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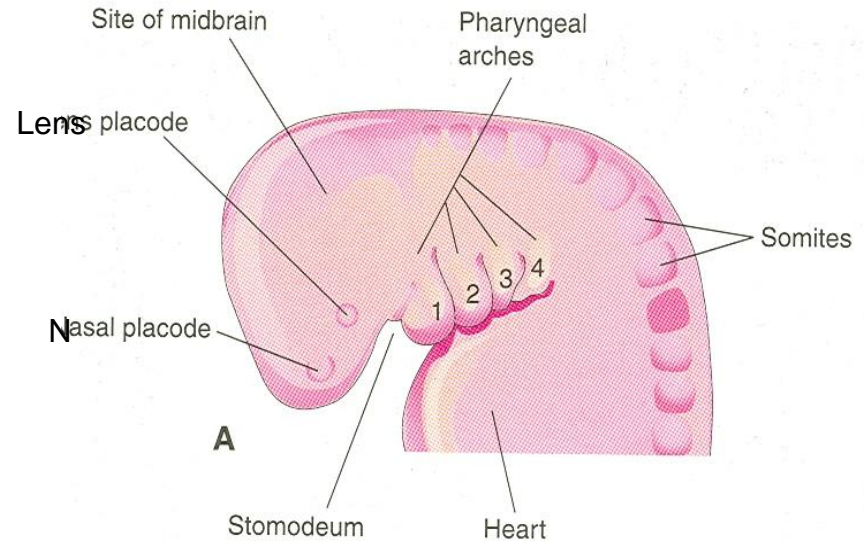
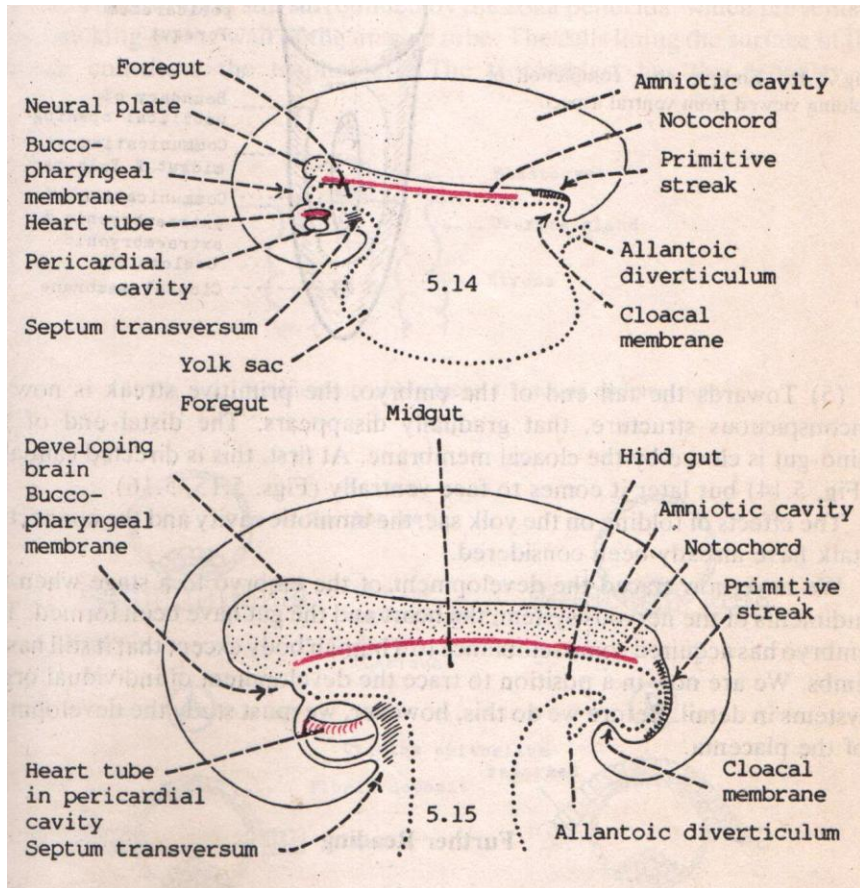
The Pharyngeal Arches

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What is Pharyngeal Arch?

- Rod-like thickenings of mesoderm present in the wall of the foregut.
- They appear in 4th-5th weeks of development.
- Contribute to the characteristic external appearance of the embryo.
- As its development resembles with gills (branchia: Greek word) in fishes & amphibians, therefore also called as branchial arch.

Formation of Pharyngeal Arches



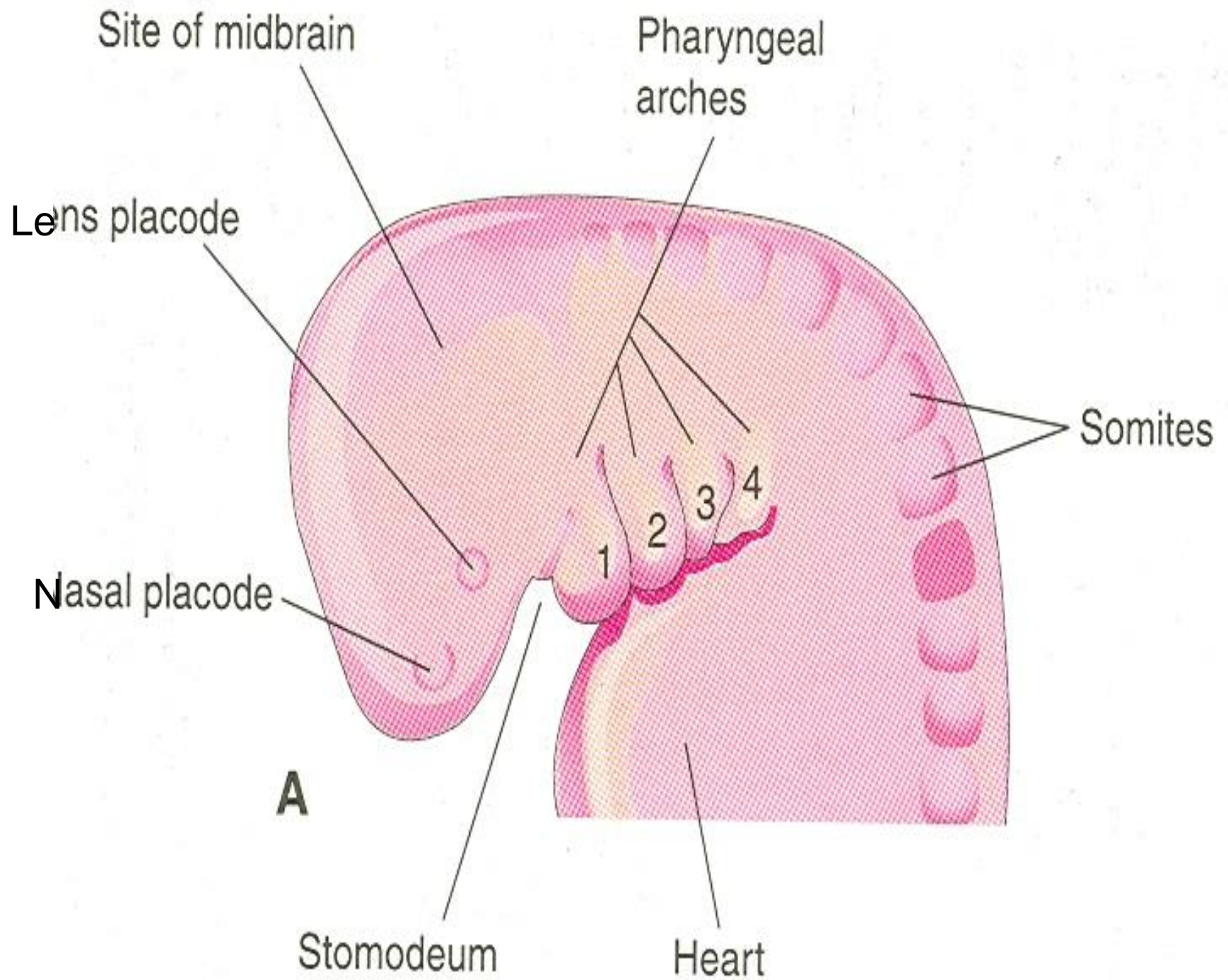
Pharyngeal Apparatus

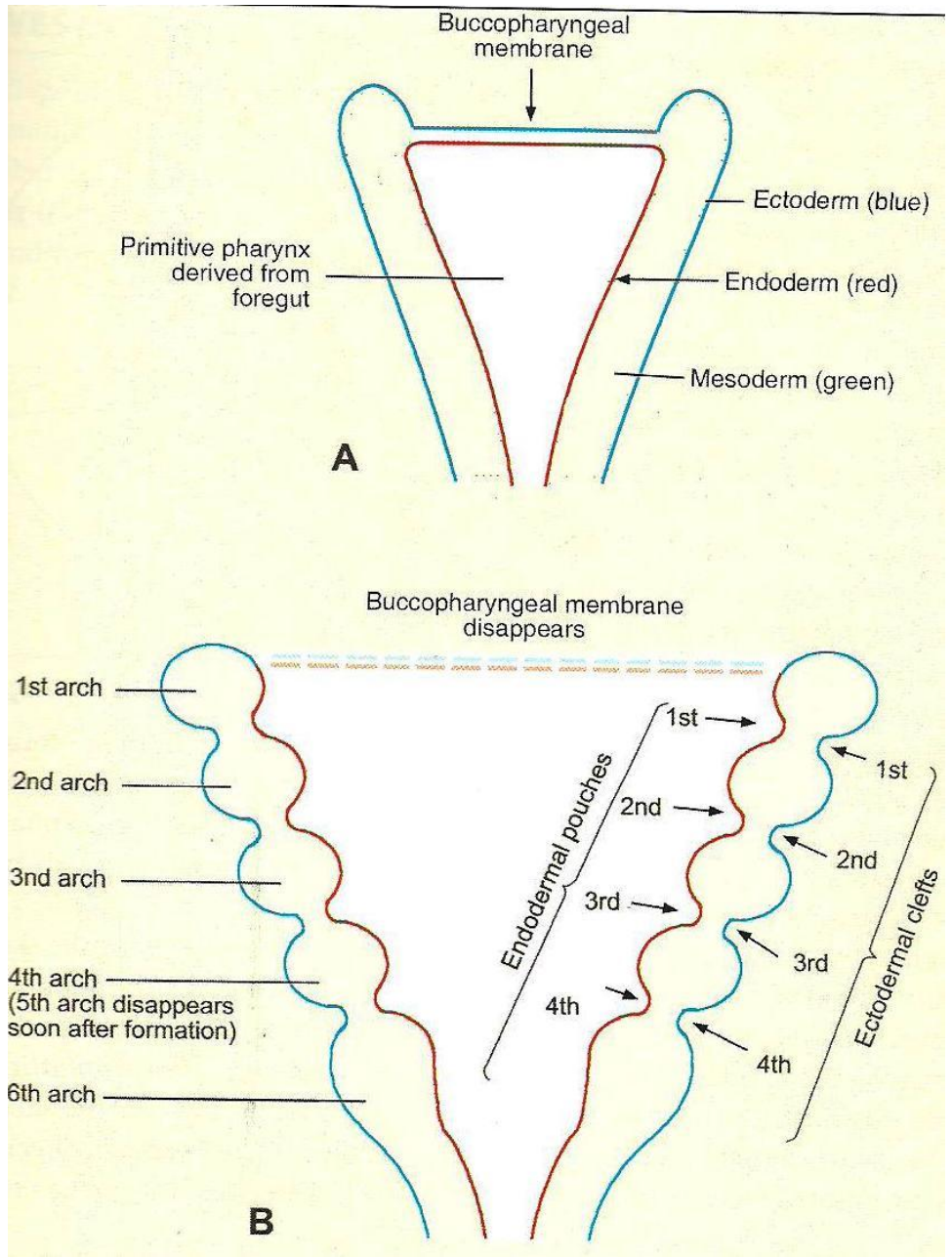
Pharyngeal apparatus consists of:

- Pharyngeal arches
- Pharyngeal pouches
- Pharyngeal grooves/clefts
- Pharyngeal membrane

Pharyngeal Arches

- Pharyngeal arches begin to develop early in the fourth week as neural crest cells migrate into the head and neck region.
- The first pair of pharyngeal arches (primordium of jaws) appears as a surface elevations lateral to the developing pharynx.
- Soon other arches appear as obliquely disposed, rounded ridges on each side of the future head and neck regions.





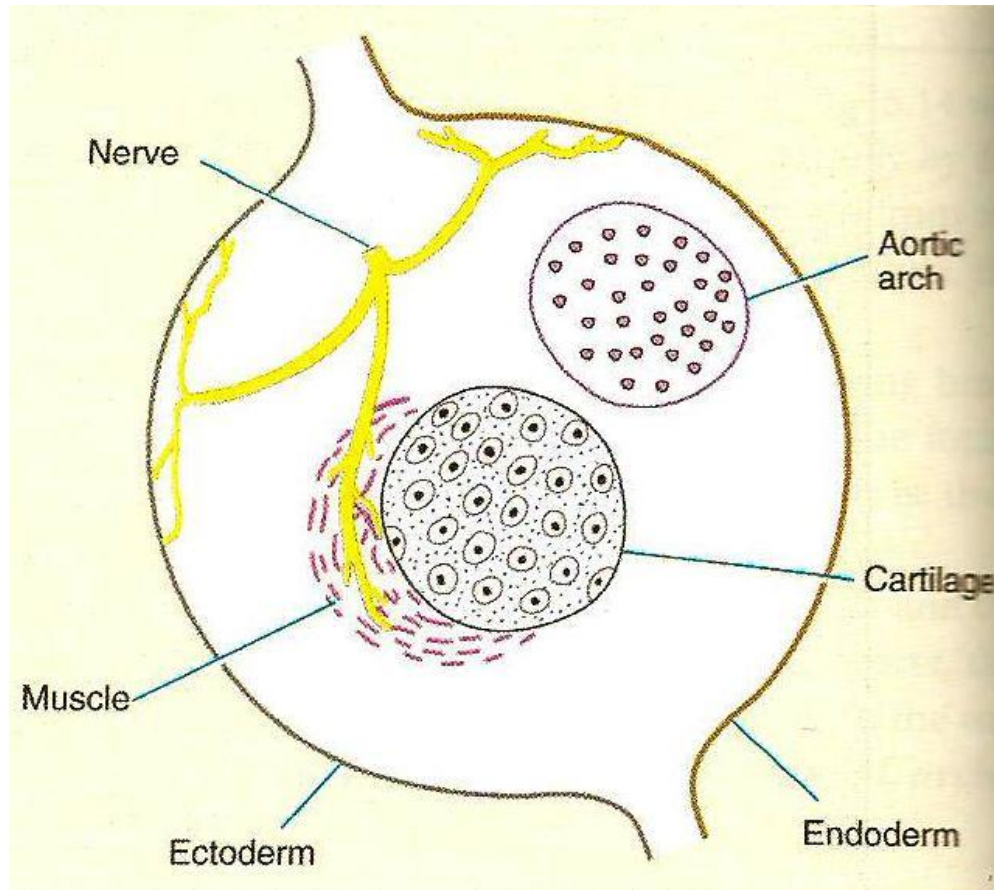
Pharyngeal Arches

- By the end of the fourth week, four pairs of pharyngeal arches are visible externally.
- The fifth and sixth arches are rudimentary and are not visible on the surface of the embryo.
- The pharyngeal arches are separated from each other by fissures called pharyngeal grooves/clefts.
- They are numbered in craniocaudal sequence.

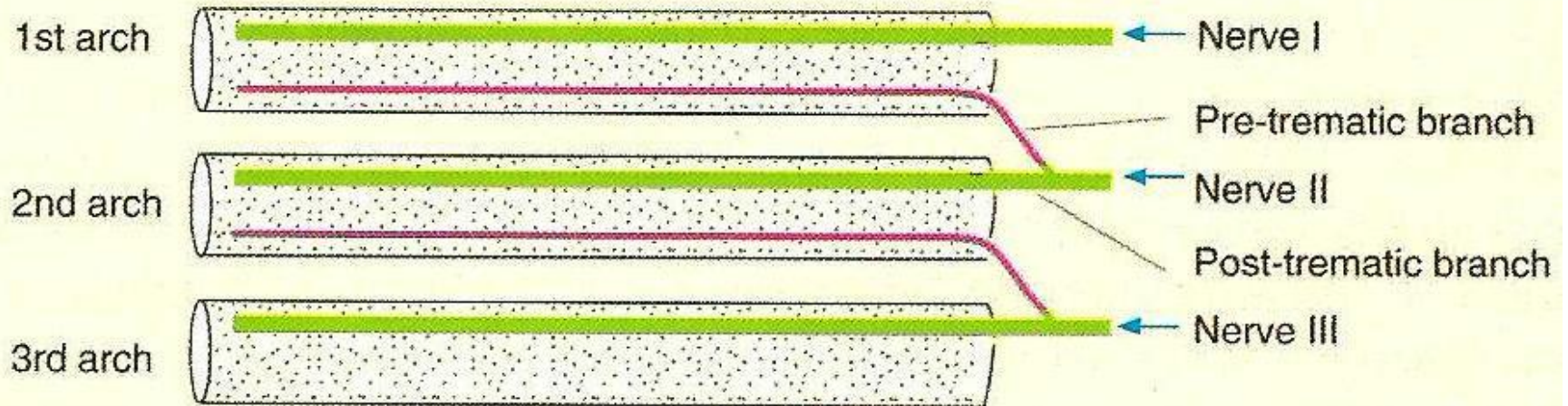
Pharyngeal Arch Components

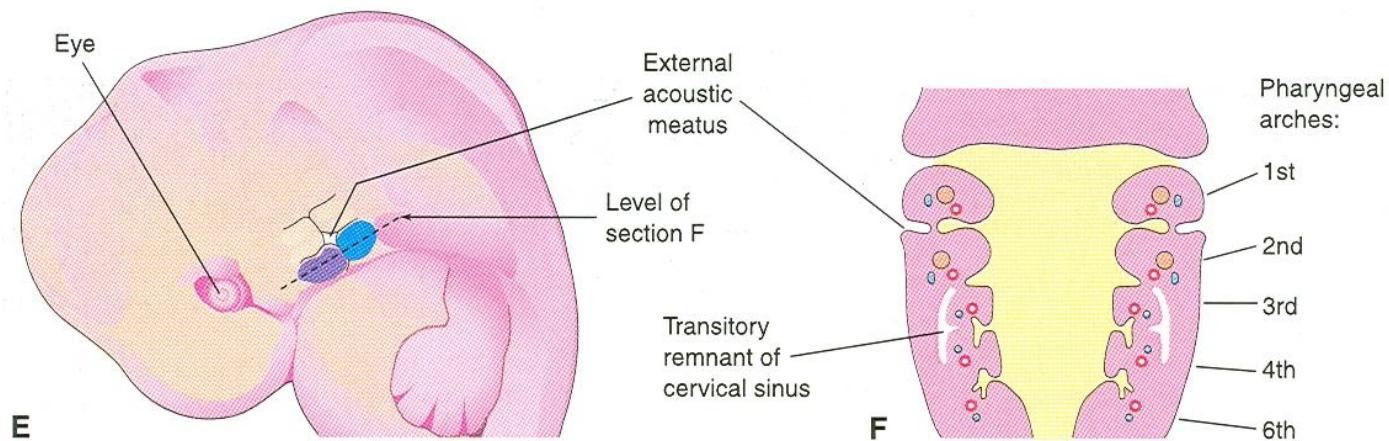
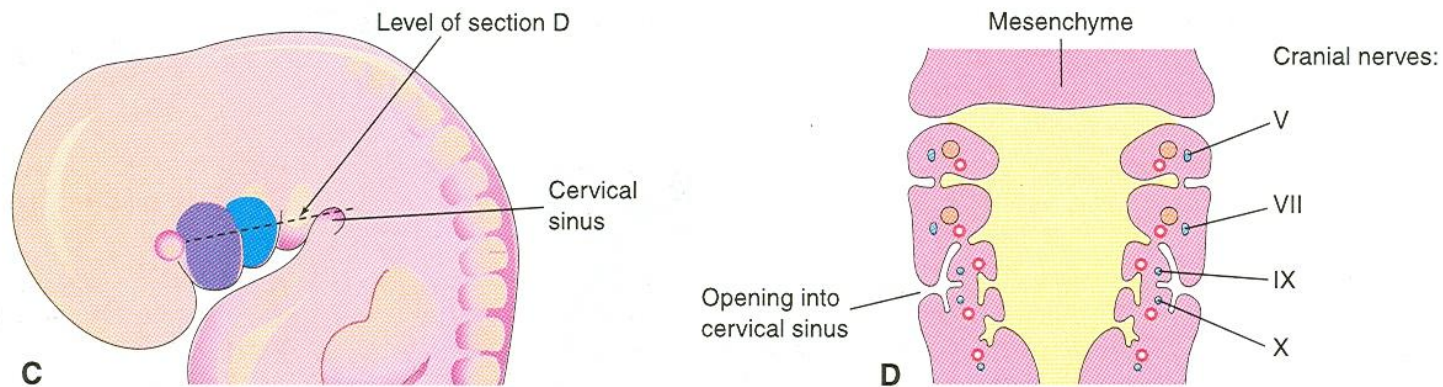
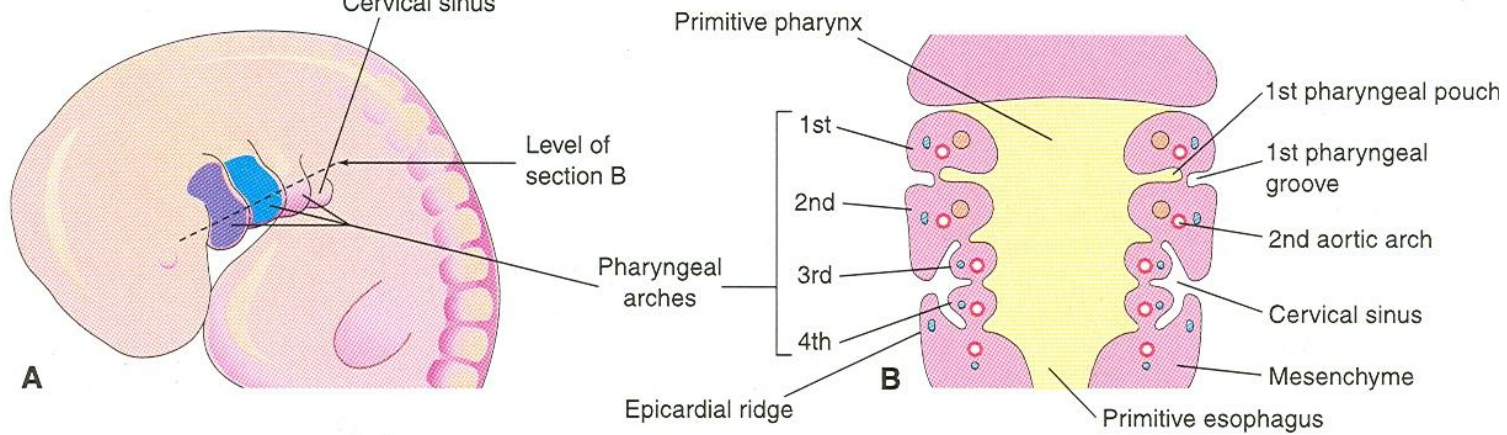
- Each pharyngeal arch consists of a core of mesenchyme.
- Is covered externally by ectoderm and internally by endoderm.
- In the third week, the original mesenchyme is derived from mesoderm.
- During the fourth week, most of the mesenchyme is derived from neural crest cells that migrate into the pharyngeal arches.

Structures in a Pharyngeal Arch



Arrangement of nerves supplying the pharyngeal arch (in lower animals)



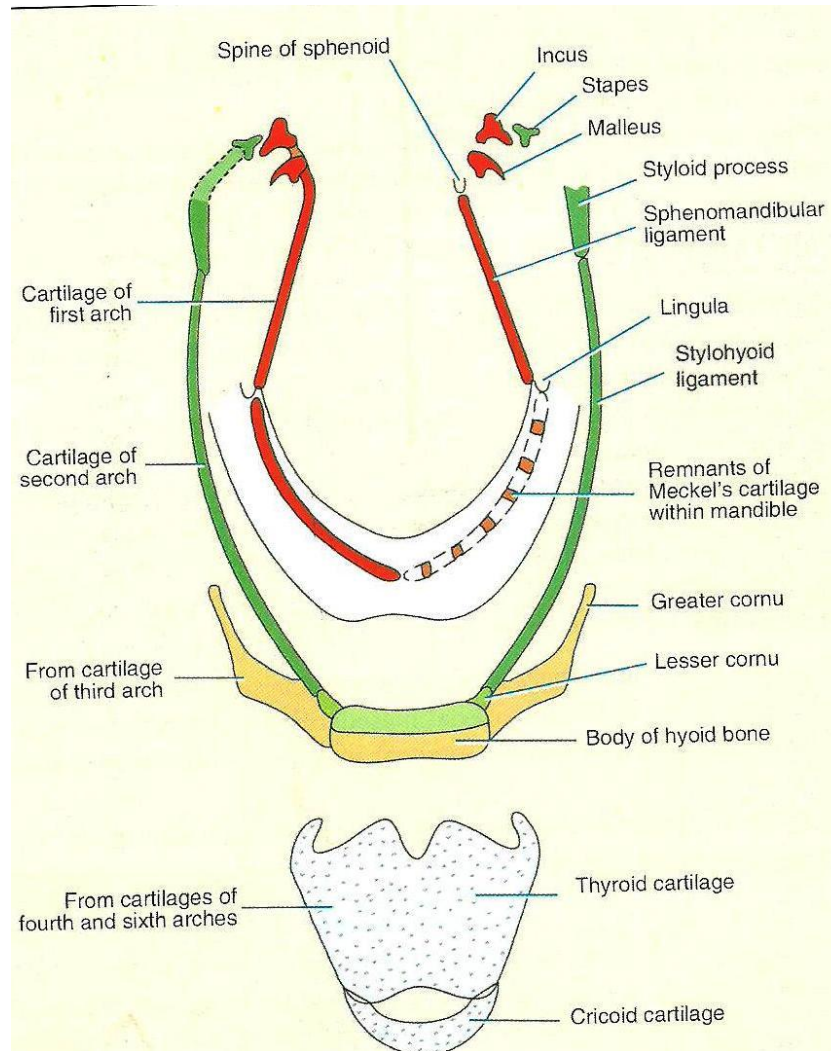


Fate of Pharyngeal Arches

A typical pharyngeal arch contains:

- An aortic arch, an artery that arises from the truncus arteriosus of the primordial heart.
- A cartilaginous rod that forms the skeleton of the arch.
- A muscular component that differentiates into muscles in the head and neck.
- A nerve that supplies the mucosa and muscles derived from the arch.

Derivatives of the skeletal elements

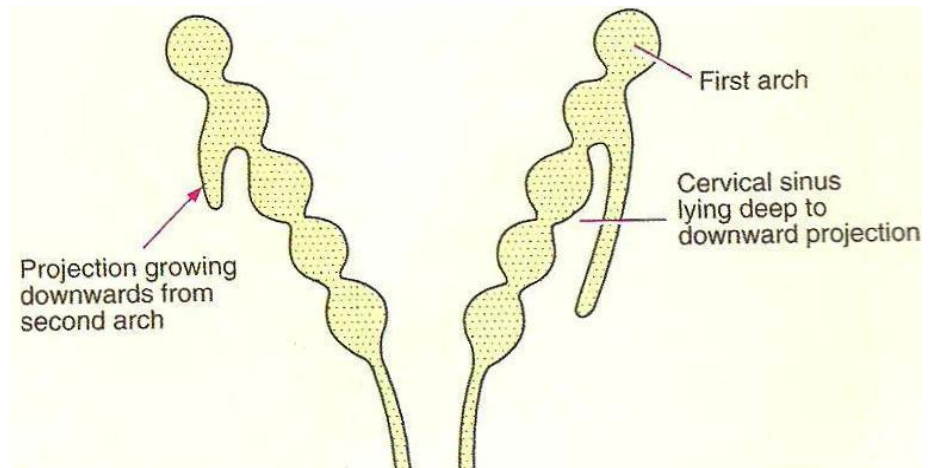


Nerve & muscles of Pharyngeal arches

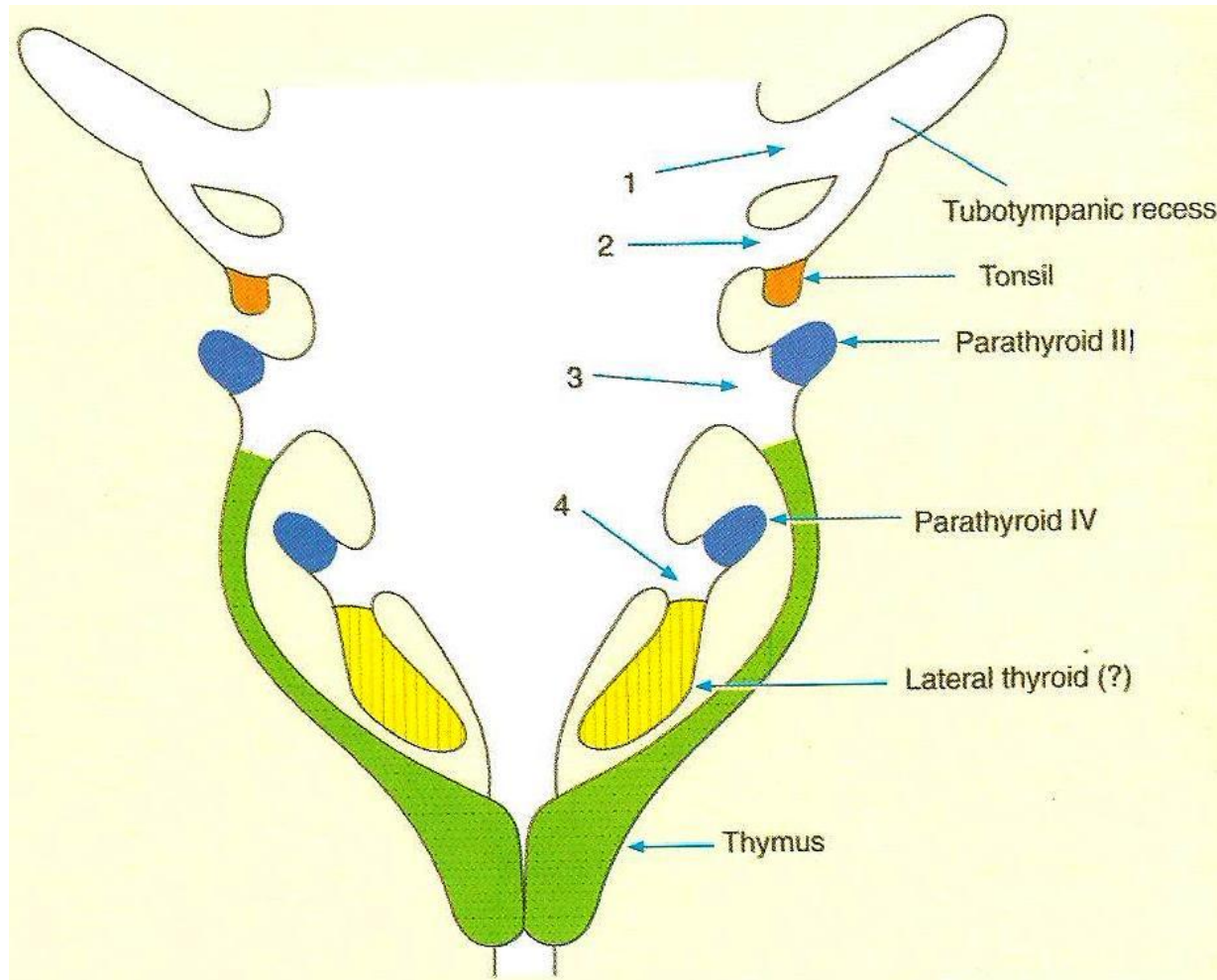
Arch	Nerve of Arch	Muscles of Arch
First	Mandibular	Medial and lateral pterygoids, Masseter, Temporalis, Mylohyoid, Anterior belly of digastric, Tensor tympani, Tensor palati.
Second	Facial	Facial Muscles, Occipitofrontalis, Platysma, Stylohyoid, Posterior belly of digastric, Stapedius, Auricular muscles.
Third	Glosso-pharyngeal	Stylopharyngeus
Fourth	Superior laryngeal	Muscles of larynx and pharynx
Fifth	Recurrent laryngeal	

Fate of Ectodermal Clefts

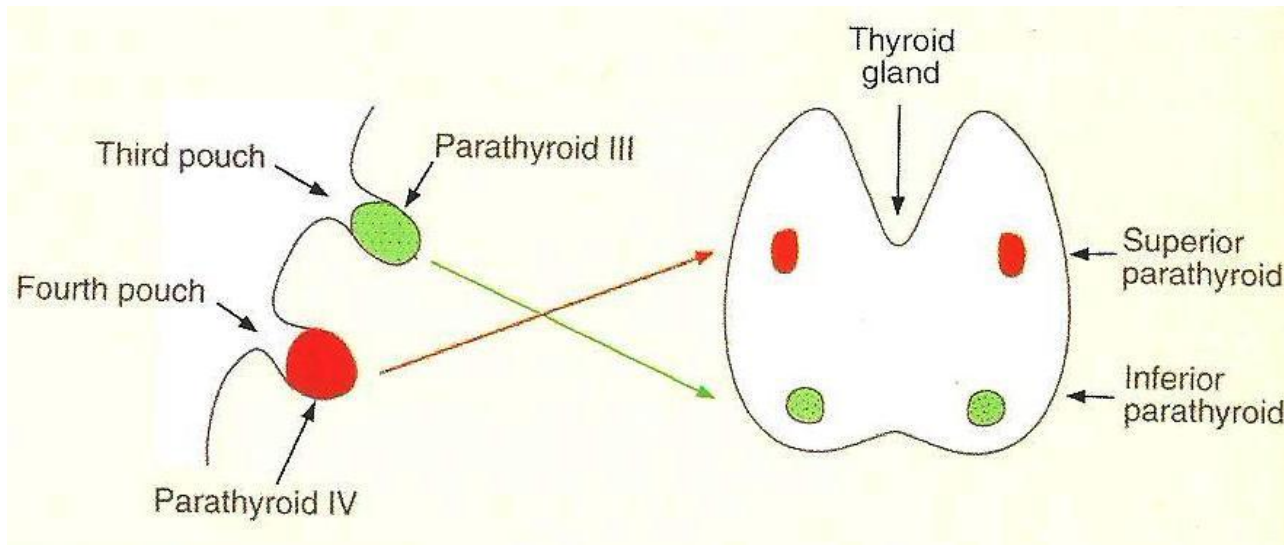
- **1st cleft:**
 - Dorsal part-** Ext. acoustic meatus & Pinna
 - Ventral part-** obliterated
- **Cervical sinus:** Branchial cysts/sinus



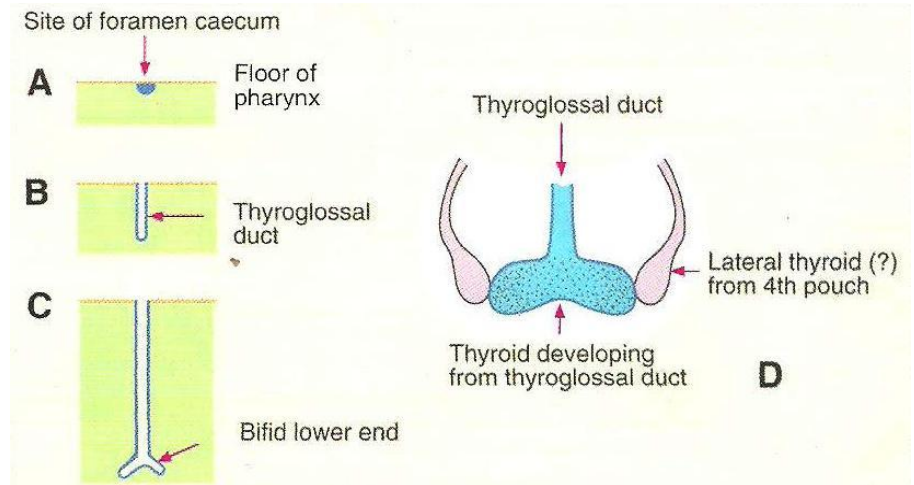
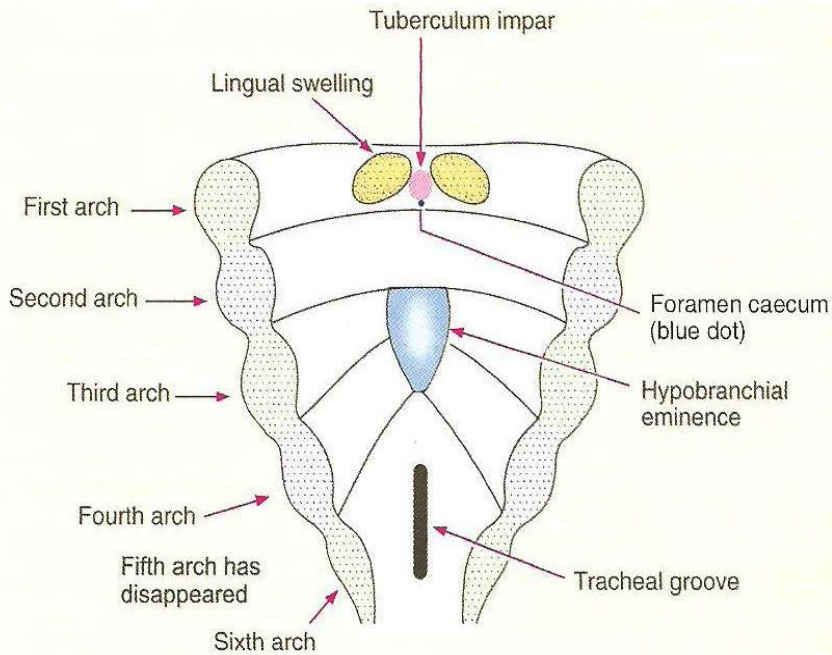
Fate of the Endodermal Pouches



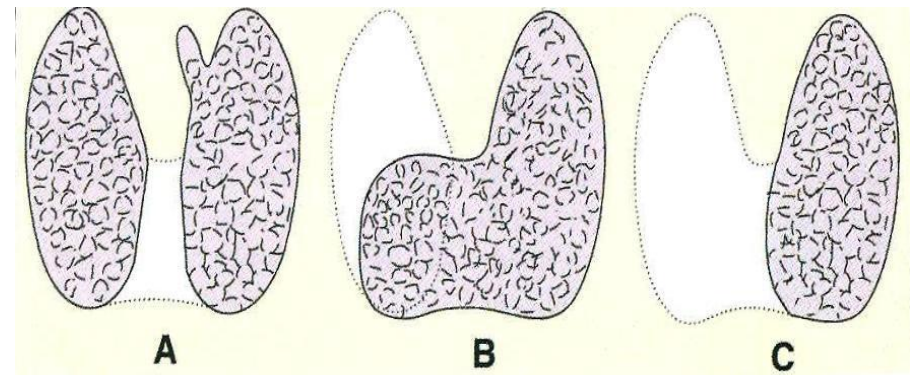
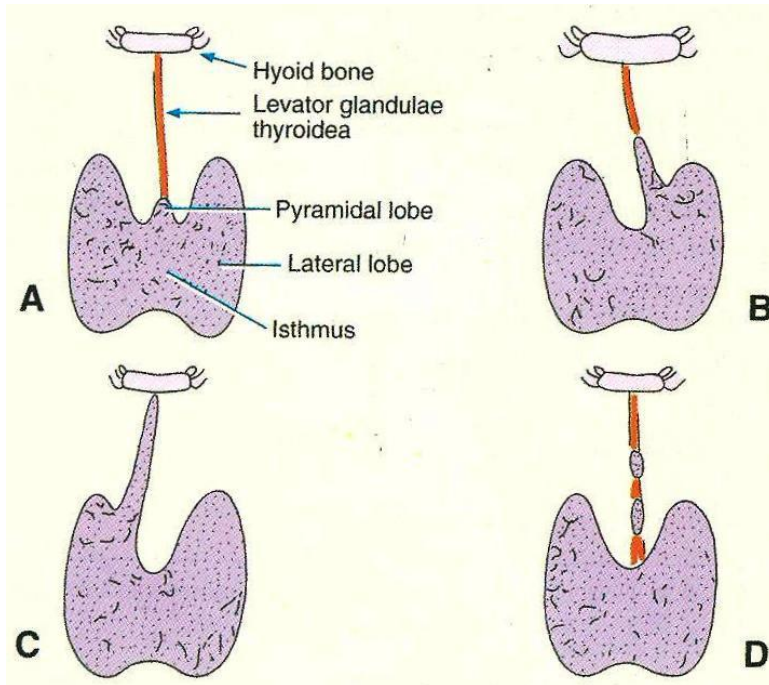
Development of Parathyroid glands



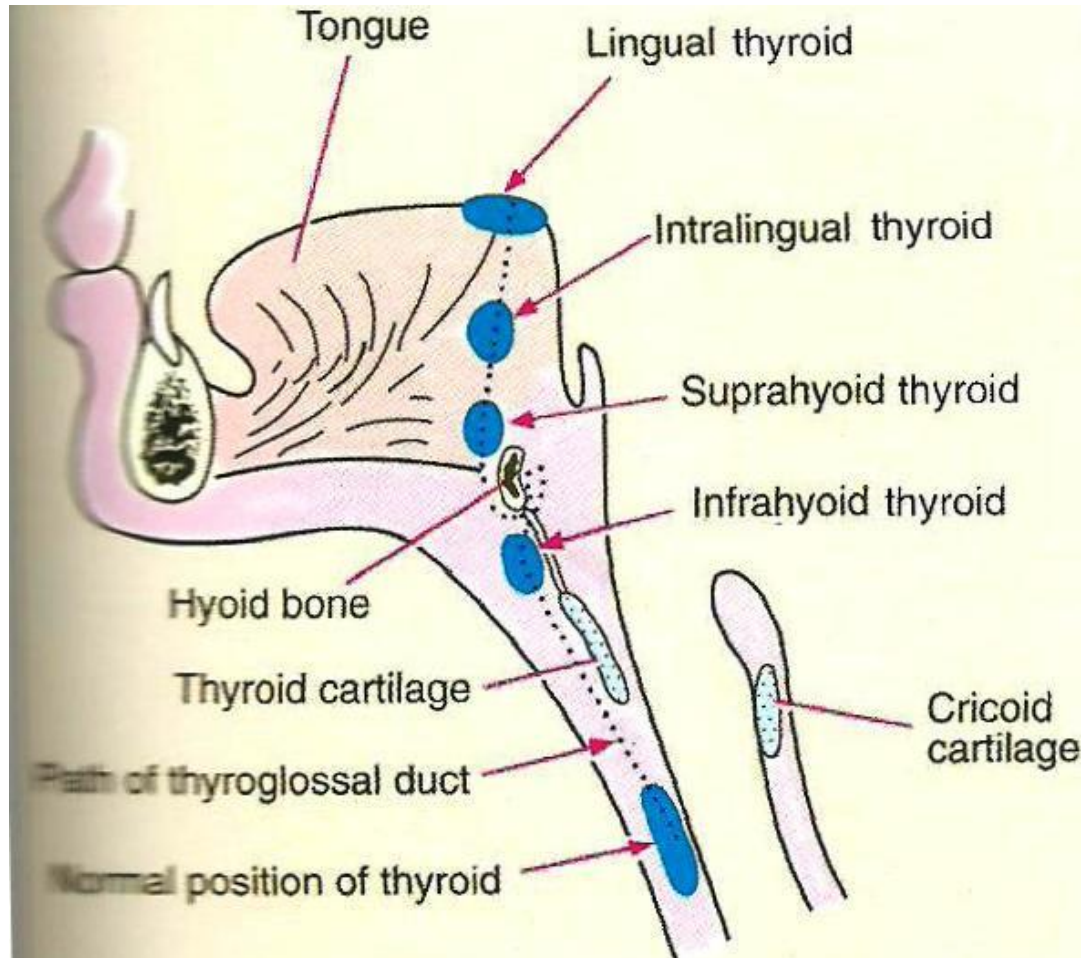
Development of the Thyroid gland



Anomalies of shape of thyroid gland



Anomalies of position of thyroid gland



Other anomalies of thyroid gland

- Ectopic thyroid tissue
- Remnants of thyroglossal duct:
 - (a) Thyroglossal cysts
 - (b) Thyroglossal fistula
 - (c) Carcinoma

REFERENCES

1. Langman's Medical Embryology, 11th Edition.
3. I.B. Singh. Human Embryology, 10th Edition.

MCQs

1. The cartilage of 2nd pharyngeal arch gives origin to:

- a) Incus
- b) Malleus
- c) Stapes
- d) All of the above

MCQs

2. All are derivatives of 1st arch **except:**

- a) Anterior ligament of malleus
- b) Sphenomandibular ligament
- c) Stylohyoid ligament
- d) Temporalis

MCQs

3. Tonsil is derived from which endodermal pouch?

- a) 1st
- b) 2nd
- c) 3rd
- d) 4th

MCQs

4. Superior parathyroid glands develop from endoderm of which pharyngeal pouch?

a) 1st

b) 2nd

c) 3rd

d) 4th

MCQs

5. Parafollicular cells of thyroid gland are derived from which endodermal pouch?

- a) 1st and 2nd
- b) 2nd and 3rd
- c) 3rd and 4th
- d) 4th and 5th