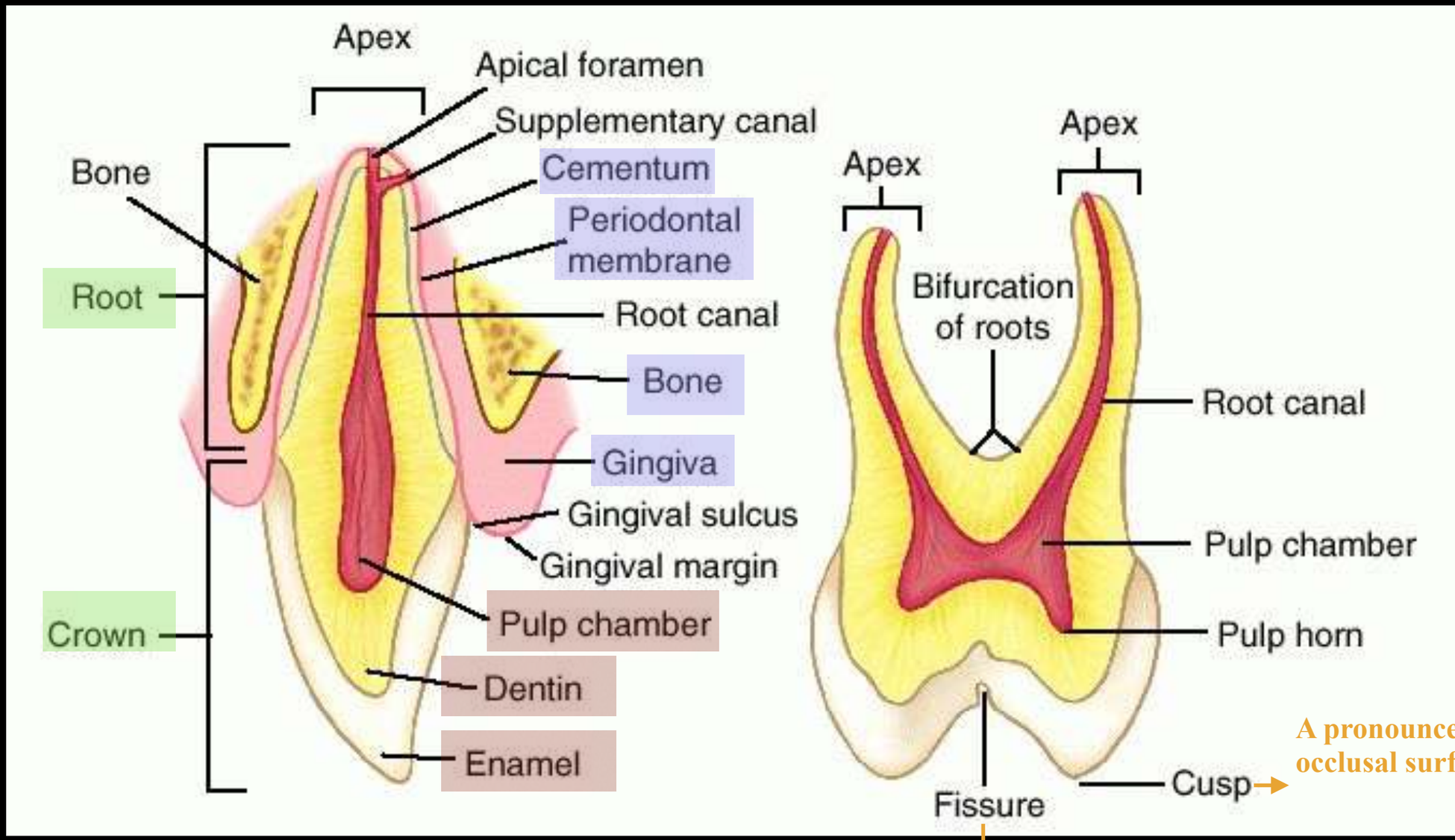
Morphology-Histology & Development of teeth

Arvin Shahbazi D.M.D, Ph.D fellow

Department of Anatomy, Histology and Embryology
Semmelweis University

Morphology of teeth



Parts of the tooth:

Crown

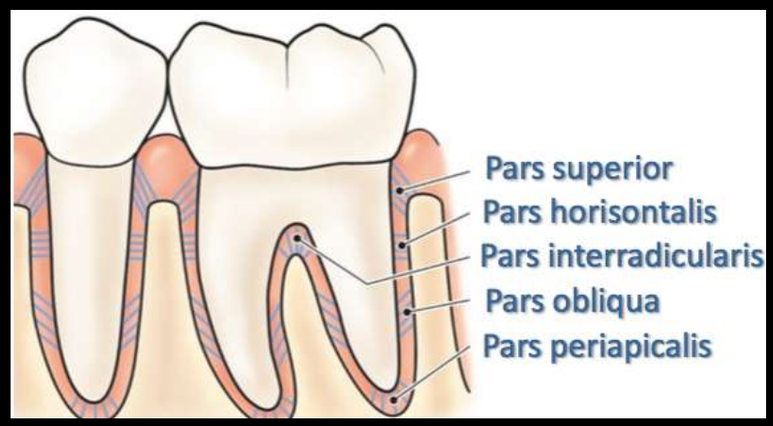
Root

Tissues of the tooth:

Enamel

Dentin

Pulp



Periodontium: Cement, Periodontal ligament, Gingiva, Alveolar bone

Arvin Shahbazi D.M.D, Ph.D fellow

Morphology of teeth

Parts of the tooth:

Crown:

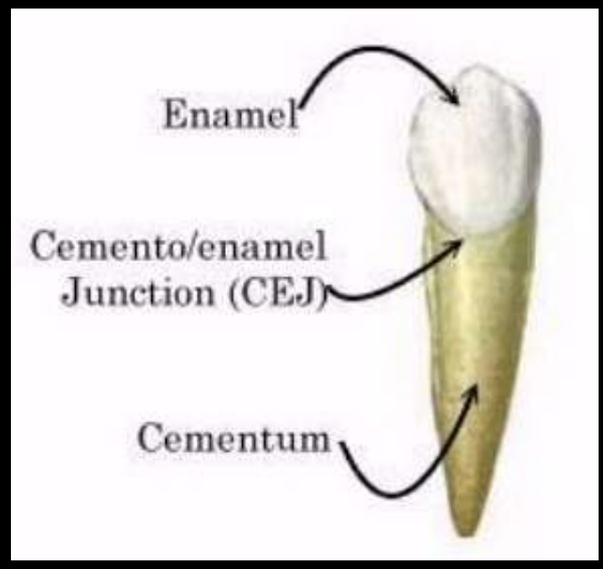
1) Anatomical crown:

The part of tooth covered by enamel

2) Clinical crown:

The portion of a tooth visible in the oral cavity

Root:



1) Anatomical root:

The portion of a tooth covered by cementum

2) Clinical root:

The portion of a tooth which lies within the alveolus

Enamel

- It is the most highly calcified & hardest tissue in the human body.
- It covers the anatomical crown of the teeth.
- It forms a protective covering of the teeth to resist the stress during mastication.
- Enamel is produced by cells of ectodermal origin (ameloblasts / adamantoblasts).
- The enamel thickness is variable over the entire surface of the crown.
- Maximum thickness of about 2- 2.5 mm on the cusps.
- Minimum thickness is at the cervical margin of the root.
- The color of enamel ranges from yellow to gray or gray- blue.
- It is semipermeable, decreased by age.

Arvin Shahbazi D.M.D, Ph.D fellow

Enamel

Chemical components of the enamel

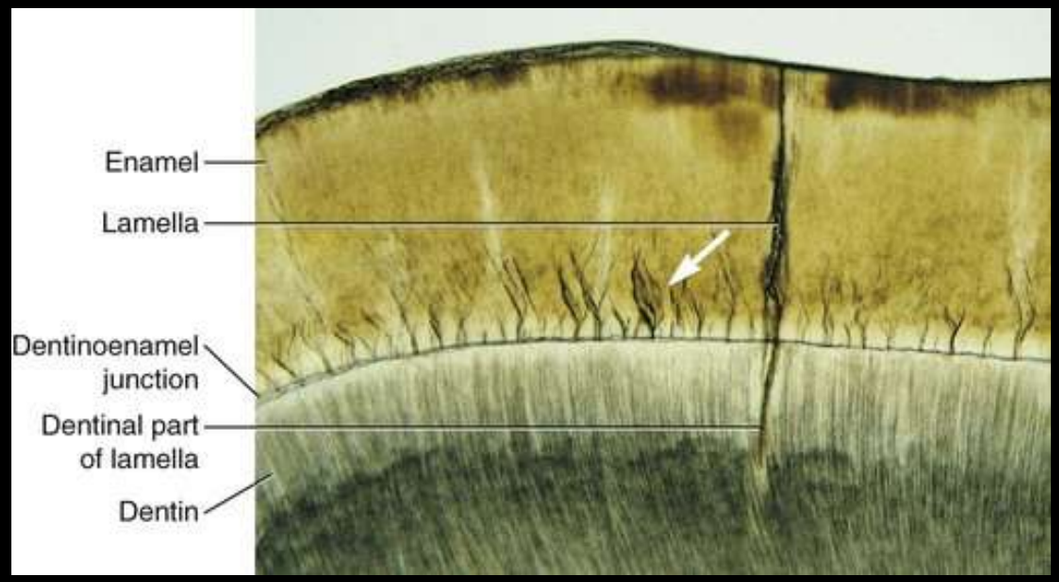
Inorganic components 98%

Major component:

Calcium and phosphate in the form of apatit crystals $Ca_{10}(OH)_2(PO_4)_6$

Minor components:

F, Na, Mg, Va, Sr, Pb, Ni, Se, Al etc.



Organic components 2%

Proteins ,carbohydrates, lipids, citrates, water

1. Enamelin:

it has function in the maturation of the enamel

2. Ameloblastin:

enamel matrix protein

3. Amelotin:

between the enamel matrix and junctional epithelium

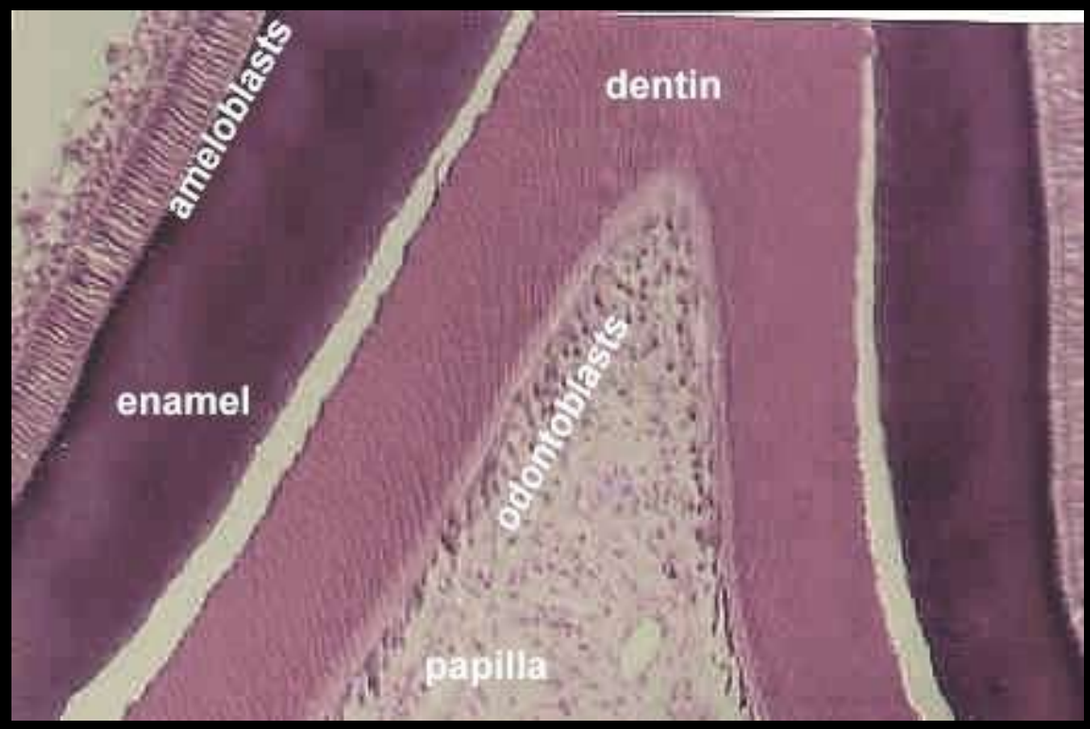
4. Enamelysin:

matrix metalloprotease, breaks down the enamel proteins

Dentin

Forms the major part of the tooth!

covered in **enamel** at the crown & by **cementum** at the roots.



CHEMICAL COMPONENTS OF DENTIN

Inorganic components:

calcium, phosphor, magnesium ,carbonate sodium, chloride, fluor

Organic components:

collagen I, V.

proteoglycans,

phosphophorine

phospholipides

cholesterin

Dentin is similar to bone, but acellular and avascular, yellowish in color .

Dentin proteins:

- dentin sialoprotein (DSP)
- dentin sialophosphoprotein (DSPP)

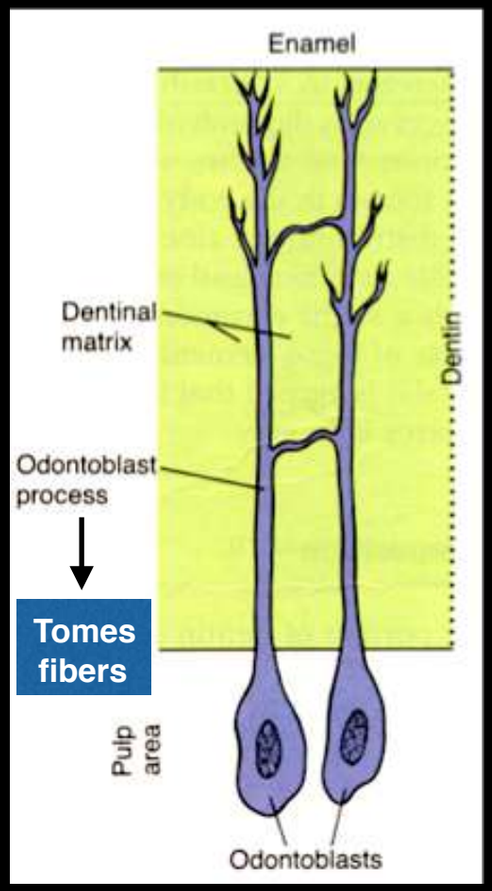
Special markers of odontoblast differentiation

- dentin phosphoprotein (DPP)

Special marker of odontoblast activity

Dentin is produced by odontoblasts (odontoblast is the cell of neural crest origin).

Odontoblasts belongs to the outer surface of the dental pulp.



Arvin Shahbazi D.M.D, Ph.D fellow

Types of Dentin

Primary dentin: **A dentin formed before the completion of the apical foramen of the root.**

Primary dentin is noted for its regular pattern of tubules.

Secondary dentin: **a dentin formed after the completion of the apical foramen and continues to form throughout the life of the tooth.**

Tertiary dentin: **is formed as a reaction to the external stimulation such as cavities!**

There are 2 types of tertiary dentin:

1) Reactionary dentin: where dentin is formed from a pre-existing odontoblast.

2) Reparative dentin: where newly differentiated odontoblast-like cells are formed due to the death of the original odontoblasts.

Peritubular dentin: **A dentin that creates the wall of the dentinal tubule.**

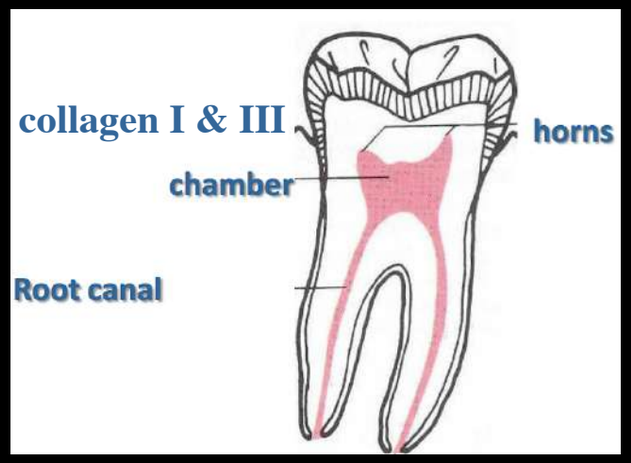
Intertubular dentin: **A dentin found between the tubules.**

Mantle dentin: **the first predentin that forms and matures within the tooth.**

Circumpulpal dentin: **the layer of dentin around the outer pulpal wall.**

Arvin Shahbazi D.M.D, Ph.D fellow

Pulp



Dental pulp is the soft tissue located in the center of the tooth.

It forms, supports, and is an integral part of the dentin that surrounds it.

The *primary function* of the pulp is formative; it gives rise to odontoblasts that not only form dentin but also interact with dental epithelium early in tooth development to initiate the formation of enamel.

The secondary function of the pulp: sensitivity, hydration, and defense.

The size and shape of the pulp depend on the tooth type (e.g. incisor and molars), the size of the pulp chamber in the deciduous teeth is much larger and closer to the occlusal surface.

According to the age of the pulp and development the endodontic treatment is chosen (e.g. pulpotmy for the children and pulpectomy for the adults).

Morphology of teeth

Number of teeth in adults: 32

In each quadrant 8 teeth are present:

1 Central Incisor

1 Lateral Incisor

1 Canine

2 Premolars (bicuspid)

3 Molars (last molar named as Wisdom)

Number of teeth in children: 20

In each quadrant 5 teeth are present:

1 Central Incisor

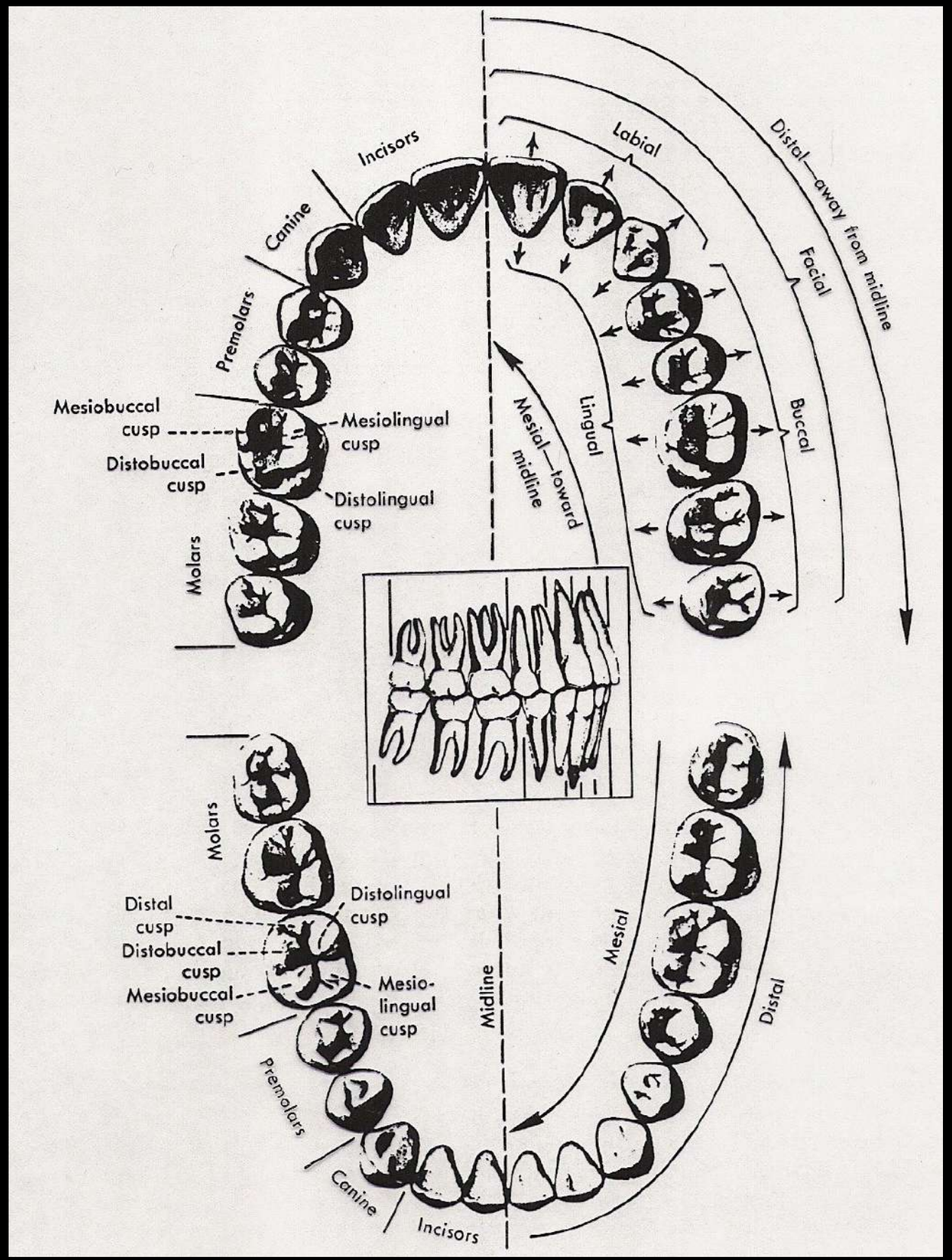
1 Lateral Incisor

1 Canine

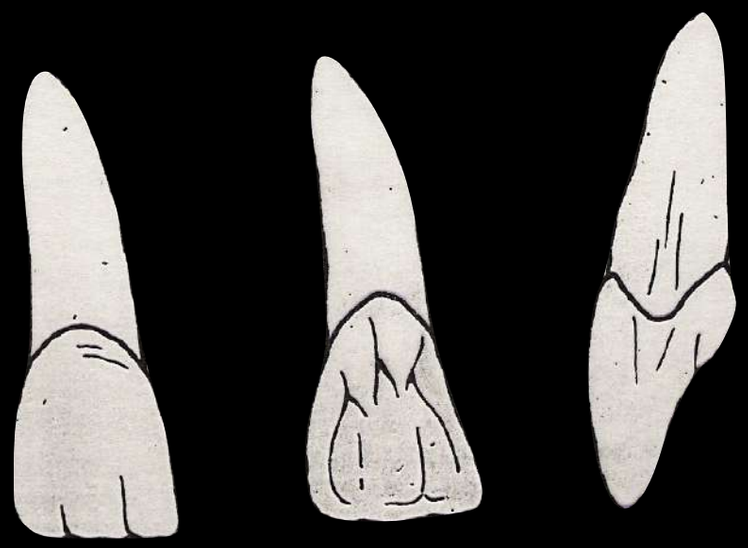
2 Molars

No premolars

No wisdom teeth



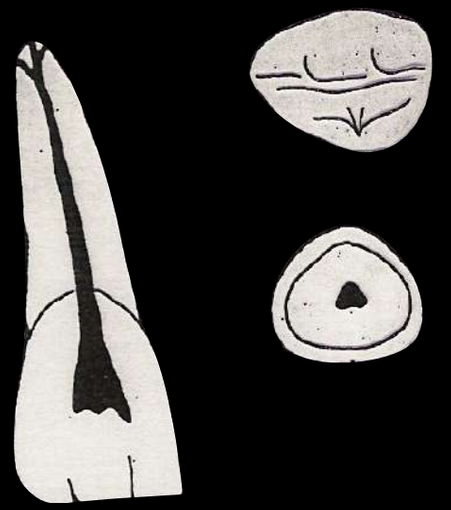
Upper 1st incisor
Dens incisivus superior centralis



- Crown:

The shape is similar to the <u>shovel or chisel</u>

- Cervical section:

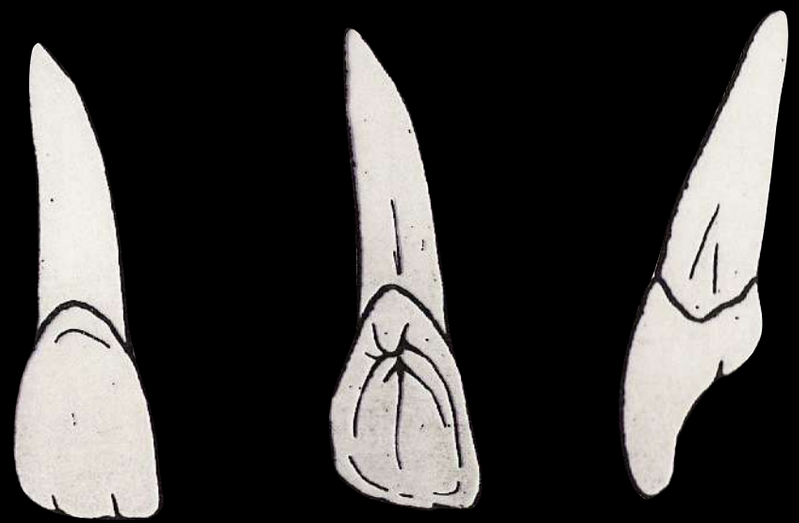


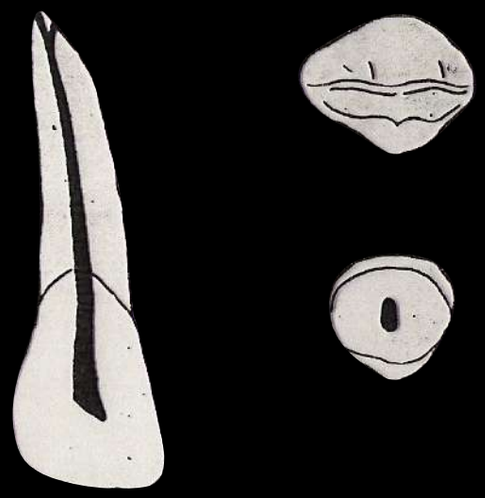
Circular (also triangular) shape

- Root:

1 root – 1 rootcanal

Upper 2nd incisor
Dens incisivus superior lateralis





In many cases this tooth might be missed (aplasia)!

- Crown:

It is smaller, but similar to the first incisor.

Note: The *mesial angle is rounded*.

- Cervical section:

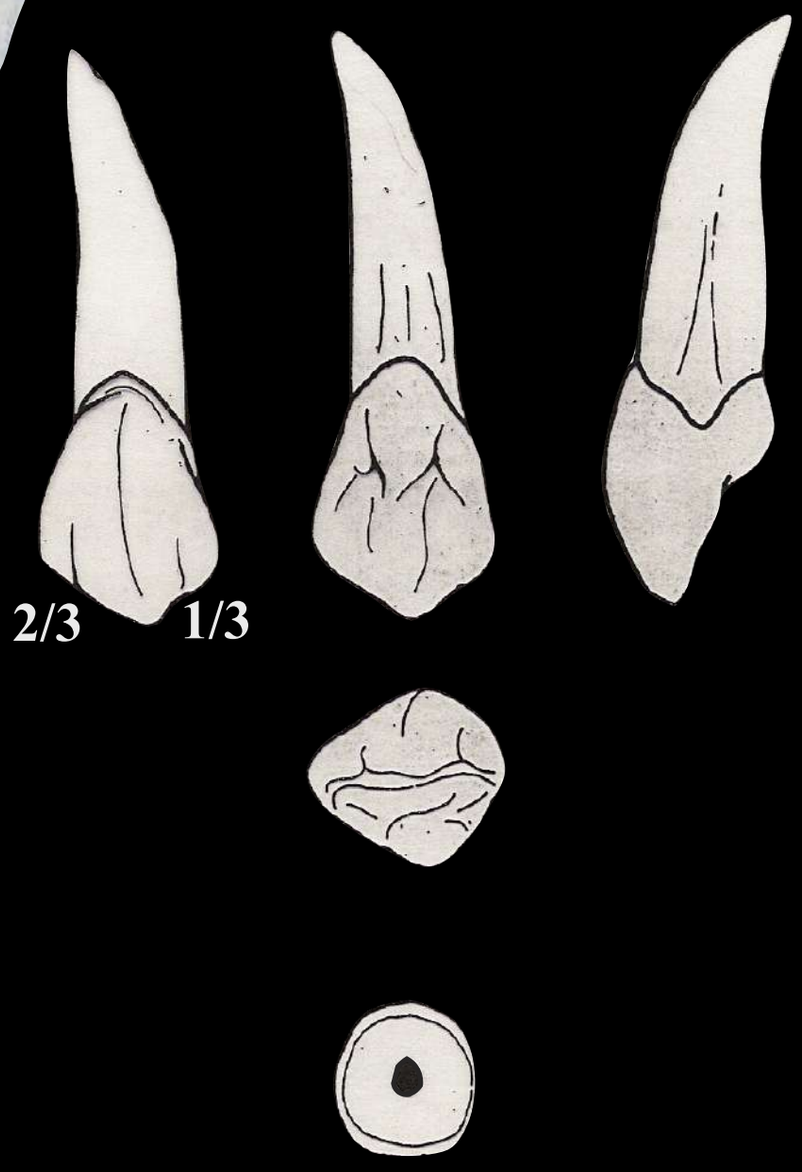
Flattened in mesiodistal direction (or can be circular shaped).

- **Foramen coecum** is on the palatal surface.
- Root:

1 root – 1 rootcanal

Arvin Shahbazi D.M.D, Ph.D fellow

Upper Canine
Dens caninus superior



- Crown:

Wedge shaped

The edges beginning from tip of the cusp divides the vestibular coronal surface into two parts:

1/3 — smaller part

2/3 — bigger part

- Cervical section:

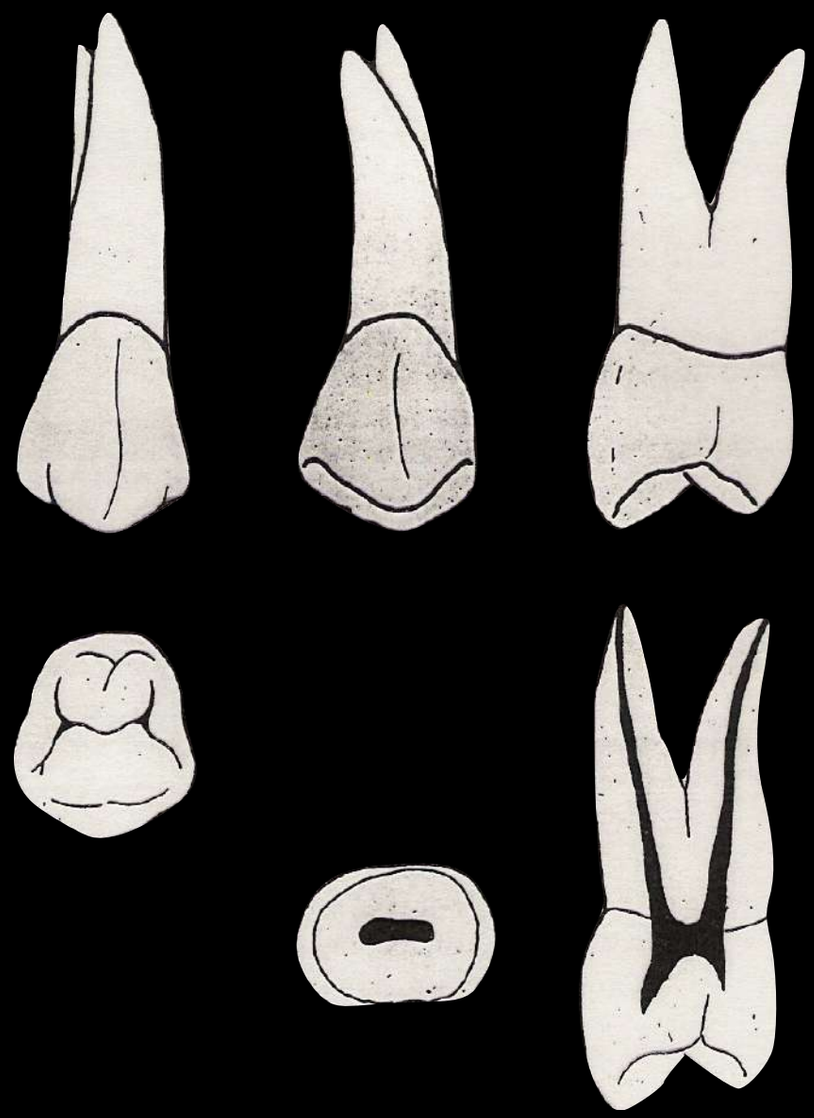
Rounded equilateral

- Root:

1 root – 1 rootcanal

It has the longest and strong root (20-22 mm) among the teeth.

Upper 1st premolar (bicuspid)
Dens praemolaris superior anterior



- Crown:

2 cups: 1 buccal - 1 palatal

Mesial surface is concave!

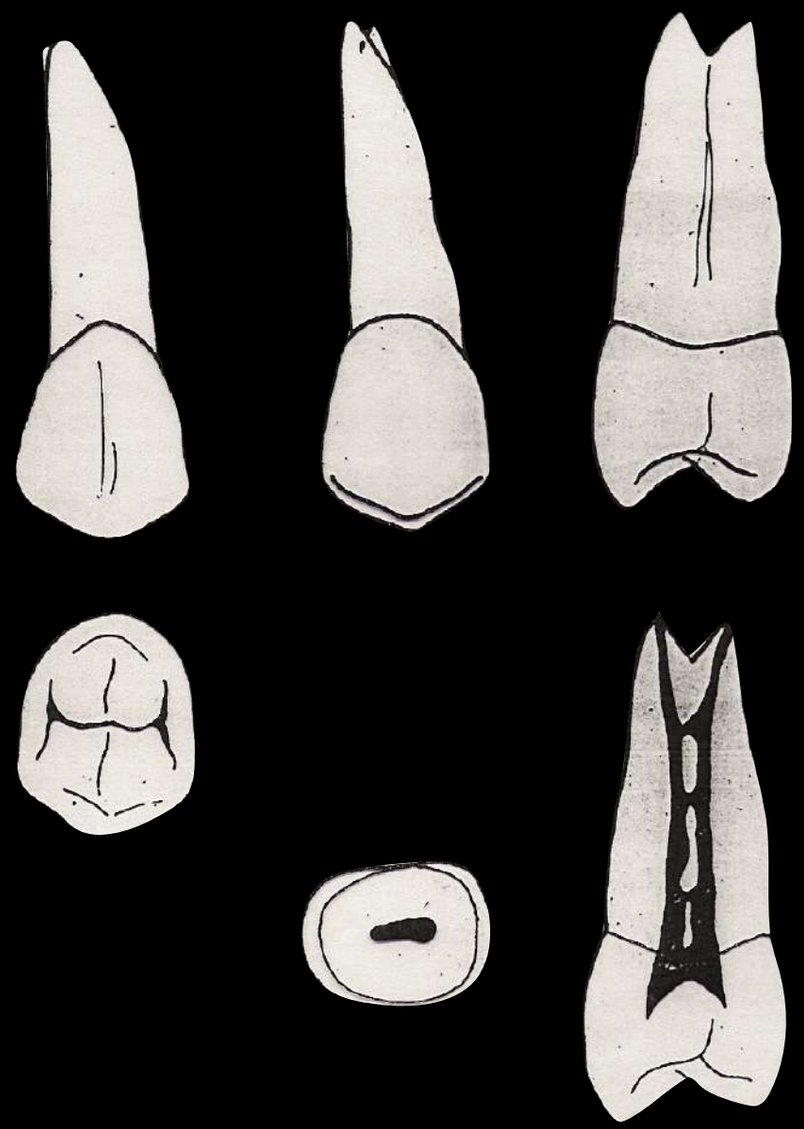
- Cervical section:

Finger biscuit

- Root:

2 roots – 2 canals:1 buccal, 1 palatal

Upper 2nd premolar (bicuspid)
Dens praemolaris superior posterior



- Crown:

It is <u>smaller</u>, and similar to the first premolar.

The cusps are totally the same.

- Cervical section:

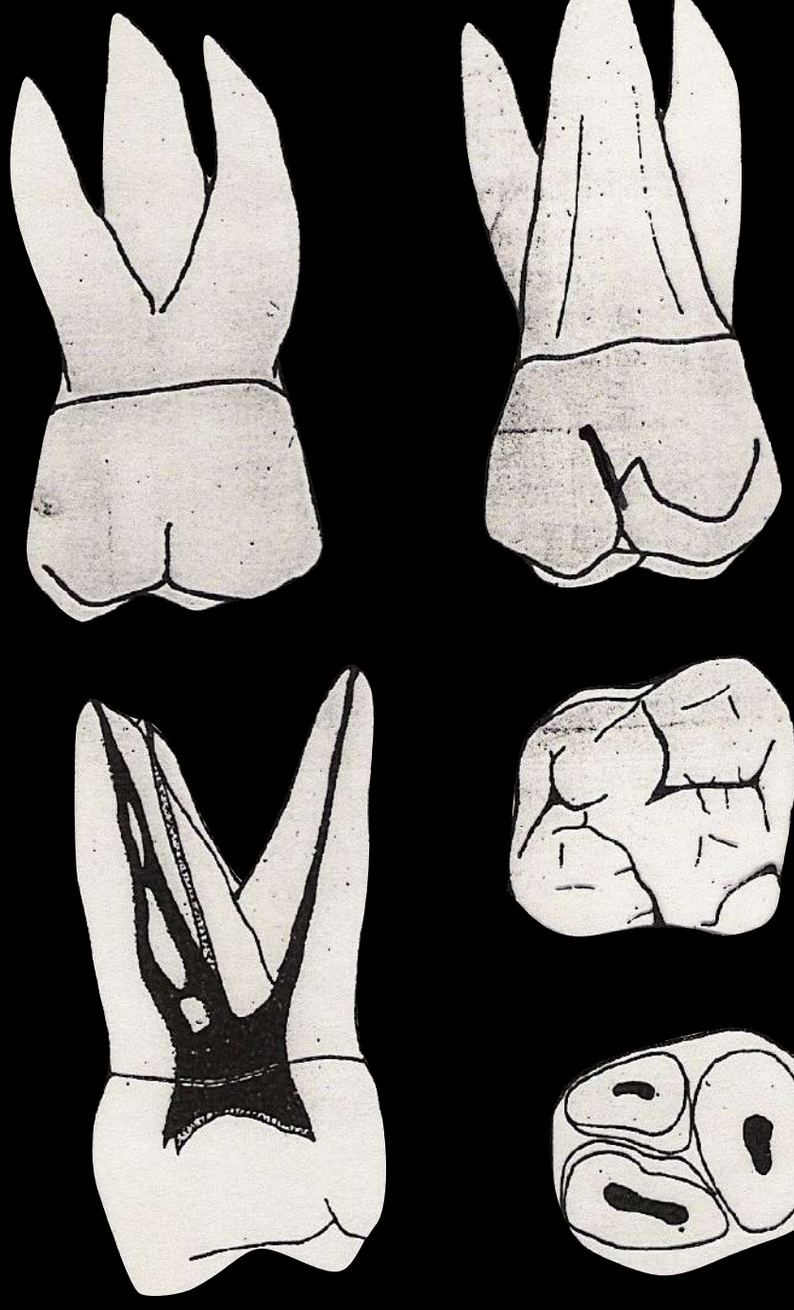
Irregularly flattened

- Root:

1 root – 1 rootcanal

Very rarely it has 2 canals or 2 roots!

Upper 1st molar
Dens molaris superior primus



- Crown:

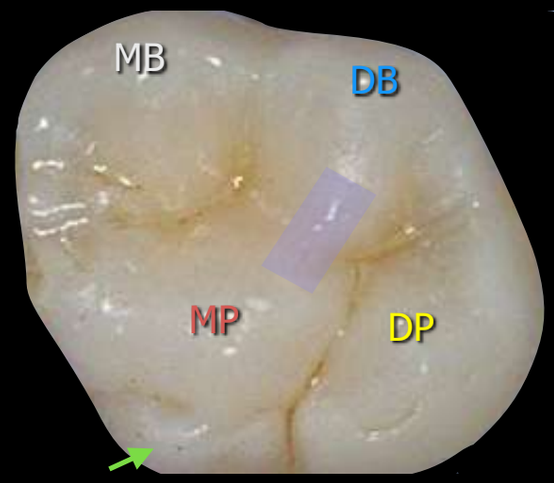
4 cusps

MB (mesiobuccal)

DB (distobuccal)

MP (mesiopalatal)

DP (distopalatal)



MP cusp is the biggest, and it has a special cusp:
tuberculum anomale Carabelli

Between MP-DB cusps, there is a projection named as **crista tansversa.**

DP is the smallest.

There is **foramen coecum** on the palatal surface of the tooth.

- Root:

3 roots – 3 or 4 canals

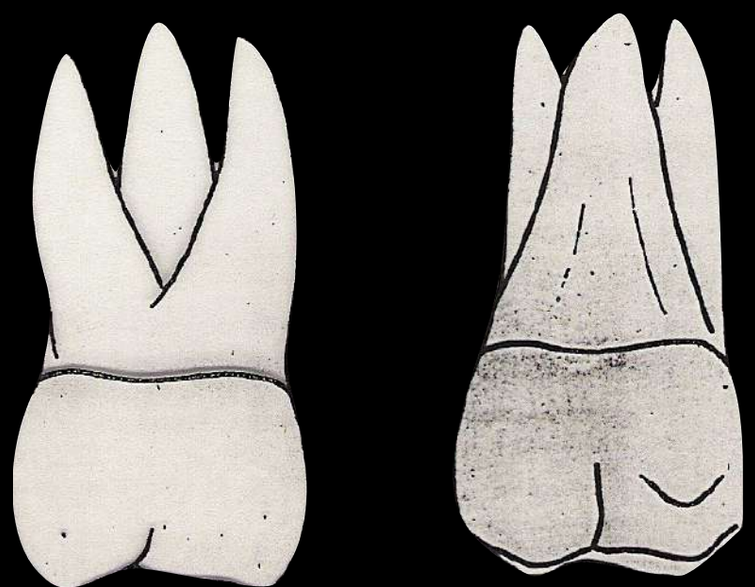
MB – 1 or 2 canals

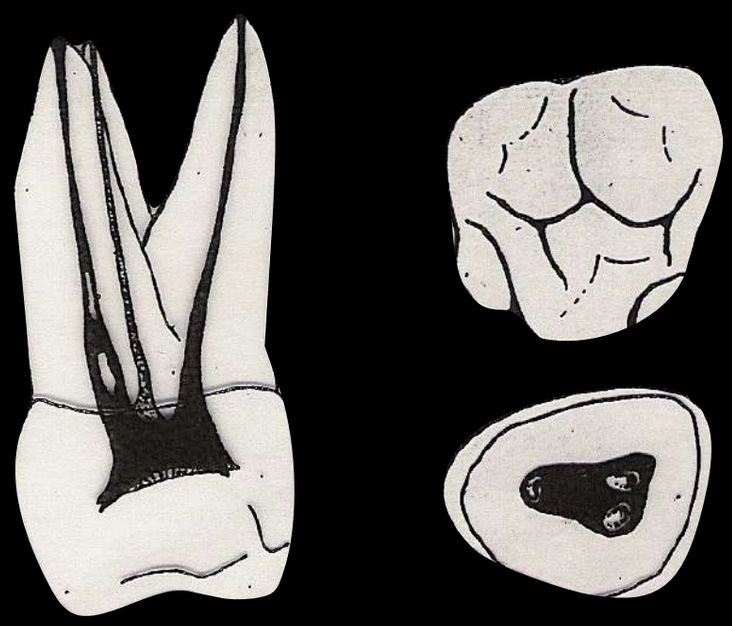
DB - 1 canal - it is the weakest root!

P - 1 canal – it is the biggest root!

Arvin Shahbazi D.M.D, Ph.D fellow

Upper 2nd molar
Dens molaris superior secundus





- Crown:

It is smaller than the first molar.

Shape is variable.

- Root:

3 root – 3 rootcanal

MB

DB

P

Upper 3rd molar or wisdom tooth
Dens sapiens superior

- Crown:

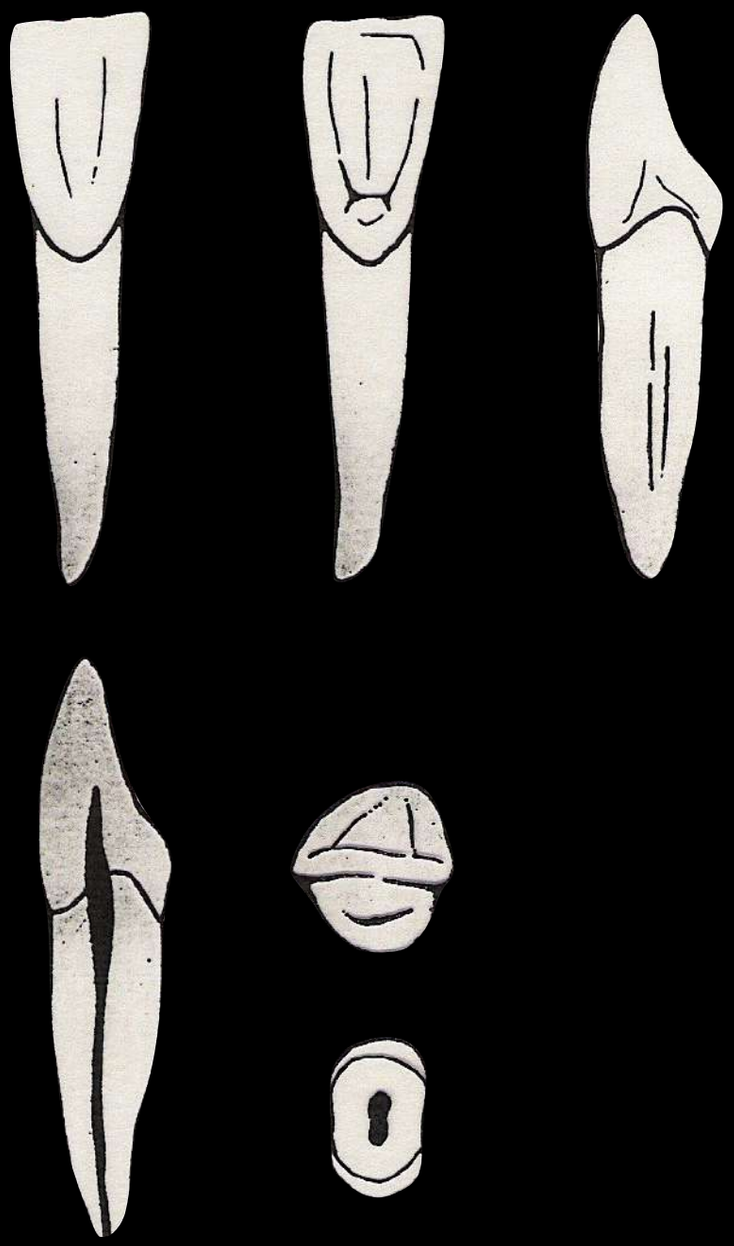
The shape is variable!

2-6 cusps!

- Root:

Number & form of roots are variable too!

Lower 1st incisor
Dens incisivus inferior centralis



- Crown:

Chisel shaped

Smallest tooth of the oral cavity!

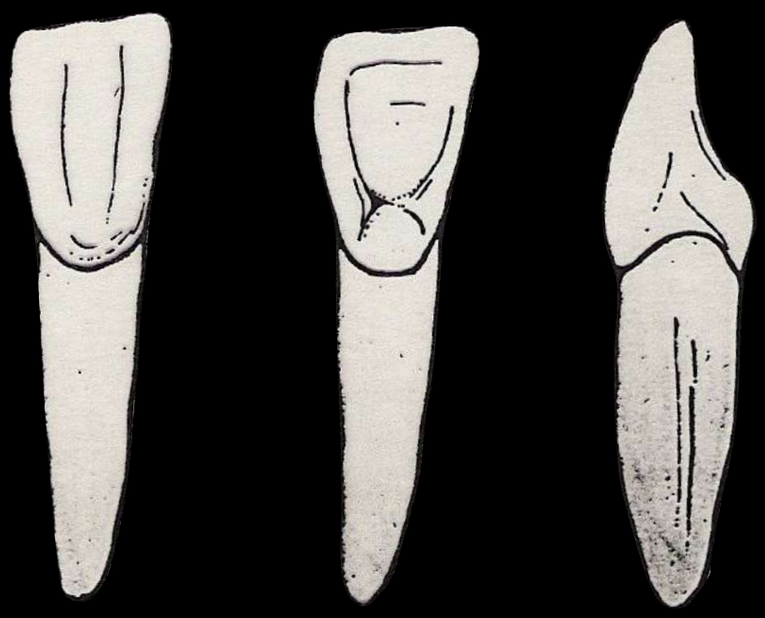
- Cervical section:

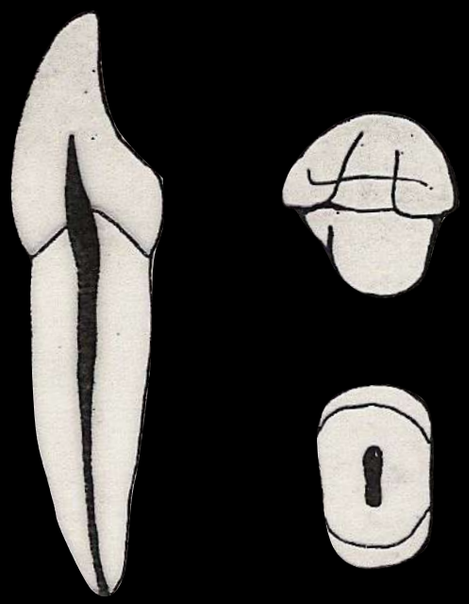
Elliptic

- Root:

1 root – 1 rootcanal

Lower 2nd incisor
Dens incisivus inferior lateralis





- Crown:

Chisel shaped & bit bigger then the 1st lower incisor.

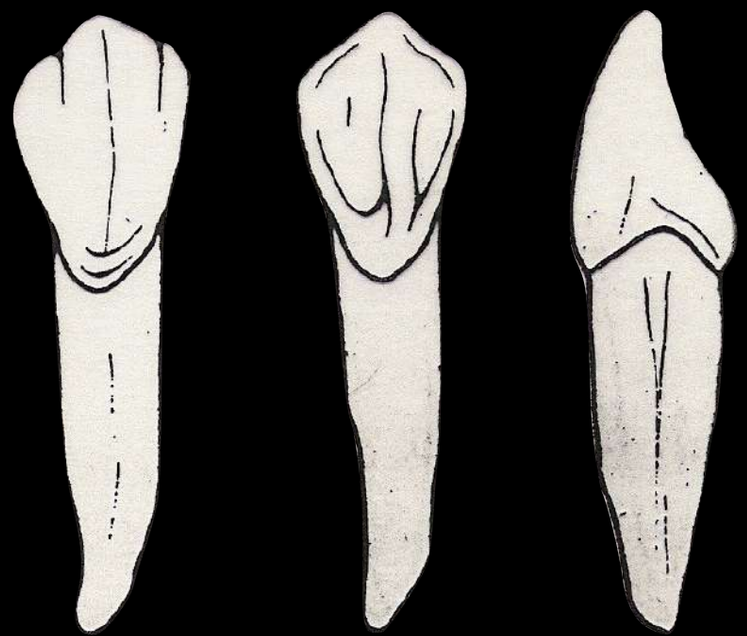
- Cervical section:

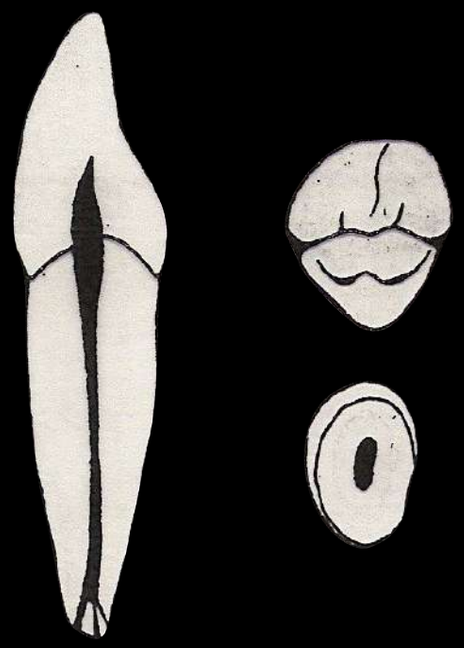
Rectangular with rounded angles

- Root:

1 root – 1 rootcanal

Lower canine
Dens caninus inferior





- Crown:

It is similar to the upper canine, but smaller and rounded shaped.

- Cervical section:

Ellipsoid shaped

- Root:

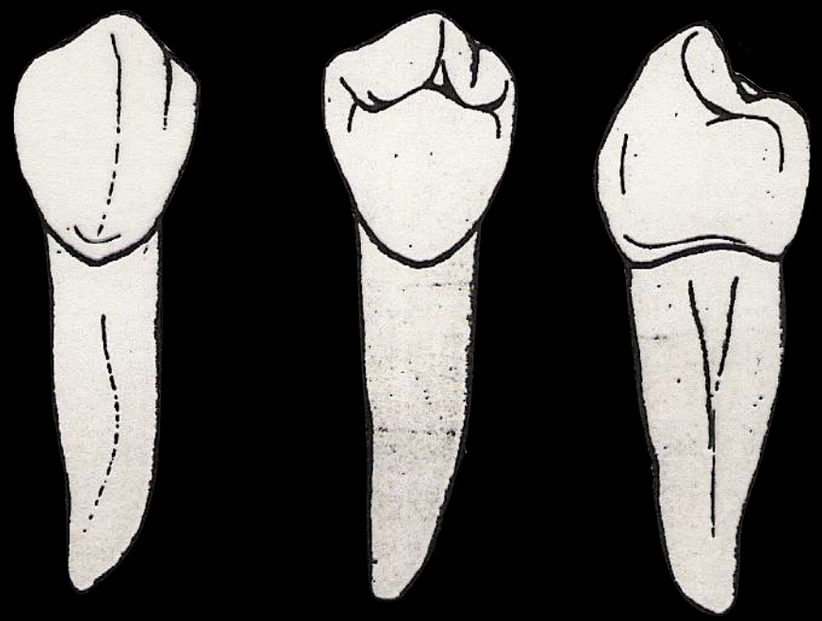
1 root – 1 root canal

It has the second longest root among the teeth!

In 1.5 % of the cases the apex of the root might be bifurcated!

Arvin Shahbazi D.M.D, Ph.D fellow

Lower 1st premolar
Dens praemolaris inferior anterior

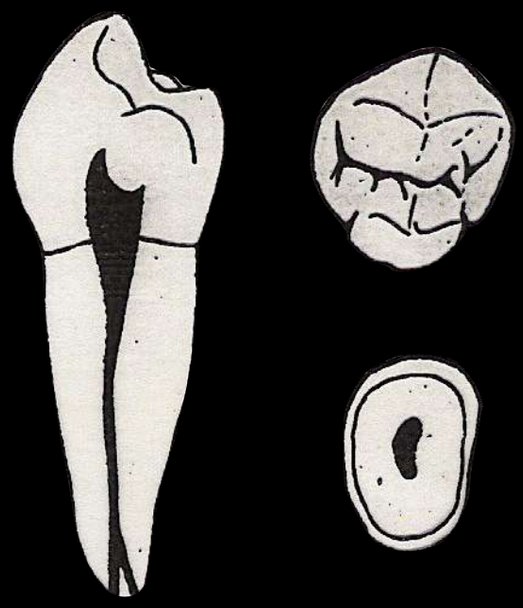


- Crown:

2 cusps – 1 buccal, 1 lingual

Buccal cusp bigger than the lingual cusp.

The occlusal surface diverges to the lingual surface.



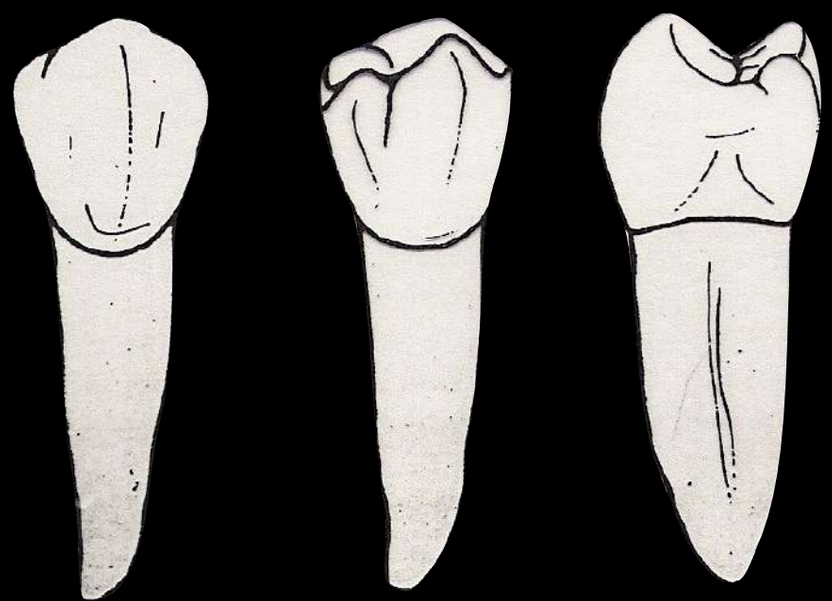
- Cervical section:

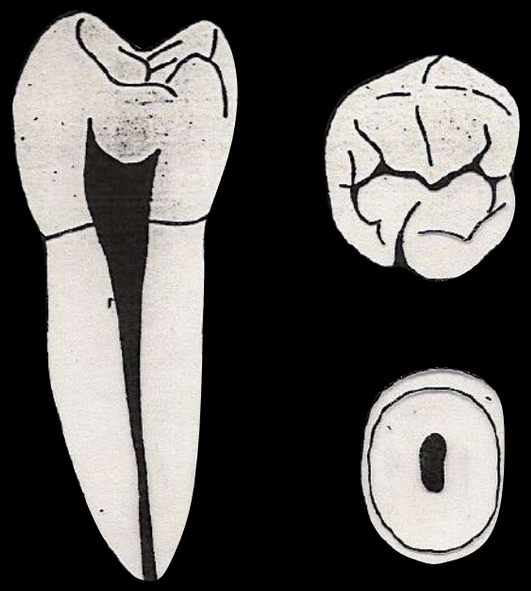
Irregular flattened shape (in mesiodistal direction)

- Root:

1 root – 1 canal

Lower 2nd premolar
Dens praemolaris inferior posterior





- Crown:

It is bigger than the lower first premolar.

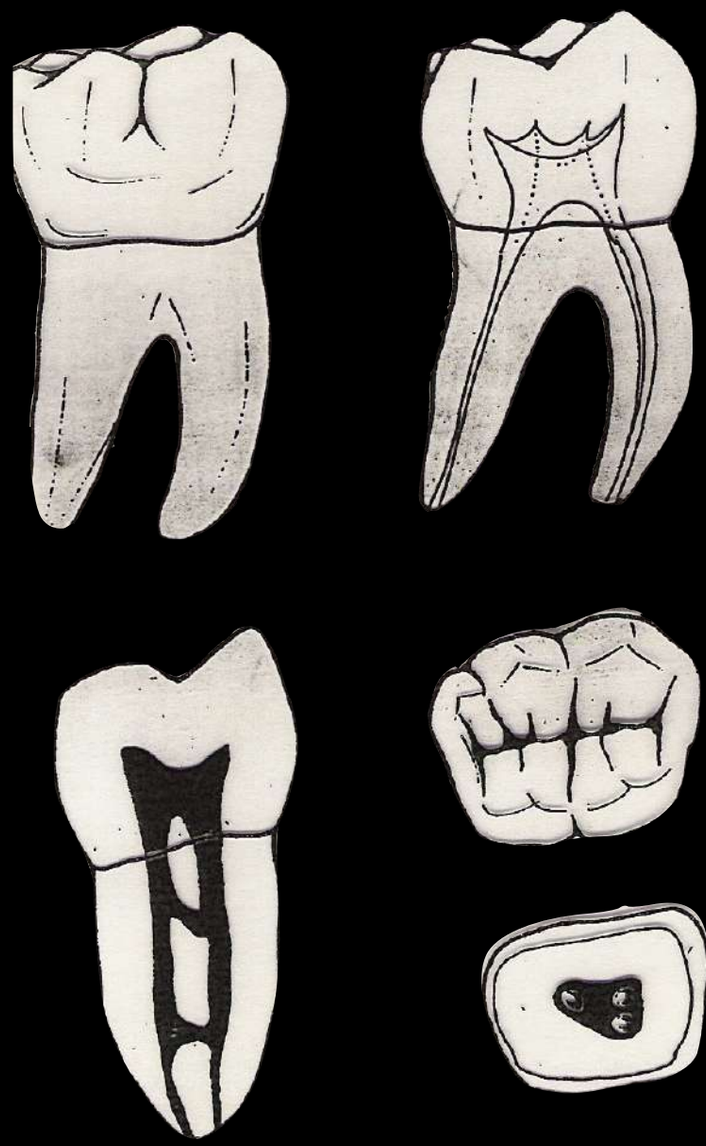
It may have 2 or 3 cusps:

1 buccal cusp - 1 or 2 lingual cusps

- Root:

1 root – 1 canal

Lower 1st molar
Dens molaris inferior primus



- Crown:

5 cusps:

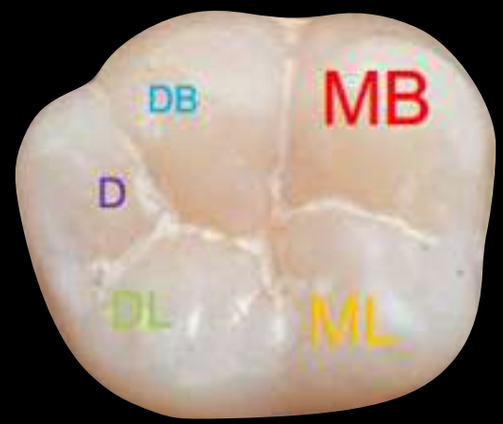
MB (mesiobuccal)

DB (distobuccal)

D (distal)

ML (mesiolingual)

DL (distolingual)



MB cusp is the largest!

DB cusp is the smallest!

Among the cups there are **fissures** and **fossa centralis**.

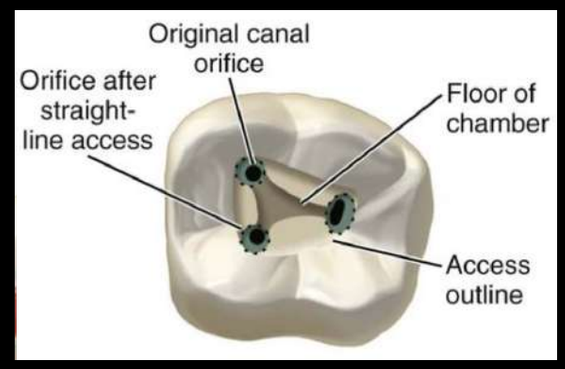
There is **foramen coecum** on the buccal surface of the tooth.

- Root:

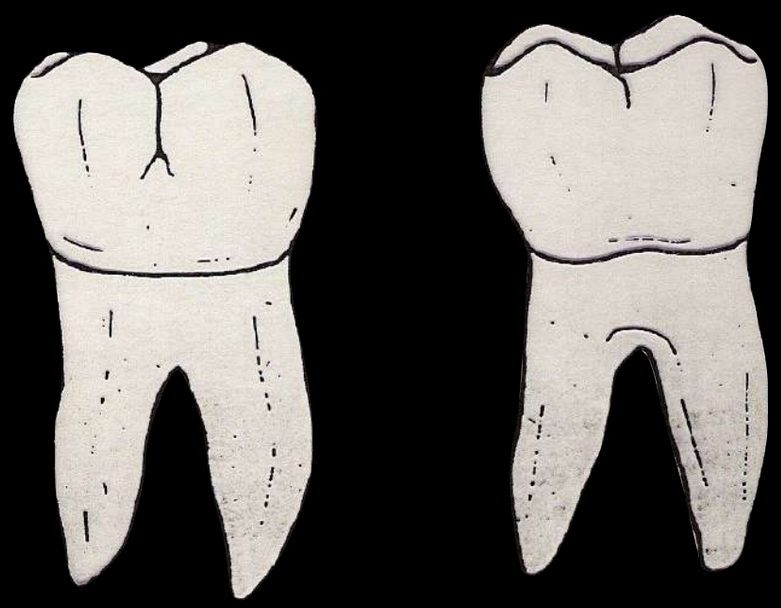
2 roots - Mesial & distal roots

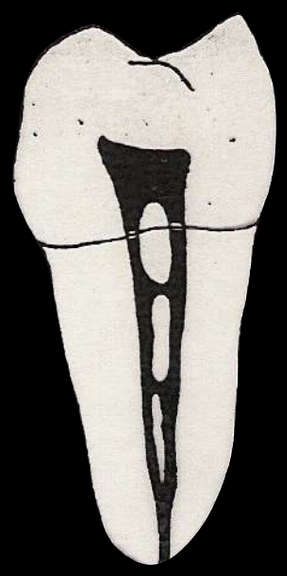
Mesial root – 2 canals: MB, ML canals

Distal root – 1 canal



Lower second molar
Dens molaris inferior secundus





- Crown:

4 cusps: MB, DB, ML, DL

There are 2 fissures, they are perpendicular to each other.

There is **foramen coecum** is on the buccal surface.

- Root:

2 roots: Mesial & Distal roots
Medial root – 1 or 2 canal(s)
Distal root – 1 canal

Lower third molar or wisdom tooth
Dens sapiens inferior

- Crown:

Smaller than the lower second molar.

Sometimes it has 4 or 5-6 cusps.

- Root:

Usually it has 2 roots: Mesial & Distal roots, or sometimes it can have 1-4 roots!

Eruption of deciduous & permanent teeth

- Order of eruption of deciduous teeth:
  1) Central incisor
  2) Lateral incisor
  3) First molar
  4) Canine
  5) Second molar

- Order of eruption of permanent teeth:
  1) First molar
  2) Central incisor
  3) Lateral incisor
  4) First premolar
  5) Canine
  6) Second premolar
  7) Second molar
  8) Third molar

Eruption times of primary teeth

Upper	Lower
Central incisor 7 mths	Central incisor 6 1/2 mths
Lateral incisor 8 mths	Lateral incisor 7 mths
Canine 16-20 mths	Canine 16-20 mths
First molar 12-16 mths	First molar 12-16 mths
Second molar 21-30 mths	Second molar 21-30 mths

3 stages of dentition:

1- primary dentition :
from 6th month to 6th year

2- mixed dentition :
between 6th to 12th year

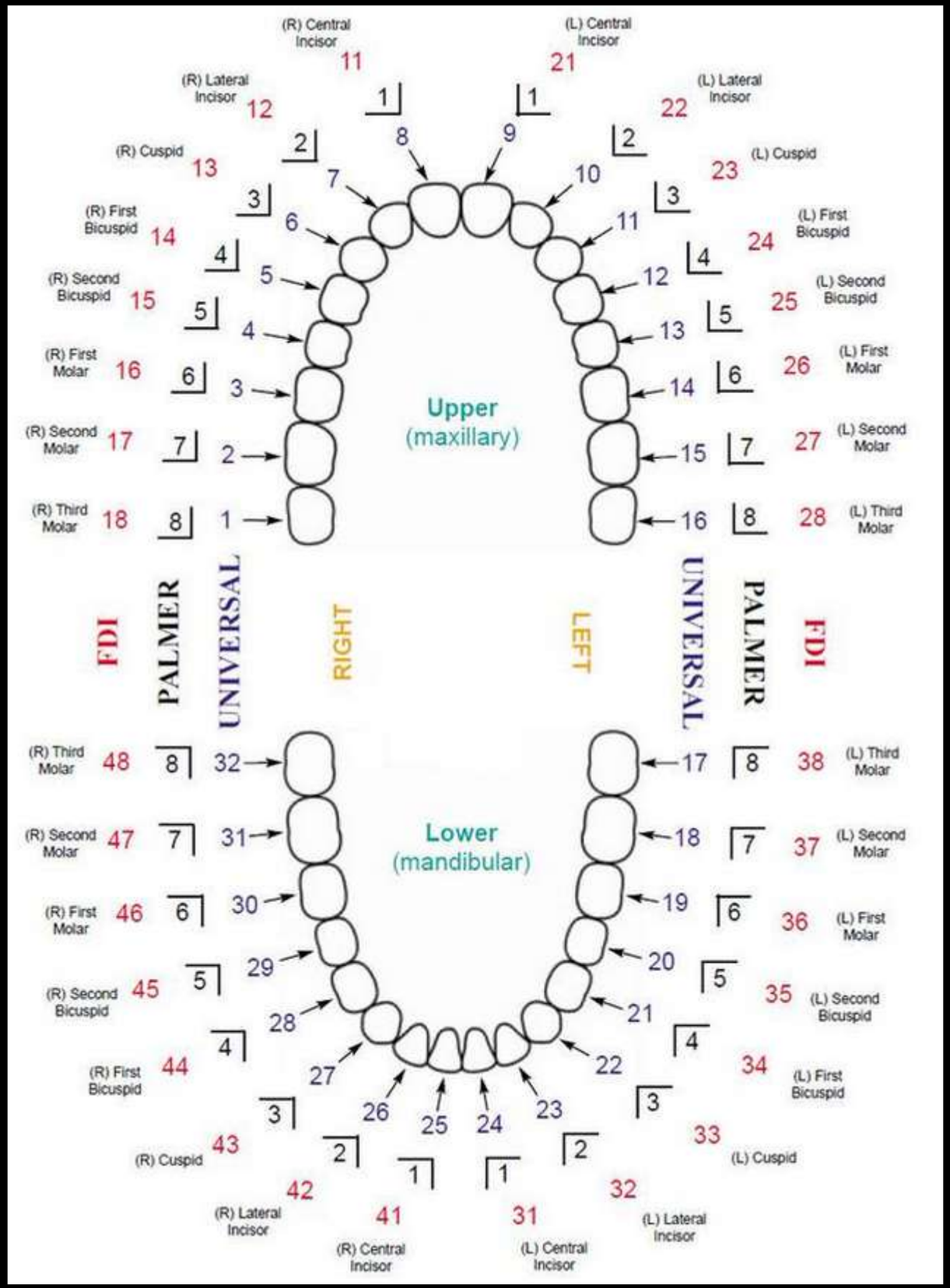
3- permanent dentition:
after 12th year

Eruption times of permanent teeth

Upper	Lower
Central incisor 7 - 8 yrs	Central incisor 6 - 7 yrs
Lateral incisor 8 - 9 yrs	Lateral incisor 7 - 8 yrs
Canine 11 - 12 yrs	Canine 9 - 10
First premolar 10 - 11 yrs	First premolar 10 - 12 yrs
Second premolar 10 - 12 yrs	Second premolar 11 - 12 yrs
First molar 6 - 7 yrs	First molar 6 - 7 yrs
Second molar 12 - 13 yrs	Second molar 12 - 13 yrs
Third molar 17 - 21 yrs	Third molar 17 - 21 yrs

Arvin Shahbazi D.M.D, Ph.D fellow

Teeth numbering systems



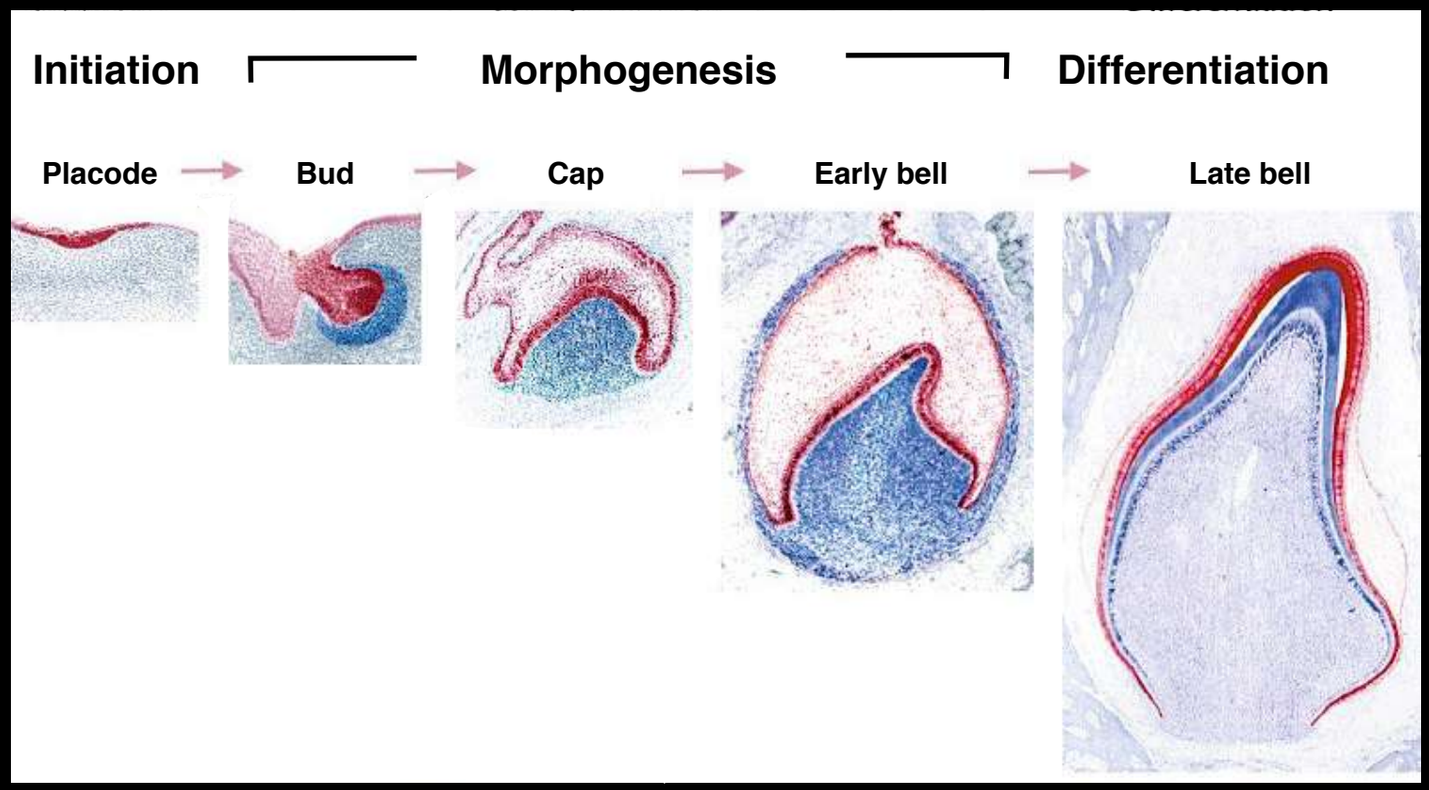
Development of teeth

Tooth development can be divided into 3 phases:

1) Initiation — the sites of the future teeth are established, with the appearance of tooth germs along an invagination of the oral epithelium called the dental lamina.

2) Morphogenesis — the shape of the tooth is determined by a combination of cell proliferation and cell movement.

3) Histogenesis — differentiation of cells forms dental tissues, both mineralized (enamel, dentine, cementum) and unmineralized (dental pulp, periodontium).



Development of teeth

Tooth formation occurs in the 6th week of intrauterinelife with the formation of primary epithelial band.

At about 7th week the primary epithelial band divides into:
A lingualy located process called dental lamina —> Contributes in the development of the teeth
A buccally located process called vestibular lamina —> Contributes in the formation of the vestibule of the mouth (lips & cheeks)

All deciduous teeth arise from dental lamina.

The primitive oral cavity (stomodeum) is lined by *stratified squamous epithelium* called the oral ectoderm.

The oral ectoderm contacts the endoderm of the foregut to form the buccopharyngeal membrane.

This membrane ruptures at about 27th day of gestation and the primitive oral cavity establishes a connection with the foregut.

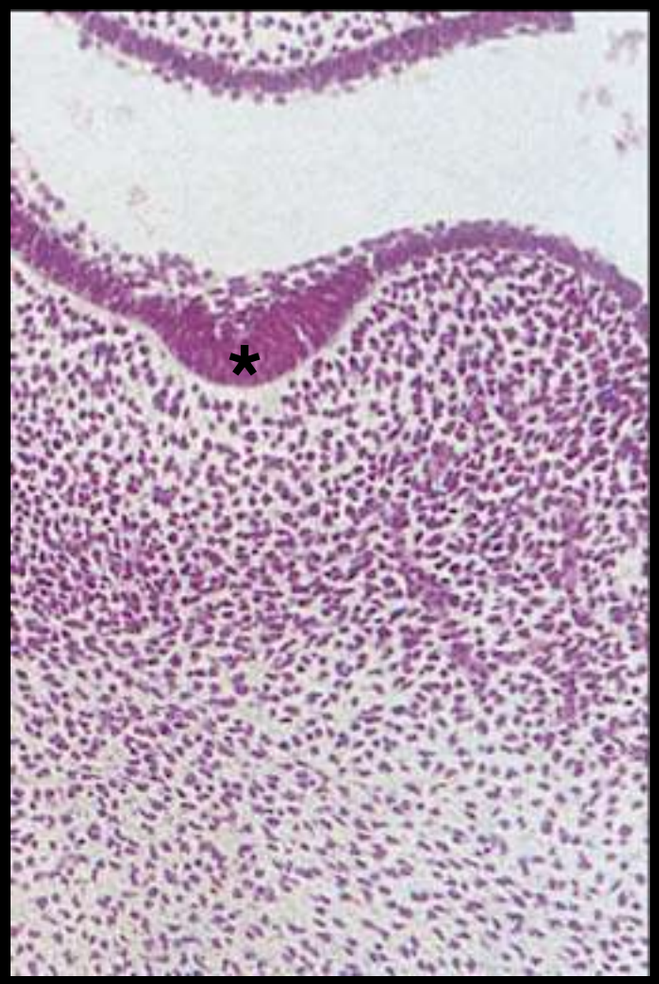
Most of the connective tissue cells underlying the oral ectoderm are of ectomesenchyme in origin.

These cells instruct the overlying ectoderm to start the tooth development,which begins in the anterior portion of the future maxilla & mandible and proceeds posteriorly.

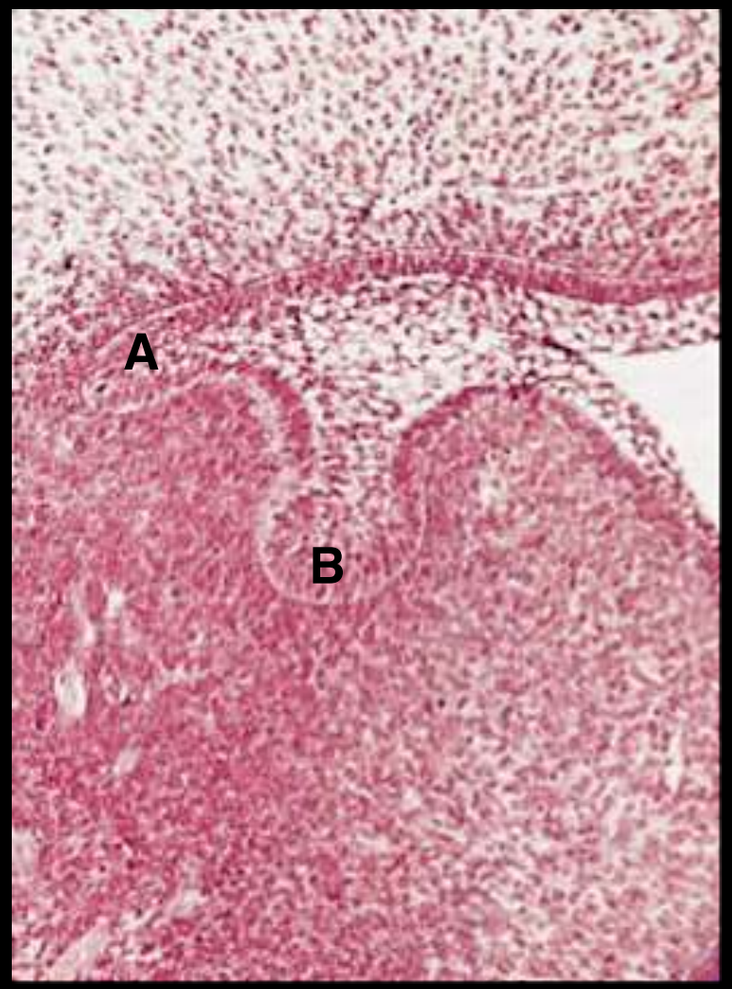
Arvin Shahbazi D.M.D, Ph.D fellow

Development of teeth

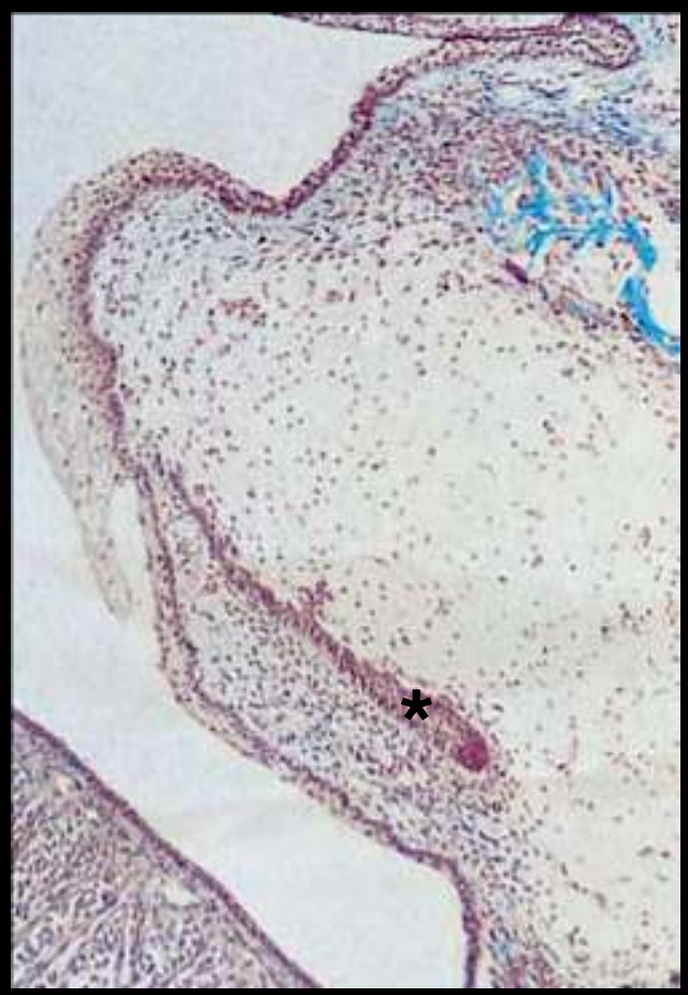
Tooth development is characterized by complex interactions between epithelial & mesenchymal tissues (ectomesenchymal origin)



Primary epithelial band at the 6th week of intra-uterine life



The vestibular lamina (A) & dental lamina (B) seen at the 7th week of intra-uterine life



Developing dental lamina

The 1st histological sign of tooth development is the appearance of mesenchymal tissue & capillary networks beneath the dental epithelium of the primitive oral cavity.

Arvin Shahbazi D.M.D, Ph.D fellow

Development of the teeth

BUD STAGE

The enamel organ (A) in the bud stage appears as a simple, spherical / ovoid, epithelial condensation that is poorly morphodifferentiated & histodifferentiated.

It is surrounded by mesenchyme (B).

The cells of the tooth bud have a higher RNA content than those of the *overlying oral epithelium*, a lower glycogen content and increased oxidative enzyme activity.

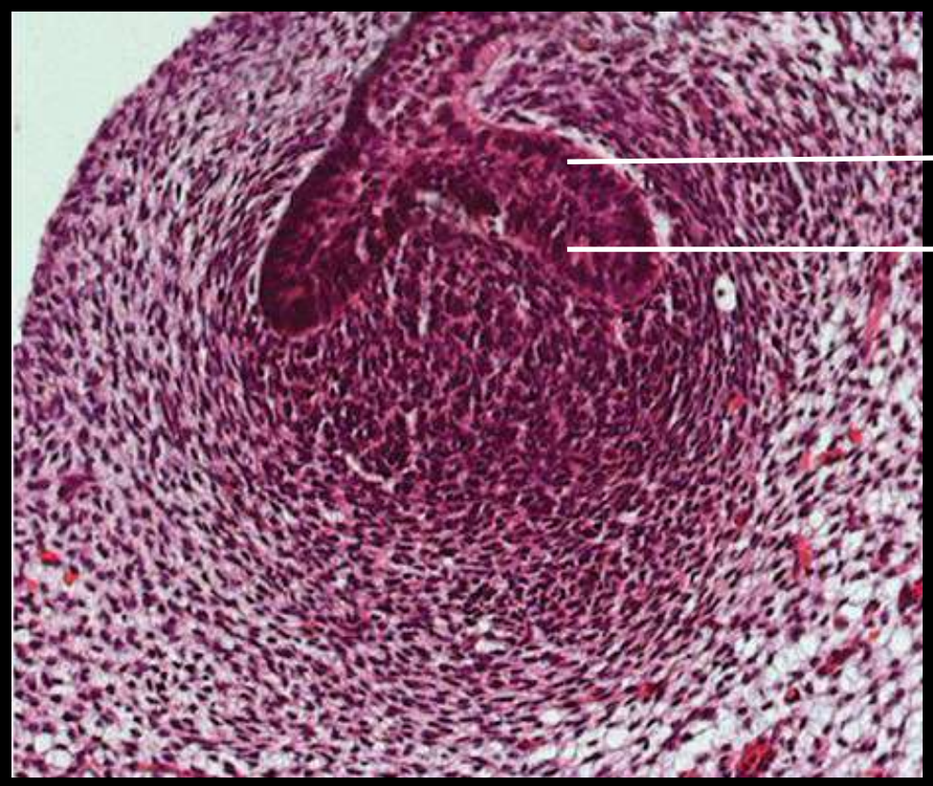
Development of teeth

CAP STAGE (early stage)

By the 11th week, morphogenesis has progressed.

Enamel organ invaginate to form a cap-shaped structure.

A greater distinction develops between the more rounded cells in the central portion of the enamel organ and the peripheral cells, which are becoming arranged to form the external & internal enamel epithelia.



Development of teeth

CAP STAGE (late stage)

About 12th week, the central cells of the enlarging enamel organ have become separated (although maintaining contact by desmosomes),

The intercellular spaces containing significant amount of glycosaminoglycans.

The resulting tissue is termed the stellate reticulum, although it is not fully developed until the later bell stage.

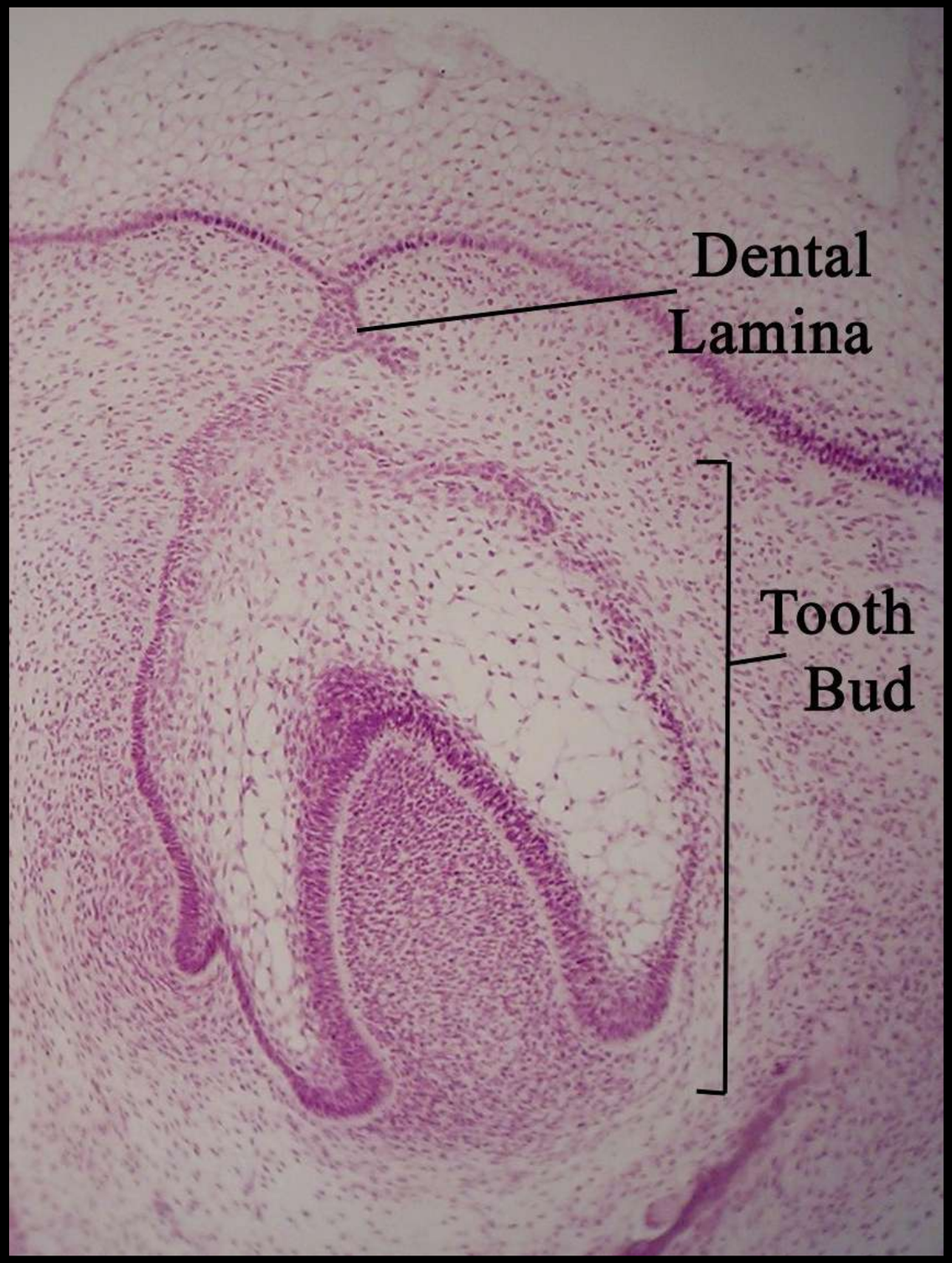
The cells of the external enamel epithelium remain cuboidal, whereas those of the internal enamel epithelium become more columnar.

RNA content and hydrolytic and oxidative enzyme activity increase, while the adjacent mesenchymal cells continue to proliferate and surround the enamel organ.

The part of the mesenchyme lying beneath the internal enamel epithelium is termed the dental papilla, while that surrounding the tooth germ forms the dental follicle.

Development of teeth

A = stellate reticulum
B = external enamel epithelium
C = internal enamel epithelium
D = dental papilla
E = dental follicle



Development of tooth

EARLY BELL STAGE

By the 14th week, further morphodifferentiation and histodifferentiation of the tooth germ.

Internal enamel epithelium broadly maps out the occlusal pattern of the crown of the tooth.

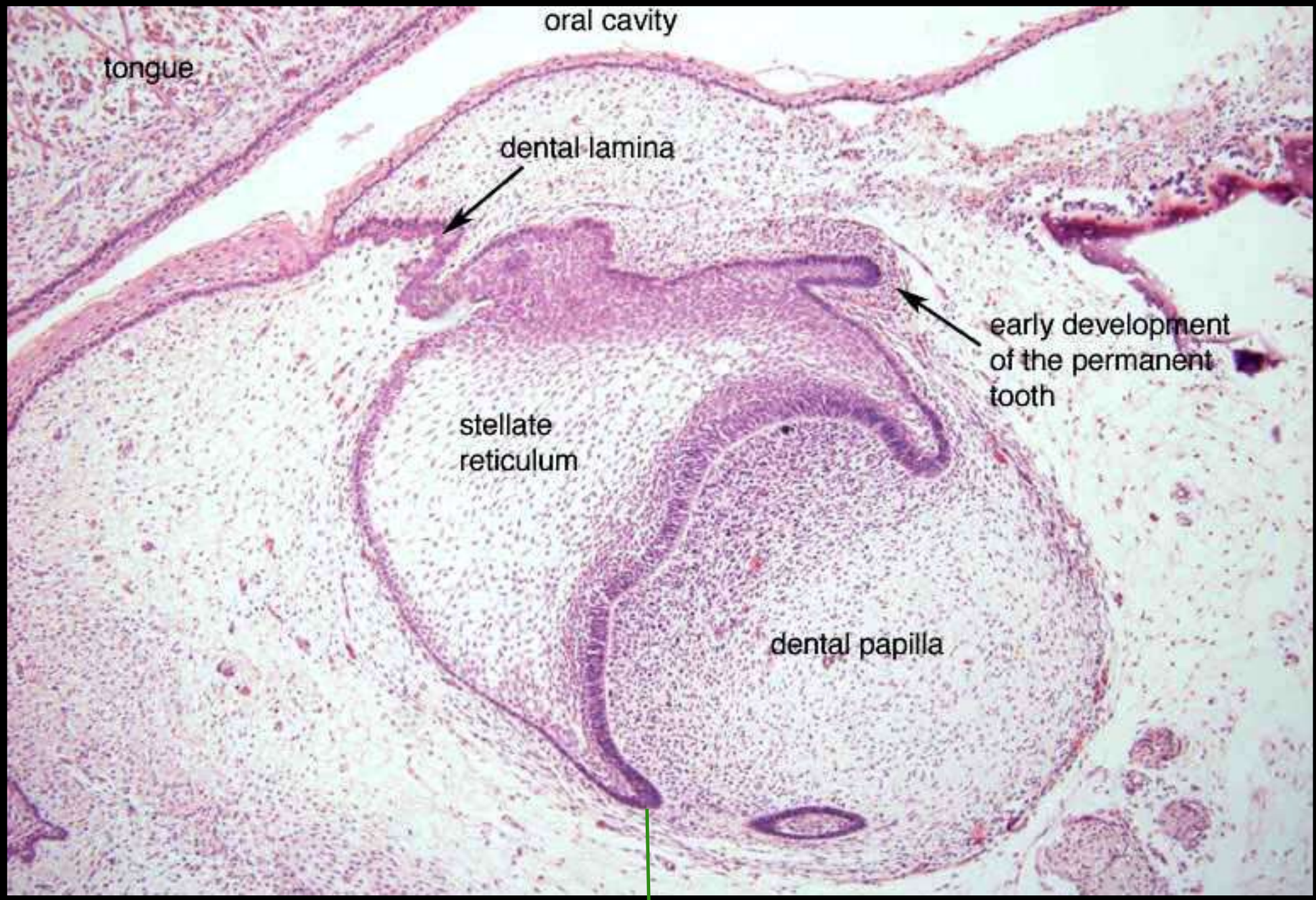
The mapping is related to differential mitosis along the internal enamel epithelium.

The future cusps & incisal margins are sites of cell maturation associated with cessation of mitosis, but areas corresponding to the fissures & margins of the tooth remain mitotically active. Thus, cusp height is related more to continued downward growth at the margin and fissures than to upward extension of the cusps.

During the bell stage, any bone resorption defects that restrict the space for development of the tooth germ leads to changes in tooth shape. Consequently, spatial impediment, and the changing mechanical forces that ensue, may be a co-factor in dental morphogenesis.

The enamel organ shows 4 distinct layers:

External enamel epithelium, stellate reticulum, stratum intermedium and internal enamel epithelium



A high degree of *histodifferentiation* is achieved in the early bell stage.

A = external enamel epithelium

B = cervical loop

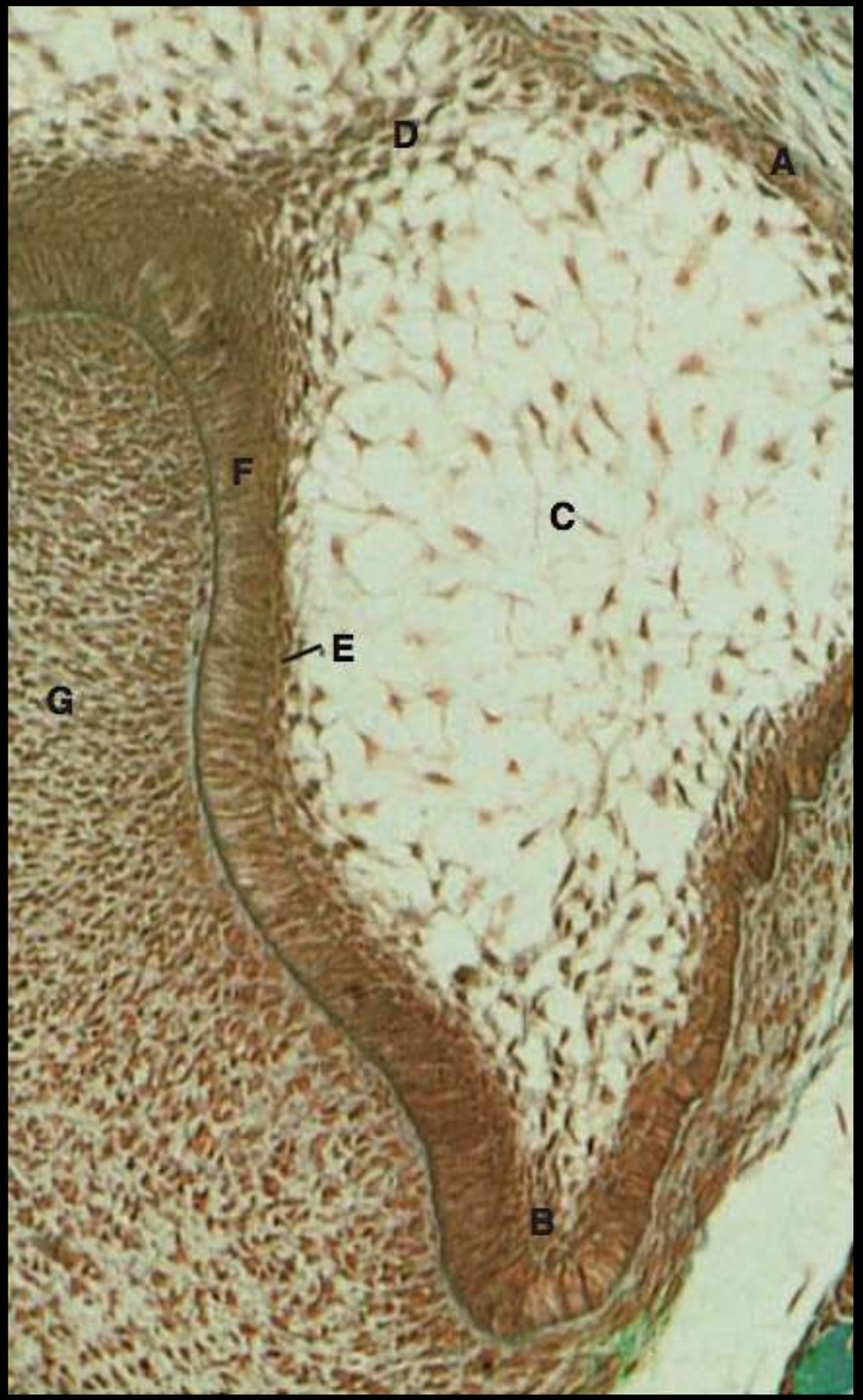
C = stellate reticulum

D = enamel cord

E = stratum intermedium

F = internal enamel epithelium

G = dental papilla



Development of teeth

EXTERNAL ENAMEL EPITHELIUM

The outer layer of cuboidal cells that limits the enamel organ.

It is separated from the surrounding mesenchymal tissue by a basement membrane 1–2 µm thick, connected to the basal lamina with associated hemi- desmosomes.

The external enamel epithelial cells contain large, centrally placed nuclei.

They contain relatively small amounts of the intracellular organelles associated with protein synthesis (endoplasmic reticulum, Golgi material, mitochondria).

The external enamel epithelium contact each other via desmosomes and gap junctions.

It is involved in the maintenance of the shape of the enamel organ and in the exchange of substances between the enamel organ and the environment.

The cervical loop, at which there is considerable mitotic activity, lies at the growing margin of the enamel organ where the external enamel epithelium is continuous with the internal enamel epithelium.

Development of teeth

STELLATE RETICULUM

This tissue is most fully developed at the bell stage.

The intercellular spaces become filled with fluid,

Contains high concentration of glycosaminoglycans. The cells also contain alkaline phosphatase but have only small amounts of RNA and glycogen.

The cells are star-shaped with bodies containing nuclei and many branching processes.

The mesenchyme-like features of the stellate reticulum include the synthesis of collagens in the tissue. Collagens types I, II and III are expressed in the cells of the stellate reticulum,

The cells of this layer possess little endoplasmic reticulum and few mitochondria. However, there is a relatively well developed Golgi complex, which, together with the presence of microvilli on the cell surface, has been interpreted as indicating that the cells contribute to the secretion of the extracellular material.

Desmosomes and gap junctions are present between the cells.

The main function is the protection of the underlying dental tissues against physical disturbance and to the maintenance of tooth shape.

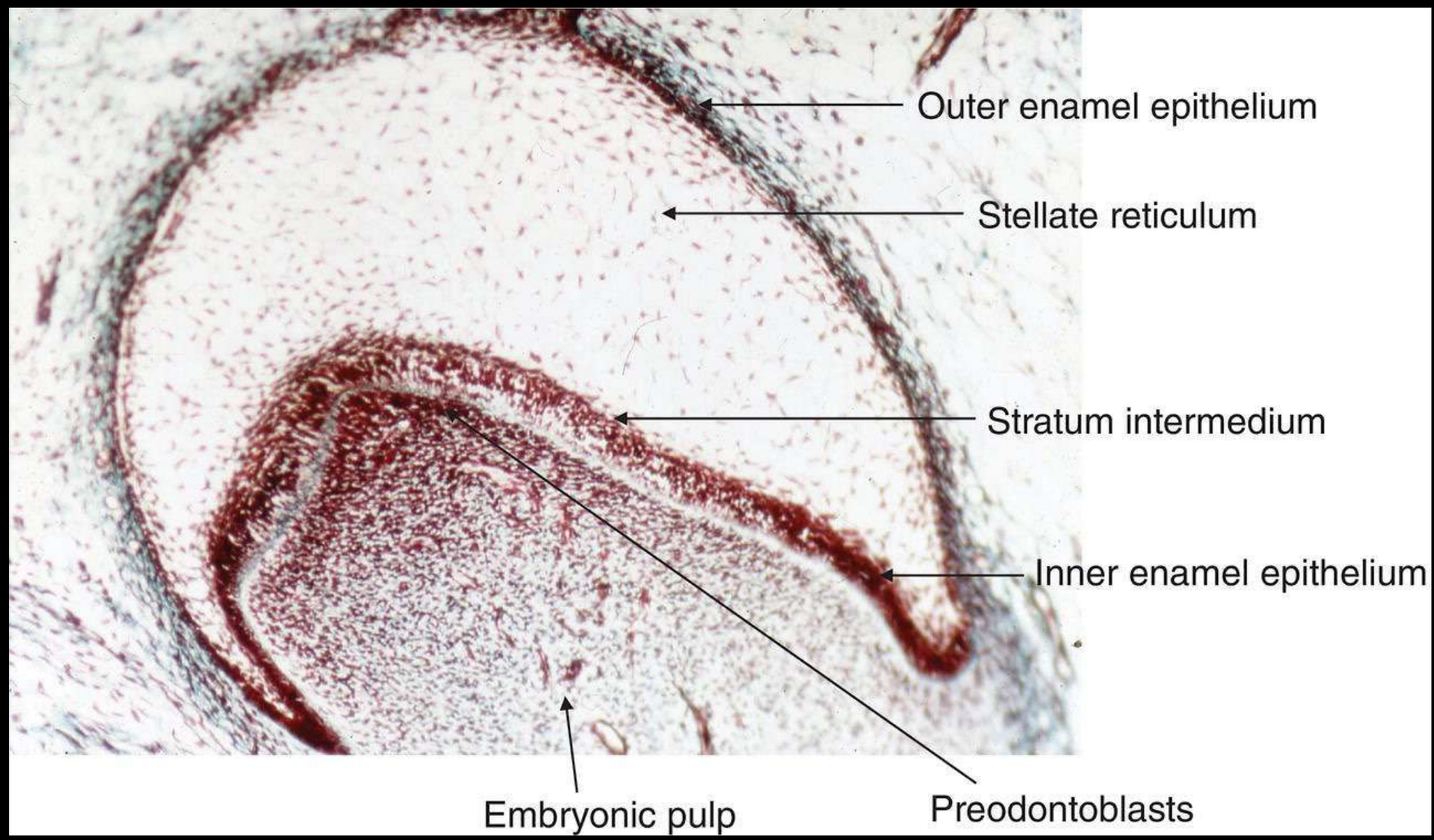
Arvin Shahbazi D.M.D, Ph.D fellow

Development of teeth

The stellate reticulum produces:

Macrophage colony-stimulating factor (MCSF)
Transforming growth factor (TGF)β1
Parathyroid hormone-related protein (PTHrP)

These molecules can be released into the dental follicle and help recruit, and activate, the osteoclasts necessary to resorb the adjacent alveolar bone as the developing tooth enlarges and erupts.

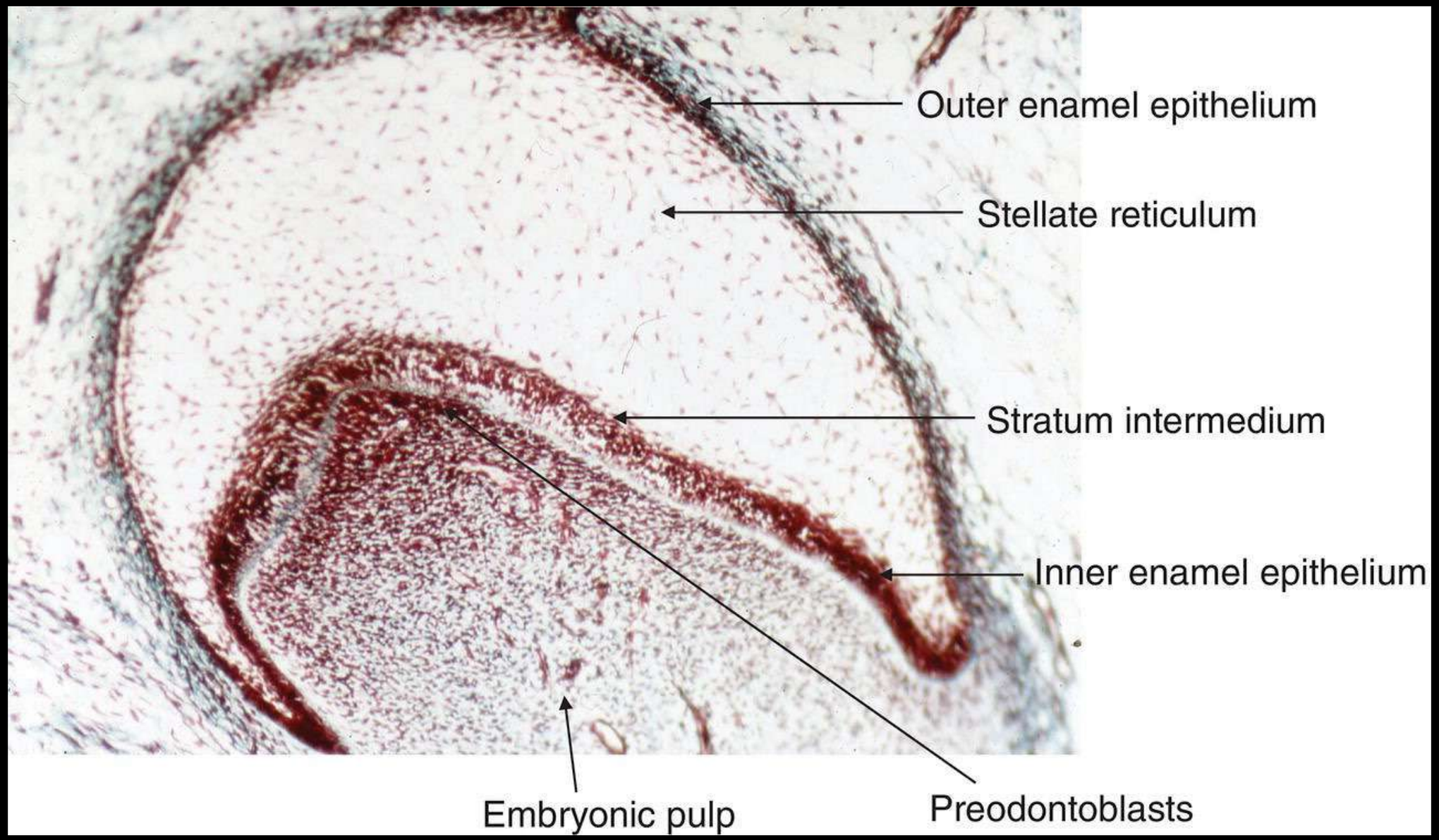


Development of teeth

STRATUM INTERMEDIUM

First appears at the bell stage and consists of two or three layers of flattened cells lying over the internal enamel epithelium.

The cells of the stratum intermedium resemble the cells of the stellate reticulum, although their intercellular spaces are smaller and the cells contain much alkaline phosphatase. I



Development of teeth

INTERNAL ENAMEL EPITHELIUM

Columnar cells are present at the bell stage.

The cells become elongated.

The internal enamel epithelial cells are rich in RNA but, unlike the stratum intermedium and stellate reticulum, *do not contain alkaline phosphatase*.

Desmosomes connect the internal enamel epithelial cells and link this layer to the *stratum intermedium*.

The internal enamel epithelium is separated from the peripheral cells of the dental papilla by a basement membrane and a cell-free zone 1–2 µm wide.

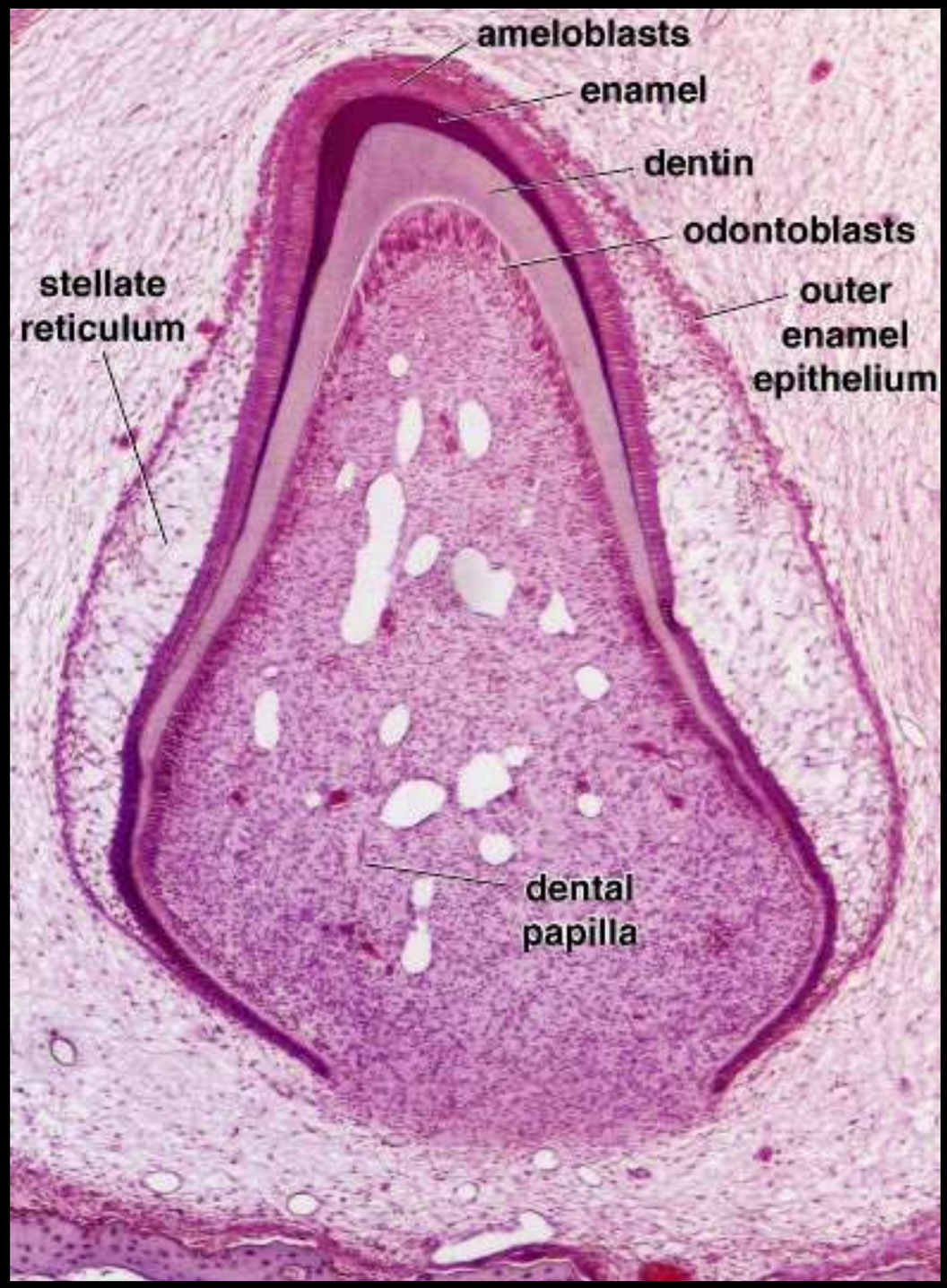
The differentiation of the dental papilla is less striking than that of the enamel organ. Until the late bell stage, the dental papilla consists of closely packed mesenchymal cells with only a few delicate extracellular fibrils. Histochemically, the dental papilla becomes rich in glycosaminoglycans.

Development of teeth

LATE BELL STAGE

The late bell stage (appositional stage) of tooth development is associated with the <u>formation of the dental hard tissues</u>, commencing at about the 18th week.

<u>Dentine formation always precedes enamel formation!</u>



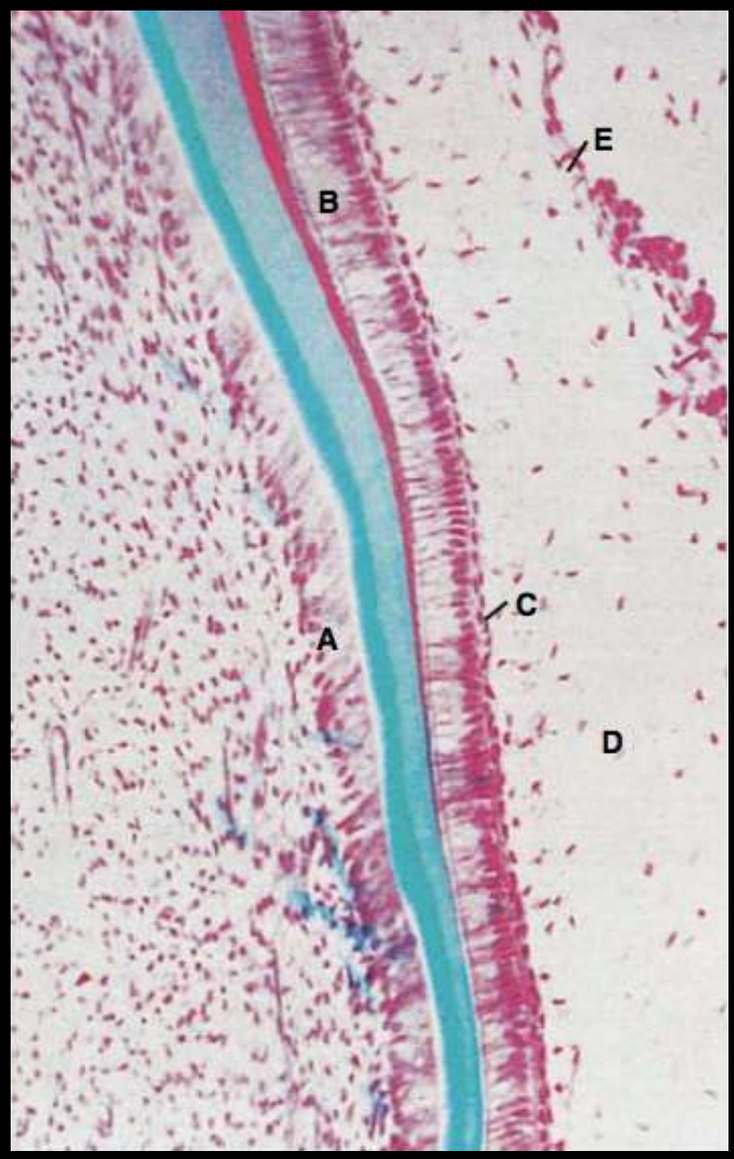
Development of teeth

The picture presents a tooth germ at the late bell stage.

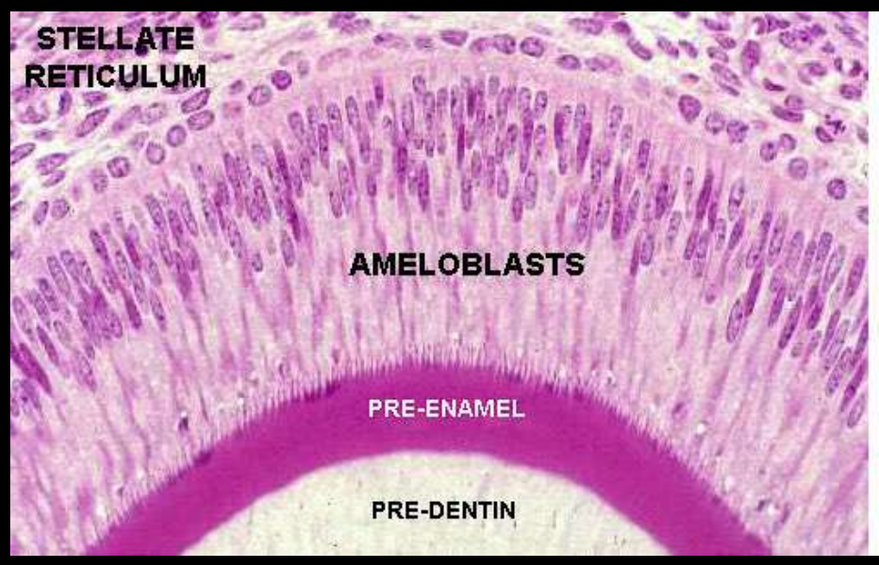
It shows enamel & dentine formation commencing at the tips of future cusps (or incisal edges). Under the inductive influence of developing ameloblasts (pre-ameloblasts), the adjacent mesenchymal cells of the dental papilla become columnar and differentiate into odontoblasts.

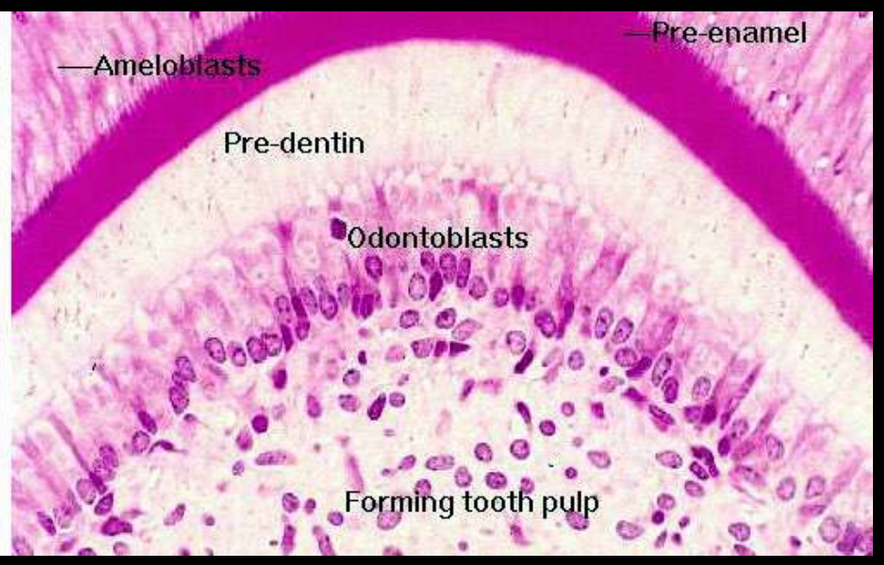
The odontoblasts, become involved in the formation of predentine and dentine.

The presence of dentine then induces the ameloblasts to secrete enamel.



A = odontoblasts
B = ameloblasts
C = stratum intermedium
D = stellate reticulum
E = external enamel epithelium



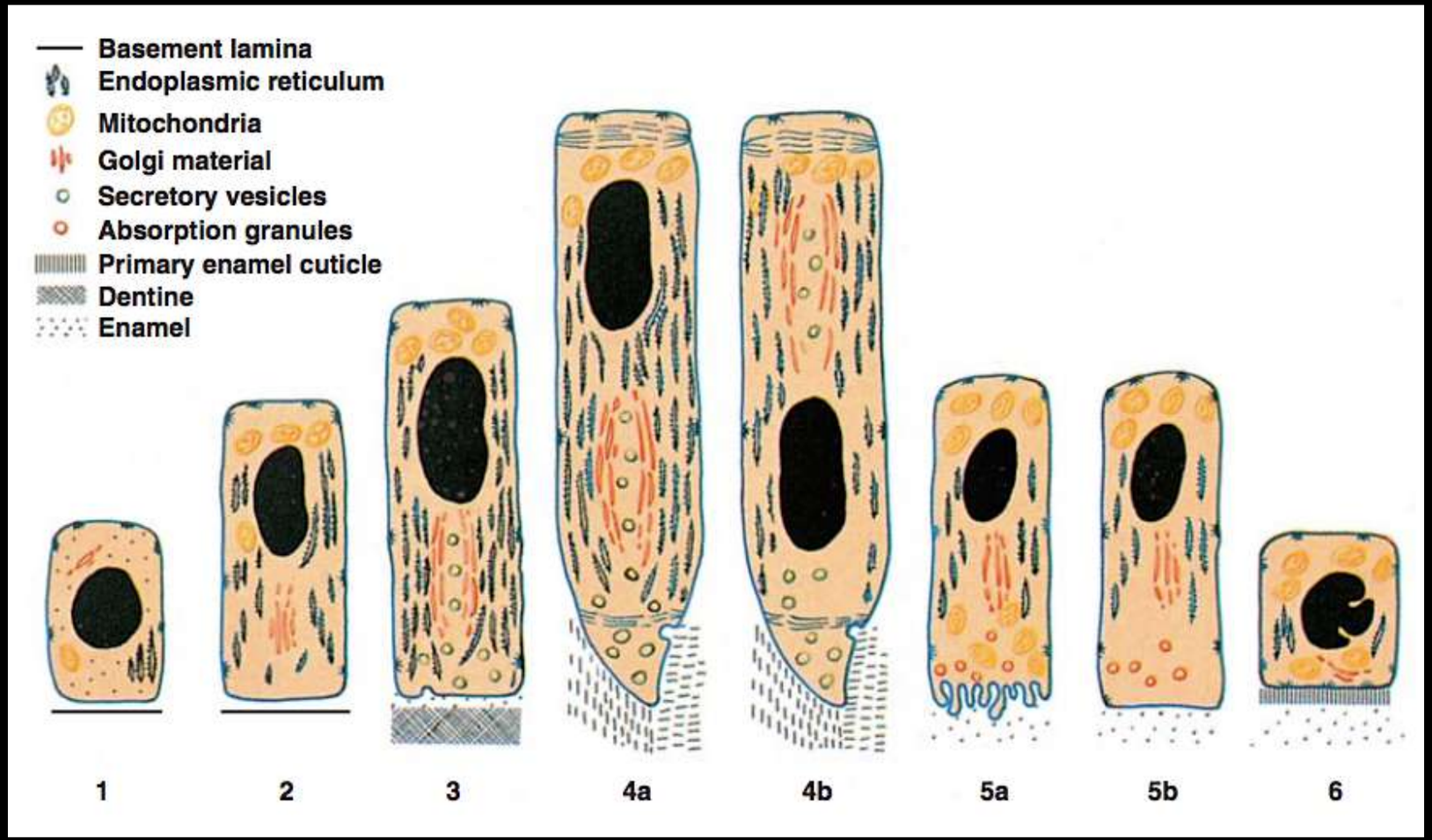


Arvin Shahbazi D.M.D, Ph.D fellow

Amelogenesis

Features associated with the five main stages of amelogenesis

Presecretory	Secretory	Transition	Maturation	Postmaturation
Cytodifferentiation: differentiation of ameloblasts	Initial layer of aprismatic enamel formed	Ameloblasts shorten, 50% die	Cycling of ruffled and smooth-ended ameloblasts	Enamel organ degenerates
Morphodifferentiation: bell stage including formation of the enamel knot	Ameloblasts develop Tomes processes	Vascular invagination of the enamel organ	Final degradation and withdrawal of matrix	Enamel coverings established
Resorption of the basal lamina of the internal enamel epithelium	Matrix secretion to final thickness	Re-formation of ameloblast basal lamina	Crystal growth continues to completion	Eruption
Epithelial–mesenchymal interactions	Initiation and continuation of mineralization to 30% by weight Crystallite elongation Matrix degradation Development of prismatic structure	Cessation of matrix secretion Continued matrix degradation Selective matrix withdrawal	Final third of mineralization after protein removal complete	Exposure to oral environment and posteruptive changes



Development of teeth

ENAMEL KNOT

A localized mass of cells in the centre of the internal enamel epithelium.

It forms a bulge into the dental papilla, at the centre of the enamel organ.

The enamel knot soon disappears and seems to contribute cells to the enamel cord.

The enamel knots are non-proliferative and produce molecules associated with signaling:

bone morphogenetic proteins (BMP-2 and BMP-7)
fibroblast growth factor
p21 (cyclin-dependent kinase inhibitor)
Shh (sonic hedgehog)
transcription factors (Msx1)

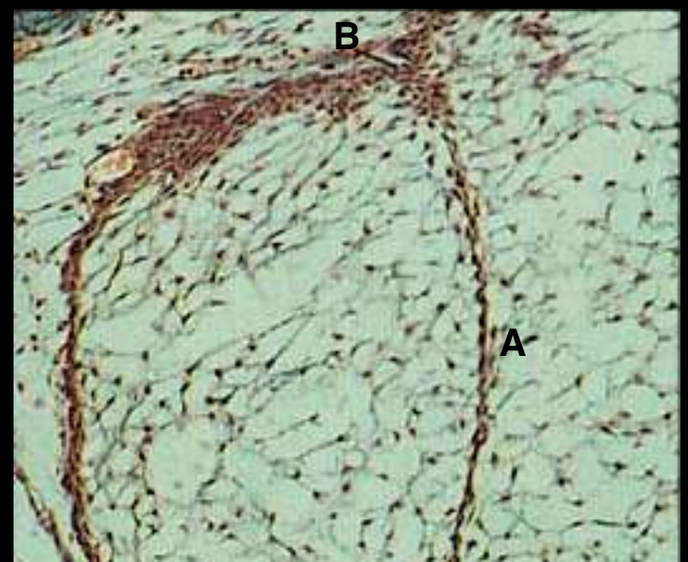
The disappearance of the enamel knot by the bell stage may be associated with apoptosis.

Arvin Shahbazi D.M.D, Ph.D fellow

Development of teeth

ENAMEL CORD

The enamel cord (A) is a strand of cells seen at the *early bell stage* that extends from the stratum intermedium into the stellate reticulum.



The enamel cord overlies the incisal margin of a tooth or the apex of the first cusp to develop (primary cusp).

When it completely divides the stellate reticulum into 2 parts, reaching the external enamel epithelium, it is termed the enamel septum.

Where the enamel cord meets the external enamel epithelium, a small invagination termed the enamel navel (B) can be seen.

The cells of the enamel cord are distinguished from their surrounding stellate reticulum cells by their elongated nuclei.

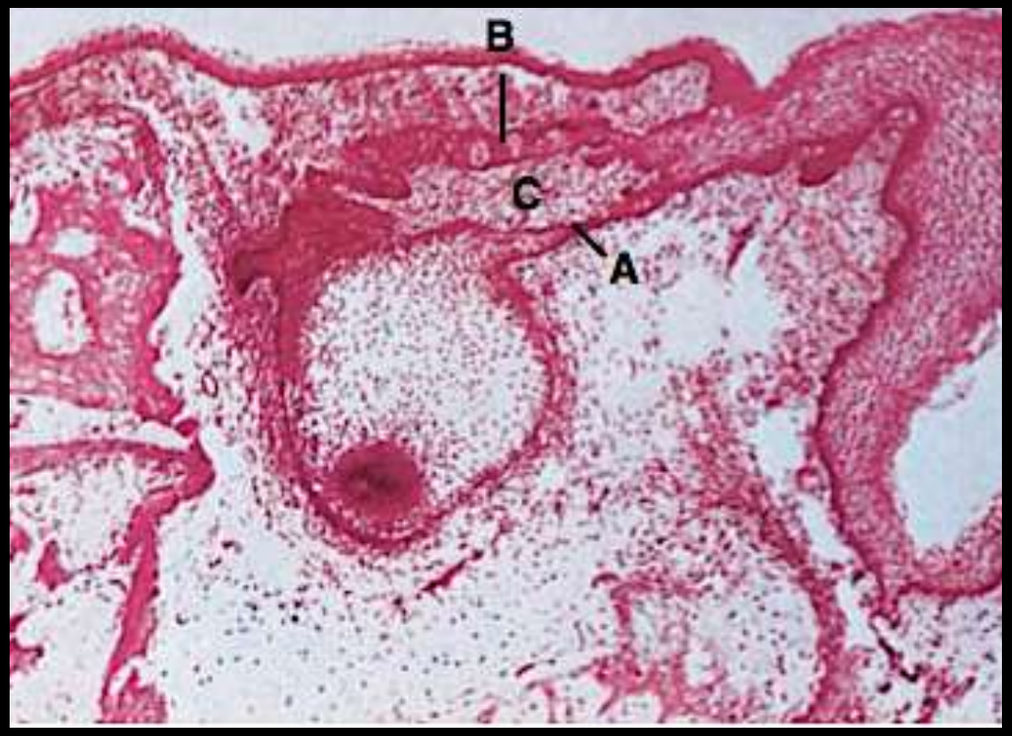
Development of teeth

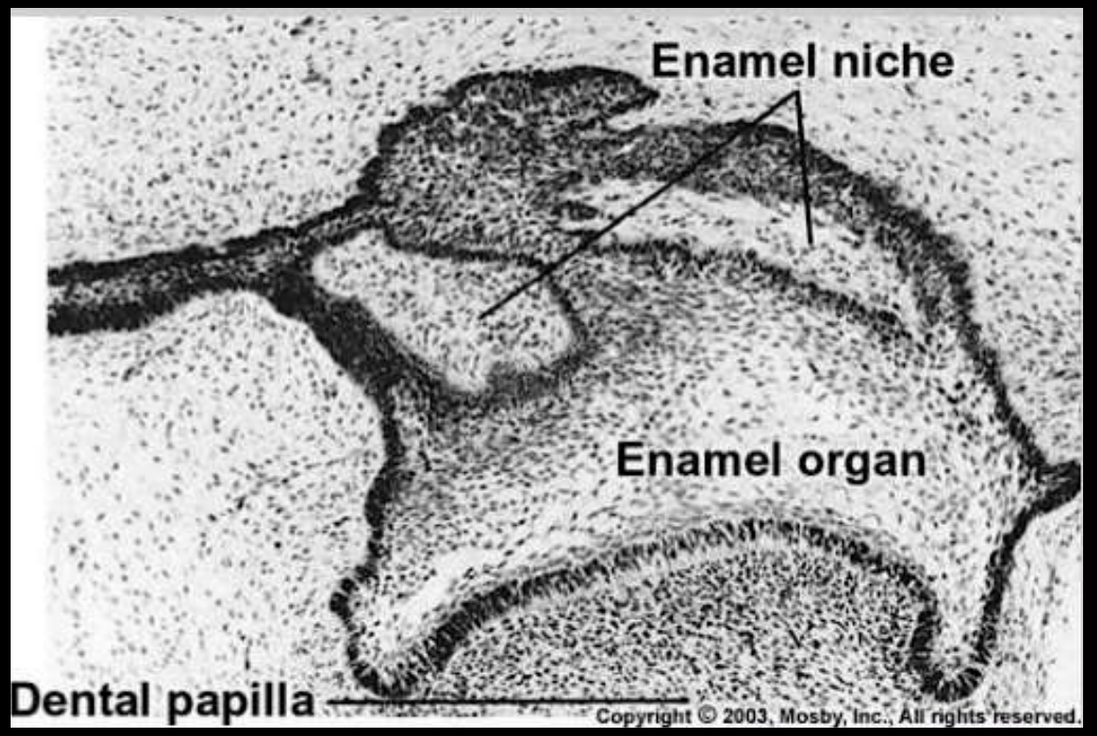
ENAMEL NICHE

where the tooth germ appears to have a double lateral (A) and medial (B) enamel strands attachment to the dental lamina.

These strands enclose the enamel niche (C), which appears as a funnel-shaped depression containing connective tissue.

The functional significance of the enamel niche is unknown!





Teeth malformation

Anodontia (anodontia vera):

Rare genetic disorder!
Congenital absence of all primary or permanent teeth
It is divided into 2 groups:
1) complete absence of teeth
2) only some absence of teeth.

Anodontia is usually part of a syndrome and seldom occurs as an isolated entity.

There is usually no exact cause for anodontia.

Oligodontia:

Absence of more then 6 teeth

Ectodermal dysplasia:

Occurs due to abnormalities of the ectoderm

Results in congenitally absent teeth or peg-shaped or pointed

Teeth malformation

Dens invaginatus (dens in dente) — (“tooth within a tooth”):

There is an infolding of enamel into dentine. Resulting from an infolding of the dental papilla during tooth development or invagination of all layers of the enamel organ in dental papillae.

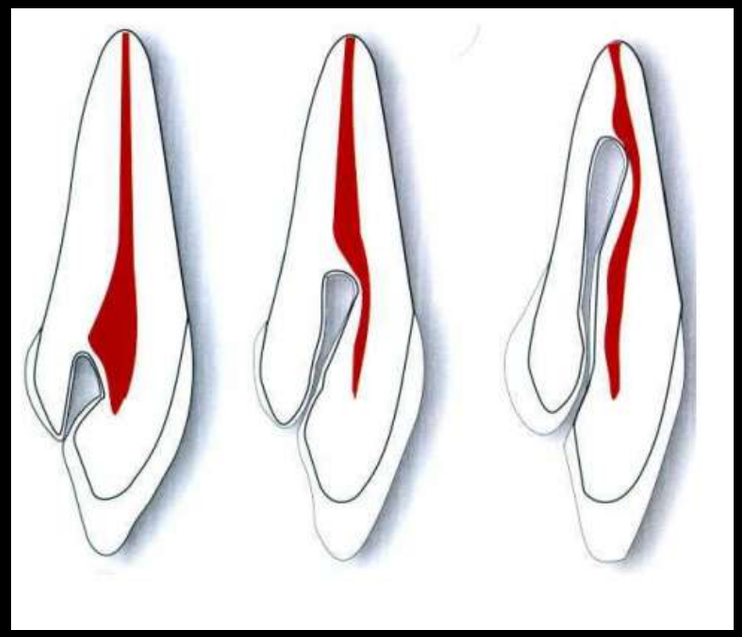
Affecting more males than females.

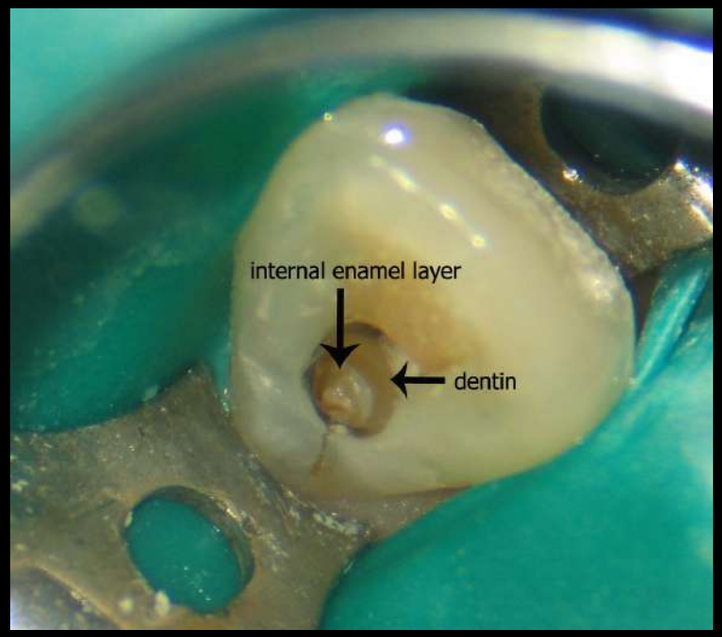
The condition is presented in 2 forms: coronal and radicular.

Teeth most affected are:

Maxillary lateral incisors (80%)

Maxillary canines (20%)



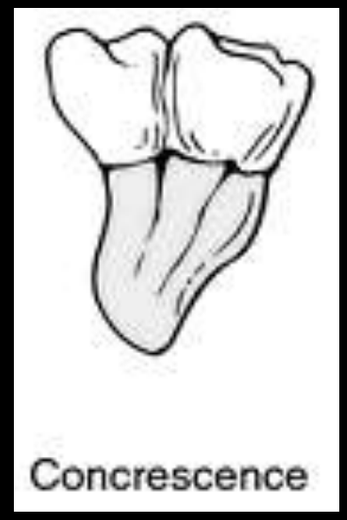


Teeth malformation

Concrescence:

The cementum overlying the roots of at least two teeth join together.

The most commonly involved teeth are upper second and third molars

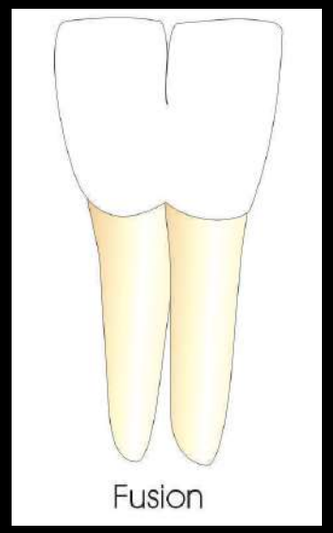


Tooth Fusion:

When 2 tooth buds fuse together to make one large wide crown.

The fused tooth will have two independent pulp chambers and root canals.

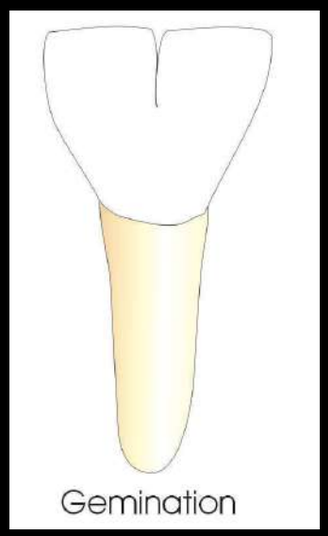
The fusion will start at the top of the crown and travel possibly to the apex of the root.



Tooth Gemination:

When one tooth bud tries to divide into two teeth.

On the radiograph, the geminated tooth will have one pulp canal but two pulp chambers.

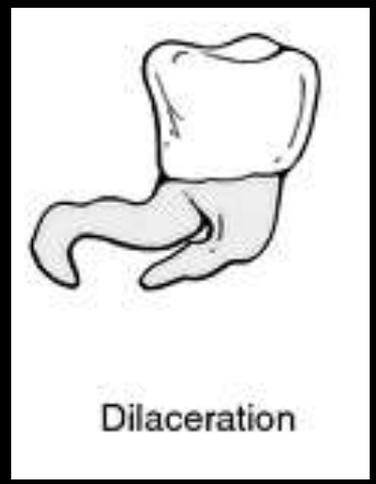


Teeth malformation

Dilaceration:

A developmental disturbance that refers to an angulation (sharp bend or curve) in the root or crown of a formed tooth.

The condition is thought to be due to trauma or possibly a delay in tooth eruption relative to bone remodeling

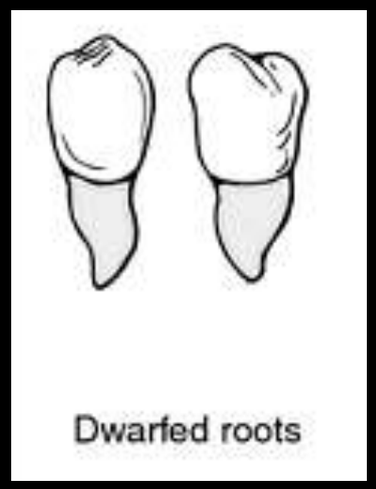


Hypercementosis:

Excessive formation of cementum (calcified tissue) on the roots of one or more teeth which mainly occurs at the apex or apices of the tooth.

Dwarf roots:

Abnormally small sized crwon/root.



Teeth malformation

Amelogenesis imperfecta:

Due to the malfunction of the proteins in the enamel (ameloblastin, enamelin, tuftelin and amelogenin) as a result of abnormal enamel formation via amelogenesis.

Abnormal color: yellow, brown or grey.

The teeth have a lower risk for dental carries and are hypersensitive.

Dentinogenesis imperfecta:

A type of dentin dysplasia that causes teeth to be discolored (most often a blue-gray or yellow-brown color) and translucent.

***Autosomal dominant* pattern,**

Mutation in dentine sialophosphoprotein gene (DSPP).


ED II/2
2018.05 .14


ED II/4
08/05/2017


EM II/14
2018.05.15


EM II/16
May 12, 2016


2017/10/01
EDI/4

Thank you


ED II/4
May 11, 2015


2018/12/10
EDI/5