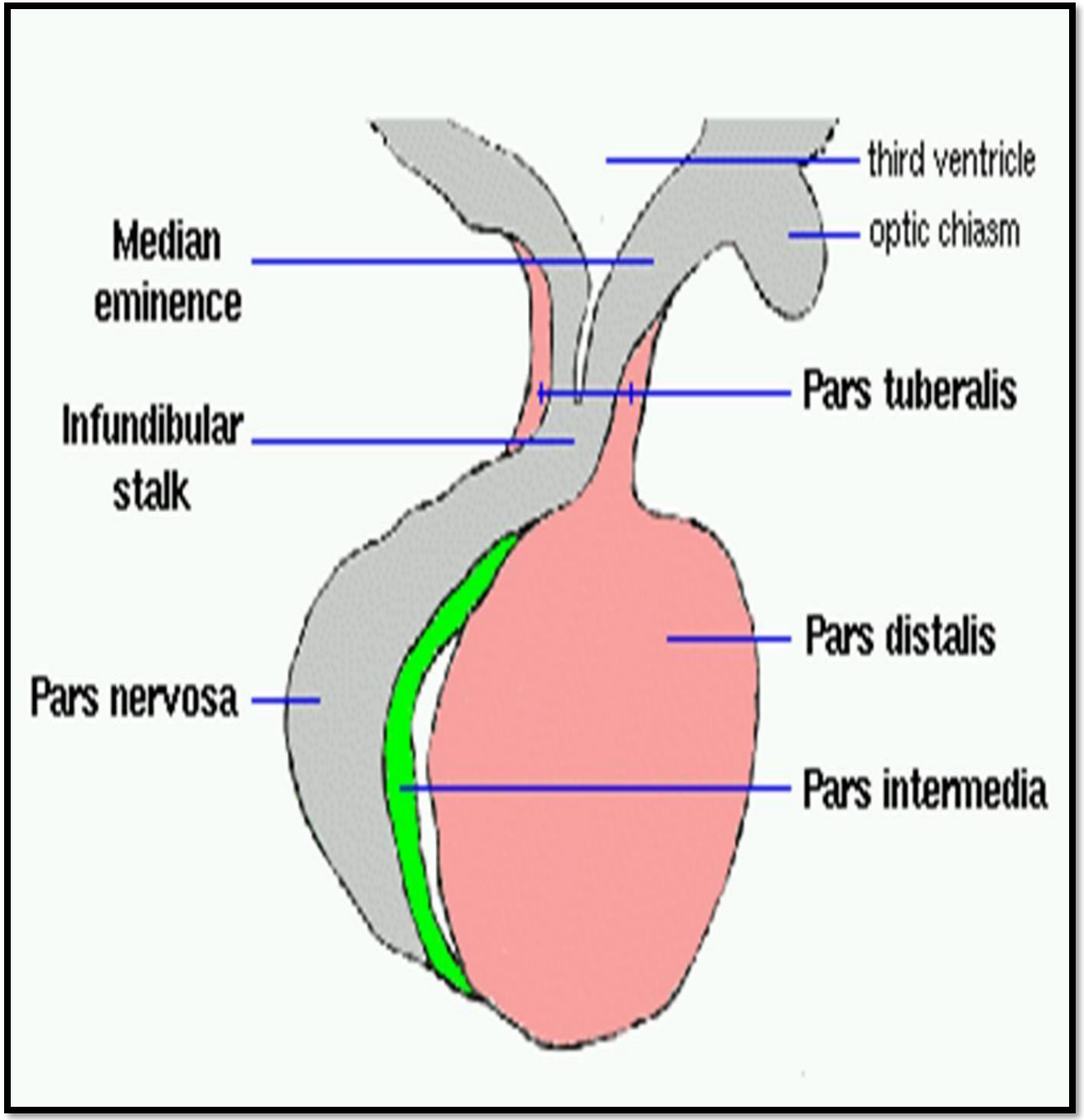
Pars intermedia - a narrow band that is usually separated from the pars distalis by a hypophyseal cleft

Neurohypohysis:

Pars nervosa - the bulk of the posterior pituitary

Median emminence - the upper section of the neurohypophysis above the pars tuberalis

Infundibulum- the "stem" that connects the pars nervosa to the base of the brain



Congenital anomalies:

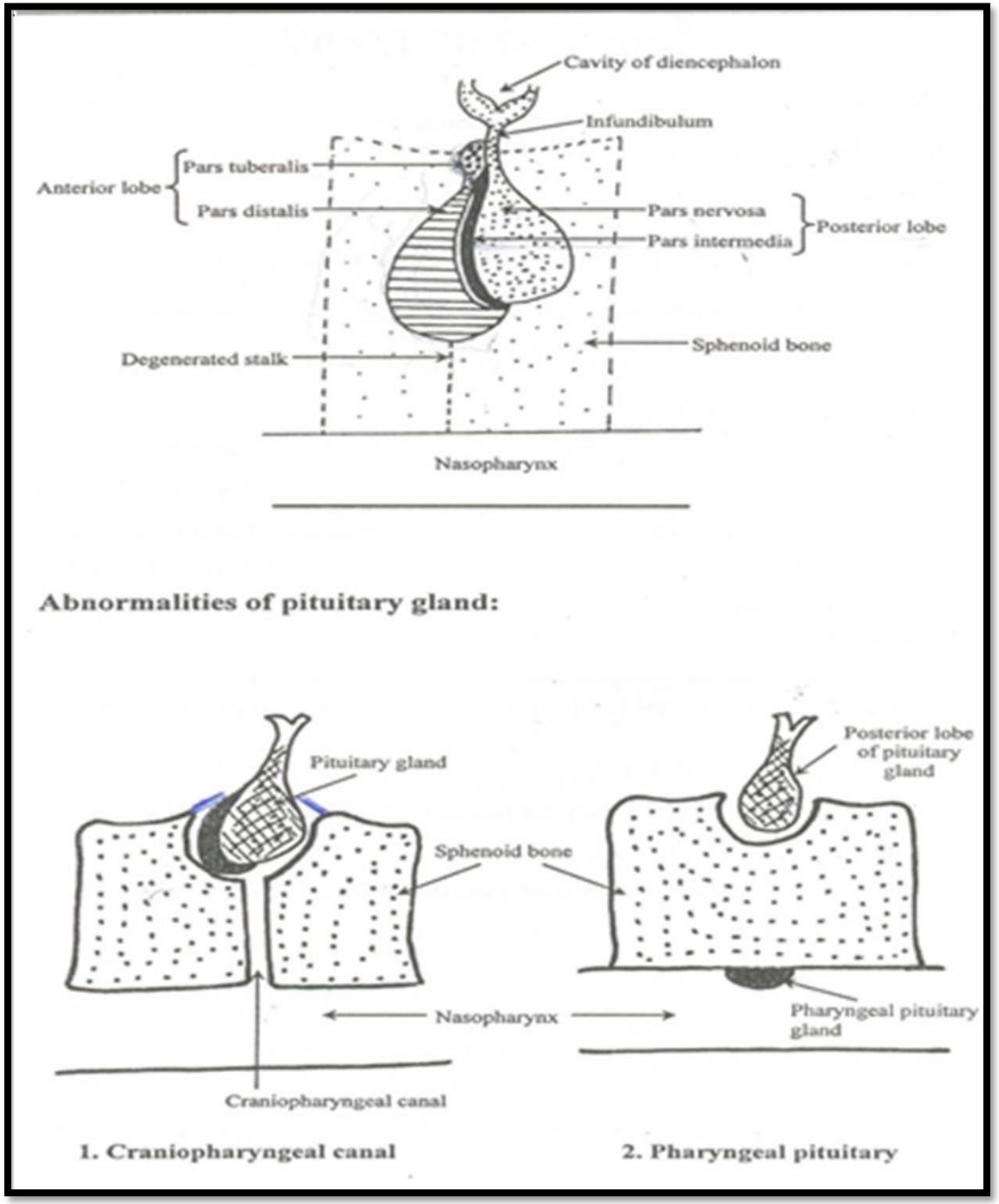
1-Craniopharyngeal canal: Due to failure of degeneration of the Rathke's stalk→ communication between the nasopharynx and hypophyseal fossa→ infection to the brain (fatal).

2-Pharyngeal pituitary gland:

Due to failure of ascent of buccal pituitary that remain in the roof of nasopharynx→may be removed during adenoidectomy.

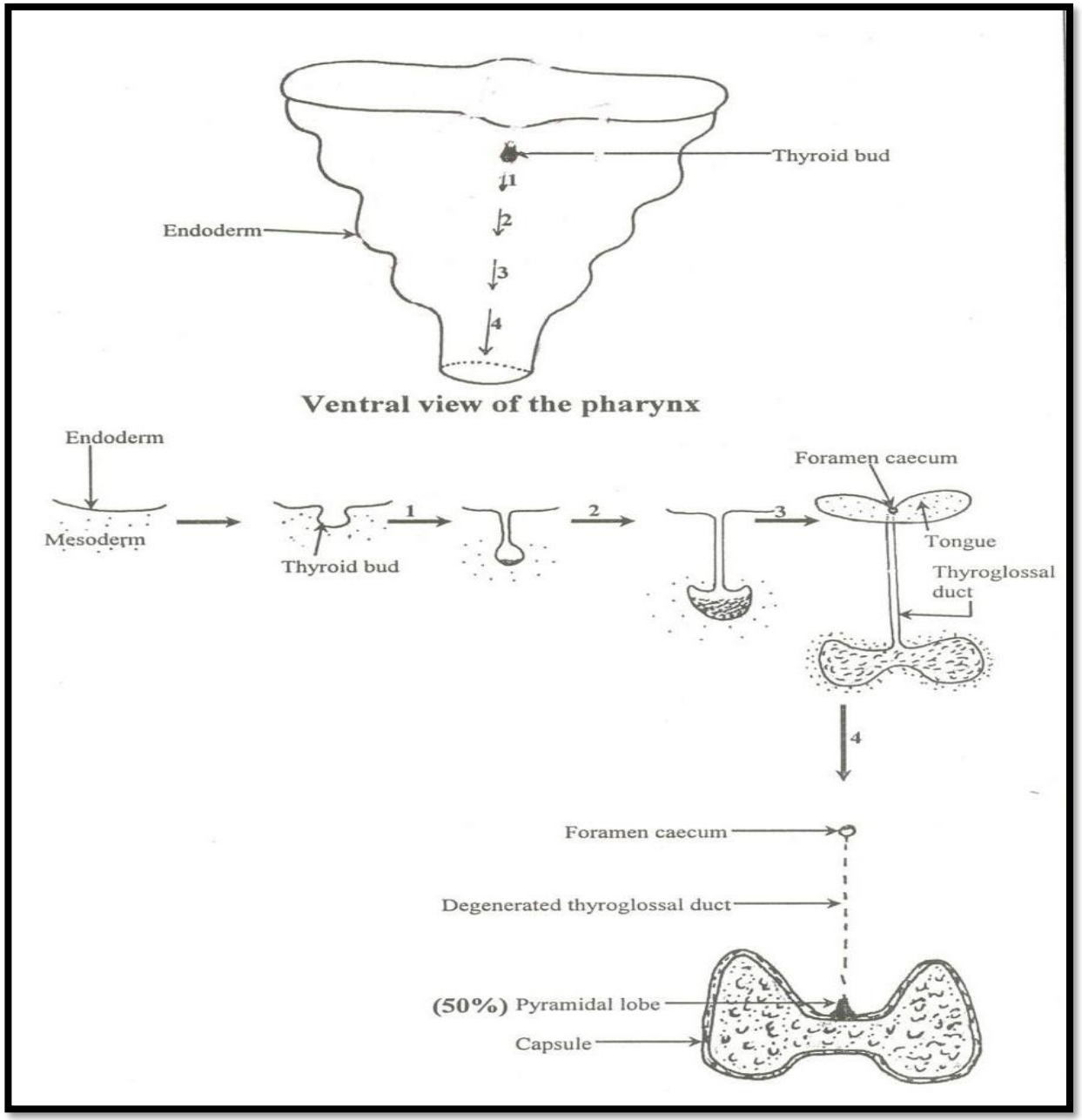
3-Agenesis of the gland

4- Craniopharyngioma due to remnants of Rathke's pouch that develop into a tumor



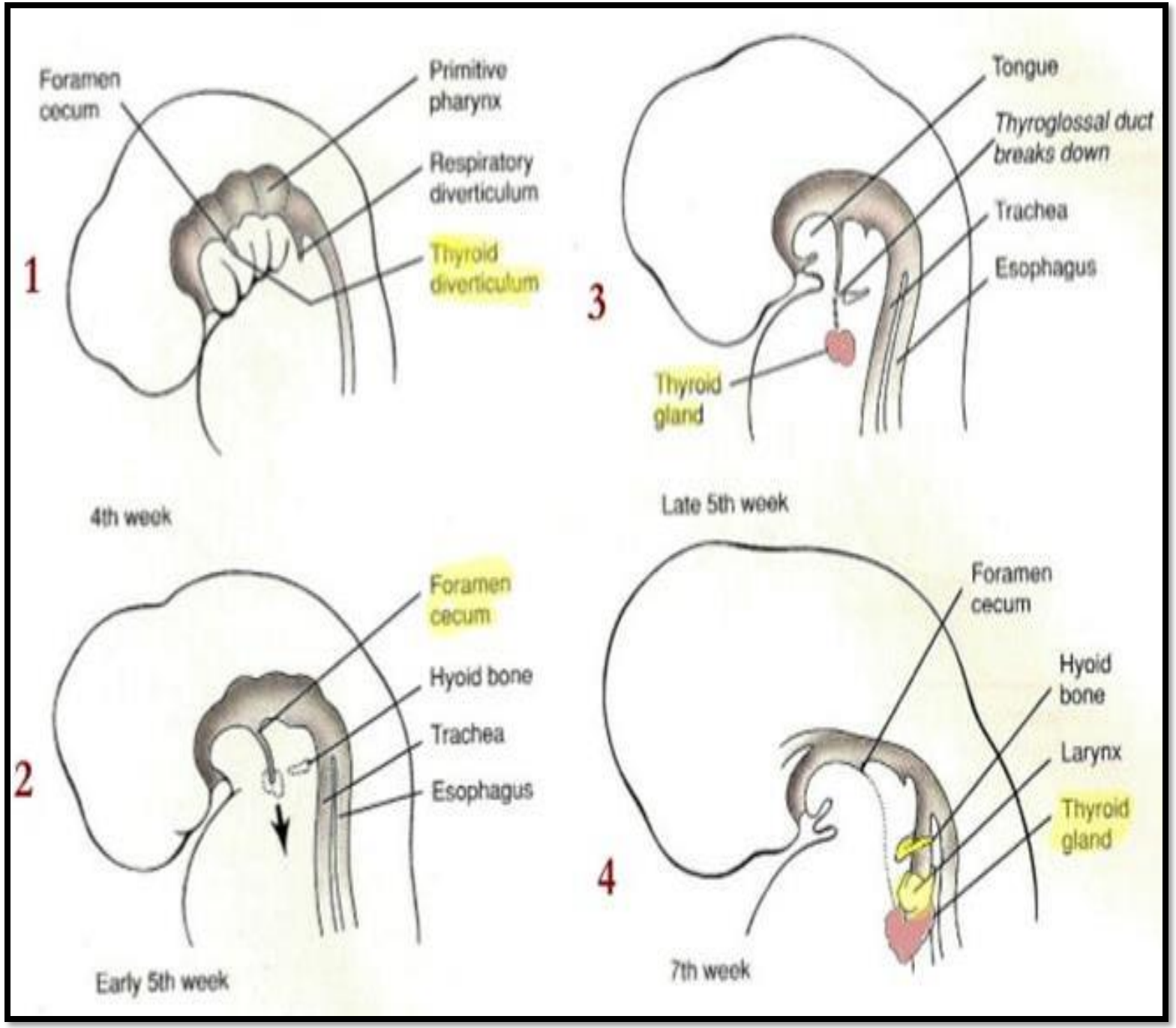
Development of thyroid gland

- ***Thyroid primordium*** **appears as a median endodermal proliferation in the floor of the pharynx between tuberculum impar and hypobranchial eminence (the site is indicated by foramen caecum in adult tongue).**
- ***This proliferation*** **is invaginated to form a bilobed diverticulum which descends ventral to the developing hyoid bone then ventral to the developing larynx. it descends caudally to the level of ultimobranchial body which prevents its further descend in the thorax**
- ***It remains*** **connected to the tongue by the *thyroglossal duct.***
- **The thyroid gland finally reaches its position by 7th week.**



Fate of the thyroglossal duct

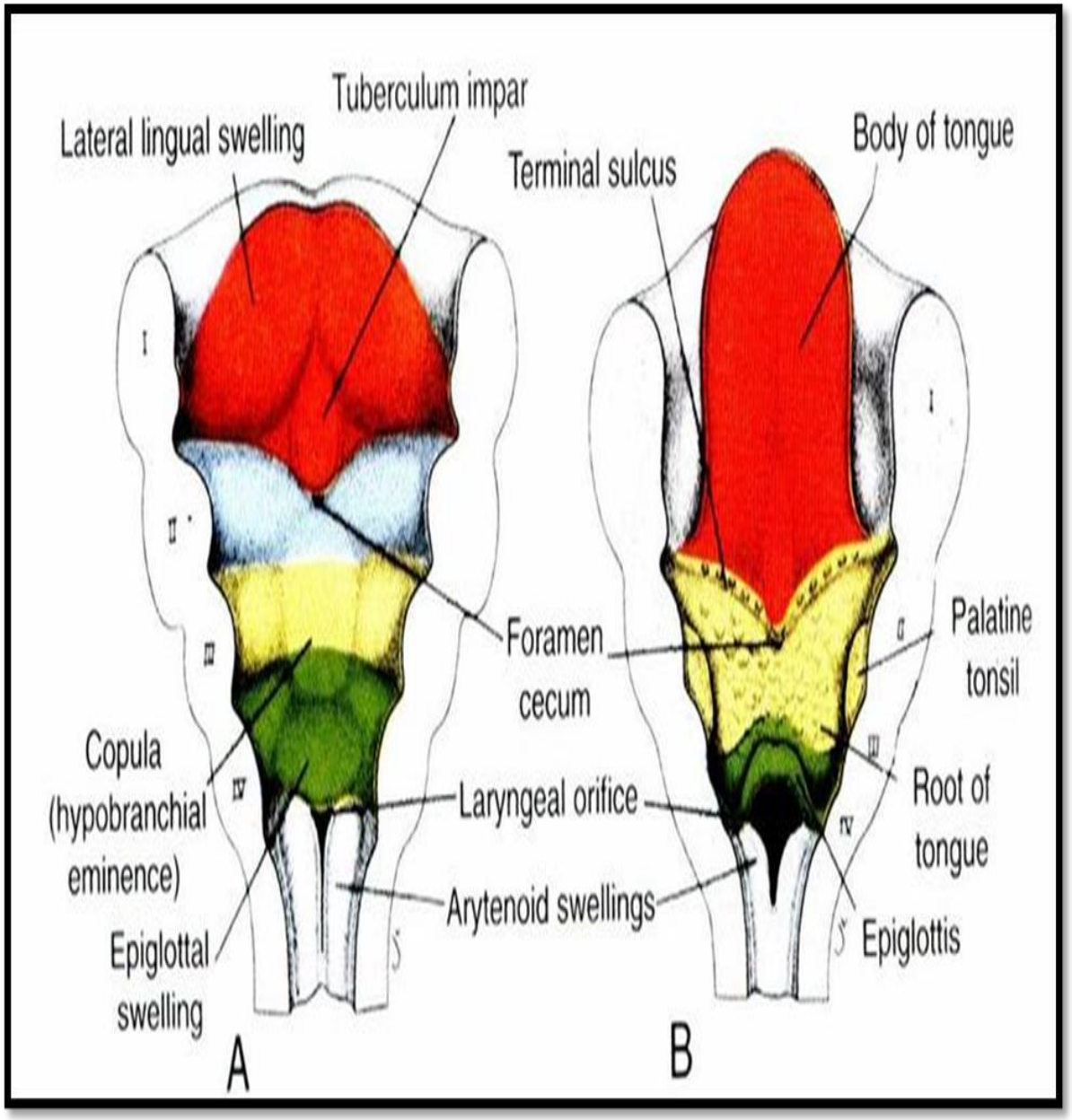
- **The part of duct between hyoid bone and isthmus of the gland gives rise to pyramidal lobe and levator glandulae thyroidea or may degenerates completely.**
- **Above the hyoid bone the duct degenerates completely.**



The thyroid follicles are derived from endodermal cells of the thyroglossal duct.

The parafollicular (C) cells are derived from the ultimobranchial body.

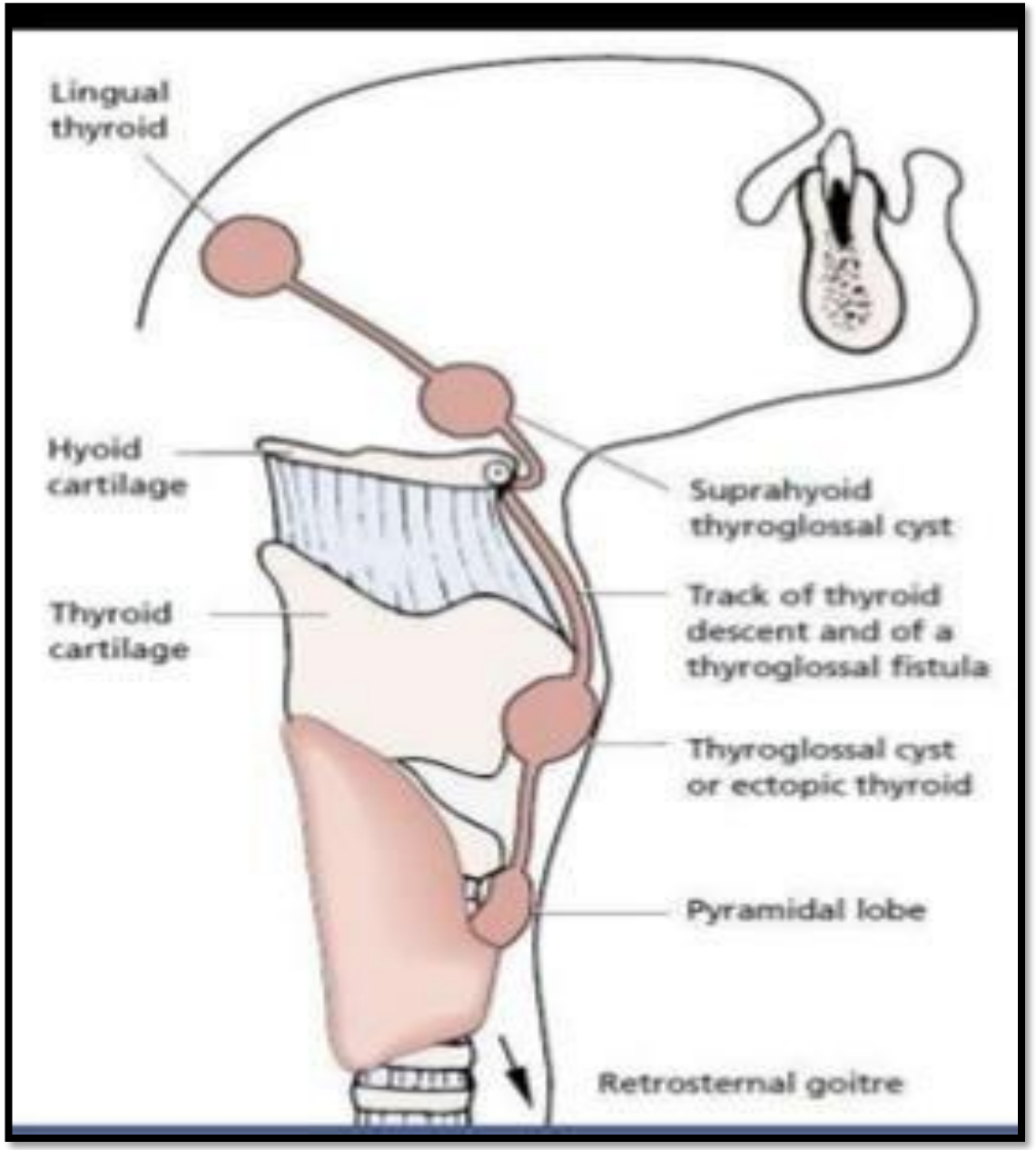
The true capsule and connective tissue septa are derived from mesoderm.

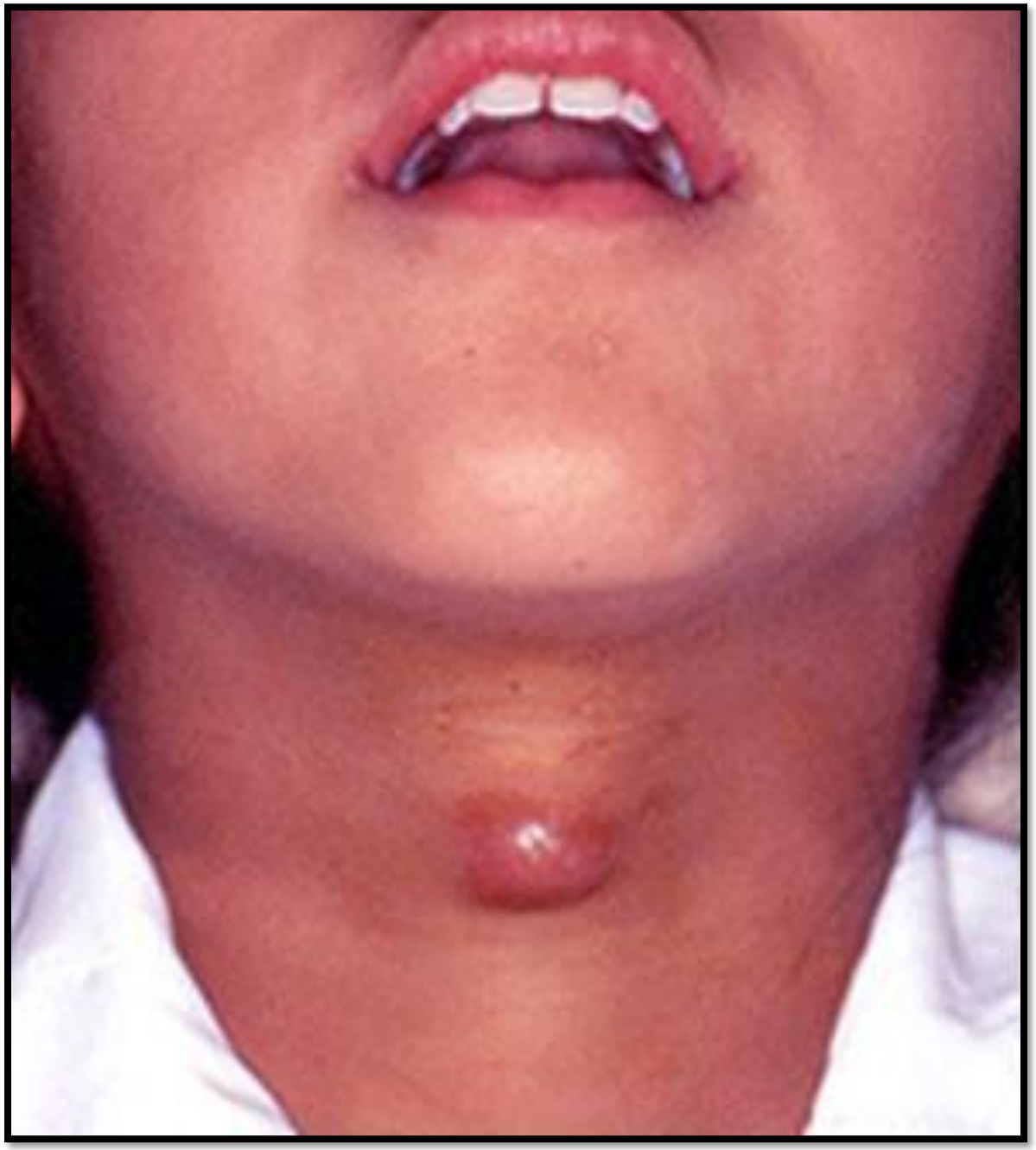


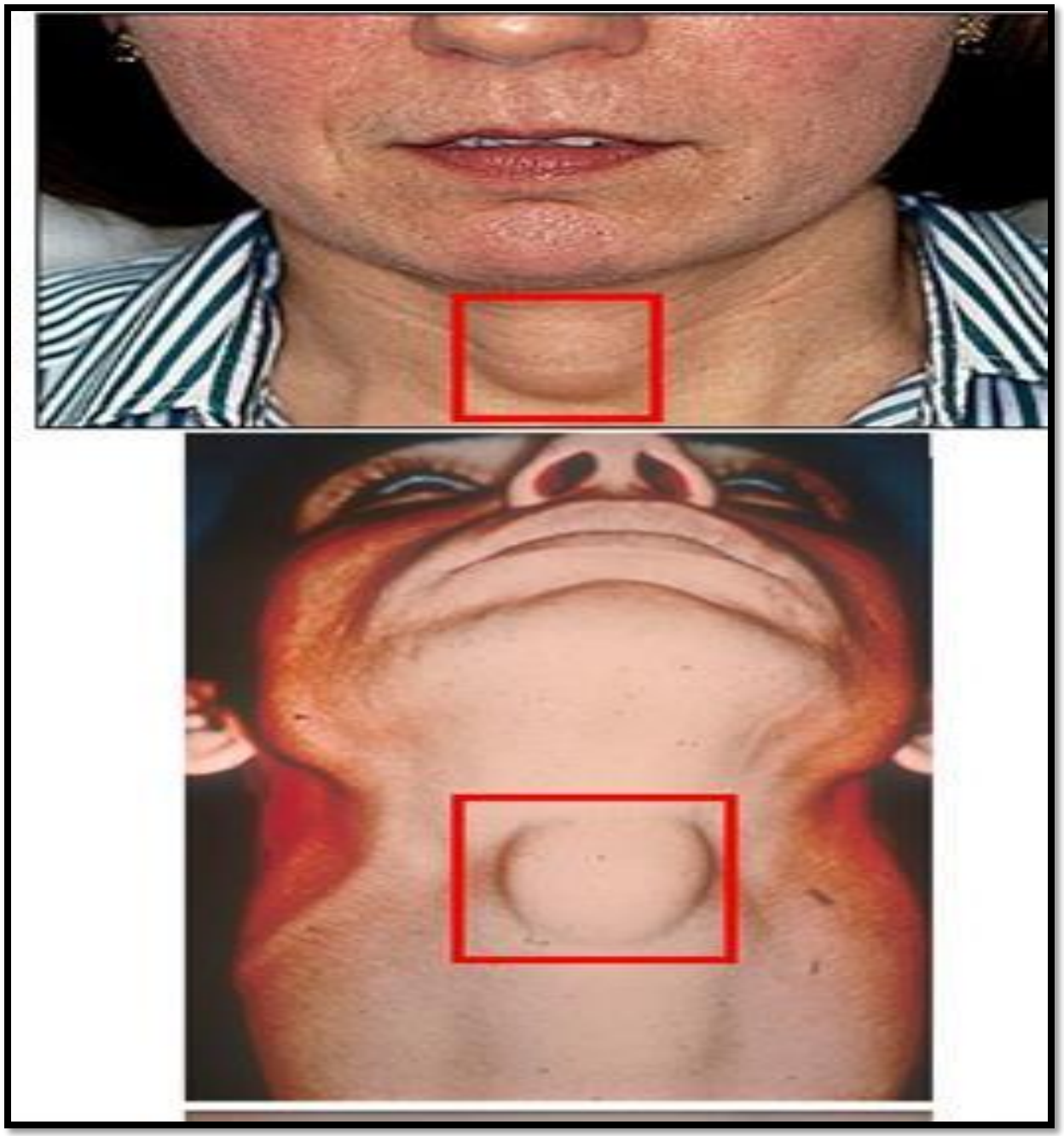
Congenital anomalies of thyroid gland

1. ***Thyroid agenesis:*** congenital absence of thyroid gland critinism.
2. ***Lingual thyroid:*** the thyroid fails to descend and lies in the substance of tongue.
3. ***(retrosternal thyroid):*** the thyroid descends to reach thorax.
4. ***Thyroglossal cyst :*** due to persistence ,patency of a part of the thyroglossal duct.
5. ***Thyroglossal fistula:*** It is acquired due to rupture of infected cyst leading to communication between the thyroglossal duct and skin of neck.

-Thyroglossal cyst & fistula moves with deglutition & protrusion of tongue .

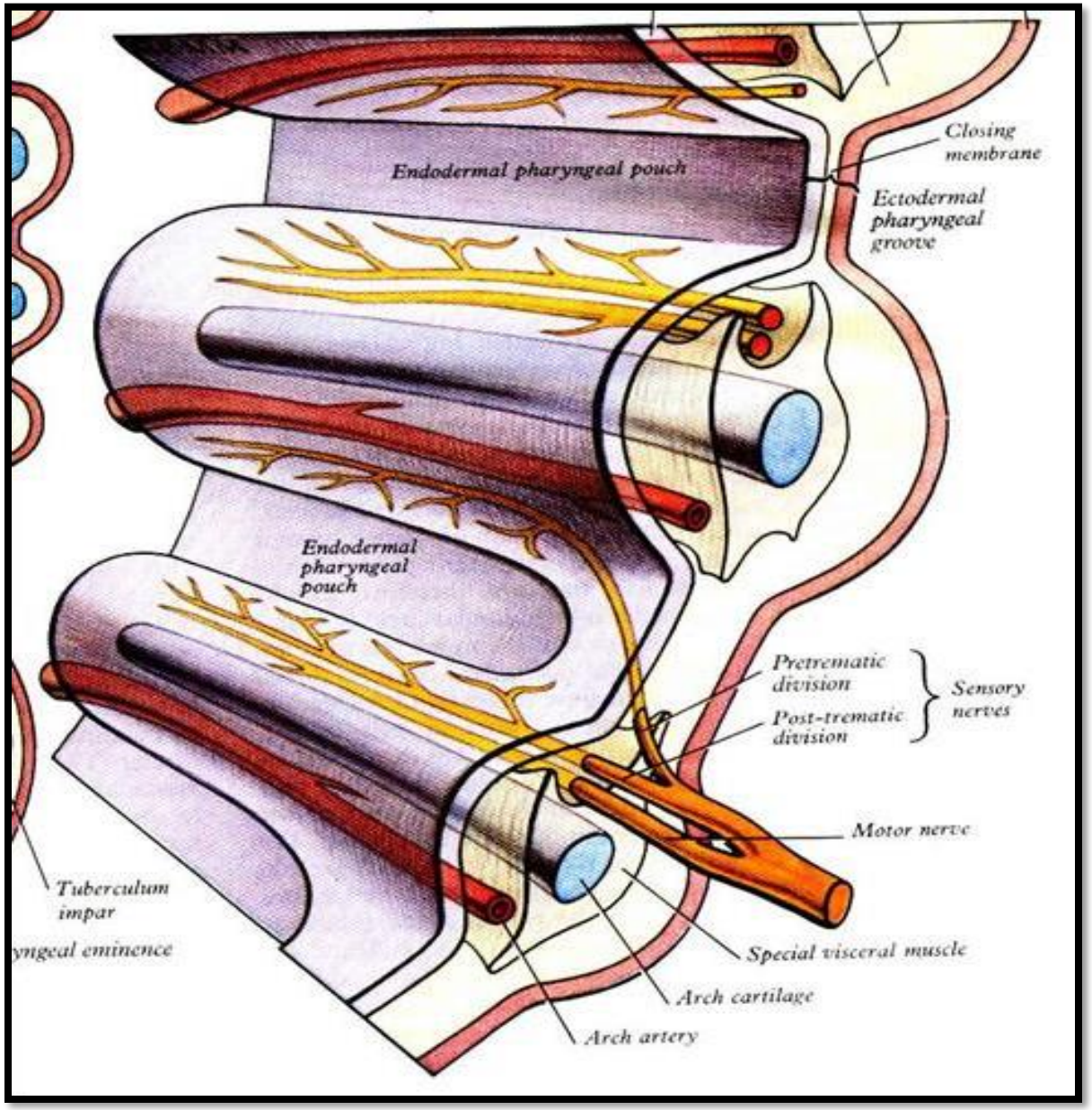




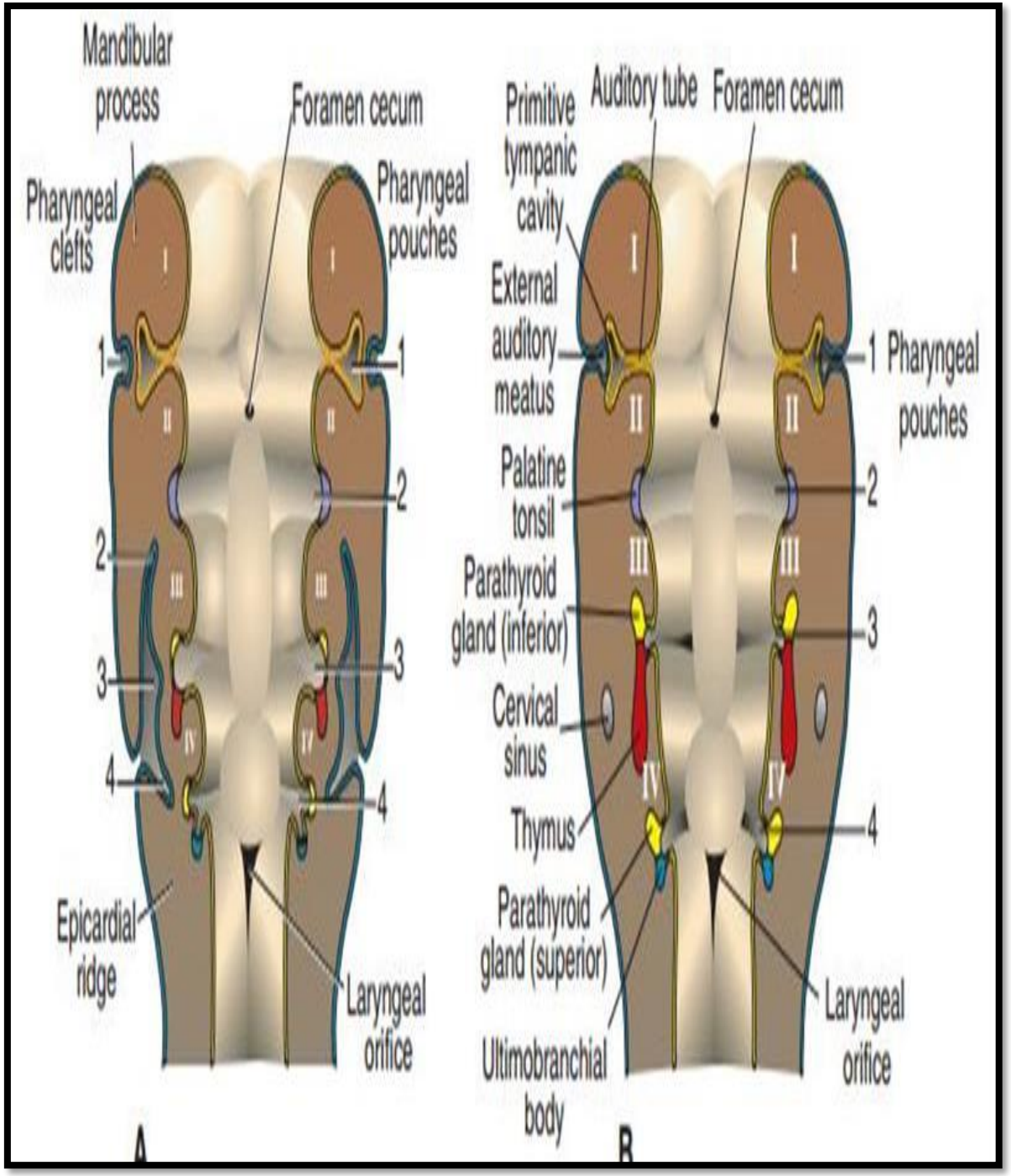


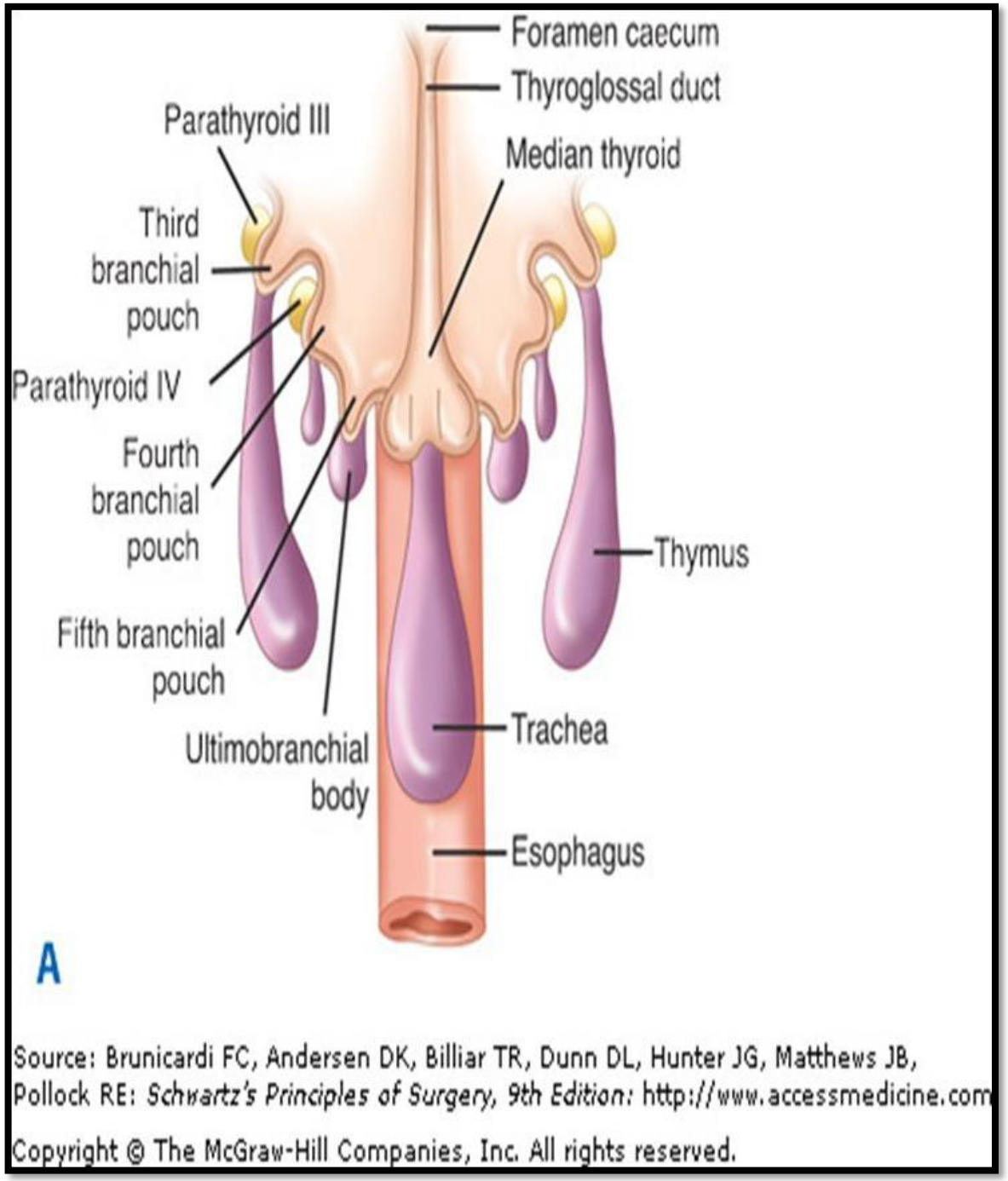
Development of Parathyroid gland

- The most typical feature in development of the head and neck is formed by the **pharyngeal or branchial arches**.
- These arches appear in the 4th and 5th weeks of development.
- There are ***6 pharyngeal arches*** which are separated from each other:
  - Externally by 4 ***pharyngeal clefts.***
  - Internally by 5 ***pharyngeal pouches.***

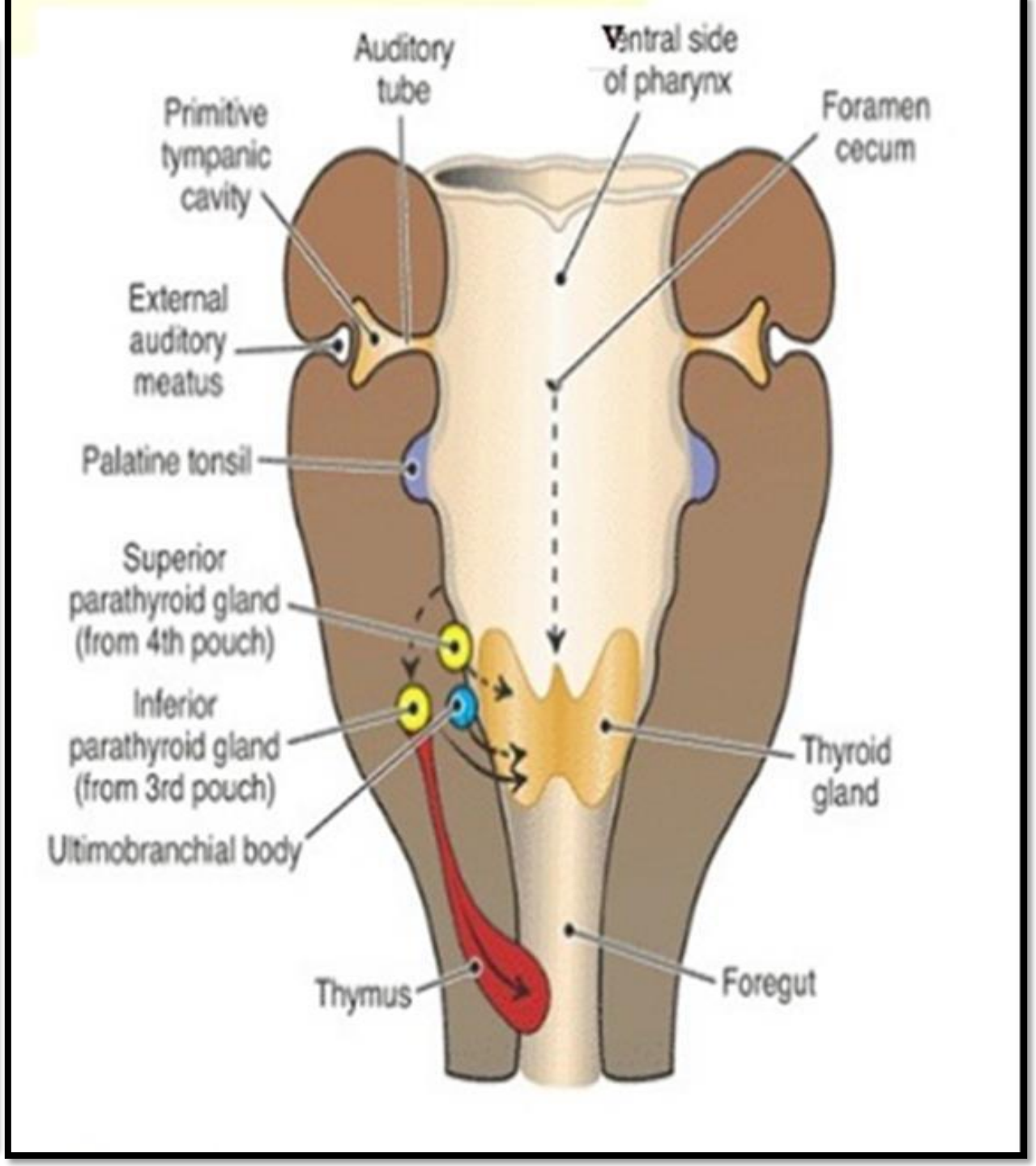


- ***DERIVATIVES OF THE PHARYNGEAL POUCHES (ENDODERM)***
- ***3rd pouch***
- The 3rd pouch forms the ***inferior parathyroid gland &*** the ***thymus gland.***
- Both gland primordia lose their connection with the pharyngeal wall and then the thymus migrates pulling the inferior parathyroid gland with it.
- ***4th pouch***
- The 4th pouch forms the superior parathyroid gland.
- ***5th pouch***
- It gives rise to the ultimobranchial body, which is later incorporated into thyroid gland & gives rise to the parafollicular (C) cells of the thyroid gland.





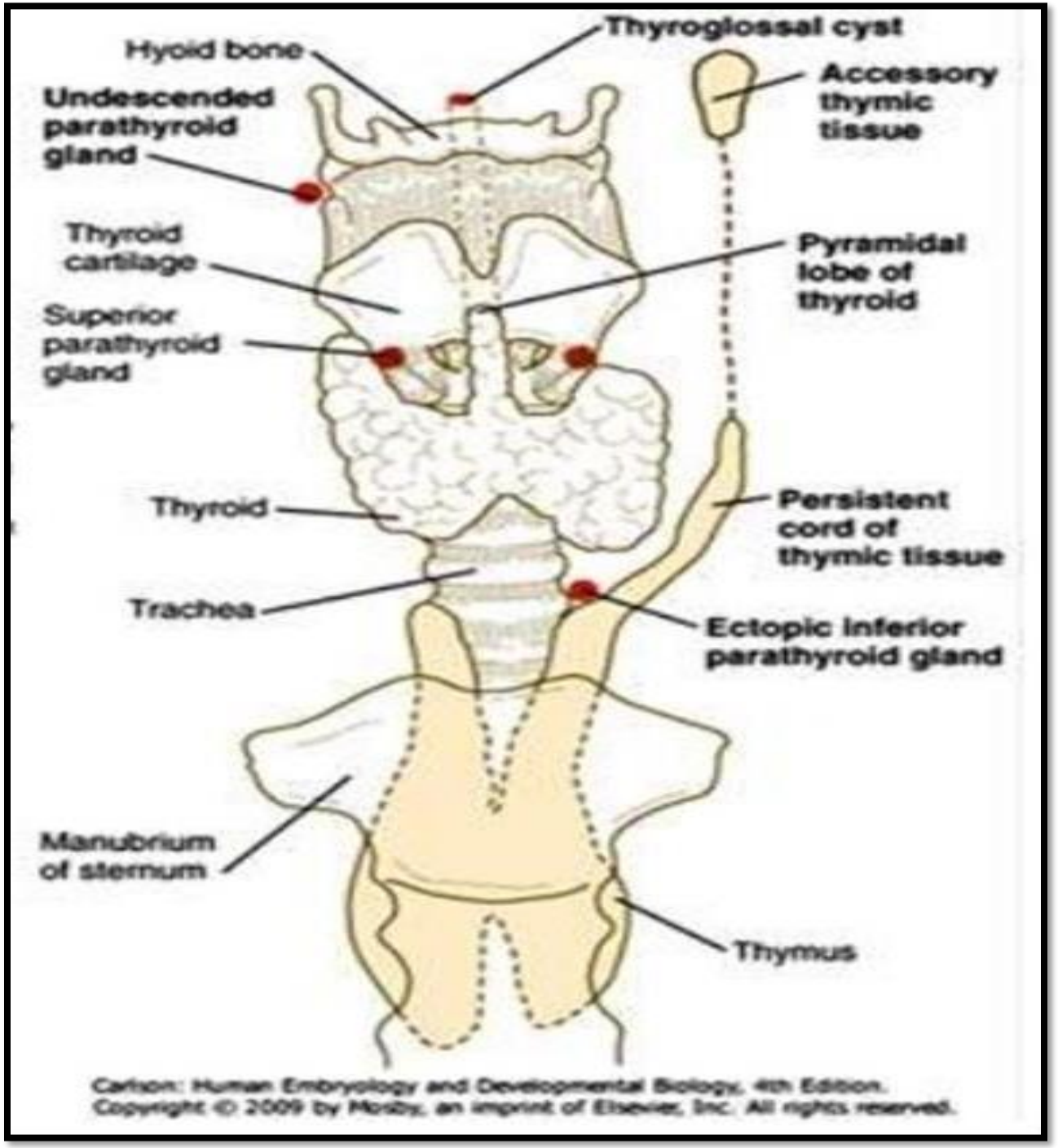
Source: Brunicardi FC, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, Pollock RE: *Schwartz's Principles of Surgery, 9th Edition:* http://www.accessmedicine.com



- ***CONGENITAL ANOMALIES OF THE PARATHYROID GLANDS:***

1-Parathyroid agenesis: congenital absence of parathyroid glands.

2 -Ectopic parathyroid tissues : **retropharyngeal , retro esophageal , related to carotid sheath , mediastinal , thymic or intrathyroidal .**



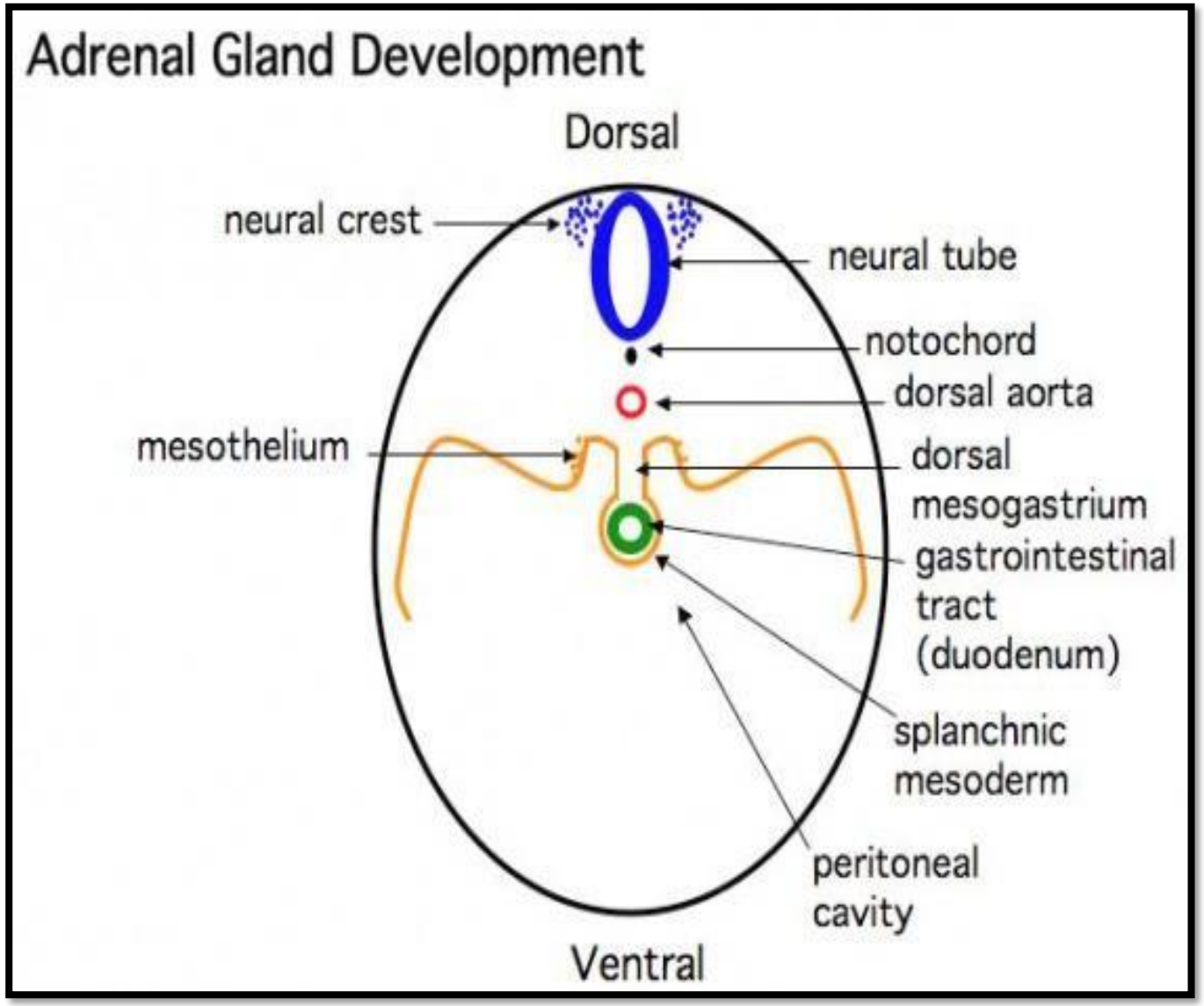
DEVELOPMENT OF THE SUPRARENAL GLAND

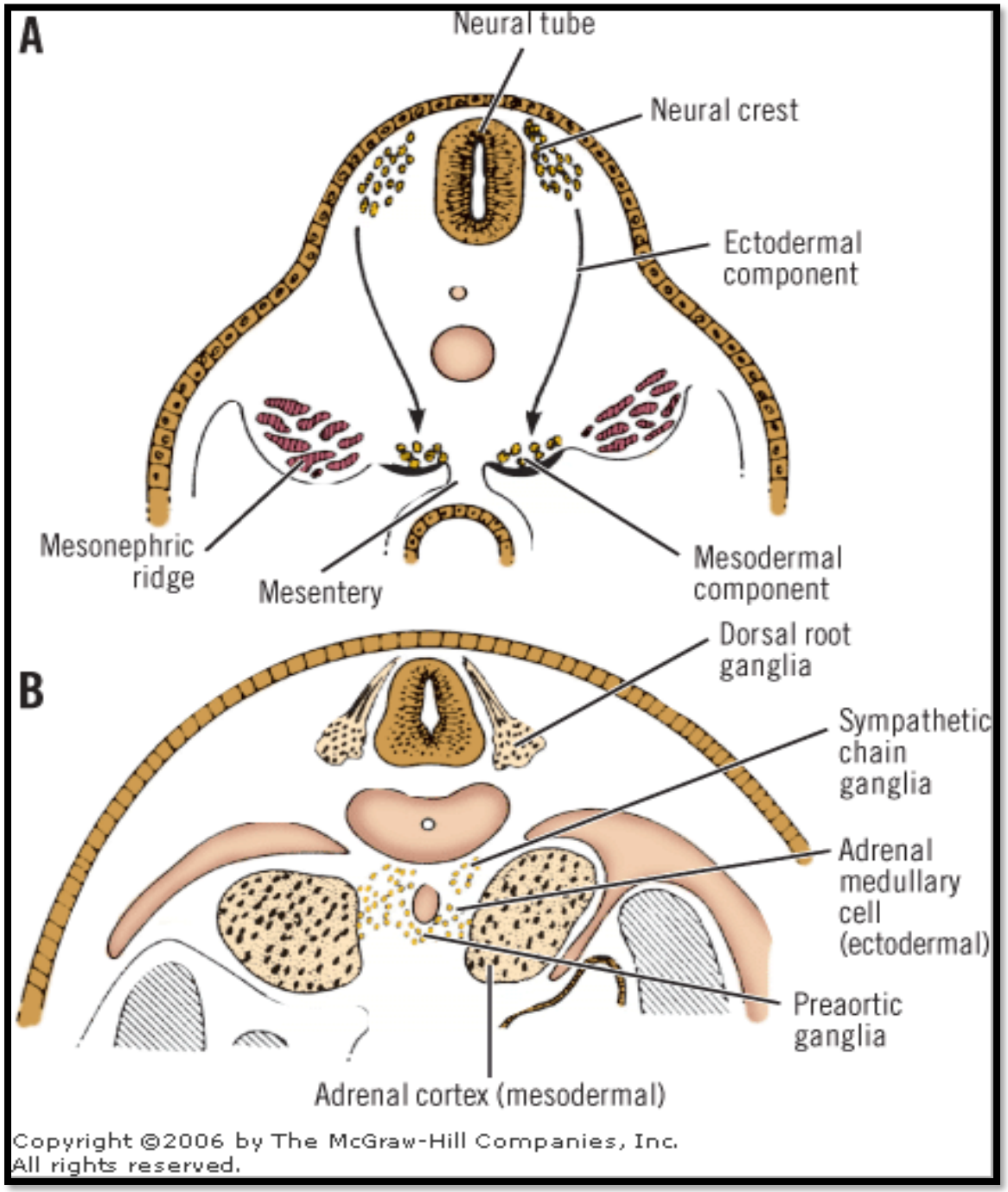
•**The suprarenal cortex:** is **mesodermal** in origin.

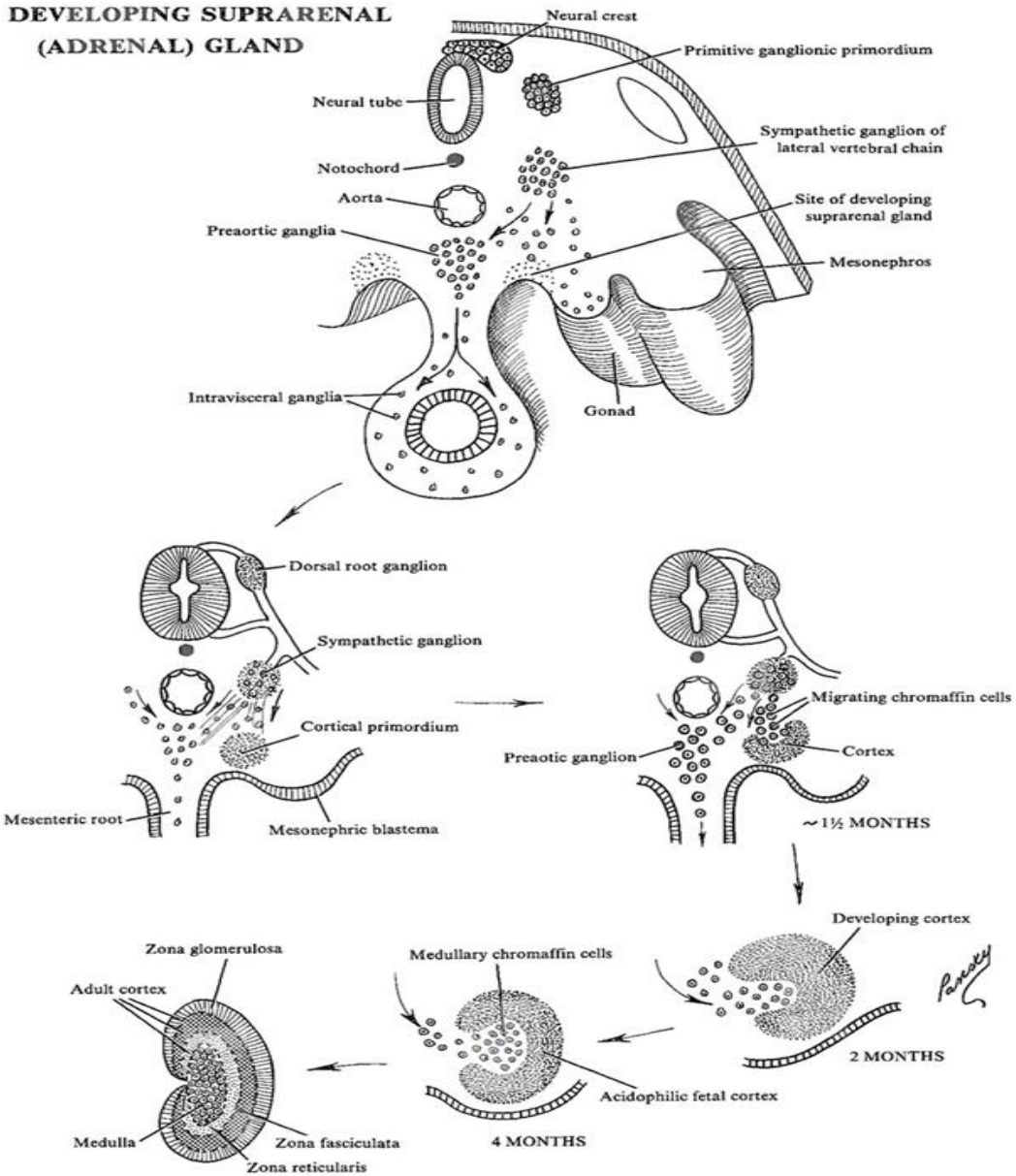
- During the 5th week , mesothelial cells of the coelomic epithelium on either side of the mesentery of the gut proliferate to form the **fetal cortex.**
- A second layer of cells develop from the coelomic mesothelium and surround the fetal cortex to form the **permanent cortex**.

•***The suprarenal medulla:** is **ectodermal** in origin.

- **Chromaffin cells** derived from the neural crest migrate to enter the medial aspect of the fetal cortex and form the suprarenal medulla.

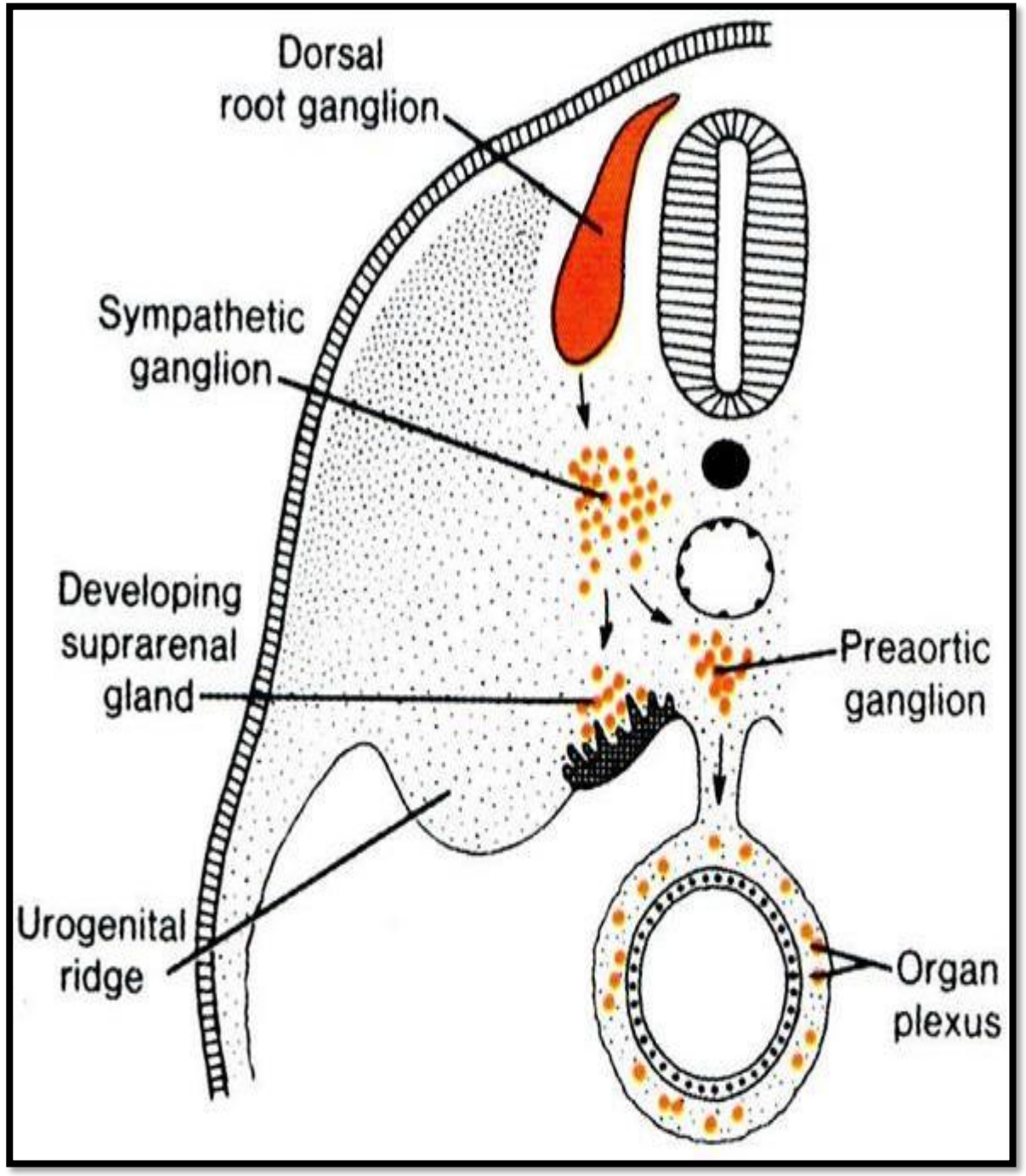


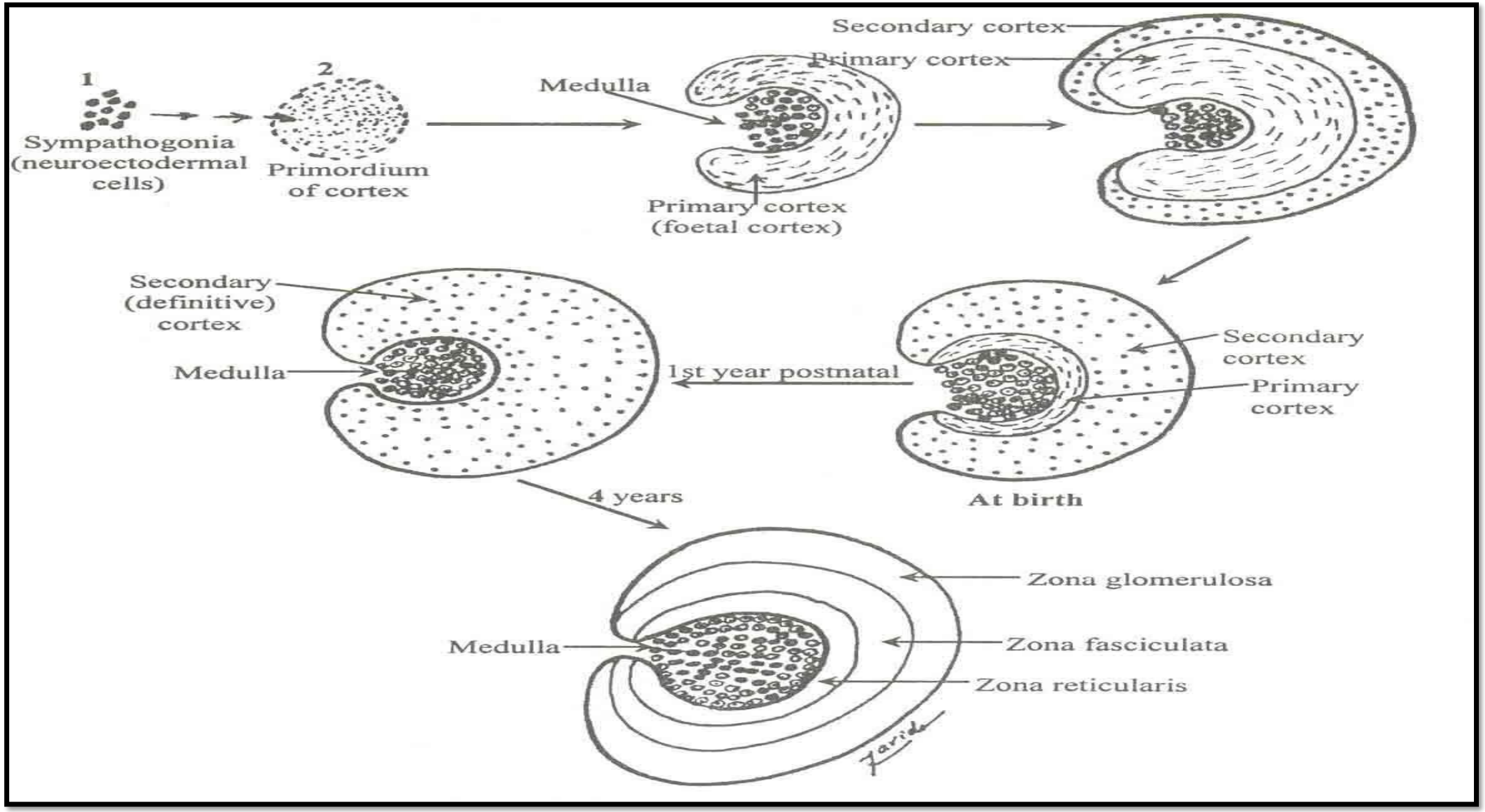




FATE:

- The **fetal cortex** regresses rapidly except its outer layer which differentiated into **zona reticularis**.
- **The permanent cortex** differentiates into **zona glomerulosa and zona fasciculate**.
- Zona glomerulosa and zona fasciculate are present at birth while zona reticularis not recognizable until the end of third year.




1
2
Sympathogonia
(neuroectodermal
cells)
Primordium
of cortex
Medulla
Primary cortex
(foetal cortex)
Secondary cortex
Primary cortex
Secondary
(definitive)
cortex
Medulla
1st year postnatal
Secondary
cortex
Primary
cortex
At birth
4 years
Zona glomerulosa
Medulla
Zona fasciculata
Zona reticularis
Zarida

Congenital anomalies

1 Ectopic suprarenal gland:

May be found under the capsule of kidney.

2 Accessory medullary tissues:

Sympathetic ganglion → neuroectodermal cells→ beside the abdominal aorta or the sympathetic trunk.

3 Accessory cortical tissue:

- **Around the suprarenal gland**
- **In broad ligament of uterus**
- **In gastrosplenic ligament**

4- Agenesis or hypoplasia.

5-CONGENITAL ADRENAL HYPERPLASIA:

It is a genetic disorder associated with excess ACTH secretion by the pituitary leading to hypertrophy of suprarenal cortex and over production of androgens.

It results in pseudohermaphrodism in the female.


THANK YOU FOR YOUR ATTENTION
FINALLY OVER!