



Oral cavity & Oral mucosa

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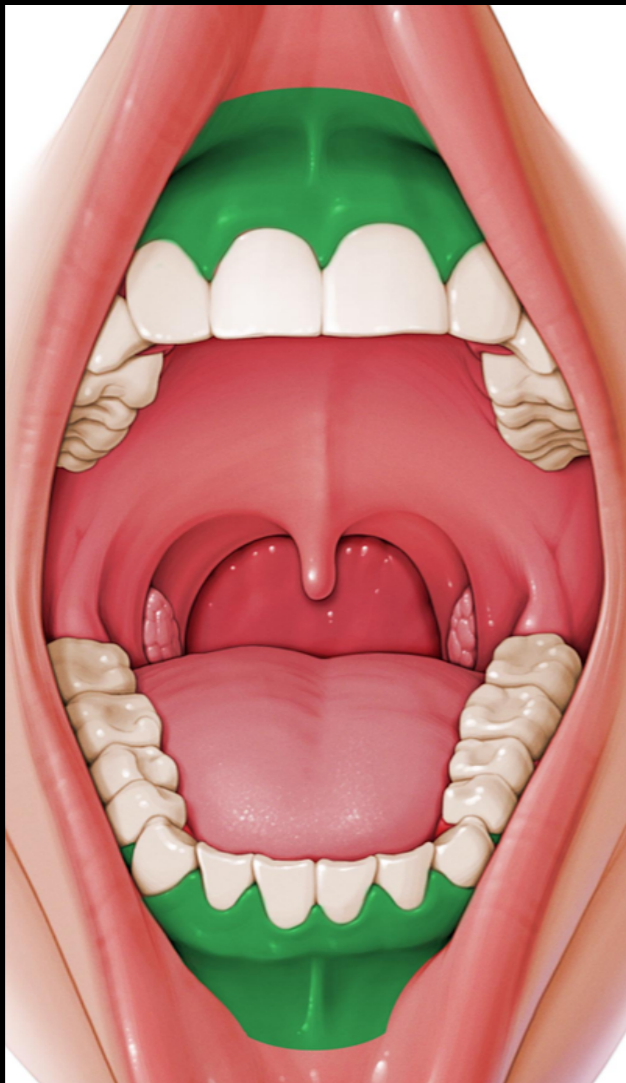


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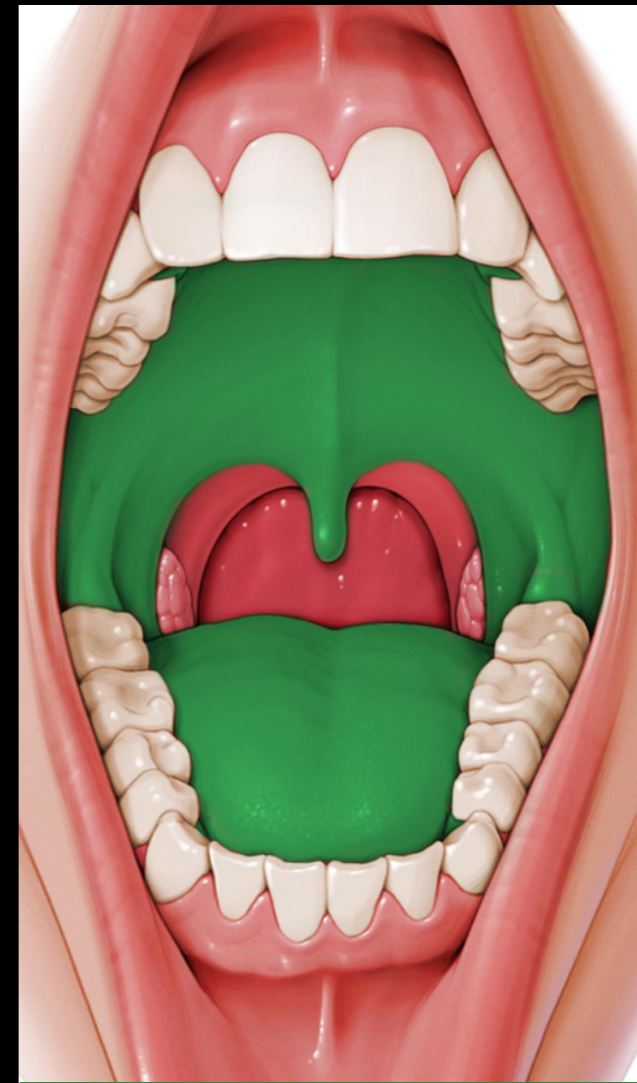
Oral cavity

Extends from the **lips & cheeks** *externally* to the **pillars of the fauces** *internally*, where it continues into the **oropharynx**.

The oral cavity is divided



1) Oral cavity vestibule



2) Oral cavity proper

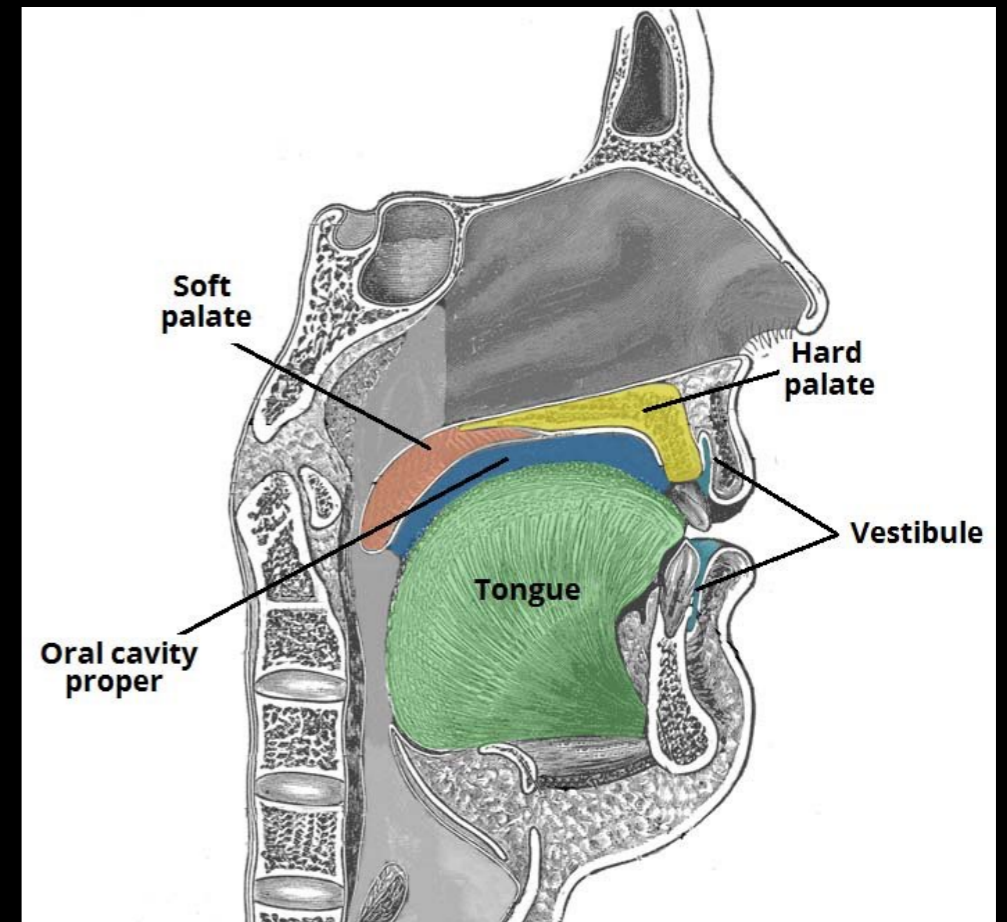
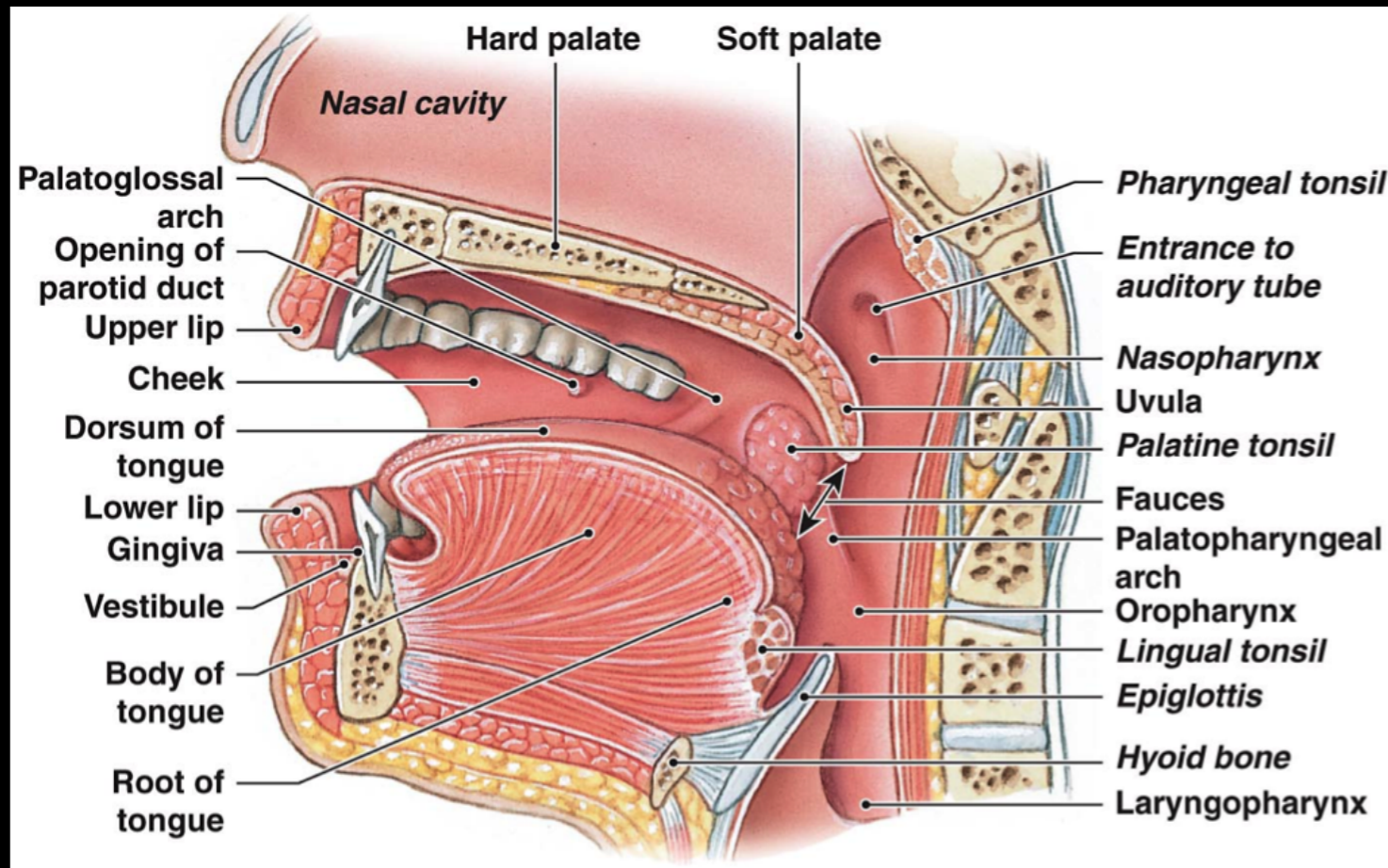
Oral cavity

Borders of the oral cavity:

The **palate (hard & soft palate)** forms the roof of the mouth and **separates** the oral & nasal cavities.

The **floor** of the oral cavity consists of mucous membrane covering the **mylohyoid muscle** and is occupied mainly by the **tongue**.

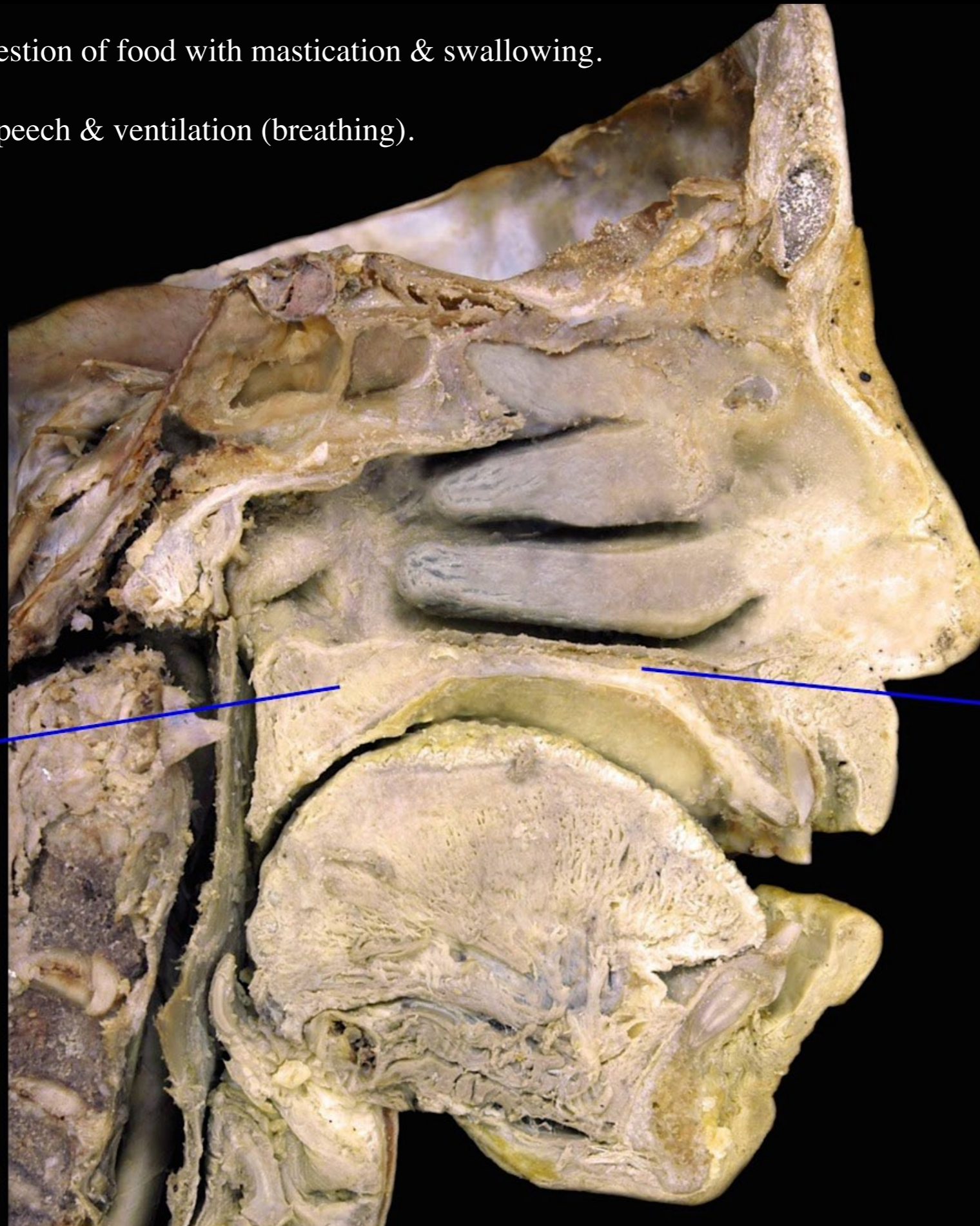
The **lateral walls** of the oral cavity are defined by the cheeks & retromolar regions.



Functions of the oral cavity:

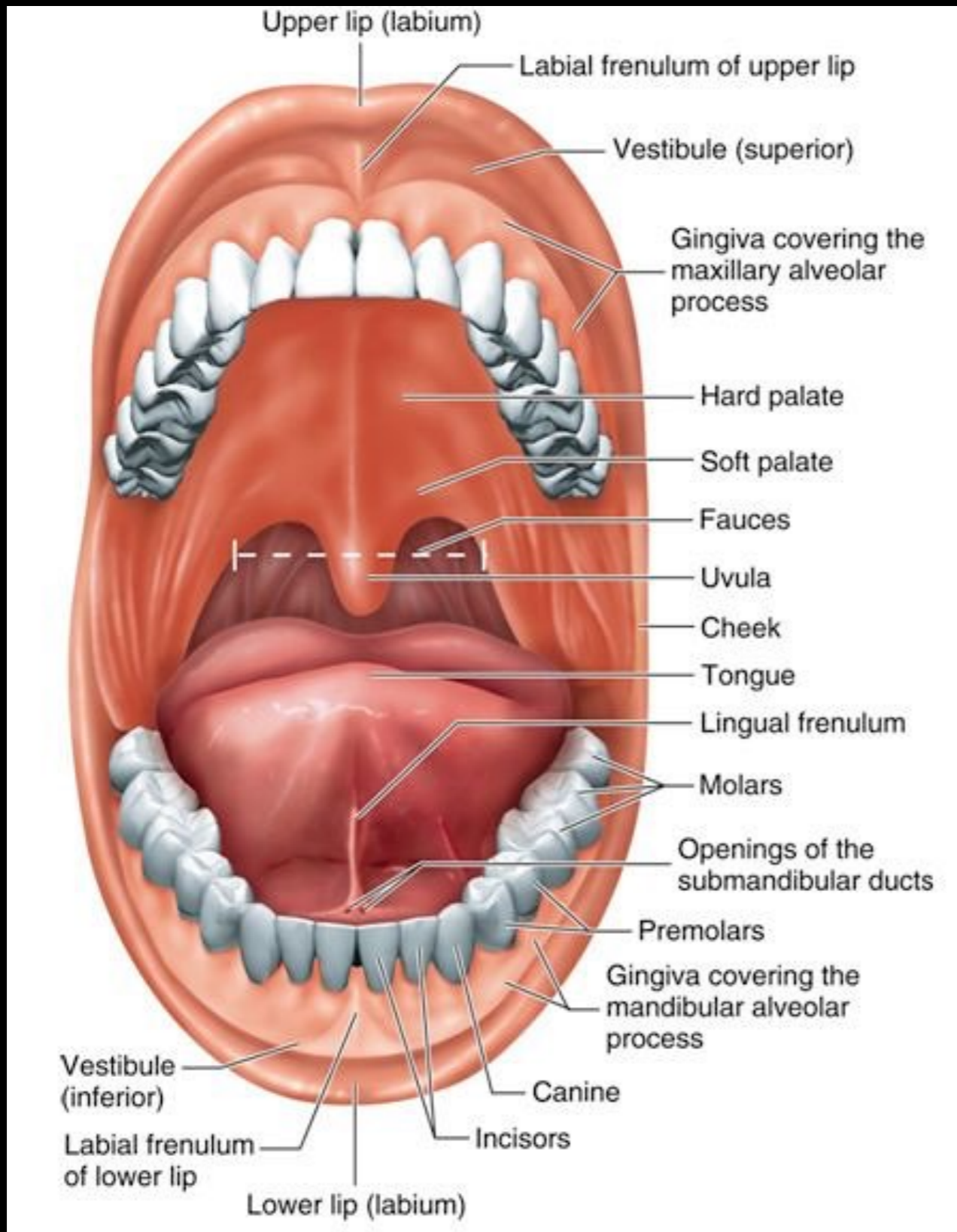
Primary functions —> ingestion of food with mastication & swallowing.

Secondary functions —> speech & ventilation (breathing).



Soft palate

Hard palate



Oral vestibule

It is a **slit-like space** between the *lips / cheeks*, and the *teeth & alveolus*.

The oral cavity vestibule is *separated* from the oral cavity proper by the **alveolar bone & teeth**.

The mucosa covering the alveolus is **reflected on to the lips and cheeks**, forming a sulcus called as **vestibular fornix**.

The upper and lower labial **frena or frenula** are such folds in the midline.

All folds contain *loose connective tissue* (no muscle attachments can be found).



Oral vestibule

When the teeth *occlude*, the **vestibule is a closed space** that communicates with the *oral cavity proper only behind* the **last molars (the retromolar regions)**. This provides a pathway for the administration of nutrients in a patient whose jaws have been *wired together following a fracture*.



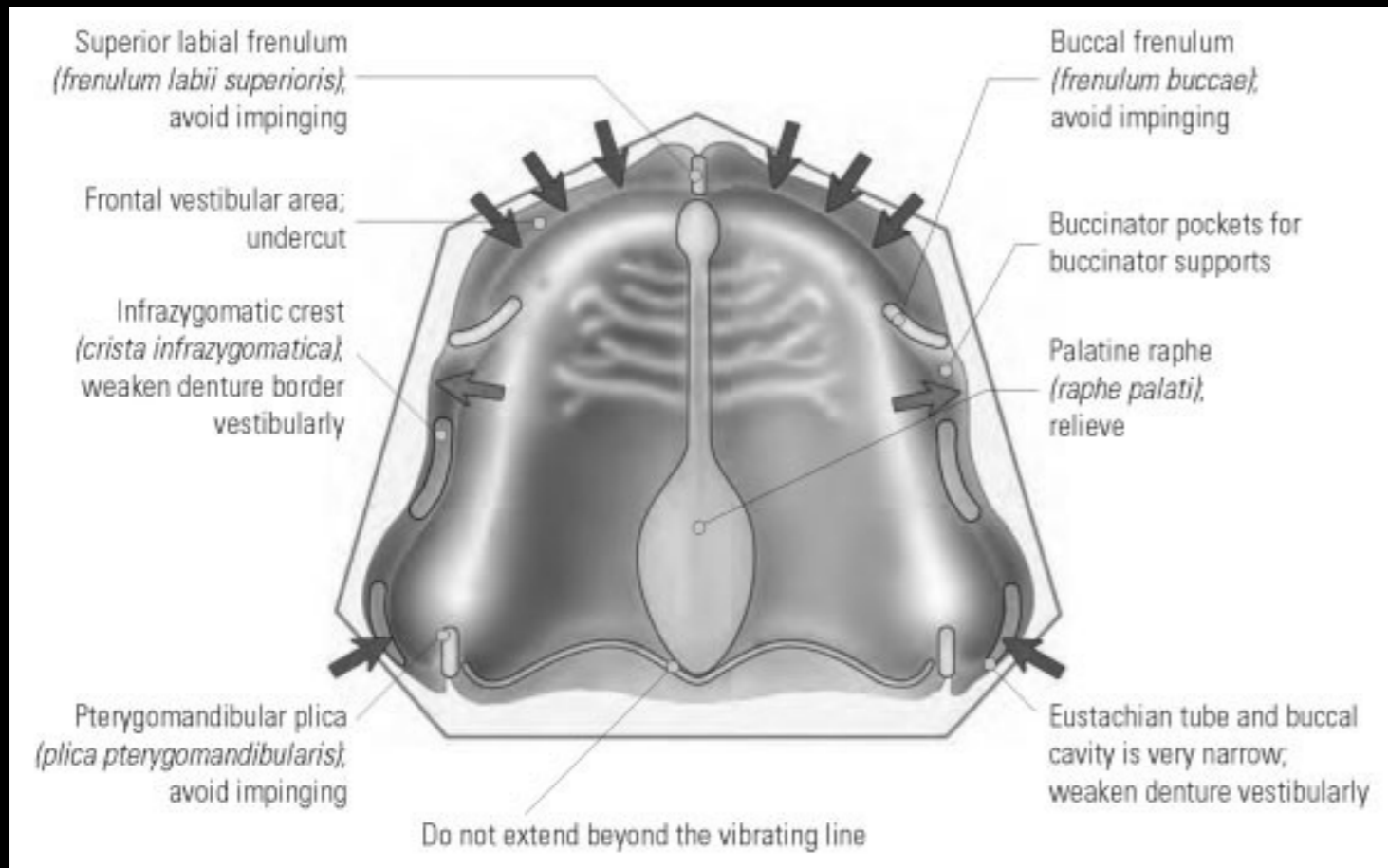
Oral vestibule

The upper labial frenum should be attached below the alveolar crest.



A large frenum with an attachment **near this crest** may be associated with a **midline diastema** between the **maxillary first incisors**.

Oral vestibule



Prominent frena may also influence the stability of **dentures** !!



Oral vestibule

Lips

Lips are composed of a **muscular skeleton (orbicularis oris muscle)** & **connective tissue**,

Lips are covered externally by skin and internally by mucous membrane.



In the **upper lip** the vermilion **protrudes** in the midline to form the **tubercle**.

In the midline of the upper lip runs the **philtrum**.

The **lower lip** shows a slight **depression** in the midline corresponding to the tubercle.



Laterally, the **upper lip** is **separated from the cheeks** by **nasolabial grooves**.

Similar grooves appear with age at the corners of the mouth.

The **labiomentental groove** **separates the lower lip from the chin**.

The **red portion** of the lip (the **vermilion**) is a feature characteristic of humans, it is formed due to:

- 1) The dilation of the small vessels in the connective tissue
- 2) Thickness of the epithelium
- 3) Degree of keratinization and amount of melanin pigments in the epithelium.

The sharp junction of the vermilion & the skin is termed the **vermilion border**.

The **corners of the lips (labial commissures)** are usually located adjacent to the maxillary canine & mandibular 1st premolar teeth.

Oral vestibule

Cheeks

Extend intra-orally:

from the **labial commissures anteriorly** to the **ridge of mucosa on the ascending ramus of the mandible posteriorly**.

They are bounded superiorly & inferiorly by the upper & lower **vestibular fornices**.

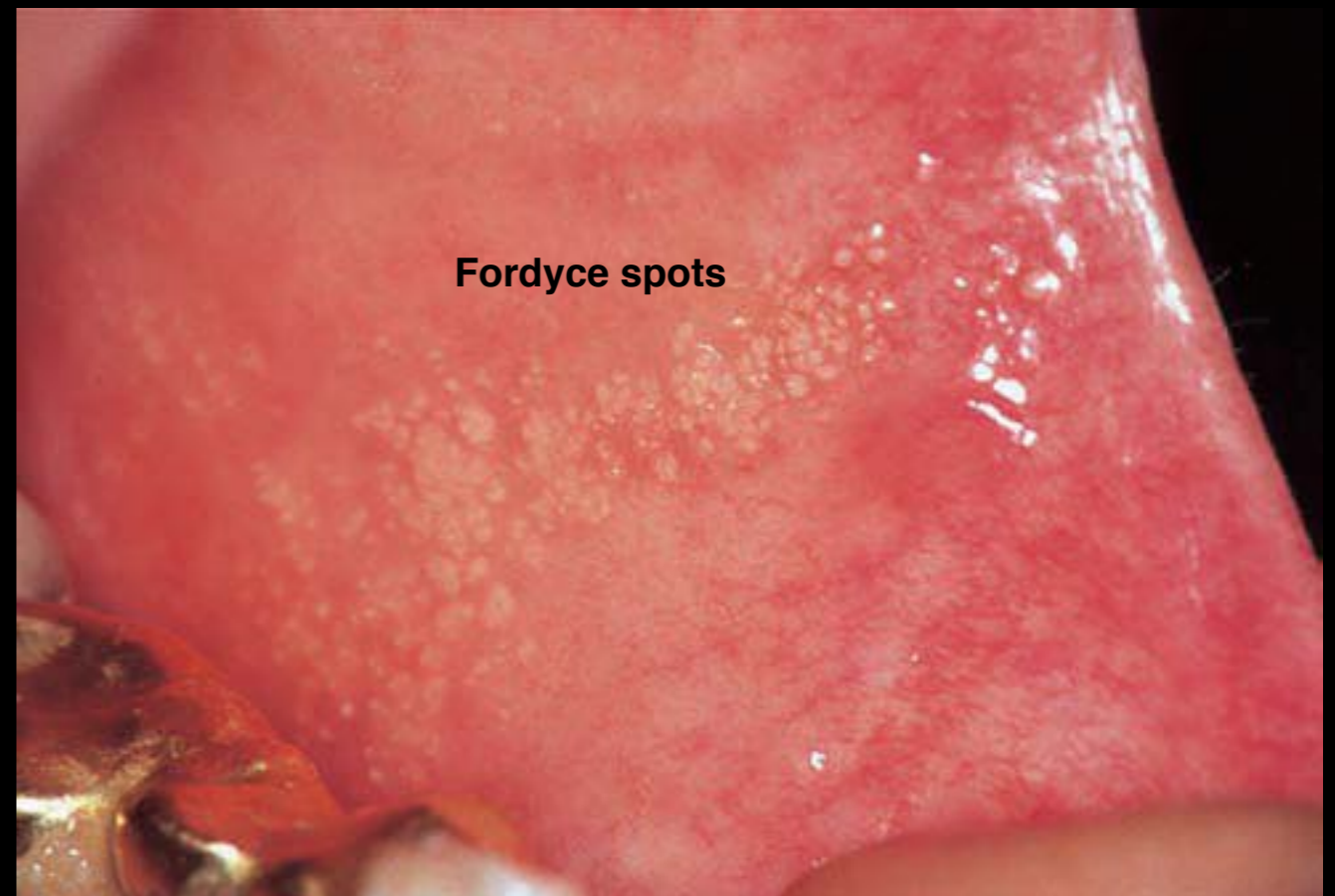
The mucosa is **non-keratinized** & tightly attaches to the **buccinator muscle**,

The cheek is stretched when the mouth is opened and wrinkled when closed.

Ectopic sebaceous glands without any associated hair follicles may be evident in the mucosa and are called **Fordyce spots**.

They are **small, yellowish-white spots, occurring singly or in clusters on the margin of the lips or the mucosa of the cheeks**.

They can be seen in the majority of patients and are said to *increase with age*.

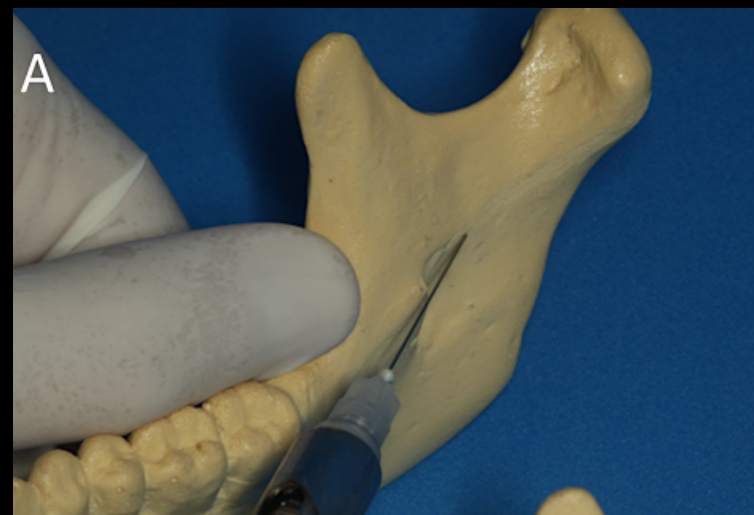
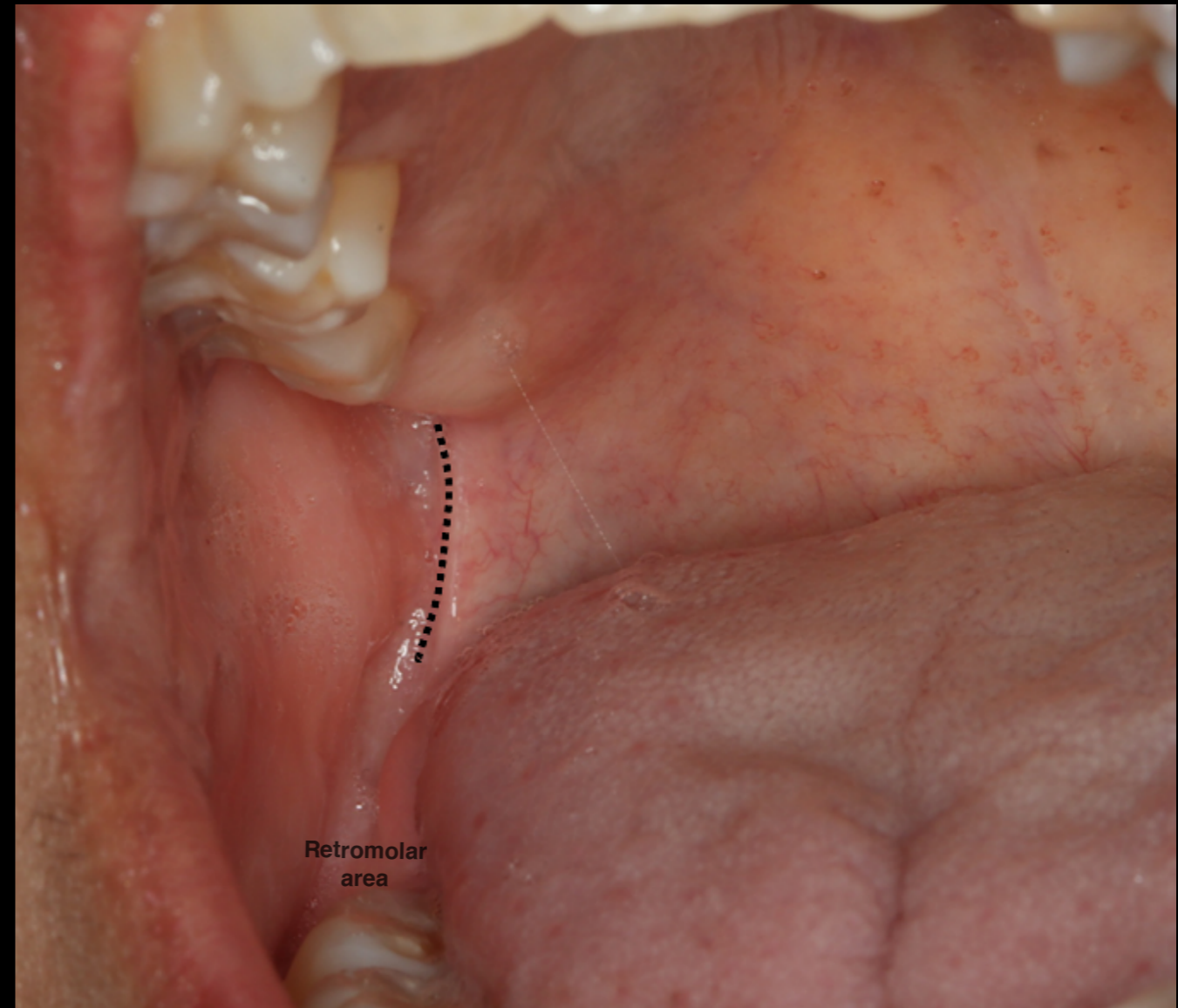


Oral vestibule

Cheeks

In the **retromolar region**:

Anterior to the *pillars of the fauces* → a fold of mucosa containing the **pterygomandibular raphe** extends from the *upper to the lower alveolus*.



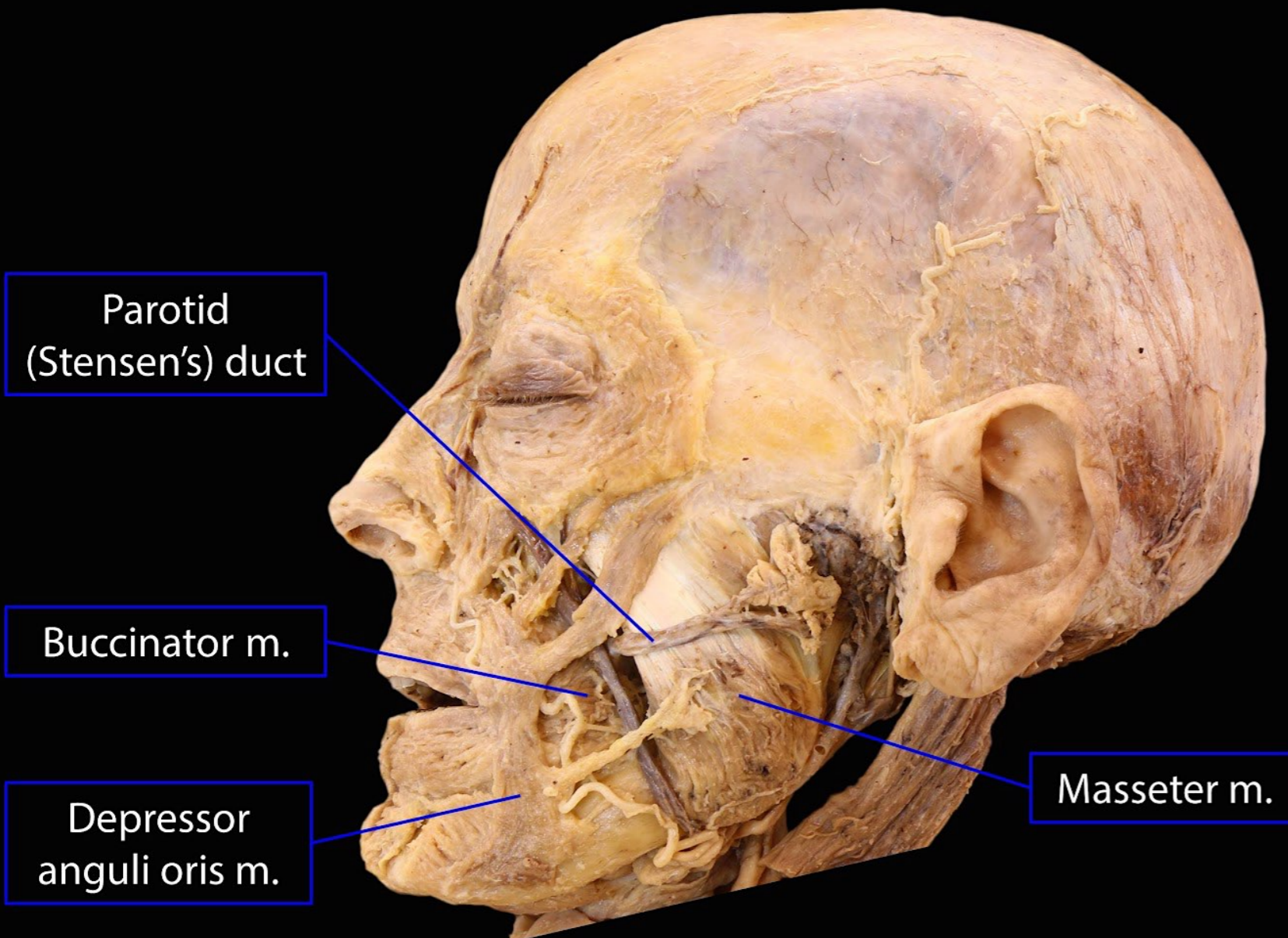
There is a *groove* located between:

pterygomandibular raphe & the ramus of the mandible is an important landmark for insertion of a **needle for local anaesthesia** of the **lingual & inferior alveolar nerves**.

Oral vestibule

Cheeks

The **parotid duct (stensen duct)** drains into the cheek opposite the **maxillary 2nd molar tooth** and its opening may be covered by a small fold of mucosa called as **parotid papilla**.



Parotid
(Stensen's) duct

Buccinator m.

Depressor
anguli oris m.

Masseter m.

Maxilla (upper jaw)



Anterior surface (malar surface)

Forms the skeleton of the anterior part of the cheek

A = frontal process

B = zygomatic process

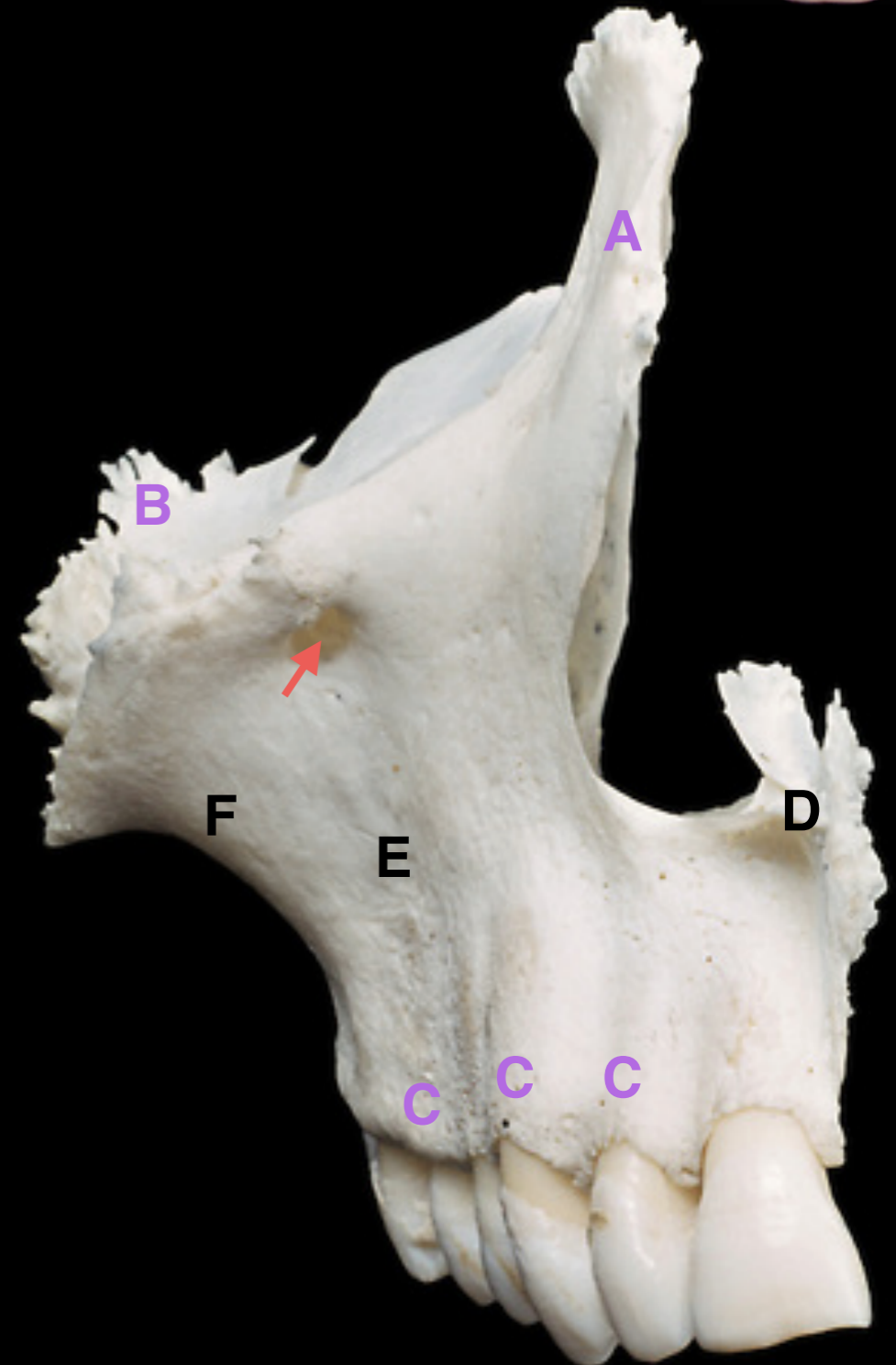
C = alveolar process

D = anterior nasal spine

E = canine fossa

F = jugal crest (zygomatico-alveolar crest)

The **infra-orbital foramen** is arrowed.



Maxilla (upper jaw)



Anterolateral surface (malar surface)

A = frontal process

B = zygomatic process

C = alveolar process

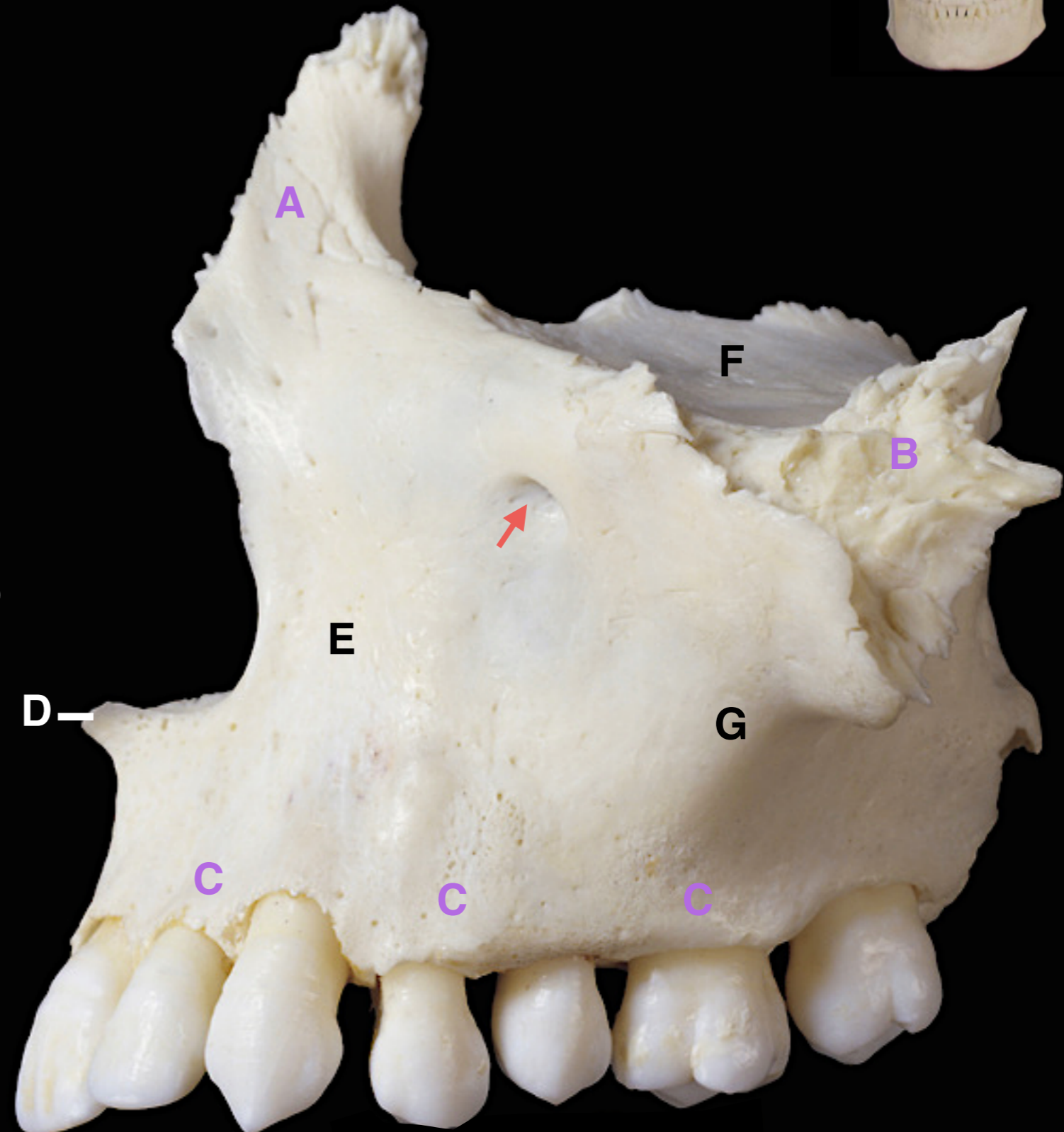
D = anterior nasal spine

E = canine fossa

F = orbital plate

G = jugal crest (zygomatico-alveolar crest)

The **infra-orbital foramen** is arrowed.



Mandible (lower jaw)

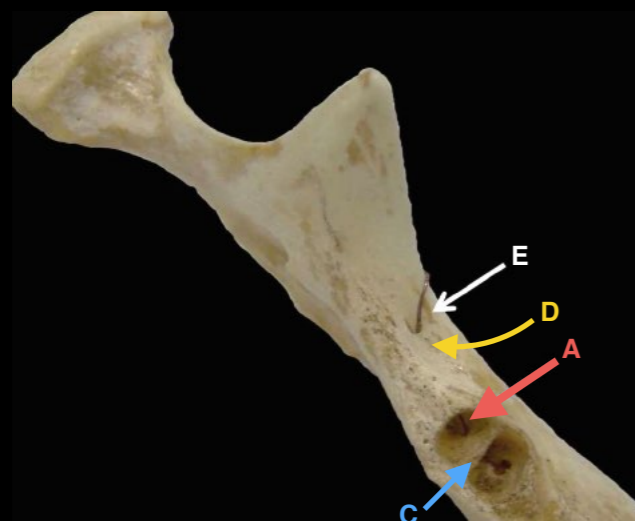
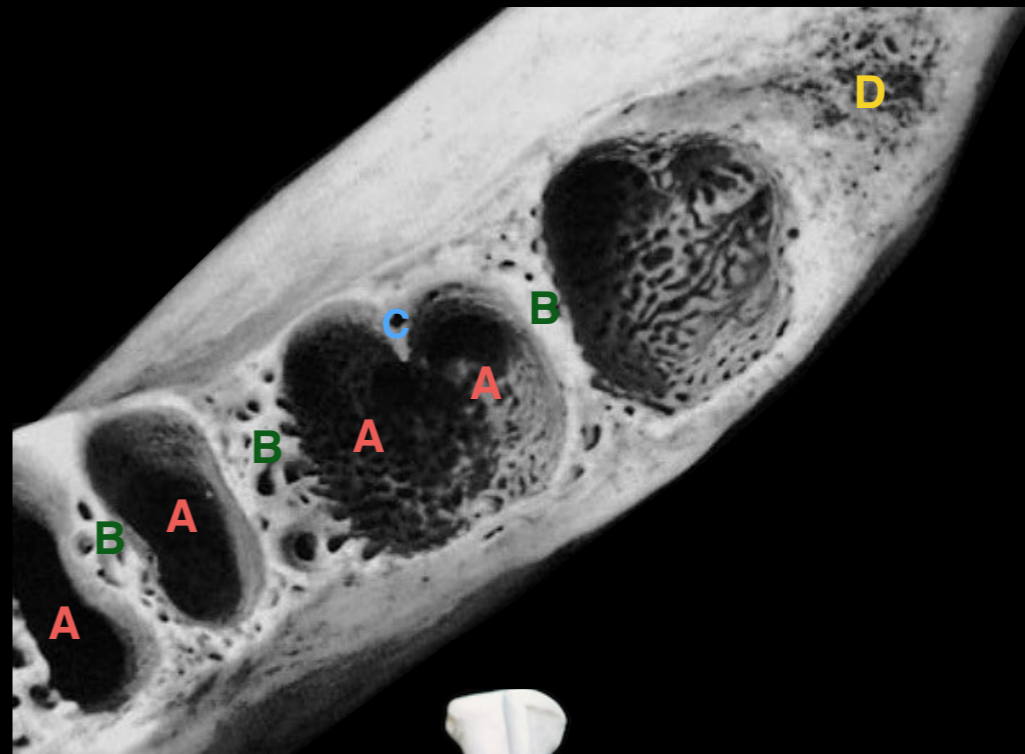
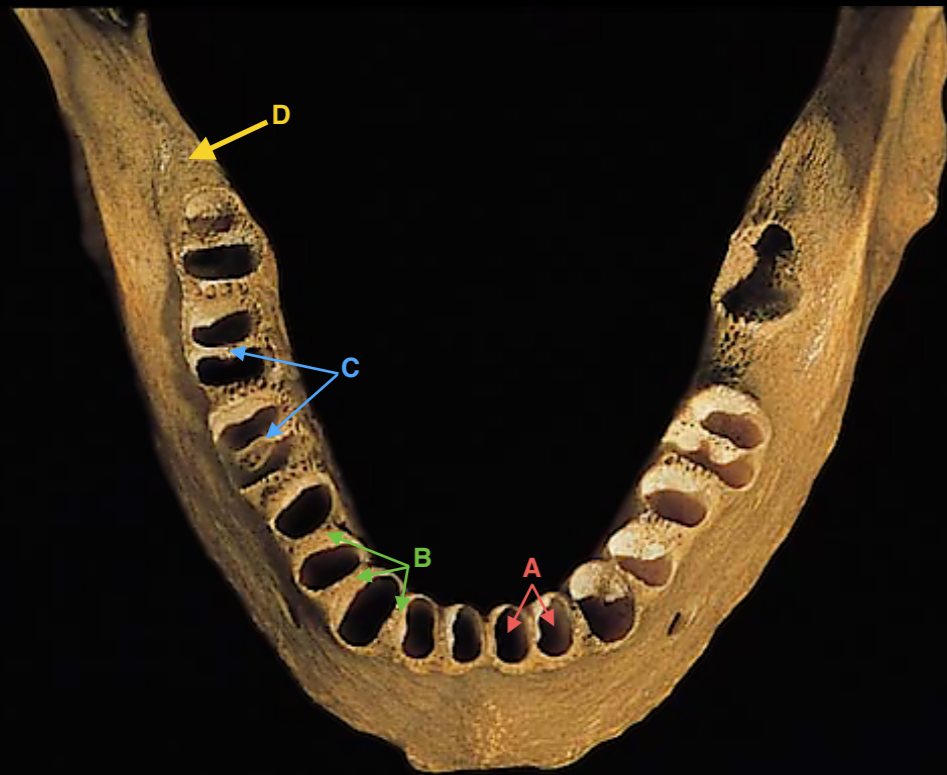
A= Alveolar socket (dental alveolus)

B= Interdental septum

C= Interradicular septum

D= Retromolar fossa (triangular depression in the mandible behind to the 3rd molar tooth)

E= Retromolar foramen (connects the *retromolar canal* to the alveolus of 3rd molar)



Oral cavity proper

Palate

Forms the roof of the mouth & separates the oral and nasal cavities.

It is divided into the immovable hard palate anteriorly and the movable soft palate posteriorly.

The skeleton of the hard palate is bony while that of the soft palate is fibrous.

The hard palate is covered by a **masticatory, keratinized mucosa** that is attaching tightly to the bone & also contains some *taste buds*.

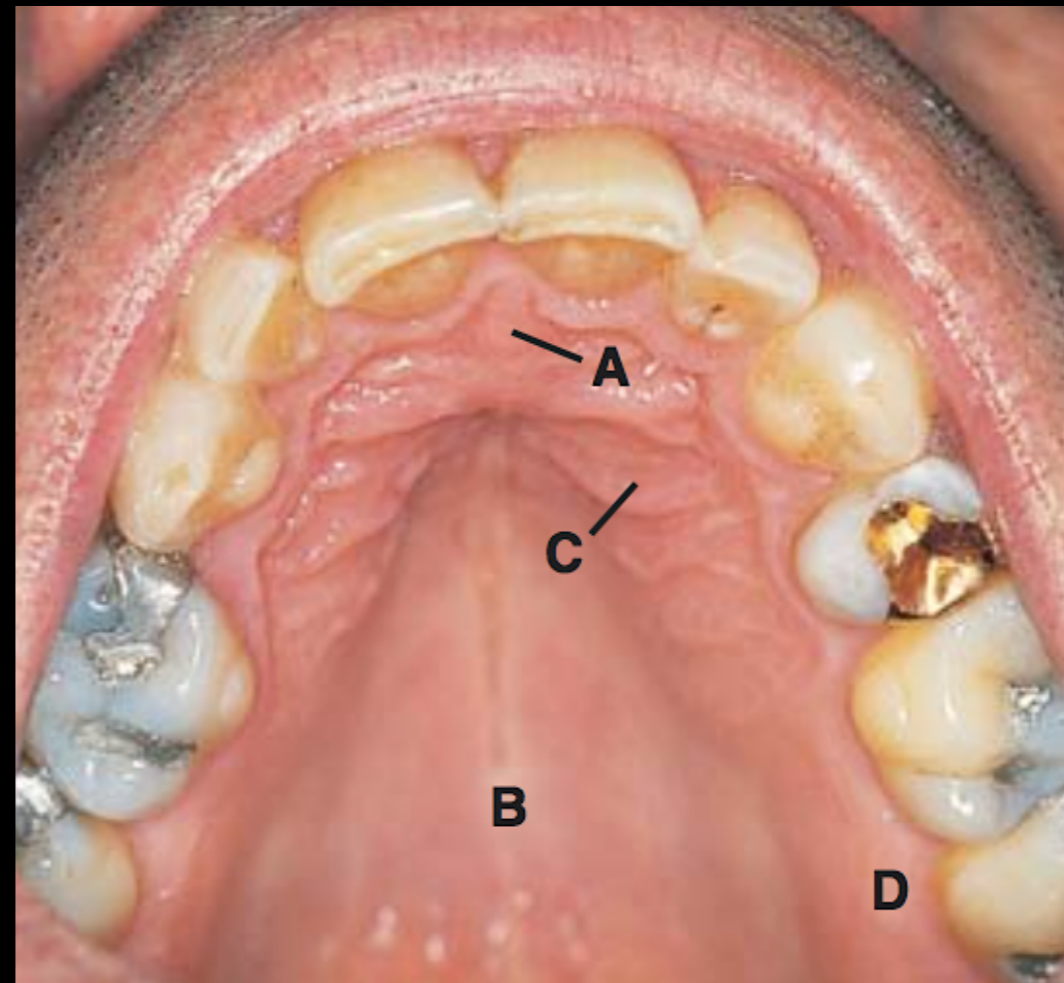
Immediately behind the maxillary central incisors we can find the → **incisive papilla** (located at the incisive fossa).

In the incisive fossa → opening of the incisive canal can be found which carries **nasopalatine nerve**.

On the midline from the incisive papilla if we move posteriorly, we can find a ridge termed as **palatine raphe** (here the oral mucosa is attached directly to bone without the presence of a submucous layer of tissue)

Palatine rugae are elevated ridges in the anterior part of the hard palate that radiate somewhat transversely from the incisive papilla & the anterior part of the palatine raphe.

Their pattern is unique to the individual and, like fingerprints, can be used for forensic purposes to help identify individuals.



A = incisive papilla

B = palatine raphe

C = palatine rugae

D = alveolus

Bony skeleton of the palate



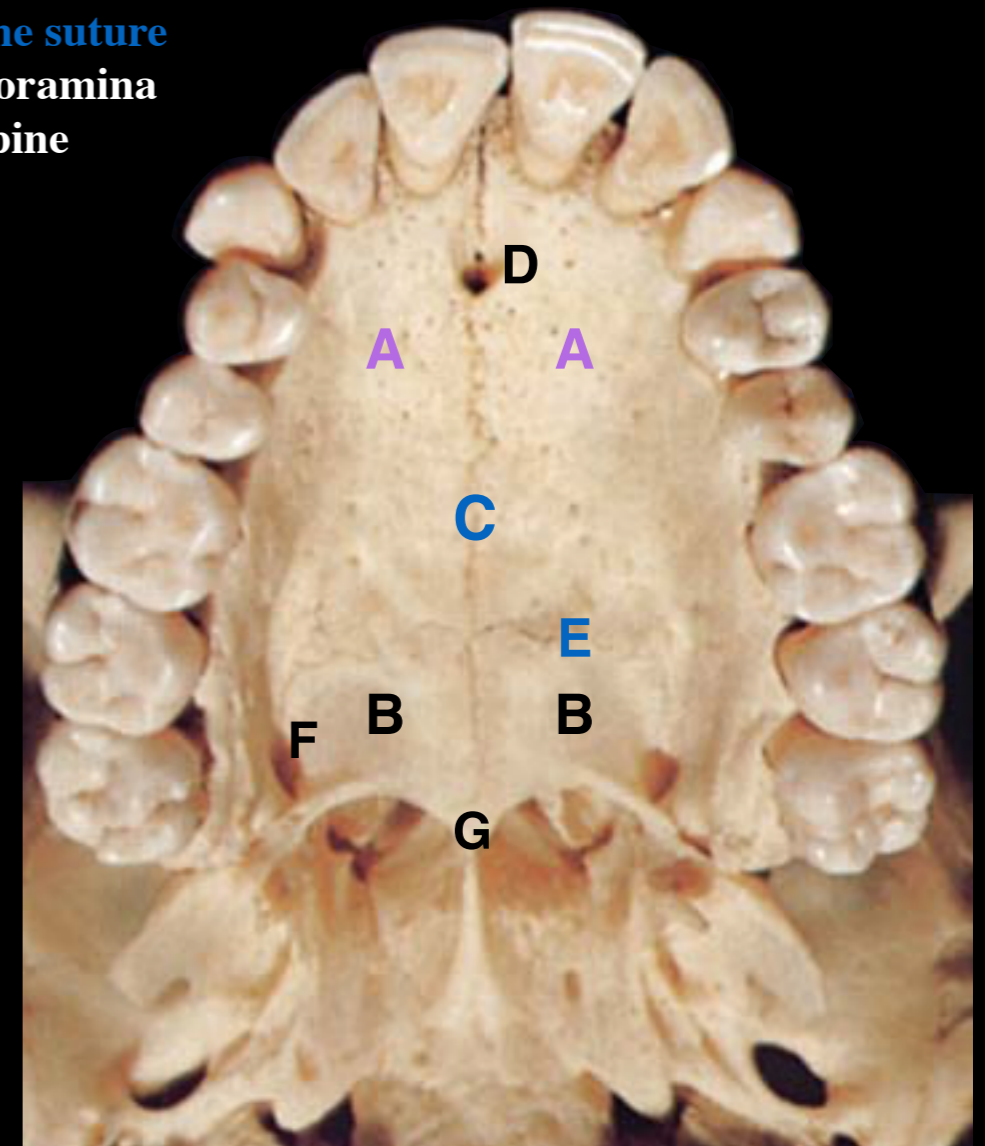
It is mainly formed by:

- 1) Premaxilla
- 2) Palatine process of the maxilla
- 3) Horizontal plate of the palatine bone

The maxillary palatine processes arise as horizontal plates at the junction of the bodies and alveolar processes of the maxillae.



- A = palatine processes of maxillae
- B = horizontal plates of the palatine bones
- C = median palatine suture
- D = incisive fossa
- E = transverse palatine suture
- F = greater palatine foramina
- G = posterior nasal spine



Hard palate



When the teeth are removed!

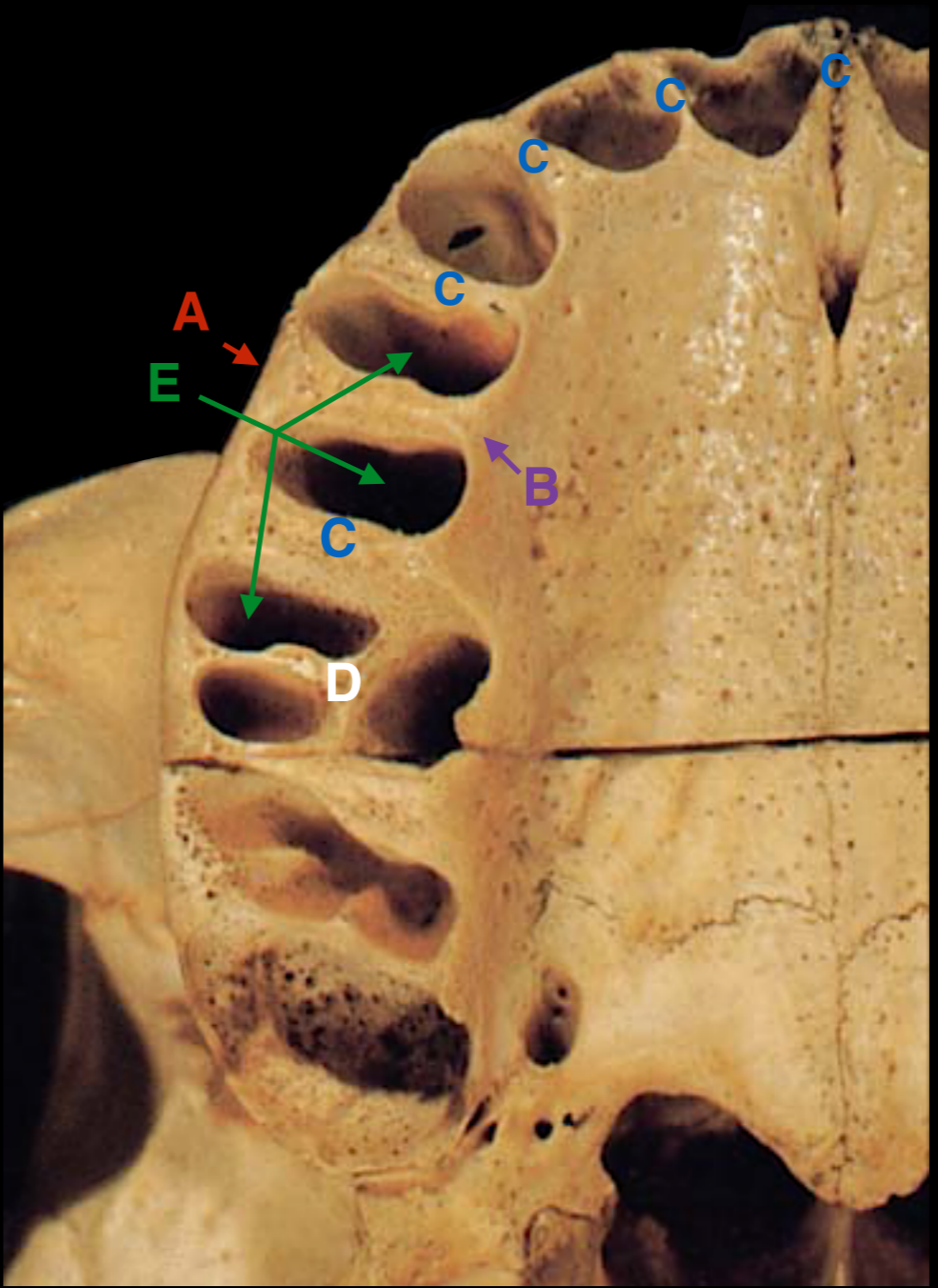
A = buccal alveolar plate

B = palatal alveolar plate

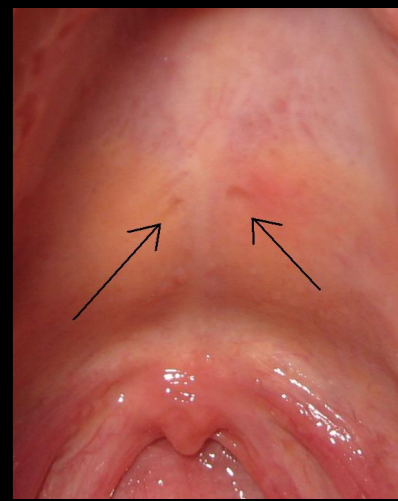
C = interdental bony septa (separates the alveolar socket)

D = inter-radicular septum between the buccal roots of 1st permanent molar.

E = Alveolar socket or dental alveolus (holds the root of the teeth)



Palate



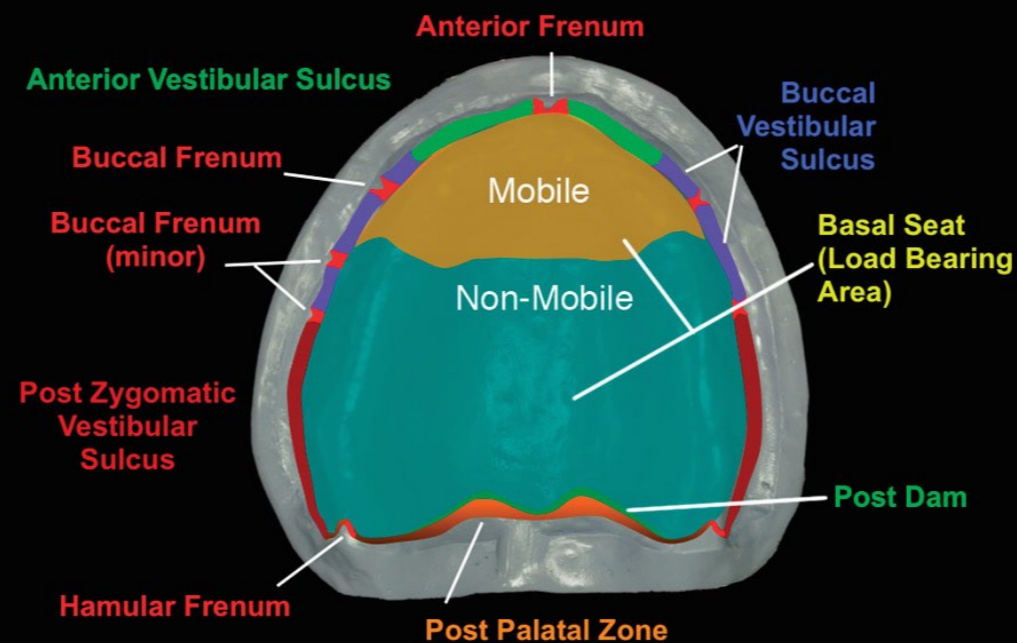
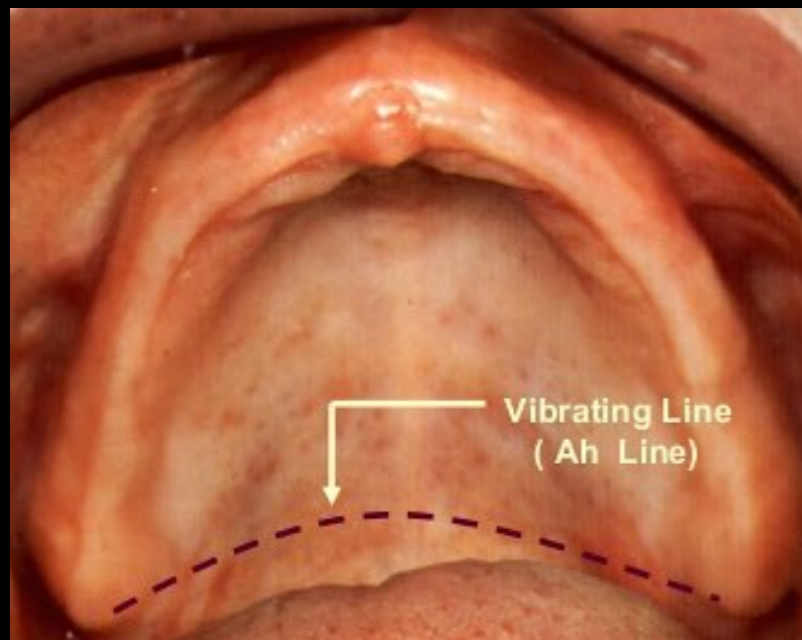
The **denture** needs to sit on the anterior border of the soft palate:

At a location sometimes referred to as the ‘vibrating line’ because the soft palate can be seen to move here on asking a patient to say ‘ah’.

There are 2 small pits called as **fovea palatini**, may be seen on either side of the midline; they represent the orifices of ducts from some of the **minor mucous glands of the palate**.

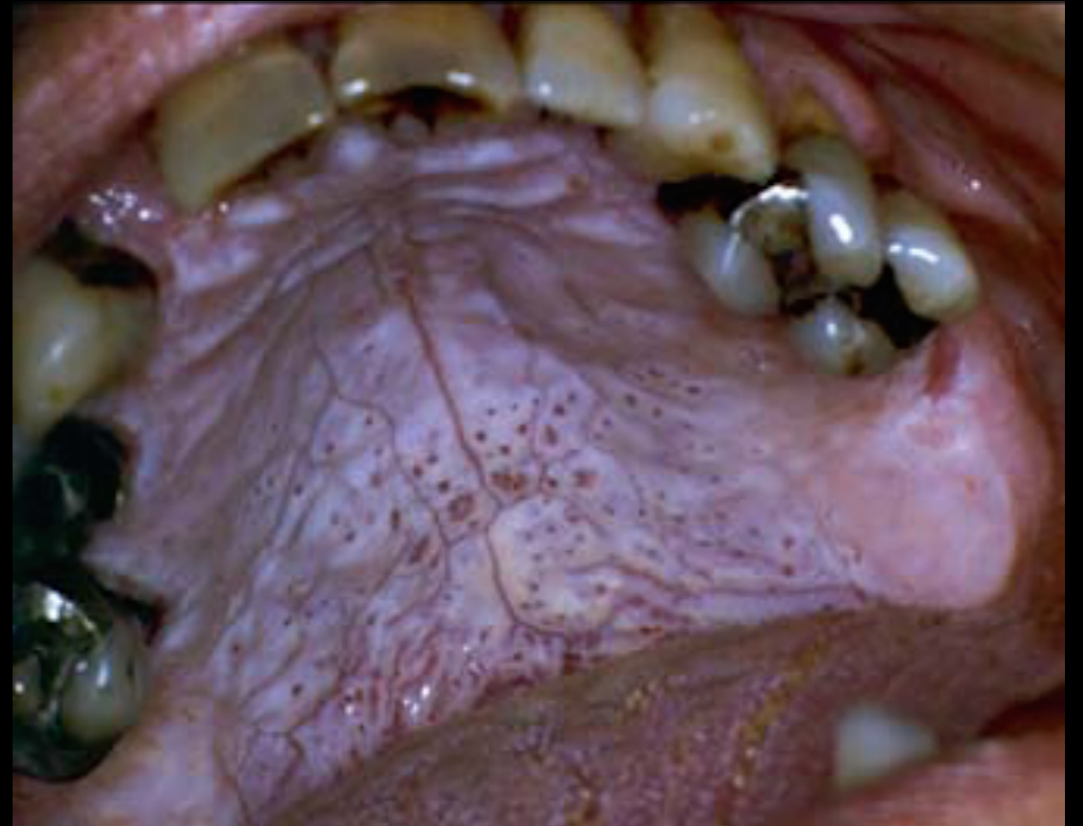
The **fovea palatini** can also be seen on impressions of the palate and a postdam may usually be safely placed a couple of millimetres behind the pits.

Knowledge of the anatomy of the palate has clinical relevance when siting the posterior border (postdam) of an upper denture.



Palate

Oral disease



Supported by the fibrous **palatine aponeurosis**,

Soft palate

The border between the soft palate & the hard palate is readily palpable and can be recognized by a change in colour, the soft palate having a yellowish appearance.

1) Levator veli palatini:

Origin: below the apex of the petrous part of the temporal bone (anterior to the carotid canal) and from cartilage of the auditory tube.

It is the elevator muscle of the soft palate. During swallowing, it elevates the soft palate to help to prevent from entry of food into the nasopharynx.

Innervation: Vagus nerve

2) Tensor veli palatini:

Origin: Scaphoid fossa at the base of the medial pterygoid plate, from the spine of the sphenoid and from the cartilage of the auditory tube

Insertion: Palatine aponeurosis

Innervation: Mandibular nerve

Function: Elevates the soft palate and opens the Auditory tube

3) Palatoglossus:

Origin: Palatine aponeurosis of the soft palate

Insertion: Side of the tongue

Innervation: Vagus nerve

Function: Elevates posterior tongue, closes the oropharyngeal isthmus

4) Palatopharyngeus:

Origin: Palatine aponeurosis

Insert: Upper part of thyroid cartilage

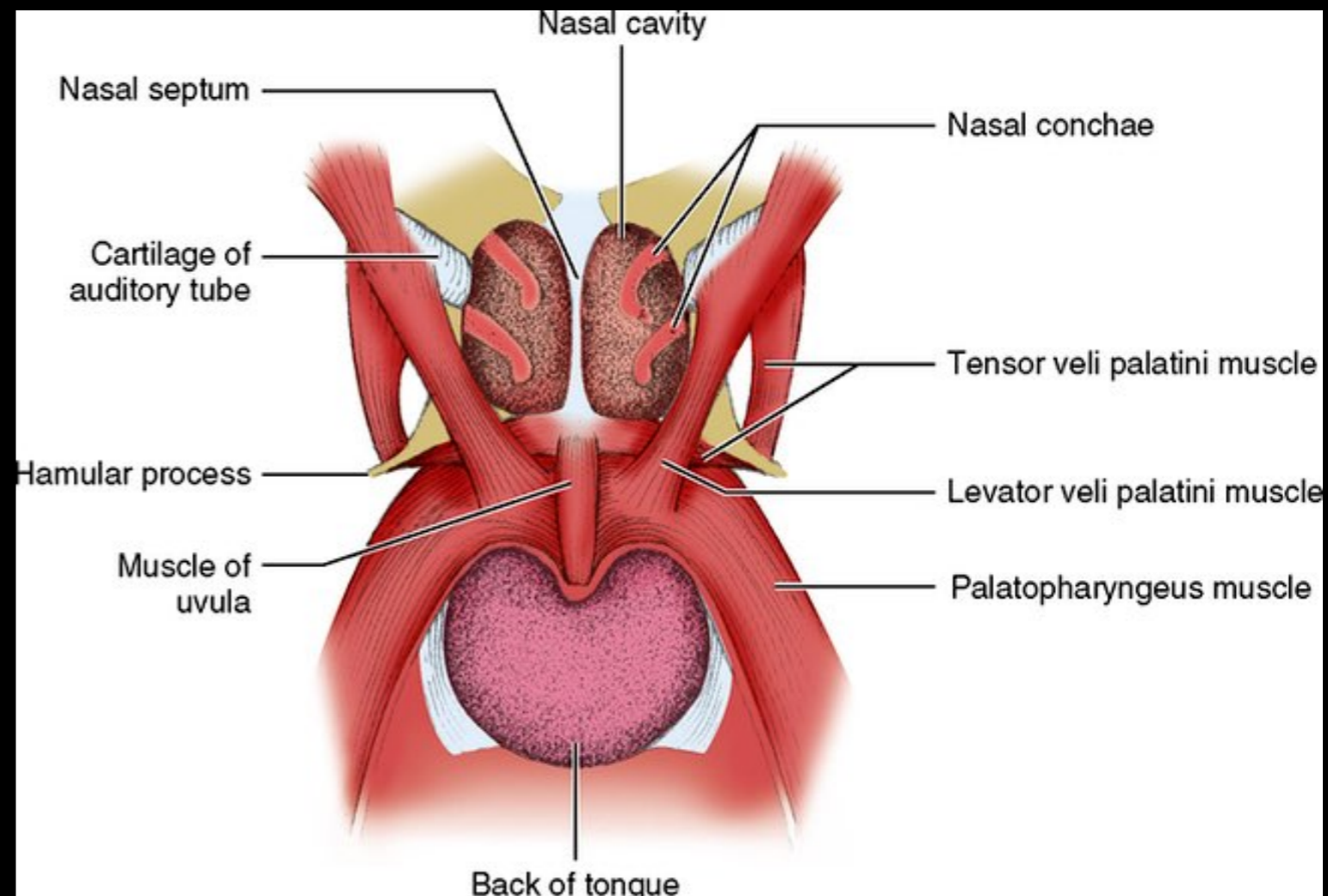
Innervation: Vagus nerve

Function: Pulls pharynx & larynx upward

5) Uvula:

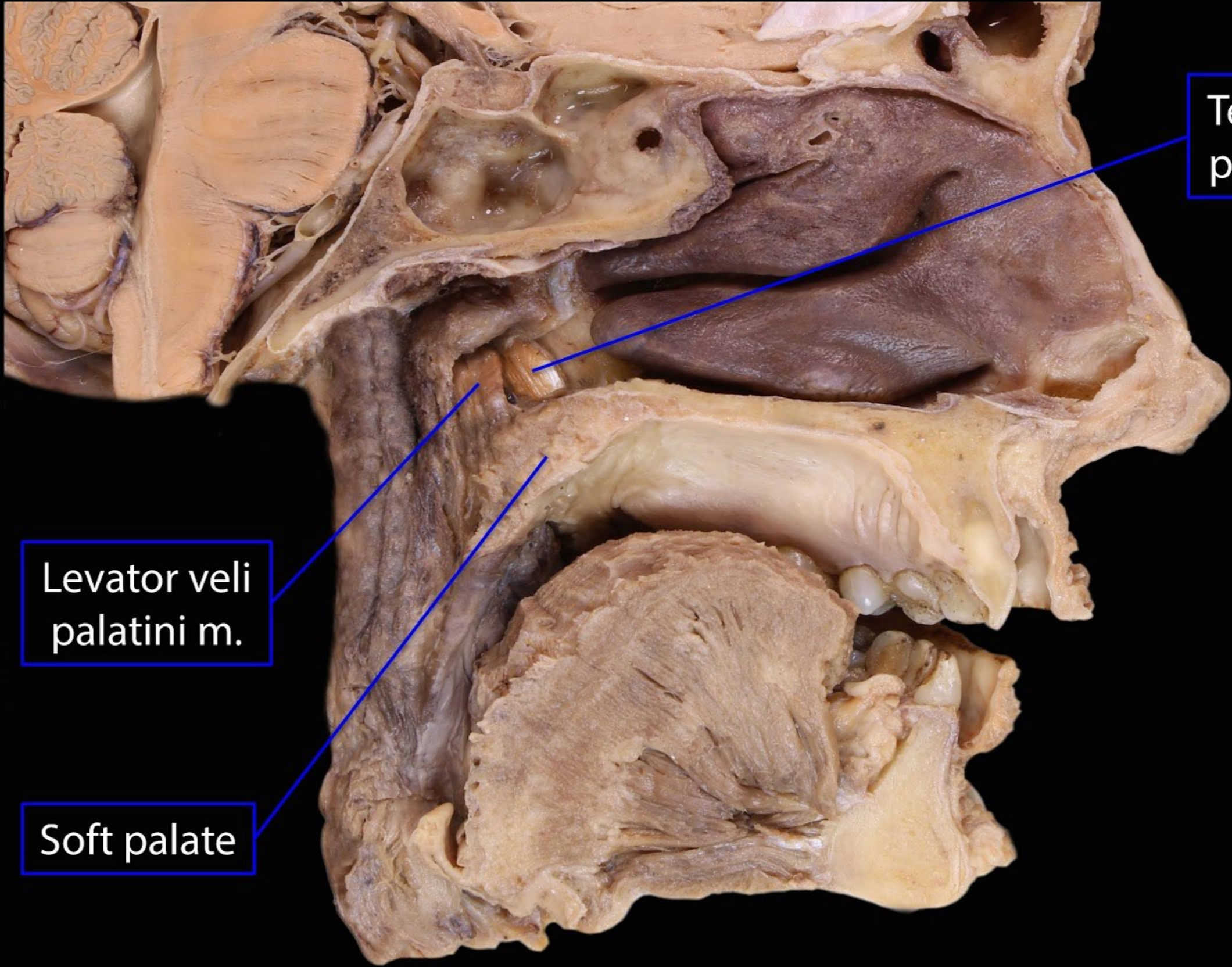
Origin: Posterior nasal spine

It is the projection of posterior part of the soft palate.



The arterial supply to the muscles of the soft palate is derived from:

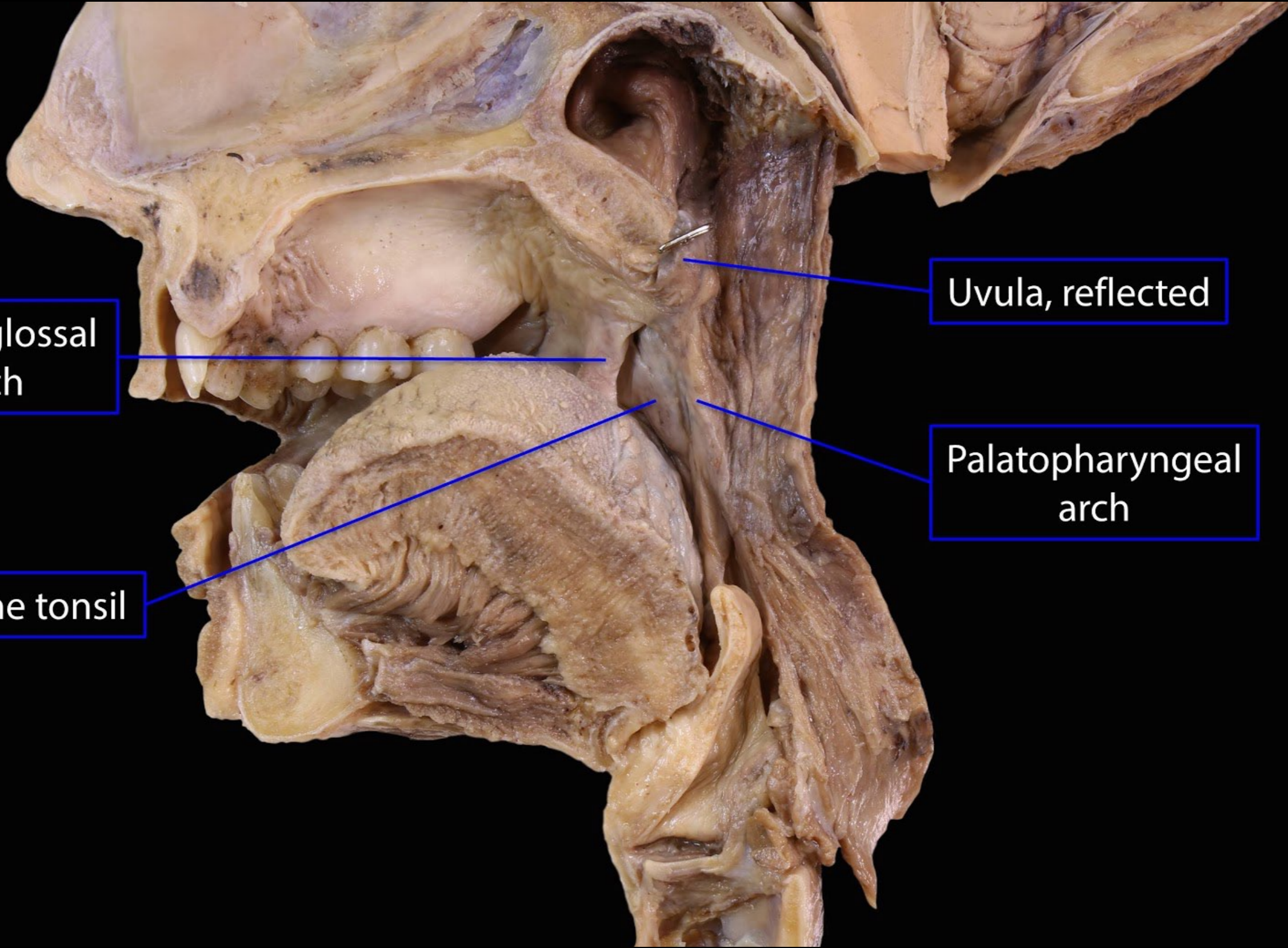
- 1) Facial artery (ascending palatine branch)
- 2) Ascending pharyngeal artery
- 3) Maxillary artery (palatine branches)



Tensor veli palatini m.

Levator veli palatini m.

Soft palate



Palatoglossal arch

Uvula, reflected

Palatine tonsil

Palatopharyngeal arch

Floor of the mouth

A **small, horseshoe-shaped region** above the mylohyoid muscle & below the movable part of the tongue.

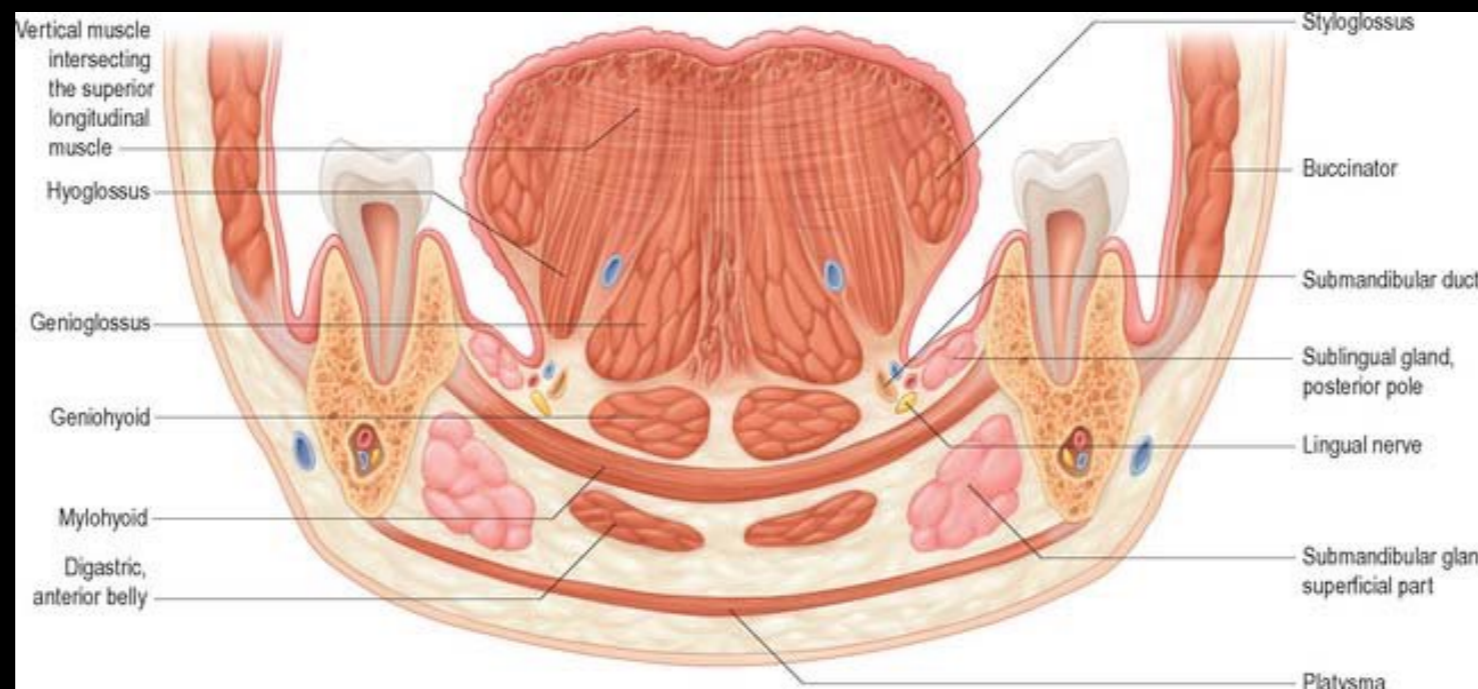
It is a region located between the medial surface of the mandible, the inferior surface of the tongue and the mylohyoid muscles.

Covered by **non-keratinized mucosa**.

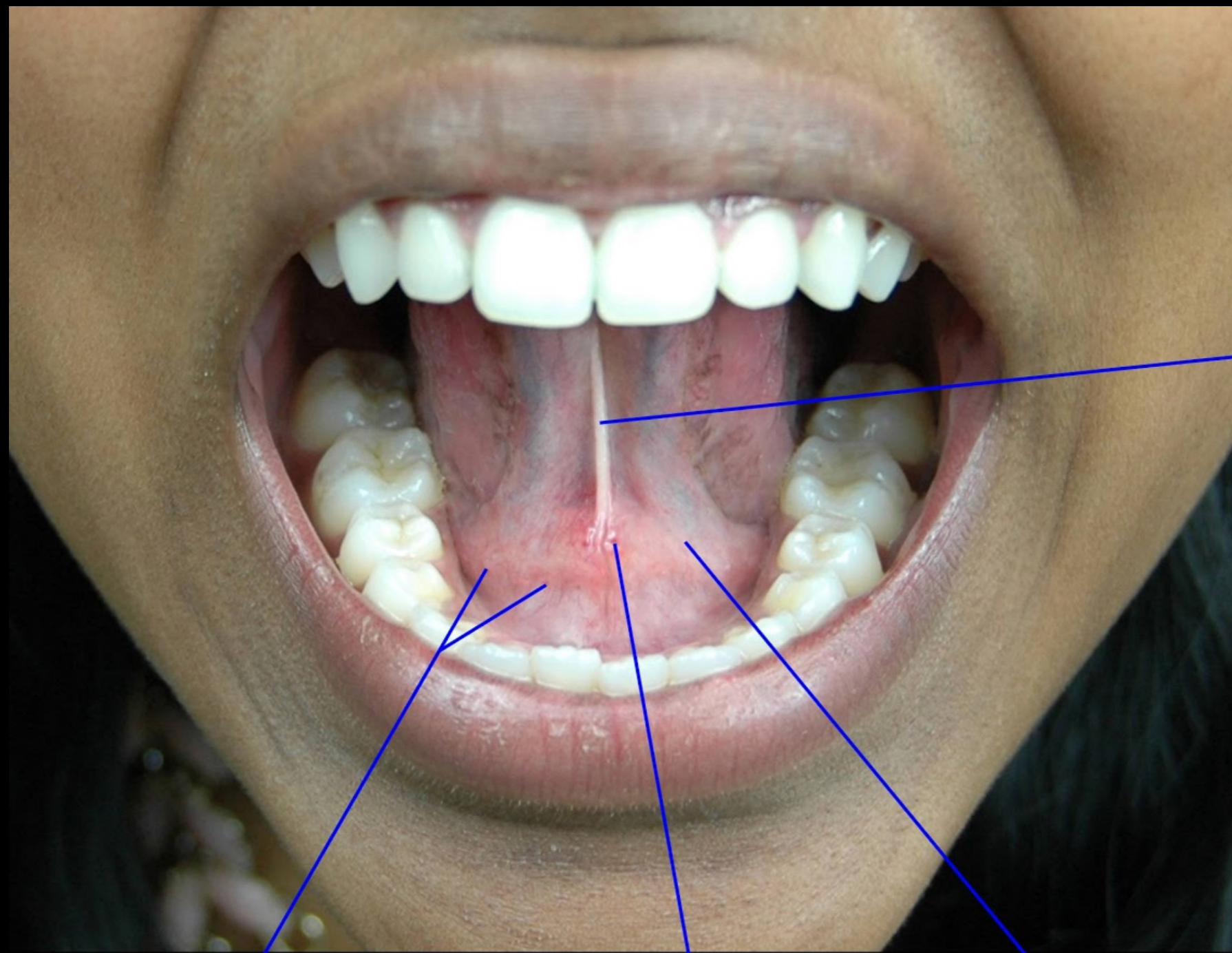
In the midline, near the base of the tongue, a fold of tissue called the **lingual frenum** extends on to the inferior surface of the tongue.

The **sublingual papilla** where submandibular salivary ducts open into the mouth, is a large centrally positioned projection at the base of the tongue.

On both side of sublingual papilla are the sublingual folds & below the submandibular ducts and sublingual salivary glands can be found.



Floor of the mouth



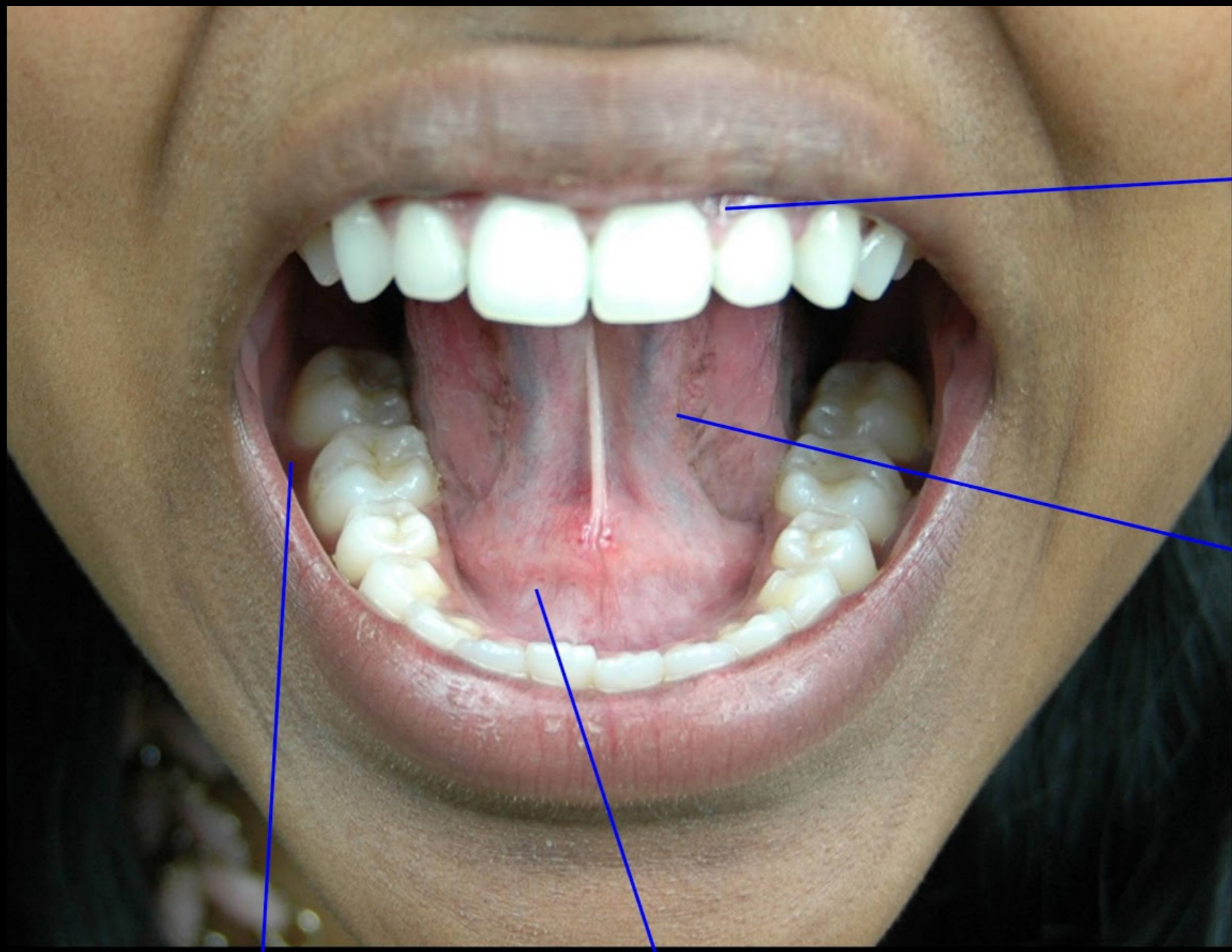
Lingual frenulum

Sublingual openings of sublingual gland

Sublingual caruncle

Sublingual fold

Floor of the mouth



Gingiva

Fimbriated fold

Oral vestibule

Oral cavity proper

Floor of the mouth

MYLOHYOID

The mylohyoid muscle arises from the mylohyoid line on the inner surface of the body of the mandible.

Its fibers moves down- wards, forwards and inwards.

The **anterior fibres** of the mylohyoid muscle interdigitate with the corresponding fibres on the opposite side to form a **median raphe**.

This raphe is *attached above to the chin* and *below to the hyoid bone*.

The **posterior fibres** are inserted on to the anterior surface of the body of the hyoid bone.

Function: The muscle raises the floor of the mouth during the early stages of swallowing.
Helps to depress the mandible when the hyoid bone is fixed.

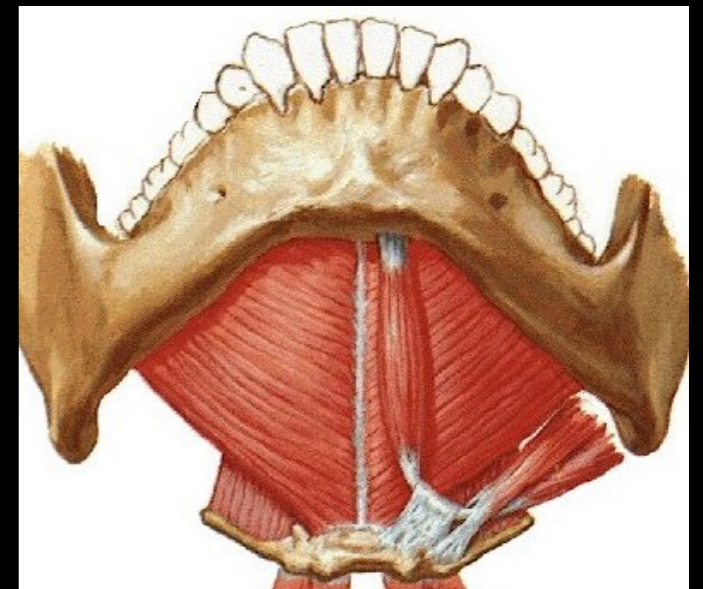
Innervation: Mylohyoid branch of the inferior alveolar branch of the mandibular division of the trigeminal nerve.

Blood supply: lingual artery (sublingual branch), maxillary artery (mylohyoid branch of the inferior alveolar artery) and the facial artery (submental branch).

The 2 mylohyoid muscles form a *muscular diaphragm* for the floor of the mouth.

Above this diaphragm are found the genioglossus and geniohyoid muscles medially and the hyoglossus muscles laterally.

Below the diaphragm lie the digastric and stylohyoid muscles.



Floor of the mouth

GENIOHYOID

Originates: Inferior genial spine (inferior mental spine)

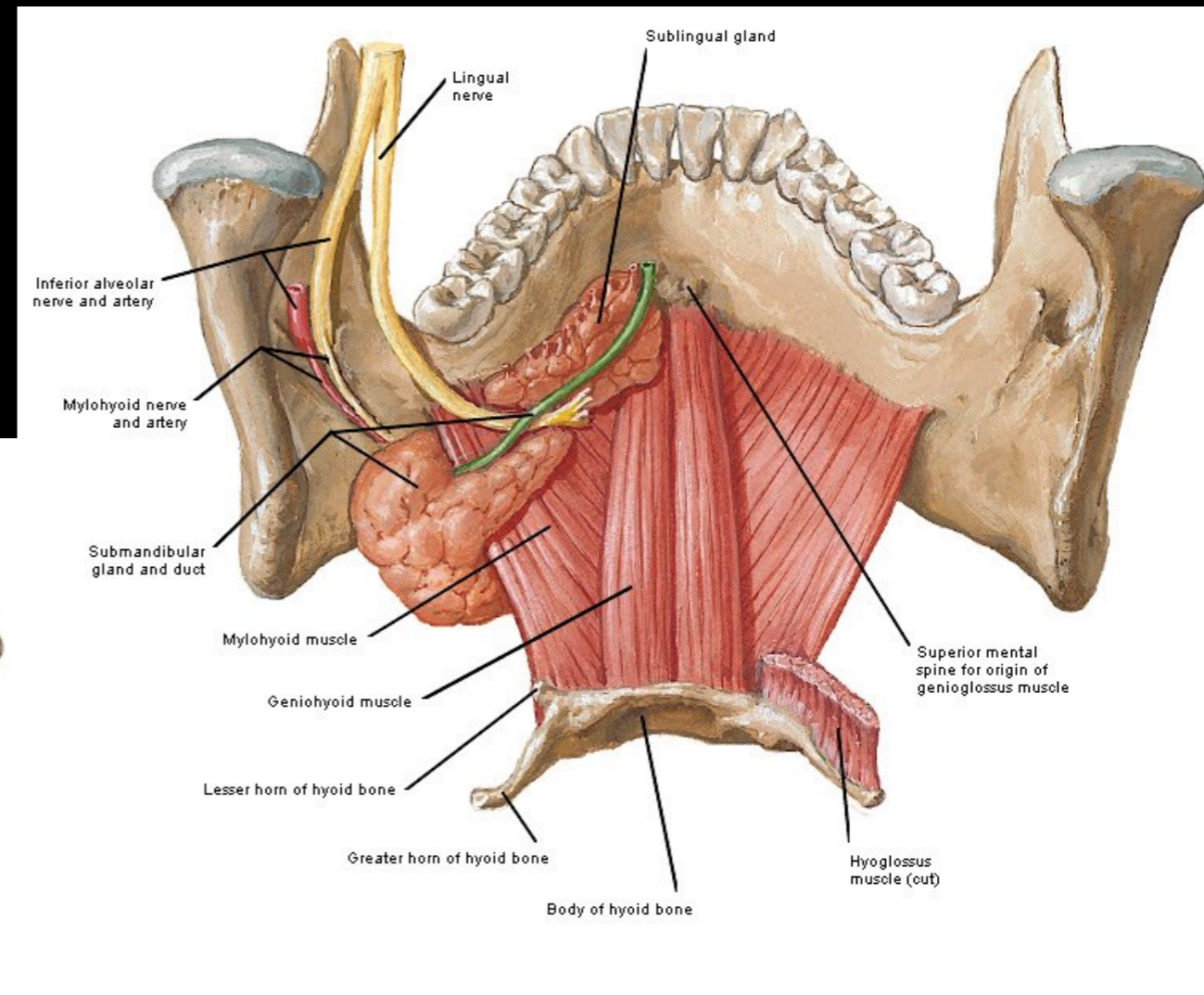
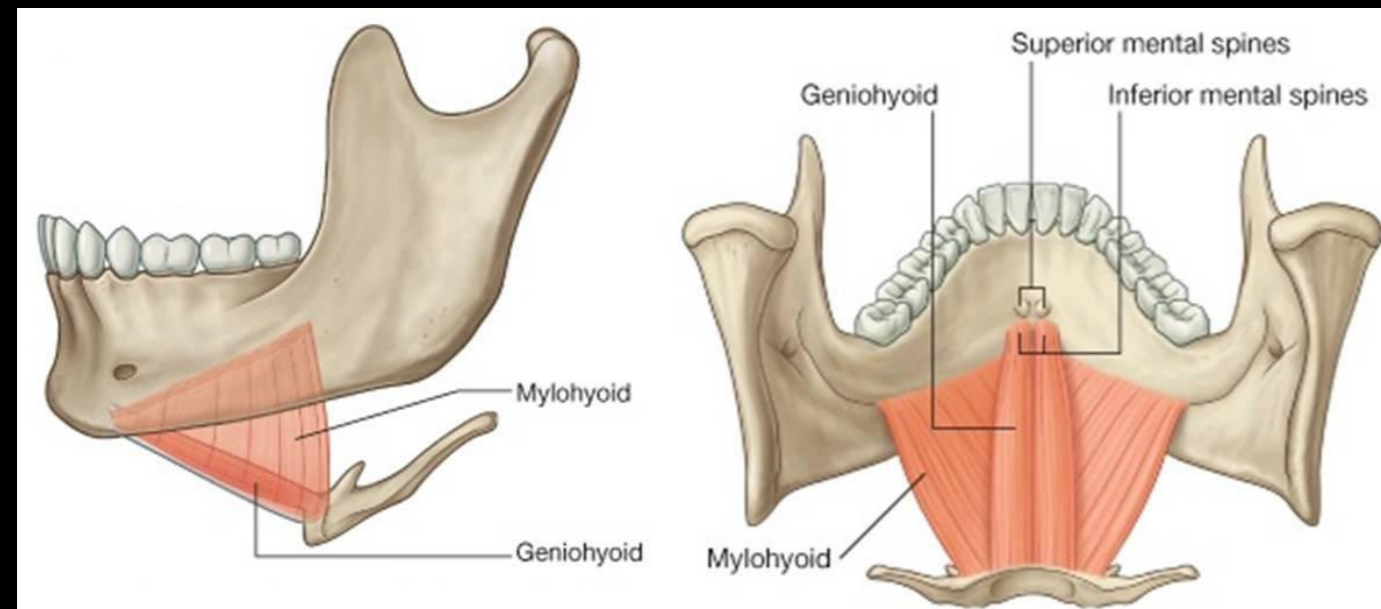
It passes backwards and slightly downwards

Insertion: on to the anterior surface of the body of the hyoid bone.

Function: Elevates the hyoid bone and is a weak depressor of the mandible.

Innervation: Deep cervical ansa (cervical plexus)

Blood supply: lingual artery (sublingual branch).



Isthmus of fauces

The oropharyngeal isthmus is where the oral cavity and the oropharynx meet.

Borders:

Sup: Soft palate (uvula)

Inf: Root of the tongue

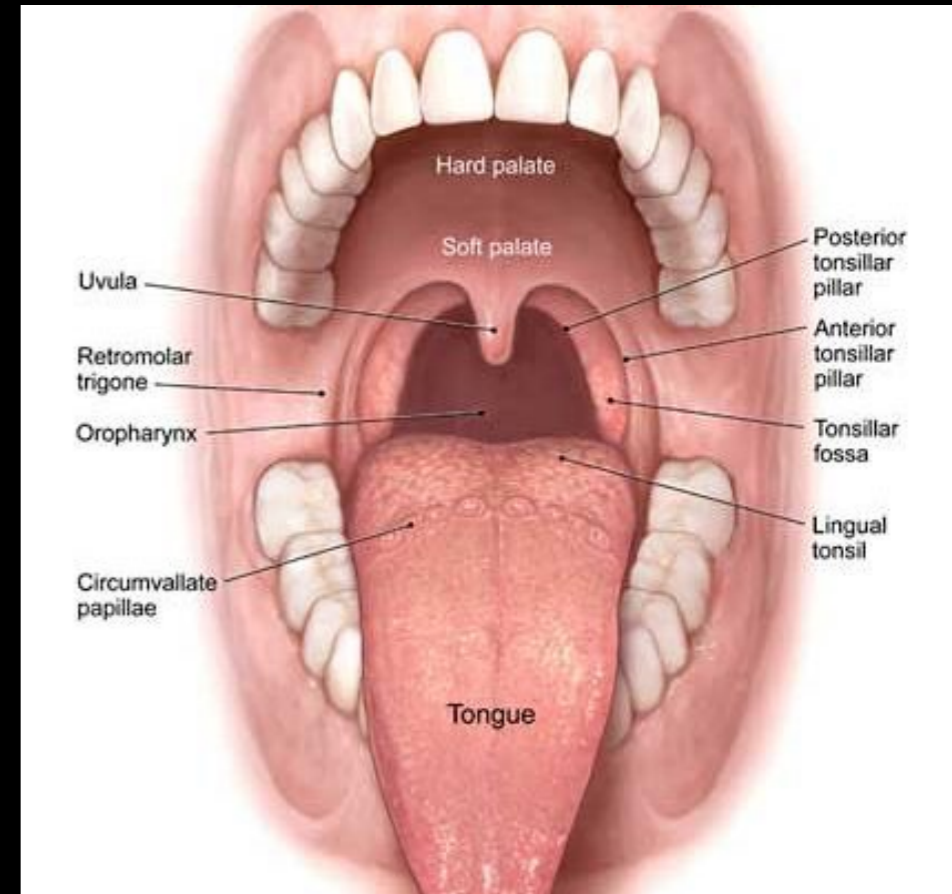
Lat: Palato-glossal & Palato-pharyngeal folds

These folds cover the **palatoglossus** & **palatopharyngeus** muscles,

Between these folds the **tonsillar fossa** is located which houses the **palatine tonsil**.

The palatine tonsil is a collection of lymphoid material of variable size that is likely to atrophy in the adult.

The palatine tonsil contains deep crypts

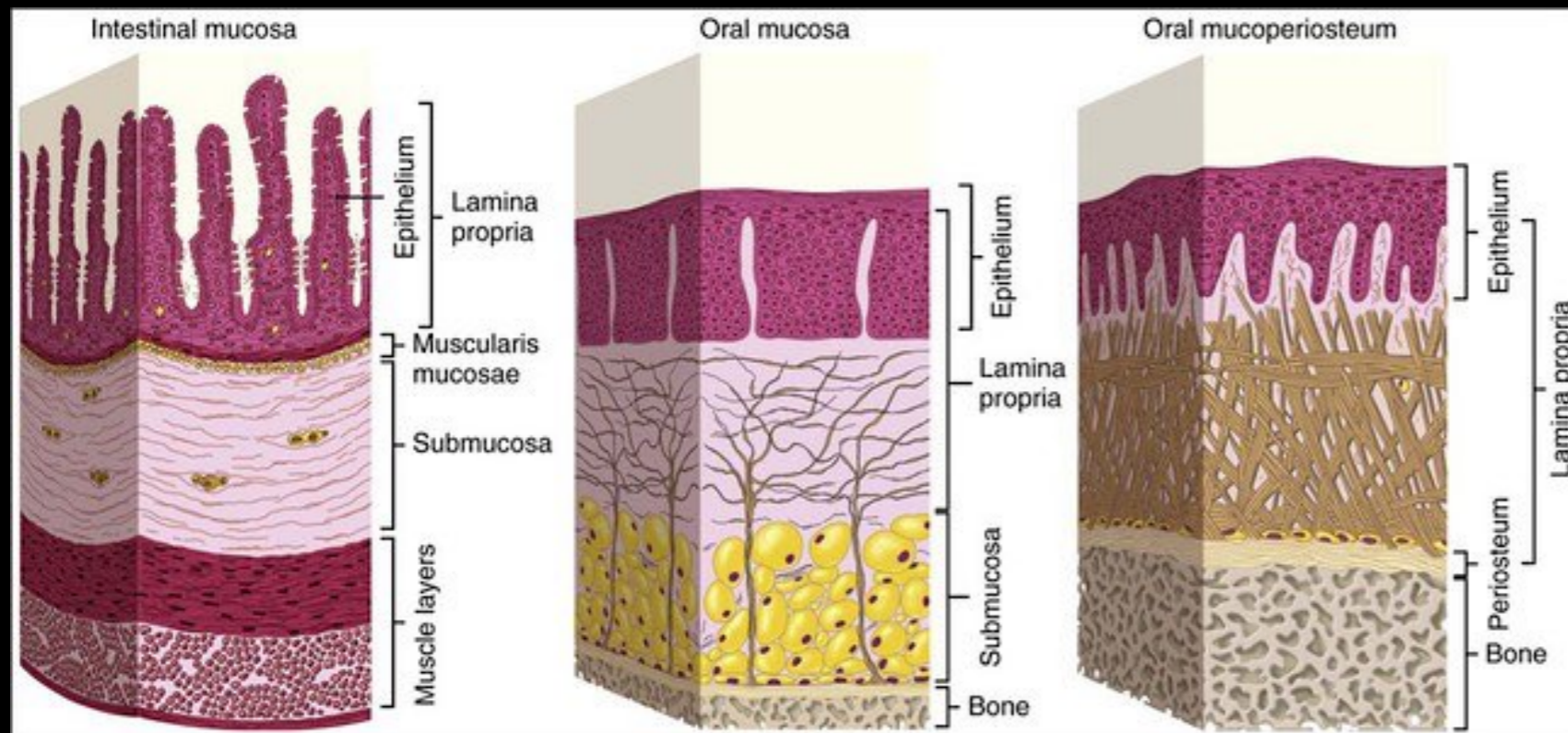
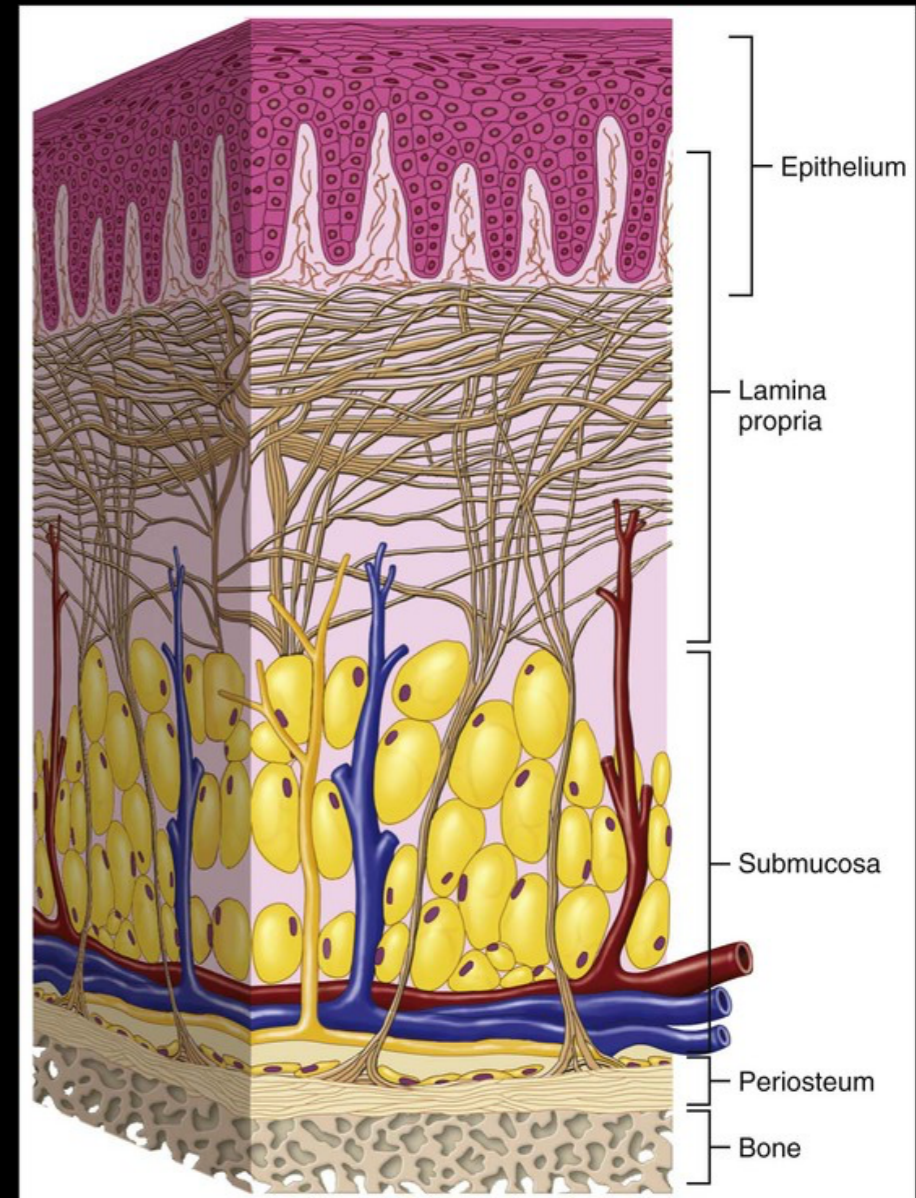


Oral mucosa

Term of the *mucus membrane* is used to describe the *moist lining of GI tract, nasal passages and other body cavities* that communicates with the exterior.

In the oral cavity, this *lining* is called as *oral mucosa*:
Stratified squamous epithelium (oral epithelium) + connective tissue (lamina propria)

The oral mucosa is located between the **lips (continues with skin - bounded by vermilion border) & pharynx (continues with the rest of the gut).**



Functions of oral mucosa

1) Protection:

Surface lining (stratified squamous epithelium) separates & protects deeper tissues and organs.

Biting and chewing expose the oral soft tissues to mechanical forces (compression, stretching) and surface abrasions so the oral mucosa shows number of adaptations of the epithelium and the connective tissue to these mechanical forces.

The epithelium acts as a major barrier to the microorganisms and their toxic products which might cause infection.

2) Sensation:

Receptors for the temperature + pain (protopathic), touch, pressure.

In the tongue also taste buds (taste receptors) are present.

Note: Reflexes like swallowing, salivating and gagging are initiated by the receptors of the oral cavity.

3) Secretion:

The major secretion associated with the oral mucosa is saliva, produced by the salivary glands.

Sebaceous glands commonly are present in the oral mucosa, but their secretion are insignificant.

4) Thermal regulation:

In some animals (such as dog), the mucosa plays a major role in the regulation of the body temperature.

The human oral mucosa plays no practical role in regulation of body temperature and no obvious specializations of blood vessels exist for controlling heat transfer (such as arteriovenous shunts).

Types of the oral mucosa according to their primary functions

1) Masticatory mucosa (forms 25% of the total oral mucosa):

Stratified squamous keratinized epithelium, found on:

- a) Dorsum of the tongue**
- b) Hard palate**
- c) Attached gingiva**

2) Lining mucosa (forms 60% of the total oral mucosa):

Stratified squamous nonkeratinized epithelium, found on:

- a) Buccal mucosa (inner lining of the cheeks)**
- b) Floor of the oral cavity**
- c) Labial mucosa (inner lining of the lips)**
- d) Alveolar mucosa (lining between the buccal and labial mucosae)**
- e) Soft palate**
- f) Underside the tongue**

3) Specialized mucosa (forms 15% of the total oral mucosa):

Taste buds, tactile receptors

Types of epithelial linings in the oral cavity

1) Stratified squamous keratinized:

Present in the epithelial surface of the masticatory mucosa & in some regions of the specialized mucosa. It is inflexible, tough, resistant to abrasion and tightly bounded to the lamina propria.

Layers:

Stratum basale (stratum germinativum): cuboidal/columnar cells sitting on basal lamina

Stratum spinosum (prickle cell layer): several large elliptical spherical cell layers

Called spinosum because the cells shrink during histological preparation and the cells remain in contact by intercellular bridges or desmosomes.

Note: **Stratum basale** + **Stratum spinosum** → forms 2/3 of the entire epithelium.

Stratum granulosum: contains small granules of keratohyalin which can be stained intensely by the acid dyes (such as hematoxylin).

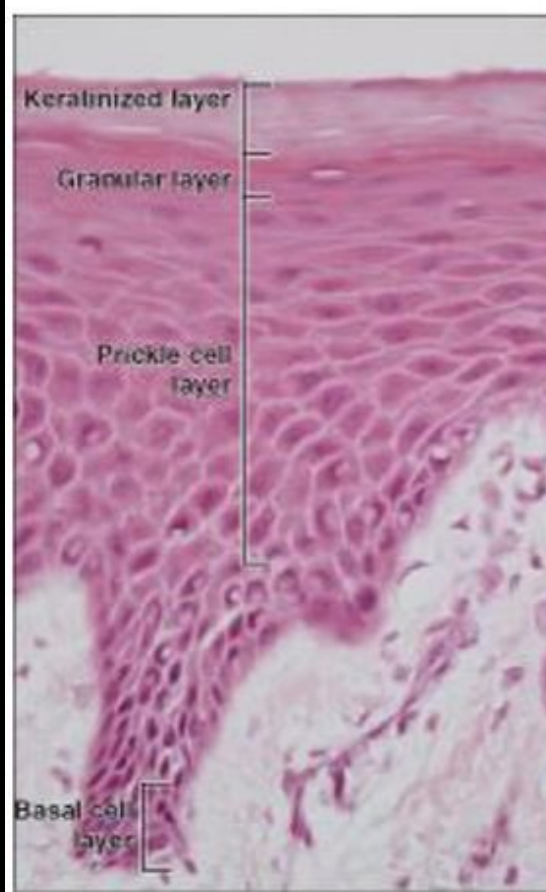
Stratum spinosum: transparent, tiny pink squamous layer which contains eleidin protein and it can be stained by eosin staining.

Stratum corneum (cornified layer): it is the keratinized layer.

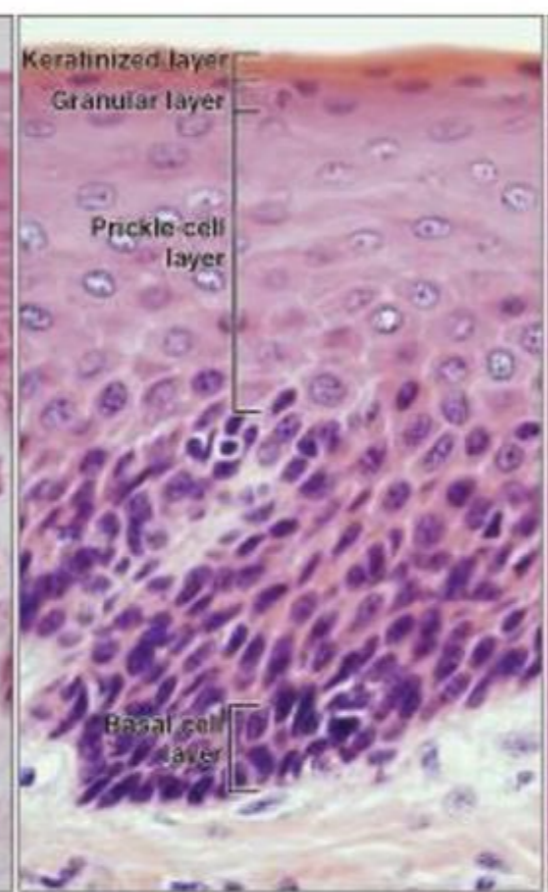
Note: The pattern of maturation of these cell layers is termed **orthokeratinization**.

Note: The masticatory mucosa (parts of the hard palate and gingiva) presents **parakeratinization (means the surface layer stains for keratin but pyknotic nuclei are retained)**.

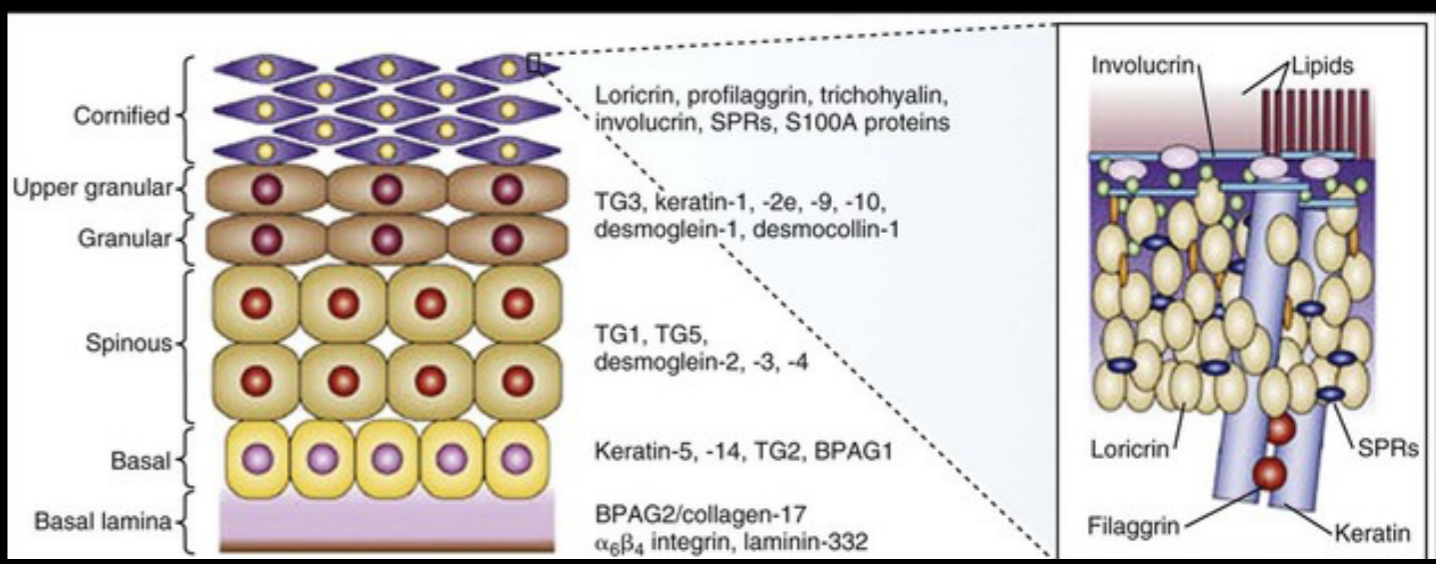
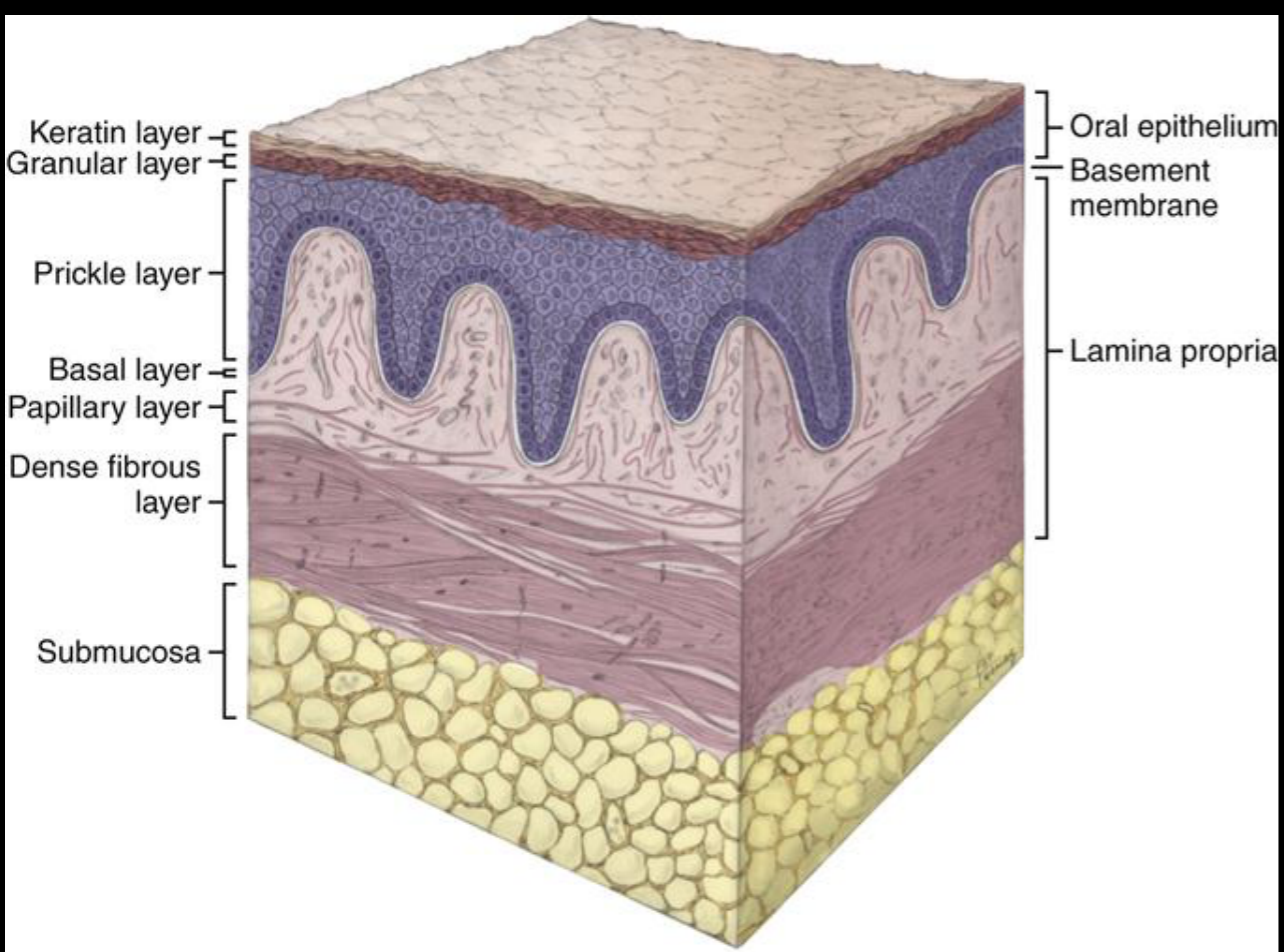
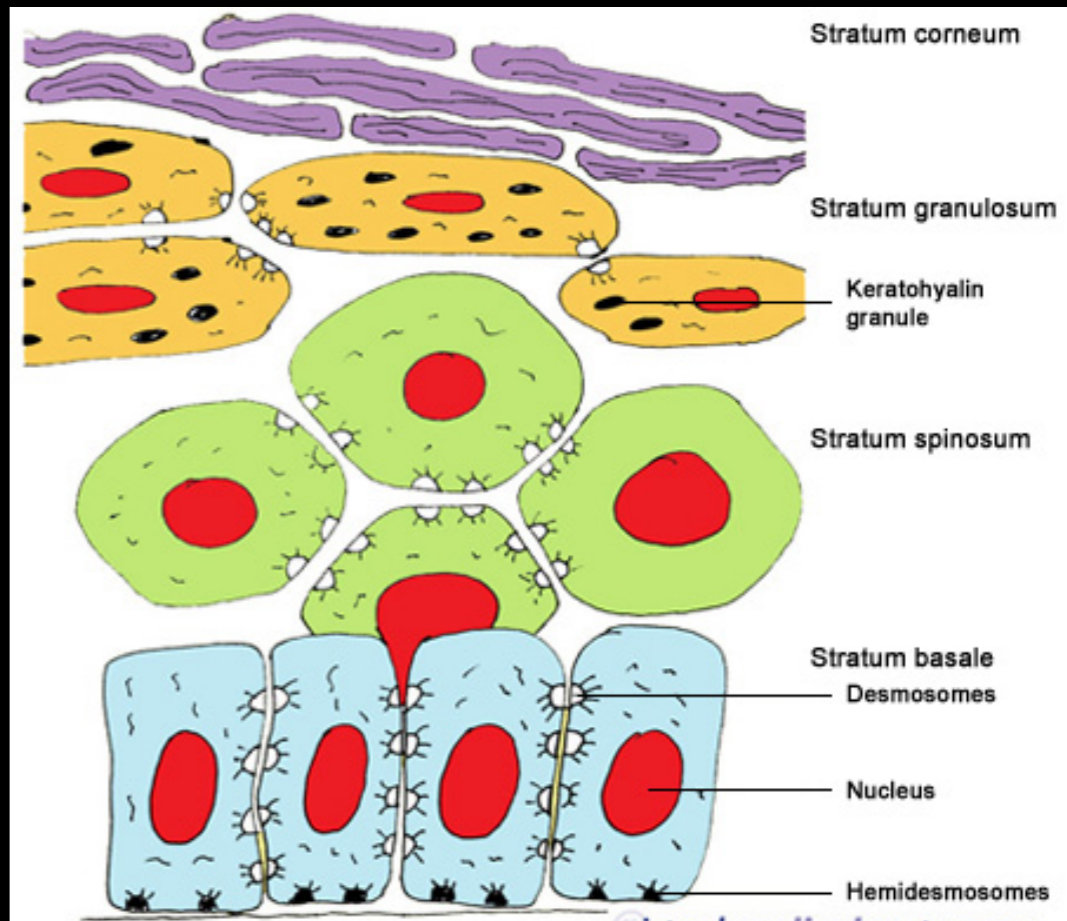
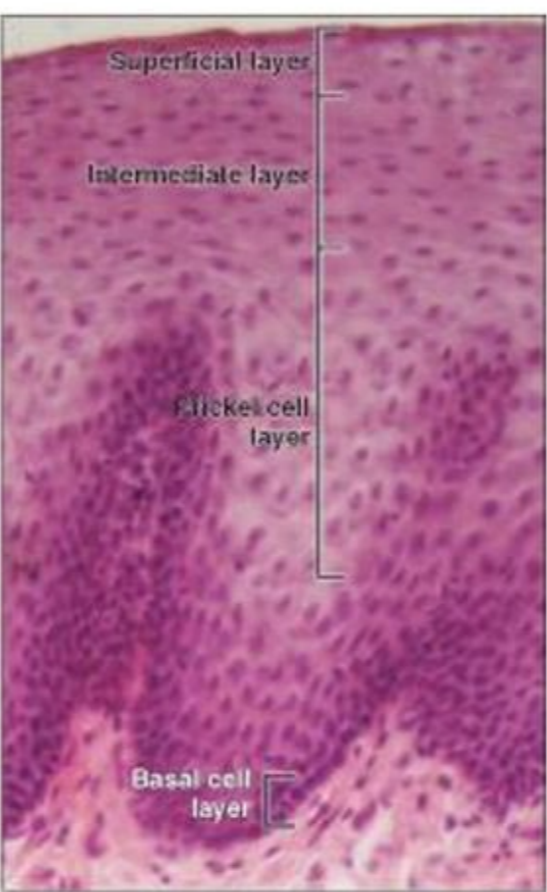
Orthokeratinized stratified squamous epithelium



Parakeratinized stratified squamous epithelium



Nonkeratinized stratified squamous epithelium



Types of epithelial linings in the oral cavity

2) Stratified squamous non keratinized:

Present in the lining mucosa of the oral cavity.

In some regions (such as labial and buccal mucosa) the epithelium is thicker than keratinized epithelium and shows different pattern of connective tissue.

Layers:

Stratum basale (stratum germinativum): cuboidal/columnar cells sitting on basal lamina
(slightly larger than the keratinized epithelium)

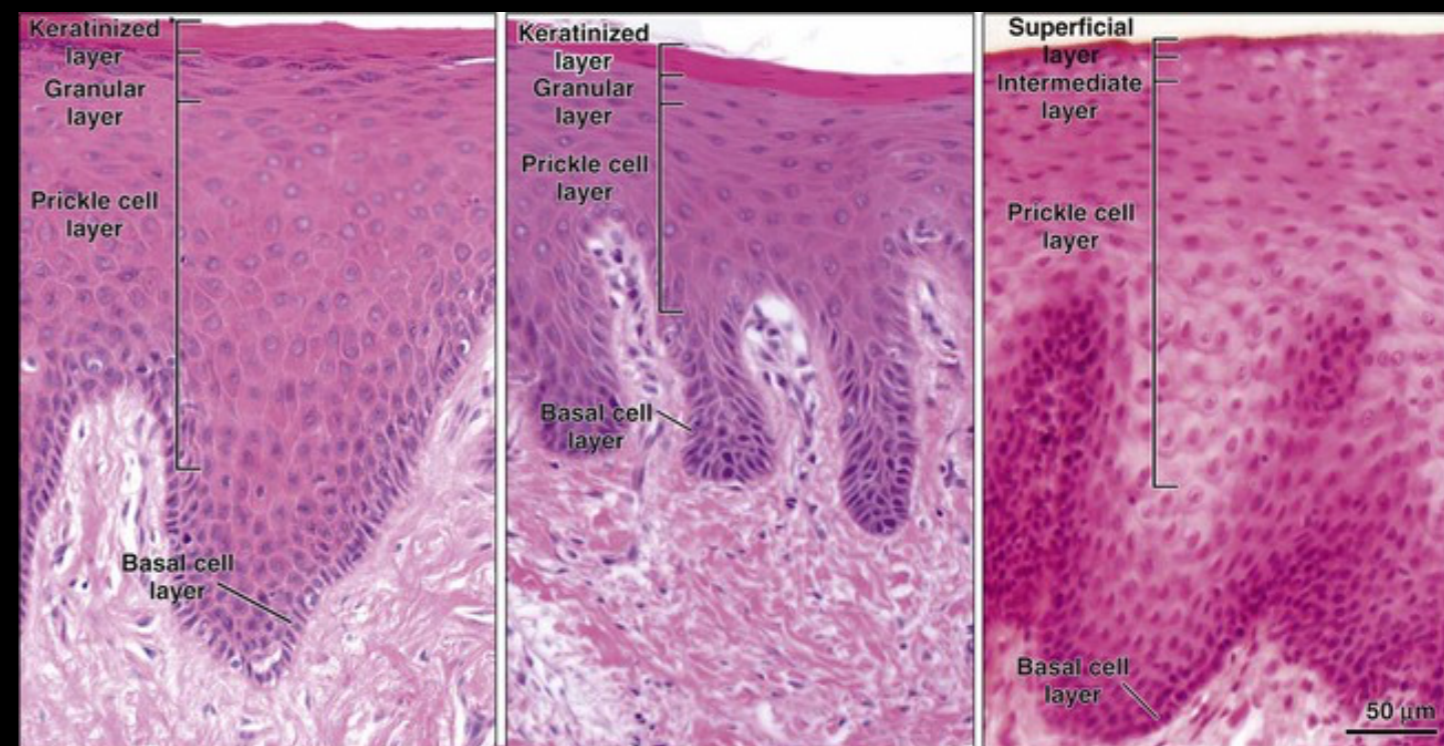
Stratum spinosum: several large elliptical spherical cell layers

Note: Here the intercellular bridges are less conspicuous.

Note: The outer layer divides in two zones:

1) **Stratum intermedium**

2) **Stratum superficiale**



Major Features of Maturation in Keratinized & Nonkeratinized Epithelium

Keratinized Epithelium		Nonkeratinized Epithelium	
FEATURES	CELL LAYER	FEATURES	CELL LAYER
Cuboidal or columnar cells containing bundles of tonofibrils and other cell organelles; site of most cell divisions	Basal	Cuboidal or columnar cells containing separate tonofilaments and other cell organelles; site of most cell divisions	Basal
Larger ovoid cells containing conspicuous tonofibril bundles; membrane-coating granules appear in upper part of this layer	Prickle/Spinosum	Larger ovoid cells containing dispersed tonofilaments; membrane-coating granules appear in upper part of layer; filaments become numerous	Prickle/Spinosum
Flattened cells containing conspicuous keratohyaline granules associated with tonofibrils; membrane-coating granules fuse with cell membrane in upper part; internal membrane thickening also occurs	Granular	Slightly flattened cells containing many dispersed tonofilaments and glycogen	Intermediate
Extremely flattened and dehydrated cells in which all organelles have been lost; cells filled only with packed fibrillar material; when pyknotic nuclei are retained, parakeratinization occurs	Keratinized	Slightly flattened cells with dispersed filaments and glycogen; fewer organelles are present, but nuclei persist	Superficial

Characteristics of Nonkeratinocytes in Oral Epithelium

CELL TYPE	LEVEL IN EPITHELIUM	SPECIFIC STAINING REACTIONS	ULTRASTRUCTURAL FEATURES	FUNCTION
Melanocyte	Basal	Dopa oxidase–tyrosinase; silver stains	Dendritic; no desmosomes or tonofilaments; premelanosomes and melanosomes present	Synthesis of melanin pigment granules (melanosomes) and transfer to surrounding keratinocytes
Langerhans cell	Predominantly suprabasal	CD1a; cell surface antigen markers	Dendritic; no desmosomes or tonofilaments; characteristic Langerhans granule	Antigen trapping and processing
Merkel cell	Basal	Probably periodic acid–Schiff positive	Nondendritic; sparse desmosomes and tonofilaments; characteristic electron-dense vesicles and associated nerve axon	Tactile sensory cell
Lymphocyte	Variable	Cell surface antigen markers (CD3—T cells; CD20—B cells)	Large circular nucleus; scant cytoplasm with few organelles; no desmosomes or tonofilaments	Associated with the inflammatory response in oral mucosa



ED II/2

2018.05.14



ED II/4

08/05/2017



EM II/14

2018.05.15



EM II/16

May 12, 2016



2018/09/29

EDI/5



ED IV/4

May 11, 2015



2017/10/01

EDI/4

