TOOTH DEVELOPMENT

Department of Histology, Embryology and Cytology of General Medical faculty

Teeth are a major component of the oral cavity and are essential for the beginning of the digestive process. . Teeth are embedded in and attached to the alveolar processes of the maxilla and mandible.

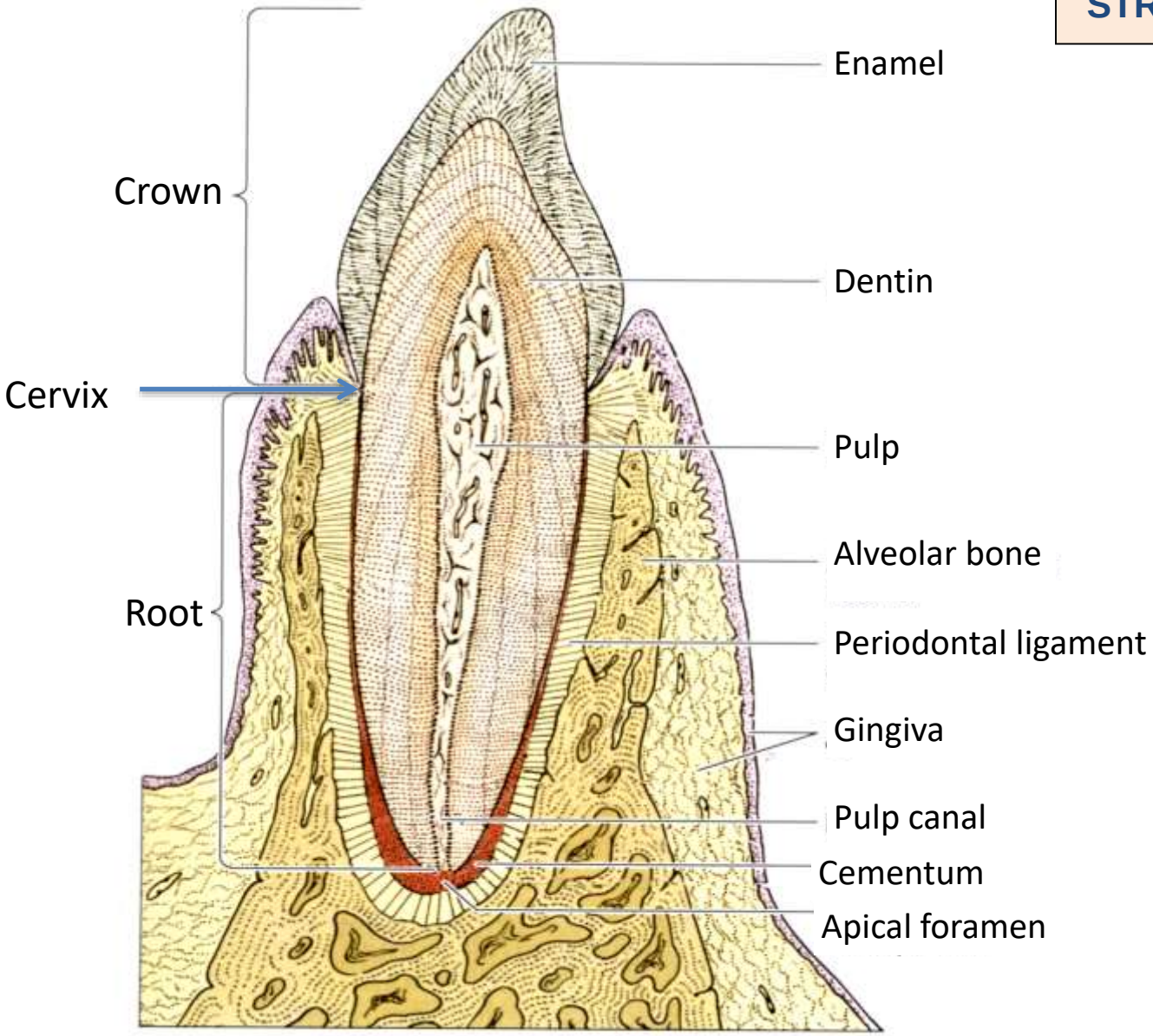
Children have 10 **deciduous (primary, milk) teeth** in each jaw

During a period of years, usually beginning at about age 6 and ending at about age 12 to 13, deciduous teeth are gradually replaced by 16 **permanent (secondary) teeth** in each jaw

	Milk , deciduous	**Permanent**
	mo	**yr**
Incisor tooth 1	6–8	7–8
Incisor tooth 2	8–12	8–9
Canine tooth	16–20	11–13
Premolar tooth	12–16	9–11
Premolar tooth	20–24	11–13
Molar tooth 1		6–7
Molar tooth 2		12–14
Molar tooth 3		17–40

Dentition

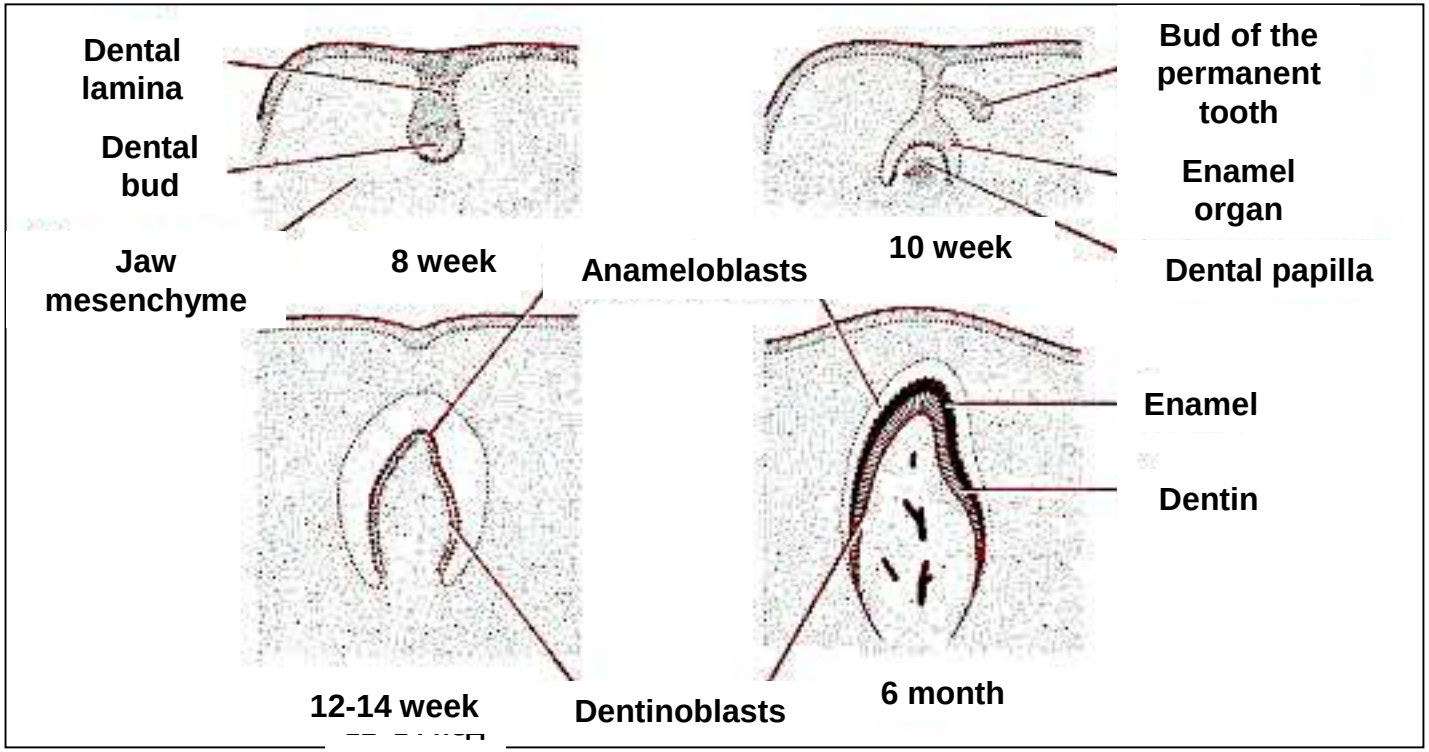
TOOTH STRUCTURE



TOOTH DEVELOPMENT

Stages of development (odontogenesis):

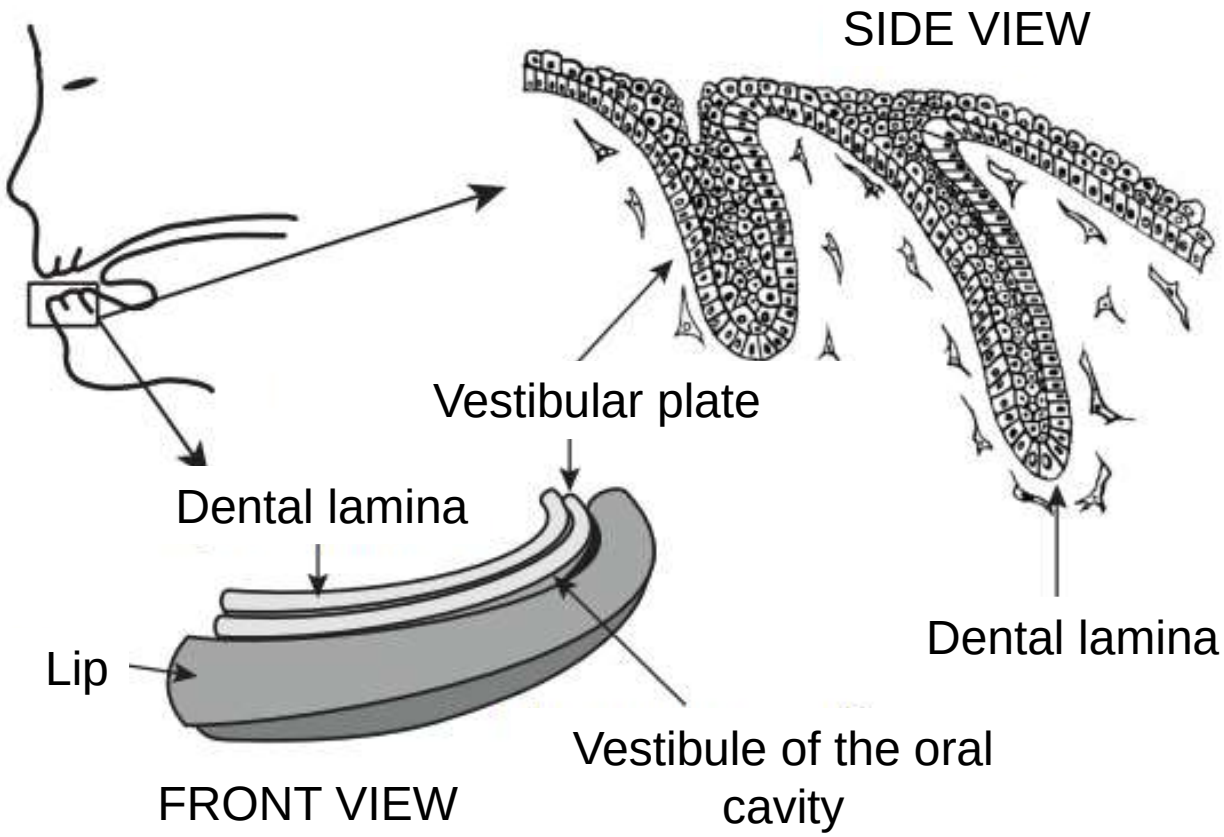
- ***Dental lamina, dental bud***
- ***Enamel organ ("cap", "bell" stages)***
- ***Histogenesis of dental tissues***
- ***Root formation, cutting***



teeth	Formation	Teething
Milk	2nd month before birth	6-7th month after birth
Permanent	4th month before birth --- 3 years of life	6-7 years of life

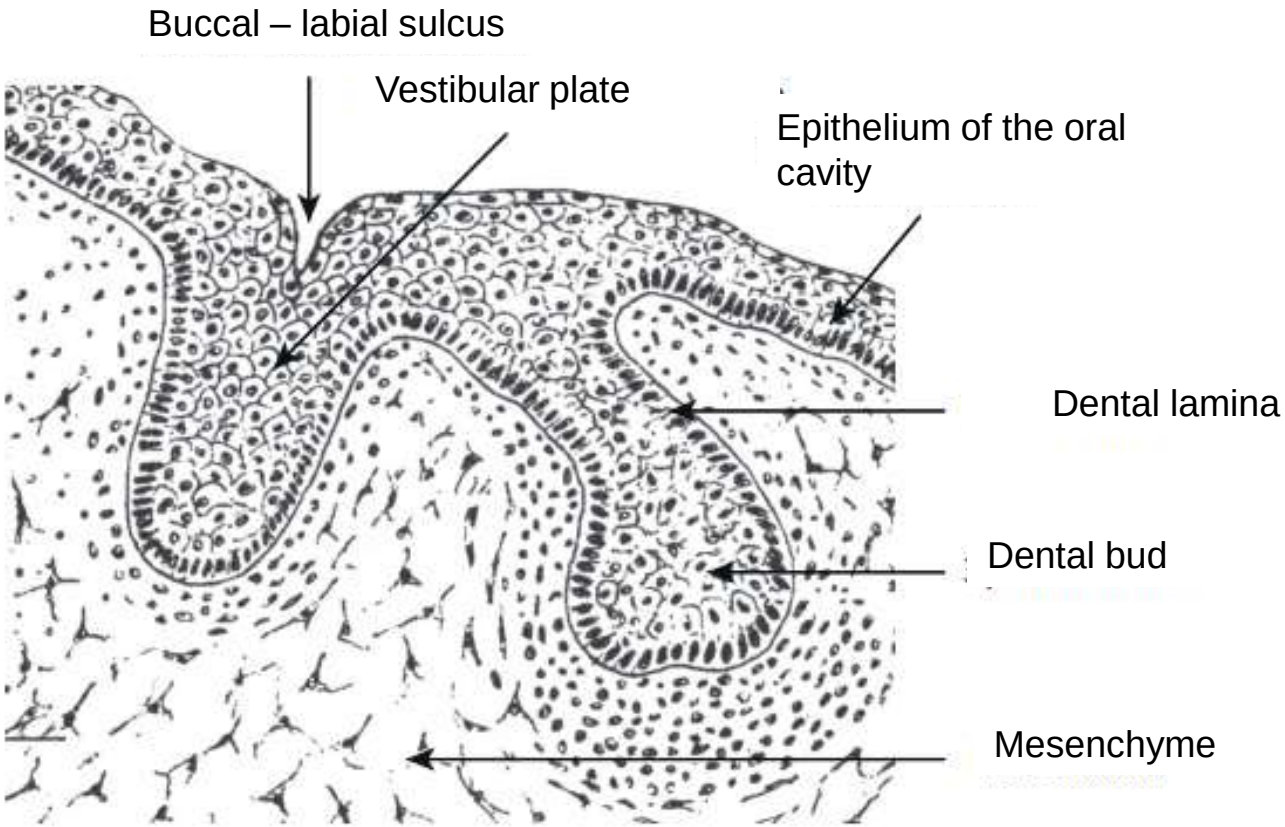
Formation of the dental lamina

The onset of tooth development is marked by proliferation of oral epithelium to form a horseshoe-shaped cellular band of tissue, the **dental lamina**, in the adjacent mesenchyme where the upper and lower jaws will develop.

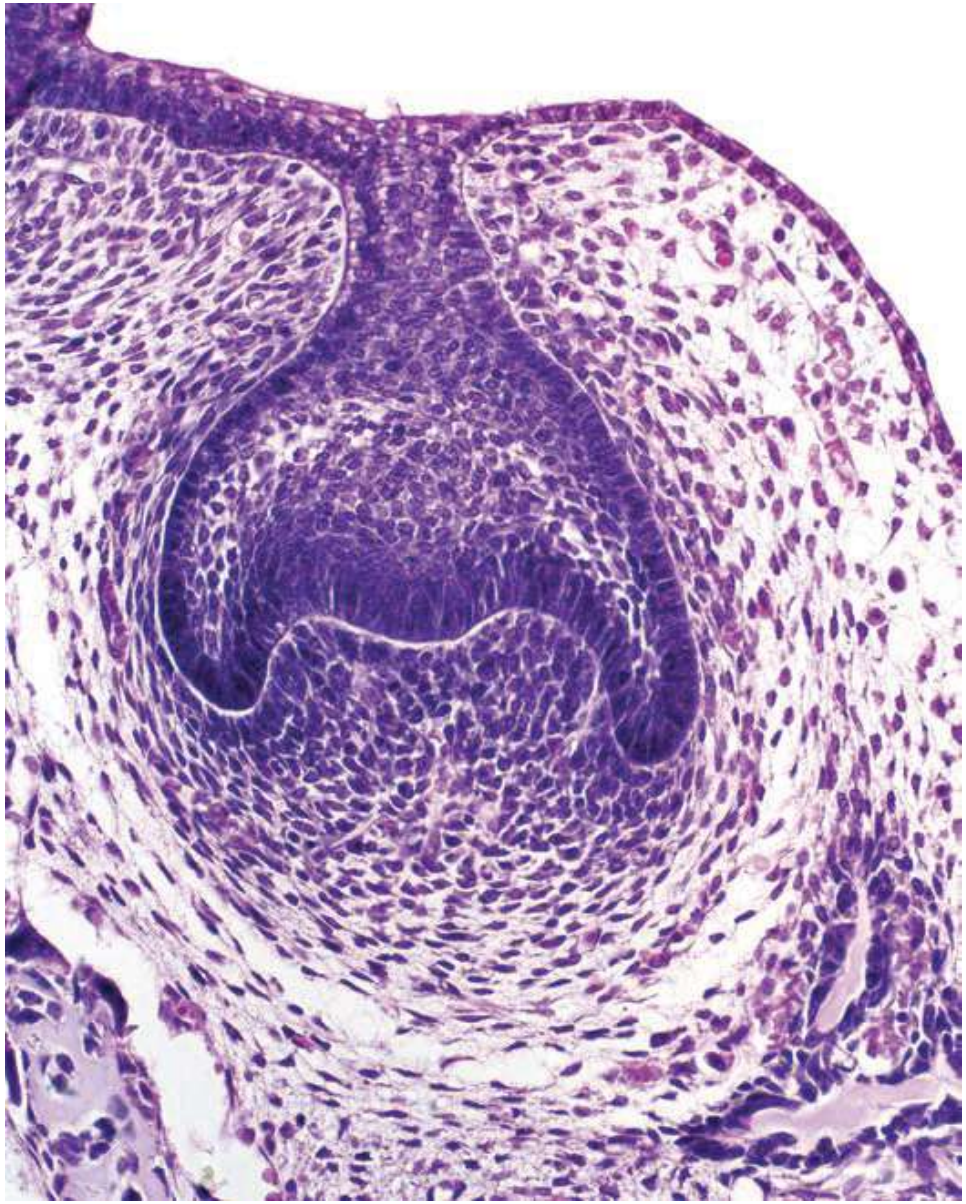


Formation of the dental bud

At the site of each future tooth, there is a further proliferation of cells that arise from the dental lamina, resulting in a rounded, cellular, budlike outgrowth, that projects into the underlying mesenchymal tissue. This outgrowth, referred to as the **bud stage**, represents the early enamel organ.

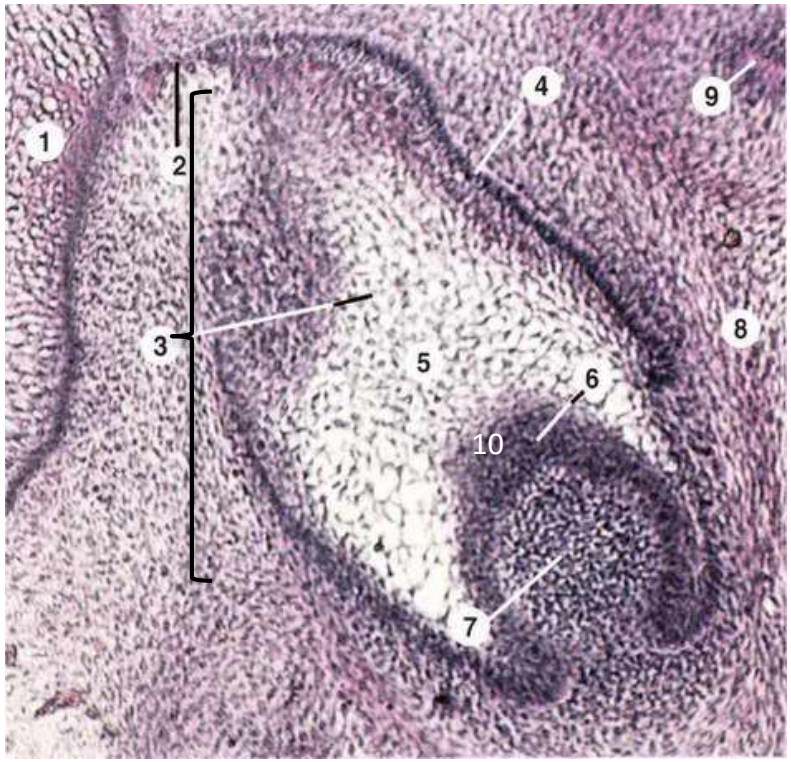


Formation of enamal organ ("cap" stage)



Developing tooth in the cap stage shows its connection with the oral epithelium. The enamel organ consists of a single layer of cuboidal cells forming the **outer enamel epithelium**, the **inner enamel epithelium** has differentiated into columnar ameloblasts, and the layer of cells adjacent to the inner enamel epithelium has formed the **stratum intermedium**. The remainder of the structure is occupied by the **stellate reticulum**. The mesenchyme of the **dental papilla** has proliferated and pushed into the enamel organ. At this stage, the forming tooth is surrounded by condensed mesenchyme, called the **dental sac**, which gives rise to periodontal structures.

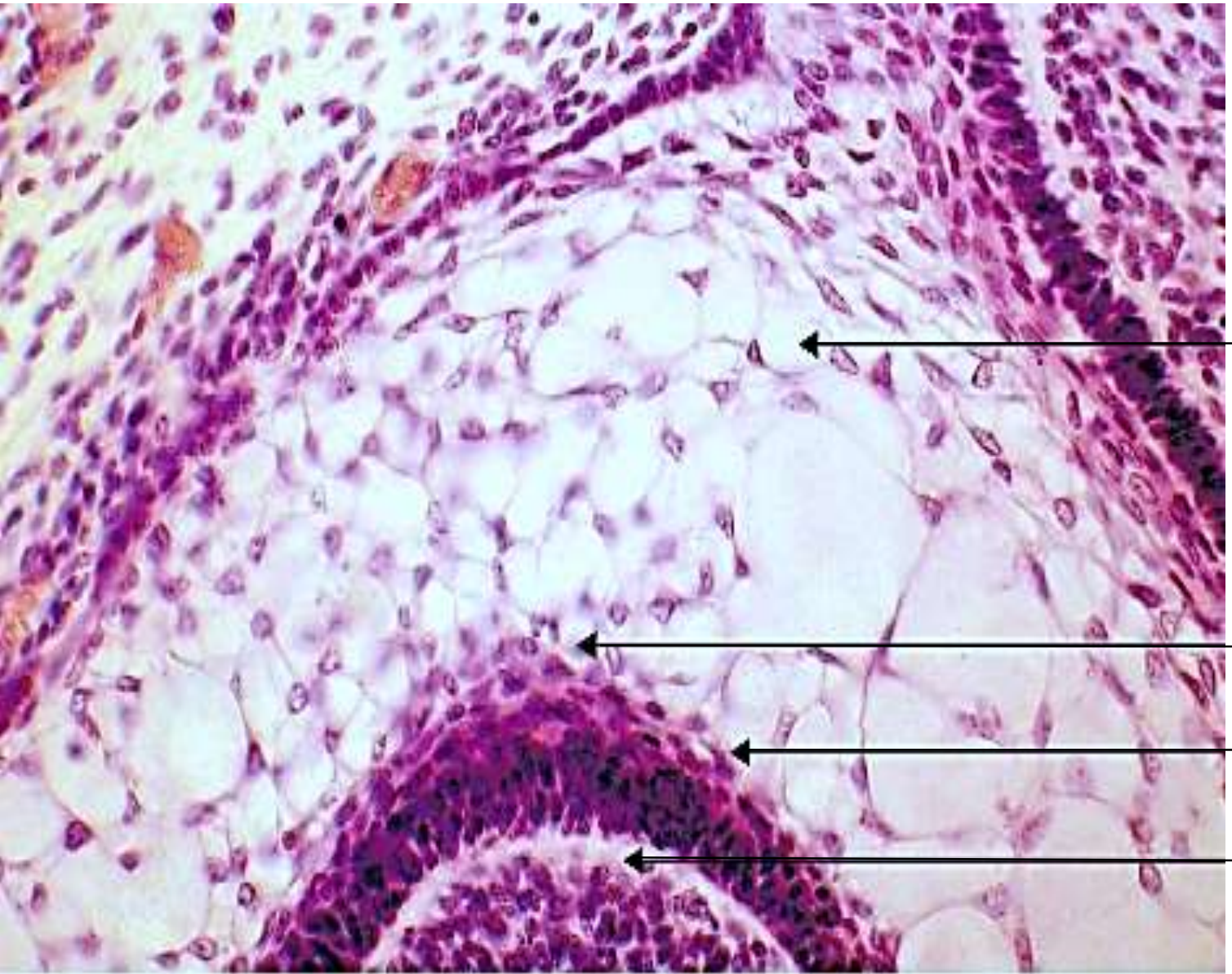
Formation of enamal organ ("bell" stage)



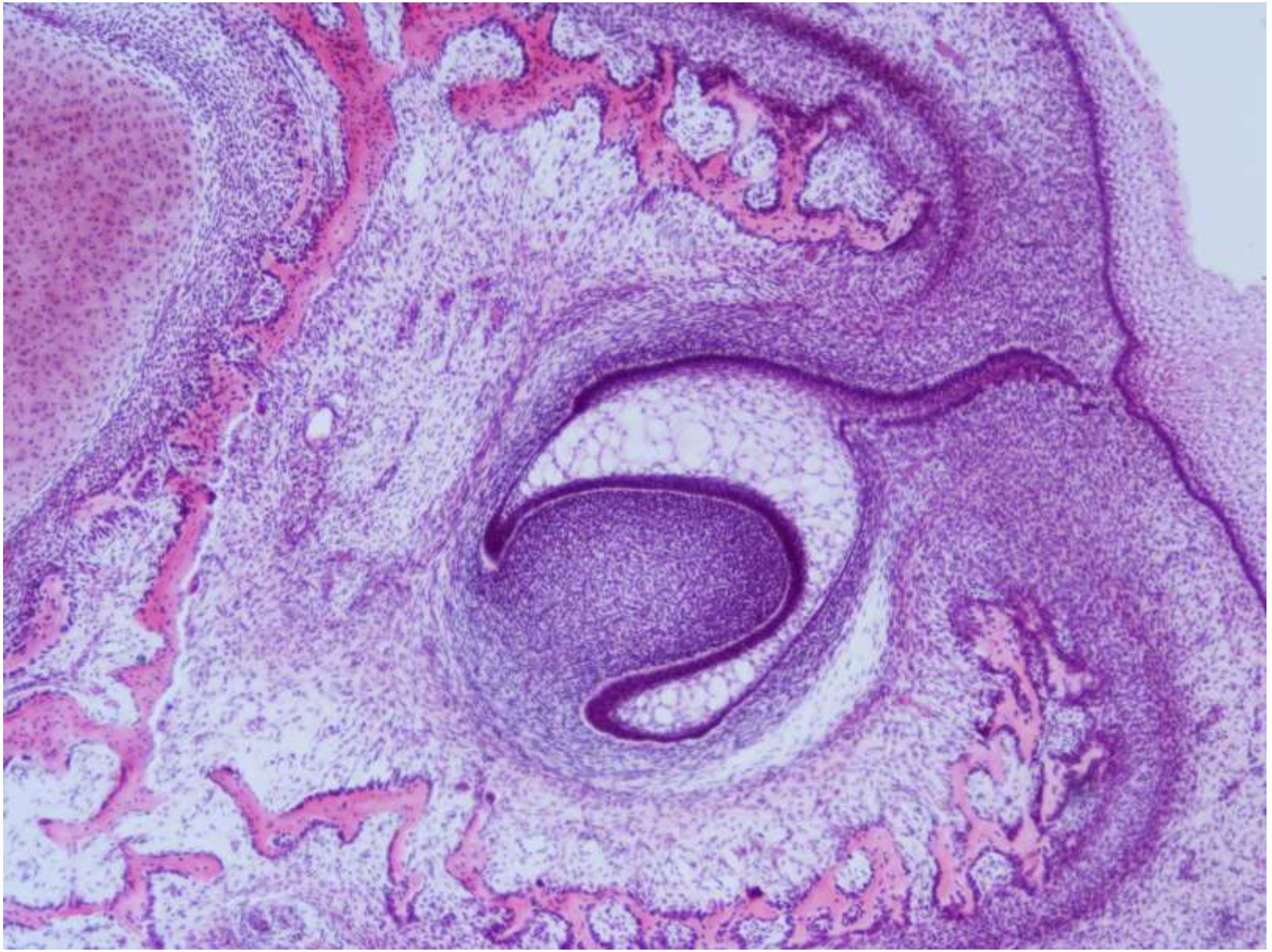
In this bell stage, the connection with the oral epithelium is almost cut off. The **enamel organ** consists of a narrow line of **outer enamel epithelium**, **an inner enamel epithelium** formed by ameloblasts, several condensed layers of cells that form the **stratum intermedium,** and the widely spaced **stellate reticulum**. The **dental papilla** is deeply invaginated against the enamel organ.

1 — stratified epithelium of the oral cavity; 2 — dental lamina;
3 — ENAMEL ORGAN: 4 — outer enamel epithelium; 5 — enamel organ pulp (stellate reticulum); 6 — inner enamel epithelium; 7 — DENTAL PAPILLA**;** 8 — dental sac; 9 — trabeculae of the developing jaw bones; 10 — stratum intermedium

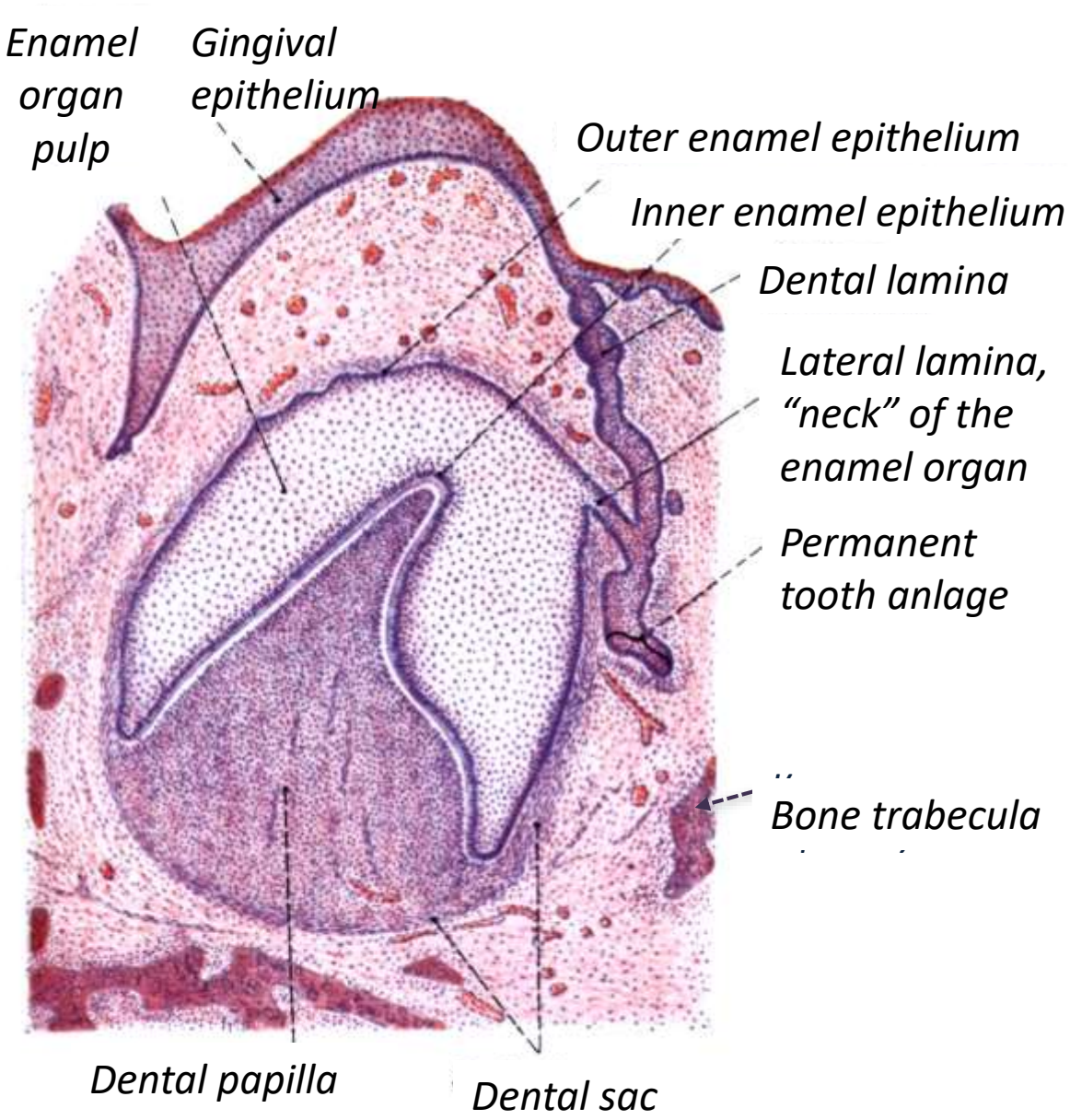
Formation of enamal organ (“bell” stage)



*Slide №122 "*Tooth development (early stage), mandible of a pig embryo, H&E"



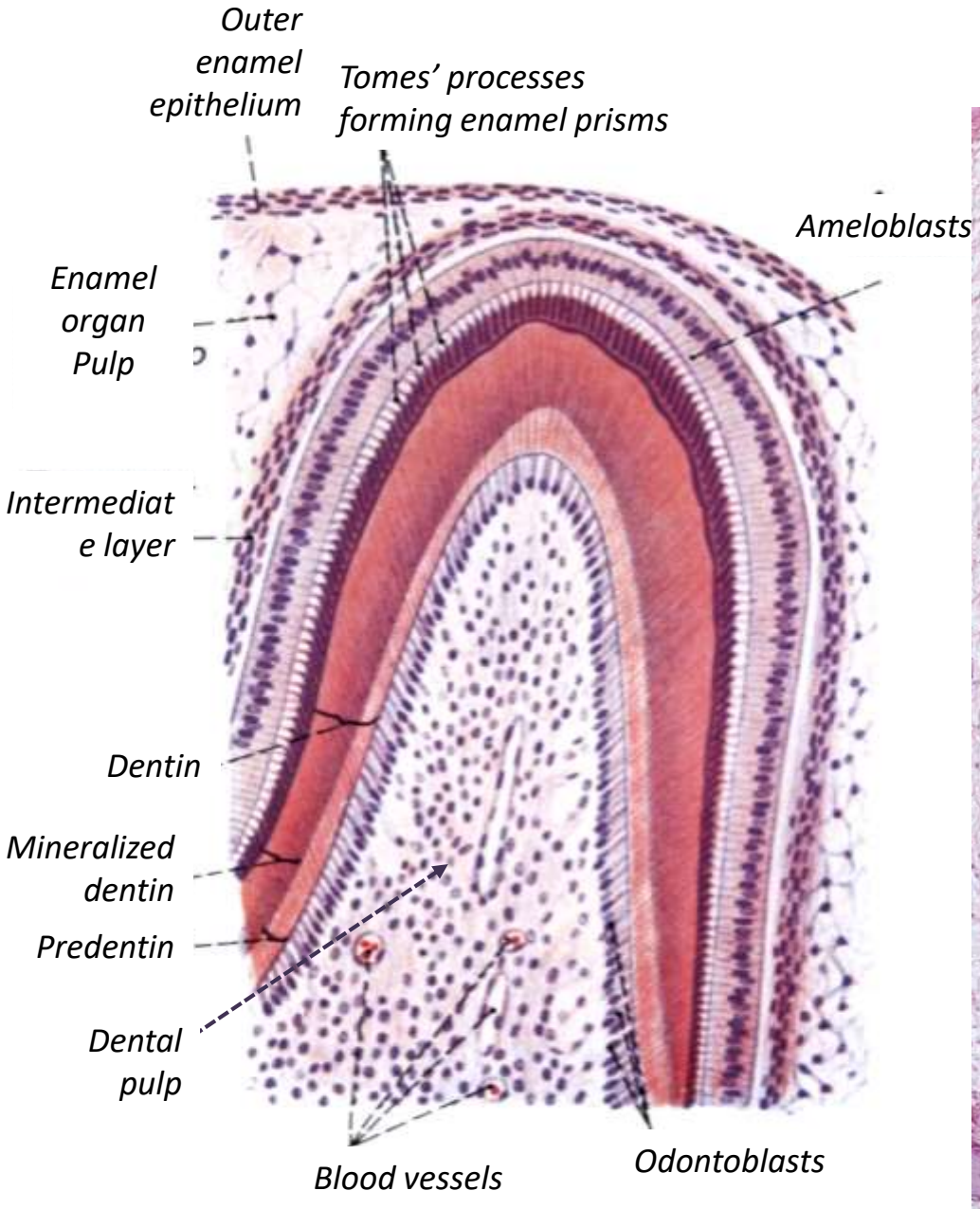
Formation of enamal organ ("bell" stage)



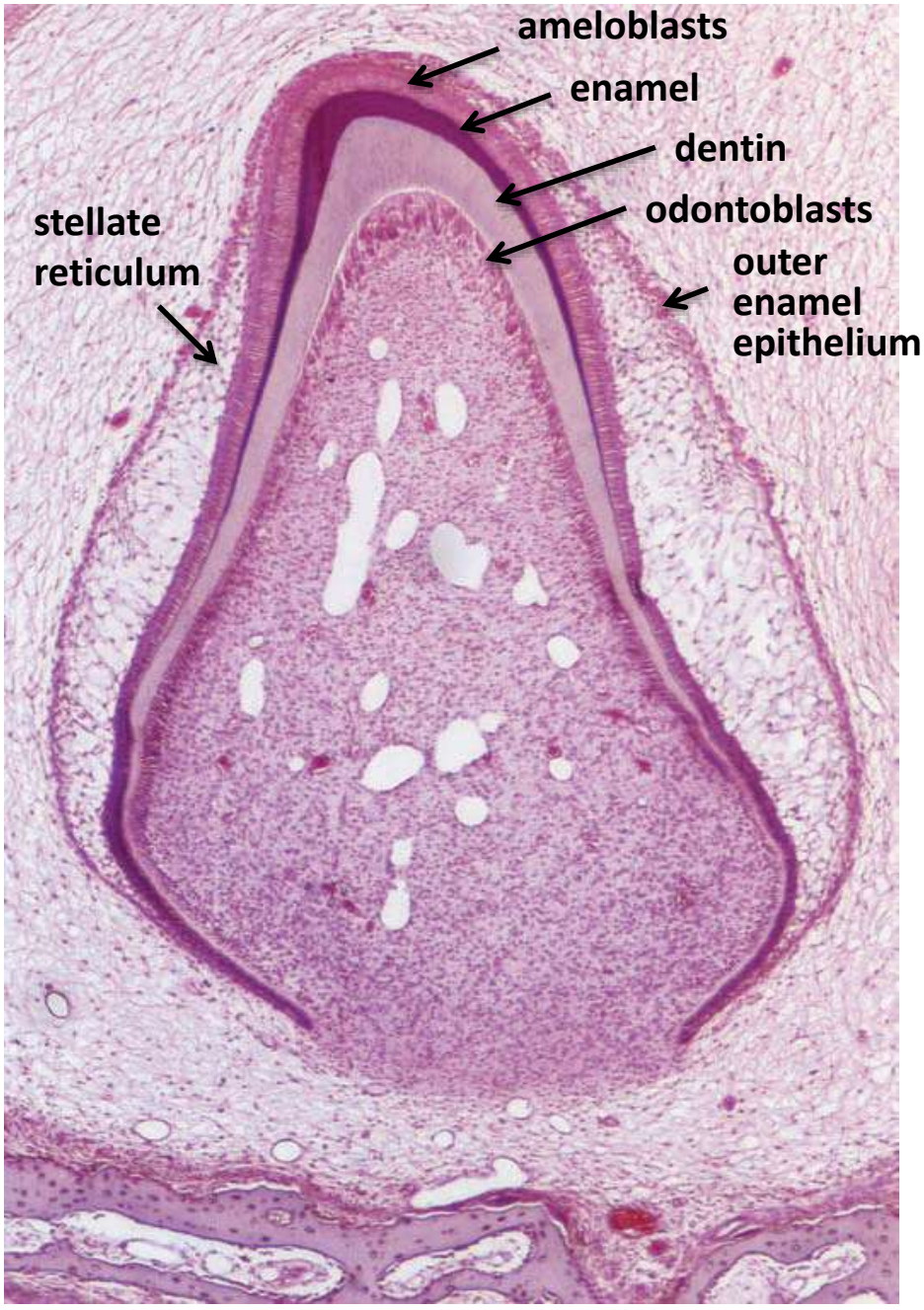
The neural crest–derived **preodontoblasts** lined up within the "bell" adjacent to the inner enamel epithelial cells become columnar and have an epithelial-type appearance.

They will become **odontoblasts** and form the dentin of the tooth. The inner enamel epithelial cells of the enamel organ will become **ameloblasts**. Along with the cells of the stratum intermedium, they will be responsible for enamel production. At the early stage, just before dentinogenesis and amelogenesis, the dental lamina degenerates, leaving the developing tooth primordium detached from its site of origin.

Histogenesis of dental tissues

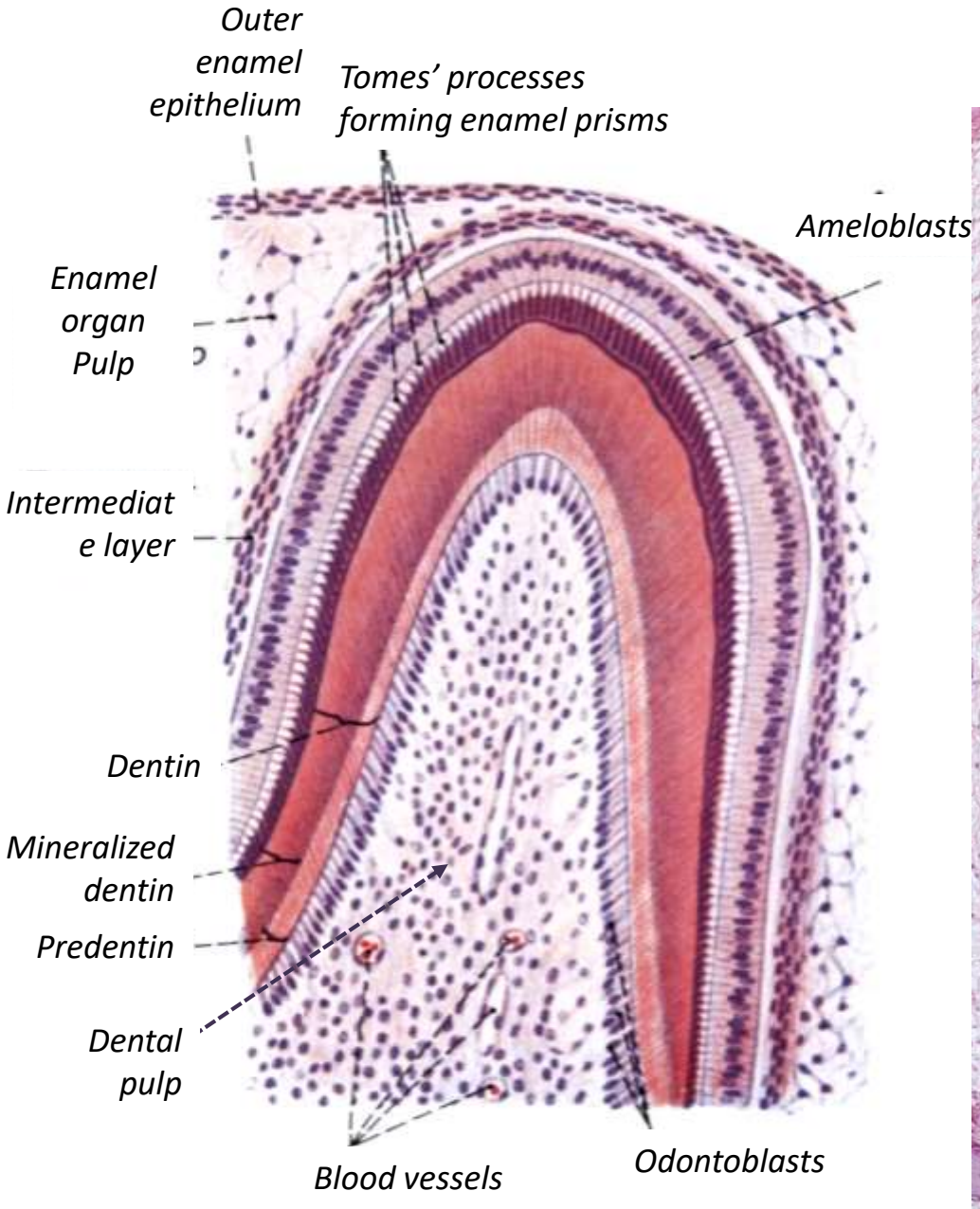


Histogenesis of dental tissues

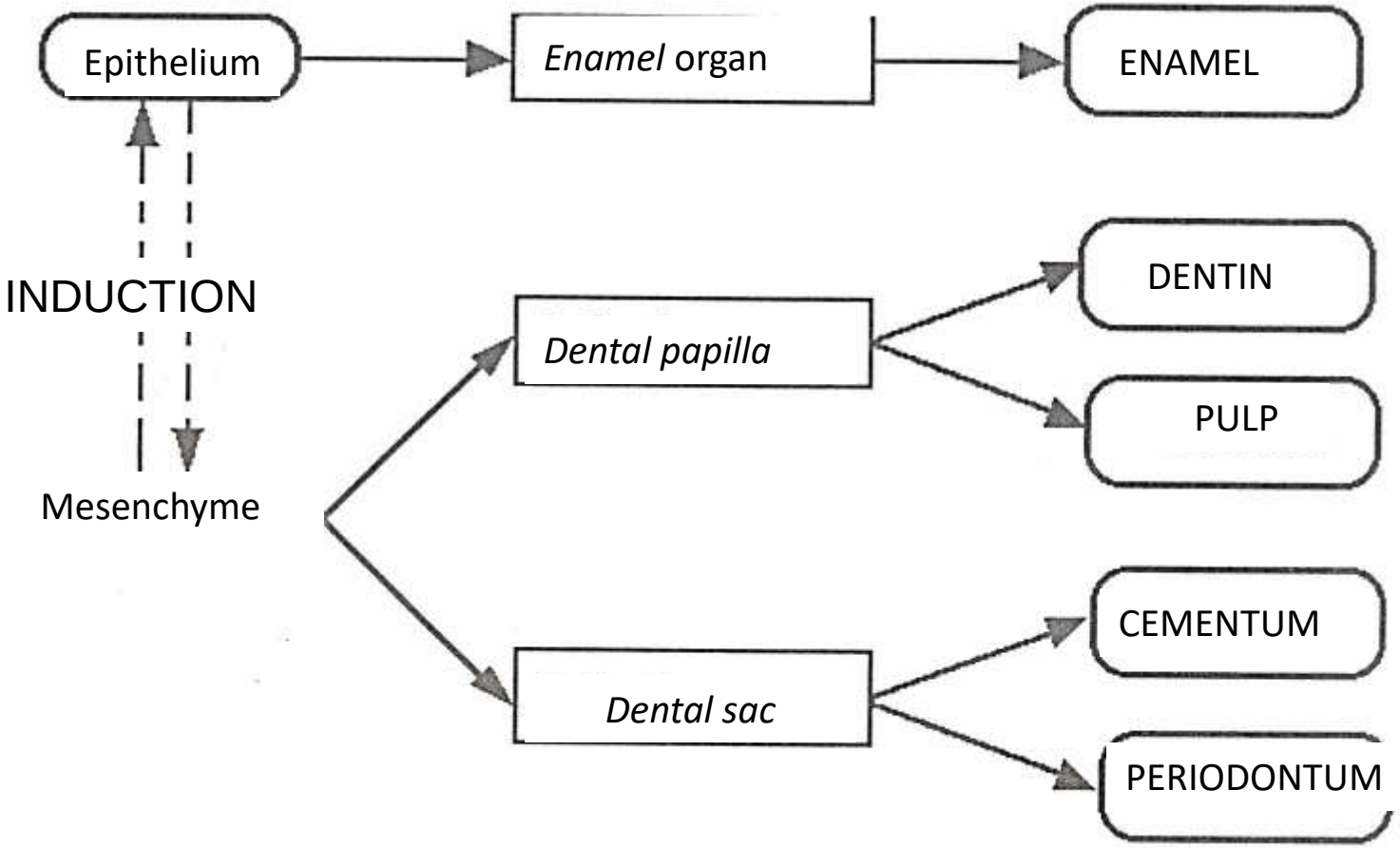


In this appositional dentin and enamel stage, the tooth bud is completely differentiated and independent from the oral epithelium. The relationship of the two mineralized tissues of the dental crown, enamel and dentin, is clearly visible. The surrounding mesenchyme has developed into bony tissue.

Histogenesis of dental tissues



SOURSES OF DENTAL TISSUE DEVELOPMENT



Slide №123 "Tooth development (later stage), H&E"

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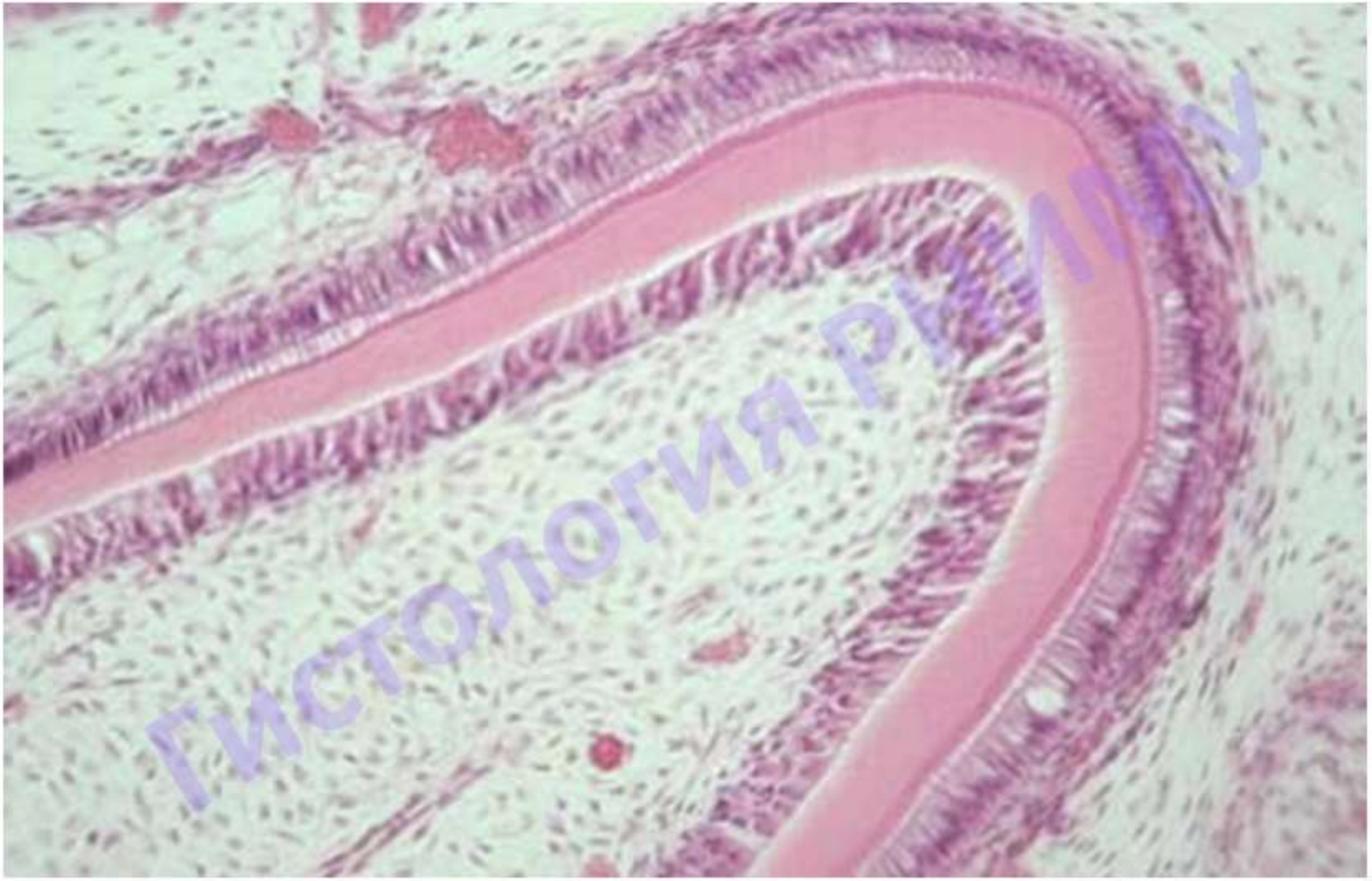
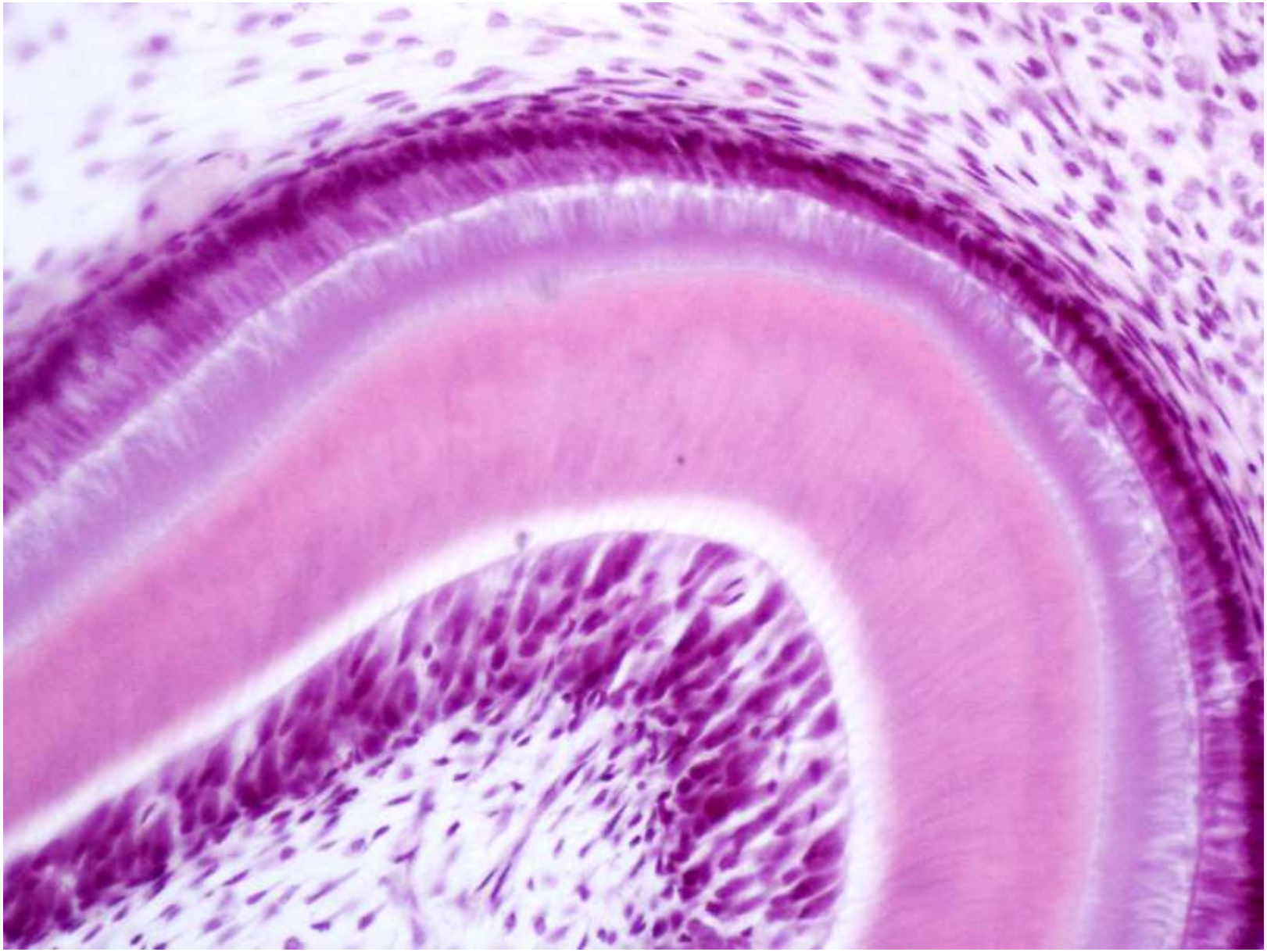
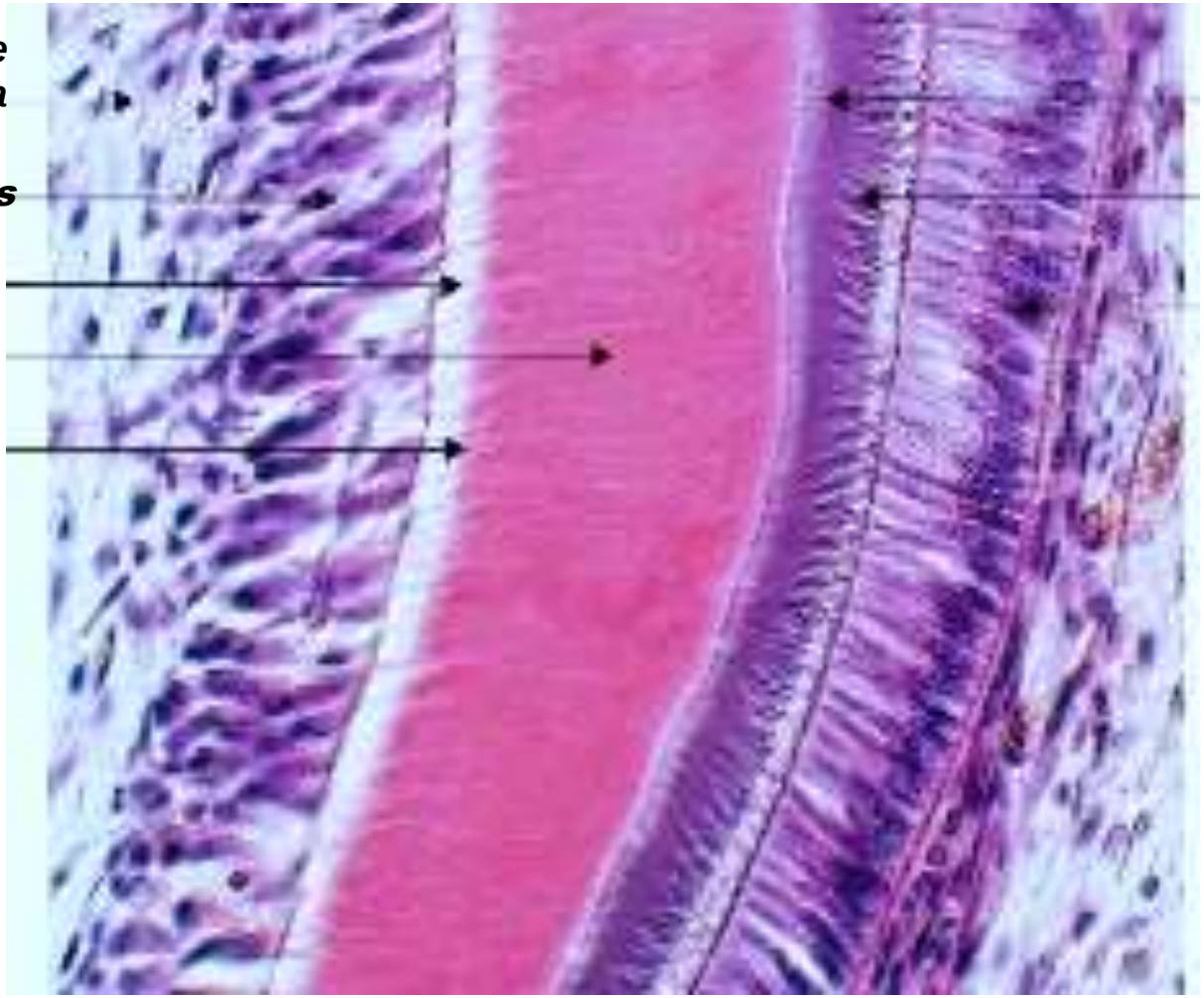


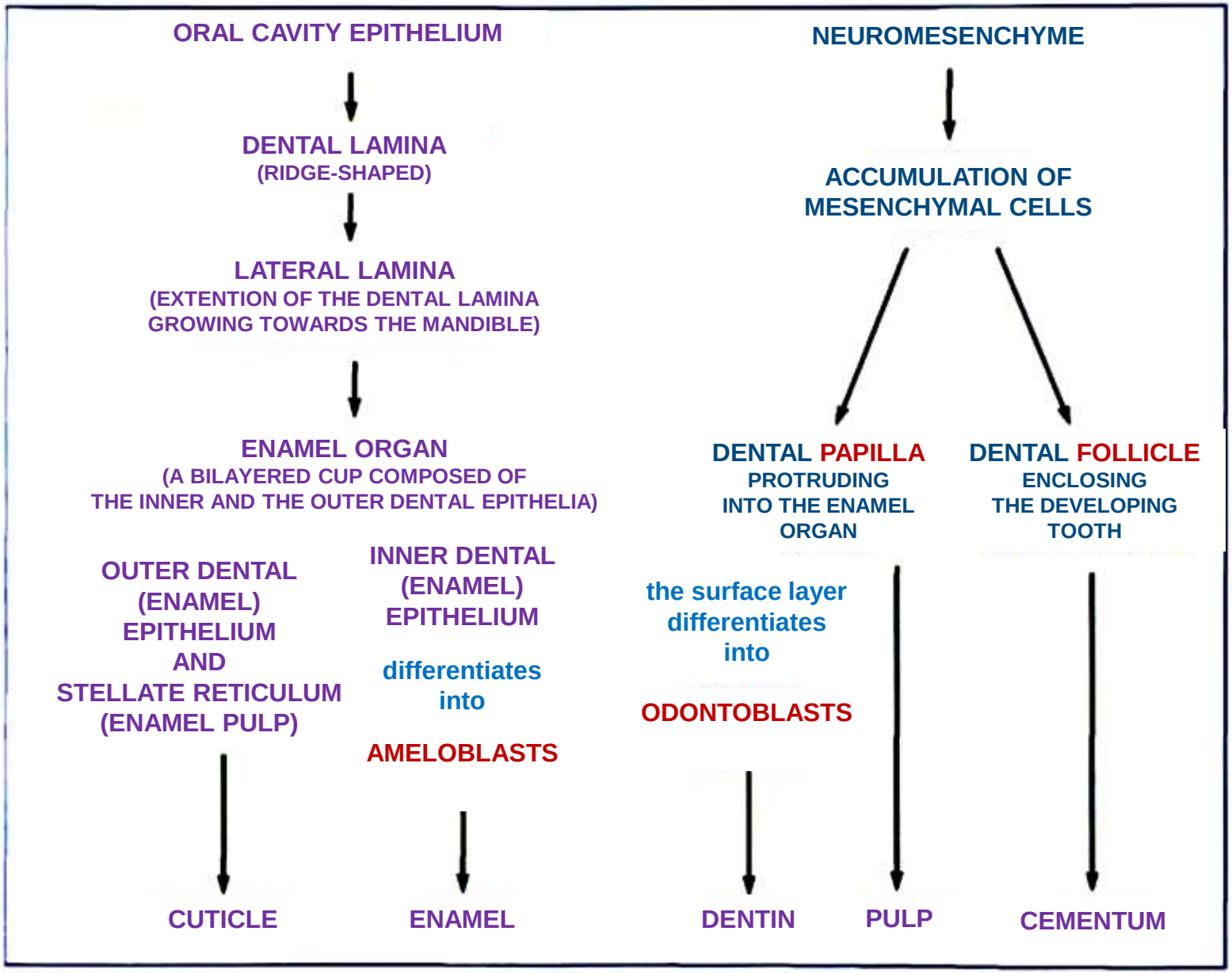
Preparation No. 123 "Tooth development (late stage)"
Stain: hematoxylin-eosin

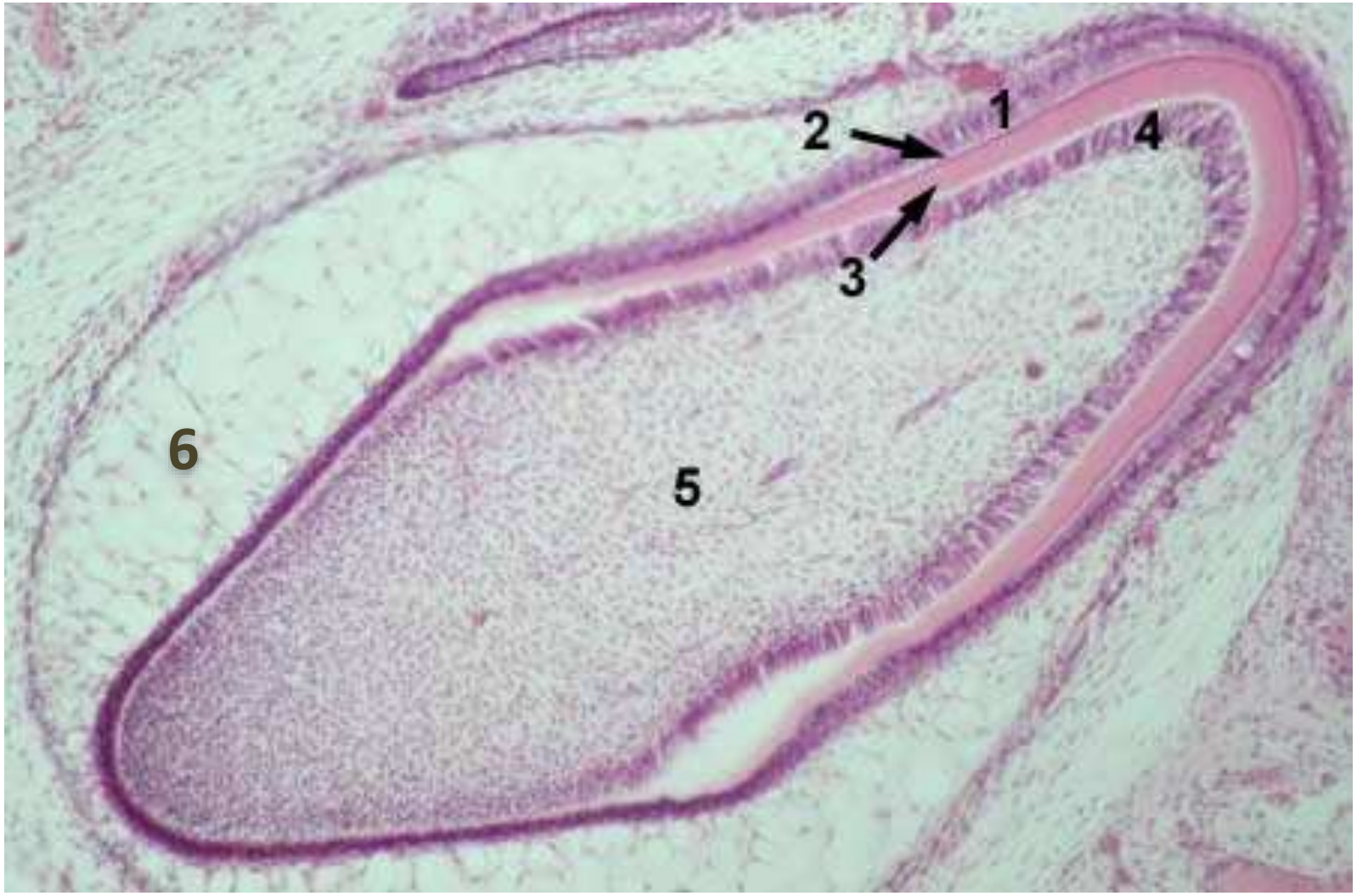


3 – HISTOGENESIS OF DENTIN AND ENAMEL

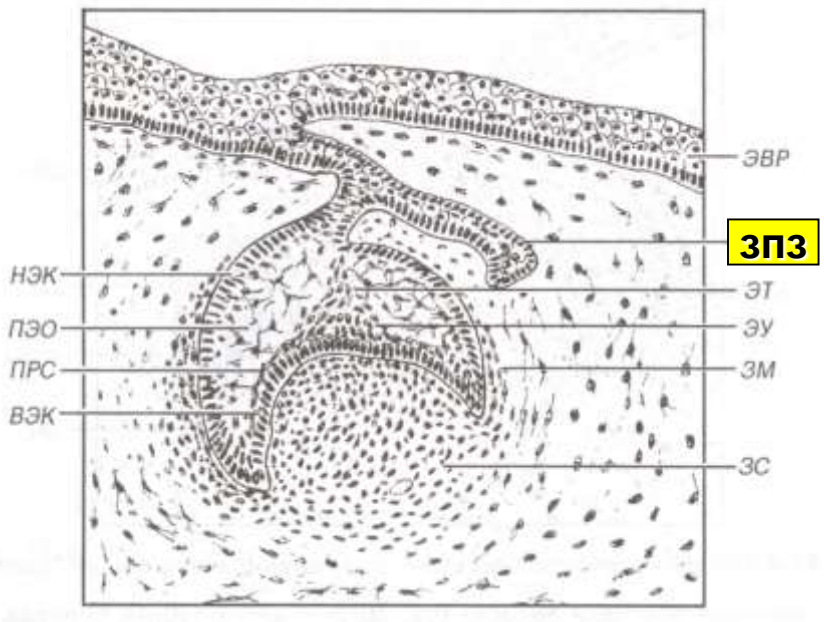


Embryonic sources of the tooth development




1
2
3
4
5
6

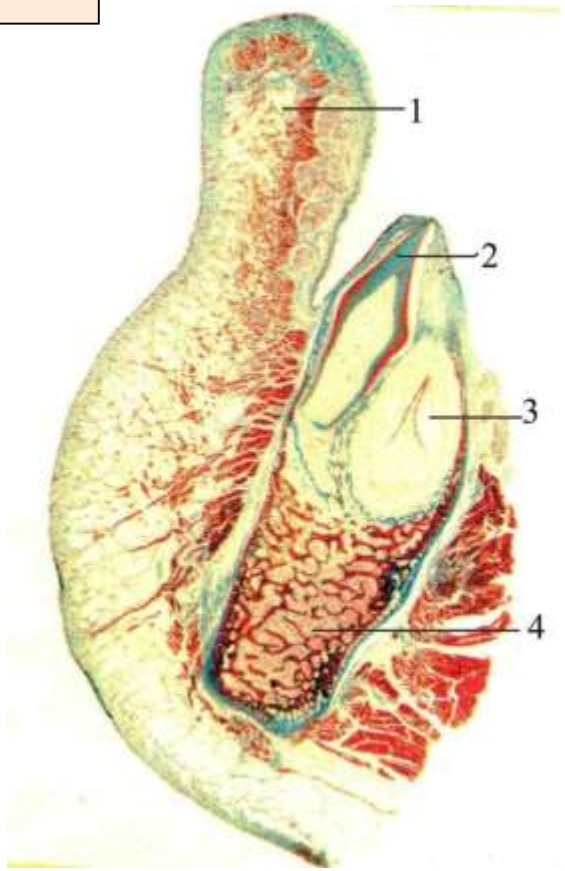
DEVELOPMENT OF THE PERMANENT TOOTH



Scheme

Germ of a permanent tooth

5th month of embryonic development



Erupting milk incisor (2), laying of permanent incisor (3), lower lip (1).

Micrograph

TEETHING

Change of teeth. 1 - crown of a falling milk tooth, 2 - formed permanent tooth.

Micrograph

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