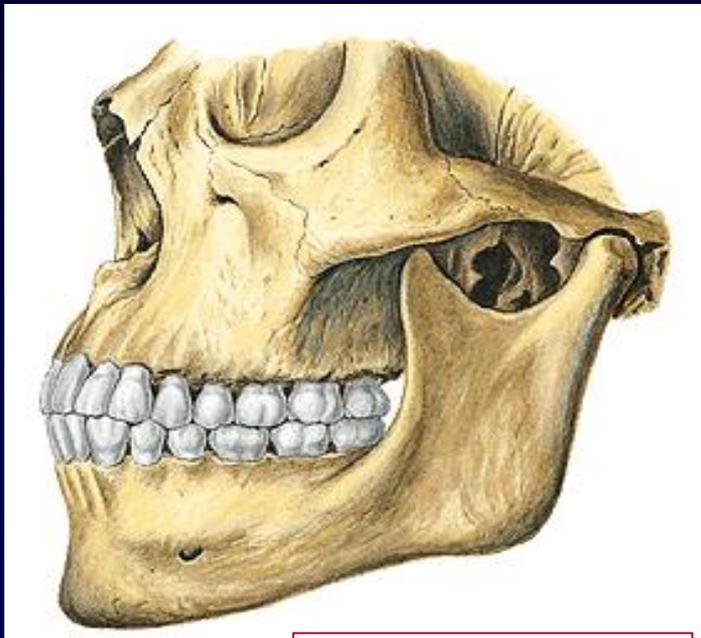




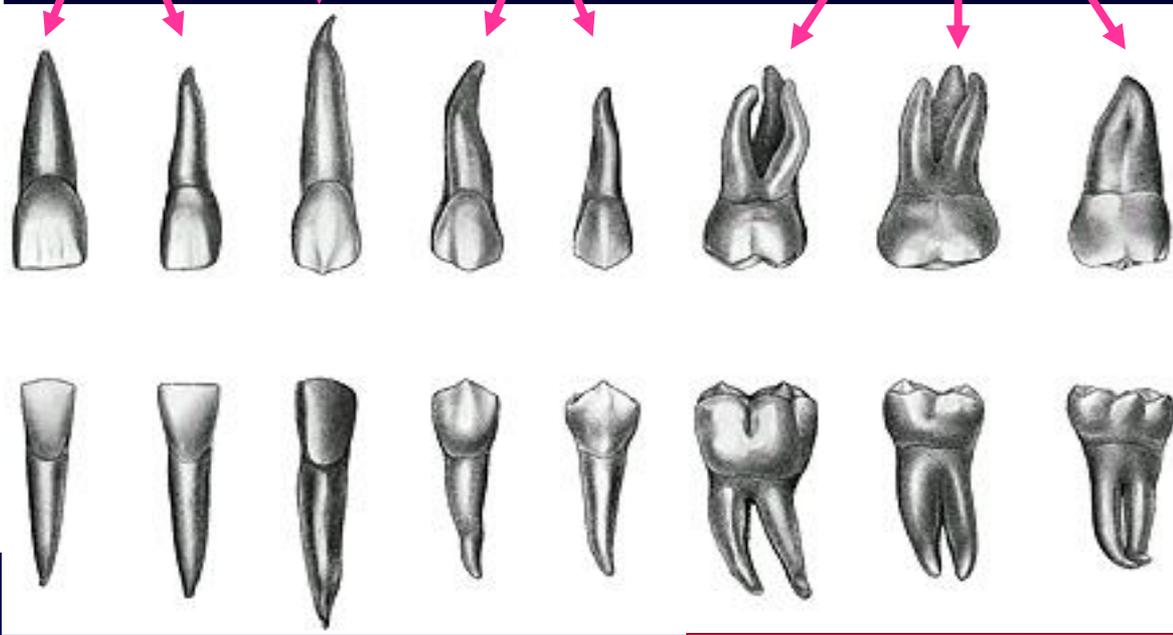
**Oral cavity
Tongue and teeth
- anatomy -
- embryology -**

Ágnes Nemeskéri

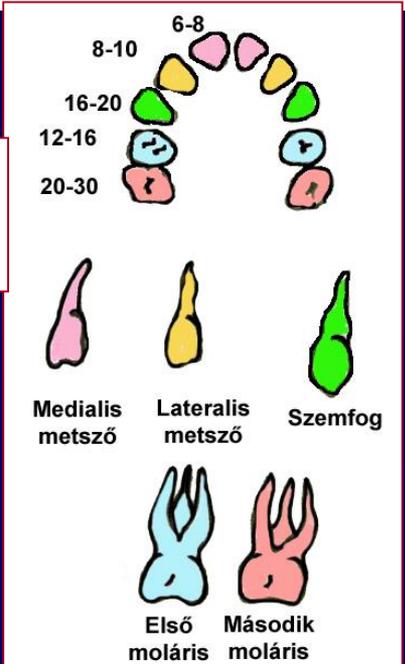
**Semmelweis University Budapest
Department of Anatomy, Histology and Embryology
Clinical Anatomy Research Laboratory**
nemeskeri.agnes@med.semmelweis-univ.hu



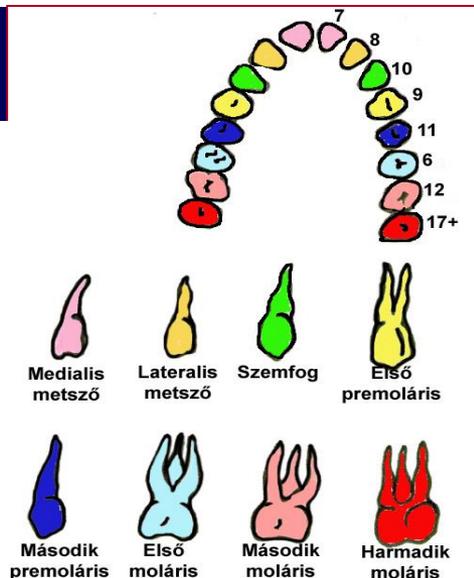
dentes incisivus dentes caninus praemolaris molaris



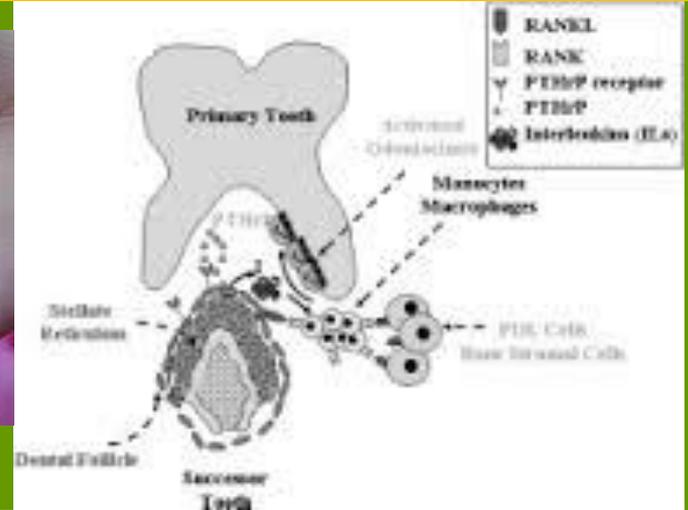
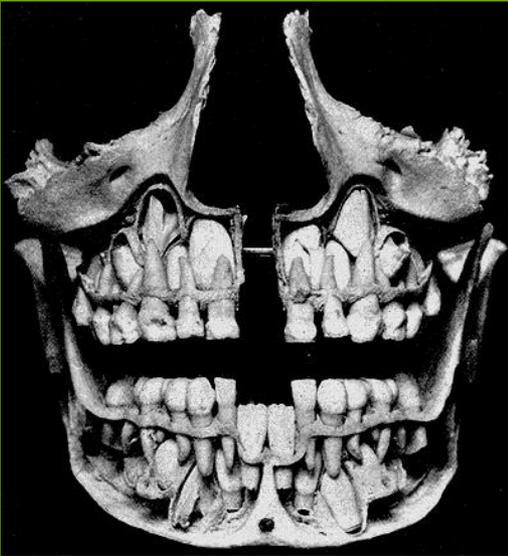
Primary teeth
-eruption -
months



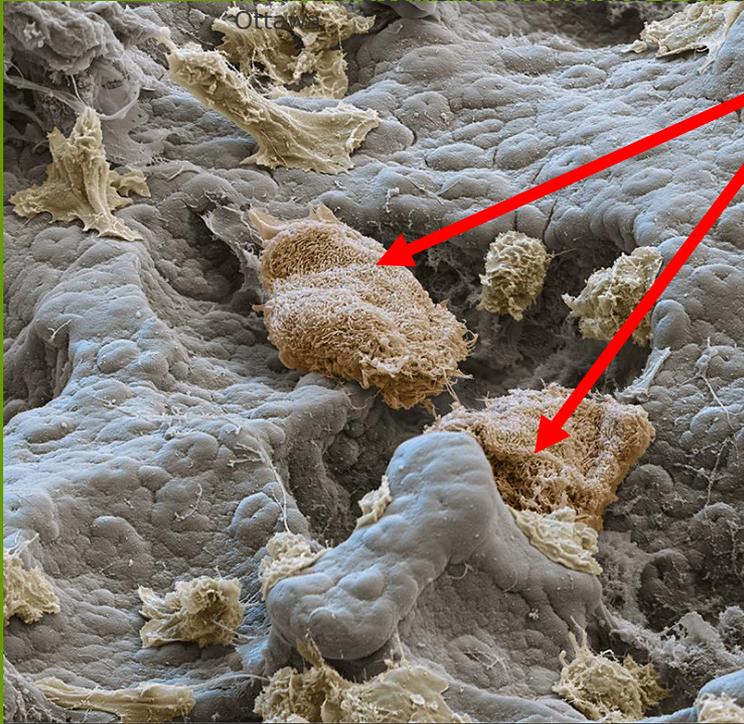
Secondary teeth
-eruption
years



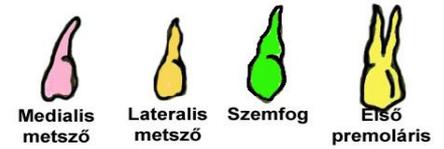
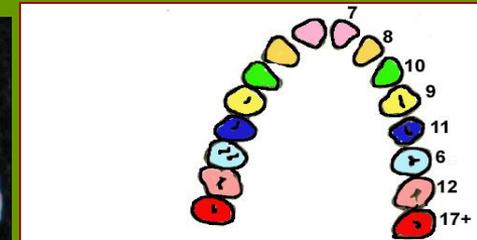
Replacement of primary teeth



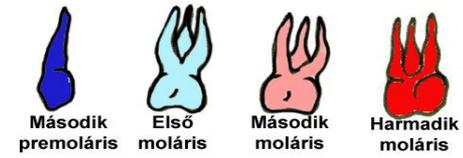
Tooth Development: Odontoclasts © Oliver Meckes and Nicole Ottaviani



odontoclasts!!



Replacement of primary teeth



Teeth



-gum - gingiva

pulp

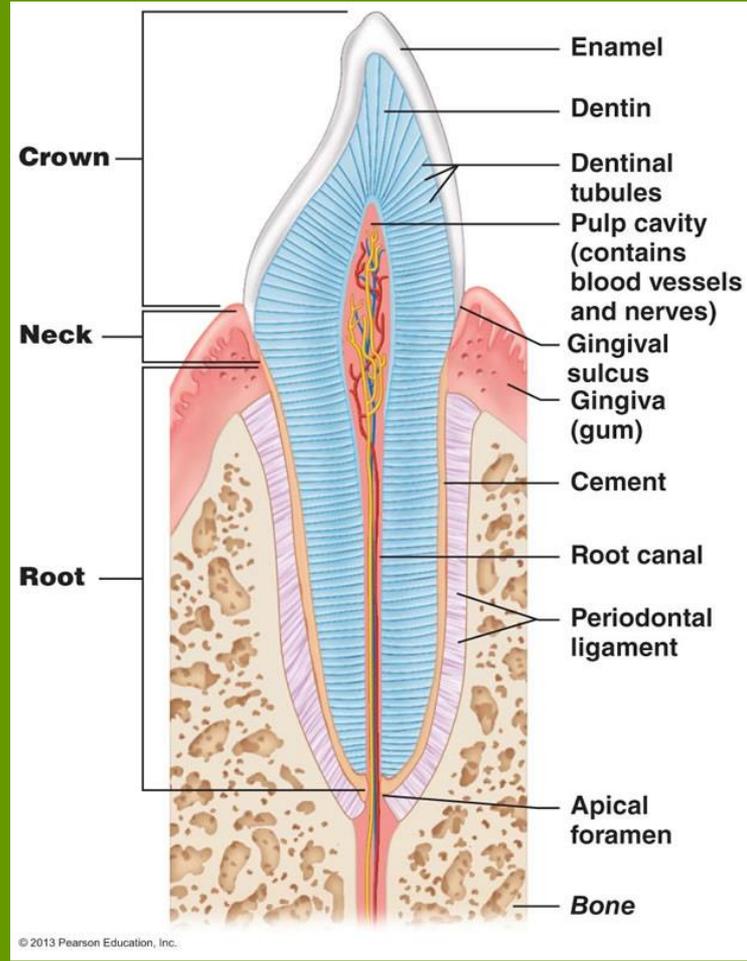
Alveolus

Periodontium

Cement

Enamel

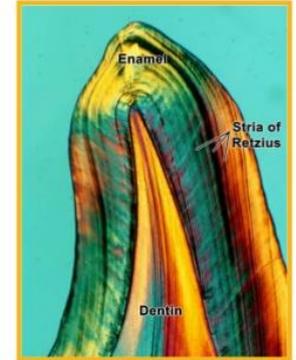
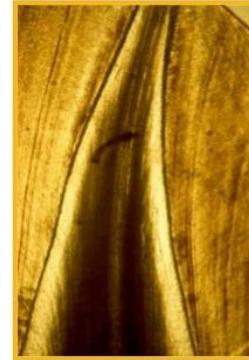
Cementum



Enamel

Enamel is the hardest substance in the human body and contains the highest percentage of minerals hydroxyapatite = crystalline calcium phosphate

Remineralization of teeth can repair damage to the tooth to a certain degree but damage beyond that cannot be repaired by the body

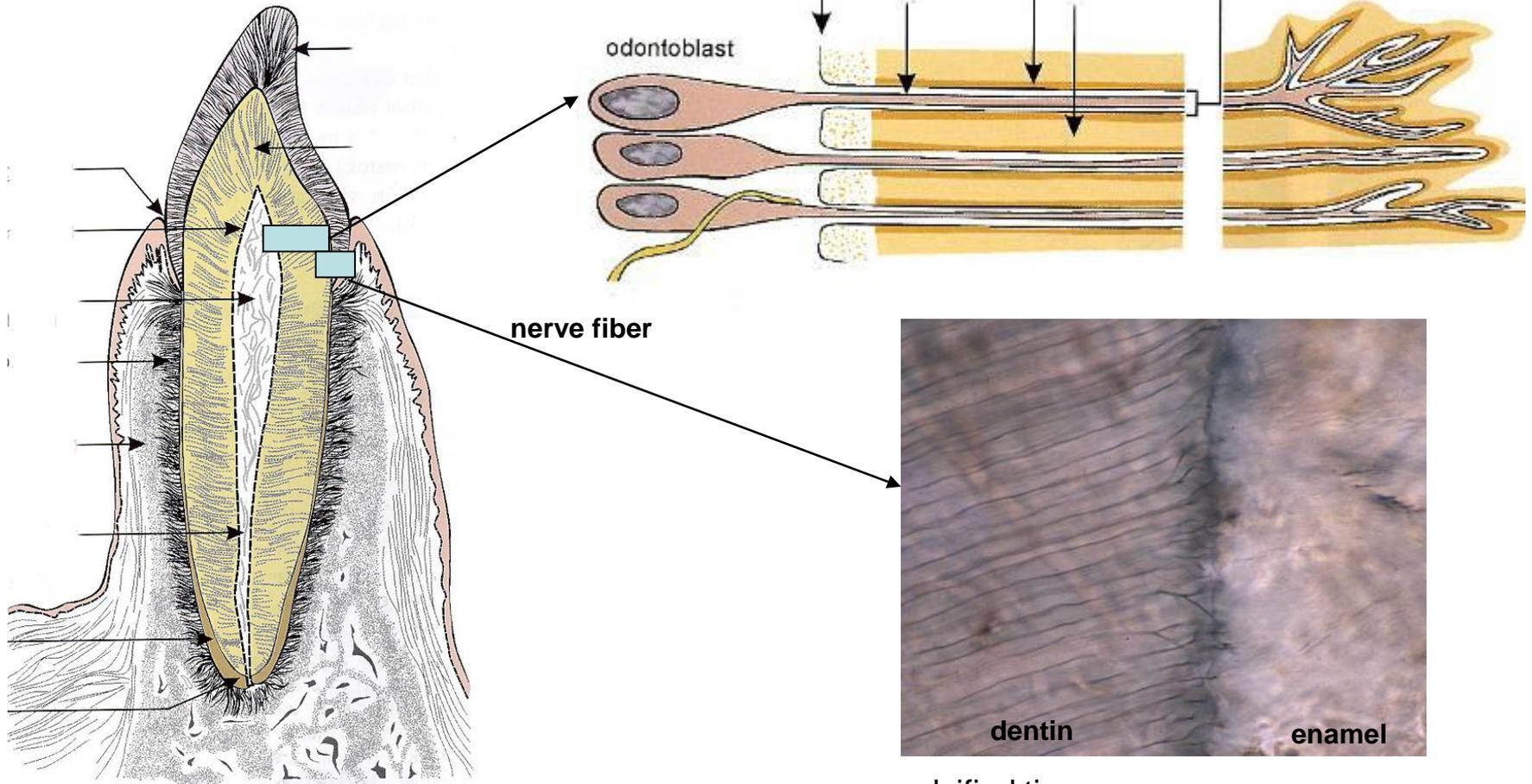


**it does not contain:
blood vessels or nerves**

Enamel does not contain collagen, as found in other hard tissues such as dentin and bone, but it does contain two unique classes of proteins: amelogenins and enamelin

Crystals in rod and inter-rod enamel are similar in structure but diverge in orientation

Dentin

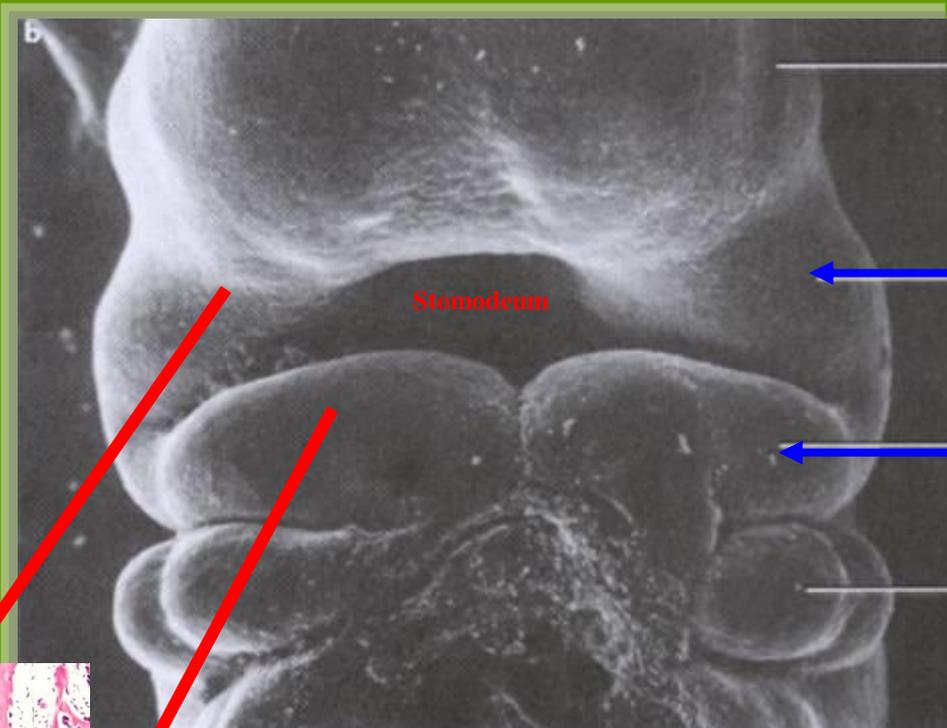


-three types of dentin:

-**primary**

- **secondary** - a layer of dentin produced after the root is completely formed

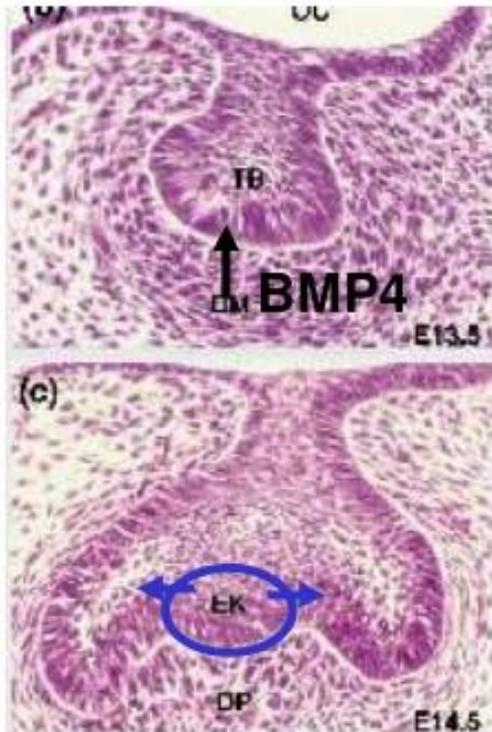
- **tertiary** - is created in response to a stimulus, such as a carious attack



- Maxillary process
- I. pharyngeal arch
- Mandibular process
- I. pharyngeal arch



Tooth development



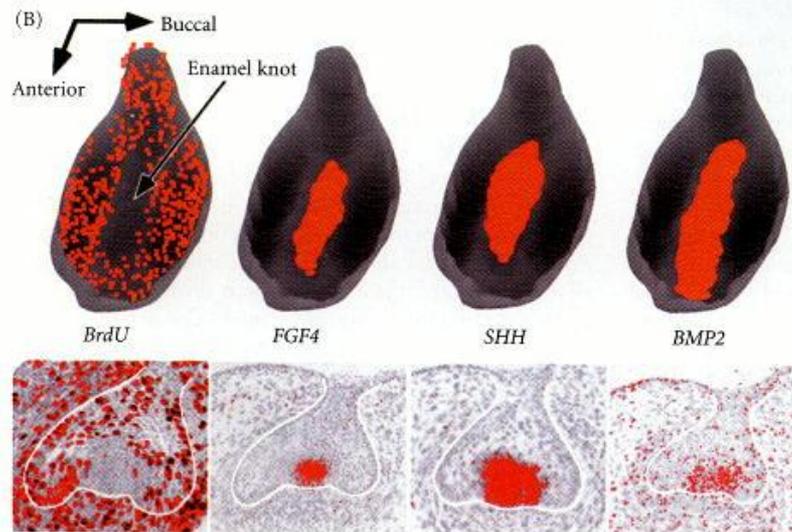
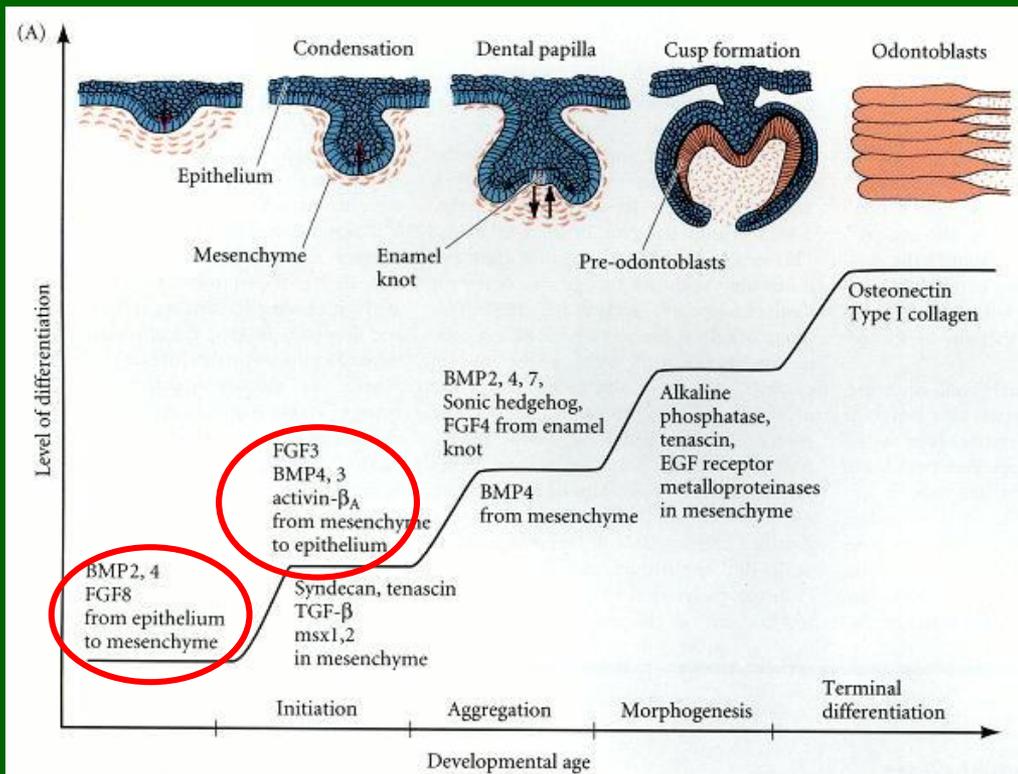
The **enamel knot** is induced by **BMP4**

The **enamel knot** produces **FGFs** that stimulate proliferation of adjacent epithelium

Development of the tooth

- 5th-6th embryonic weeks, first the primary teeth except the molar teeth
- development: crown, then root
- 2 populations of cells:
 - **Oral cavity epithelium:** enamel producing *ameloblasts* (ameloblast)
 - **mesenchyma** (neural crest cells): dentin-producing *odontoblasts*

First step: epithelium of mandibular and maxillar processes induce aggregation of mesenchymal cells of neural crest origin at special locations

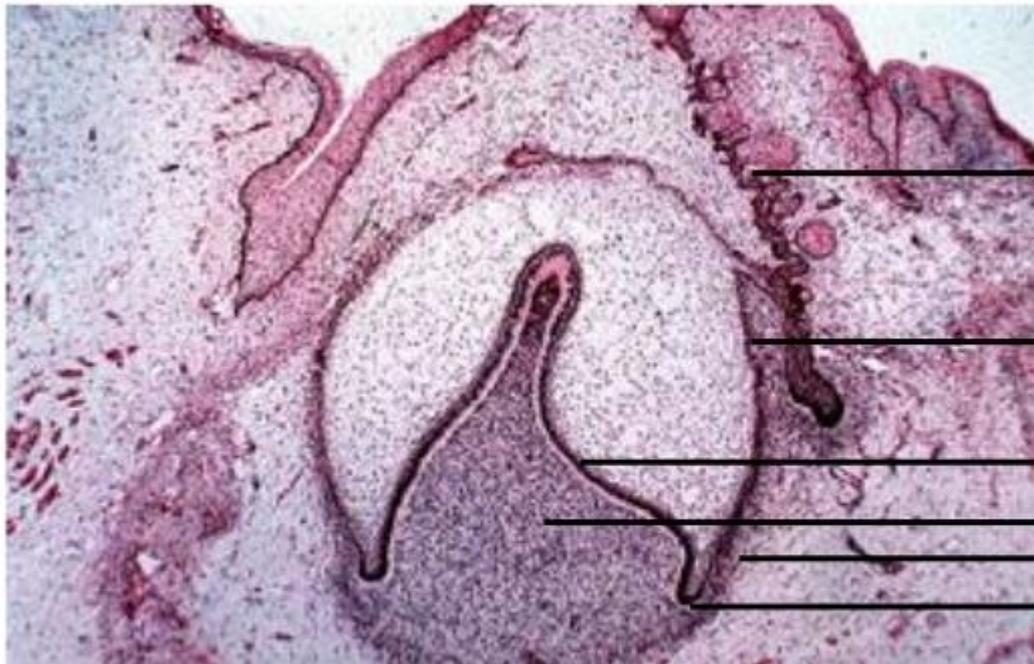
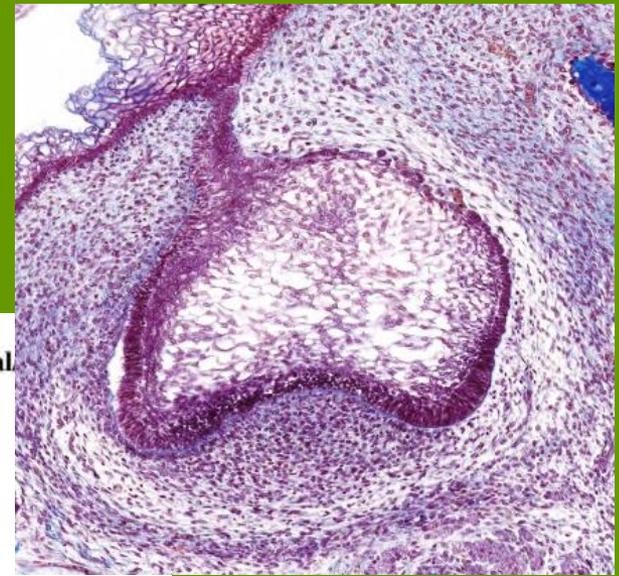


mesenchymal condensation:
 FGF8 present - BMPs absent:
 gaps between teeth

Tooth development – cap and bell stages

3. Bell Stage

<http://www.usc.edu/hsc/dental>



Dental lamina

Outer dental
epithelium

Inner dental
epithelium

Dental papilla

Dental follicle

Cervical loop

-cap stage

Continued growth leads to bell stage, where the enamel organ resembles a bell with deepening of the epithelium over the dental papilla

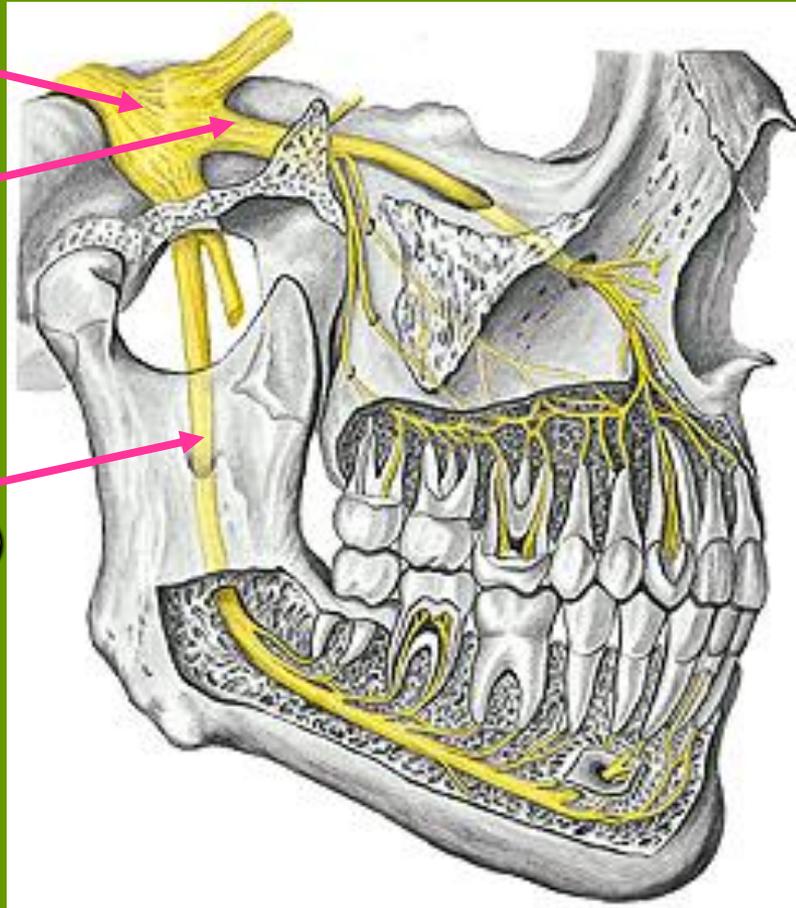
Continuation of histodifferentiation (ameloblasts and odontoblasts are defined) and beginning of morphodifferentiation (tooth crown assumes its final shape)

Innervation of the teeth

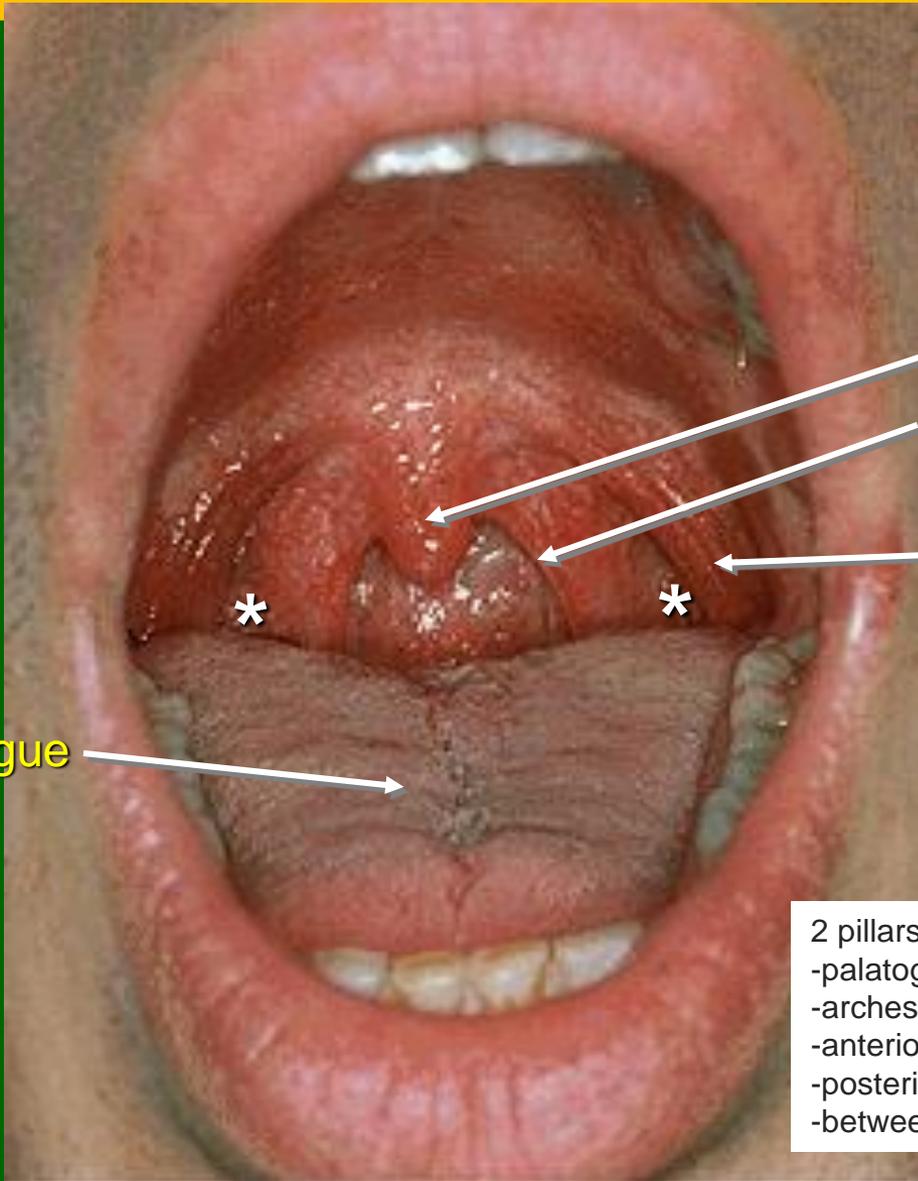
trigeminal ganglion

-maxillary n.

-inf.alveolar n.
(-from mandibular n.)



Isthmus of fauces or oropharyngeal isthmus



uvula

palatopharyngeal arch

palatoglossal arch

*: palatine tonsil

tongue

2 pillars:

-palatoglossus and palatopharyngeus muscle

-arches:

-anterior: [palatoglossal arch](#),

-posterior: [palatopharyngeal arch](#)

-between these two arches is the [palatine tonsil](#)

Pharynx

- fibromuscular tube
- semicircular in cross section
- directly anterior to the vertebral column
- extends from skull base to lower border of cricoid cartilage
- six muscles are responsible for voluntary actions of the pharynx:
 - 3 pharyngeal constrictor muscles layered on top of one another
 - three vertically oriented muscles: stylopharyngeus, salpingopharyngeus, palatopharyngeus
 - aid in the act of swallowing
- cavity of pharynx is a continuation of oral cavity
- pharynx communicates:
 - with the nasal cavity, middle ear cavity, larynx
- the interior of the pharynx is separated into three sections
nasopharynx, oropharynx, and laryngopharynx

