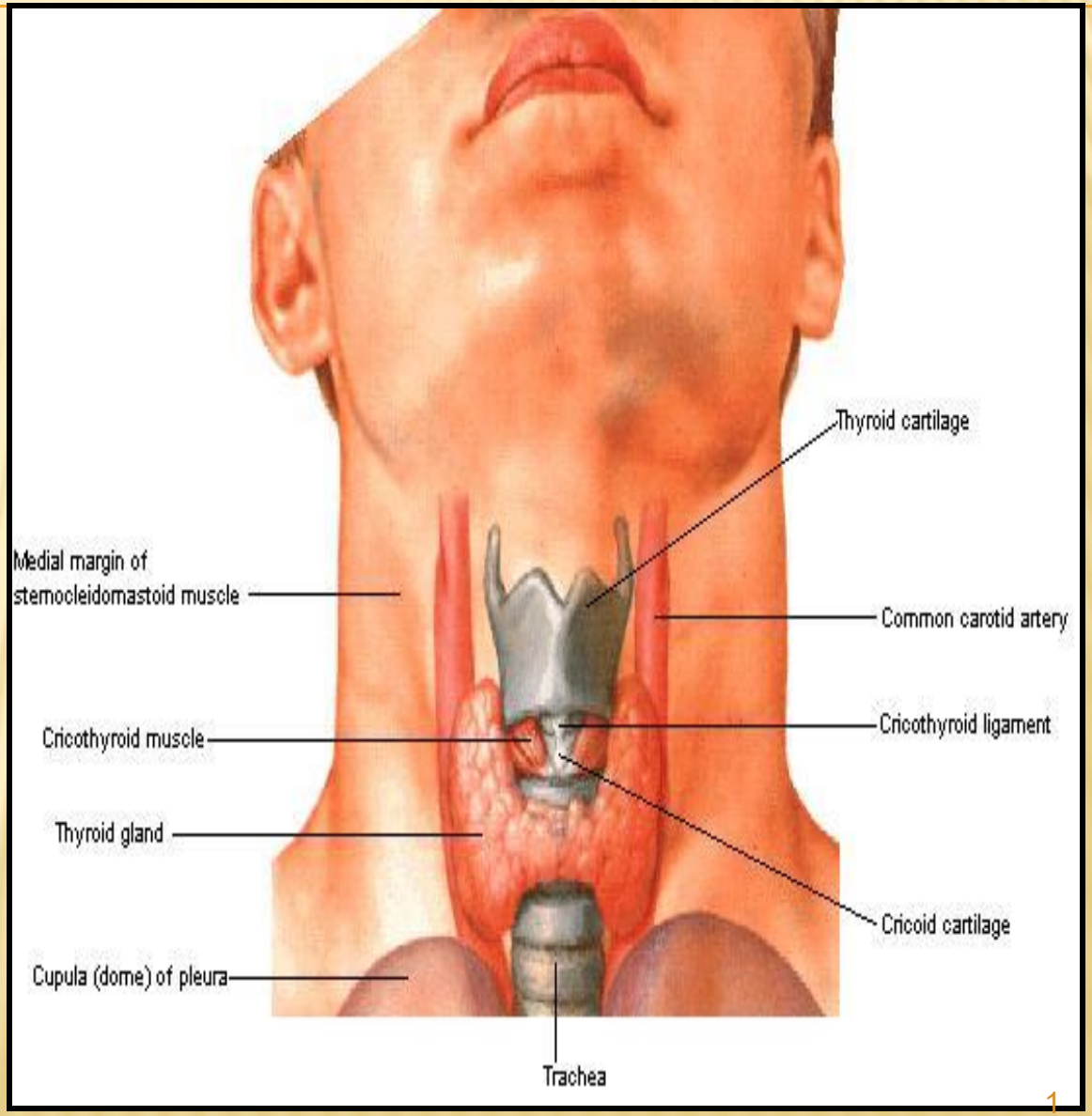
THYROID & PARATHYROID



Prof . Saeed Abuel Makarem

OBJECTIVES

By the end of the lecture, you should be able to:

- Describe the shape, position, and relations of the thyroid and parathyroid glands.
- List the blood supply & lymphatic drainage of the thyroid and parathyroid glands..
- List the nerves endanger with thyroidectomy operation.
- Describe briefly the **development** of the thyroid & parathyroid glands.
- Describe the **most common congenital anomalies** of the thyroid gland.

Before we go to the thyroid !!!

What are the layers of the **deep cervical fascia** of the neck?

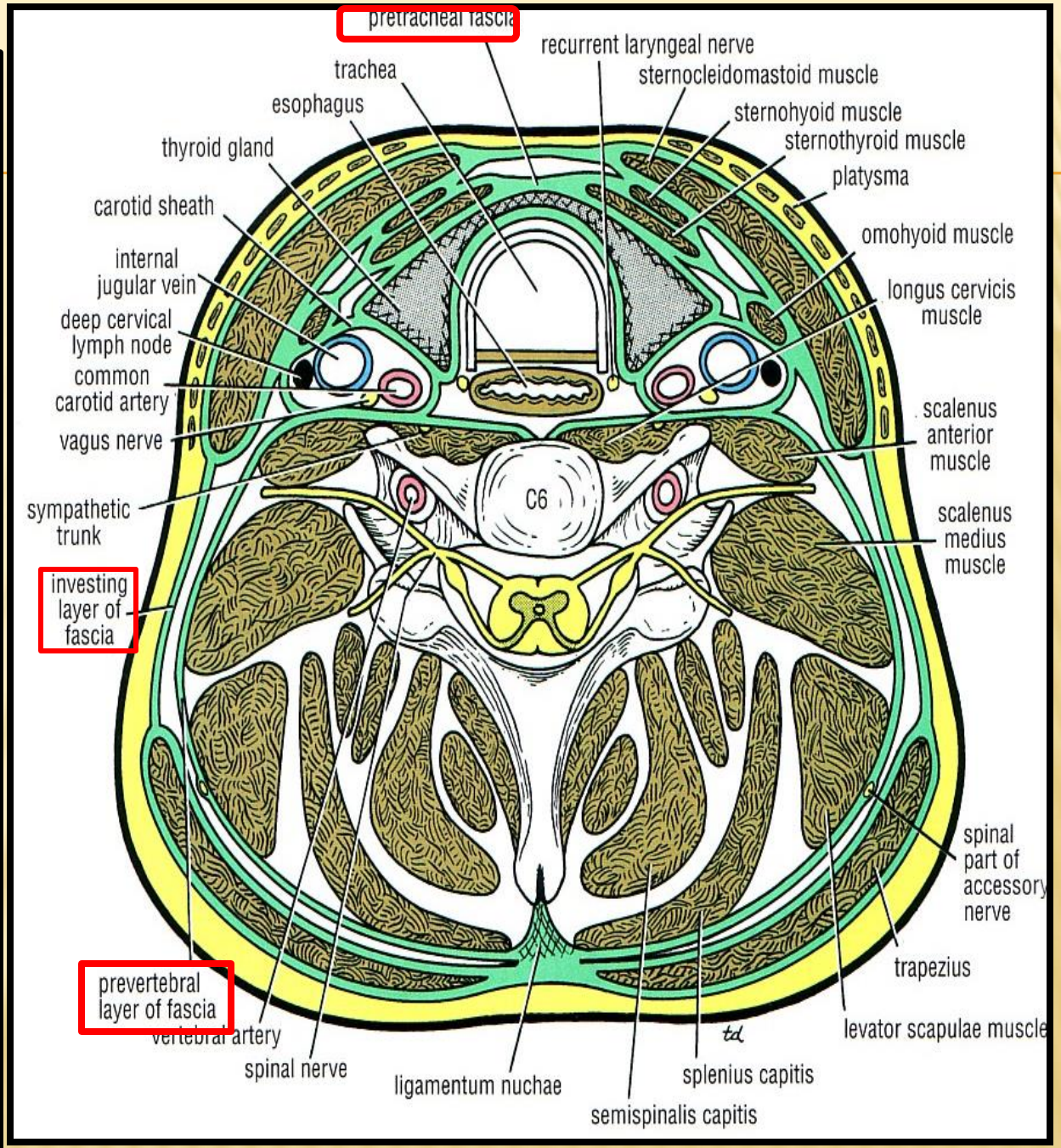
It is divided into 3 main layers:

1- Investing layer.

2- Pretracheal layer.

3- Prevertebral layer.

Also the carotid sheath is a part of deep cervical fascia of the neck.

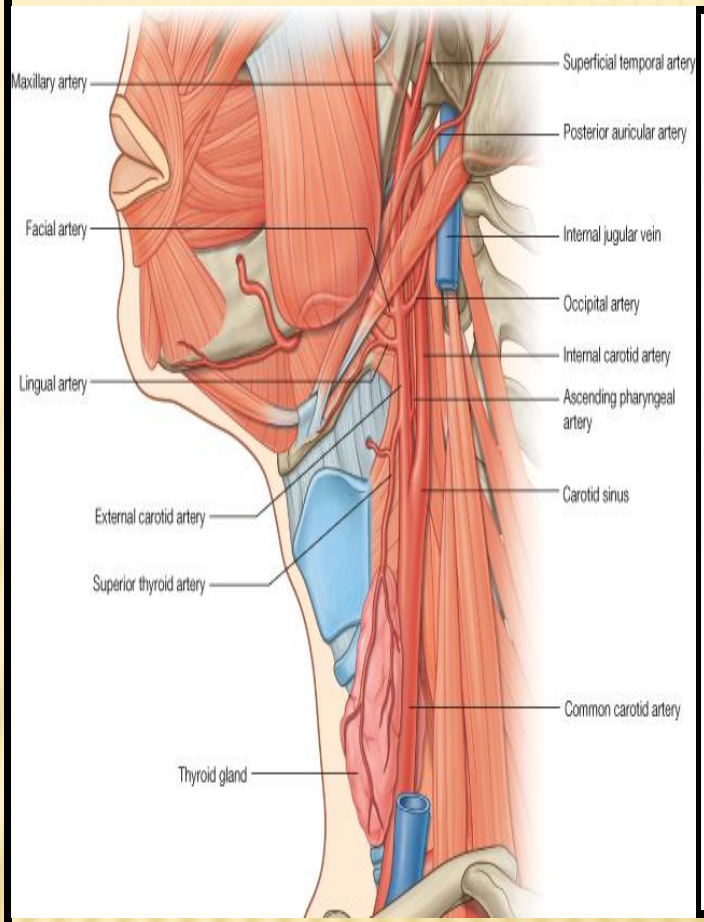


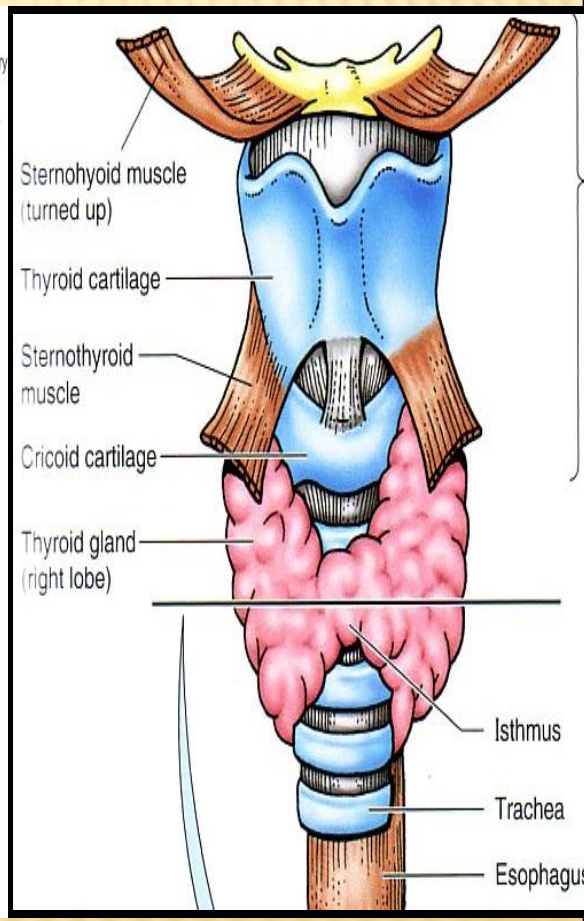
Thyroid gland

- **Endocrine**, butterfly shaped gland.
- Consists of right & left lobes.
- The **2 lobes** are connected to each other by a narrow **isthmus.**
- The isthmus overlies the **2nd 3rd & 4th tracheal rings.**
- The gland is surrounded by a facial sheath derived from the pretracheal layer of the deep cervical fascia.
- What is its Clinical importance?

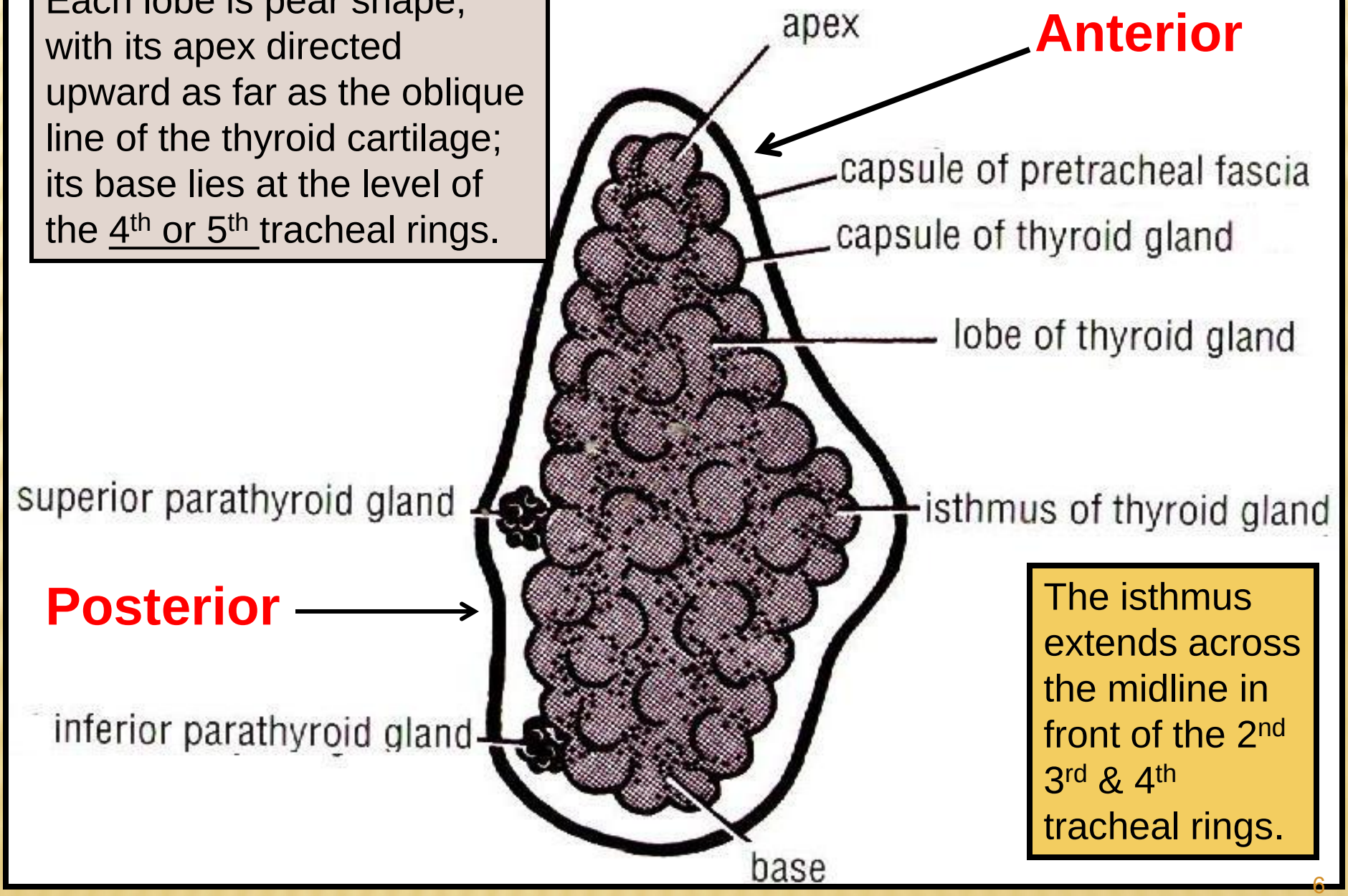
Thyroid gland

- Each lobe is pear-shaped, with its apex reaches up to the **oblique line** of thyroid cartilage.
- Its base lies at the level of *4th or 5th* tracheal rings.
- Inside the pretracheal facial capsule, there is another capsule.
- So, it is surrounded by 2 membranes.





Each lobe is pear shape, with its apex directed upward as far as the oblique line of the thyroid cartilage; its base lies at the level of the 4th or 5th tracheal rings.

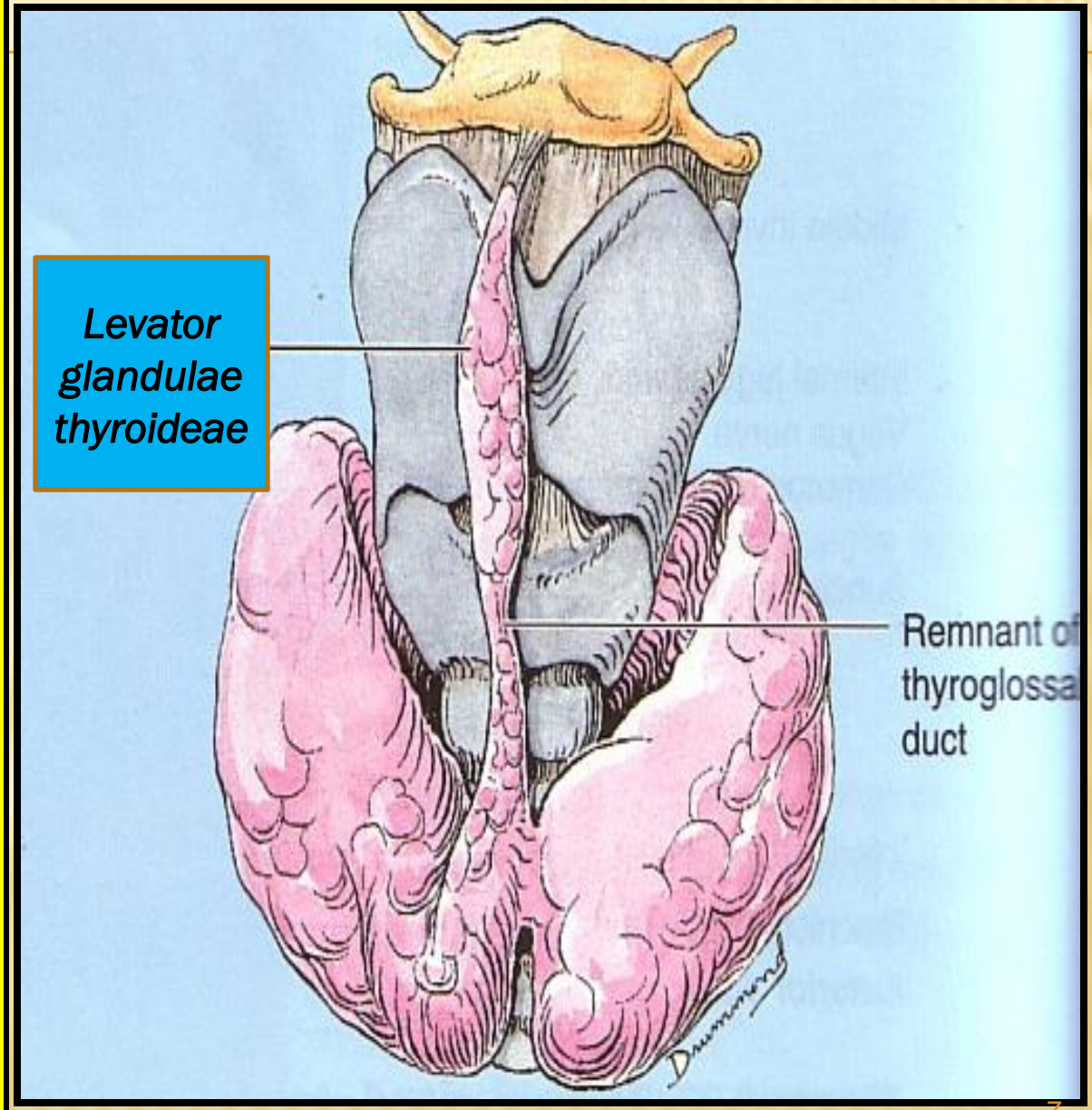


The isthmus extends across the midline in front of the 2nd 3rd & 4th tracheal rings.

A 3rd small pyramidal lobe is often present which projects from the upper border of the isthmus slightly to left of middle line.

*The **Pyramidal lobe*** is connected to **hyoid** bone by a fibrous or muscular band called ***levator glandulae thyroideae.***

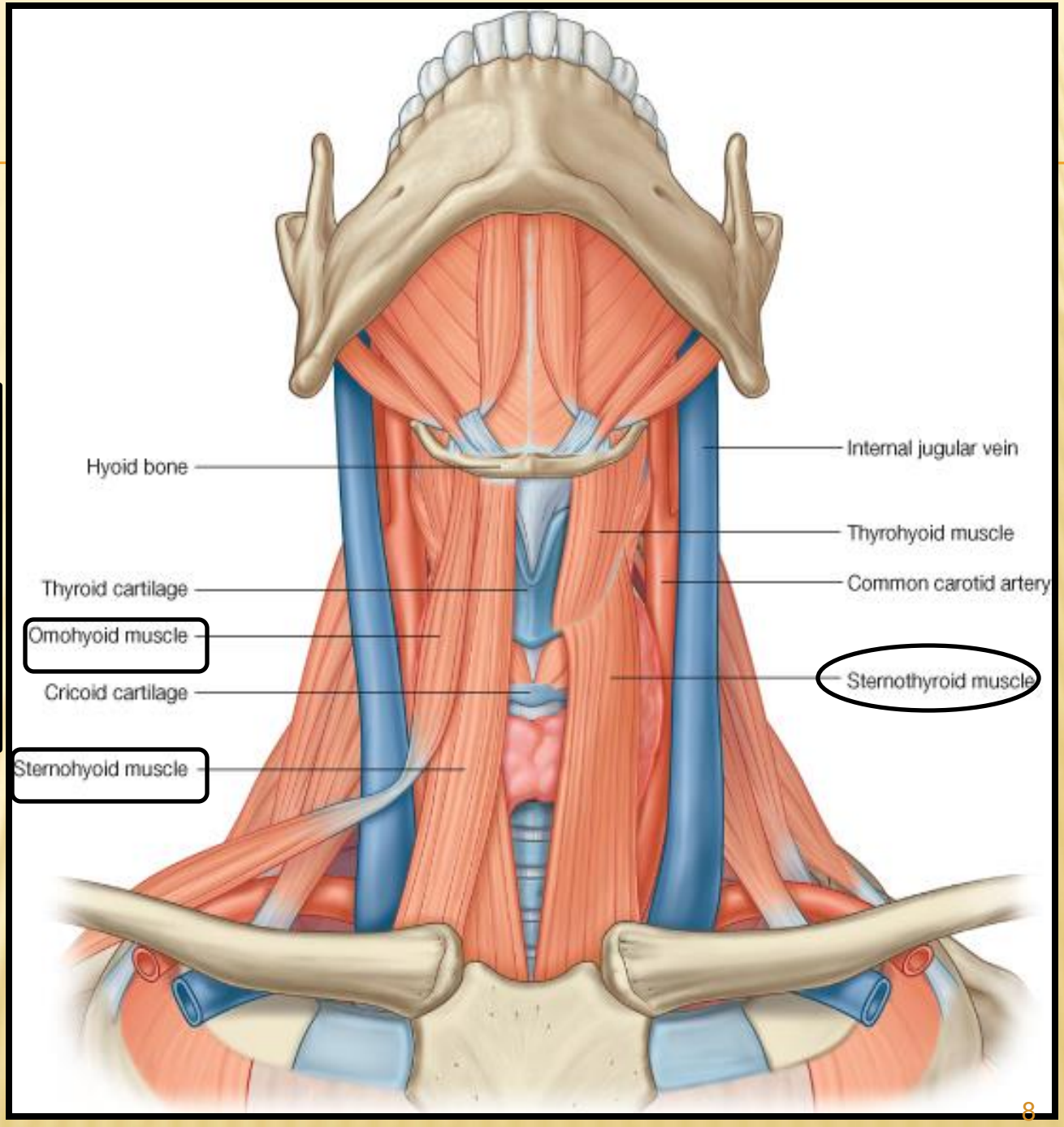
This represents the fibrosed & obliterated thyroglossal duct.



RELATION OF THE THYROID GLAND

Anterolaterally: (4 S).

1. **S**ternohyoid.
2. **S**ternothyroid.
3. **S**uperior belly of omohyoid
4. **St**ernomastoid.



Posteriorly:

Carotid sheath and its contents.

Medially:

Above:

Larynx & pharynx.

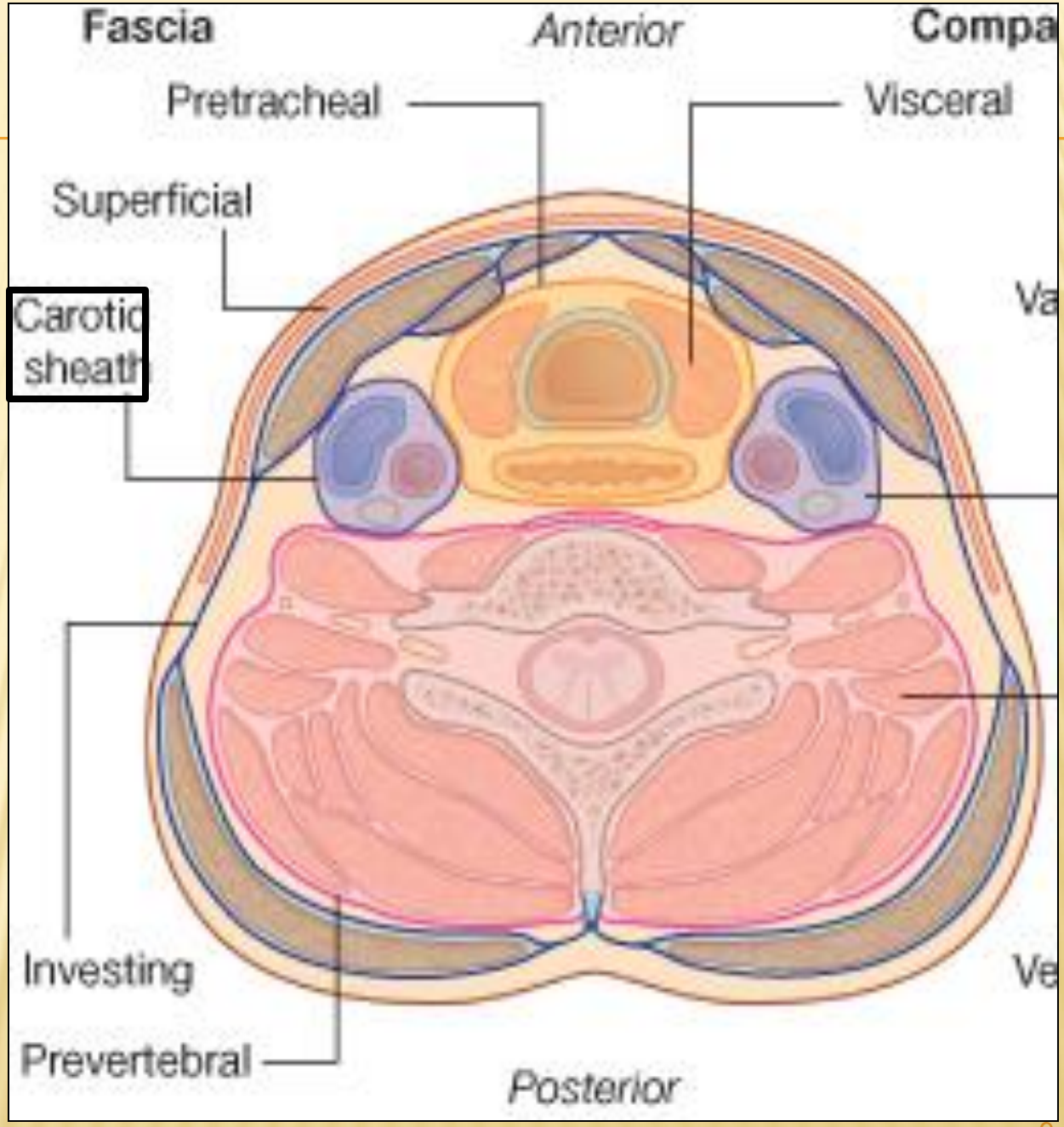
Below:

Trachea & esophagus.

Recurrent laryngeal nerves.

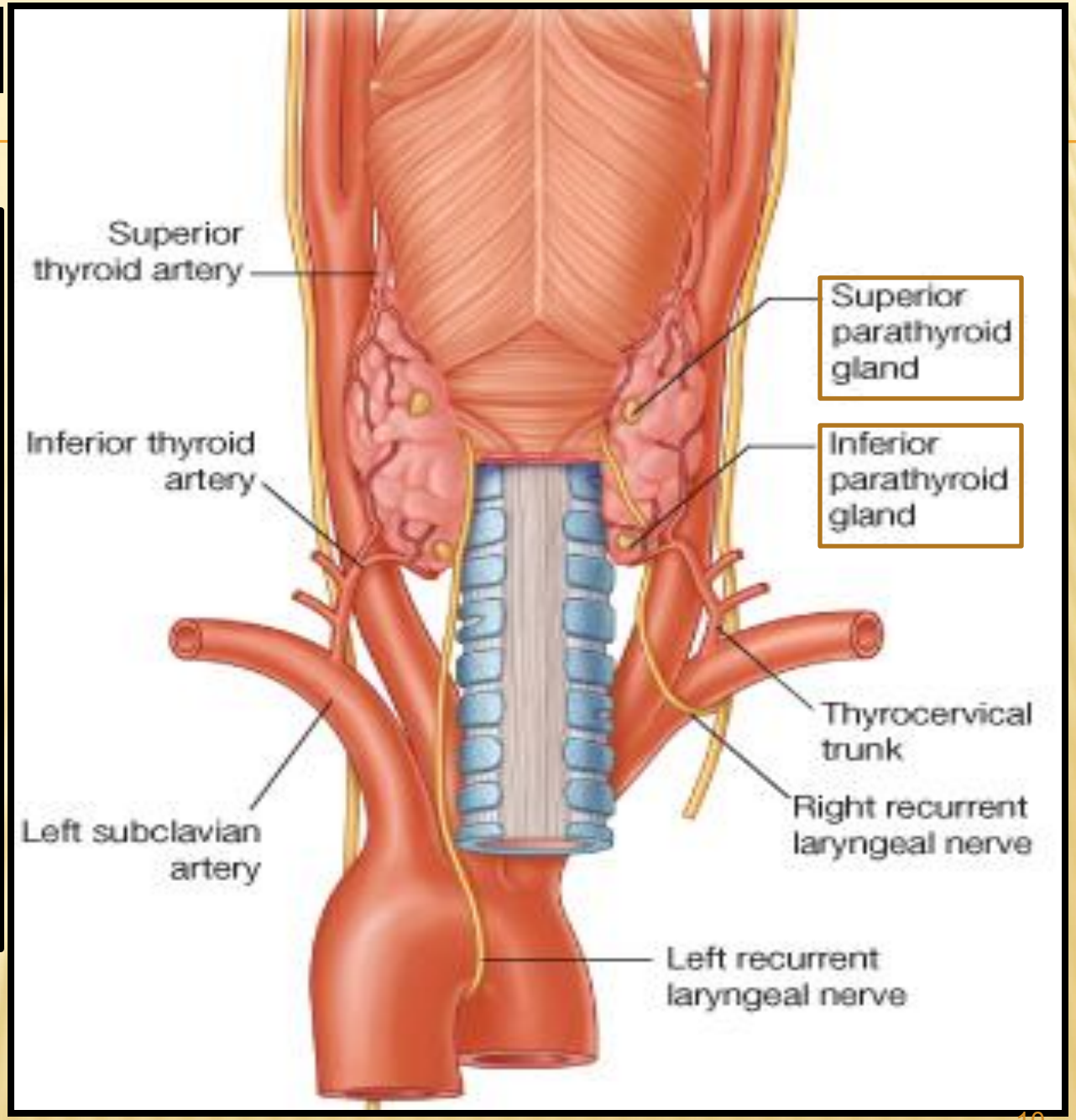
Cricothyroid muscles

External laryngeal nerves.



Posterior border

- The *posterior border is* rounded and related to the superior & inferior *Parathyroid glands*.
- It is also related to anastomosis between ***superior & inferior thyroid arteries.***



ARTERIAL SUPPLY

1. Superior thyroid artery:

It is a branch of the external carotid artery.

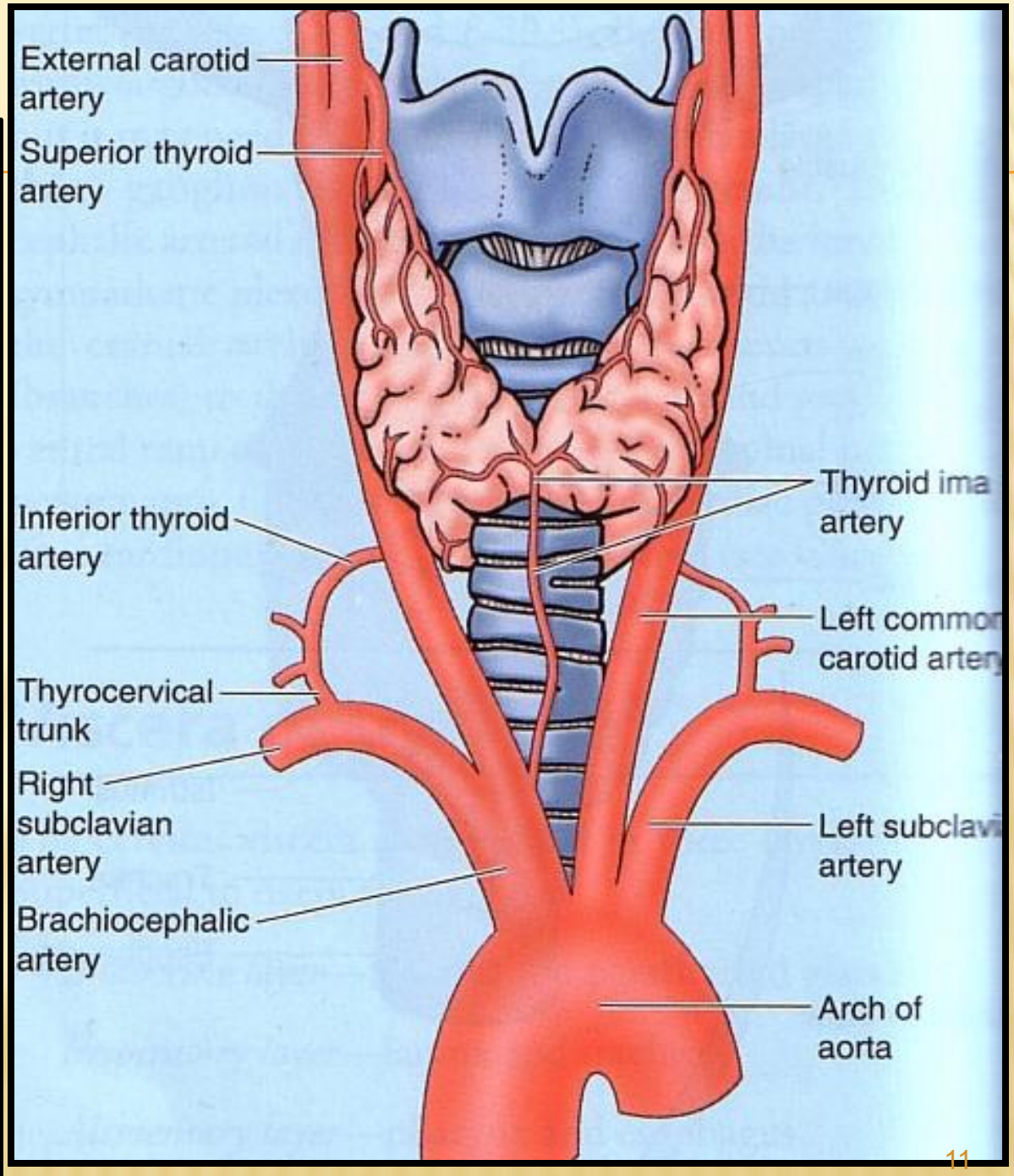
It descends to the upper pole of the gland, with the ***external laryngeal nerve,*** **(IMPORTANT) !**

It runs along the upper border of the isthmus to anastomosis with that of the opposite side.

2- Thyroidea ima artery:

If present, it arises from aortic arch or from the *brachiocephalic artery.*

It ascends in front of the Trachea to reach the isthmus.



3-Inferior thyroid artery:

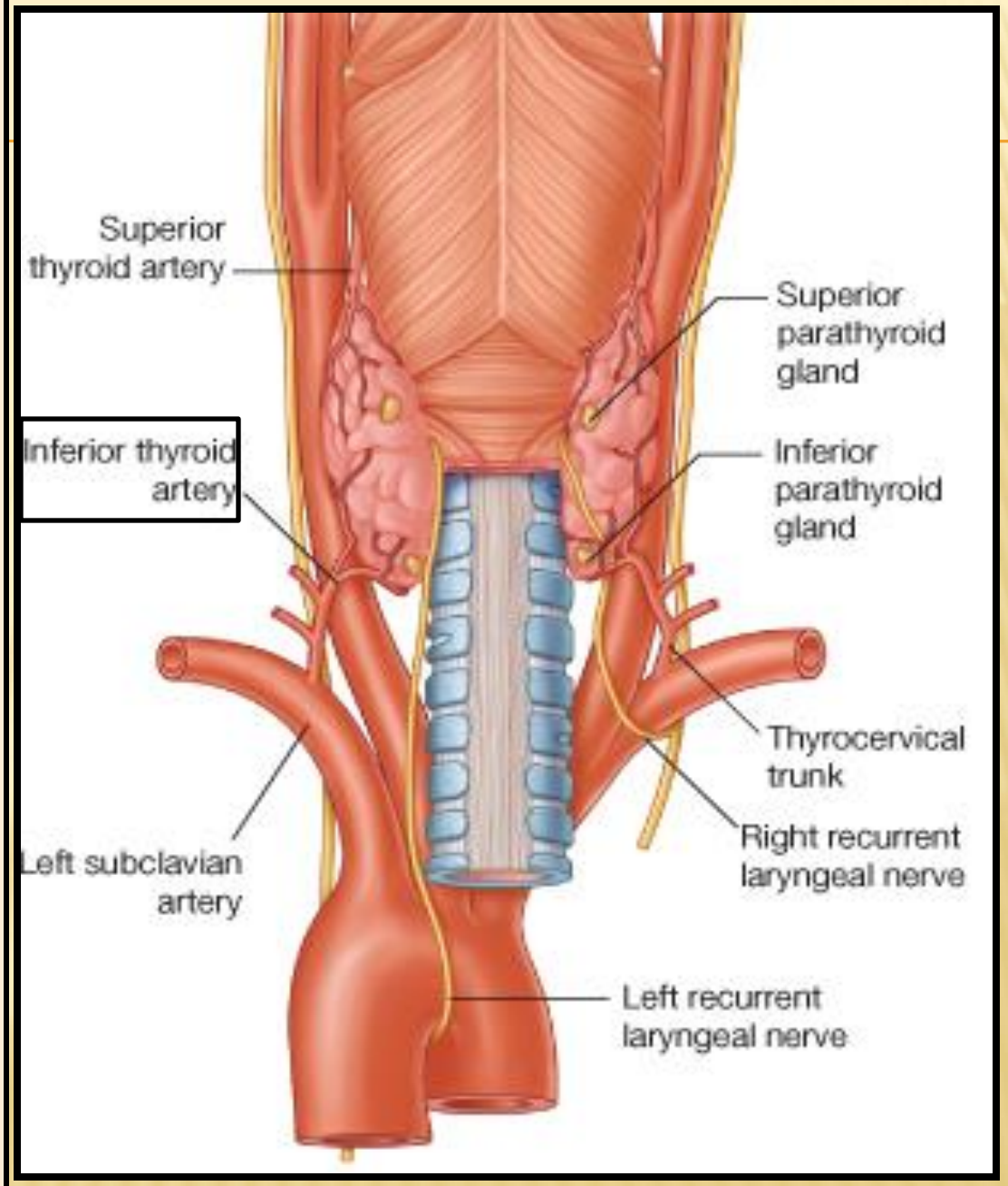
From **thyrocervical** trunk of the 1st part of the subclavian artery,

It ascends upward to the level of the **cricoid** cartilage, (C6).

Then it curves medially behind the carotid sheath.

Then it reaches the posterior aspect of the gland & descends downwards.

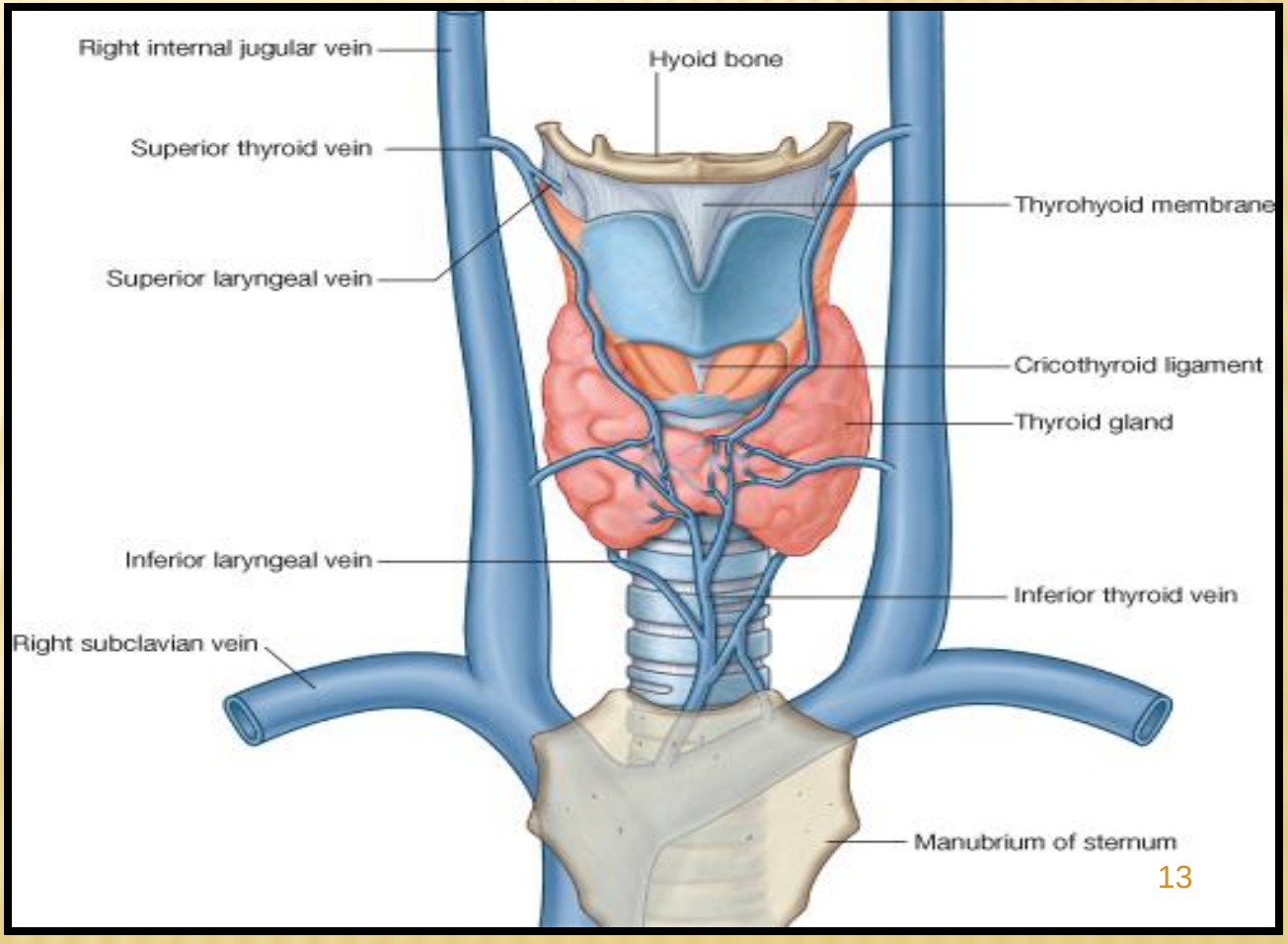
The recurrent laryngeal nerve crosses either in front or behind it.!



Veins of Thyroid Gland

1-Superior thyroid vein → Internal jugular vein.
2- Middle thyroid vein → Internal jugular vein.
3- Inferior thyroid vein → Left brachiocephalic vein.

Lymph of the Thyroid Gland: Deep cervical & paratracheal lymph nodes.



Parathyroid glands

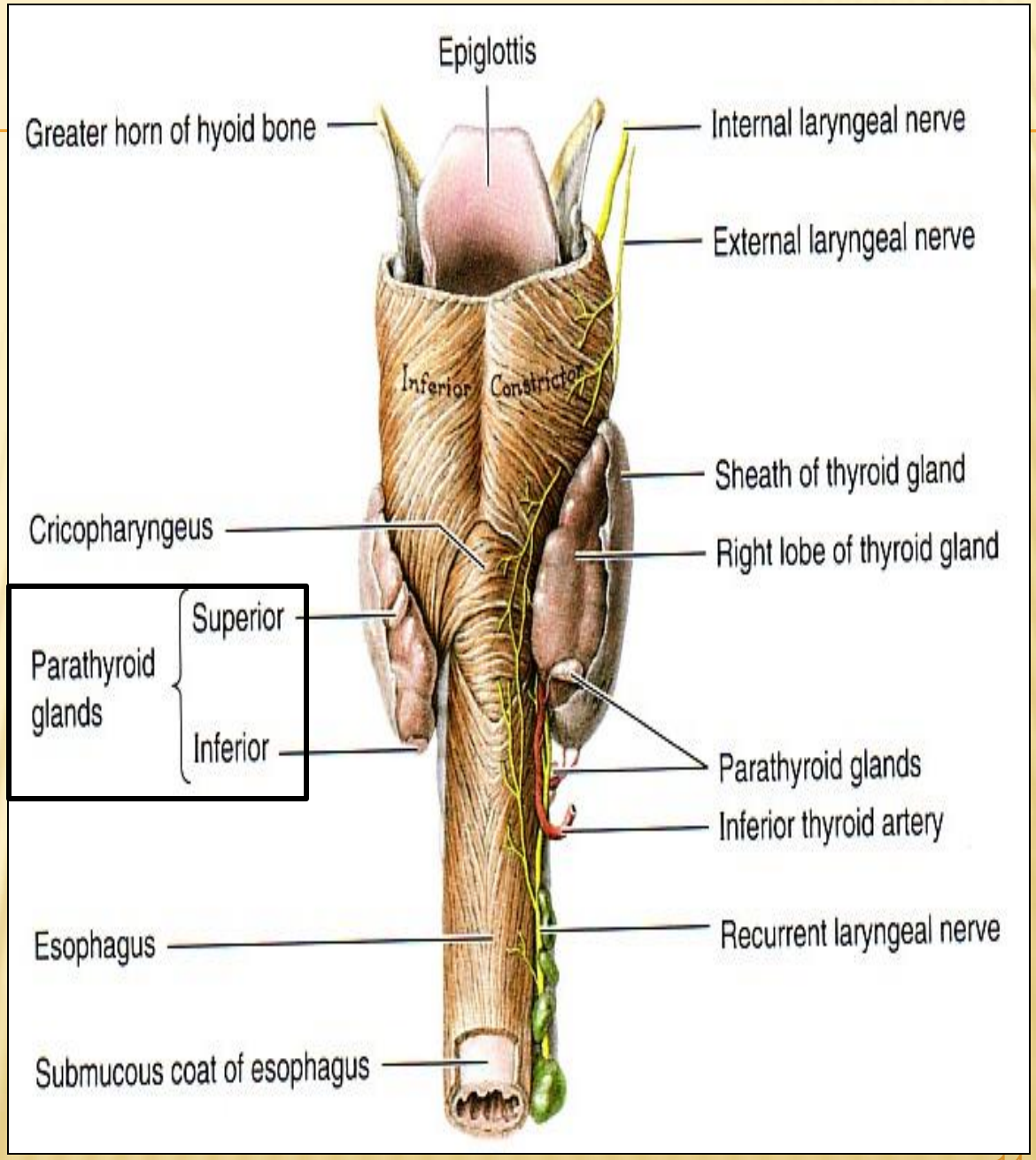
4 small ovoid bodies, about 6 mm. long.

They lie within the facial capsule of the gland, (between the 2 membranes).

2 superior parathyroid has a constant position at the middle of the posterior border of the thyroid gland.

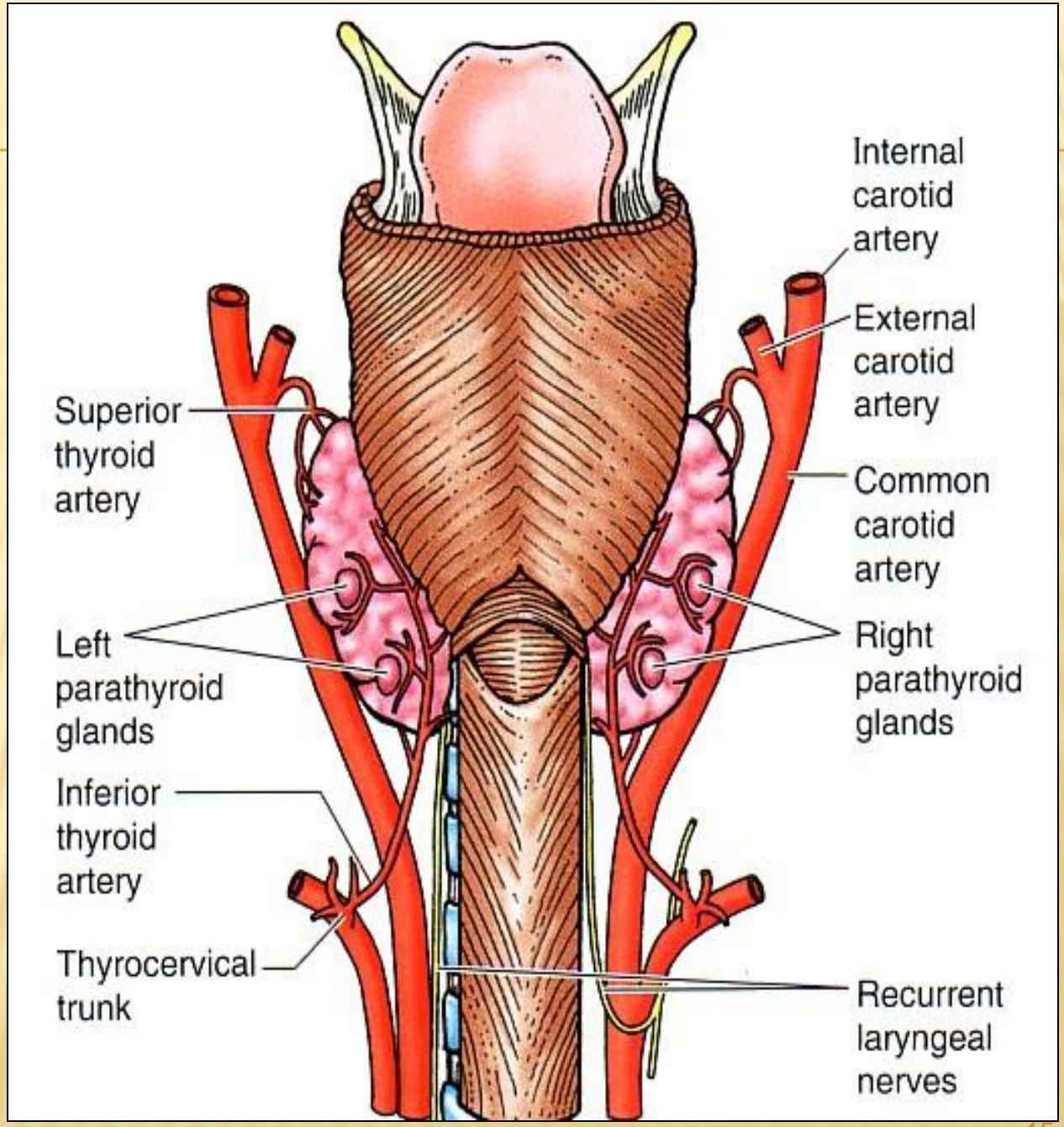
2 inferior parathyroid usually at the level of the inferior pole.

They lie within the thyroid tissue or sometimes outside the facial capsule.



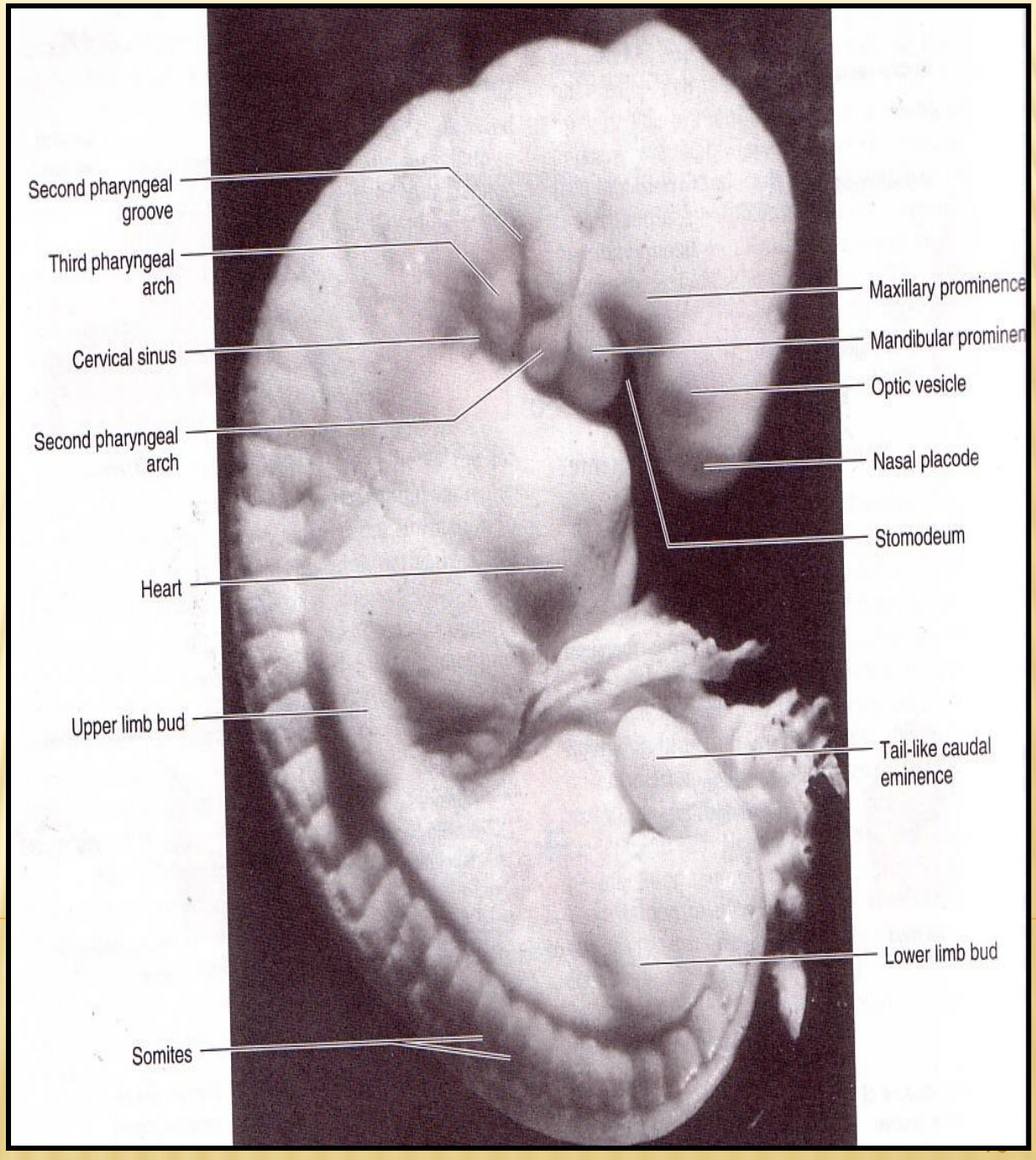
PARATHYROID GLANDS

- They are supplied by superior and inferior thyroid arteries.
- Their veins are drained to superior, middle and inferior thyroid veins.
- Lymph nodes:
- Deep cervical & paratracheal lymph nodes.
- **Nerve supply**:
- Superior & middle cervical sympathetic ganglia.



DEVELOPMENT OF THYROID AND PARATHYROID GLANDS

What is meant by the **Pharyngeal Apparatus?**



Pharyngeal Apparatus

The ***head & neck*** region develops from the pharyngeal apparatus.

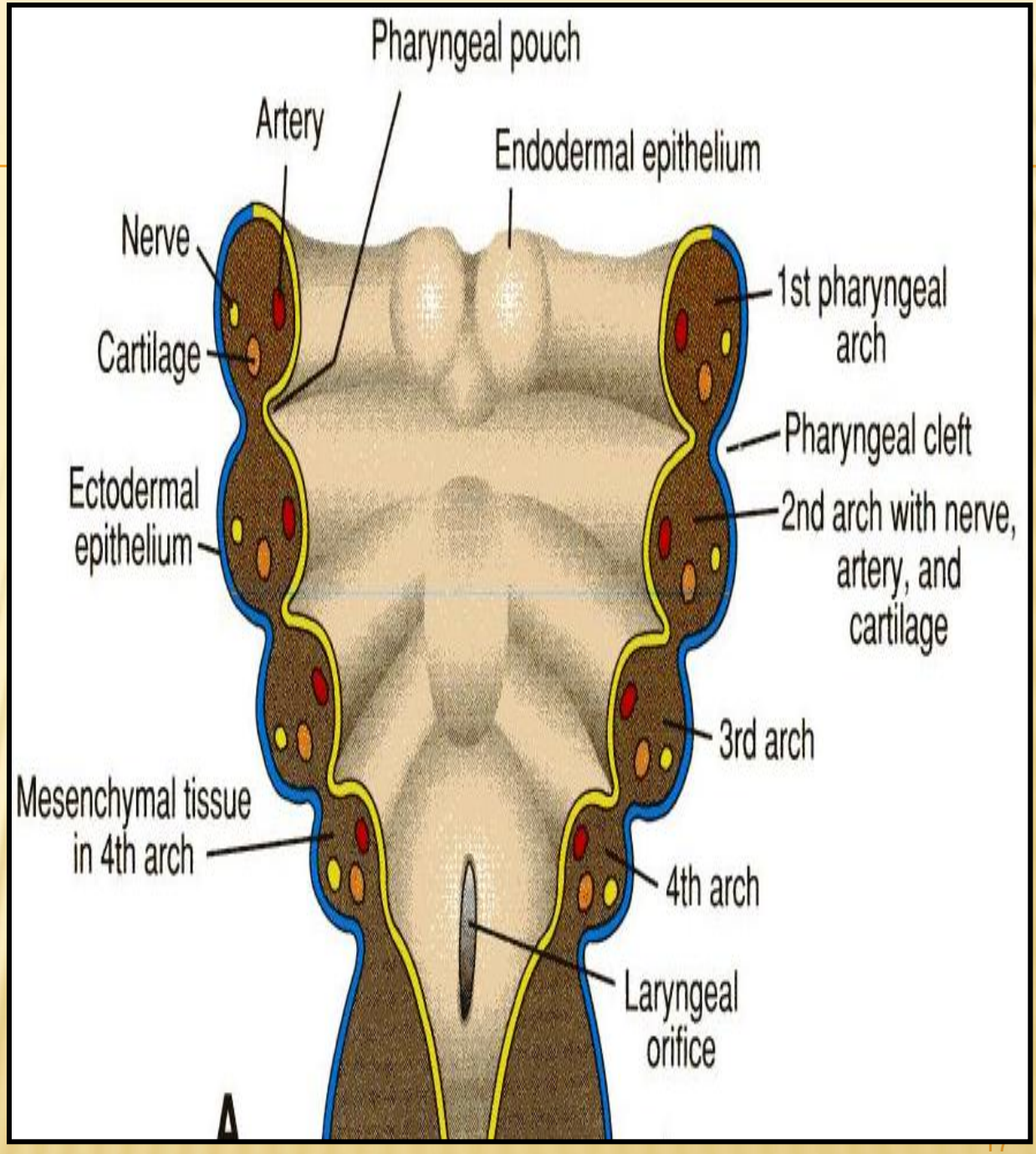
The pharyngeal apparatus is formed of:

1- Pharyngeal **arches.**

2- Pharyngeal **pouches.**

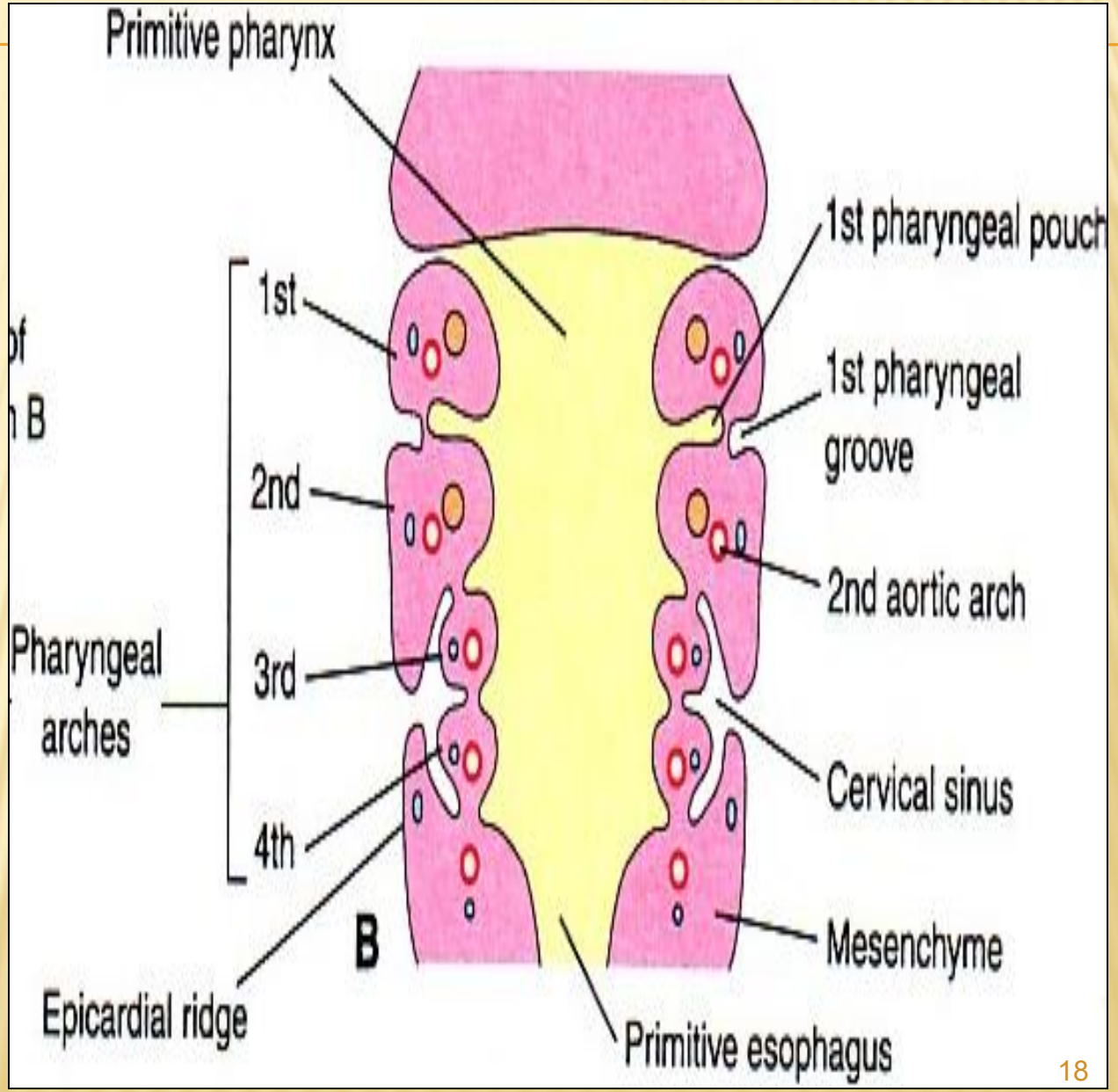
3- Pharyngeal **clefts** or **grooves.**

4- Pharyngeal **membranes.**



PHARYNGEAL APPARATUS

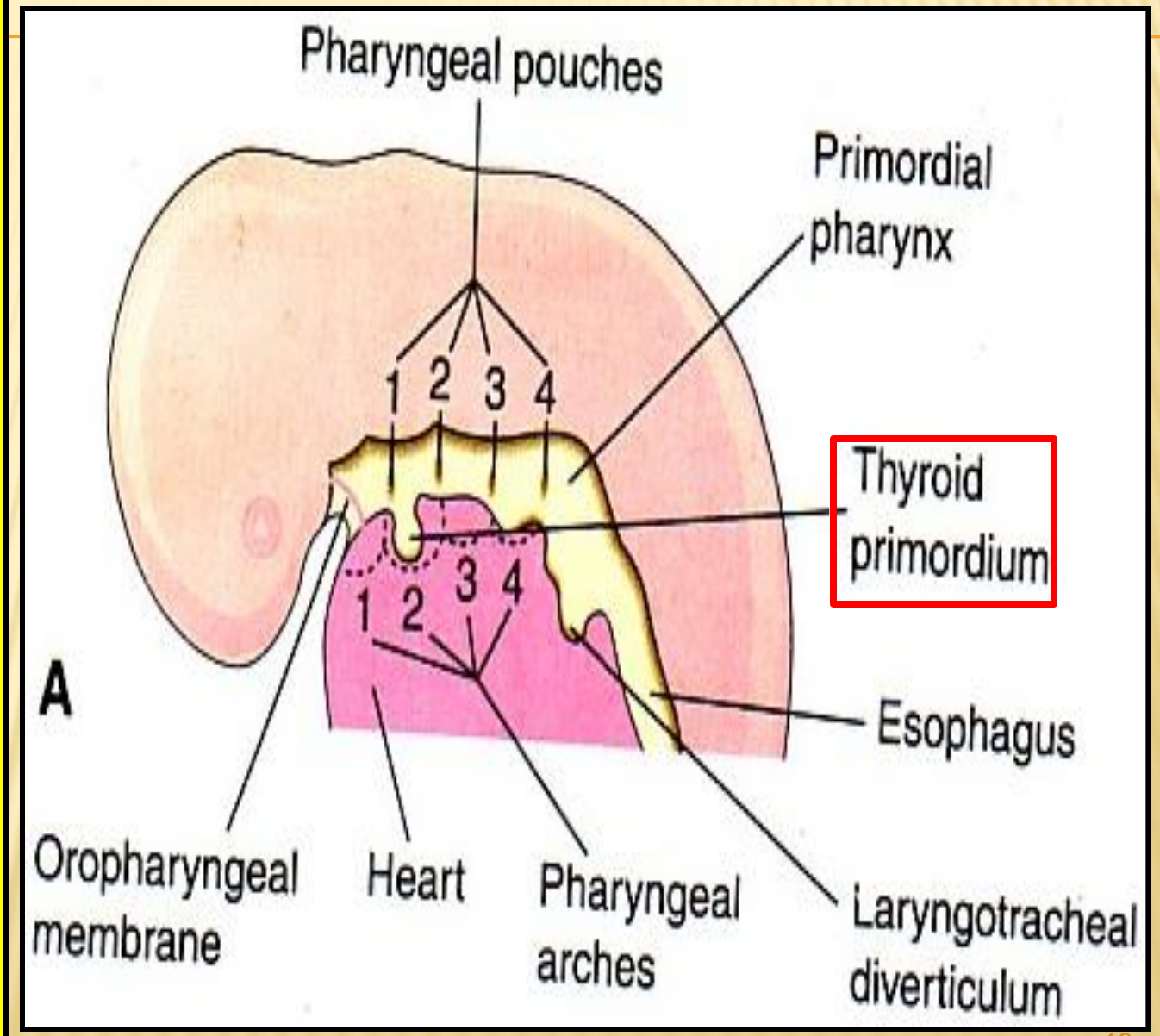
The mesoderm in the head & neck regions divided into six cubical masses called the 6 pharyngeal or branchial arches. Each arch is formed of a Core of mesoderm, covered from outside by ectoderm and the space between 2 arches from outside is called cleft or **groove.** **Each** arch is lined from inside by *endoderm* and the space between the 2 arches from inside is called **pouch**.

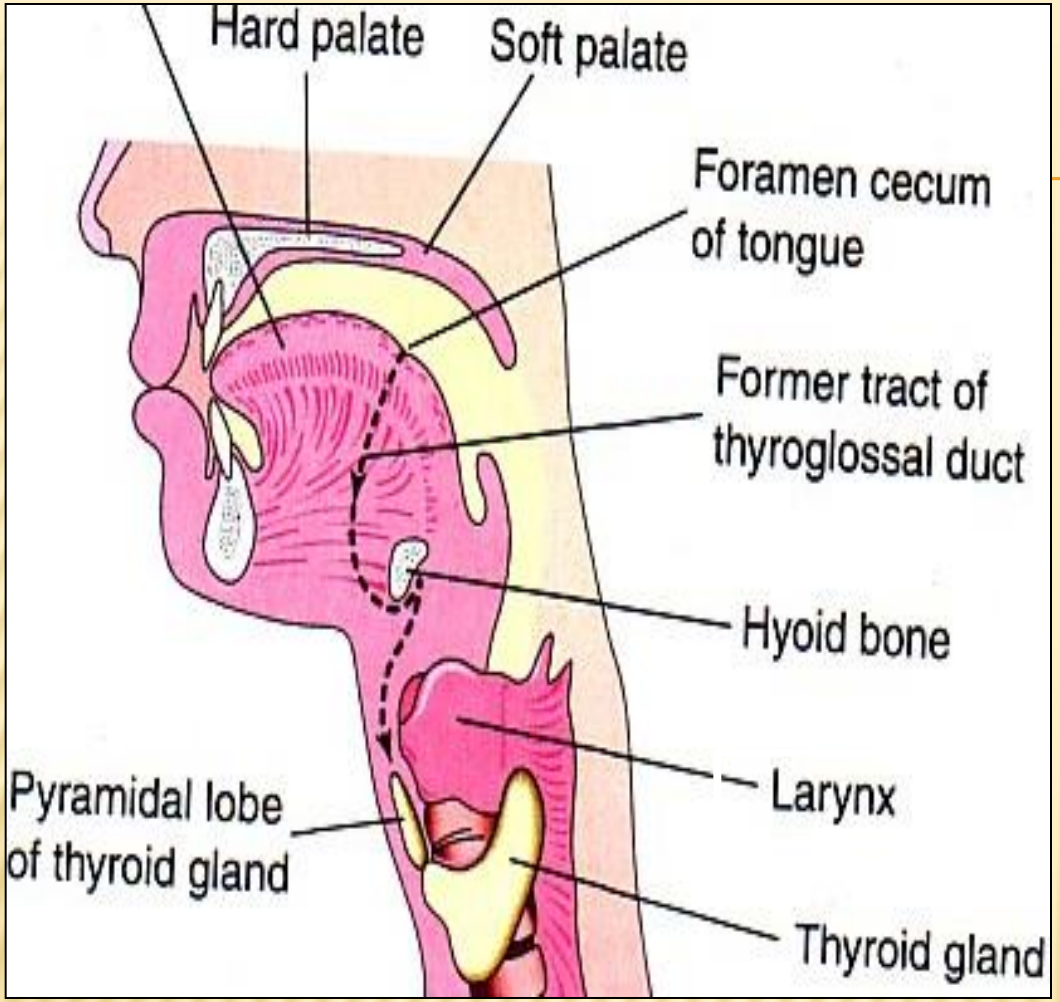


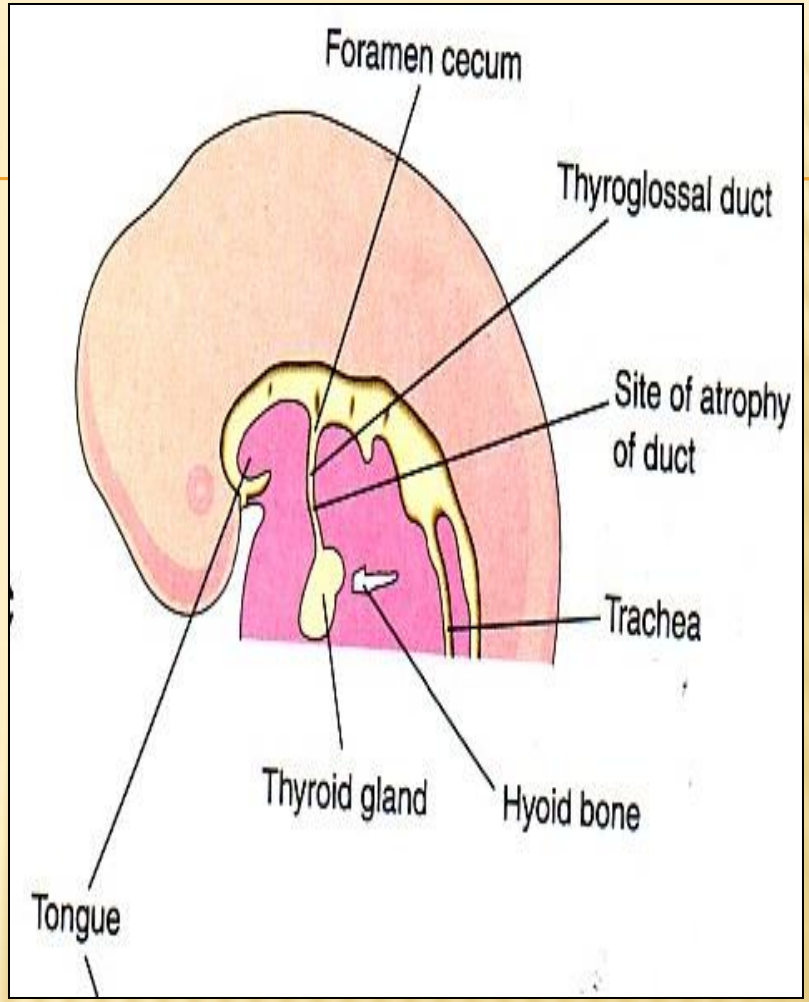
THYROID PRIMORDIUM

It is the first endocrine gland to develop.
By the 24th day after fertilization, the thyroid gland begins to develop.

It develops from the endoderm of the floor of the primitive pharynx, at the junction of the anterior 2/3rd & posterior 1/3rd of the developing tongue, (foramen cecum).
It develops from the **(Thyroid primordium).**







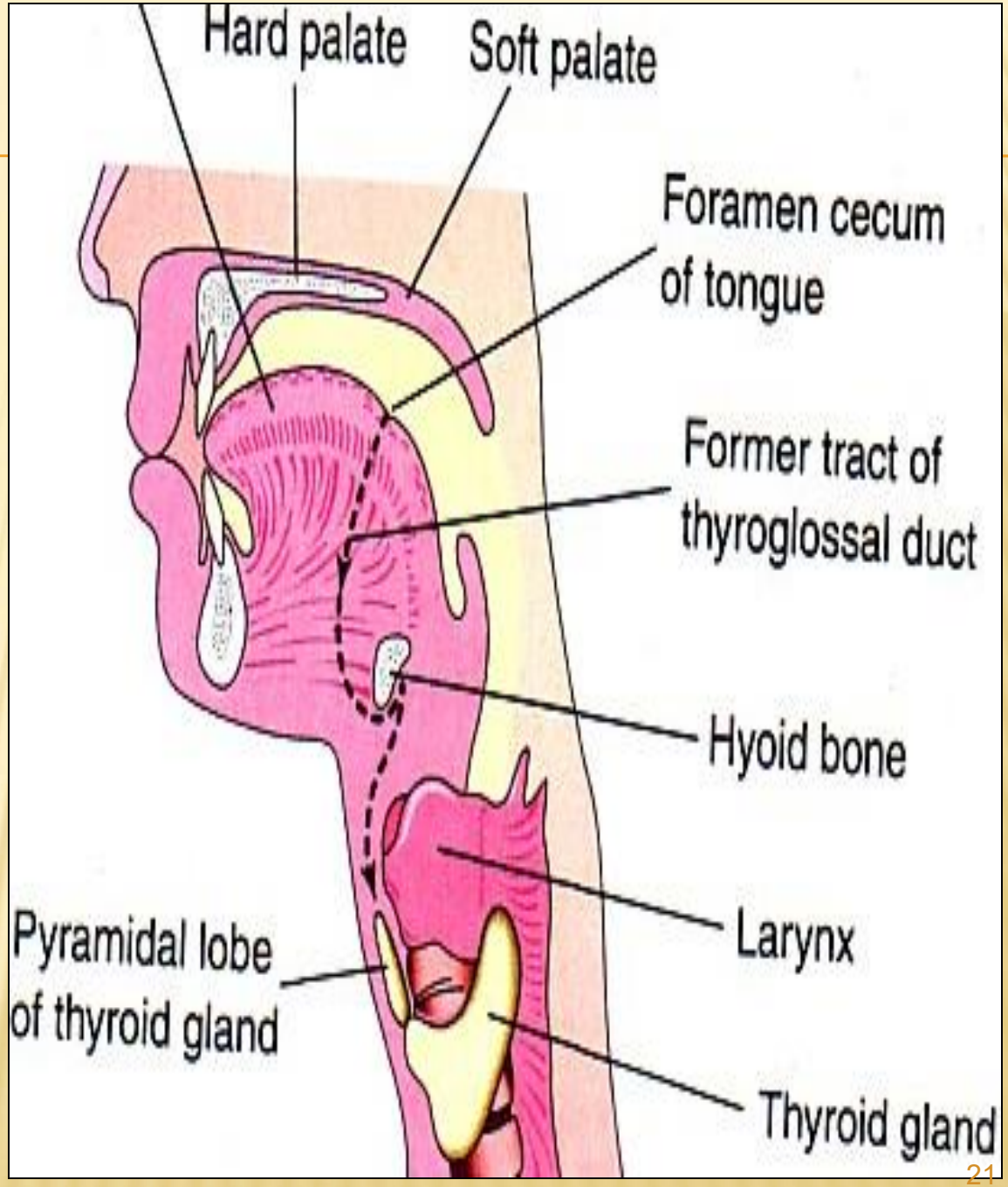
As the tongue grows, the developing thyroid gland descends downward in the neck.

It descends anterior to the developing hyoid bone & laryngeal cartilages.

The thyroid is connected to the developing tongue by a narrow tube, called the thyroglossal duct.

At first the thyroid primordium is hollow, but soon it becomes solid & divided into 2 lobes and an isthmus.

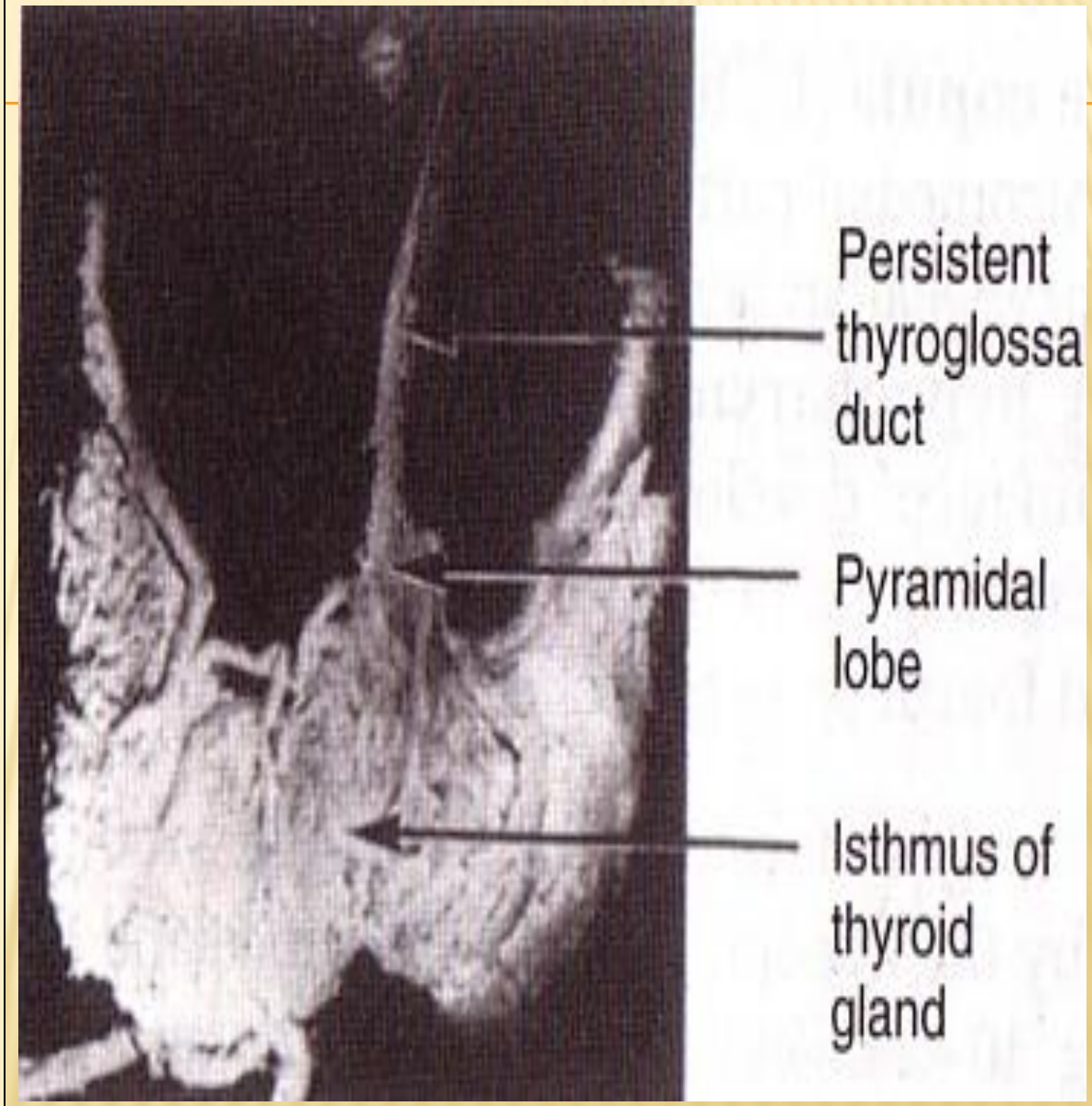
By 7th week (50th day) the gland reaches its final destination and takes its final shape and the thyroglossal duct begins fibrosis and degeneration.



The upper end of the duct persists in the dorsum of the tongue as the foramen cecum.

While the distal part of the duct may persists in 50% of people to form the pyramidal lobe.

The pyramidal lobe may be attached to the hyoid bone by fibrous or smooth muscle called Levator **glandulae thyroidae**.



Congenital Anomalies

1. Agenesis of the thyroid gland.
2. Congenital Hypothyroidism.
3. Persistence of thyroglossal duct.
4. Thyroglossal cyst.
5- Ectopic thyroid gland.
6- Accessory thyroid tissue.

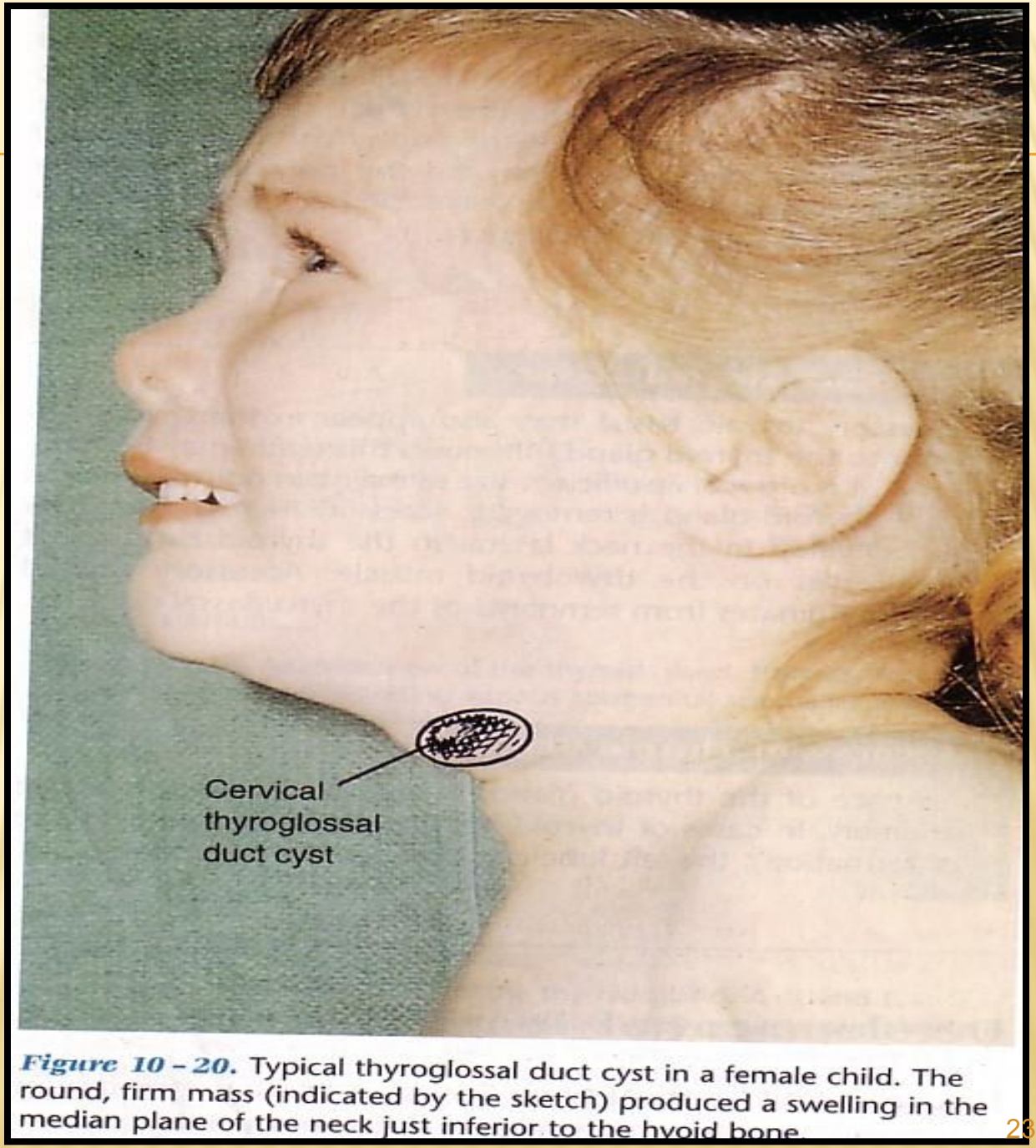


Figure 10 – 20. Typical thyroglossal duct cyst in a female child. The round, firm mass (indicated by the sketch) produced a swelling in the median plane of the neck just inferior to the hyoid bone.

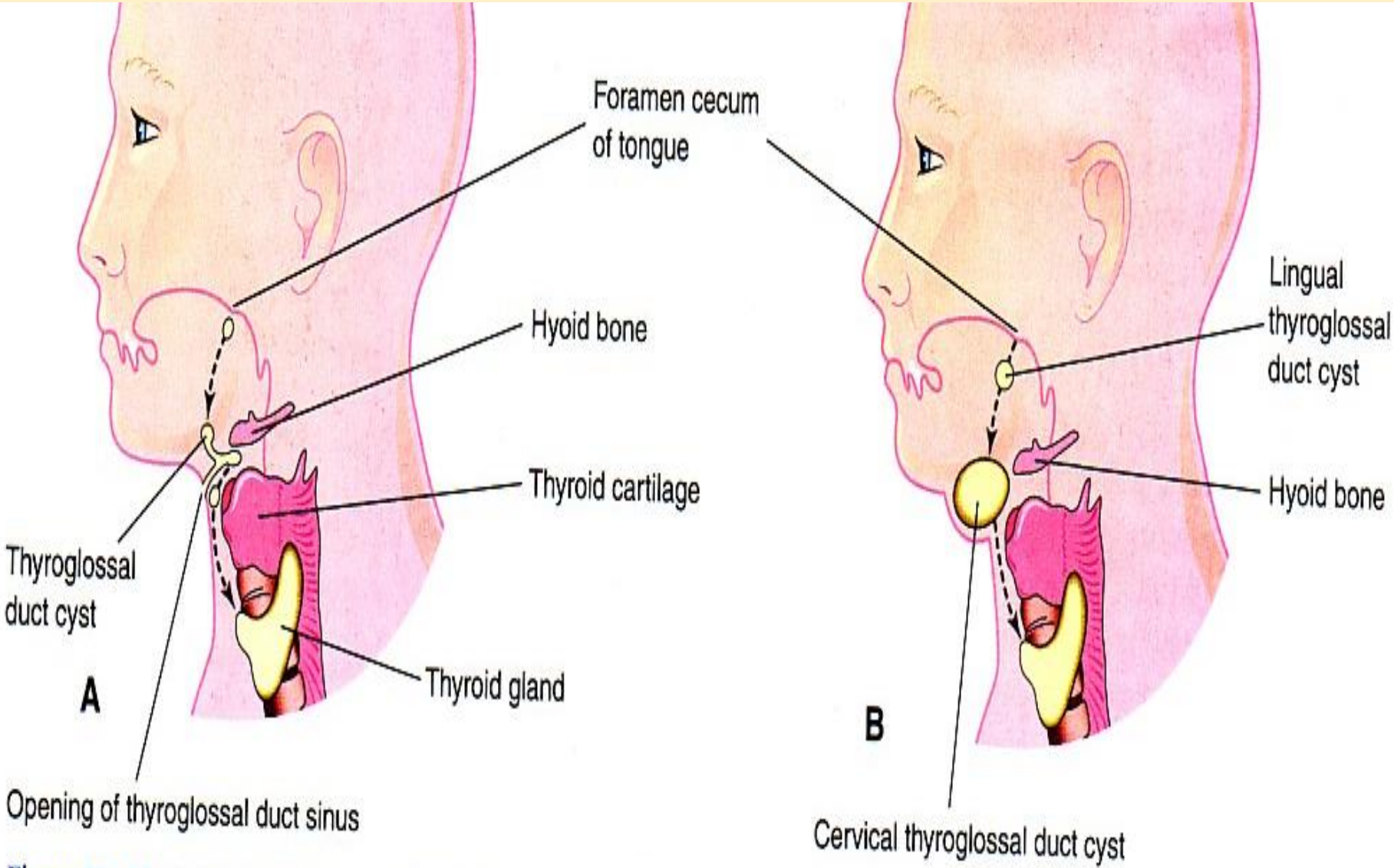
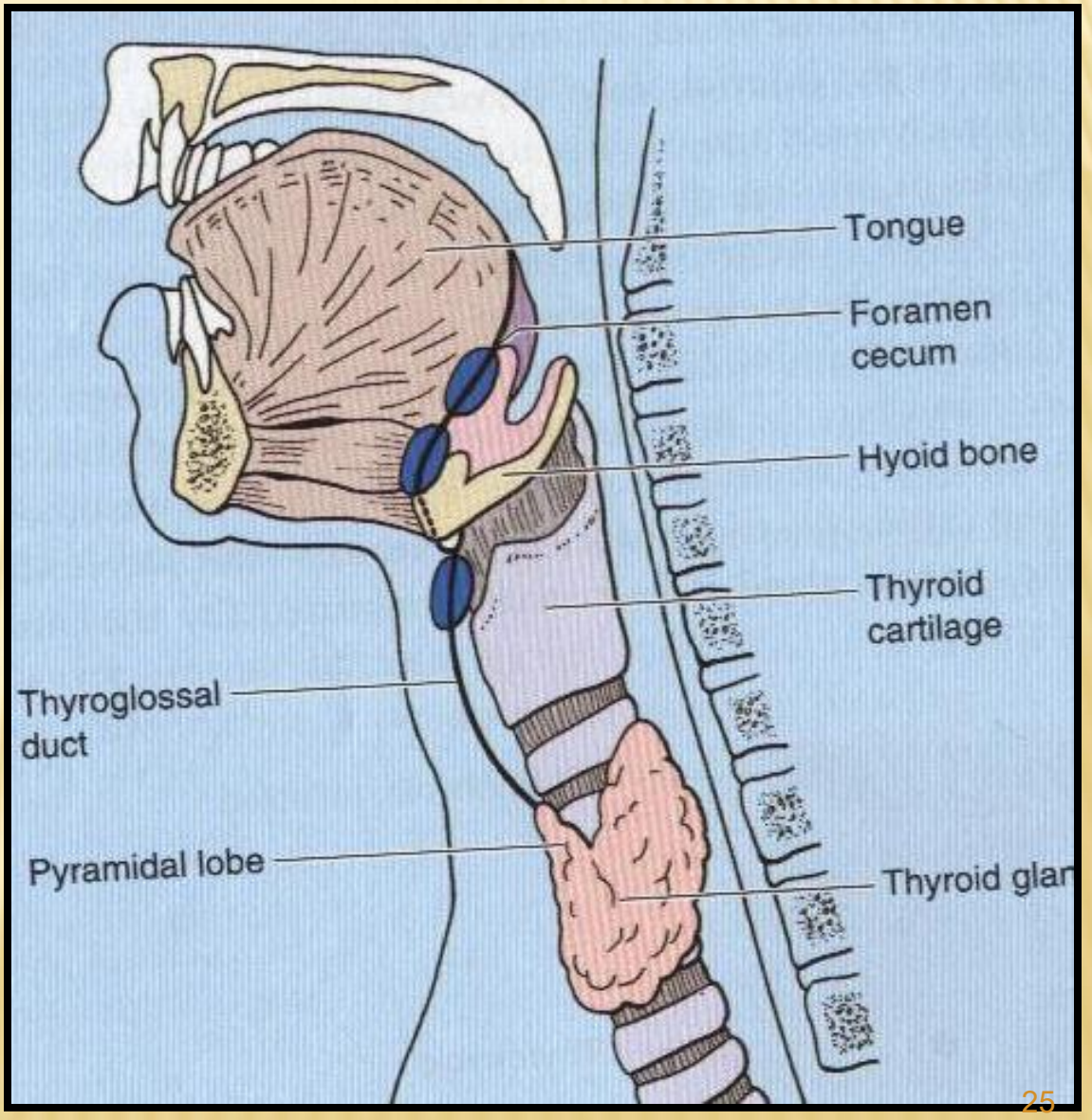


Figure 10 - 19. *A*, Sketch of the head and neck showing the possible locations of thyroglossal duct cysts. A thyroglossal duct sinus is also illustrated. The *broken line* indicates the course taken by the thyroglossal duct during descent of the developing thyroid gland from the foramen cecum to its final position in the anterior part of the neck. *B*, Similar sketch illustrating lingual and cervical thyroglossal duct cysts. Most thyroglossal duct cysts are located just inferior to the hyoid bone.

ECTOPIC THYROID TISSUE

- The thyroid glands develops high up close to foramen cecum of the developing tongue.
- Then it descends along the thyroglossal duct to reach its final position by the 7th week.
- Descent of the thyroid could be arrested at any point, or extends down behind the sternum in the thorax.



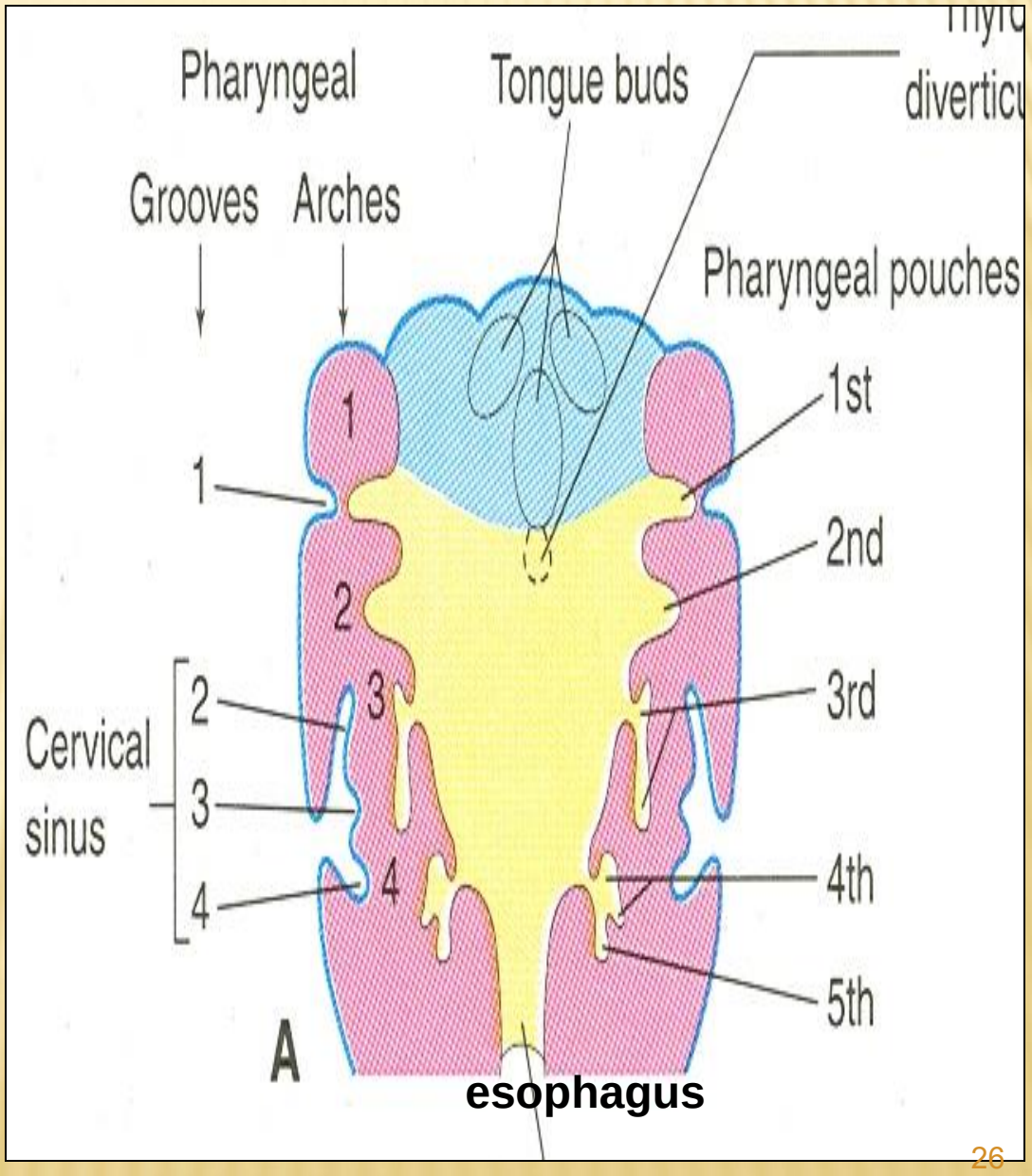
Pharyngeal Pouches

The pairs of pouches develop in a craniocaudal sequence between the arches.

The first pair of pouches lies between the first and second pharyngeal arches.

There are four pairs of pharyngeal pouches.

The fifth pair of pouches is absent or rudimentary.

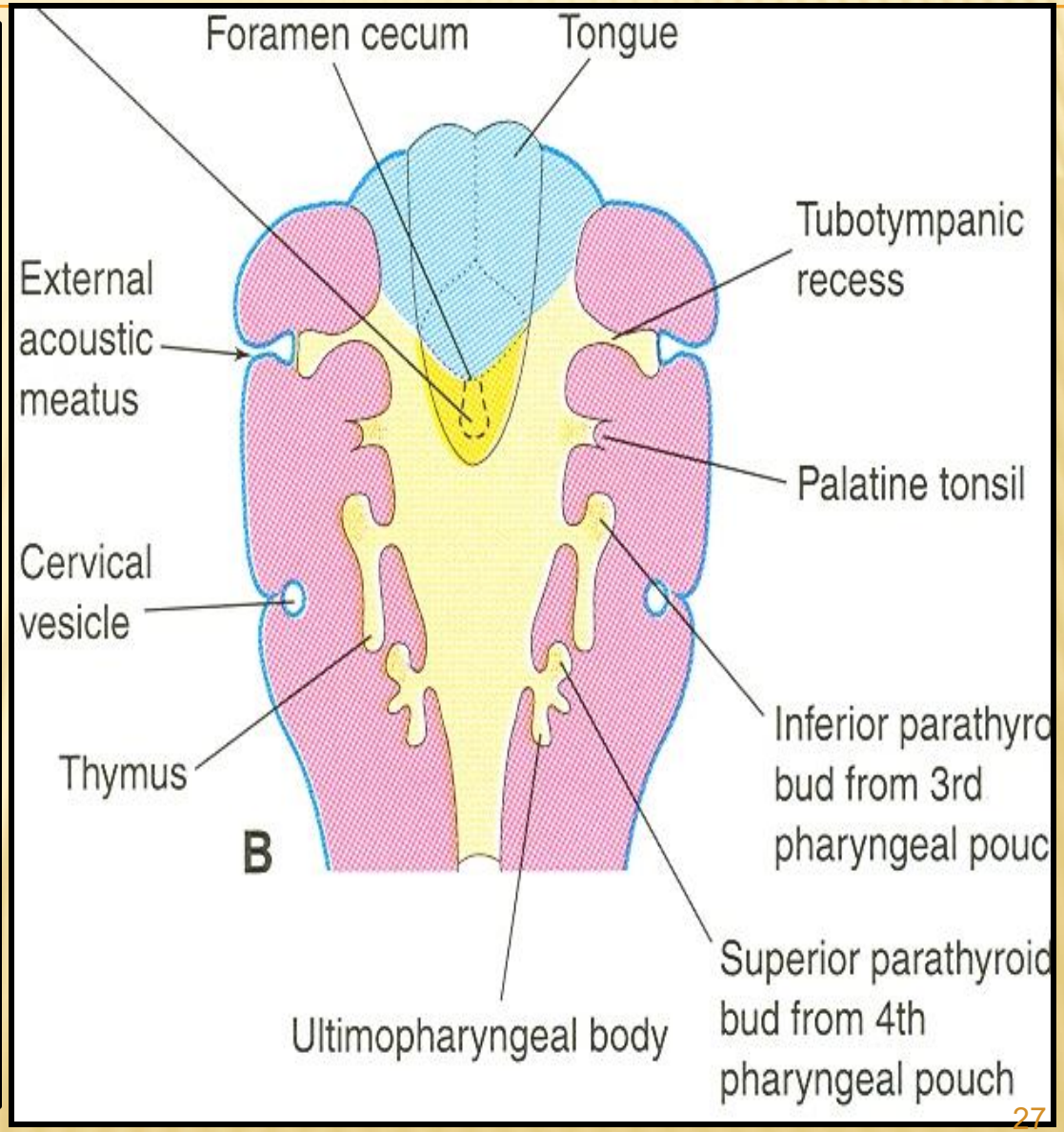


DEVELOPMENT OF THE PARATHYROIDS

Each of the **3rd & 4th** pharyngeal pouch develops into dorsal and ventral parts.

By the sixth week the **Dorsal** part of the 3rd pouch develops into inferior parathyroid **bud**, while the **Dorsal** part of the 4th pouch develops into the superior parathyroid **bud.**

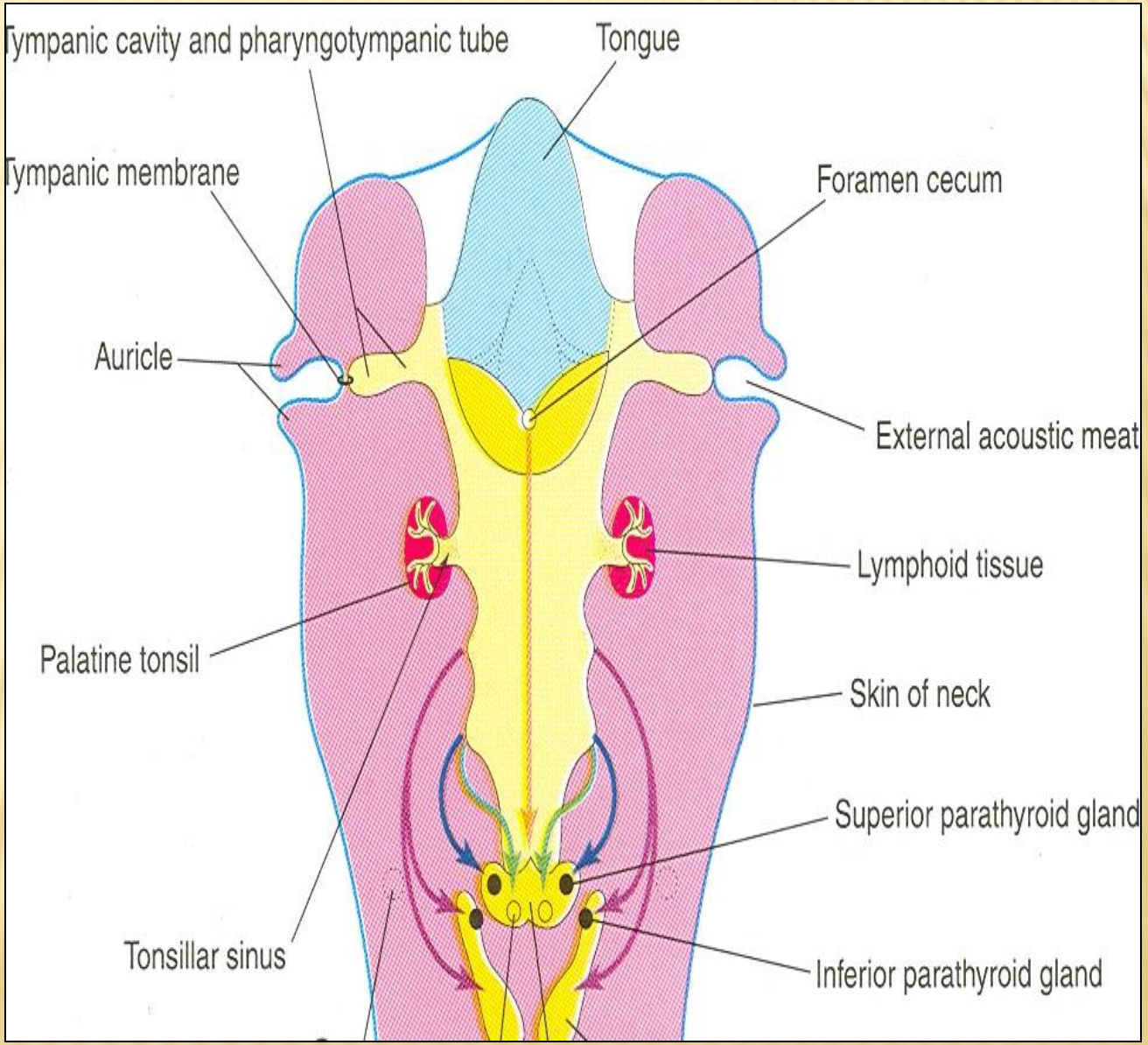
The ventral part of 3rd pouch gives the **primordium** of the **thymus gland** while the ventral part of the 4th forms what is called Ultimopharyngeal body.



DEVELOPMENT OF THE PARATHYROIDS

As the thymus primordium develops, it descends downward to the thorax, behind the sternum to the superior mediastinum.

So, it drags the inferior parathyroid **bud** to a lower level than the superior parathyroid.
Both parathyroid glands lie behind the thyroid gland.



Clinical notes

The **external laryngeal nerve** runs close to the **superior thyroid artery** before turning medially to supply the cricothyroid muscle. **High ligation** of the superior thyroid artery during thyroidectomy places this nerve at risk of injury, so it should be ligated within the upper pole of the gland. Its lesion will cause horsiness of voice.

NB. RLN lesion may results in impaired breathing & speech.

Clinical notes

The inferior thyroid artery is closely associated with the **recurrent laryngeal nerve**. This nerve can be found, in a triangle bounded laterally by the common carotid artery, medially by the **trachea,** and superiorly by the base of thyroid lobe.

The relationship of the recurrent laryngeal nerve and the **inferior thyroid artery** is **highly variable** in that the nerve can lie deep or superficial to the artery, or between the branches of the artery, and be different on either side of the neck.

Consideration of this nerve and its branches must be given during thyroidectomy.

NB. RLN lesion may results in impaired breathing & speech.

TEST YOUR SELF!

- **Which of the following nerves is endanger in ligation of the superior thyroid artery?**
- A. External laryngeal.
- B. Recurrent laryngeal.
- C. Internal laryngeal.
- D. Superior laryngeal.
- **Which of the following structures lies anterior to the thyroid lobe?**
- A. Inferior belly of omohyoid.
- B. Internal jugular vein.
- C. Vagus nerve.
- D. Sternohyoid.

GOOD LUCK