Alveolar Bone & Maxillary sinus

By

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Learning objectives

I. **Definition** of Alveolar bone

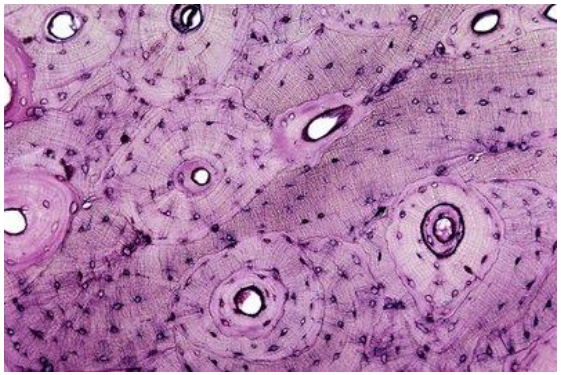
II. **Parts** of Jawbone

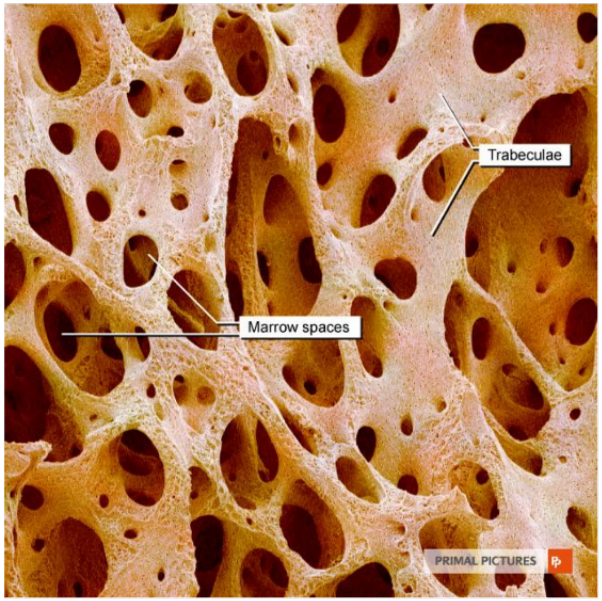
III. **Histological types** of bone

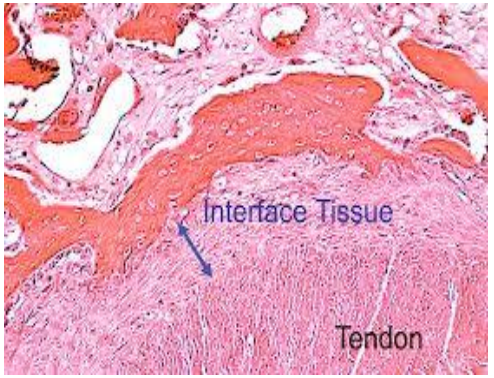
IV. Basic structure of **maxillary sinus**

Histological types of bone

- Lamellar (Adult)
  - Compact
  - Cancellous
- Woven (Developing) +(Healing)



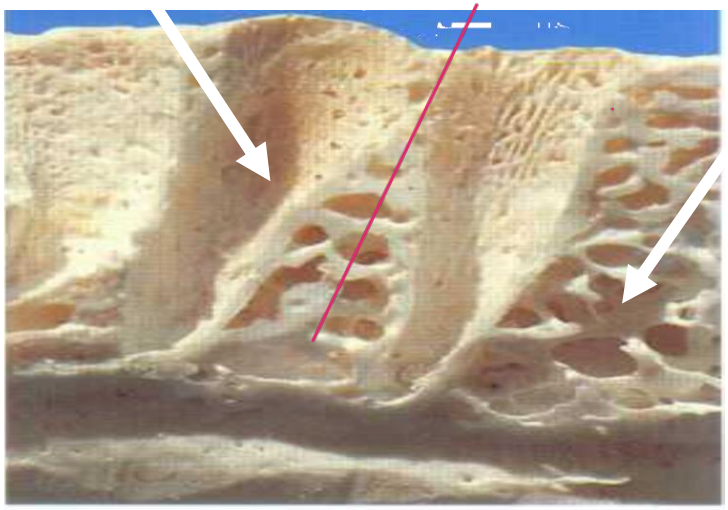


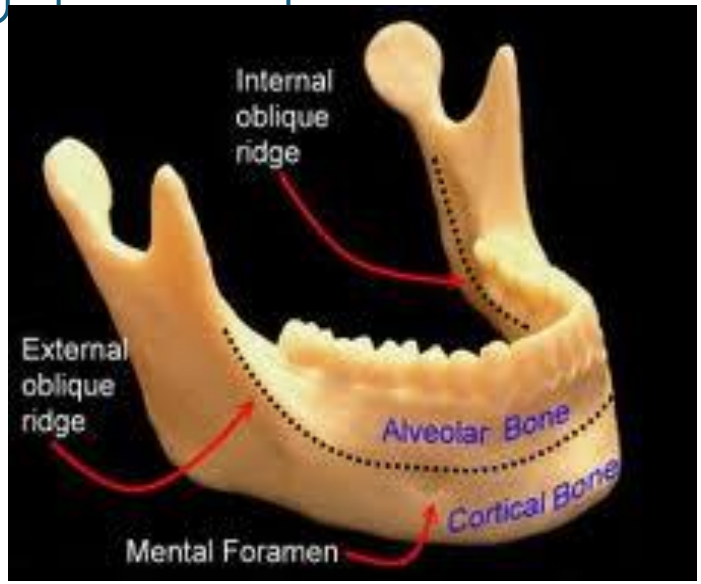


Alveolar bone

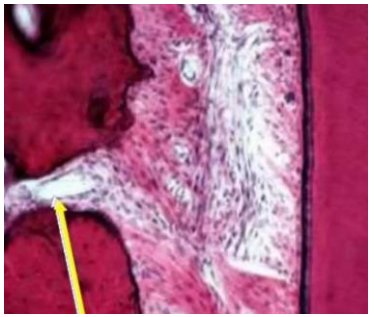
Definition: part of the maxilla & mandible that forms & supports the crypt of developing teeth and sockets of erupted teeth

- Jaw bone
  - 1.Alveolar bone
    - i.proper
      - A.Bundle
      - B.compact
    - ii.supporting
      - A.cortical
      - B. spongy
  - 2.Basal bone





1. Alveolar bone (alveolar process)



i. Alveolar bone proper (Cribriform Plate)

- Called cribriform plate as it is perforated by many canals which carry branches of the **intra-alveolar nerves** and blood vessels into PDL

- A thin lining of the tooth **socket** or alveolus

- **Function:** gives **attachment** to the principal fibers of PDL

- **Composition:** Bundle & Lamellated bone

A- Bundle Bone (Lamina Dura)

- part of the alveolar process into which the fiber **bundles of PDL** insert (**Sharpay`s fibers**) that are perpendicular to the resting/ incremental lines.

- In X-ray, it is called the **lamina dura** because of an increased **radio-opacity**. This apparent density is due to **thick bone** not to any increased mineral content

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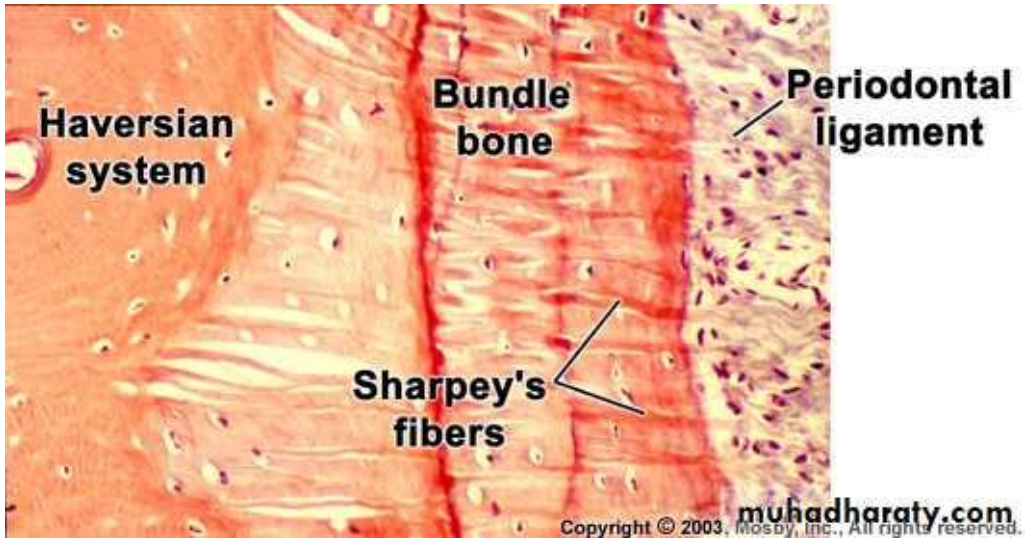
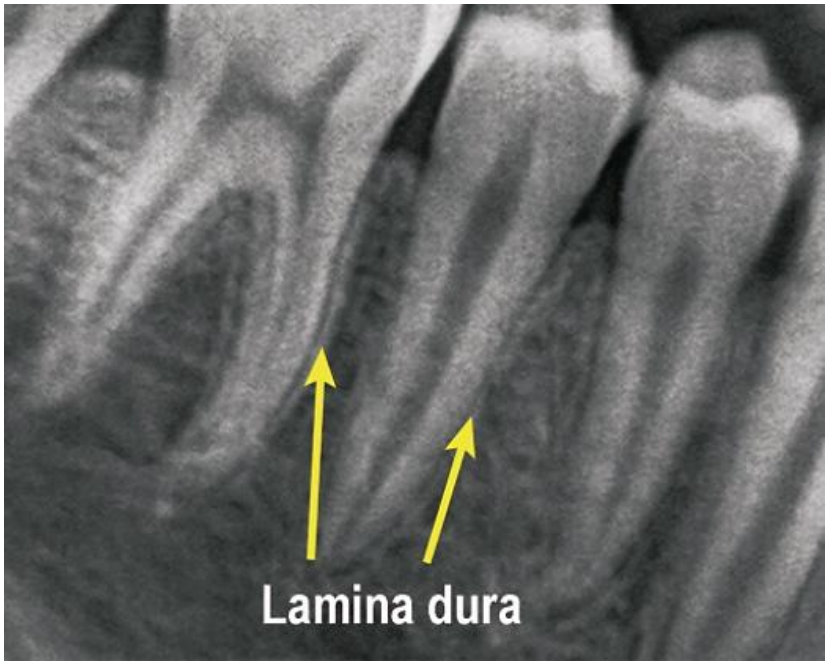
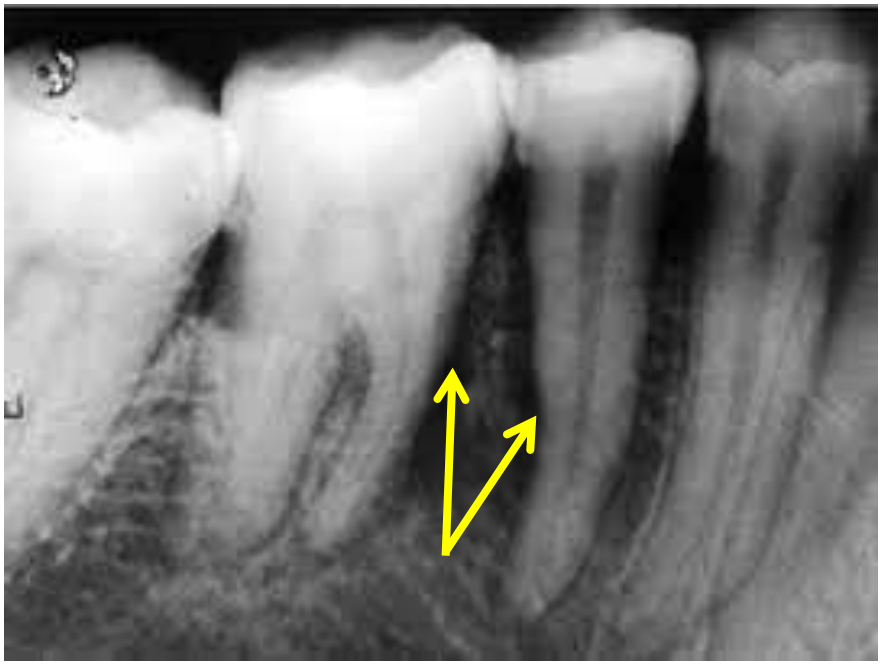


Clinically: The lamina dura is an important diagnostic landmark in **determining the health** of the periapical tissues as Loss of density usually means **infection**, **inflammation**, and **resorption** of this bony socket lining



Healthy periapical tissues with normal lamina dura

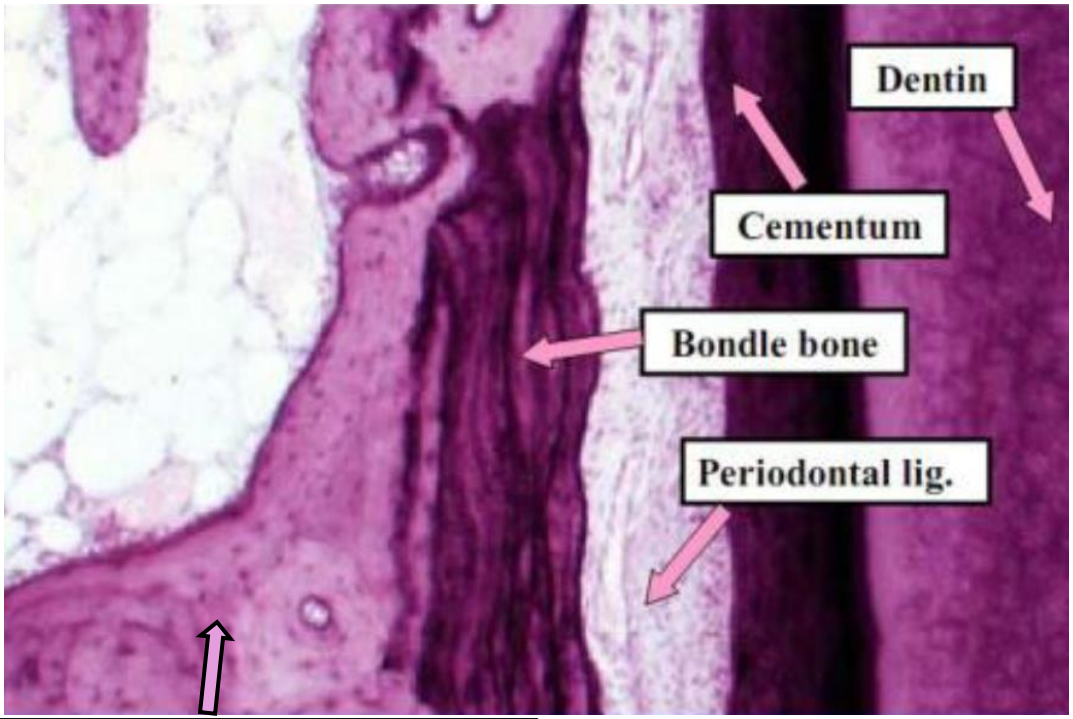


Unhealthy periapical tissues with loss of lamina dura (arrow)

B- Lamellated Compact Bone

- Lamellated bone lies **adjacent** to the bundle bone layer

- It is formed of **lamellae** that are arranged **parallel** to the surfaces of adjacent marrow spaces, or form **Haversian system**



Lamellated Compact Bone

ii. Supporting alveolar bone

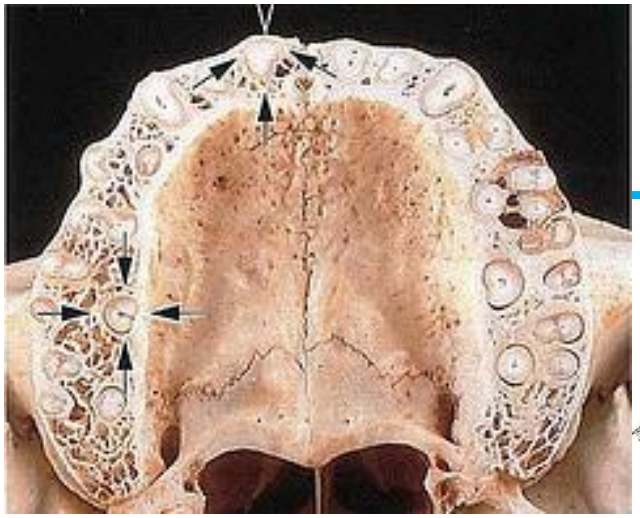
A- Cortical Plate of Compact Bone

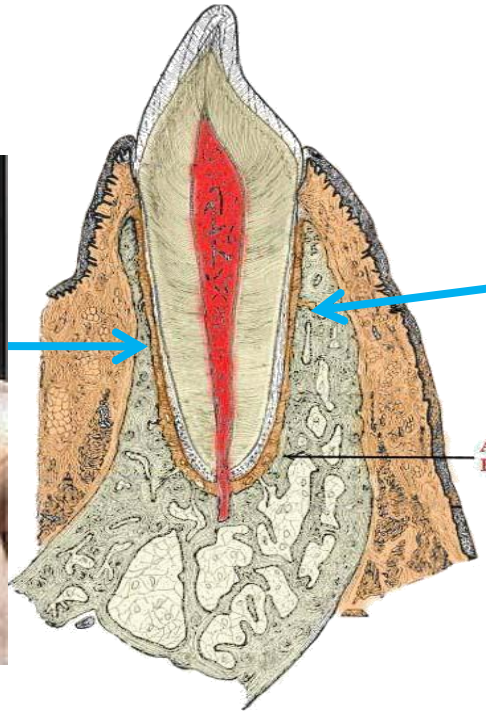
- Consists of compact bone and forms **outer and inner plates** of alveolar processes

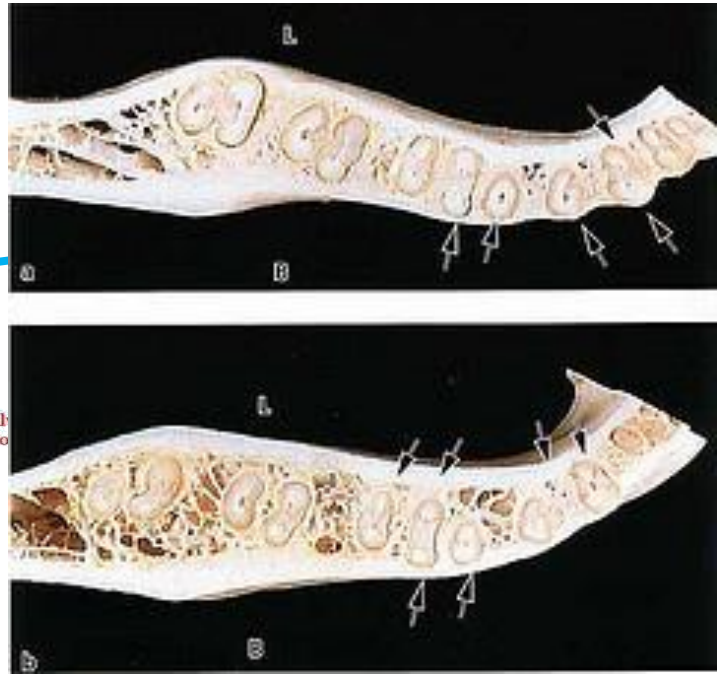
- **Thinner** in the **maxilla** than in the mandible.

-In the **anterior region of both jaws**, the supporting bone usually is **very thin**, no spongy bone is found, and the cortical plate is fused with the alveolar bone proper

-Thickest in the **premolar** and **molar** regions of both jaws especially on the buccal side







B- Spongy bone / Cancellous bone

found between the **cortical plates** and the **alveolar bone proper**. Radiographic studies classified of spongiosa of the alveolar process into two main types;

Type 1

-The interdental and interradicular trabeculae are **regular and horizontal in a ladder like** arrangement

-Seen most commonly in the **mandible**.

Type 2:

-Shows **irregularly** arranged numerous delicate interdental and interradicular trabeculae

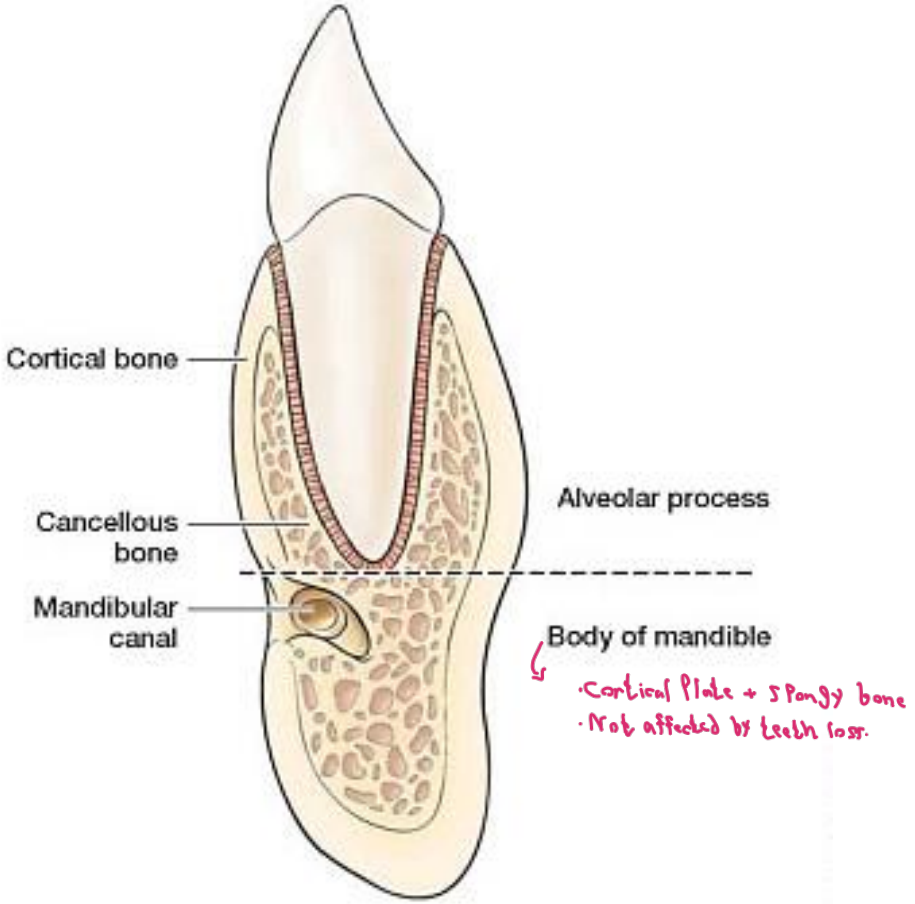
- Seen most commonly in **maxilla**.

Type I

Type II

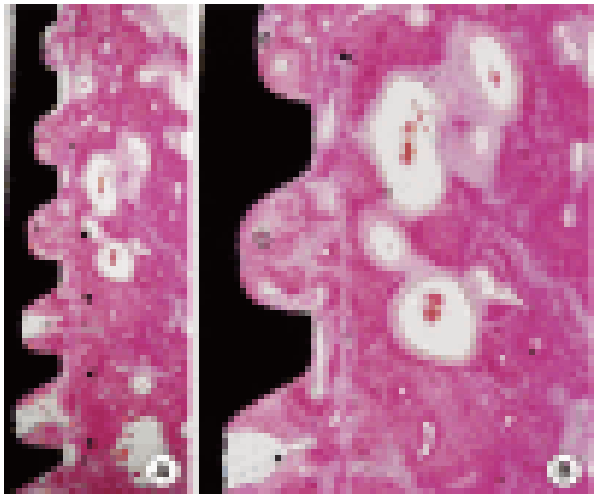
2. Basal bone

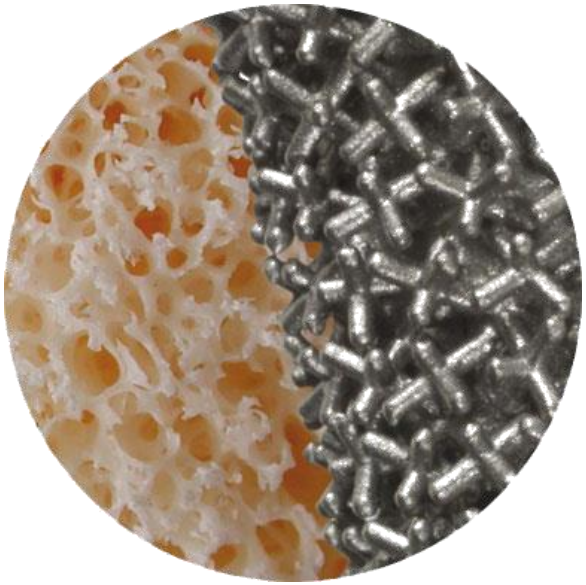
- **Location:** apical to the roots of the teeth
- **Function:** forms the body of the maxilla and mandible



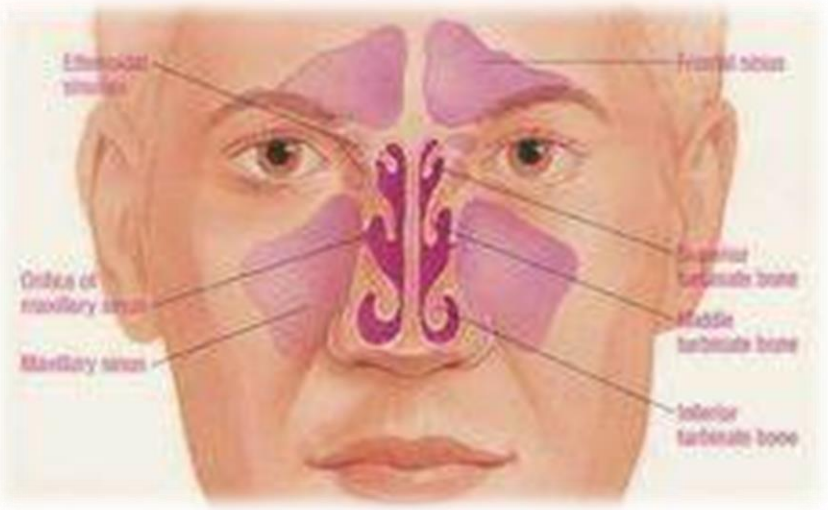
Osseointegration

- It Is the direct **structural and functional connection** between living bone and the surface of a load-bearing artificial implant.
- when pure titanium comes into direct contact with the living bone tissue, the two literally grow together to form a permanent biological adhesion.





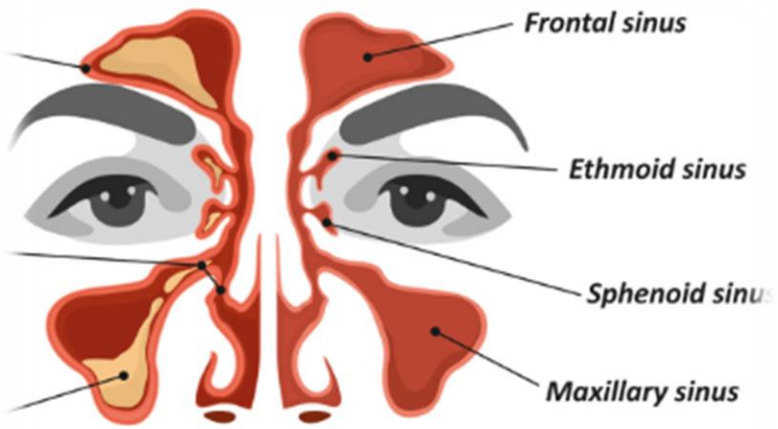
Maxillary sinus



Maxillary sinus (Antrum of Highmore

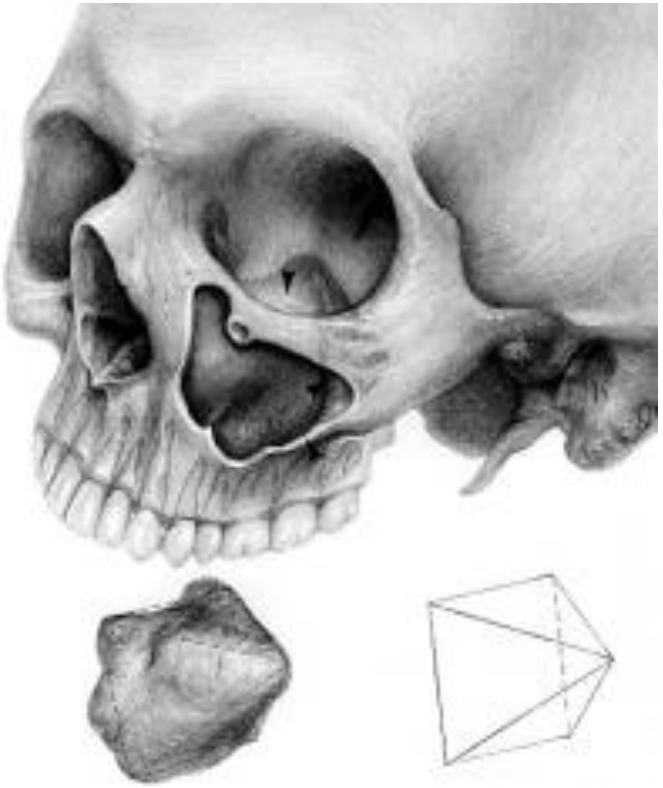
Air filled cavity

It is the **largest** bilateral sinus in the body of maxilla and opens into the nasal cavity

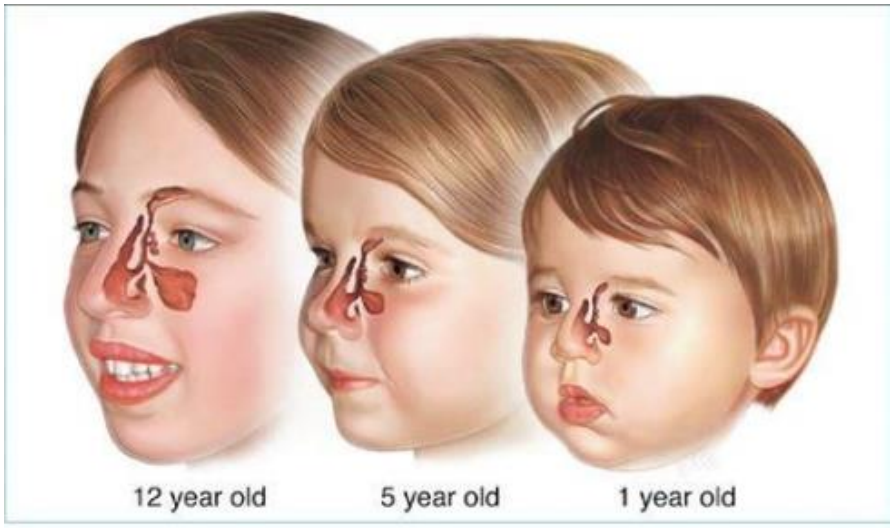


It is **pyramidal** in shape with 6 walls

1. **Base:** lateral wall of nasal cavity
2. **Apex**: into the zygomatic process
3. **Anterior wall**: Facial surface of maxilla
4. **Posterior wall:** Infront of infratemporal surface
5. **Roof :** Orbital surface
6. **Floor:** Alveolar process.



- It is developed in **the 16th WIU**
- Grow by **pneumatization**

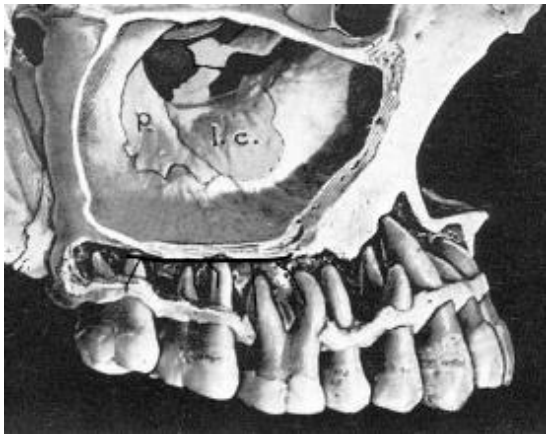


Relation to the teeth

A**) Deciduous**: Maxillary D**>** E**>** C

B) **Permanent:**

Maxillary 2nd **>** molar 1st **>** Molar 3rd molar **>** premolar**>** very rarely canine



Clinically: be careful during minor oral procedures as:

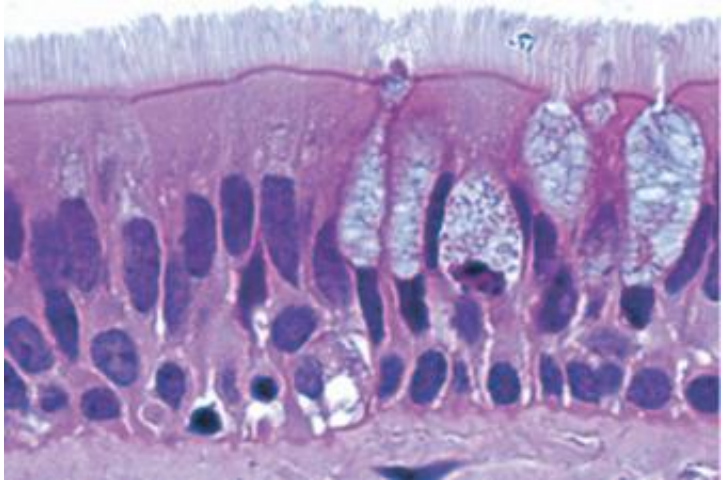
-Root canal treatments

-Teeth extraction: roots may penetrate or forced into it

-Implant placement: careful not to penetrate

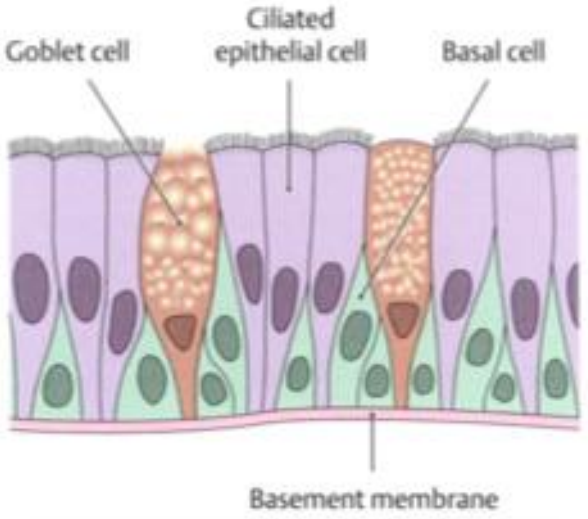
Histology

The sinus is lined by a thin delicate mucous membrane composed of **pseudostratified ciliated columnar epithelium rich in goblet cells** and lamina propria that is fused with the periosteum of the underlying bone.



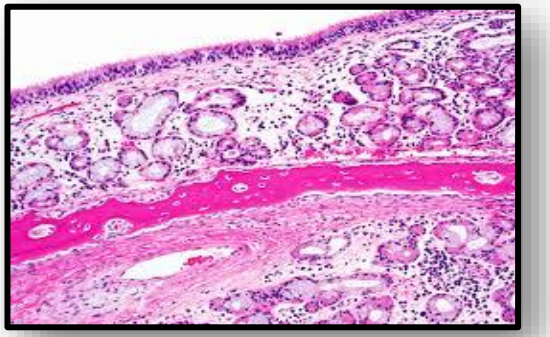
Epithelium consists of 4 types of cells:

1. Columnar ciliated cells (most numerous)
2. Basal cells
3. Columnar non-ciliated cells
4. Goblet cells

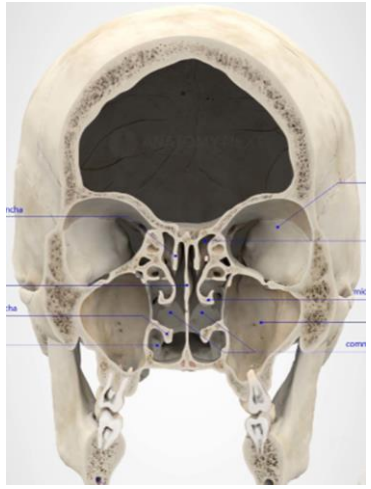


Lamina propria :

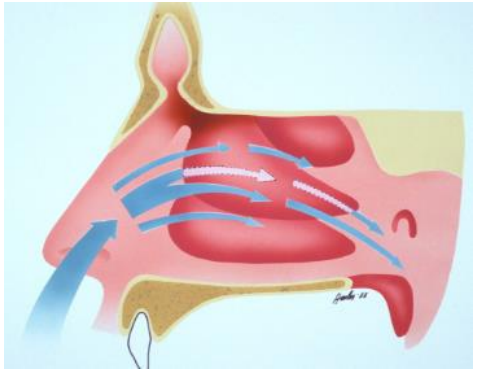
- It consists of bundles of collagenous fibres with very few elastic fibers.
- **Mixed mucous and serous glands** are present. The excretory ducts convey their secretions to the sinus lumen



Function



1. Lightening the weight of the skull
2. Resonance of voice during speech
3. Conditioning of inspired air by regulation of the temperature of air by humidification or warming.
4. Act as a cushion which can absorb and reduce harmful effect of mechanical trauma and protect underlying vital organ
5. Production of bactericidal enzyme **lysozyme**



“Exert a bactericidal influence through hydrolysis of bacterial wall