Development of tooth
Primitive oral cavity or stomodeum is lined by stratified squamous epithelium

Oral ectoderm

Certain areas of basal cells of oral ectoderm proliferate more rapidly – epithelial band
Forms a continuous horseshoe shaped band of thickened epithelium in the location future dental arches of upper and lower jaws – *Primary Epithelial Band*
Primary epithelial band

Vestibular lamina

Dental lamina
DENTAL LAMINA

- Serve as primordium for the ectodermal portion of the deciduous teeth.
- Dental lamina appears as a thickening of the oral epithelium adjacent to condensation of ectomesenchyme
- Forms when the embryo is about 6 weeks old
Successional lamina

- Lingual extension of dental lamina
- Develops from 5th month in utero

The distal proliferation of the dental lamina is responsible for the location of germs of permanent molars in the ramus of the mandible & tuberosity of the maxilla
VESTIBULAR LAMINA
LIP FURROW BAND

- Proliferation of vestibular lamina leads to the formation of vestibule
- Cells rapidly enlarge & then degenerate to form a cleft which becomes the vestibule between the cheek & tooth-bearing area
Certain points along the dental lamina, each representing the location of one of 10 mandibular & 10 maxillary deciduous teeth, ectodermal cells multiply more rapidly & grow into the underlying mesenchyme.

Downward growths represent the beginning of enamel organ.
As cell proliferation continues, each enamel organ increase in size & changes in shape.

Ectomesenchymal cells surrounding the E.O condense forming dental papilla
- Surrounding the combined enamel organ & dental papilla – dental sac.
- Enamel organ – enamel
- Dental papilla – dentin & pulp
- Dental sac – cementum & periodontal ligament
Developmental Stages

Bud
Cap
Bell

Advanced bell stage
Bud Stage

- Enamel organ consists of peripherally located low columnar cells & centrally located polygonal cells
- Due to increased mitotic activity – ectomesenchymal cells condense - D.P
Cap Stage

- Tooth bud proliferates forming the shape of cap which is characterized by a shallow invagination on the deep surface of the bud

- Convexity – peripheral cells are cuboidal
- Concavity – tall, columnar cells

- O E E & I E E are separated by a delicate basement membrane
Stellate Reticulum

- Polygonal cells located in the center begins to separate as more intercellular fluid is produced & form a cellular network
Cellular Network

Mucoid - Rich in albumin

Cushionlike consistency that may support & protect the delicate enamel – forming cells
Enamel knot

- Densely packed cells in the center of EO forms enamel knot

**Enamel cord** — vertical extension of EO

- Acts as a reservoir of dividing cells for the growing EO
Dental Papilla

- Active budding of capillaries & mitotic figures are seen
- Peripheral cells adjacent to IEE enlarge & later differentiate into odontoblasts

Dental sac

Dense & more fibrous layer develops
Epithelial enamel organ, dental papilla & dental sac are the formative tissues for an entire tooth & its supporting structures.
Bell Stage

Enamel organ assumes a bell shape as the invagination of the epithelium deepens.

Inner enamel epithelium
Stratum intermedium
Stellate reticulum
Outer enamel epithelium
Bell stage
DENTAL PAPILLA

CERVICAL LOOP

O E E

I E E
**Inner enamel epithelium**

- **Consists of single layer of cells** – tall columnar cells - ameloblasts

- **Cells** - 4 to 5 micrometers in diameter

- **Elongated cells** are attached to one another by junctional complexes
Stratum Intermedium

- Layers of squamous cells forming between inner enamel epithelium & stellate reticulum
- Closely attached by desmosomes
- Well developed cytoplasmic organelles, glycogen deposits - indicate high degree of metabolic activity
Stellate Reticulum

- Star shaped cells – long processes
- These cells collapse reducing the distance between centrally situated ameloblasts & O E E
O E E

- Flatten to a low cuboidal form
- During formation of enamel, smooth surface of OEE is laid in folds
- Adjacent mesenchyme of the dental sac forms papillae – capillary loops – rich nutritional supply
Dental papilla

- Enclosed in the invaginated portion of the enamel
- Peripheral cells of the dental papilla differentiate into Odontoblasts - Cuboidal - columnar form
Dental sac

- Fibers of the dental sac differentiate into the periodontal fibers
- Fibers get embedded in the developing cementum & alveolar bone

Advanced bell stage

Boundary between IEE & odontoblasts outlines the future dentinoenamel junction