Oral Histology 2nd stage

Lab 7

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Enamel Structures

Enamel is the hardest calcified tissue in the human body due to its high mineral content and crystalline organization. Its main function is to form a protective, resistant covering for teeth during mastication.

Chemical Composition

- 96% inorganic (Hydroxyapatite crystals), 4% organic matter and water
- Organic matrix consists of non-collagenous proteins:
- Function: guide crystal growth and orientation.

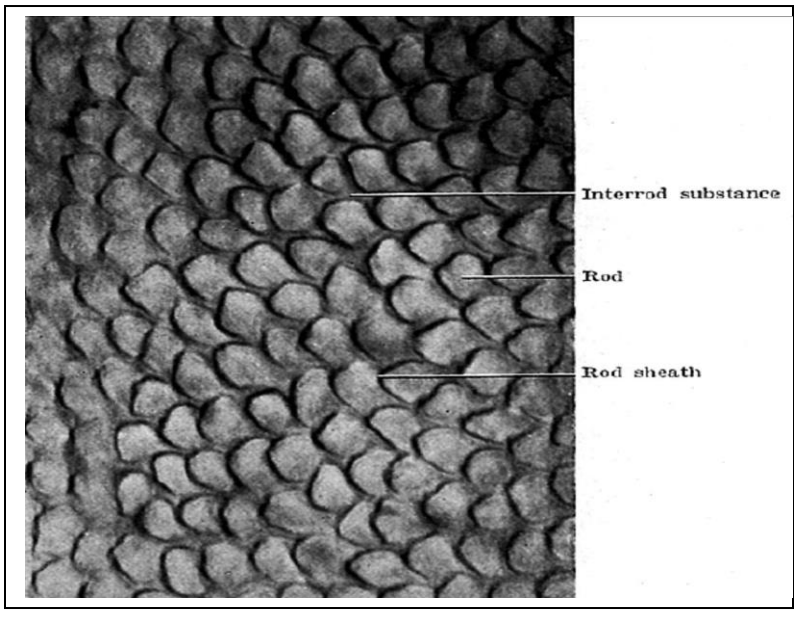
Physical Properties

Hardest but brittle tissue ,needs dentin support .Translucent, color varies from whitish to light yellow.Permeable to fluids and bacteria due to microcracks and pores.

Structure of Enamel

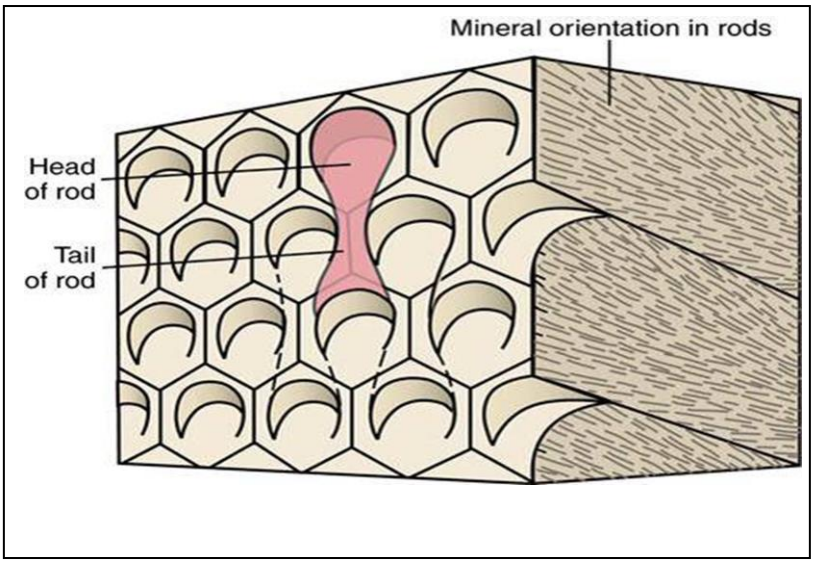
1-Enamel rods (prisms) 2- Rod sheaths 3-Inter-rod substance.

Structure of enamel



- Rods extend from the DEJ to the surface toward cusp tips. Formed by Tomes' process of ameloblasts.
- Rod sheath: thin organic layer separating rod and interrod enamel.
- Cross section: keyhole shape — head (incisal) and tail (cervical).

keyhole-shaped enamel rods →

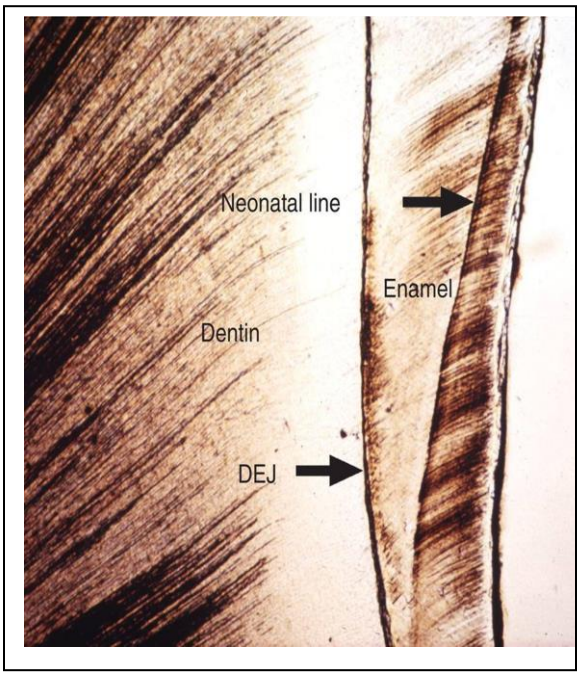


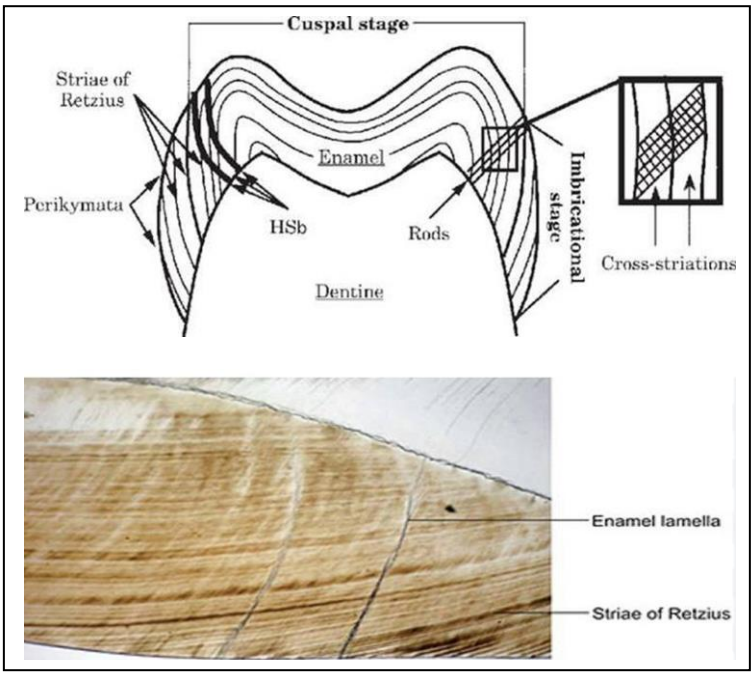
Incremental Lines of Enamel

1-Cross striations: are periodic lines seen along enamel rods, appearing like ladder rungs. They represent the daily incremental growth of enamel (≈ 4 µm per day).

2-**Striae of Retzius**: weekly growth lines; appear as concentric rings; terminate as perikymata on surface.

3-**Neonatal Line**: pronounced Retzius line formed at birth, separating prenatal from postnatal enamel.





Incremental lines of enamel

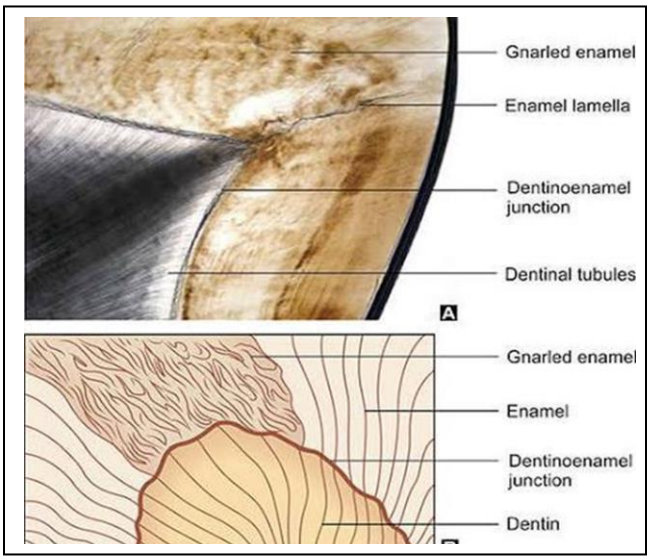
Histological Features

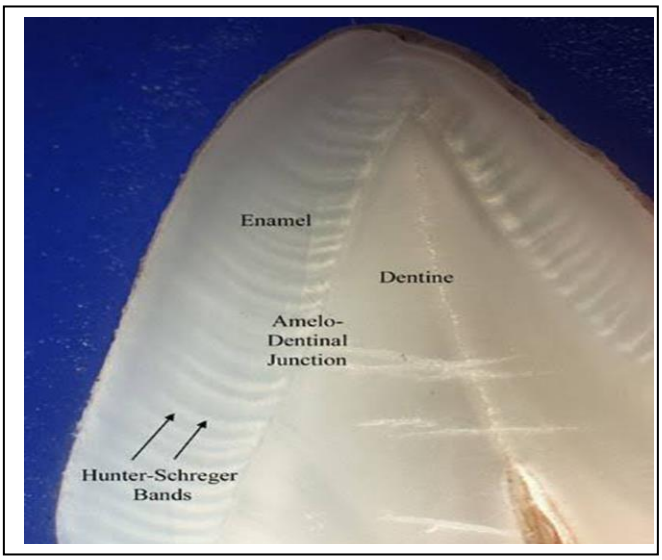
Gnarled Enamel : twisted rods at cusp tips; increases strength.

Hunter-Schreger Bands :optical light/dark bands due to rod orientation.

Enamel Spindles : trapped odontoblastic processes crossing DEJ.

Enamel Tufts: protein-rich (enamelin) structures extending from DEJ into enamel; possible bonding sites with dentin.

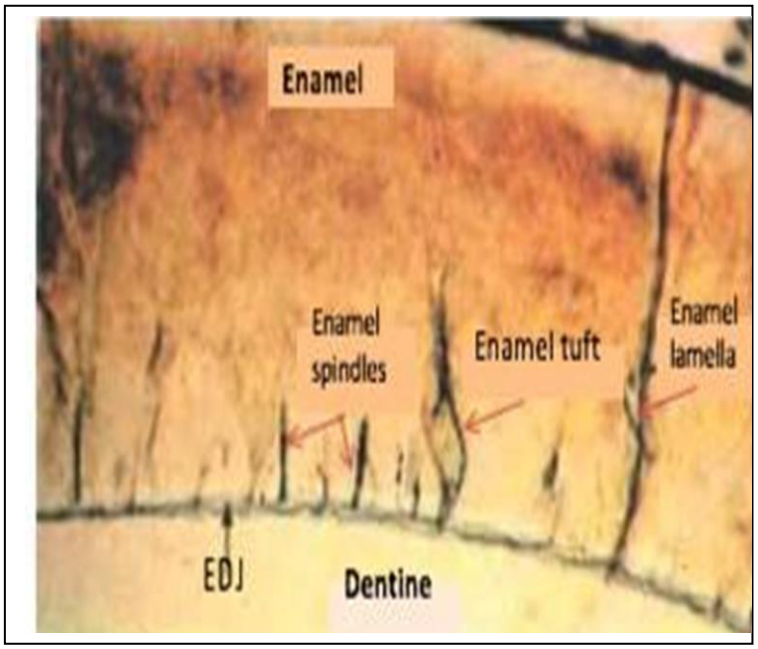




Gnarled Enamel

Hunter-Schreger Bands

Enamel Spindles & Enamel Tufts



Surface Structures

Perikymata : external manifestations of Retzius lines; fine, wave-like grooves near CEJ.

Enamel Cuticle: secreted by ameloblasts after enamel formation; removed after eruption.

Enamel Pellicle: salivary protein film protecting enamel, may reduce bacterial attachment.

Enamel Lamellae : thin, organic leaf-like structures extending from surface toward DEJ; develop along stress planes.

Rodless Enamel : 30 µm thick layer without prisms, found near DEJ and outer surface; common in cervical areas and deciduous teeth ~~Enamel Structures~~

Rodless enamel