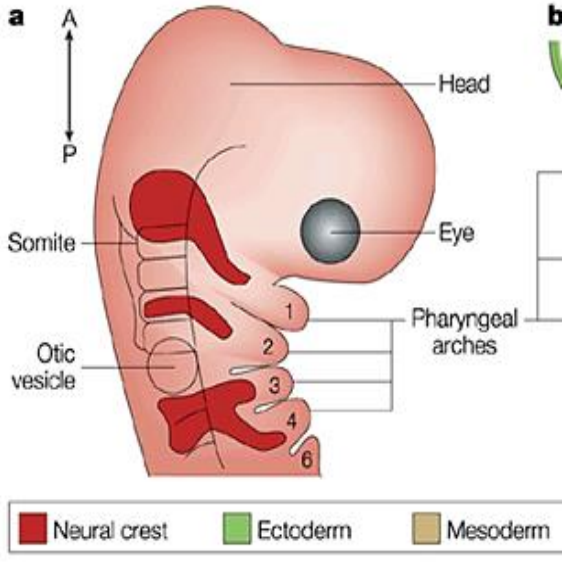
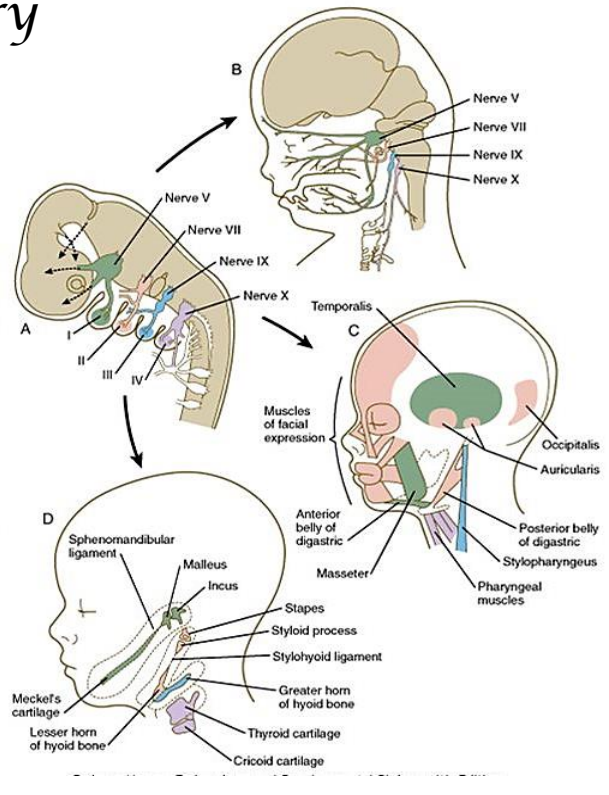
Practical Medical Embryology

Second stage

Thi-Qar University -College of Dentistry





Ass.Lec. Sada Ghalib Taher

Development of face

facial primordia appear at end of 4th week (neural crest ectomesenchyme of 1st pharyngeal arch) around stomodeum

- frontonasal prominence cranially
- maxillary prominences laterally
- mandibular prominences caudally
  - on each side develop bilateral oval thickenings of the surface ectoderm → **nasal placodes**
    - they depress within 5th week → **nasal pits**
    - pits are bordered by horseshoe-shaped elevations = **medial and lateral nasal prominences**

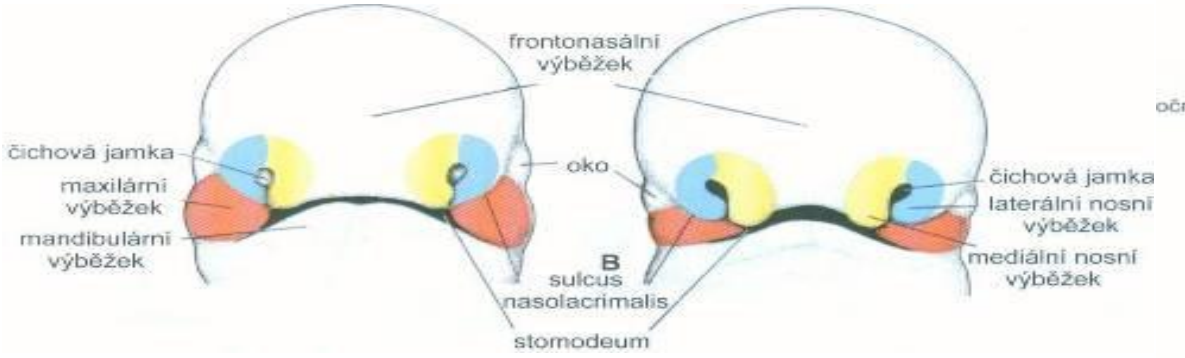
Development of face

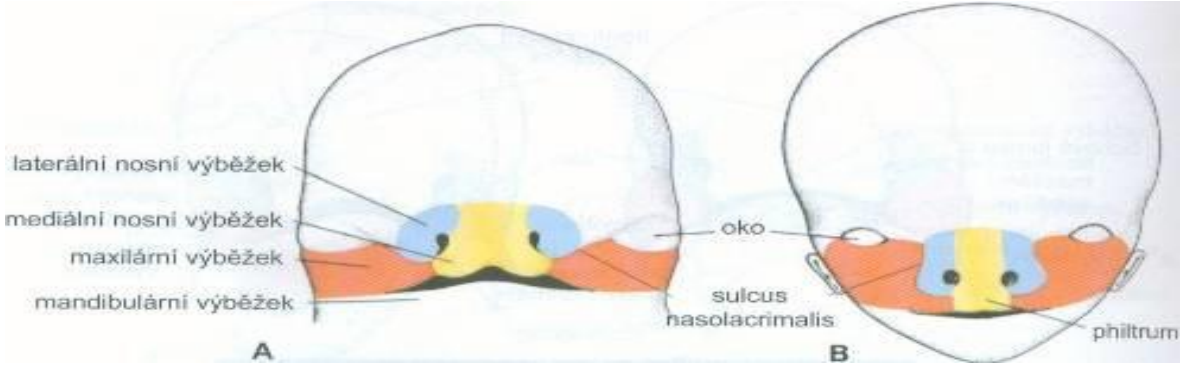
Table 17.3 Structures Contributing to Formation of the Face

Prominence	Structures Formed
Frontonasal[a]	Forehead, bridge of nose, and medial and lateral nasal prominences
Maxillary	Cheeks, lateral portion of upper lip
Medial nasal	Philtrum of upper lip, crest, and tip of nose
Lateral nasal	Alae of nose
Mandibular	Lower lip

[a]The frontonasal prominence is a single unpaired structure; the other prominences are paired.

Development of face





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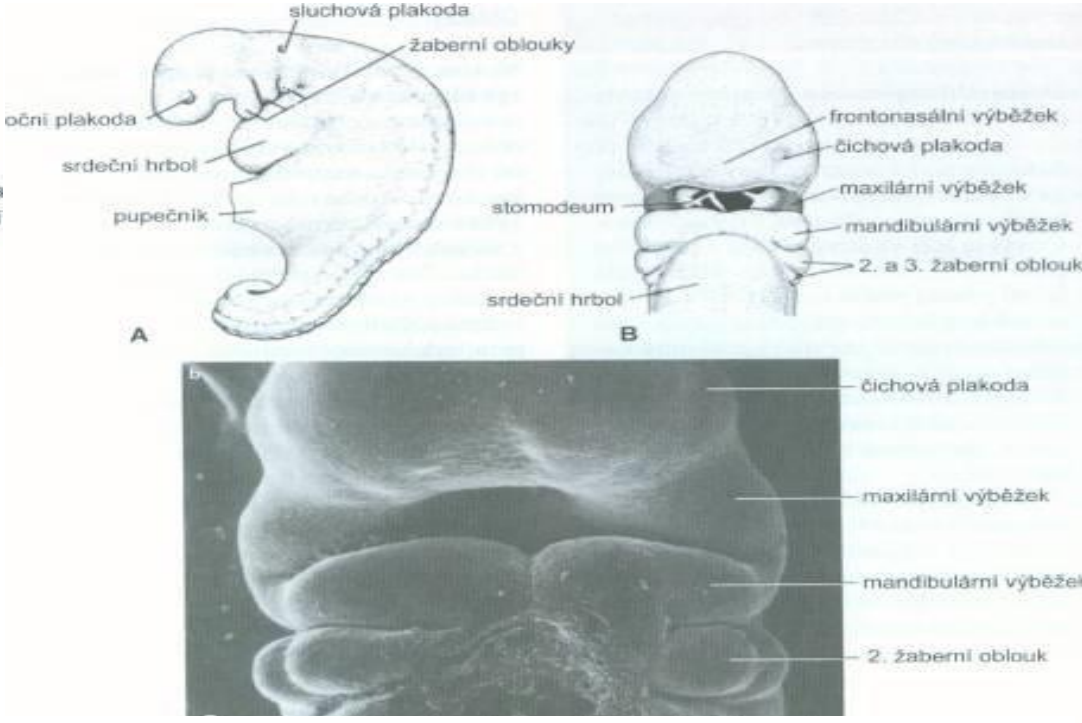
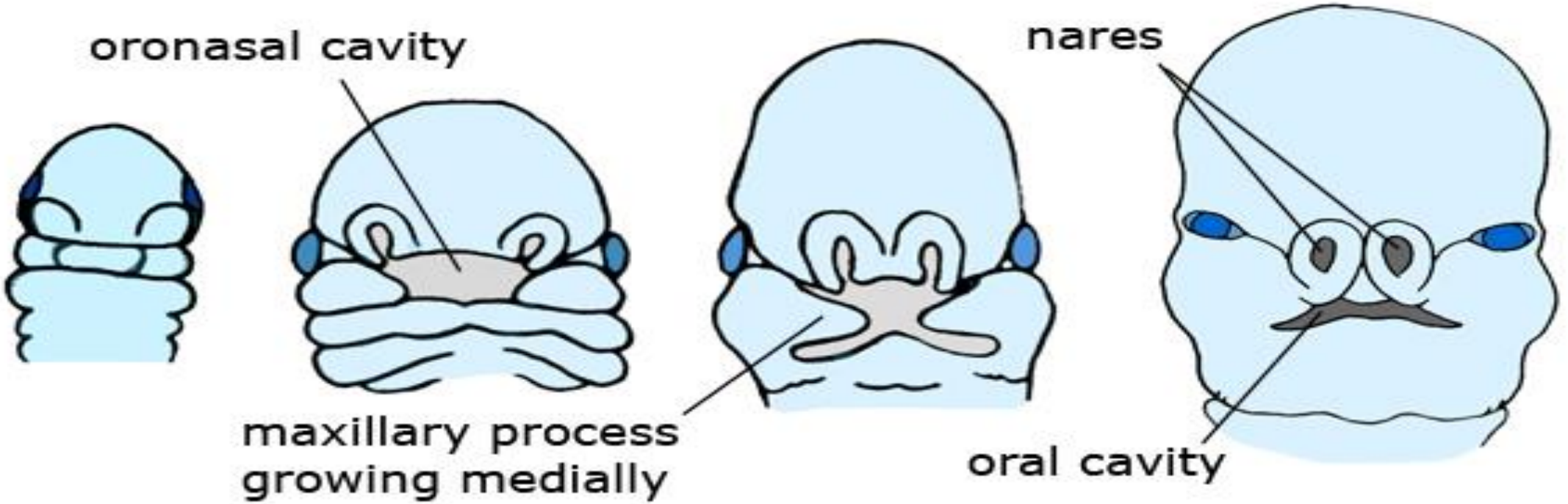
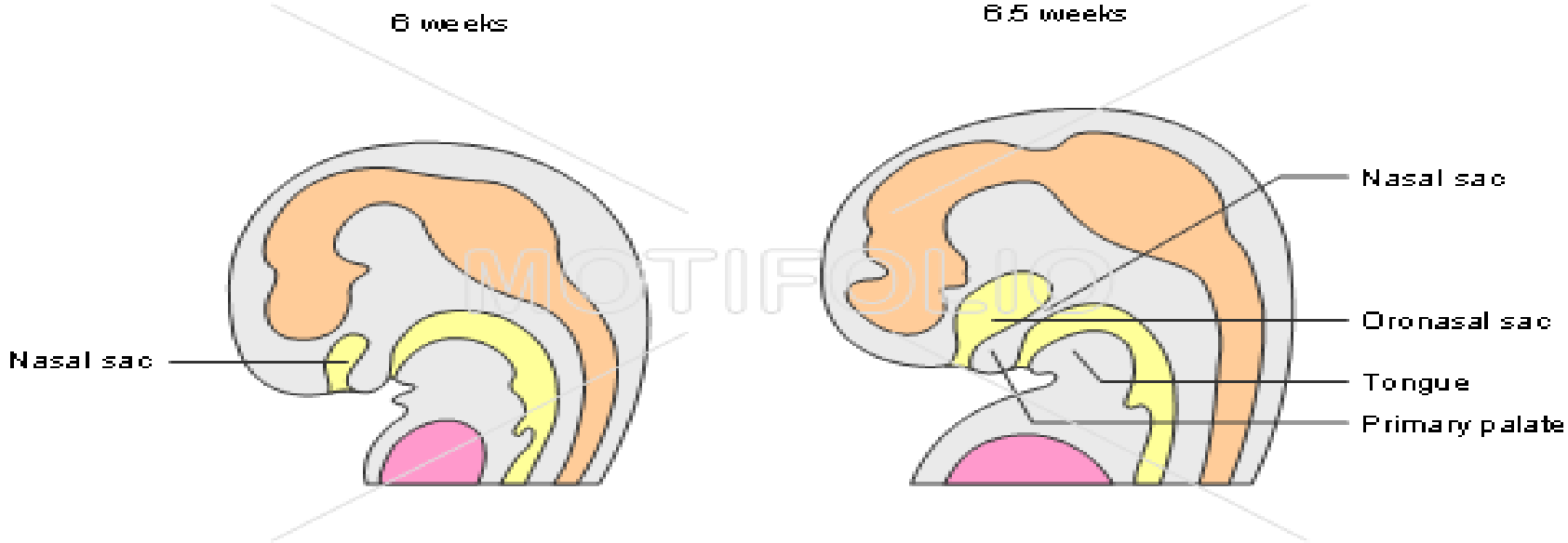


Face development. A. Position of branchial arches in lateral view in 4th week. B. Front view of face foundation in the 5th week. Maxillary and mandibular extensions are well visible, olfactory placodes are formed in margins of frontonasal extension. C. SEM photo of the face of human embryo in 5th week of dev.


oronasal cavity
nares
maxillary process
growing medially
oral cavity

Development of the nasal cavities

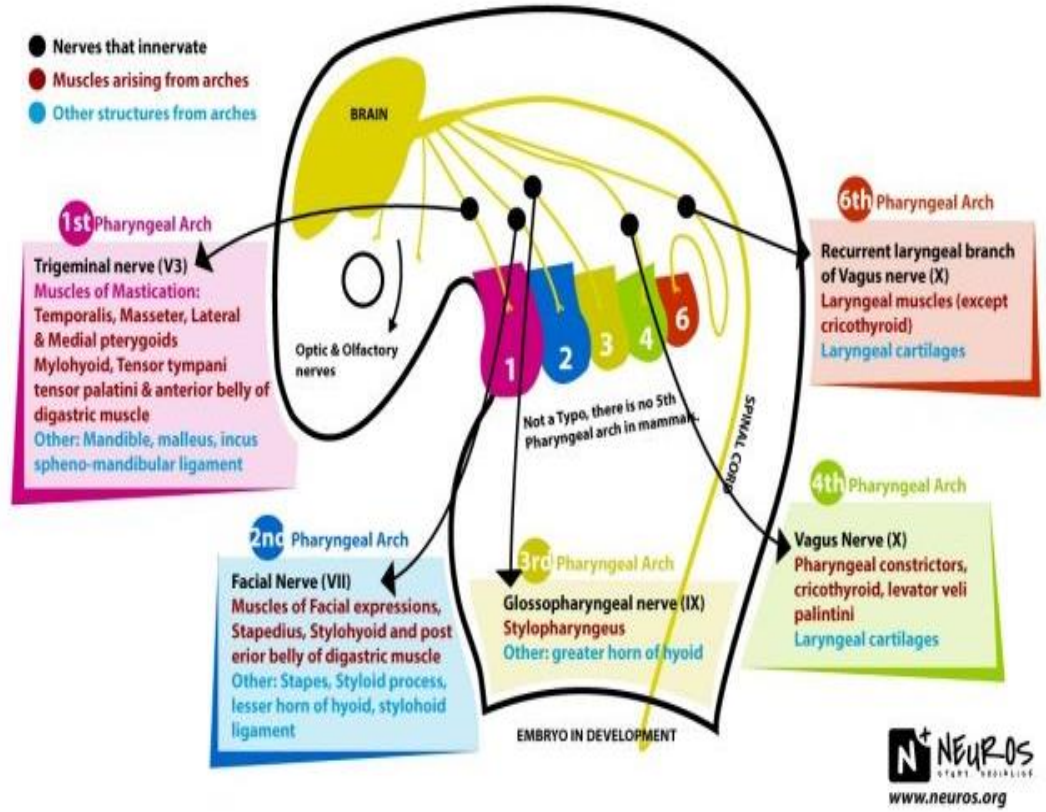


Endodermal /pharyngeal pouches

•In the interval between any two arches, the endoderm is pushed outwards to form a series of pouches.

•**Ectodermal cleft**

•The surface ectoderm dips inwards opposite each pouch.



Each pharyngeal arch contains :

1.a skeletal element (cartilage).

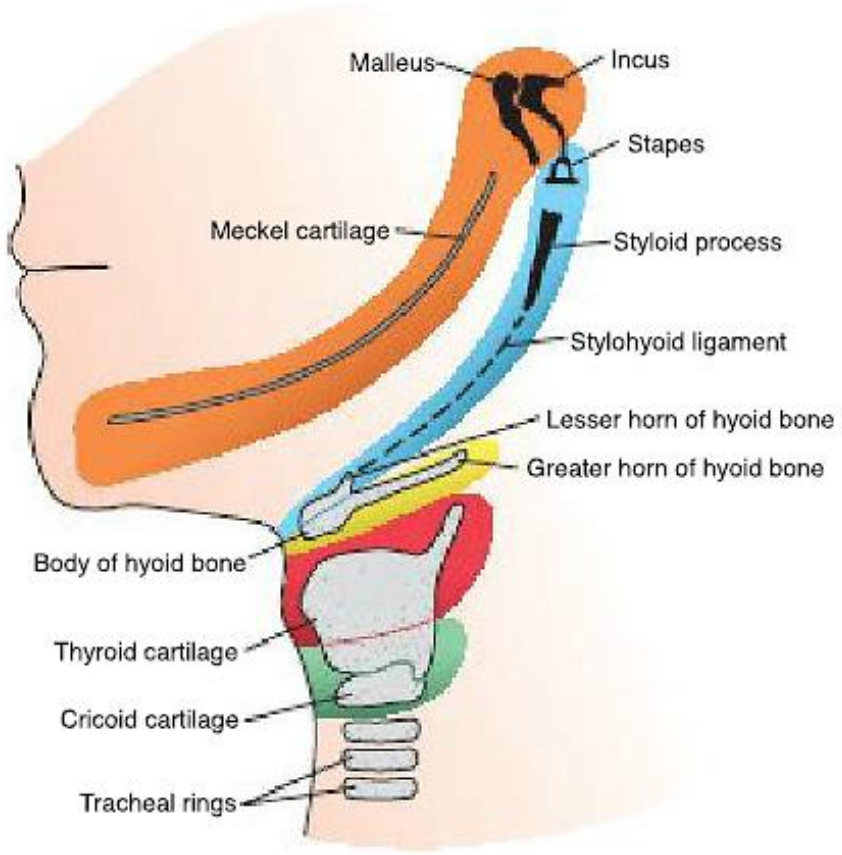
2.Striated muscle (supplied by a nerve of the arch and an arterial arch.

- The cartilage of the 1st arch (Meckle's cartilage) gives rise to the incusand malleus.
- The cartilage of the 2nd arch forms

a.The stapes.

b.The styloid process.

c.Part of the hyoid bone.



The cartilage of the 3rdarch forms the greater part of the hyoid bone.

•The cartilage of 4thand 6tharches give rise to the cartilage of the larynx.

•**Nerves of the arches:**

•1starch ----------mandibular.

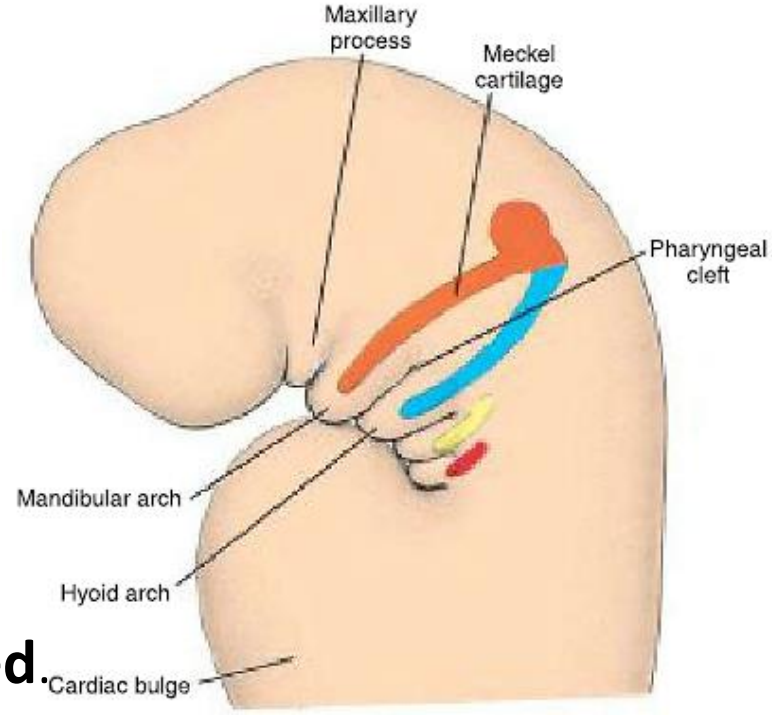
•2ndarch ----------facial.

•3rdarch ----------glossopharyngeal.

•4tharch ----------superior laryngeal.

•5tharch ----------recurrent laryngeal.

The muscles are supplied by these nerves are derived from the mesoderm of the arch concerned.



The external acoustic meatus develops from the 1st ectodermal cleft.

•Tubotympanic recess develops from the 1st and 2nd endodermal pouch.

-The middle ear and the auditory tube develops from the tubotympanic recess.

-The palatine tonsil arises from the 2nd pouch.

The inferior parathyroid gland and the thymus are derived from the 3rd pouch.

The superior thyroid gland is derived from the 4th pouch.

•The thyroid gland develops mainly from the thyroglossal duct.

•Thyroglossal duct is formed as a median diverticulum arising from the floor of the pharynx (at the foramen caecum.

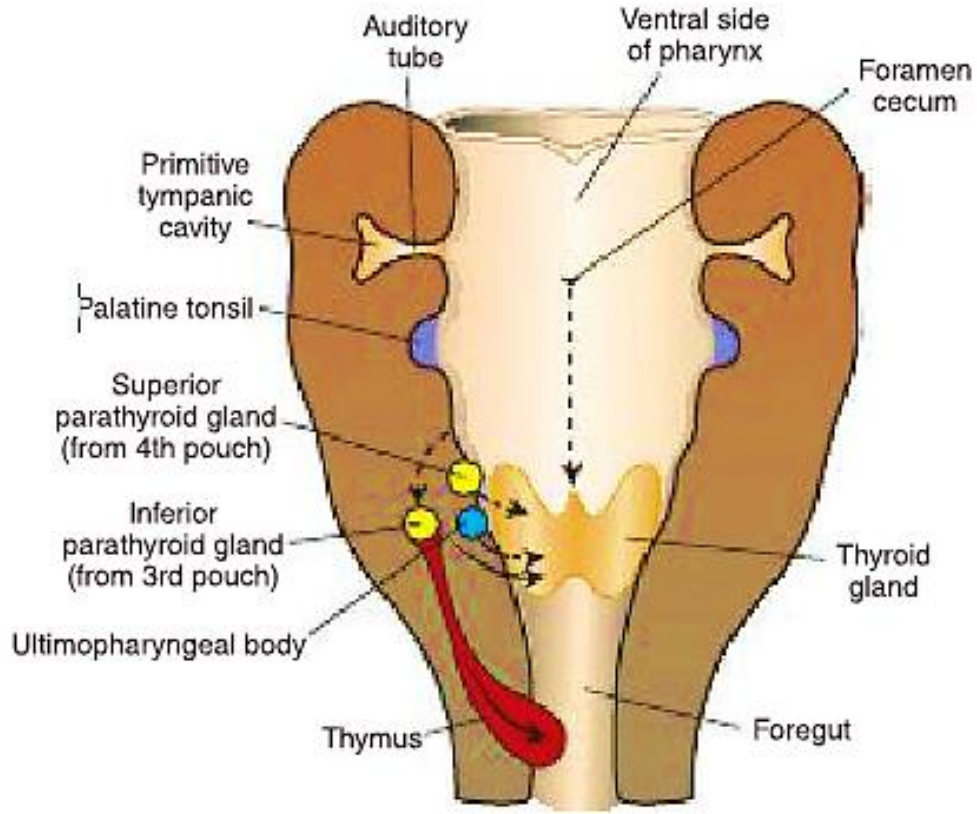


FIGURE 17.11 Migration of the thymus, parathyroid glands, and ultimobranchial body. The thyroid gland originates in the midline at the level of the foramen cecum and descends to the level of the first tracheal rings.

- **The following structures are formed in the mesoderm of each arch:**

1.Skeletal element.

2.Striated muscle.

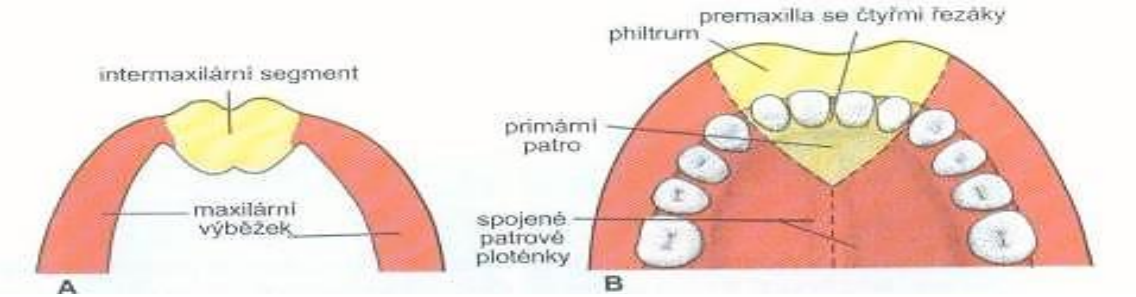
3.Arterial arch.

Development of palate

- primary palate
  - from *intermaxillary segment*
    - by merging of both medial nasal prominences
  - lip component → *philtrum*
  - component for the upper jaw (carries 4 incisors)
  - palatine component (forms the primary palate)
  - passes continuously into nasal septum (from frontonasal prominence)

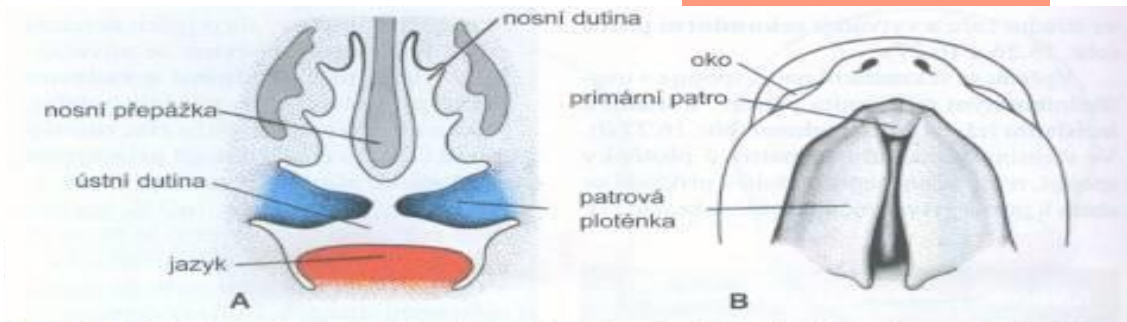
- secondary palate
  - by merging of palatine processes of maxillary process (6th week)
  - ventrally fusion with primary palate (future *os incisivum*)

Development of palate



A. Intermaxillary segment and maxillary extensions. B. From intermaxillary segment originate part of middle sulcus of upper lip (philtrum), next ventral part of upper jaw (premaxilla) in the extent of four dentes incisivi and also primary palate having triangular shape.

Palate development. A. Frontal section of head in 7th week of development. Palate plates are in vertical position on both sides of tongue foundation. B. View of palate plates before their horizontalization. Primary palate is not yet separated.



Palate development. A. Frontal section of head in 8th week of development. Tongue moves caudally and palate plates moved into horizontal position. B. Frontal view of palate plates that are already in horizontal position but not fused yet so that nasal septum could be visible.

Palate development. A. Frontal section of the head in 10th week . Palate plates fuse and connect with nasal septum. B. Foramen incisivum is preserved in the place of fusion of primary and secondary palate.

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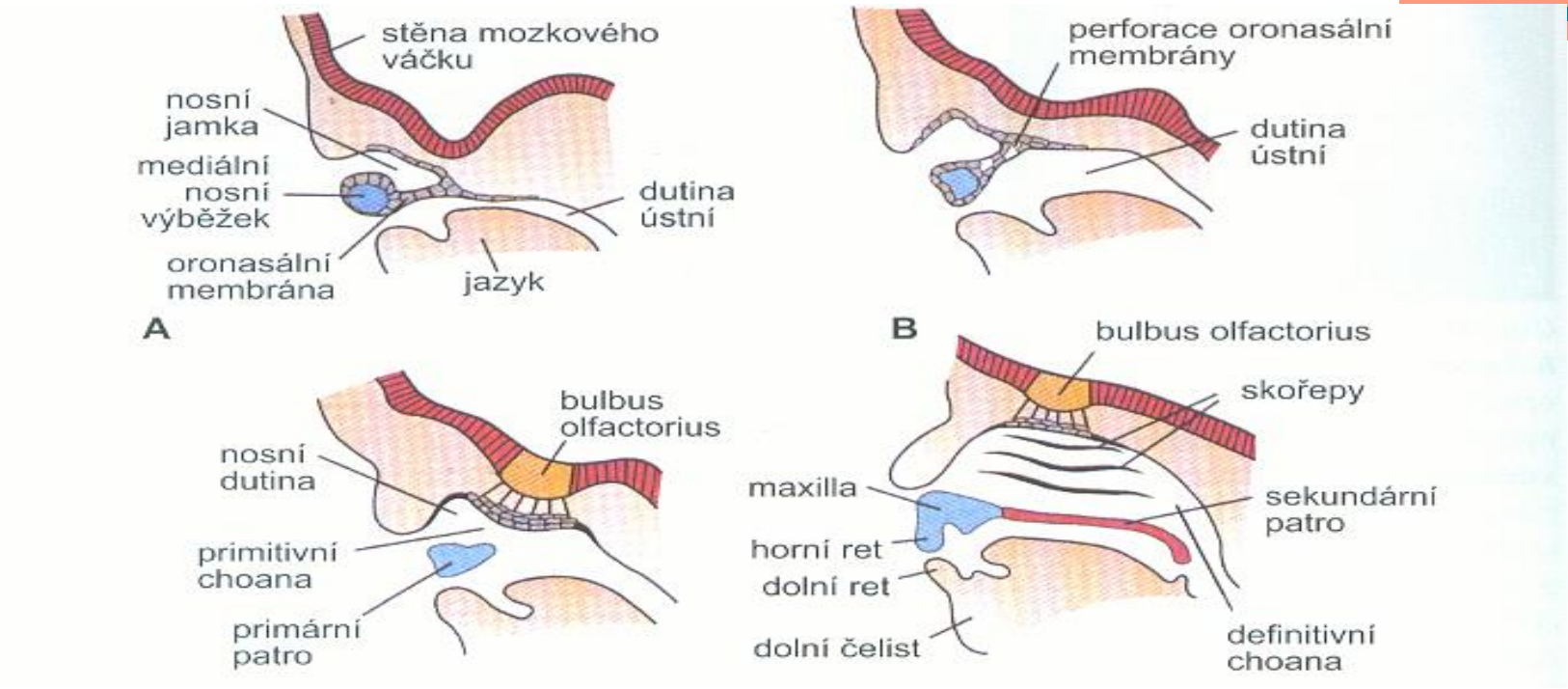
Separation of oral and nasal cavity

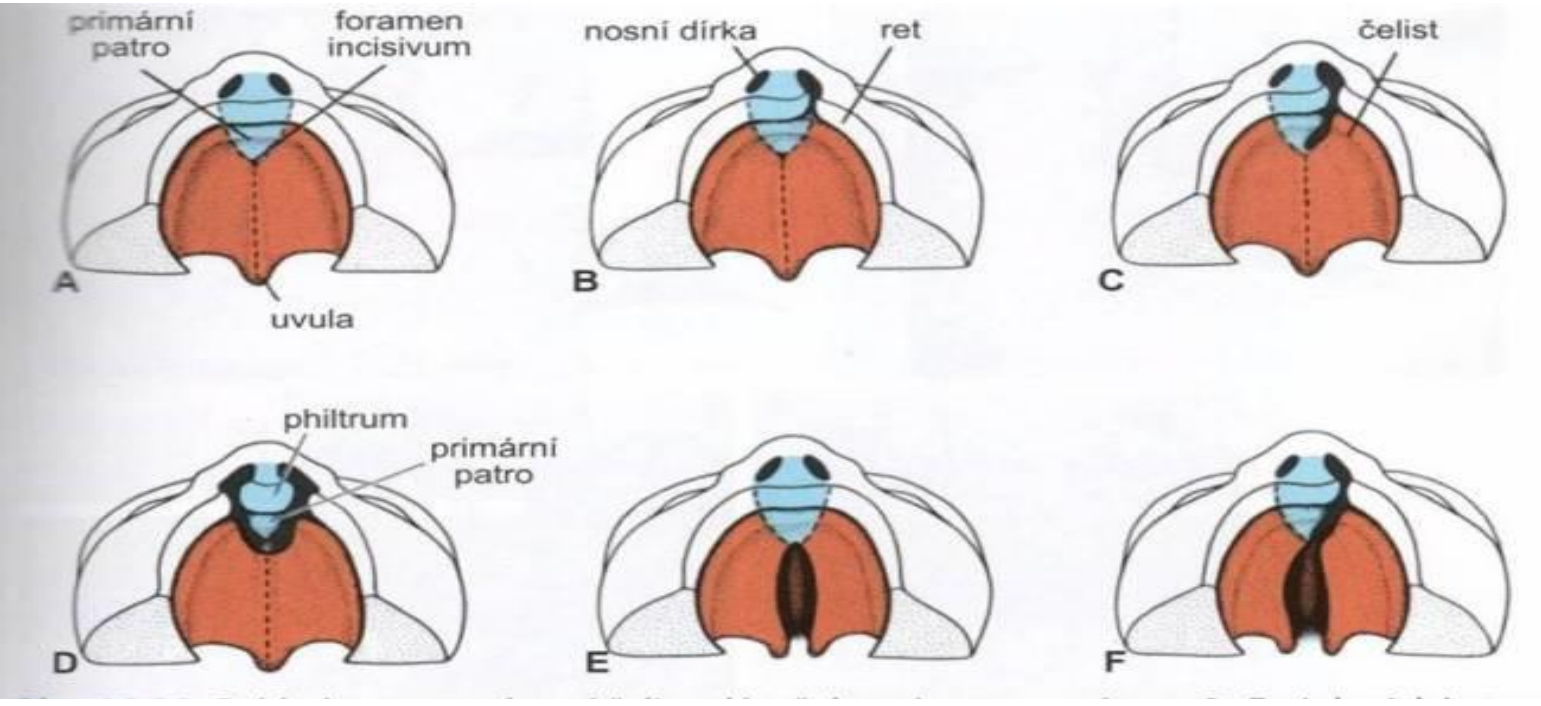


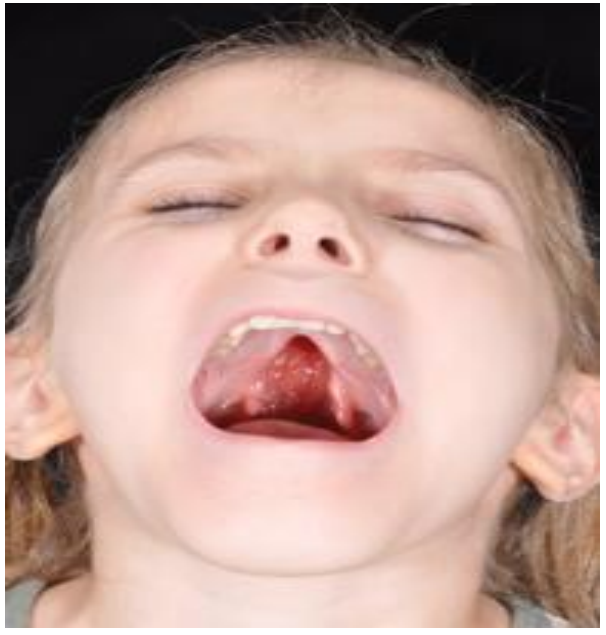
Stages of nasal and mouth cavity separation. A. Sagittal section via nasal pit and cadal margin of medial nasal extension in 6th week of development. Primitive nasal cavity is separated from mouth cavity by oronasal membrane. B. Similar section as in A in time when oronasal membrane ceases. C. Embryo in 7th week, primitive nasal cavity is connected with mouth cavity. D. Sagittal section of face in 9th week. Definitive nasal cavity is separated from mouth cavity by primary and secondary palate. Defininitive choane connect nasal cavity with nasopharynx.

Cleft malformations of face and palate

- impaired fusion of structures
- **anterior** palate clefts (*cheiloschisis, cheilognathoschisis*)
  - lateral lip, upper jaw cleft, cleft between the primary and secondary palates
  - partial or complete lack of fusion of maxillary prominence with medial nasal prominence on one or both sides
- **posterior** palate clefts (*palatoschisis*)
  - secondary palate cleft, uvula cleft (*staphyloschisis*)

Cleft malformations of face and palate





View of palate, upper jaw, gingiva, upper lip and external nose. A. Physiological situation. B. One sided cleft of lip continuing into nostril. C. One sided cleft of lip and jaw continuing into foramen incisivum. D. Both sided cleft of lip and upper jaw. E. Isolated cleft of palate. F. Palate cleft with one sided cleft of jaw and lip.

Paranasal sinuses

- sinus maxillares
  - small (4 mm)in the time of delivery
- cellulae ethmoidales

- the rest postnatally
- from the invaginations of the wall of nasal cavity – pneumatized spaces in bones
  - only sinus sphenoidalis directly from nasal mucosa


THANK YOU
FOR
LISTENING