

Practicals 3

Tonsils

Introduction to teeth

Tonsils – Waldeyer's ring

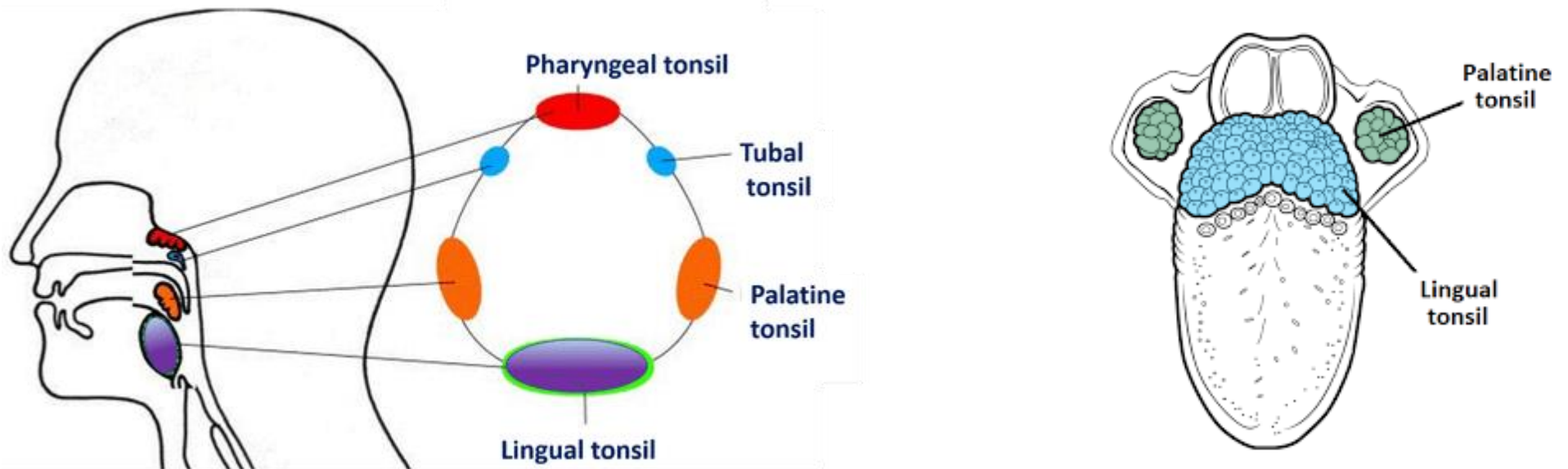
Group of peripheral lymphoid organs positioned at the entrance into naso- and oropharynx

Total 6 (*tonsillae palatinae*, *tonsillae tubariae*, *tonsilla lingualis*, *tonsilla pharyngea*)

Mucosal organs – accumulation of lymphoid tissue in lamina propria

B - dependent areas - secondary lymph follicles

T - dependent regions - interfollicular zones



Palatine tonsils

Positioned on the right and left side between glossopalatal and pharyngopalatal arches, ovoid shape, deep and branched tonsillar crypts, there are usually up to 35 (contain detritus), tonsil separated by fibrous capsula – can have septa.

The surface of the tonsil is covered by a stratified squamous epithelium

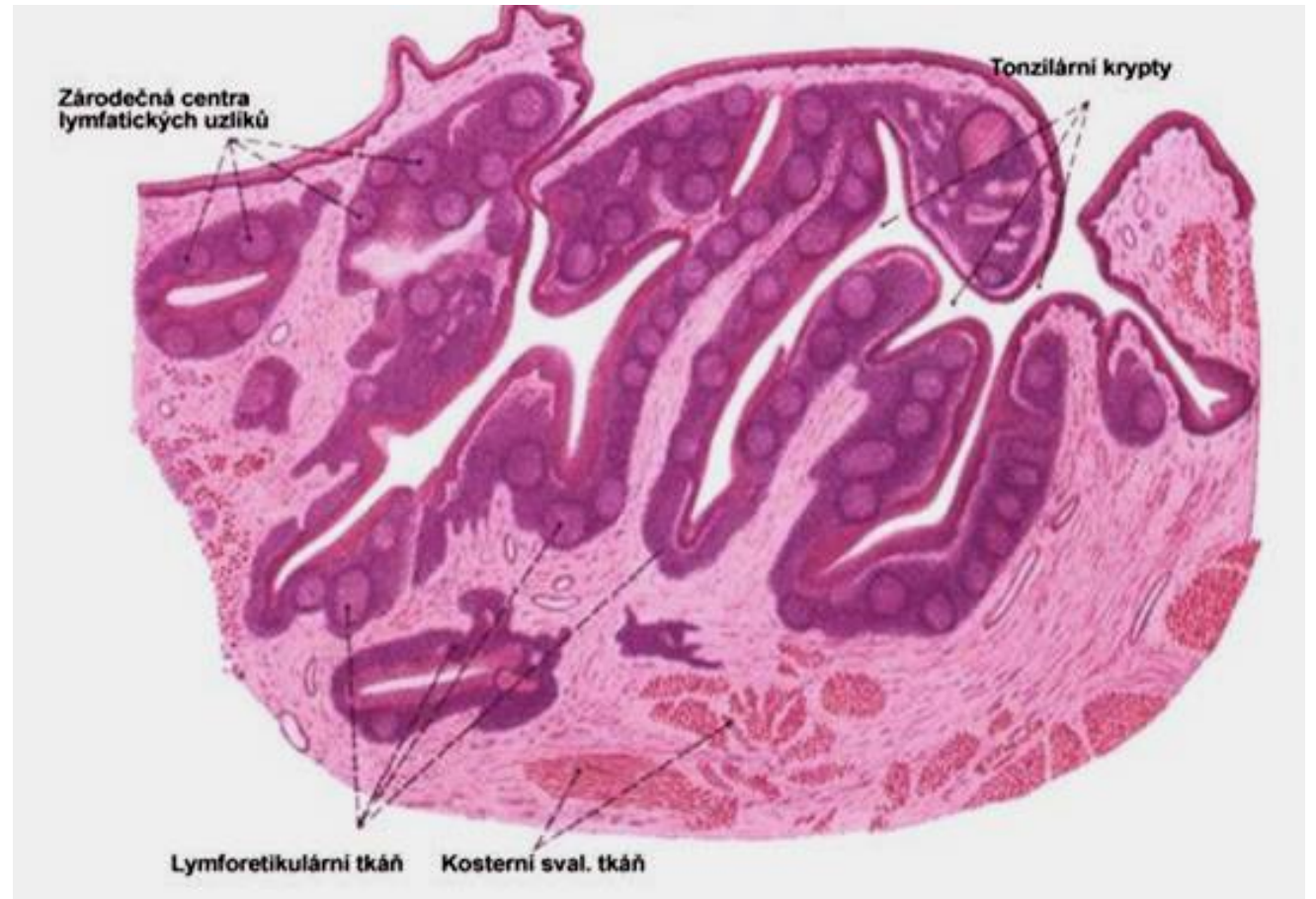
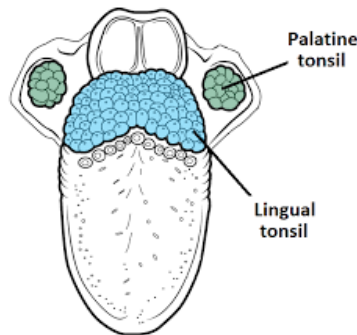
In lamina propria are large lymphatic follicles with light germinal centers

Brighter center - contains centroblasts

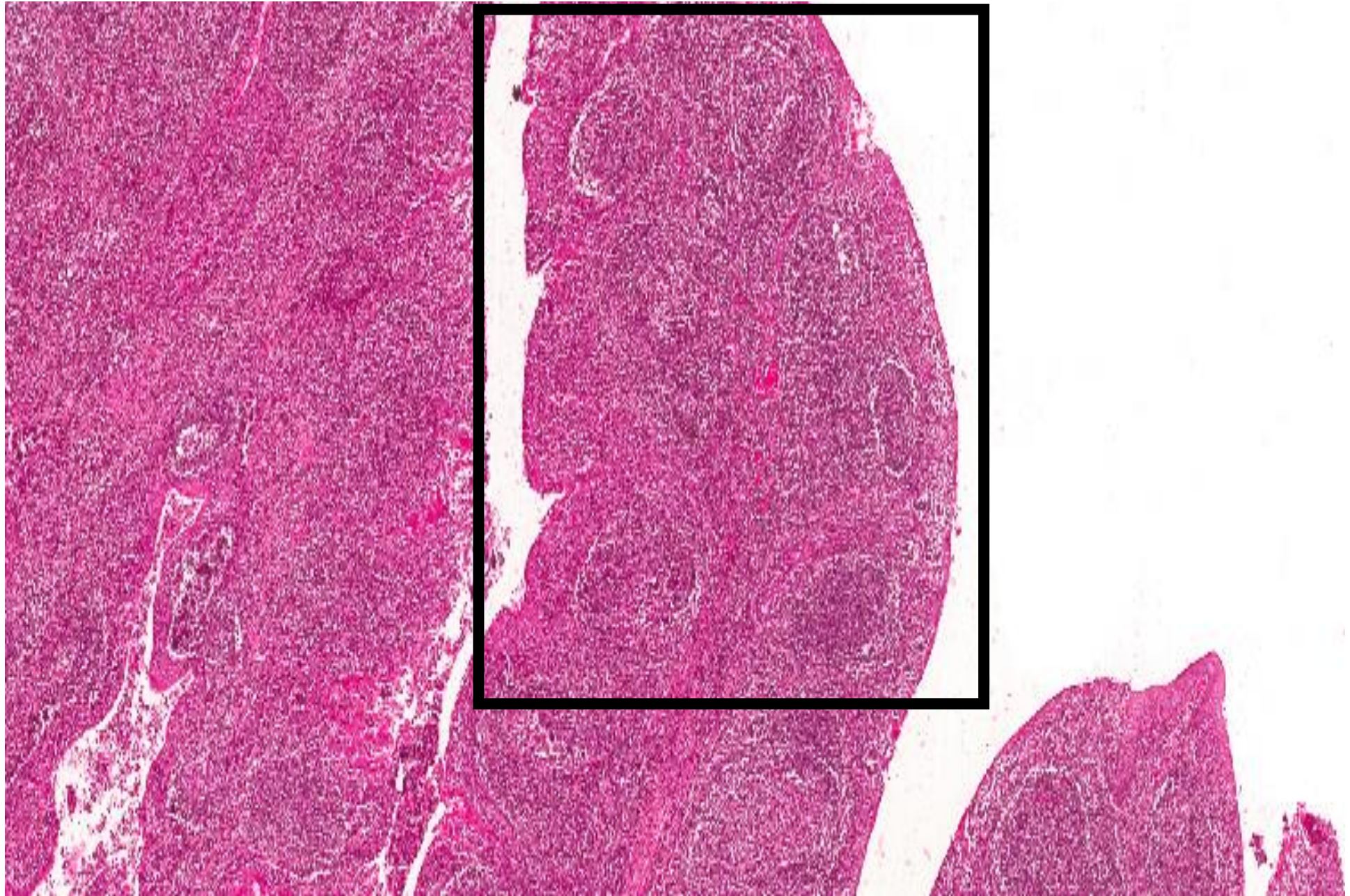
Epithelium above nodules (differences):

The structure of the epithelium and the contacts between the cells are very loose, caused by infiltration by lymphocytes, macrophages, dendritic cells, discontinuous basement membrane

FAE – (follicle associated epithelium)



Palatine tonsils



Palatine tonsils

Lymphocytes which penetrate into the oral cavity are referred to as **salivary bodies**

A

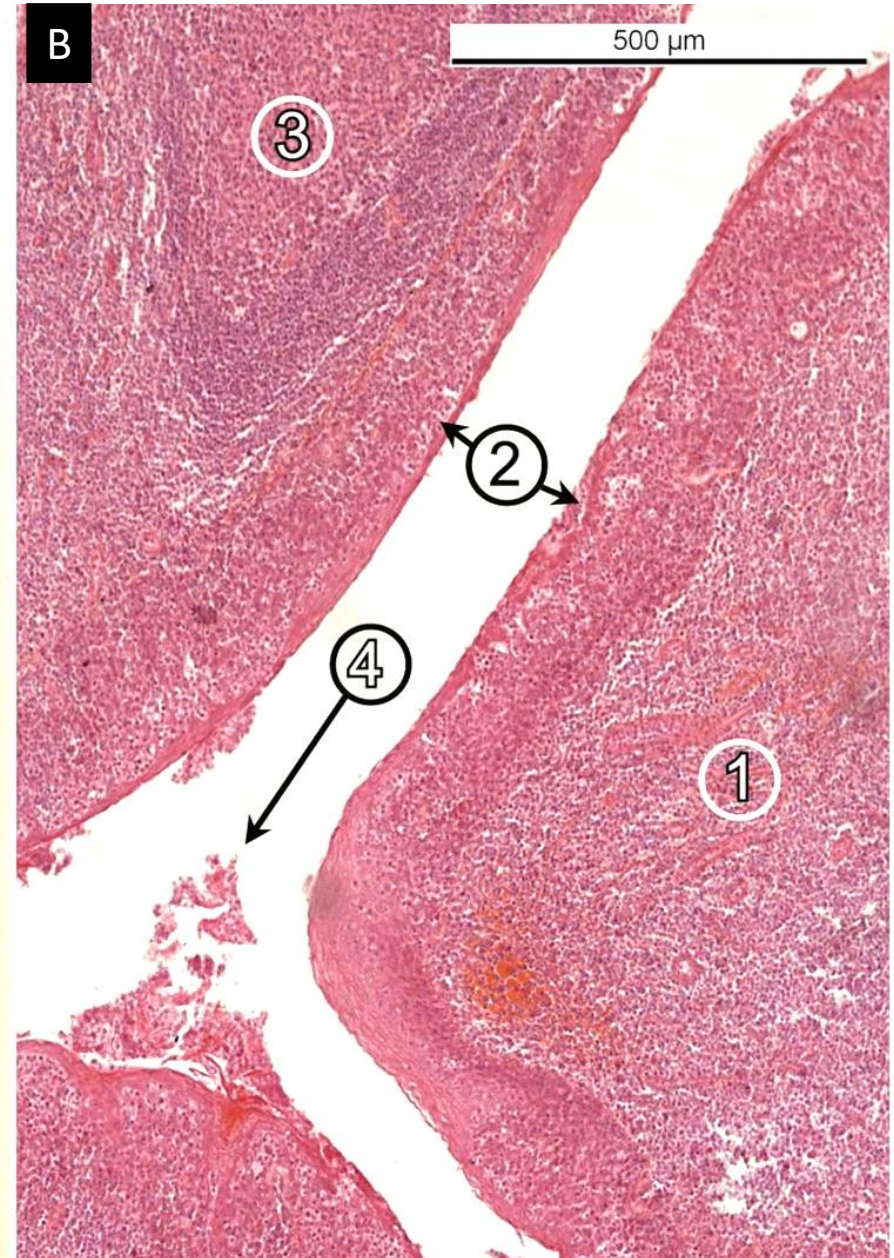
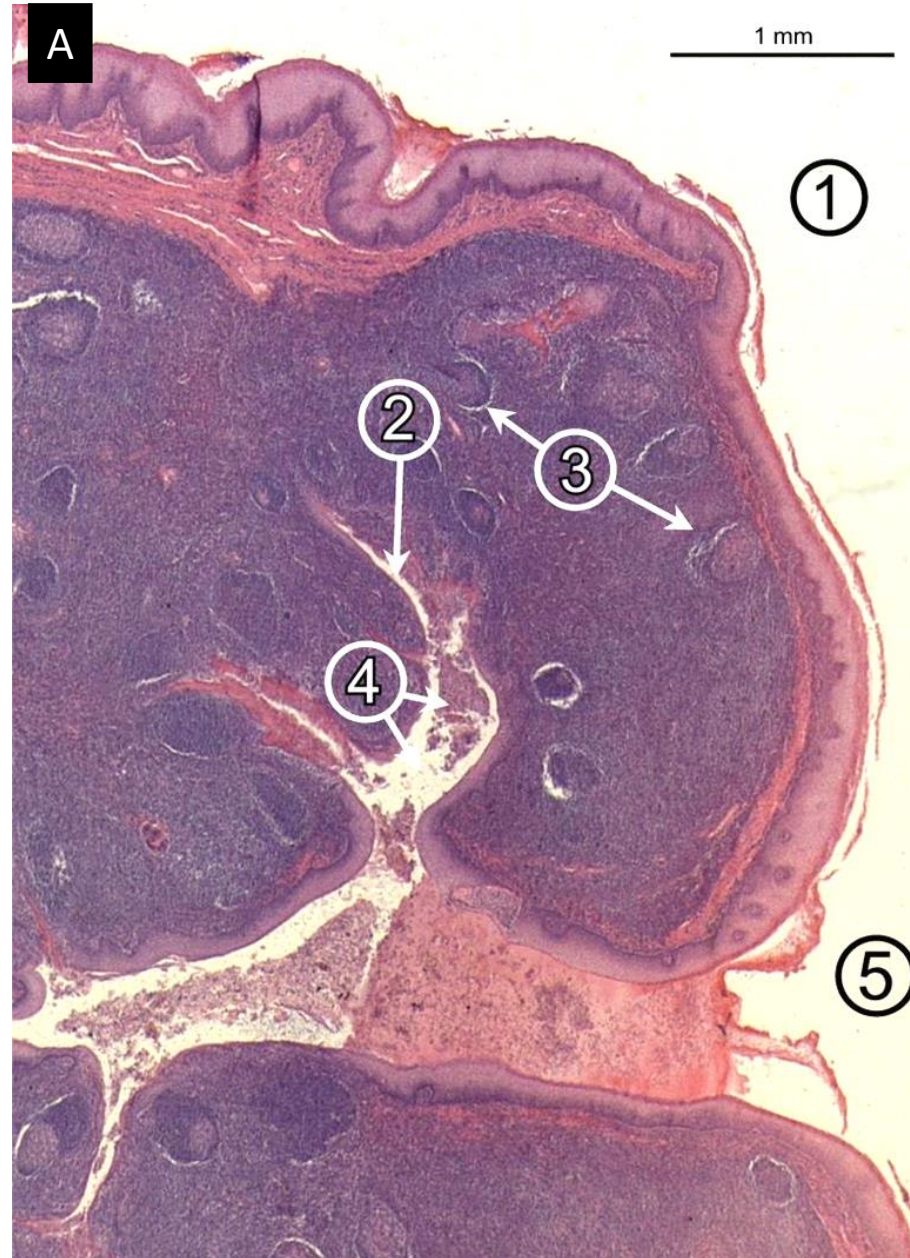
Tonsilla palatina (H.E.)

- 1 – stratified squamous epithelium
- 2 – lymphocytes infiltrated epithelium (FAE)
- 3 – secondary lymph nodules or follicles
- 4 – detritus in tonsilar crypt

B

Tonsilar crypt in detail (H.E.)

- 2 – with lymphocytes infiltrated epithelium
- 3 – germinal centre of a secondary nodule
- 4 – detritus



Lingual tonsil

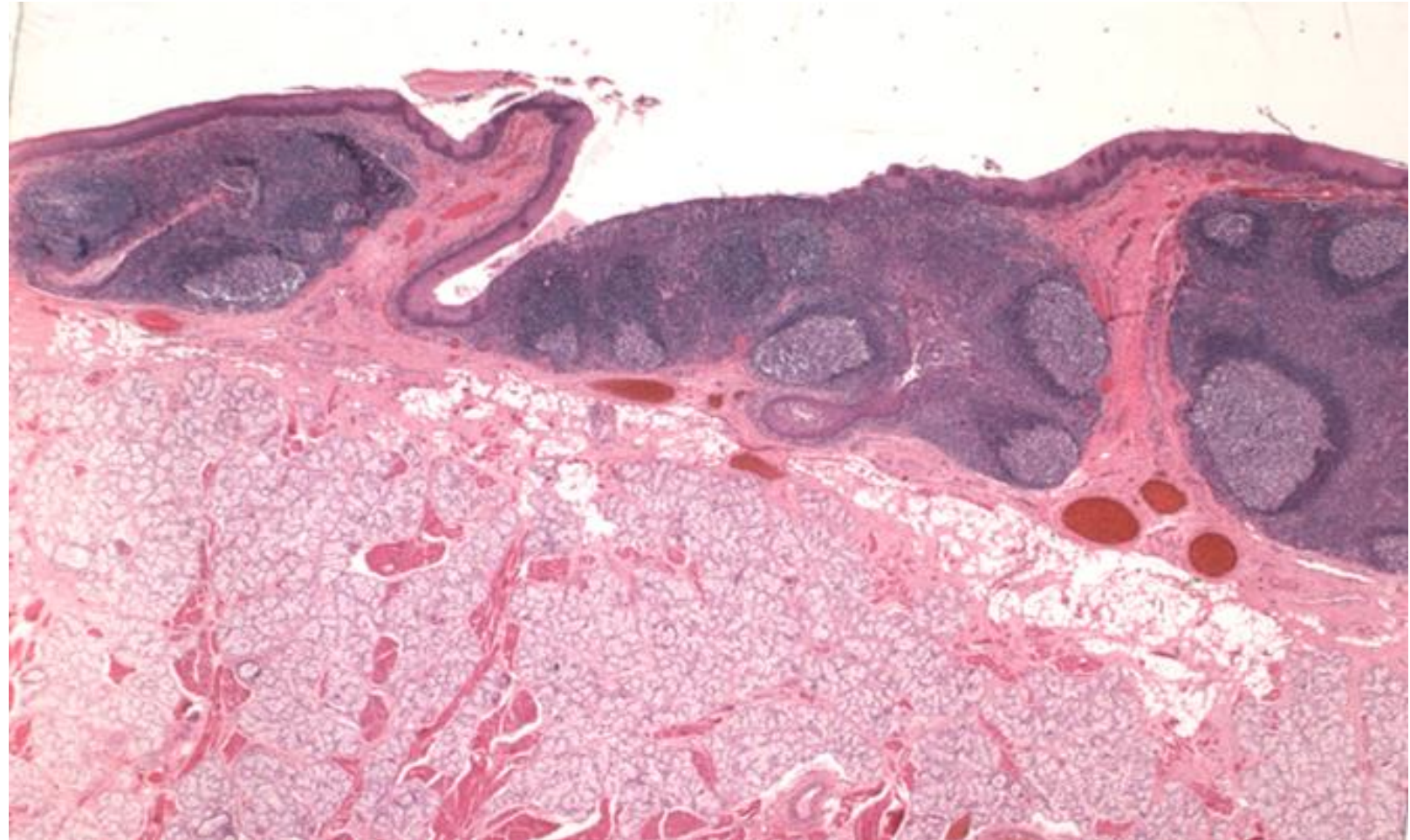
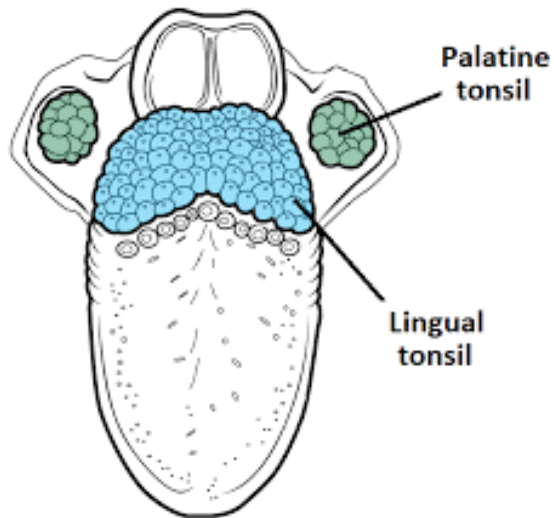
Group of lymph nodules (*folliculi linguales*) in the mucosa of **lamina propria** on the dorsal side of radix linguae behind the circumvallate papillae

Surface covered by **stratified squamous epithelium**

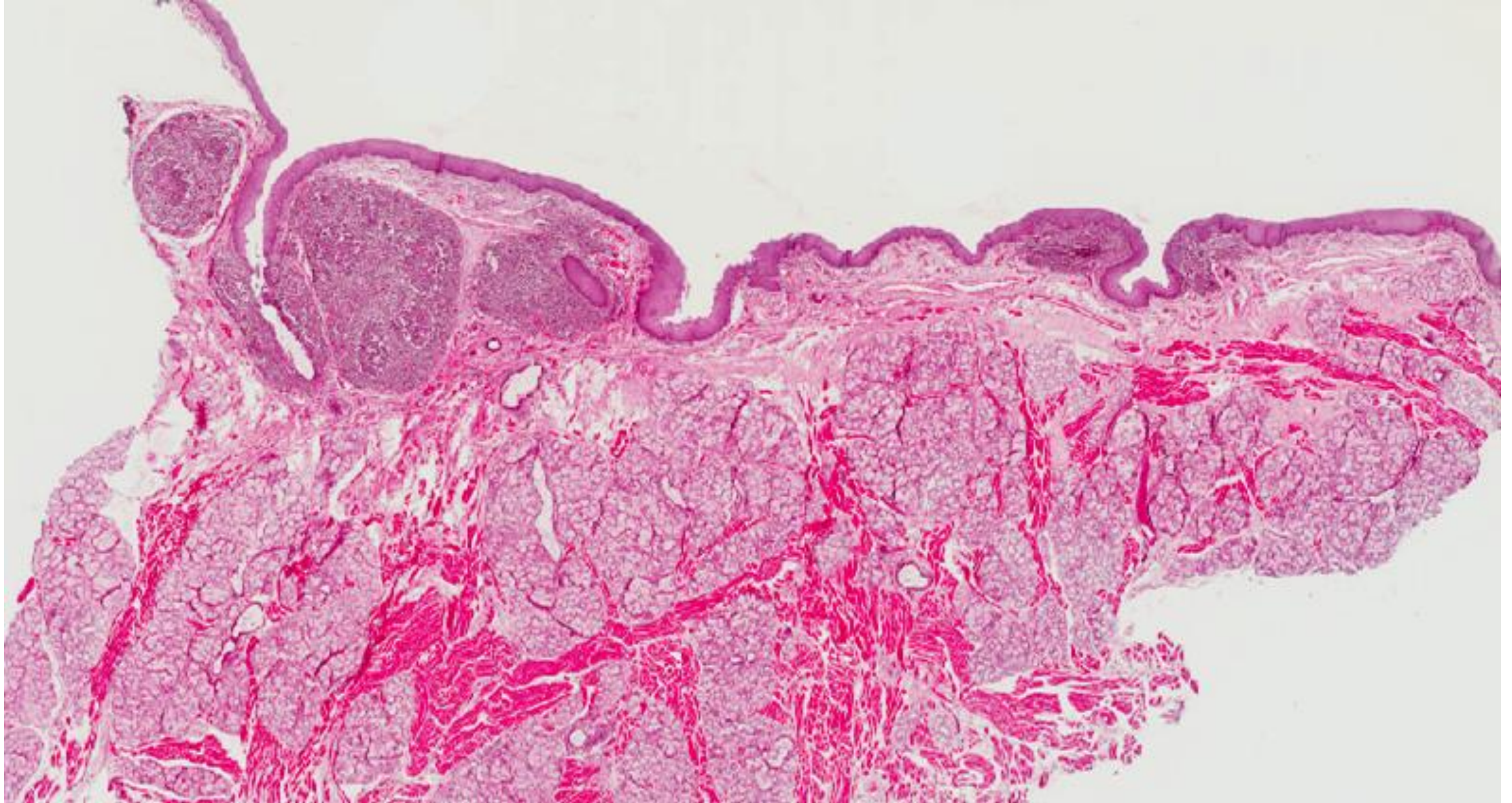
At the bottom of shallow crypts are openings of purely mucinous Webers glands (*gll. Linguales posteriores*)

Crypts are perpetually washed out – no detritus.

No obvious capsula.



Lingual tonsil



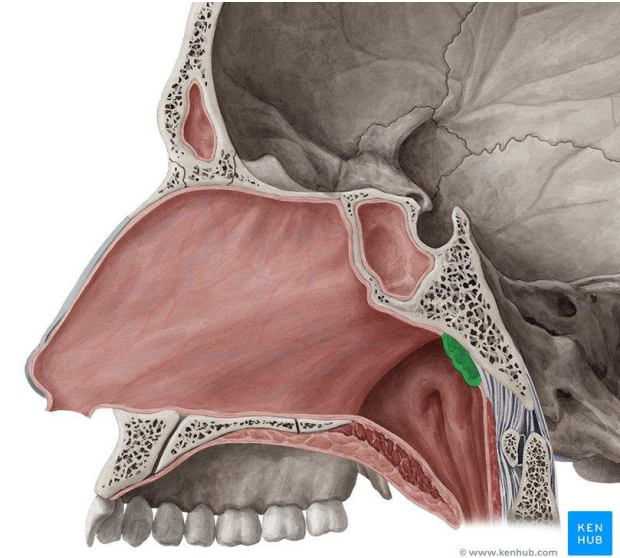
Pharyngeal tonsil (Adenoid)

Located on the top of pharynx (*fornix pharyngis*)

From the other it differs by the surface covered by pseudostratified columnar epithelium which might contain goblet cells

Shallow crypts

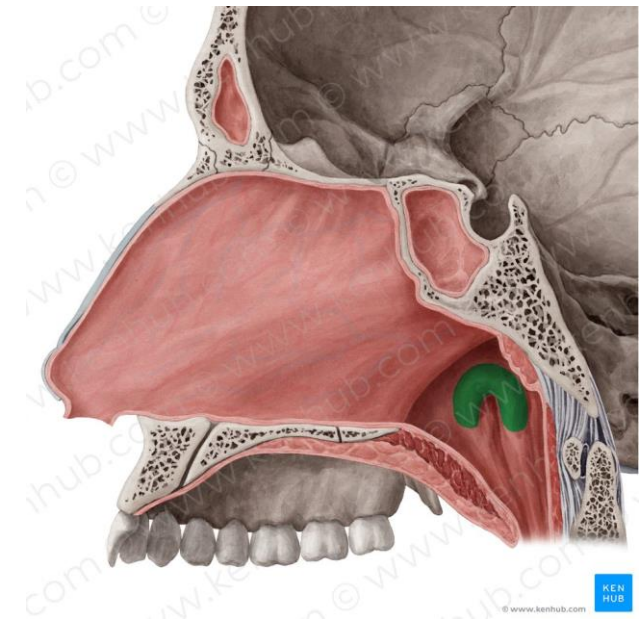
In childhood tonsilla pharyngea can often be hypertrophic which cause problems with nose breathing



Tubal tonsils (Gerlach tonsils)

Paired tonsil

Group of small lymphoid tissue in lamina propria of mucosa in the pharyngeal opening of the eustachian tube (*ostium pharyngeum tubae auditivae*)



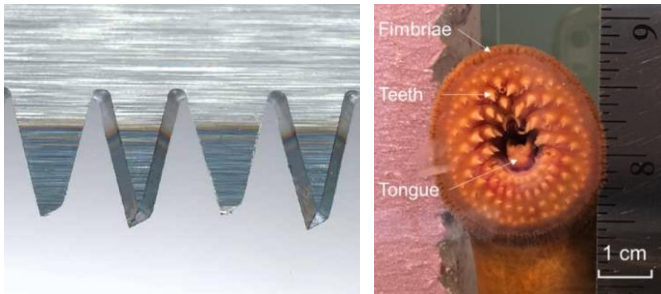
What are teeth?

What are teeth?

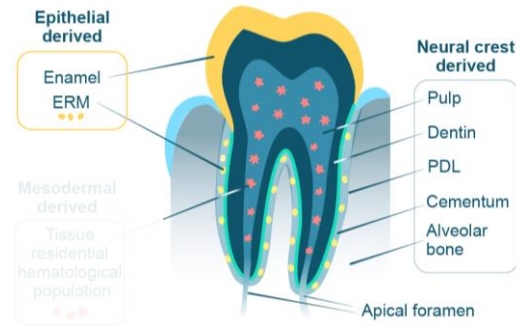
„Tooth“ as a term

Functional view

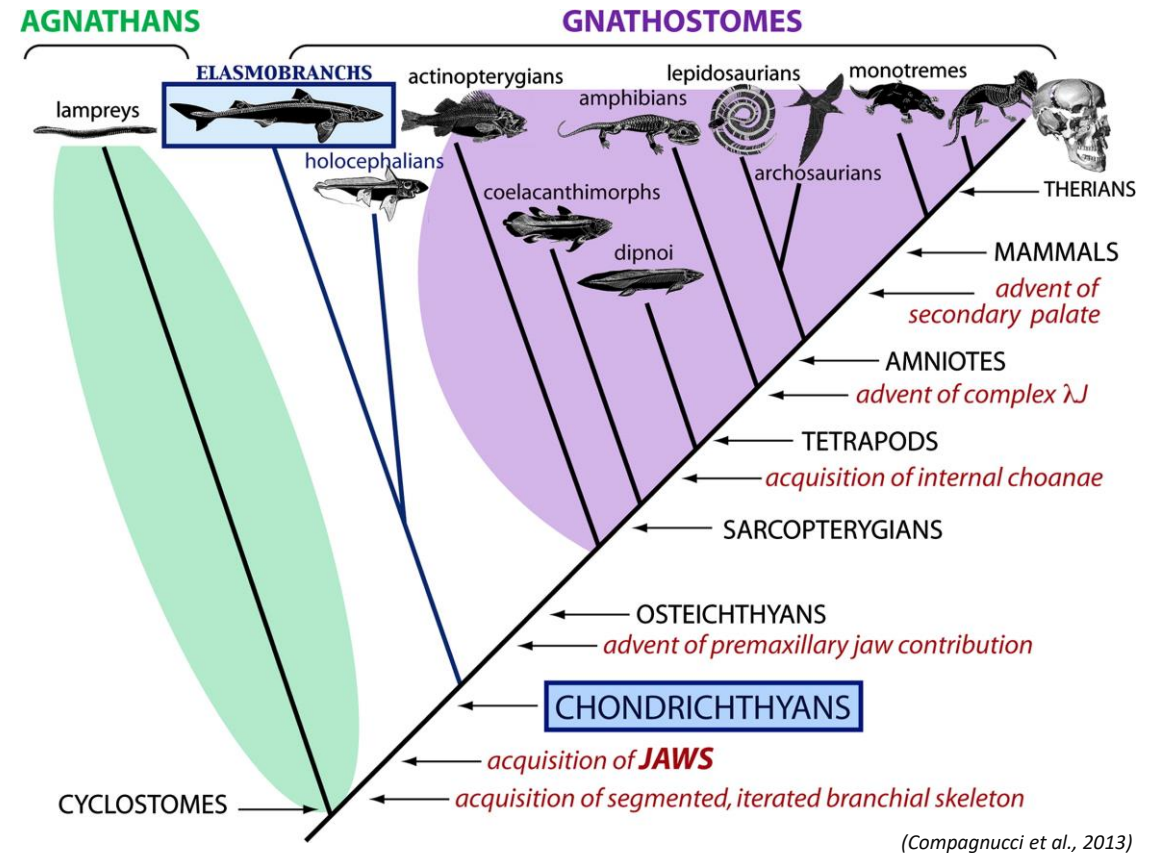
Embryonic view



(Shi et al., 2021)



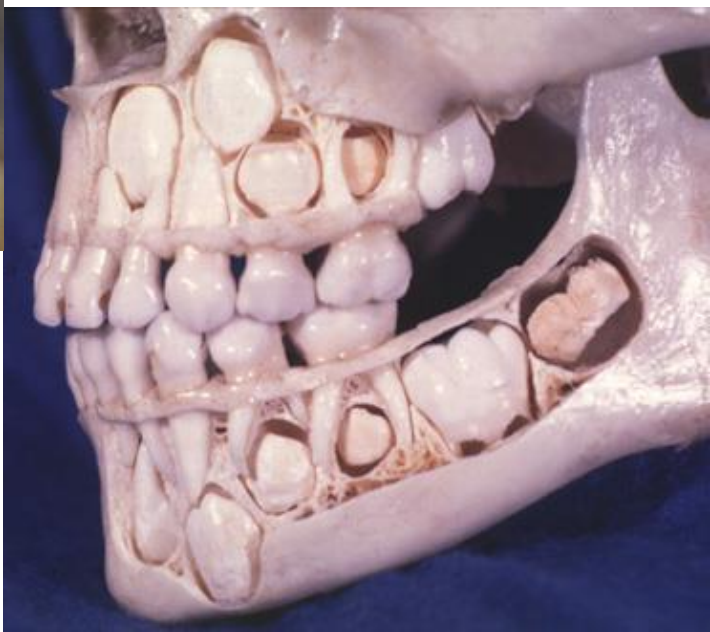
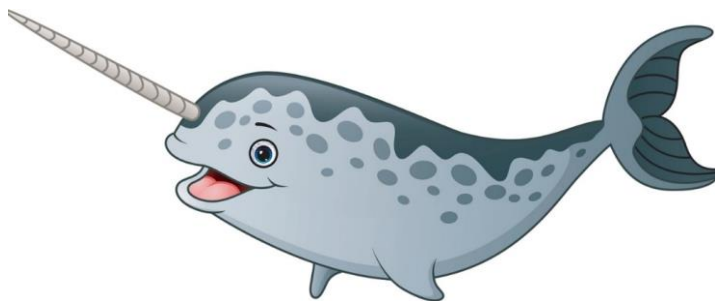
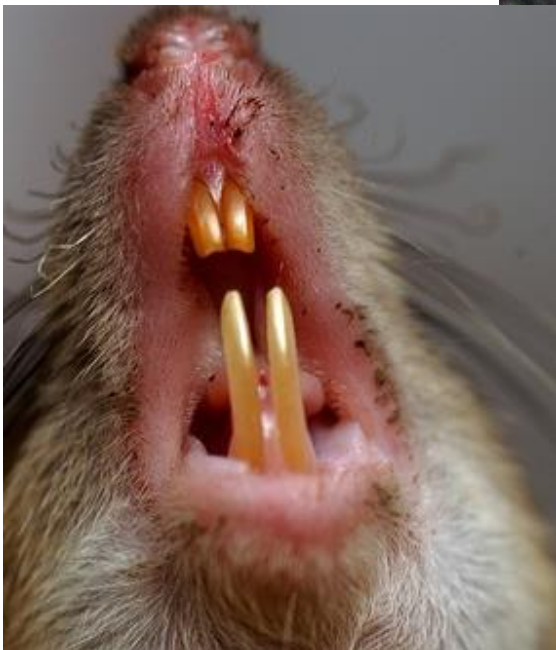
(Krivanek et al., under review)



(Compagnucci et al., 2013)

Calcified structures at the beginning of the digestive tract of jawed vertebrates (not all).

Significant evolutionary diversity



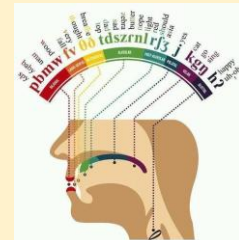
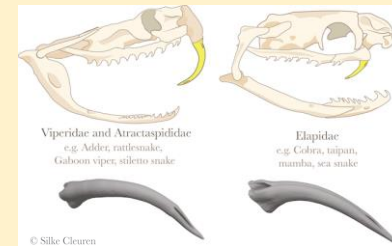
Classification of teeth

Significant evolutionary adaptation

Function

Function

- Mechanical food processing
 - Tearing of food
 - Crushing of food
- Predation & killing
 - Poisonous teeth (fangs)
- Social interaction
 - Defence
 - Dominance
 - Articulation
- Sensory organ
- Mechanical interaction with the environment



Classification of teeth

Significant evolutionary adaptation

Function



Shape

Topographic attachment in the jaw

Functional attachment in the jaw

Regeneration

etc.

Shape of dentition

Homodont

Heterodont

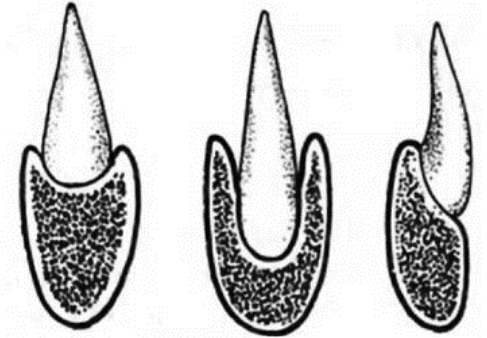


Anatomical attachment in jaw

Acrodont

Thecodont

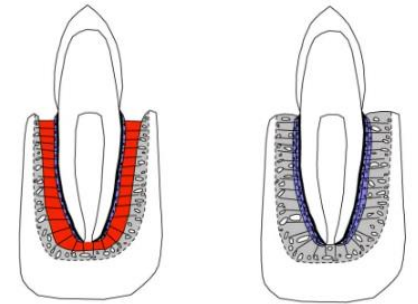
Pleurodont



Functional attachment in the jaw

Gomphosis

Ankylosis



Aaron R. H. Le Blanc, Ph.D.

Regeneration

Number of generations

Monophyodont

Diphyodont

Polyphyodont

Capacity of growth

Brachyodont

Hypsodont

Hypselodont

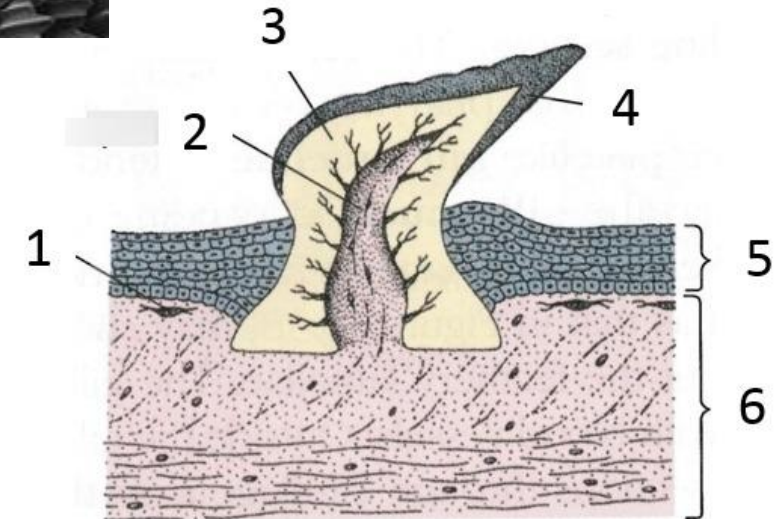
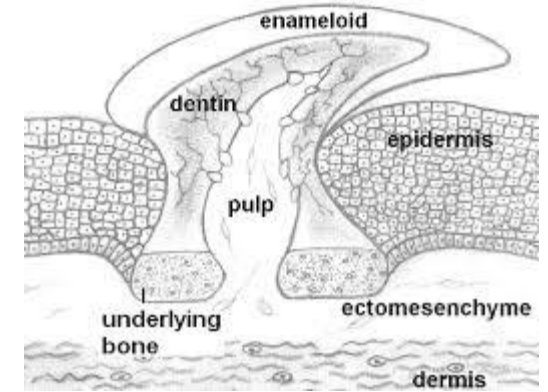
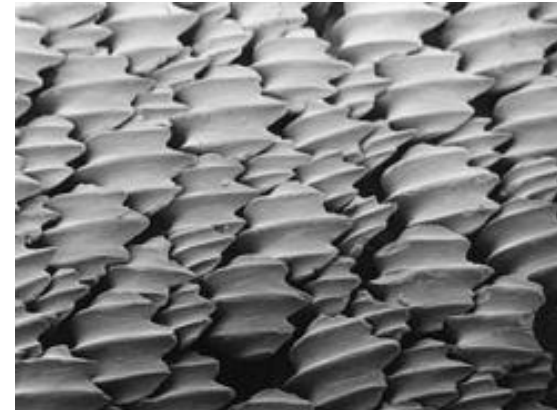
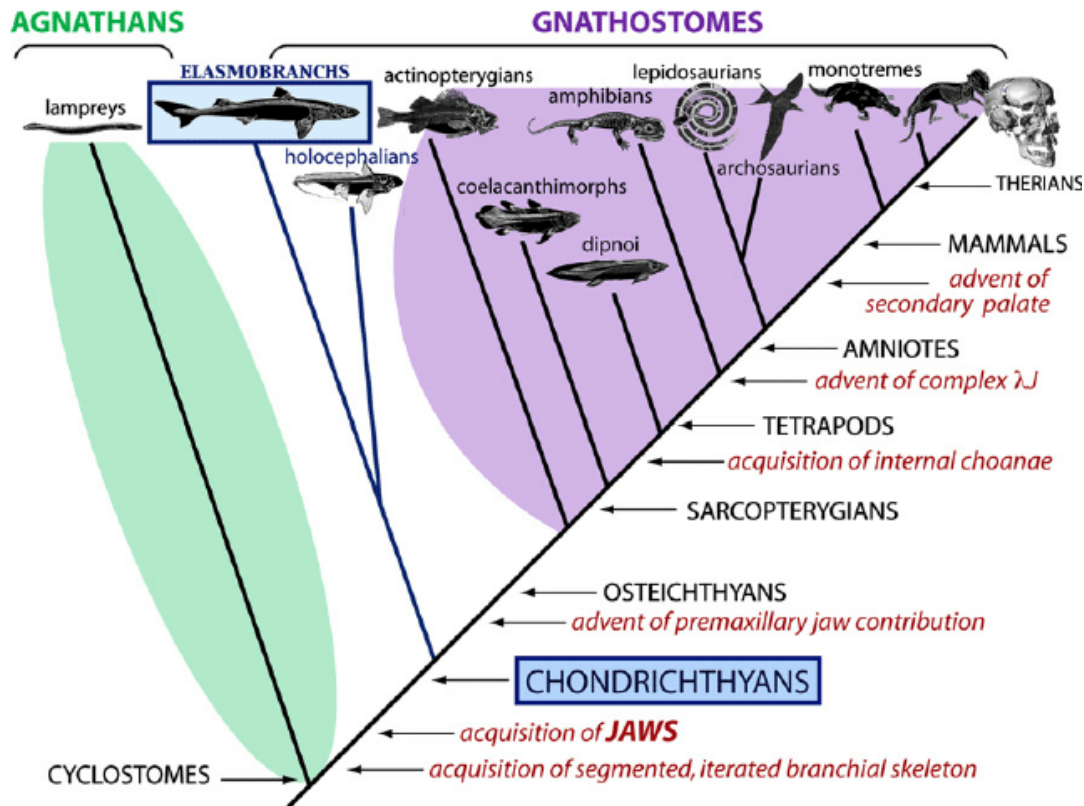
etc.

Basics in the phylogenesis and comparative tooth anatomy

Teeth - calcified structures that derive from the ectoderm and ectomesenchyme (neural crest)

Evolutionarily in phylogeny, they appear only in **the jawed vertebrates – Gnathostomata**

Ancestor of teeth - **placoid scales** in fishes that covered the surface of the body and the oral cavity





Lampres, cyclostomata



Set of all teeth = dentition

Brachyodont
Taurodont
Bilophodont
Haplodont
Polyprotodont
Acrodont Cynodont Protodont
Labyrinthodont Secodont
Loxodont
orthodont
Pleurodont Homodont Tritubercular
Hypsodont Diprotodont
Lophodont Heterodont
Monophyodont Selenodont
Polyphyodont Thecodont Diphyodont
Triconodont

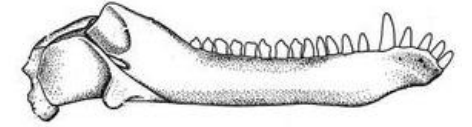
Set of all teeth = **dentition**

Types of dentition

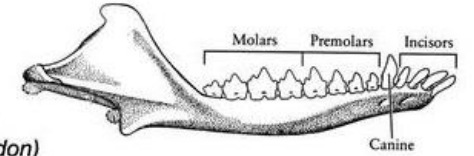
Shape of teeth: **homodont** - identical in shape
heterodont - different in shape
(in mammals *dentes incisivi*, *canini*, *praemolares* and *molares*)

"REPTILIAN" vs MAMMALIAN DENTITION

Homodont
(cynodont)



Heterodont
(*Morganucodon*)

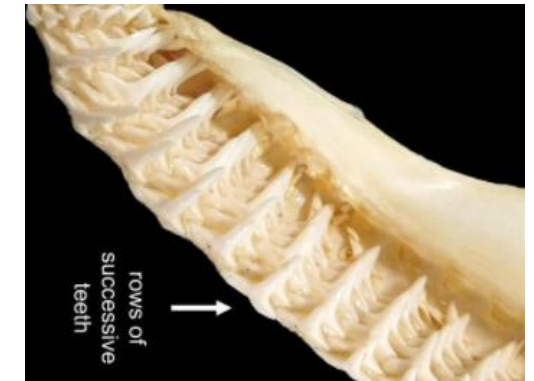


According to the **number of replacements** (sets of teeth) during life:

monofyodont - e.g., Holocephala - chimeras)

difyodont (*dentes decidui*, *dentes permanentes*) – e.g. mammals

polyphyodont - e.g., fish, lower amphibians

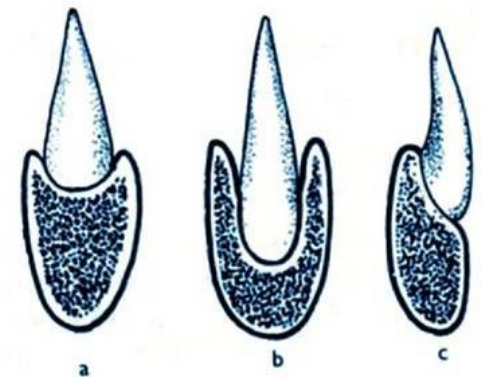


According to the **attachment** of the teeth to the jaw:

acrodont - attach to the jaw from above (bony fish, amphibians)

pleurodont - on the jaw from the side (for reptiles)

thecodont - inserted into dental sockets –
recent mammals (dinosaurs, crocodiles)

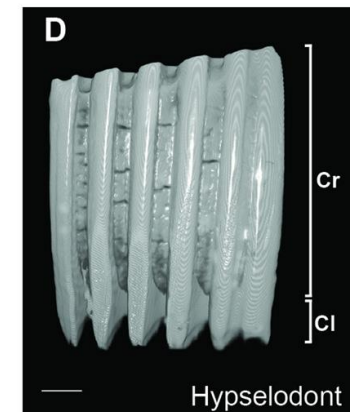
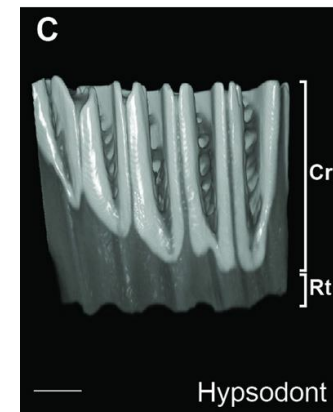
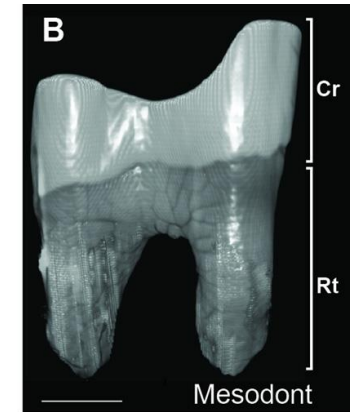
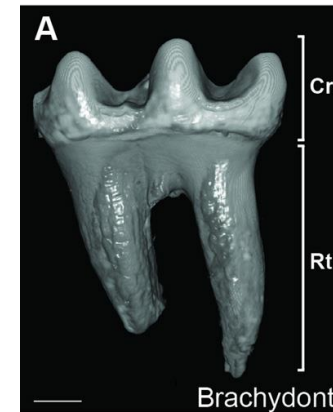
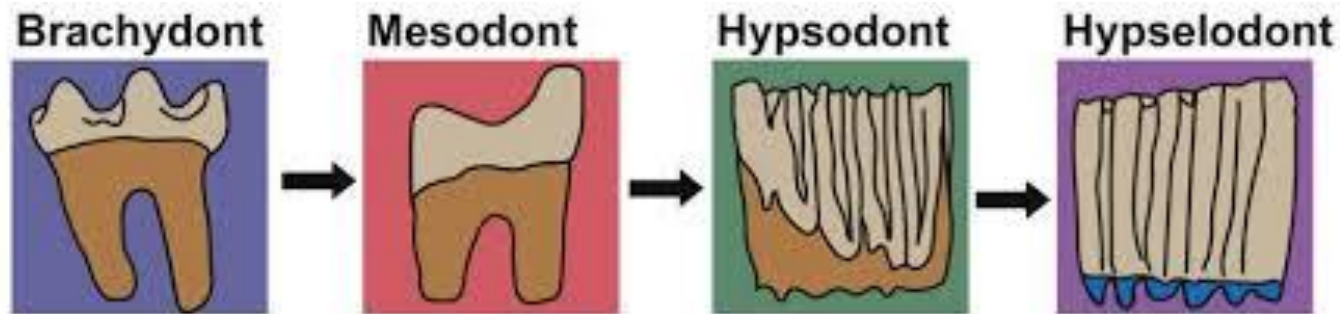


Set of all teeth = **dentition**

Podle **typu rŕstu** zubŕ:

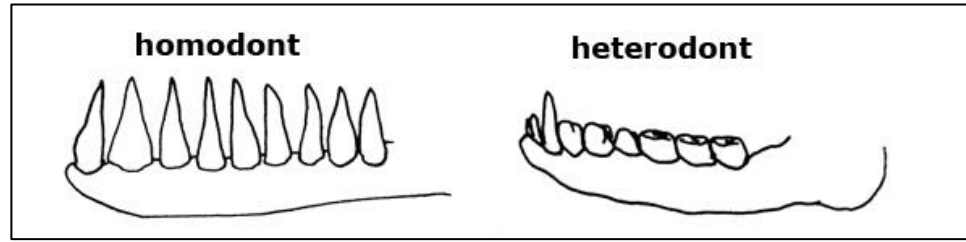
Brachydont
Hypselodont
Hypsodont
(Mesodont)

- Long root
- No root – continuously-growing
- High crown

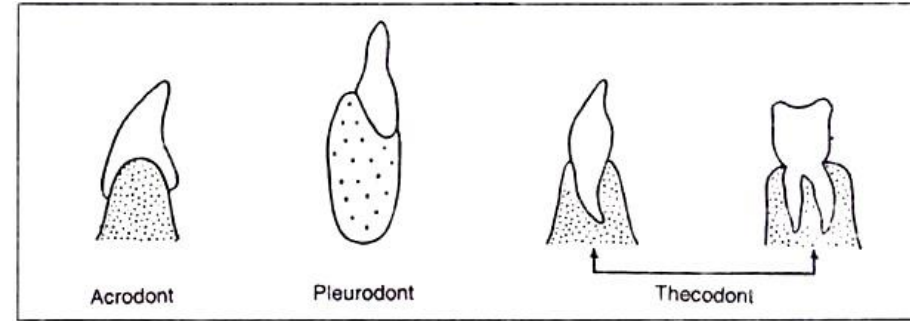


Human dentition is:

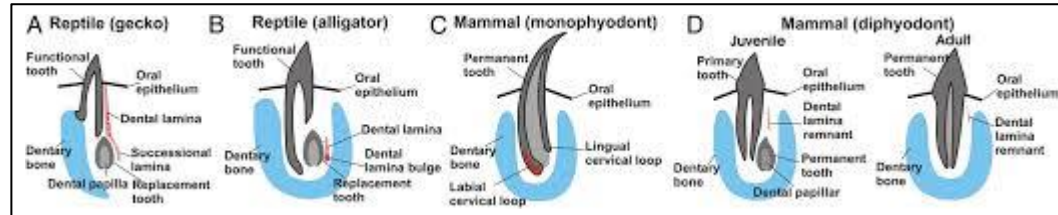
Heterodont



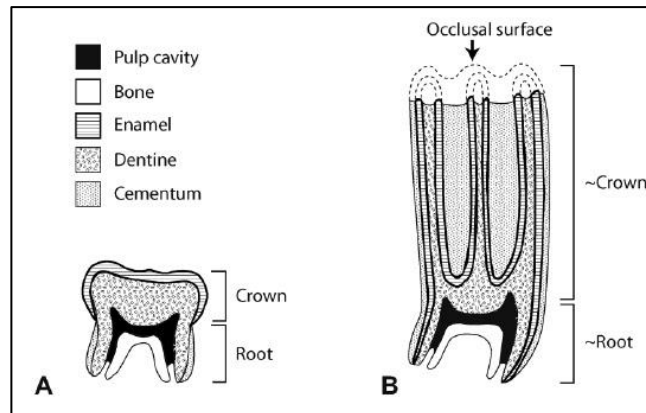
Thecodont



Diphyodont



Brachyodont



Tooth numbering

Several possibilities

Beginning letter

incisors – dentes incisivi

$I_1, I_2 / i_1, i_2$

canines – dens caninus

C / c

premolars – dentes premolares

$P_1, P_2 / p_1, p_2$

molars – dentes molares

$M_1, M_2, M_3 / m_1, m_2, m_3$

Number

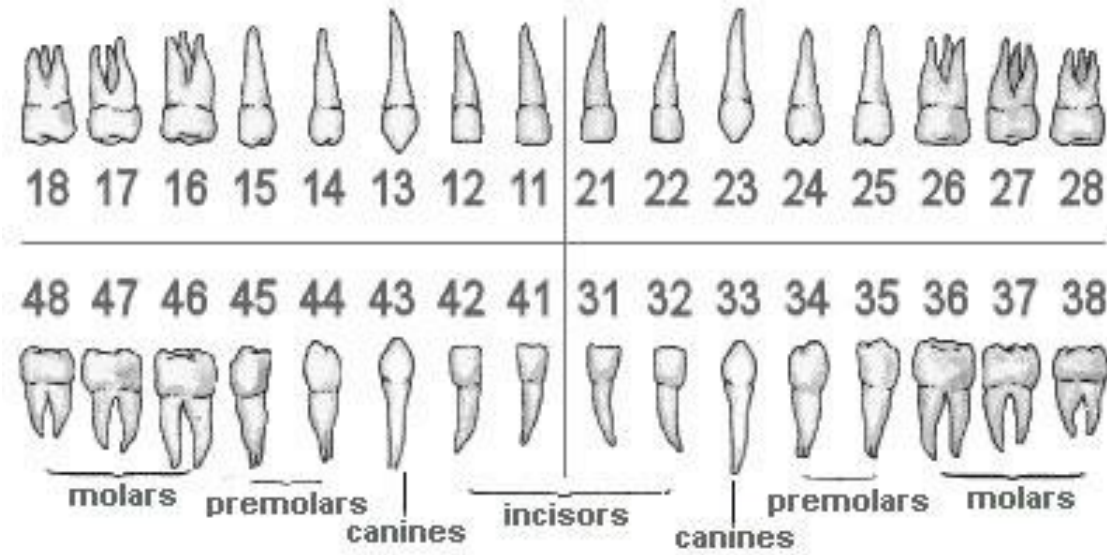
international marking using "two-digit code"

(ISO System - International Standards Organization Designation system: teeth divided into quadrants (clockwise):

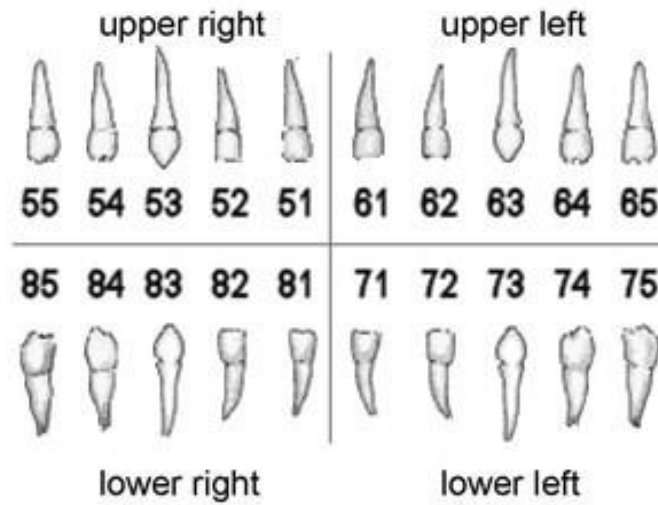
1 - 4 dentes permanentes

5 - 8 dentes decidui

Dentes permanentes



Dentes decidui



Primary teeth notation system

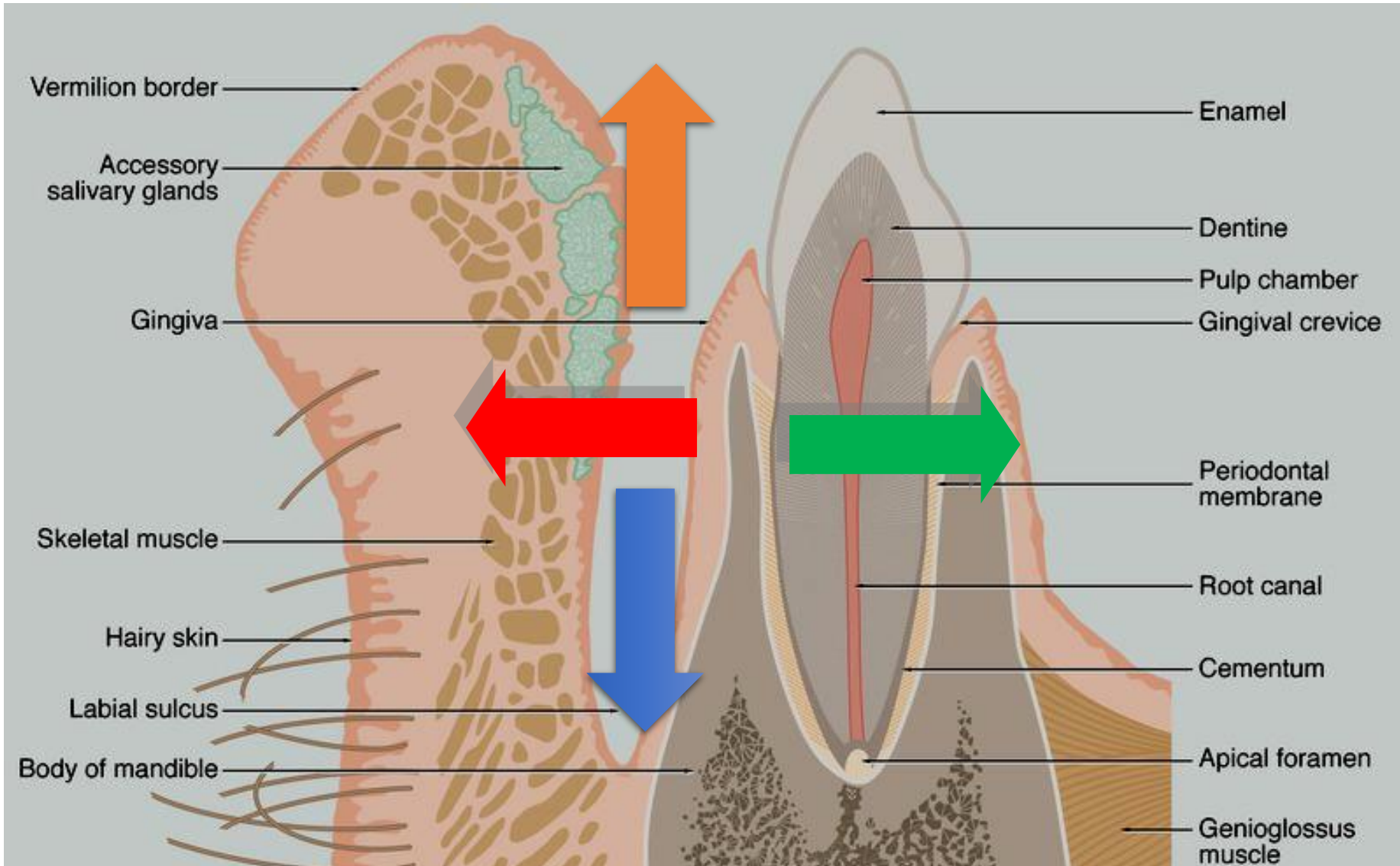
Directions

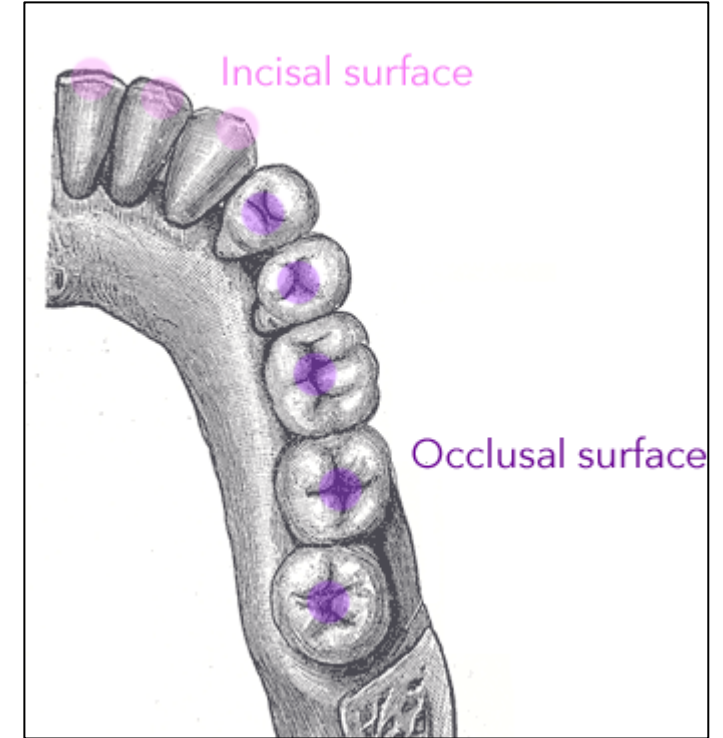
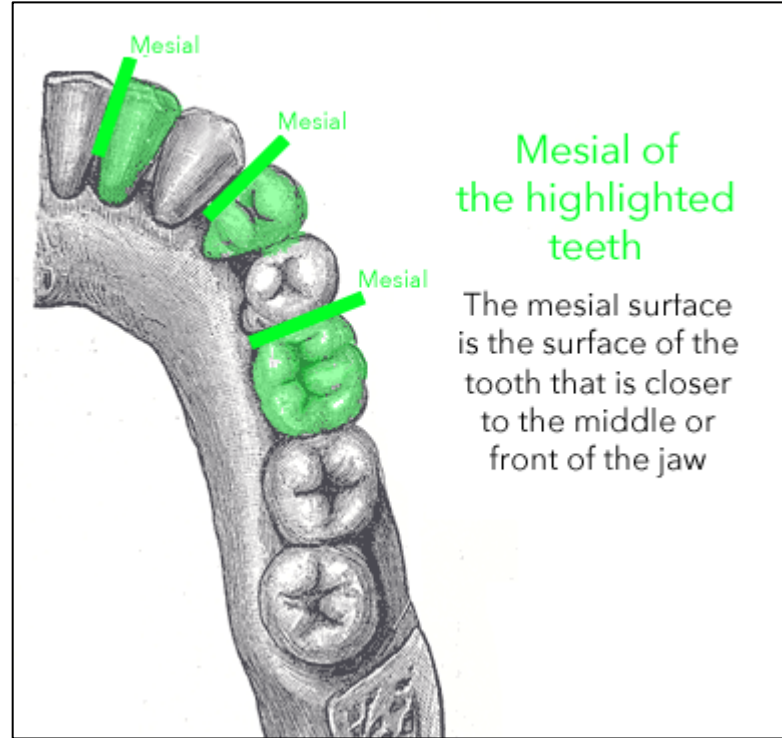
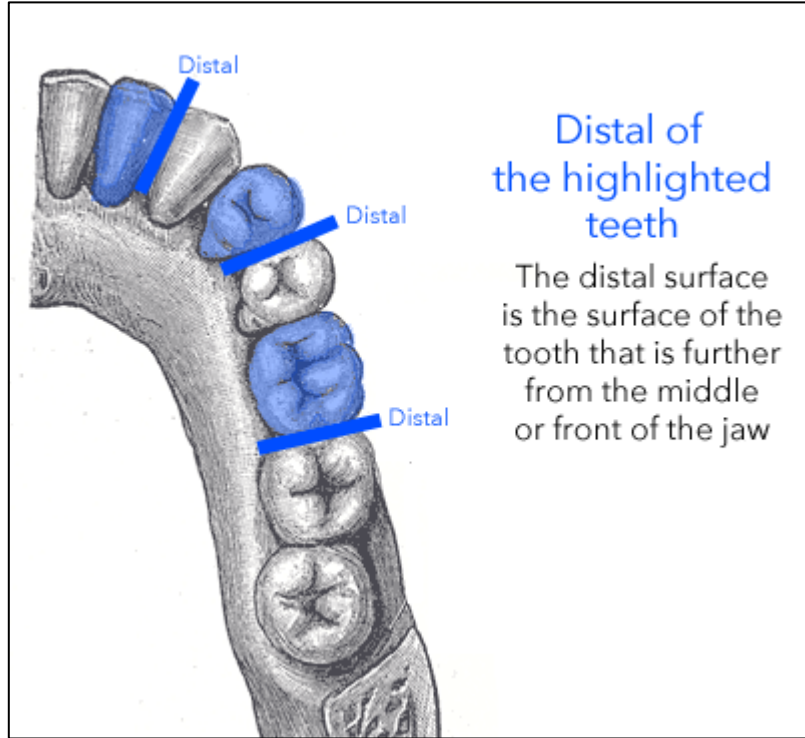
coronal

vestibular (labial, bucal)

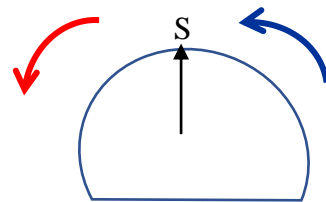
apical

lingual (palatinal)





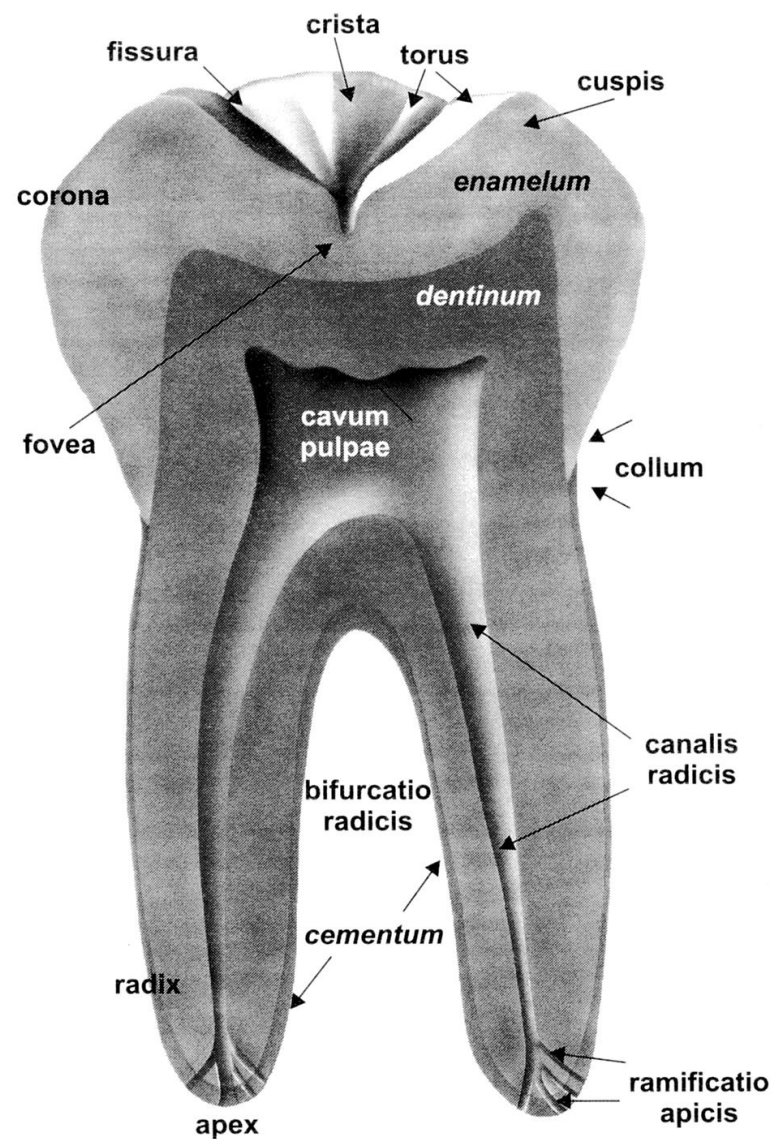
Distal
(towards the last molar)



Mesial
(towards the midline)

Tooth and dental socket, periodontium, gingiva crown, neck, root

Části zuby:

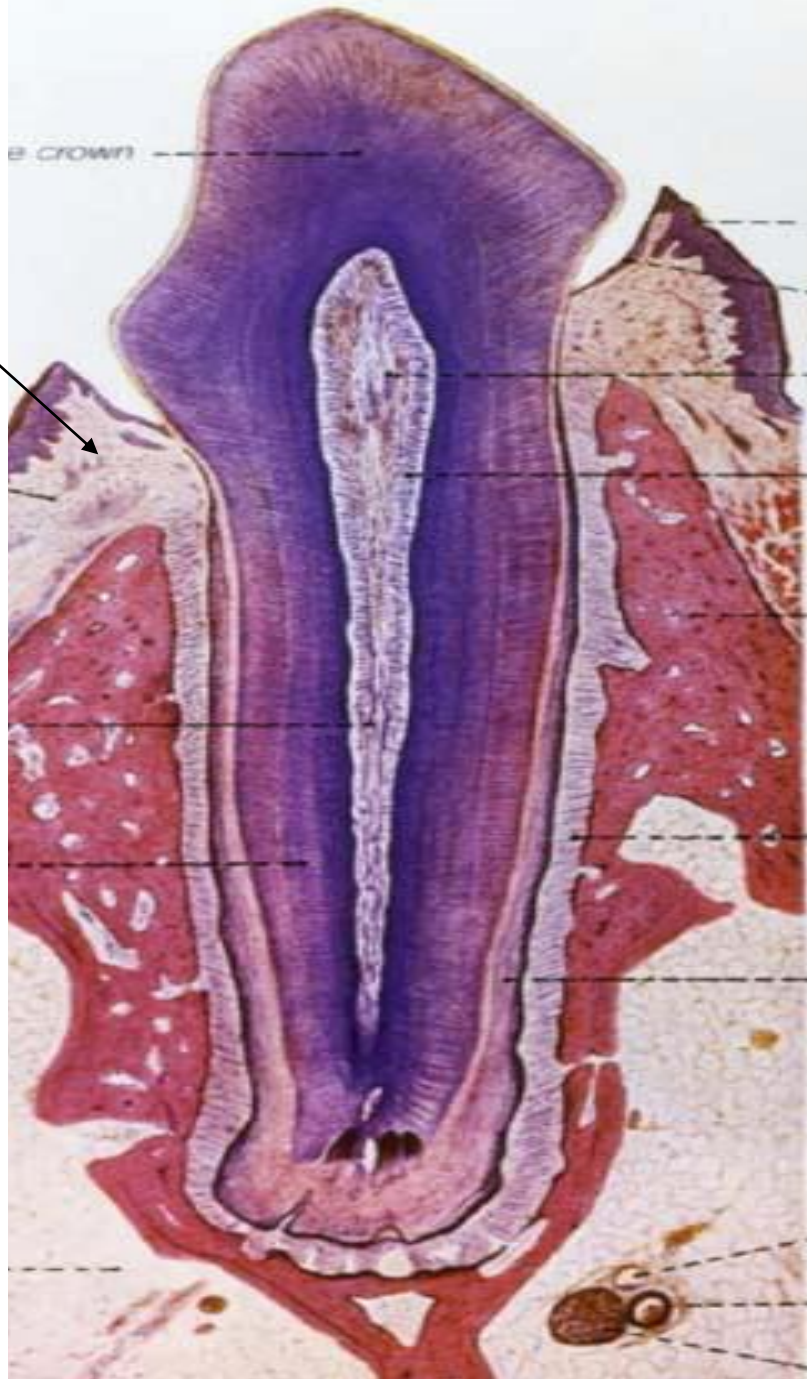


Klepáček, Mazánek a kol. 2001



Tooth (dens)

gingiva



TERMINOLOGIE:

Dentes decidui (lactei)	20
Dentes permanentes	28-32

Corona dentis	(crown)	
Collum	(neck)	
Radix	(root)	1-3
Cavum et canalis radices dentis (cavity and root canal)		
Pulpa dentis	(pulp)	
Foramen apicis radices	(opening at the tip of the root)	
Alveolus		
Periodontium		

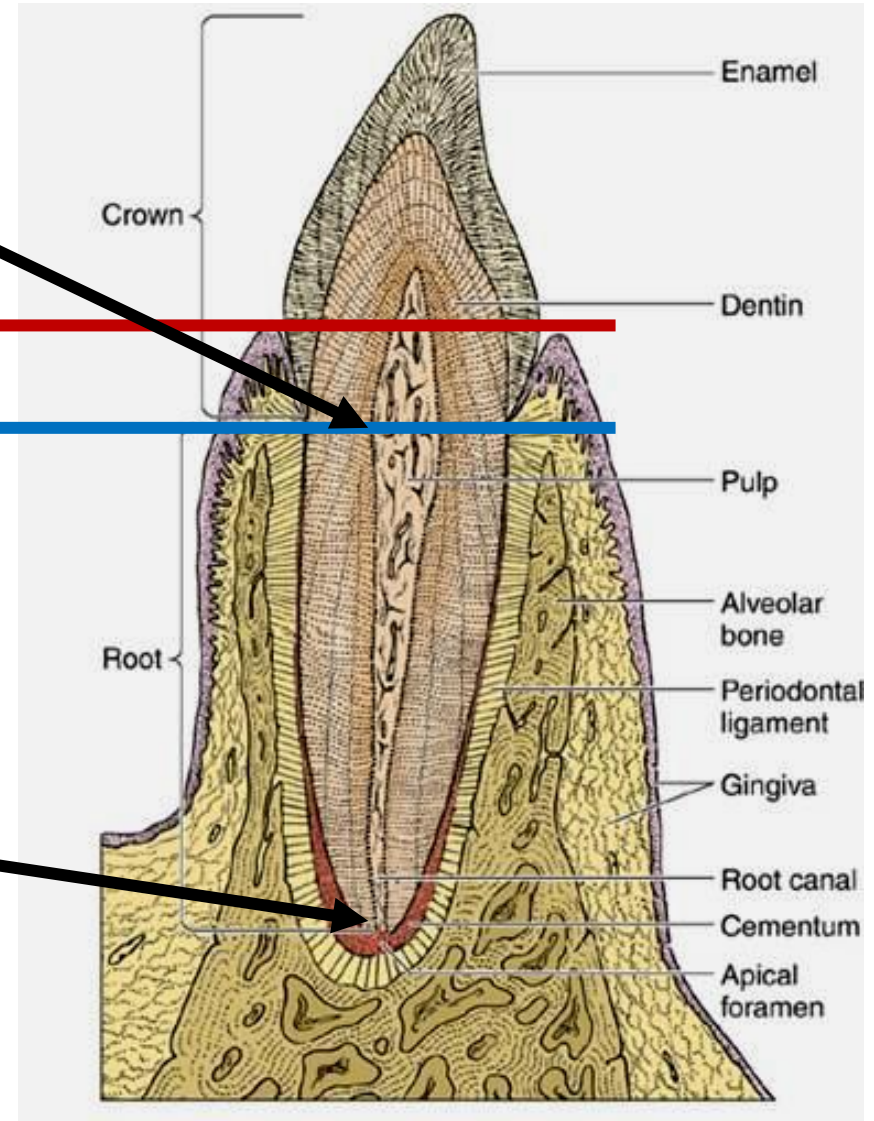
Vein
Artery
Nerve

Cavitas dentis passing to canalis radicus dentis

Anatomical vs clinical crown

Anatomical vs clinical root

Foramen apicis radicus Dentis



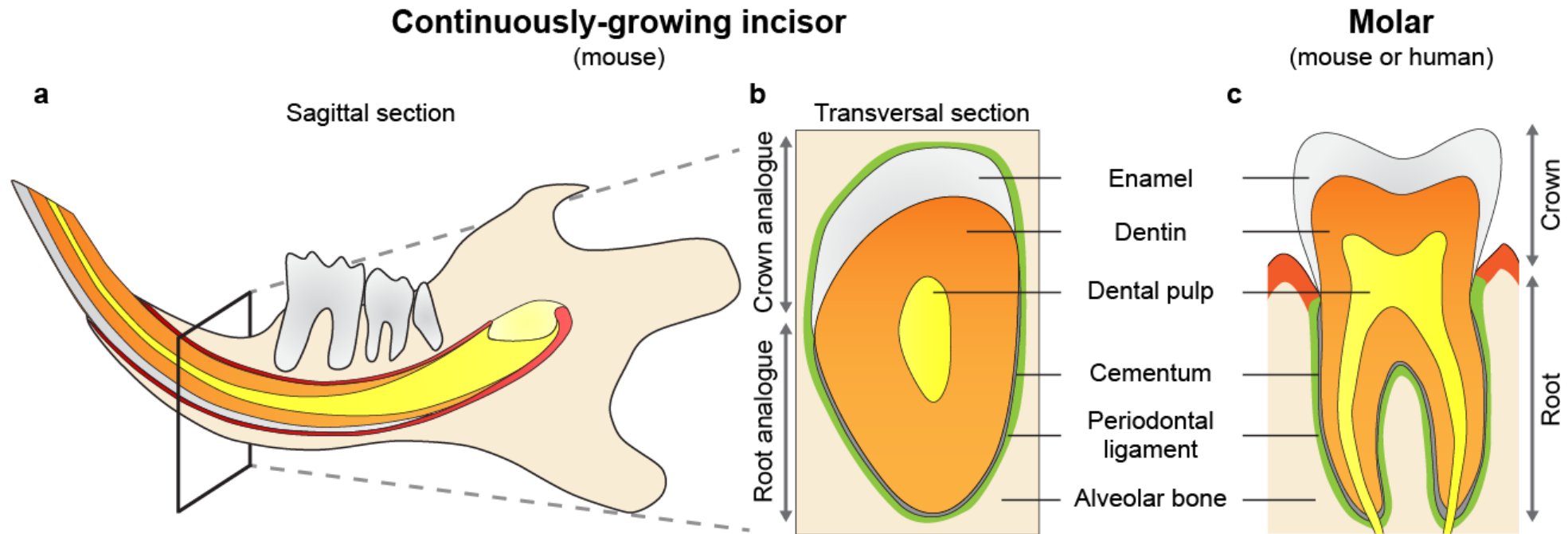
Tissues of tooth

Enamel - enamel, subst. adamantina (row adamas, adamantos = diamond steel), substantia vitrea (lat. vitrum = glass)

Dentin - dentin, substantia eburnea (l. Ebur = ivory)

Cementum - substantia ossea, crusta petrosa

Dental pulp - pulpa dentis



Babirusa



Tusks

