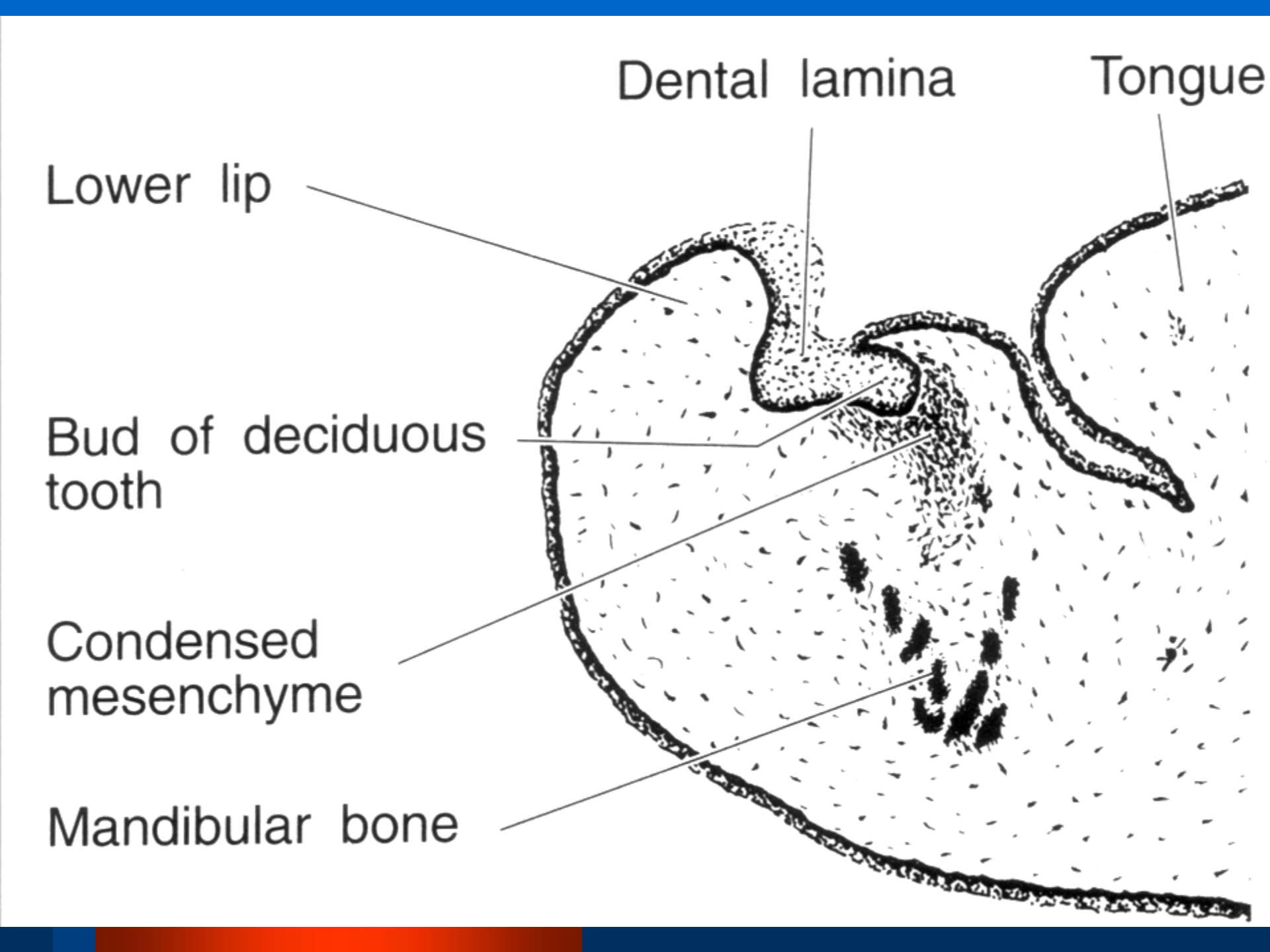
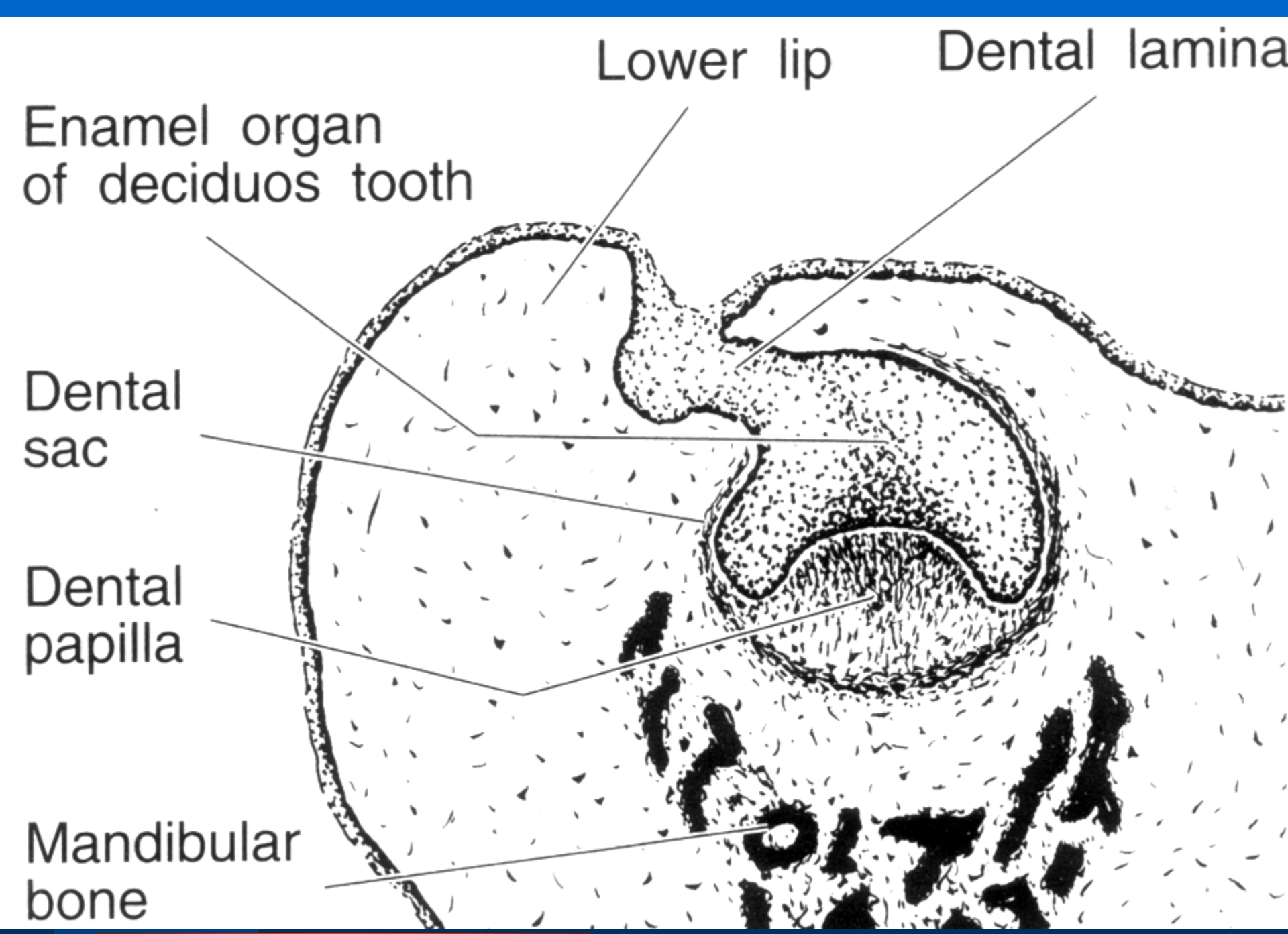
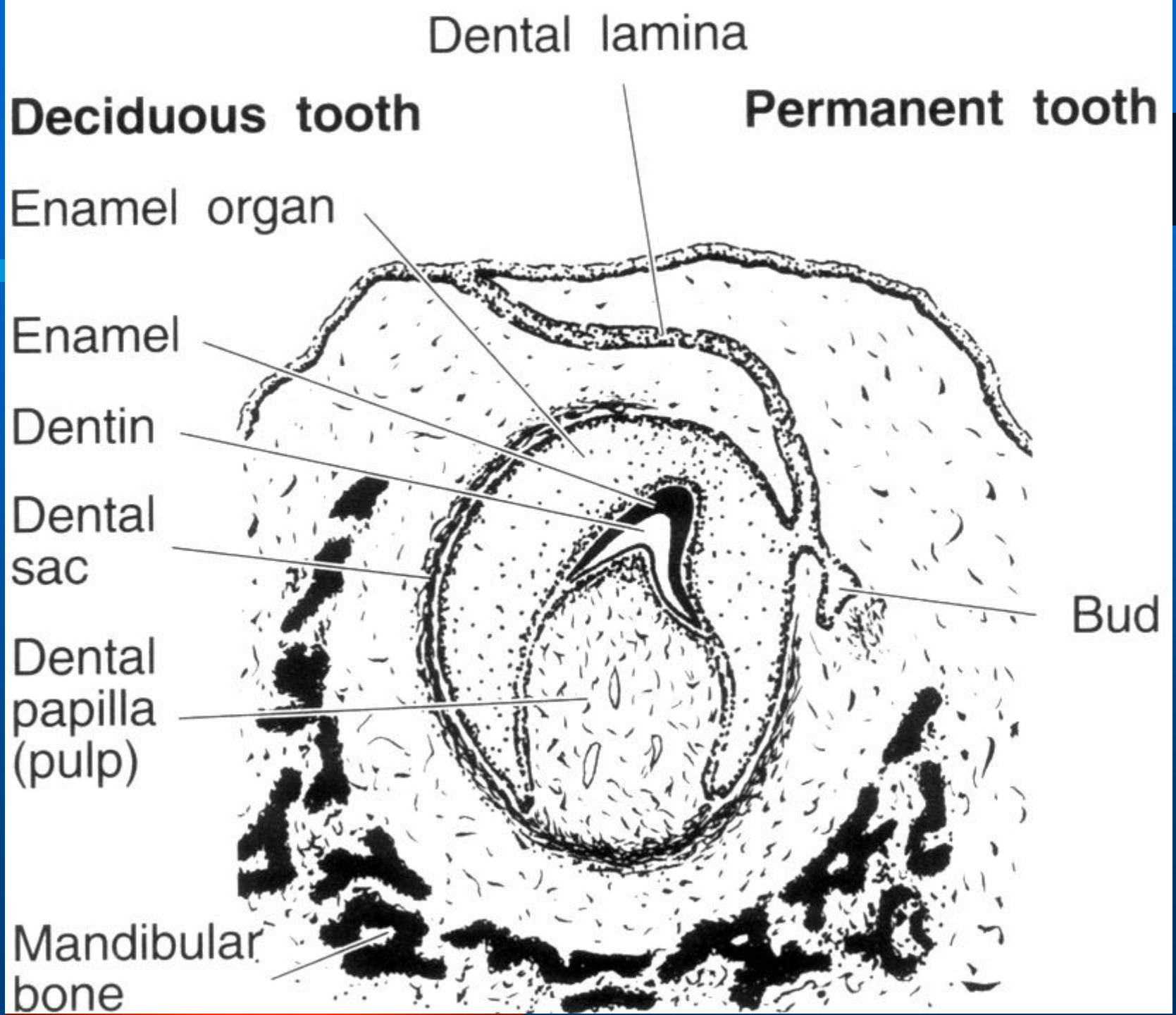
Pediatric dentistry II

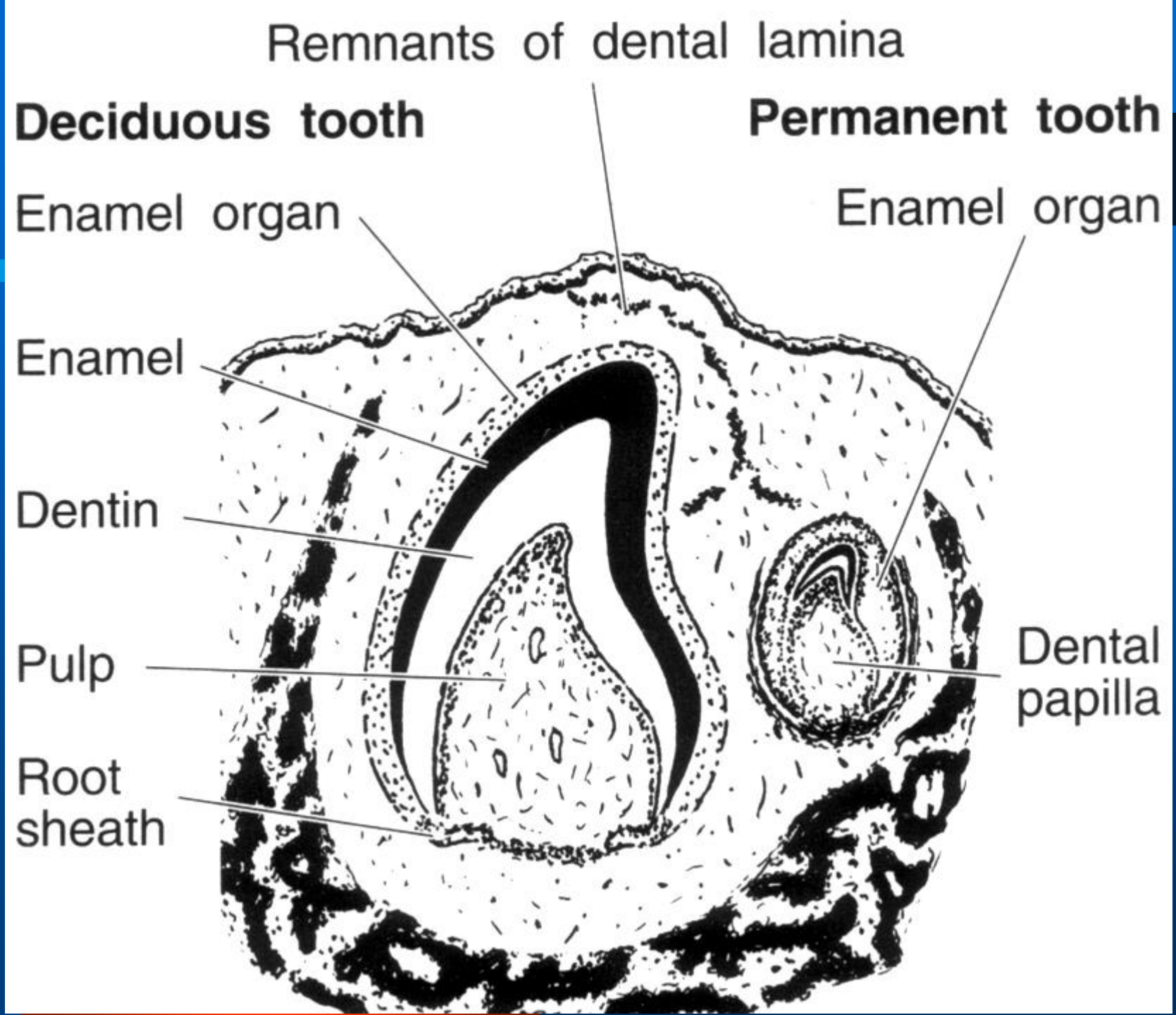
Tooth development

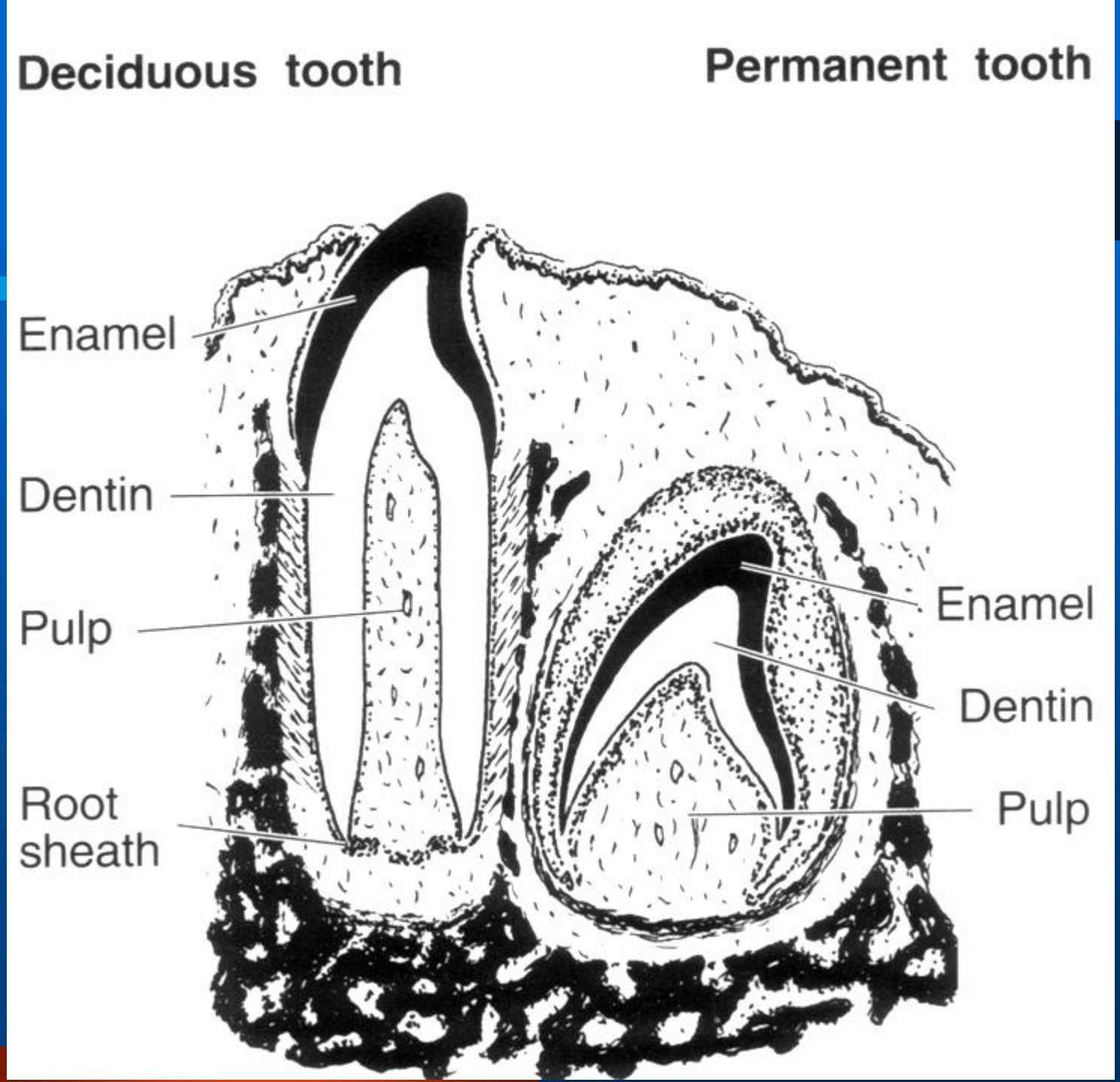
Defects of teeth

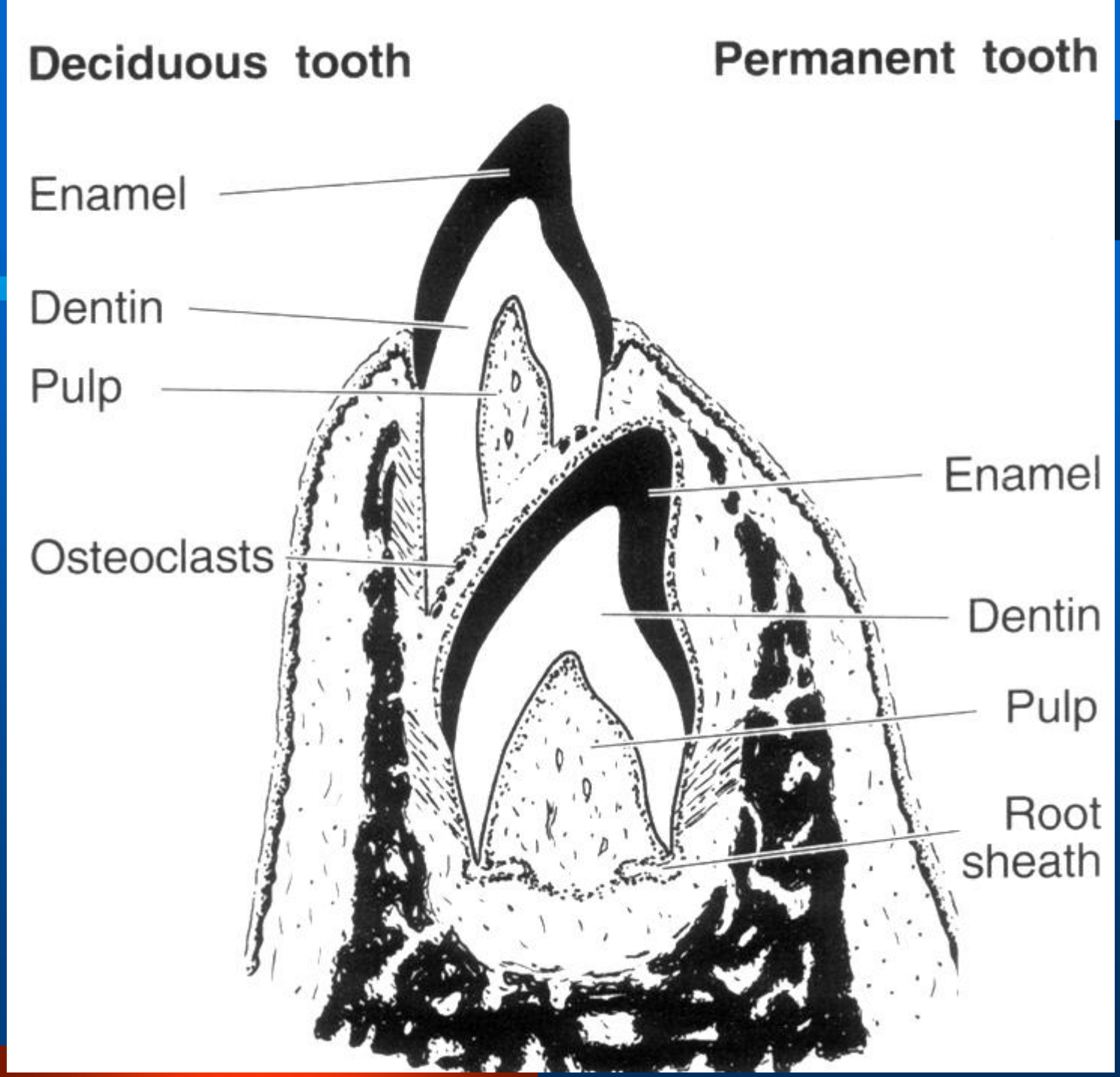

Dental lamina
Tongue
Lower lip
Bud of deciduous tooth
Condensed mesenchyme
Mandibular bone

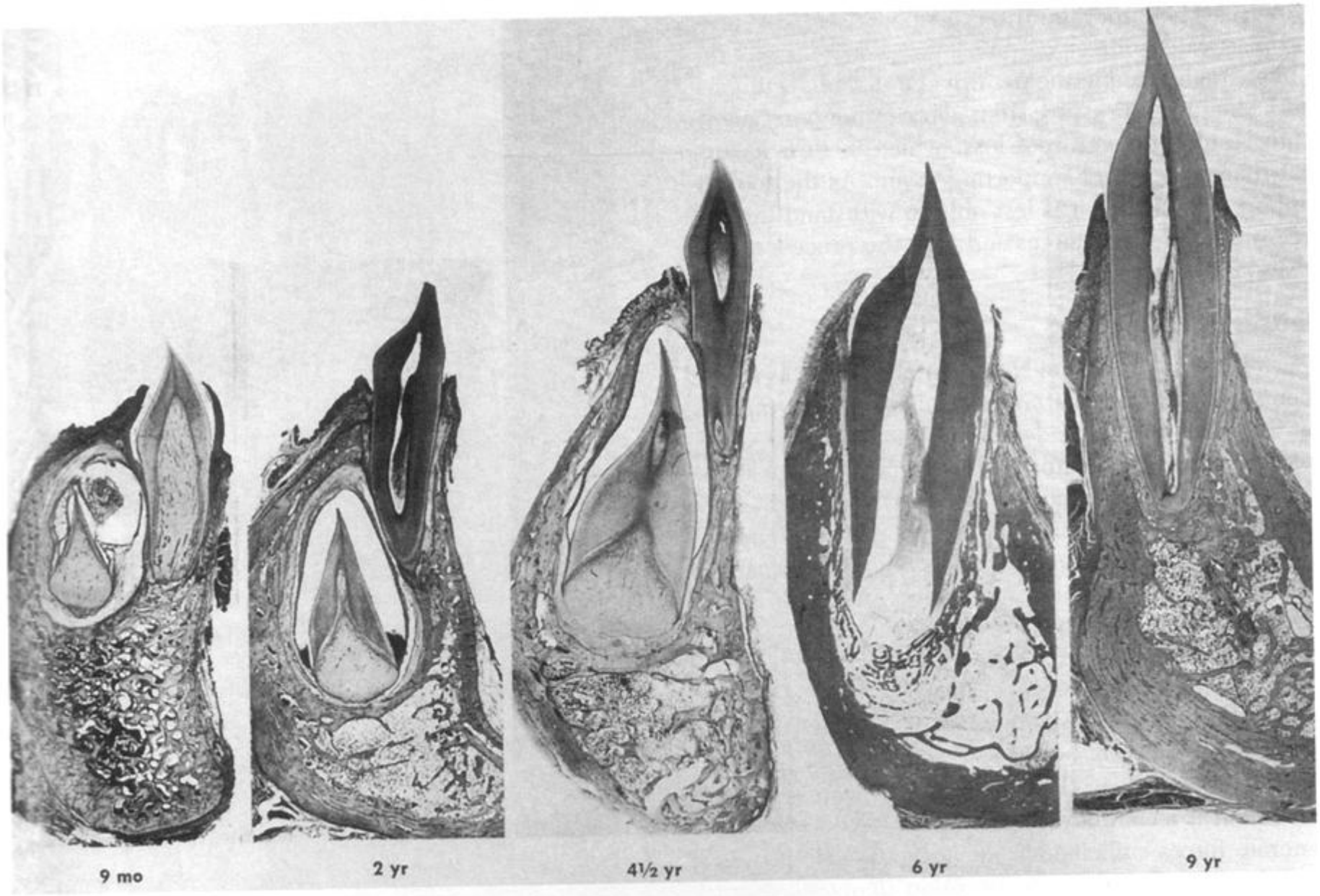

Lower lip
Dental lamina
Enamel organ of deciduos tooth
Dental sac
Dental papilla
Mandibular bone

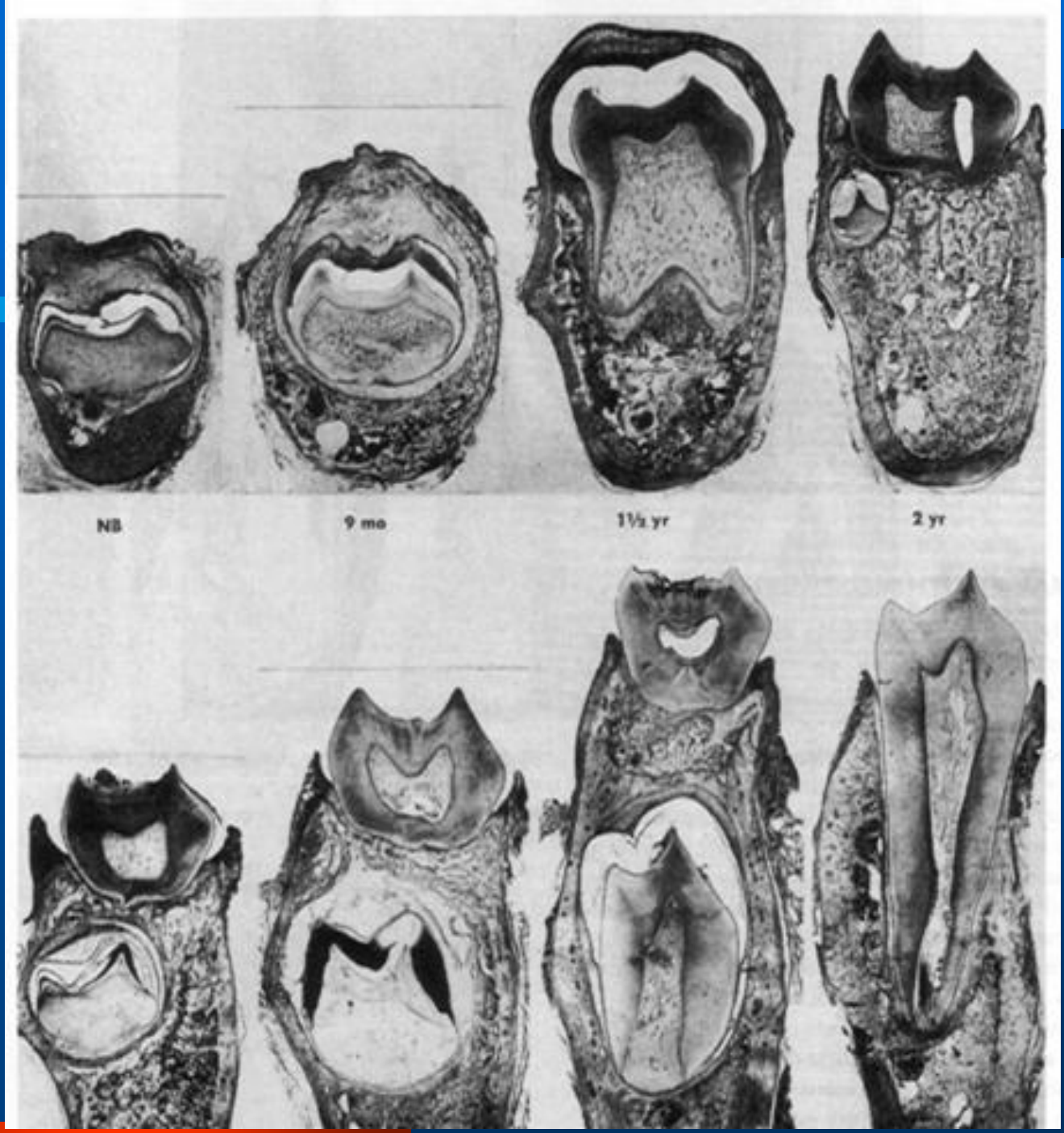

Dental lamina
Deciduous tooth
Permanent tooth
Enamel organ
Enamel
Dentin
Dental sac
Dental papilla (pulp)
Bud
Mandibular bone

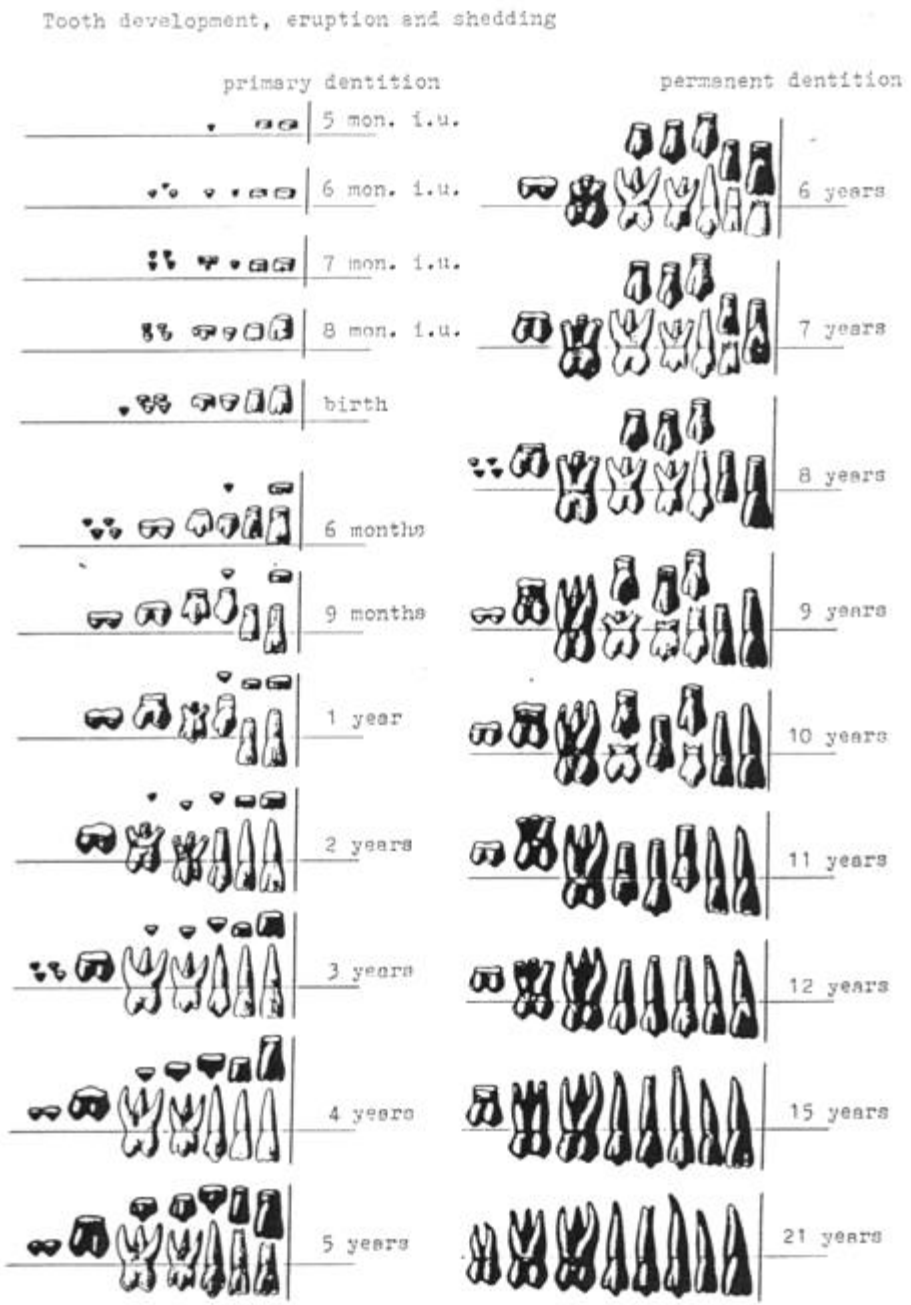

Remnants of dental lamina
Deciduous tooth
Permanent tooth
Enamel organ
Enamel organ
Enamel
Dentin
Pulp
Root sheath
Dental papilla


Deciduous tooth
Permanent tooth
Enamel
Dentin
Pulp
Root sheath
Enamel
Dentin
Pulp


Deciduous tooth
Permanent tooth
Enamel
Dentin
Pulp
Osteoclasts
Enamel
Dentin
Pulp
Root sheath


9 mo
2 yr
4½ yr
6 yr
9 yr


NB
9 mo
1½ yr
2 yr



Tooth development, eruption and shedding

Defects of tooth development

1. Enamel defects
2. Dentin defects
3. Defects - both enamel and dentin
4. Cement defects
5. Defects - both dentin and cement
6. Defects of tooth form, size, and number

Defects of enamel formation

A. **Environmental determinants**
   1. **Developmental**
   2. **Traumatic**
   3. **Inflammatory and infectious**
   4. **Chemical and metabolic**

B. **Hereditary determinants**
   1. **Primary defects in enamel in amelogenesis**
   2. **Defect in enamel accompanied by generalized condition**

3 basic manifestations

1. **Hypoplasia – reduction of enamel thickness (whole, partly)**
2. **Hypocalcification – lack of initial calcification of enamel, or unsatisfactory calcification**
3. **Hypomaturation – lack of secondary mineralization or maturation**

A- Environmental defects of enamel

1. Developmental defects
   natal, neonatal lines. Extent – microscopic - hypoplasia. Only in primary dentition (development of permanent starts later)
   Cause – pretermed birth, immaturity, Diabetes mellitus in mother, heart diseases, and other systemic diseases
2. Traumatic defects of enamel
   A. physiologic attrition – consequence of natural tooth contacts
   B. pathologic attrition – intensification - bruxism, use of teeth as tools
      Exposure of the dental pulp – rarely (secondary dentin formation)
   C. abrasion – pathologic loss of enamel (and dentin) as the consequence of physical forcel other than that of occlusion (mastication). Wedge defects,plaing woodwings instruments, tooth brushing, pipe smoking
   D. mutilation – ritual abrasion (Afrika, Eskimosi)
   E. ionizing radiation
   F. physical trauma – fractures, surgical repair of clefts etc.

A – Environmental defects

3. Inflammatory and infectious
   A. Turner tooth – damage of permanent bud by chronic inflammation in primary tooth periodontium!!!
   B. Enamel hypoplasia as a result of fever, direct effecton odontogenic epithelim – rubeola virus
   C. congenital syphilis – Hutchinson´s teeth, mulberry molars

A - Environmental defects

4. Chemical and metabolic influences
   - A. fluorosis
   - B. tetracyclines
   - C. chemical colourings –metallic, non-metallic, copper, lead, iodides, bromides
   - D. Defects of metabolism
     - alkaptonuria– brownish discoloration of permanent teeth
     - Congenital erythropoetic porphyria – primary teeth – yellow, brown, pink to red – enamel and dentin permanent teeth – dentin and cement
     - erythroblastosis fetalis and icterus gravis neonatorum – yellow to green – primary dentition incorporation of bilirubini nto enamel. hypoplasia
     - Other hemolytic diseases – also in permanent dentition, if the disease appeared in early childhood
   - E. erosion – dissolution od enamel by chemical process
     - idiopatic erosion – composition of saliva (citric acid)
     - dietetic erosion – citrus fruits, coca – cola

_Hereditary determinants

A. PRIMARY DEFECT OF ENAMEL DURING AMELOGENESIS (AMELOGENESIS IMPERFECTA)

1. Hypoplastic type
   - a) pitted — AD
   - b) local — AD
   - c) smooth — AD
   - d) smooth — XD, bound to x
   - e) rough — AD
   - f) hypoplastic – hypomaturation — AD
   - g) rough — AD

2. Hypocalcified type
   - a) autosomal dominant
   - b) autosomal recessive

3. Hypomaturation type
   - a) bound to x – chromosome — XR
   - b) pigmented — AR
   - c) snow capped teeth — AD
   - d) enamel opacities
     white hypomaturated enamel — AR

Prevalence 1 : 14 000 –most common – AD hypocalcified

A. PRIMARY DEFECT OF ENAMEL DURING AMELOGENESIS (AMELOGENESIS IMPERFECTA)

HYPOPLASTIC FORM –local defects and generalized forms – most common AD

In men – form bound to x – chromosome

Thin enamel, no contacts between teeth, both dentitions affected

HYPOMATURATION FORM – soft enamel, detaching from dentine

X bound recessive - the most frequent

Defect is in enamel rods (sheath)

Rods are missing – pigmented debris – both dentitions affected

HYPOCALCIFIED FORM – AD

Enamel detaching from dentine - sensitive

Open bite – frequently

Defect in intraprismatic calcification

B. INHERITED DEFECTS OF ENAMEL IN GENERALIZED DISEASES

In 33 kinds of generalized conditions –all types of Amelogenesis imperfecta as a part of syndroms

The most importants:

epidermolysis bullosa, mucopolysacharidosis, rachitis, ectodermal dysplasia, Down syndrome, dysostosis mandibulofacialis, dysostosis cleidocranialis, fenylketonuria, neurofibromatosis, sclerosis tuberosa

DEFECTS OF DENTINE

A. Environmental determinants
   1. **Inflammatory and infectious**
   2. **Developmental**
   3. **Chemical and metabolic**

B. Hereditary determinants
   1. **Primary defects in dentine in dentinogenesis**
   2. **Defects in dentine accompanied by generalized condition**

A. Environmental determinants

1. Developmental
   Neonatal, infantile, pubertal lines – hypomineralized bands – trauma „in utero „ , during childbirth, hormons influence
   No clinical significance

2. Inflammatory and infectious determinants
   - External and internal resorption
   - Tertiary dentine formation
   - Pulp stones and calcification

3. Chemical and metabolic determinants
   a) deficiency of C vitamine– irregular course of tubules, scurvy – cessation of tooth development
   b) deficiency of D vitamine – predentine enlargment
   c) hypervitaminosis D – calcification in the dental pulp, hypermineralization of enamel and dentine matrix
   d) tetracyclines – binde to organic and inorganic component – chromogenic dentine
   e) hypoparathyreosis – calciotraumatic complex, hypomineralization

B. Hereditary determinants

1. Primary defect in dentin during dentinogenesis
   - Dentinogenesis imperfecta (opalescent dentine)
     Brown translucent teeth, both dentitions
     Dental pulp: cavity – obliteration – AD
     Rapid abrasion, atubular dentine, changes in connective tissue of the dental pulp
   - Dentinal dysplasia
     Radicular dysplasia – AD
     Rootless teeth, both dentitions
     Dental pulp obliteration
   - Coronal dysplasia – AD, rare
   - Progressive dental pulp obliteration

2. Defect of dentine accompanied by generalized conditions
   - Dentinogenesis imperfecta + osteogenesis imperfecta
     generalized disease of connective tissue
     Fragile bones, blue sclerae, defects of dentine, vestibulocochlear deafness
     brown –bluish teeth, dental pulp obliteration
     RAPID ABRASION
   - Fibrous dentinal dysplasia – AD
   - Unger – Trott´s syndrome – AD or. X chrom.
     Branchioskeletogenital syndrome
   - Vitamin D resistent rachitis (rickets)
     Hypophosphatasia X bound
     De Toni – Debré – Fanconi syndrome A. R

DEFECTS – ENAMEL AND DENTINE

A. ENVIRONMENTAL DETERMINANTS

1. developmental
2. traumatic as well as in defects of enamel, dentine
3. inflammatory, infectious
4. chemical, metabolic

   hypoplasia of enamel – detachment from dentine

   discoloration by biliary dyes (hepatitis, obstruction)

B. HEREDITARY DETERMINANTS

1. primary defect of enamel, dentine in odontogenesis
   - Odontodysplasia – both dentitions, probably somatic mutation affects part of the dental lamina
   - Enamel – hypoplasia, hypocalcification, rods are missing
   - Dentine – thin, abnormal tubules
   - Dental pulp – fibrous, pulp stones, calcificatios

2. defect of enamel, dentine accompanied by generalized conditions
   - Pseudohypoparathyreosis X, AD
     - Hypocalcemia – does not respond to parathormon treatment
     - Enamel –pits, hypoplasia
     - Dentine – different calcification, open, short apexes

Into this group – many hereditary diseases

DEFECTS OF CEMENTOGENESIS

A. Environmental defects

1. developmental
2. traumatic
3. inflammatory, infectious
4. chemical, metabolic

B. HEREDITARY

A. ENVIRONMENTAL

1. developmental – (dentes concreti, confusi)
   - true (confusi)
   - false (concreti)
2. traumatic
3. inflammatory

} hypercementosis

4. chemical, metabolic

Scurvy – defect in collagen fibres formation - periodontal ligament is detaching from the surface of cement

B. HEREDITARY

A. HEREDITARY FACTORS

1. primary defect of cement in cementogenesis

   Hereditary multiple cementosis AD

2. Defects accompanied by general conditions

   A. dysostosis cleidocranialis AD

   B. osteitis deformans (Paget) AD

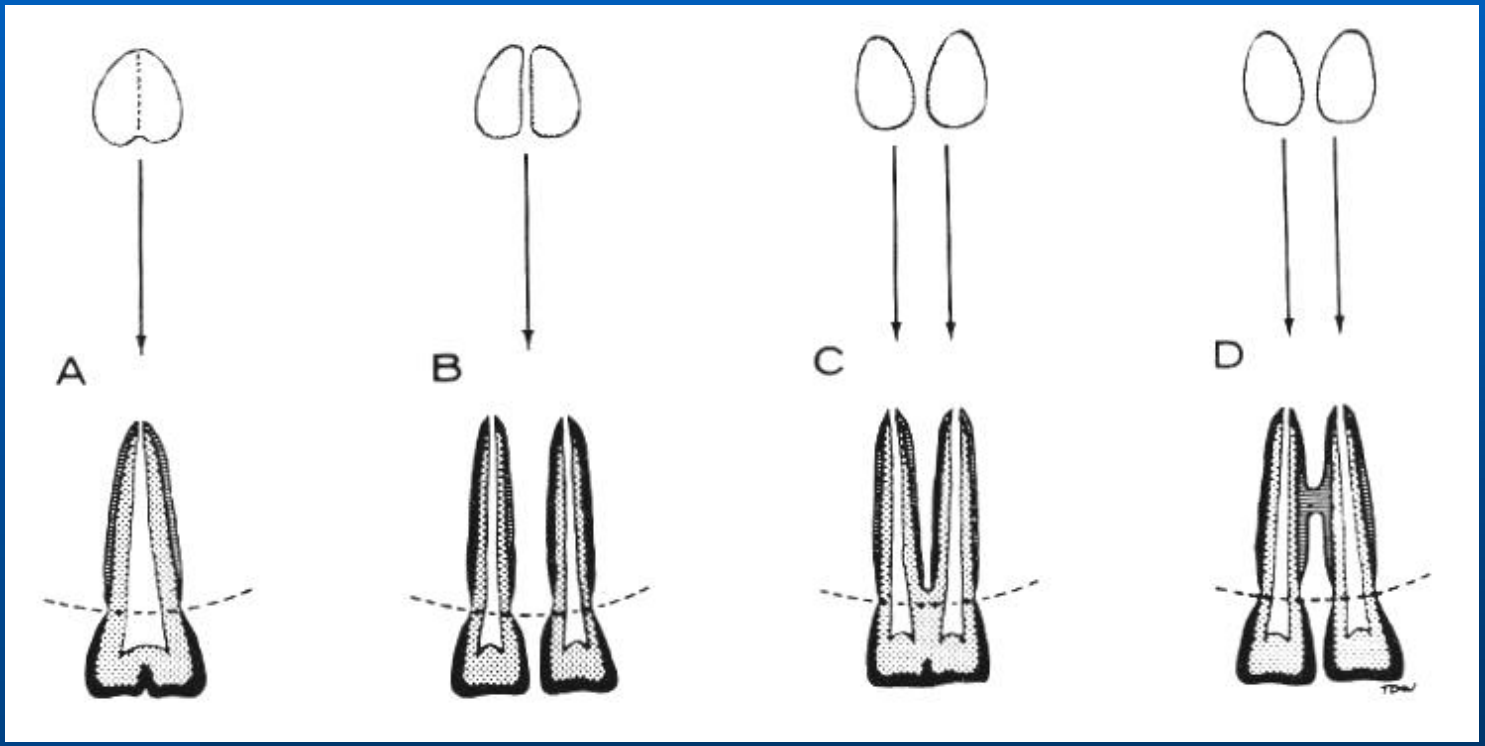
} defects of structure and eruption

DEFECTS AFFECTING CEMENT AND DENTINE

Hypophosphatasia

- Primary – the bone system AR
- Premature loss of primary teeth, low level of AF
- Reduction of cement and dentine thickness, large dental pulp cavity

GEMINATION TWINNING FUSION CONCRESCENCE



Different types of fusion with gemination (double teeth)