



TATYASAHEB KORE DENTAL COLLEGE AND RESEARCH CENTRE

NEW PARGAON – 416 113

Tal.: Hatkanangale Dist.:Kolhapur (Maharashtra State)

National Dental Commission

INFORMATION REGARDING INSTITUTIONAL COMPLIANCE



4. Clinical Compliance

4.2 Student clinical work registers are updated regularly.

Mahatma Gandhi Charitable Medical Trust, Warananagar.



TATYASAHEB KORE DENTAL COLLEGE & RESEARCH CENTRE, NEW PARGAON

RECOGNISED BY DENTAL COUNCIL OF INDIA, NEW DELHI.

AFFILIATED TO MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK.



Dr. Harish Kulkarni M.D.S.
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Dist. Kolhapur 416 127

DENTAL HISTOLOGY RECORD BOOK

NAME : Mitali Vikas Patil

PERMANENT REGISTRATION No. : _____

UNIVERSITY EXAMINATION No. : _____ ROLL No : 42

Mahatma Gandhi Charitable Medical Trust, Warananagar.

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**DENTAL HISTOLOGY
RECORD BOOK**

CERTIFICATE

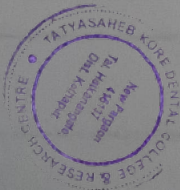
This is to certify that Shri/Kum. Patil Mitali Vikas

Roll No. 42

*has satisfactorily carried out the Practical work in Dental Histology as
prescribed by the Maharashtra University of Health Sciences, Nashik
for the year 20 25 & 20 26*

Staff Incharge

Date :-

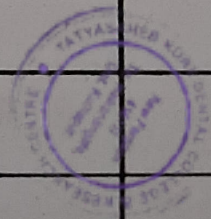


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Professor & Head

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1) Haematoxylin and Eosin stain

Principle :-

Haematoxylin is basic dye so it stains the nucleus which is acidic because of presence of nucleic acid i.e DNA & RNA. Eosin is acidic so it stains the cytoplasm which is basic in nature

Result :-

Haematoxylin : blue - Nucleus

Eosin : Pink - cytoplasm, blood vessel wall, collagen, nuclear fibres, RBC, Fungal hyphae

2) Van Gieson's stain :-

Principle :-

Based on differential staining of collagen fibres and other tissue and size of dye molecules

Components :-

Saturated picric acid solution, 1% aqueous acid fuschin solution in distilled water, destine blue

Result :-

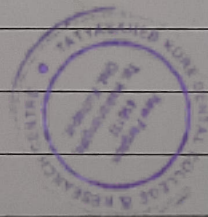
Epithelium : yellow

Cell nuclei : Blue / black

Collagen : Bright red

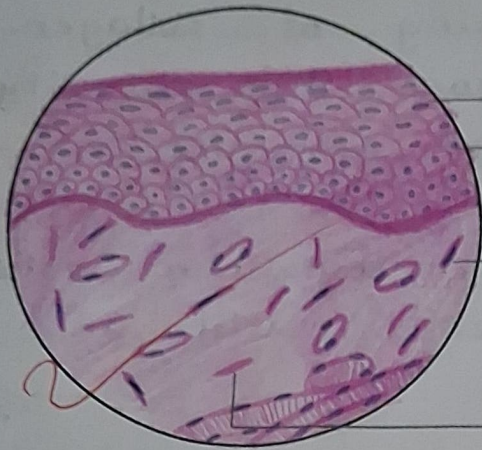
Muscle fibre : Red

RBC's : Red



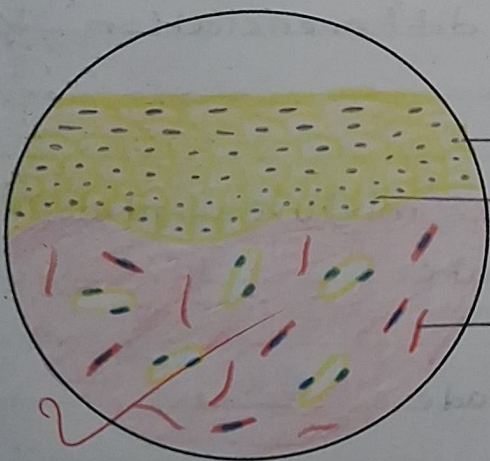
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Haematoxylin and Eosin Stain

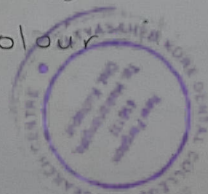


- Cytoplasm stained with eosin
- Nucleus of epithelial cells stained with haematoxylin
- Nucleus of endothelial cell and fibroblast stained with haematoxylin
- collagen and ground substance stained with eosin

Van Gieson Stain



- Epithelium stained yellow
- Nucleus stained blue/black
- Collagen stained red



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3) Masson's Trichrome Stain

This stain is used for staining nucleus

Principle

Based on differential staining of collagen fibres and other developing upon the porosity of tissue and size of dye molecule

Components

Phosphotungstic acid (PTA), methyl blue acid fuchsin in glacial acetic acid and distilled water

Result

Epithelium	: Orange red
Nucleus	: Blue / black
Collagen	: Blue (Methyl blue)
Muscle and RBC	: Red (acid fuchsin)

4) Mallory's stain

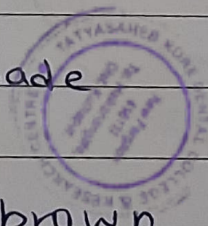
This stain is used for check degree of keratinization and to differentiation keratin from epithelium

Component

Prussion blue, orange G mixture, phosphotungstic acid (PTA), distilled water

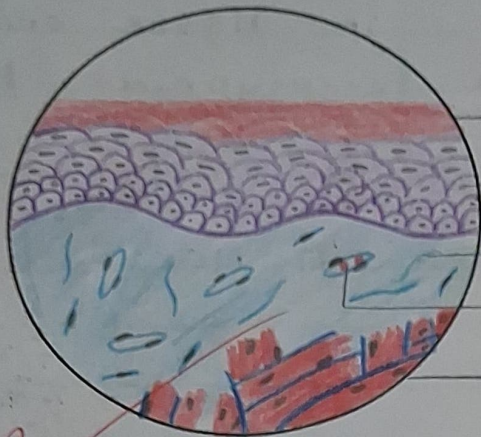
Result

Connective tissue	: blue shade
Keratin	: orange
Nucleus	: Blue, brown
Remaining structure	: Blue with different contrast



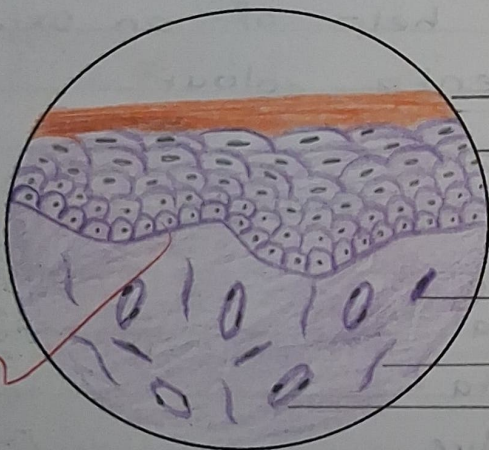
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MASON'S TRICROM STAIN

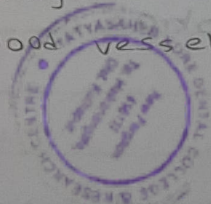


- Keratin stained red
- Nucleus stained blue/black
- Collagen stained blue
- Erythrocyte stained red
- Muscle stained red

MALLORY'S STAIN



- Keratin stained orange
- Nucleus stained blue/black
- Basement membrane
- Fibroblast
- Collagen
- Blood vessel



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5) Pearl's Prussian Blue Stain -

This stain is used for demonstration of iron

Principle

Ferric acid ions present in tissue combines with potassium ferrocyanide forming Ferric - Ferro cyanide

Components

Potassium ferrocyanide and dil. HCl

Result -

Nucleus : Bluish pink

Cytoplasm : Red / Pink

6) Periodic acid schiff's stain for basement membrane

This stain is demonstration of glycogen and nucleopolysaccharide

Principle

Tissue containing 1,2 glycol group are converted into aldehyde with the help of an oxidising agent to give a magenta colour

Component -

Periodic acid and Schiff's reagent

Result

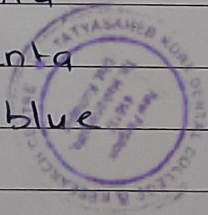
Carbohydrates : Magenta

Fungal hyphae : Magenta

Cytoplasm : Pale blue

Nucleus : Blue

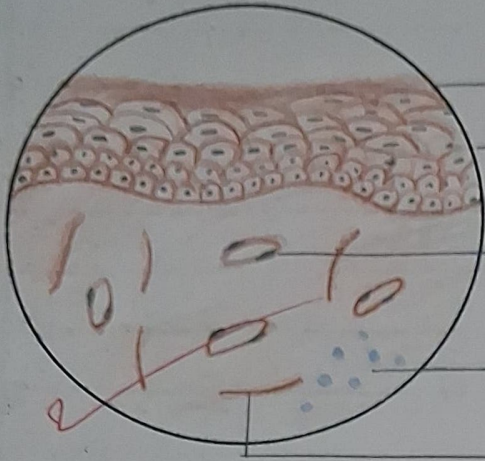
Basement membrane : Magenta



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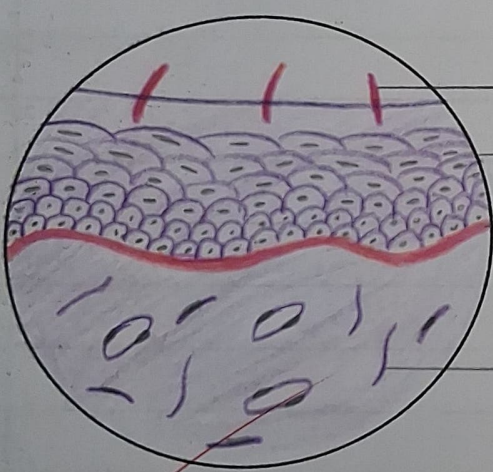
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PERL'S PRUSSIAN BLUE STAIN

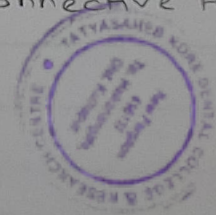


- Keratin
- Stratified squamous epi.
- Basement membrane
- Blood vessels
- Haemosiderin pigment
- Collagen fibers

PERIODIC ACID SCHIEFF STAIN

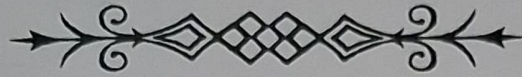


- Candida hyphae
- Epithelium
- Basement membrane
Stained magenta red
- Connective tissue

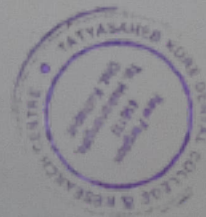


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Study of Cells



WARANA
HEALTH MOVEMENT



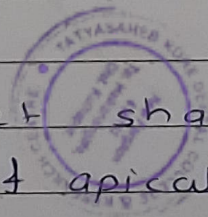
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1) Stratified squamous epithelium

- In stratified squamous epithelium the cells are arranged in different layers
- The basal cells are cuboidal in shape with central nucleus, arranged in single layer on the basement membrane
- The superficial cells are squamous or polyhedral in outline with centrally placed nucleus
- All these cells are attached to each other by desmosomal junctions

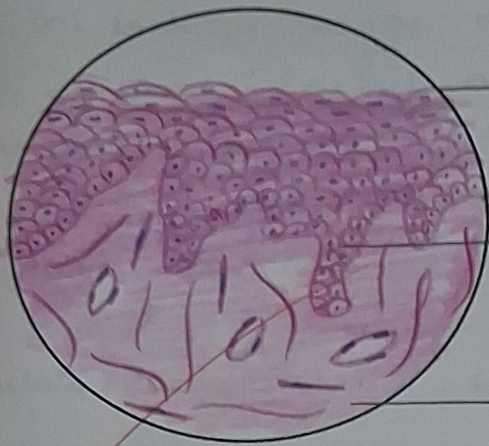
2) Pseudostratified ciliated columnar epithelium

- The cells of the ciliated columnar epithelium are columnar in shape of varying size arranged in a single layer on basement membrane
- The nuclei of cells are placed at different levels giving the erroneous appearance of stratification
- The cells on the superficial aspect have cilia which help in the movement of mucous secretory
- Among columnar cells unicellular secretory arranges called goblet cells are also noticed
- The Goblet cells are goblet shaped with a basally placed nucleus & apical cytoplasm filled with secretory products



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Stratified squamous Epi

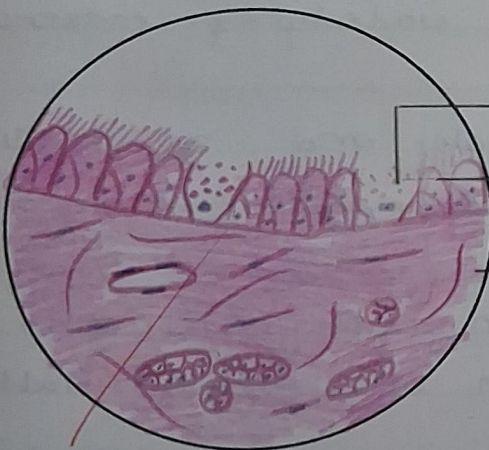


→ stratified squamous epithelium

→ cells arranged in different layers

→ connective tissue

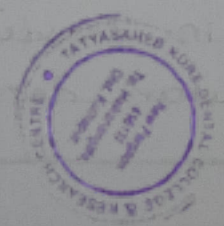
Pseudostratified ciliated columnar epithelium



→ Goblet cells

→ Pseudostratified ciliated columnar epithelium

→ connective tissue



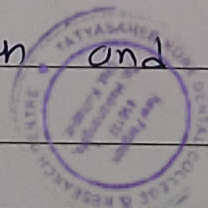
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3) AMELOBLAST

- 1) These cells are derived from inner epithelium 4-5 μm in diameter and 10 μm in height
- 2) Attached to one another by junction complex to stratum intermedium by desmosomes
- 3) They lay down enamel matrix and also take part in mineralization
- 4) characterised by polarised nuclei tall columnar body, hypochromatic nuclei

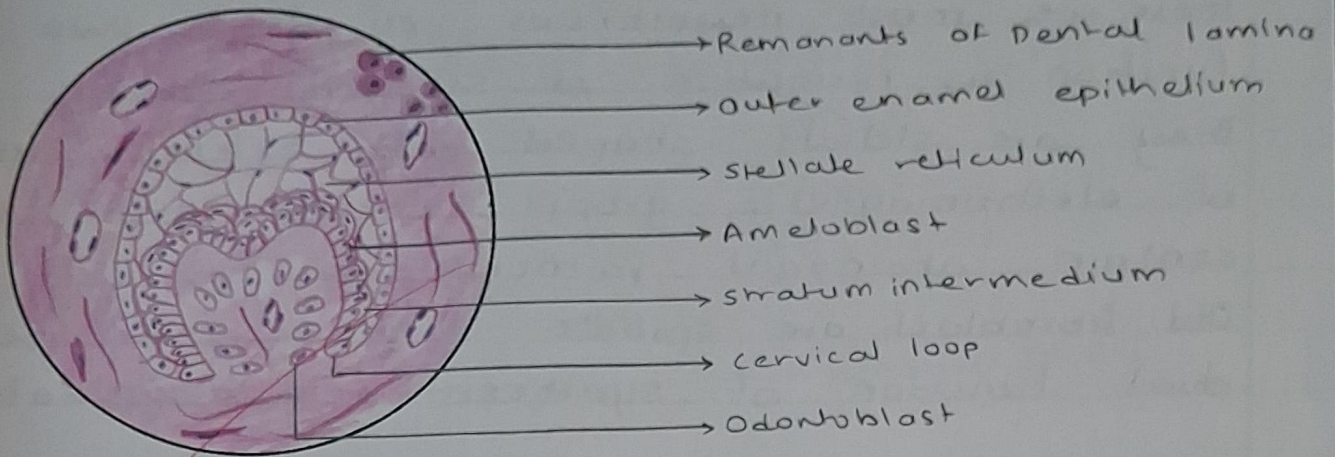
4) ODONTOBLAST

- 1) These cells are of dental papilla
- 2) They originate by organising influence of inner enamel epithelium on the underlying mesenchymal cells of dental papilla
- 3) They are 5-7 μm in diameter and 25-40 μm in length of different shape in different parts of tooth
- 4) They are tall columnar in coronal region cuboidal in cervical length and ~~differe~~ flattened in radicuar dentin

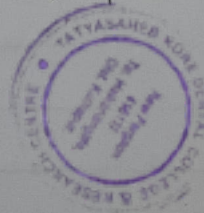
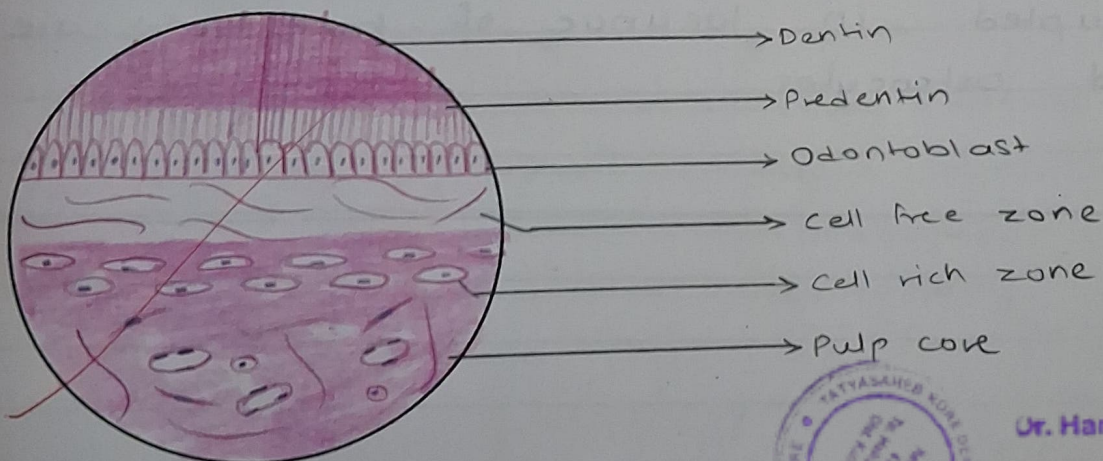


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Ameloblast



Odontoblast



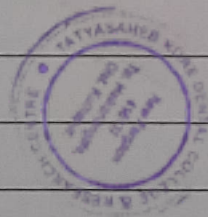
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5) Fibroblast and Fibrocytes

- These are most numerous cell of the pulp their function is formation of collagen fibres
- They are stellate shaped with extensive process of electomagnetic group reveals that they contain abundant mitochondria
- Old fibroblast are spindle shaped and have dual function of synthesis and degradation

6) Osteoblast and osteocyte

- These are bone forming cells
- They secrete type I collagen fibres as well as collagenous matrix of bone
- After lossening this function they get interrupted in lacunae of bone and are called osteocytes



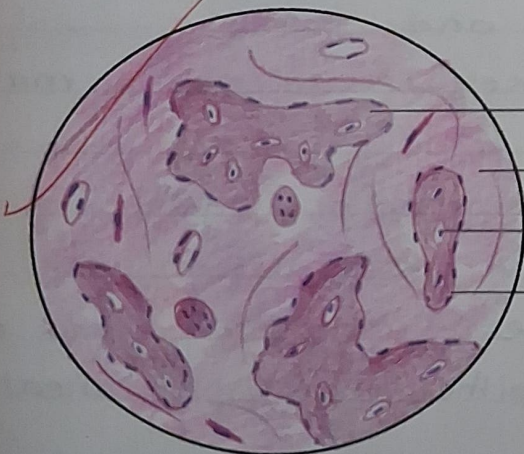
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Fibroblast and Fibrocyte

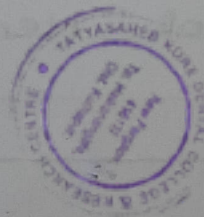


- Ground substance
- Blood vessels with RBC
- Endothelial cells
- Fibroblast
- Fibrocytes
- collagen fibers

Osteoblast and Osteocyte



- Bony trabeculae
- Bone marrow
- Osteocytes
- Osteoblasts



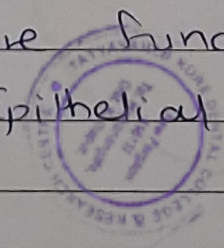
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7) Osteoclast

- They are bone resorbing cells
- They may be uninucleate or multinucleate
- They are formed in resorbing layers called Howship's lacunae
- Parts of cell in contact with the bone shows ruffled border - site of activities
- Ruffled border is surrounded by a clear zone having no organelle but only has fine granules cytoplasm with microfilaments

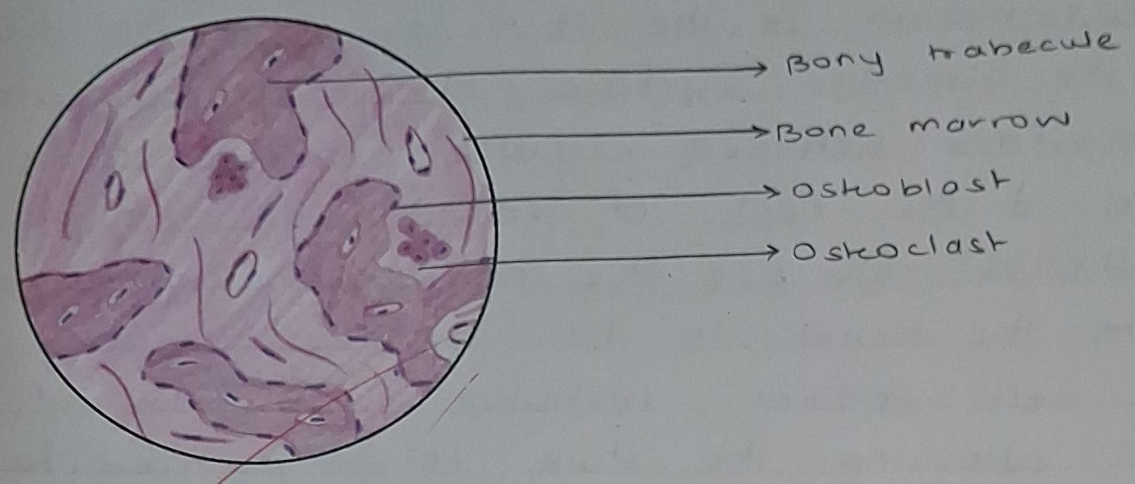
8) Cementoblast and Cementocytes

- Cementoblast form cementum
- They are formed from undifferentiated mesenchymal cells of dental follicle
- They synthesize collagen and protein polysaccharide which makes up organic matrix of cementum
- They have numerous mitochondria, golgi apparatus and endoplasmic reticulum
- Marginal cementocytes are functional and are removal of Hertwigs Epithelial root sheath

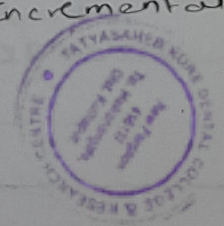
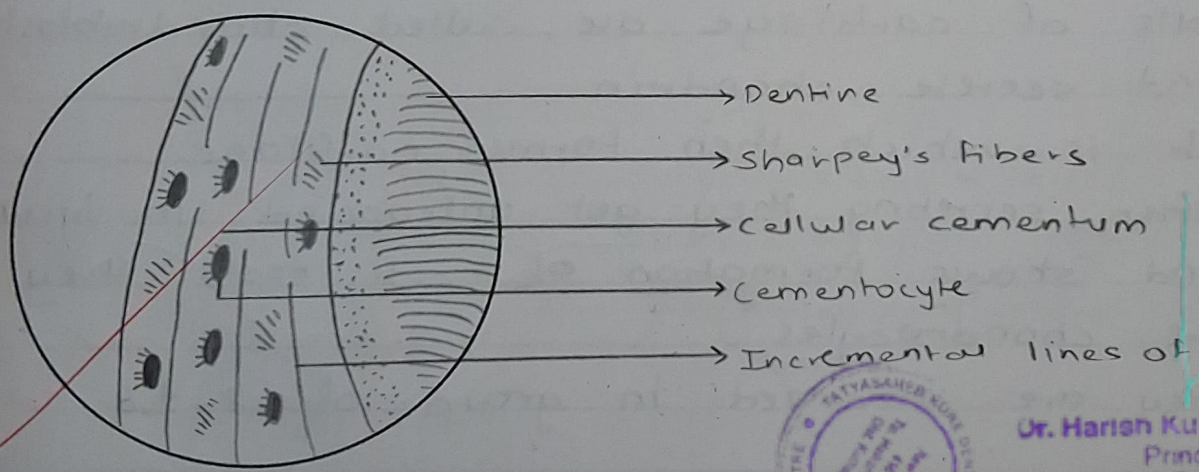


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Osteoclast



Cementoblast and Cementocytes



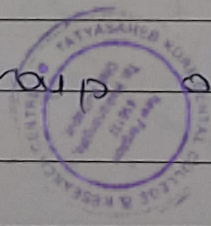
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9) Endothelial cells

- The endothelium is the thin layer of cells that line the interior surface of blood vessels, forming an interface between circulating blood in the lumen & the rest of vessel wall
- Endothelial cells line the entire circulatory system from the heart to the smallest capillary
- These cells reduce turbulence of flow of blood allowing the fluid to be pumped farther
- Function
 - Vasoconstriction & vasodilation
 - Blood clotting
 - Formation of new blood vessels

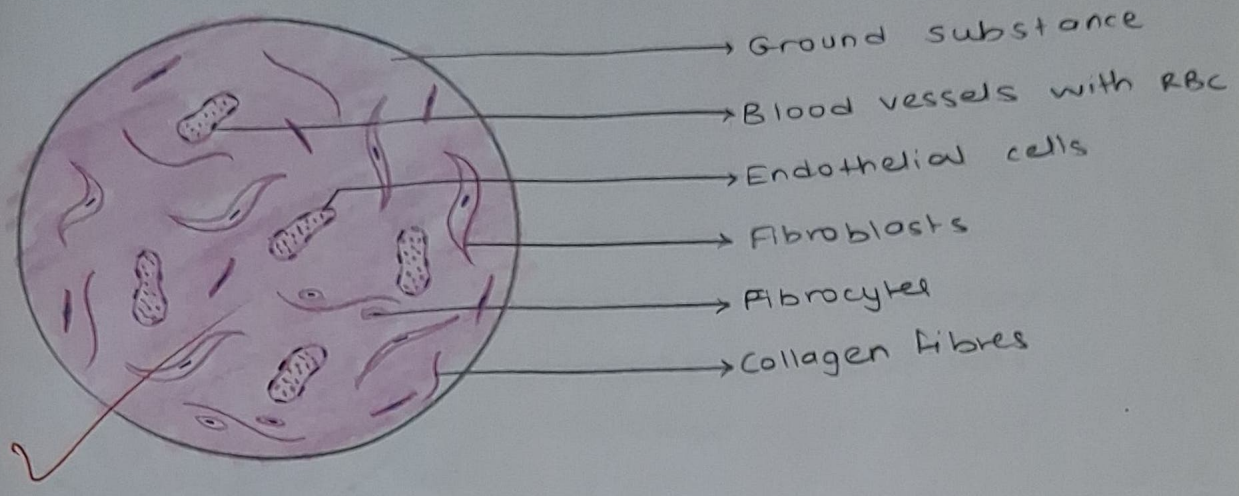
10) Chondroblast and chondrocytes

- Cells of cartilage are called chondroblast and secrete chondrin
- It is which then forms cartilage
- After secreting they get entrapped in lacunae and show formation of cell rests they are chondrocytes
- They are arranged in groups of 2, 4, 8

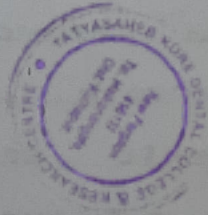
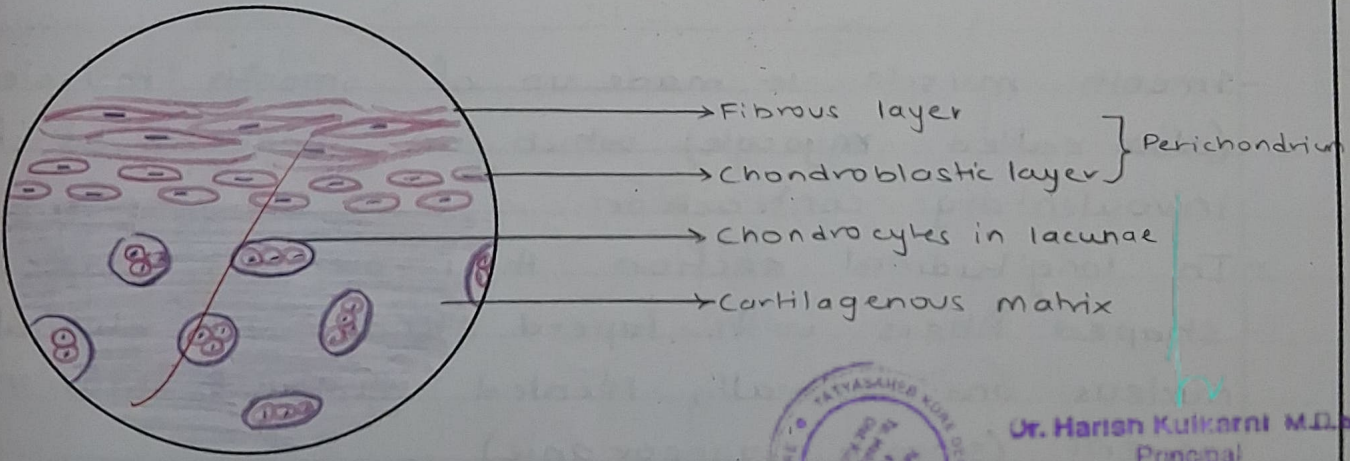


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Endothelial cells



Chondroblast and Chondrocyte



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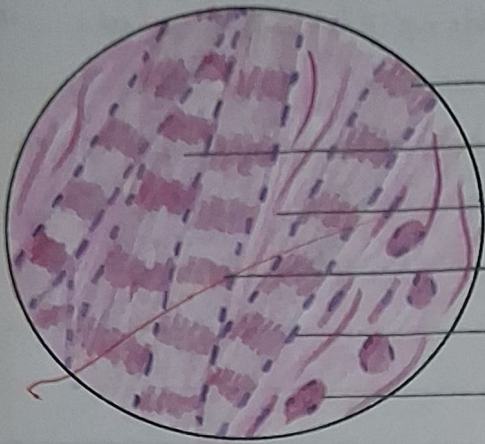
11) Striated muscle

- Striated muscle is seen as highly eosinophilic cylindrical like structure in a hematoxylin & eosin stain.
- Each muscle fiber is composed of many myofibrils. Fibers show characteristic transverse striations.
- Sarcoplasm is rich in cytoplasmic organelles.
- Nuclei are flattened, multiple & are located at the periphery.
- Muscles as whole enclosed in connective tissue called epimysium. This connective tissue extends inwards dividing muscle into fasciculi.
- These extensions are called perimysium from which again septa extend that invests individual muscle fibers.

12) Smooth muscle

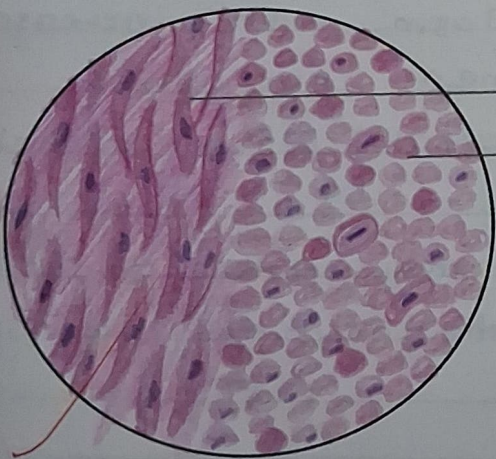
- Smooth muscle is made up of smooth muscle cells (also called myocyte) which are specialized for involuntary contraction.
- In longitudinal section they are long, spindle-shaped fibers with tapered ends with elongated nuclei and centrally located nuclei. Striations are absent (smooth appearance).
- In transverse section - it is circular and polygonal nuclei may not always be visible in all cells. In thin section if present it appears round and centrally placed.

Striated muscles

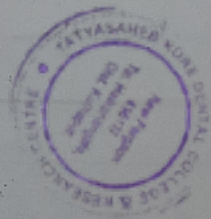


- Dark band
- Light band
- Intrafascicular connective tissue
- Striated muscle in longitudinal section
- Peripherally placed nucleus
- Striated muscle in cross section

Smooth muscle



- Longitudinal section
- Transverse section



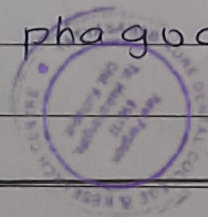
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13) Adipose cells

- They contain always large droplets of fat that always fill the cells
- Nucleus pushed towards periphery always it is flattened
- These cells are seen in benign tumor also called as lipoma

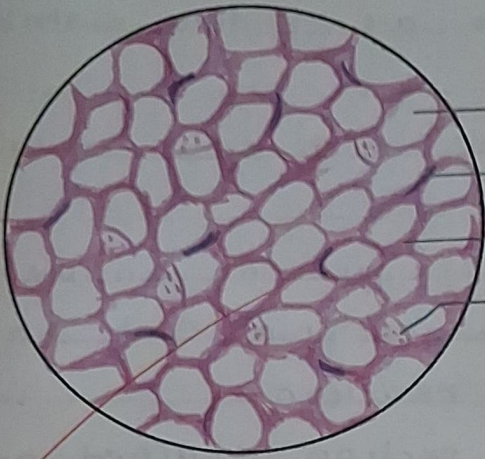
14) Macrophages

- Macrophages are irregular, short blunt processes small, round with granular cytoplasm
- When mature resemble fibroblast
- During inflammation these cells exhibit granules & vacuoles in their cytoplasm with increased nucleus size & a prominent nucleolus
- Usually associated with small blood vessels & capillaries
- Distinguishing features is aggregates of vesicles or phagosomes which phagocytized dense irregular body



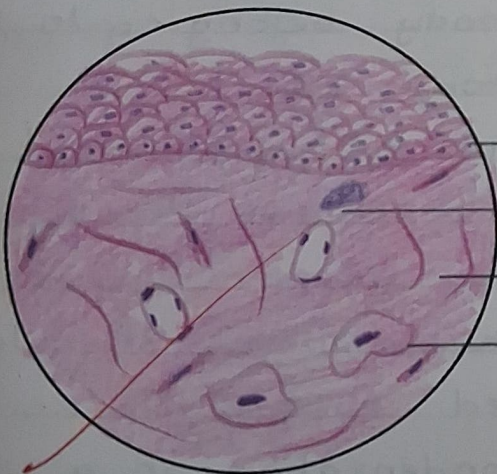
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Adipose cell

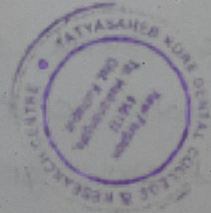


- Fat cells with empty cytoplasm
- Eccentrically placed nucleus
- Polygonal fat cell
- Endothelial cells

Macrophage



- Epithelium
- Mast cell's granules stained violet
- connective tissue
- Macrophage



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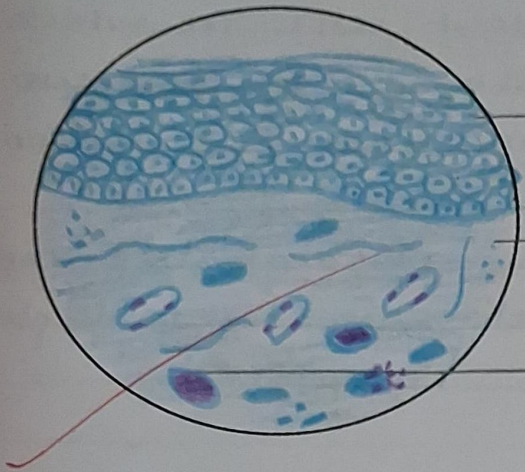
15) Mast cell

- These connective tissue cells are widely distributed in the oral mucosa
- Mast cells are round or ovoid with small centrally placed nucleus
- The cytoplasm contains granules rich in histamine, heparin & serotonin that have important role in allergic reaction
- These cells can be seen in section stained by toluidine blue as cells filled with purple coloured coarse granules
- Mast cells are concerned with inflammation & immune response

16) Plasma cell

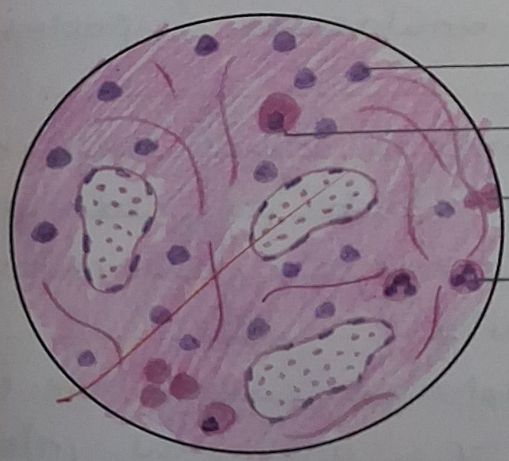
- These are defence cells of the body belonging to the group of chronic inflammatory cells
- Plasma cells are derived from B-lymphocytes & are specialized for synthesis of antibodies thereby imparting resistance to the body against disease
- They are ovoid in shape with basophilia of cytoplasm & eccentric oval or rounded nucleus
- Nucleus shows chromatin condensation in a radial pattern giving rise to cartwheel or 'clock face' appearance
- Plasma cells are seen in connective tissue of oral mucosa

Mast cell

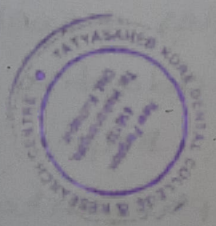


- Epithelium stained blue
- Connective tissue
- Mast cells granules stained violet / purple

Plasma cell



- Lymphocytes (small and large)
- Plasma cells with eccentrically placed nucleus
- Russel bodies
- Neutrophils



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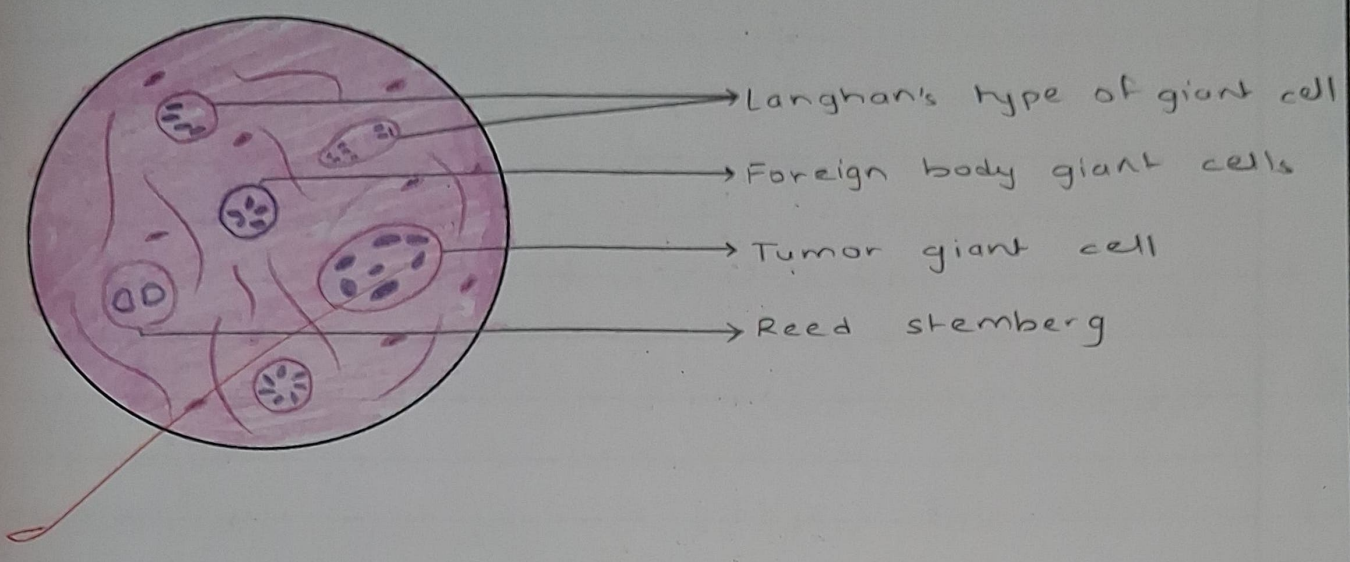
17) Giant cell

- These are multinucleated giant cells in which nucleus are uniform & similar to nucleus of macrophage epithelium cells are arranged in centre
- They are formed in chronic inflammation condition
- Giant cells are large cells having multiple nuclei dispersed in the cytoplasm

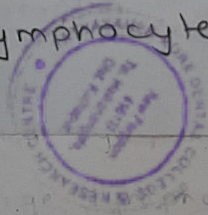
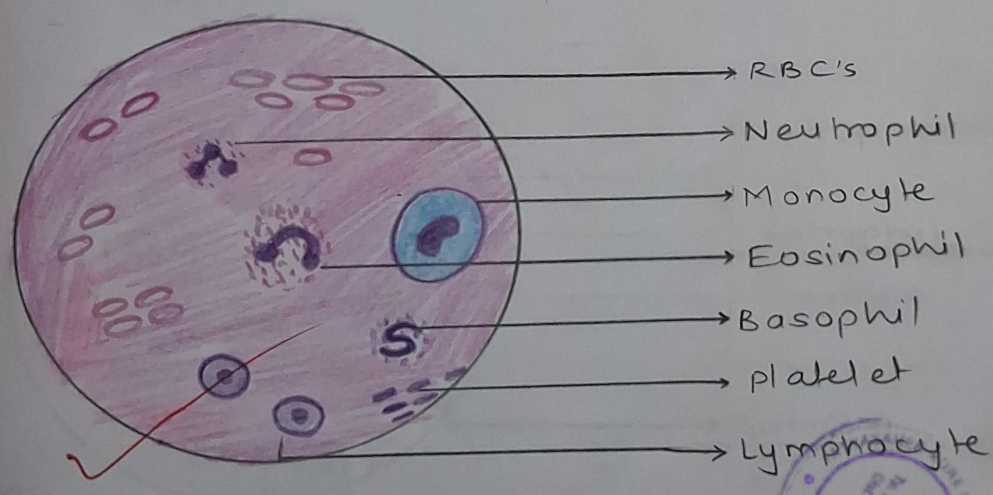
18) Peripheral blood smear

- It is used evaluate the different type of blood cells - RBC's, WBC's and platelets
- RBC's is biconcave in shape and help in nutrient transport and exchange in various gaseous exchange
- WBC's are divided into granulocytes (cytoplasm contains granules) and agranulocytes (cytoplasm without granules)
- Granulocytes contains neutrophils which help in phagocytosis eosinophils (which play role in allergic reaction) Basophils contains inflammatory reaction and hypersensitivity
- Agranulocytes contains lymphocytes play vital role in adaptive immunity and viral infection
- Monocytes help in chronic inflammation and antigen presentation

Giant cell



Peripheral blood smear

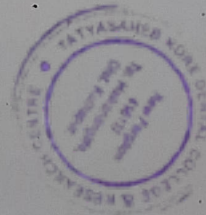


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Study of Development of Tooth



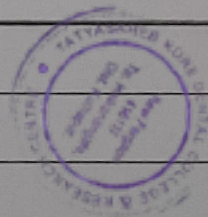
WARANA
HEALTH MOVEMENT



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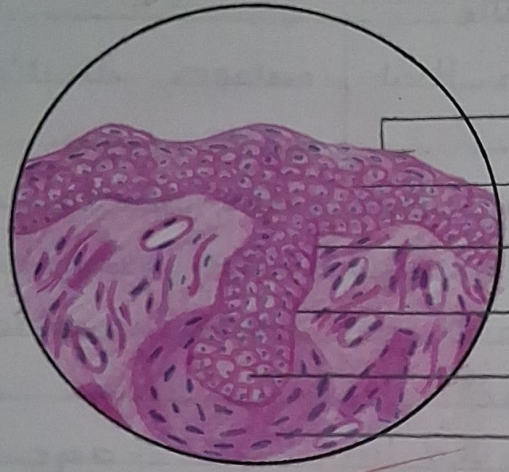
1) Bud Stage :-

- The primordia of teeth are seen as structures budding off from the basal layer of the oral ectoderm, lining the dental lamina. These buds form the enamel organ of tooth germ.
- In this stage the enamel organ is round or oval resembling a bud and stage hence this stage is referred to as bud stage.
- At this stage two types of cells are seen histologically:
 - a) Cuboidal - The cells lining the periphery of the bud are cuboidal cells.
 - b) Polyhedral - The cells which are centrally located are polyhedral in shape.
- The peripheral cells of enamel organ form dental papilla which in turn form dentin and pulp.
- Dental sac or dental follicle is formed by marginal condensation surrounding enamel organ and dental papilla - dental sac.
- Forms periodontal ligament, cementum and alveolar bone.
- The cells of the enamel organ in this stage are in the physiologic phase of proliferation.

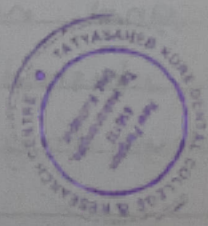


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BUD STAGE



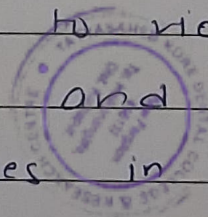
- Oral ectoderm
- Dental lamina
- Enamel Organ
- Peripheral Columnar cells
- Central Polyhedral cells
- Condensation of ectomesenchyme



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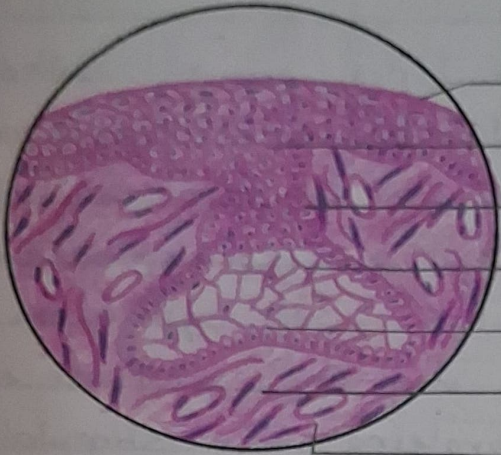
2) Cap stage :-

- The further growth of enamel organ is unequal and bud does not expand uniformly and it gradually expands into a cap shaped structure
- This results from an invagination that develops at its deeper part
- The convex surface of the cap faces the oral cavity
- At this stage, the tooth germ appears like a cap of enamel organ sitting on a ball of dental papilla both enclosed in dental sac
- 3 layers of cells are observed in cap stage
 - a) Inner enamel epithelium - The cells lining the inner part of enamel organ. The cells are columnar in shape and comparatively more condensed. This layer of cells differentiate dental papilla
 - b) Outer enamel epithelium - The cells lining the outer part of enamel organ. The cells are cuboidal in shape and differentiate dental sac
 - c) Stellate reticulum - Also called as enamel pulp, it is present between inner and outer enamel epithelium. It is a layer of star shaped cells, the functions of which are cushion effect provider acting as shock absorber and nutritive due to rich GAG content
- Proliferation, histodifferentiation and morphodifferentiation are the physiological changes in this stage

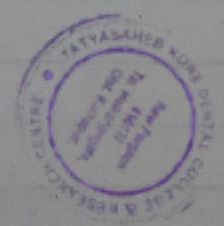


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CAP STAGE



- Oral ectoderm
- Dental lamina
- Outer enamel epithelium
- Stellate Reticulum
- Inner enamel epithelium
- Dental papilla
- Dental sac



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3) Early bell stage :-

- During this stage, the enamel organ enlarges and invagination deepens further to resemble a bell
- 4 cell layers are observed

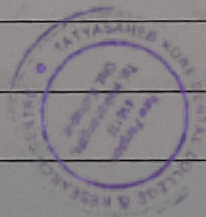
a) Inner enamel epithelium : The inner enamel epithelial cells become fully functional ameloblasts and later changes its shape according to function it performs. Later it becomes a part of reduced enamel epithelium

b) Stratum intermedium - 2-3 layers of squamous cells appear, intermediately above the inner enamel epithelium. Storage and synthesis of proteins and stimulating cells of inner enamel epithelium to get modified into ameloblasts are its functions

c) Stellate reticulum - The star shaped cells are tightly attached to each other by desmosomes

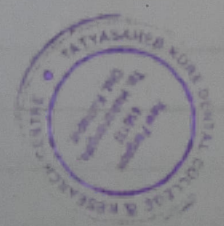
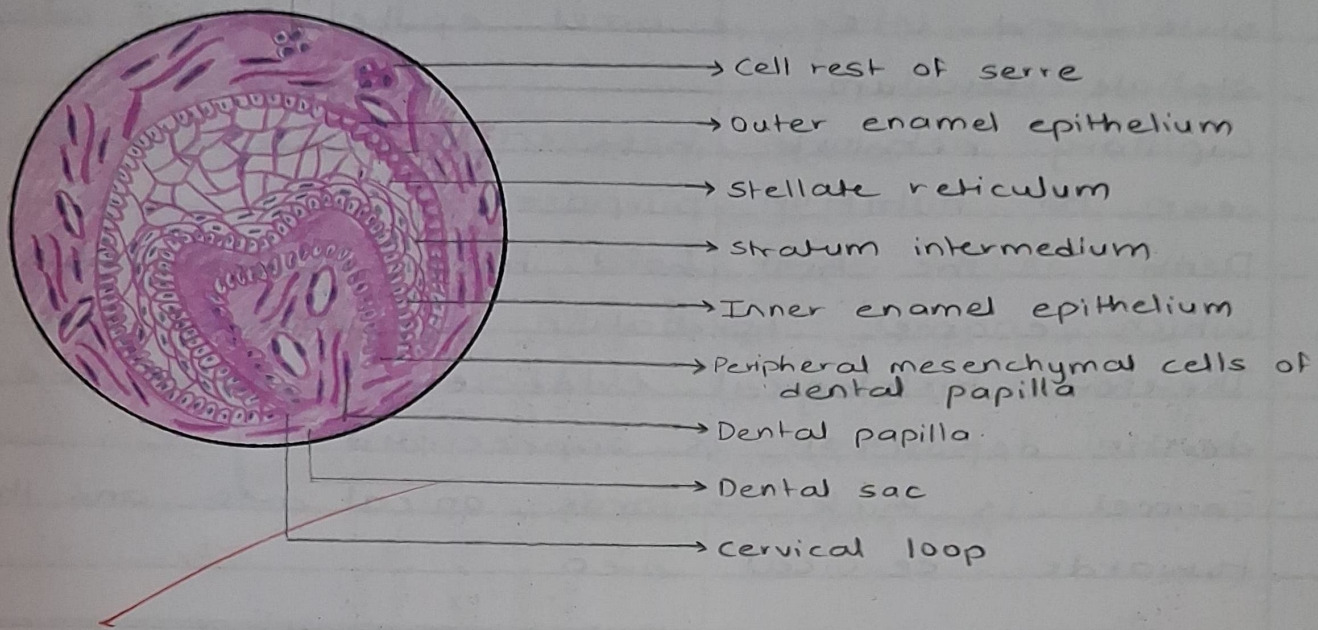
d) Outer enamel epithelium : It holds the content of enamel organ. Along with inner enamel epithelium it forms reduced enamel epithelium and Hertwig's epithelial root sheath

- Histodifferentiation and morphodifferentiation are the physiological changes that occur in this stage



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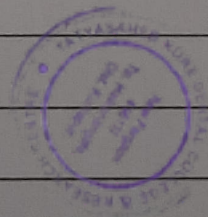
EARLY BELL STAGE



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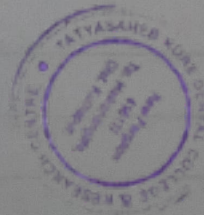
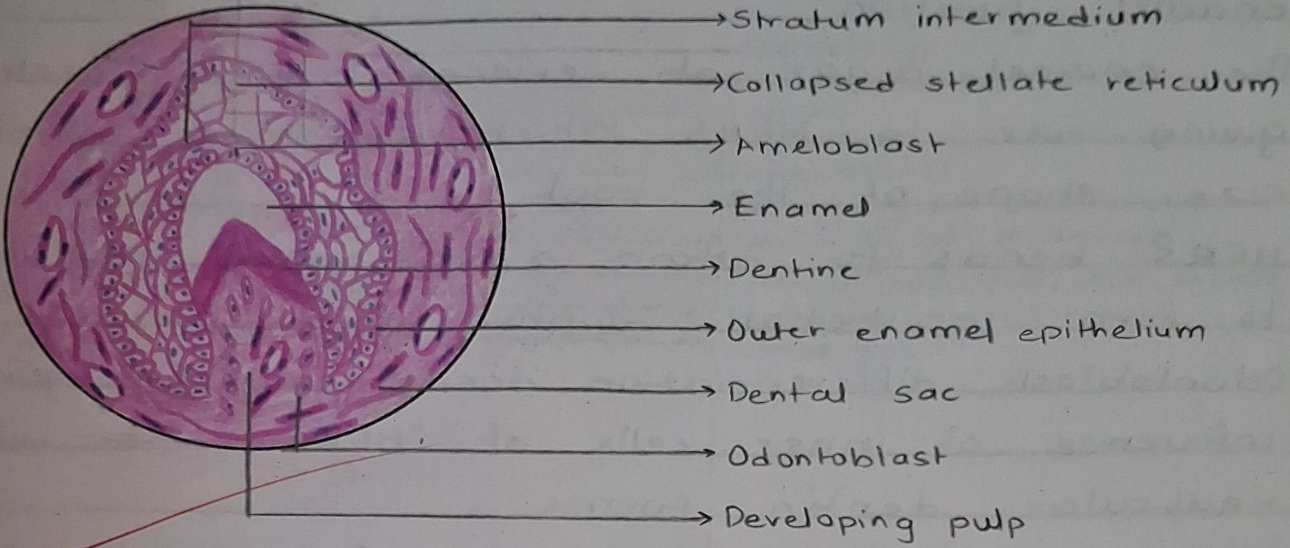
4) Advanced bell stage

- This stage is marked by folded appearance of outer enamel epithelium, reduced distance between outer and inner enamel epithelium and collapsed stellate reticulum
- Capillary network between shrunken foldings is seen for nutrition purpose
- Dentin is the first hard tissue formed here, after which enamel formation is initiated
- Therefore histological evidence of enamel and dentin deposition is appreciated
- Enamel is thick towards apical area and thinner towards cervical area



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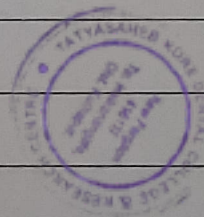
ADVANCED BELL STAGE



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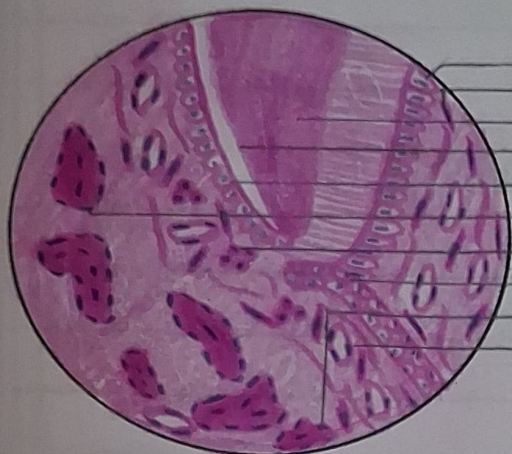
5) Root Formation

- It begins after enamel and dentin formation reaches the cervical region at future cemento-enamel junction
- The enamel organ at cervical loop proliferates giving rise to HERS which determines number, size, shape of the root
- HERS bends to attain a horizontal position to form epithelial diaphragm
- Odontoblast differentiation occurs under the influence of inner cells of HERS, after which radicular dentin forms
- After formation of 1st layer of radicular dentin HERS degenerates and its remnants remain back called as cell rests of Malassez
- From dental follicle differentiation of cementoblasts takes place, leading to cementum formation
- Therefore, orientation of periodontal ligament takes place



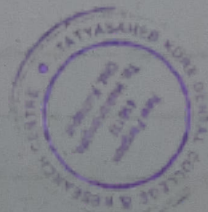
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DEVELOPEMENT OF ROOT



- Odontoblast
- Dental papilla
- Dentine
- Cementum
- Cementoblast
- Developing periodontal ligament
- Cell rest of Malassez
- Hertwig's epithelial root sheath
- Developing alveolar bone
- Dental sac

Handwritten notes in red ink:
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 17/2/20



Handwritten signature in blue ink:
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