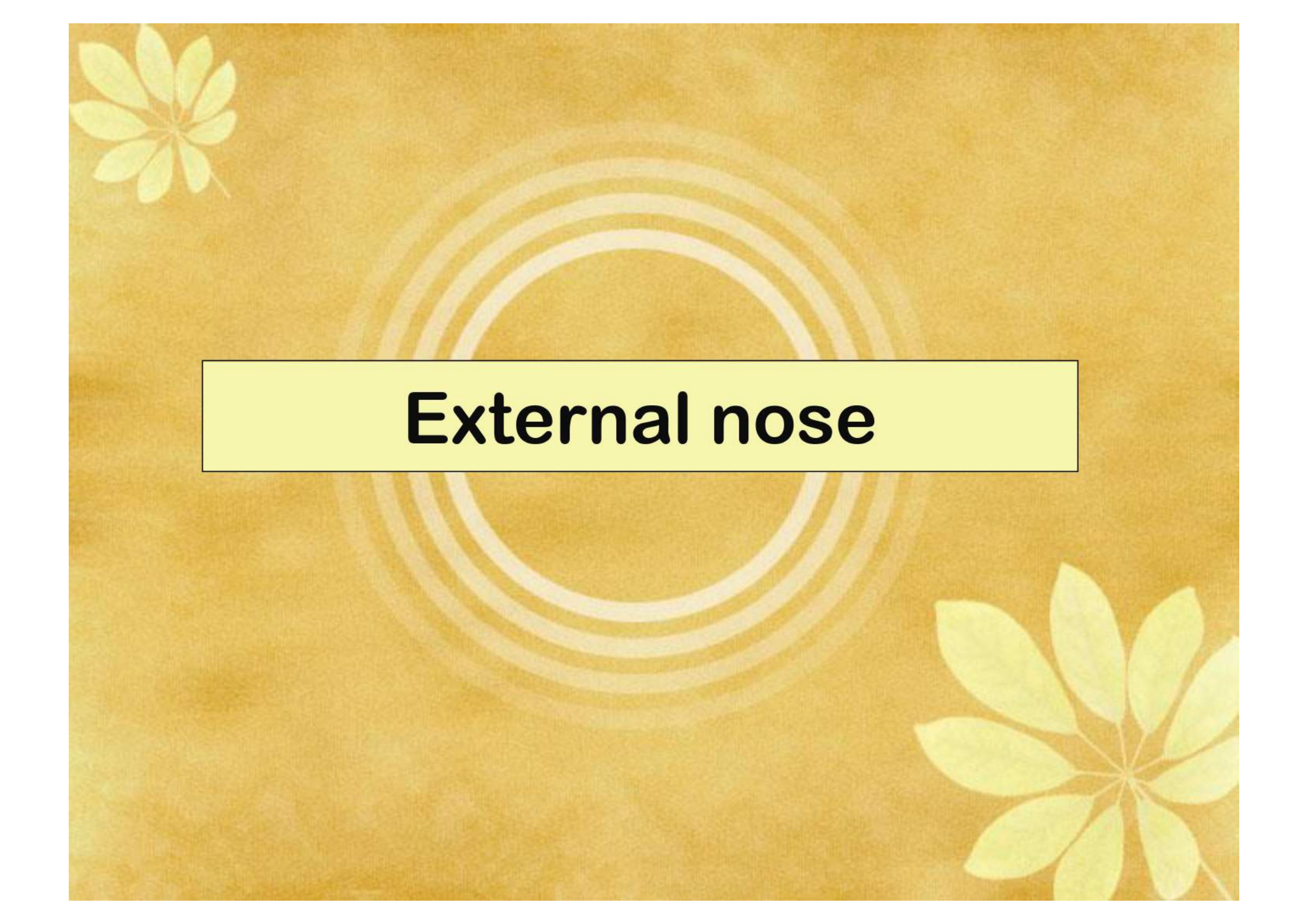




Dr. Doaa Shuaib

Nose & paranasal sinuses

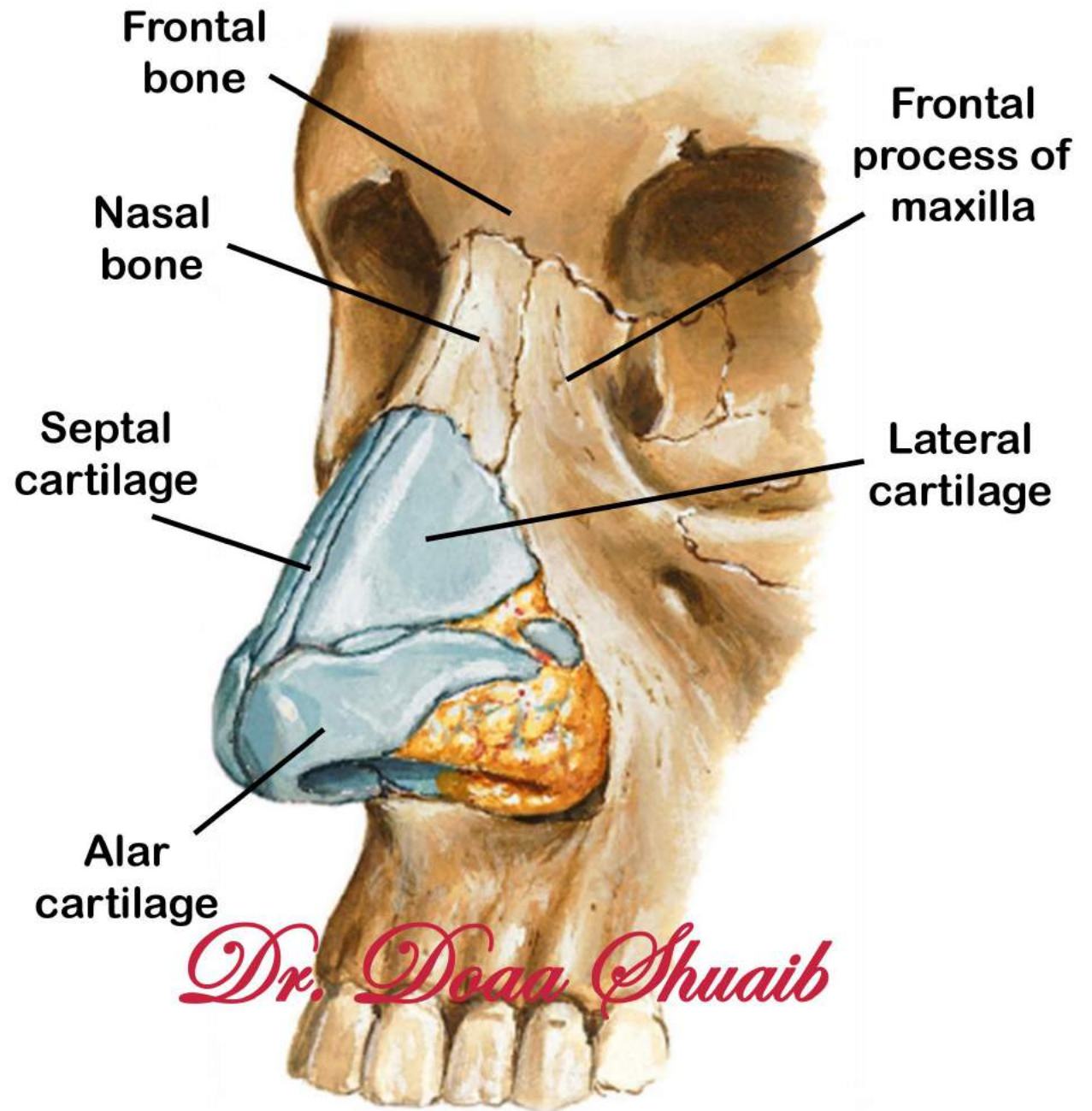
**Assistant Professor of Anatomy & Embryology
Faculty of Medicine – Cairo University
Email: doaa.shuaib@kasralainy.edu.eg**

The background is a textured, golden-yellow surface. In the center, there are several concentric, light-colored circles that create a ripple effect. In the top-left and bottom-right corners, there are stylized, light-green floral motifs with multiple pointed petals.

External nose

Shape & parts

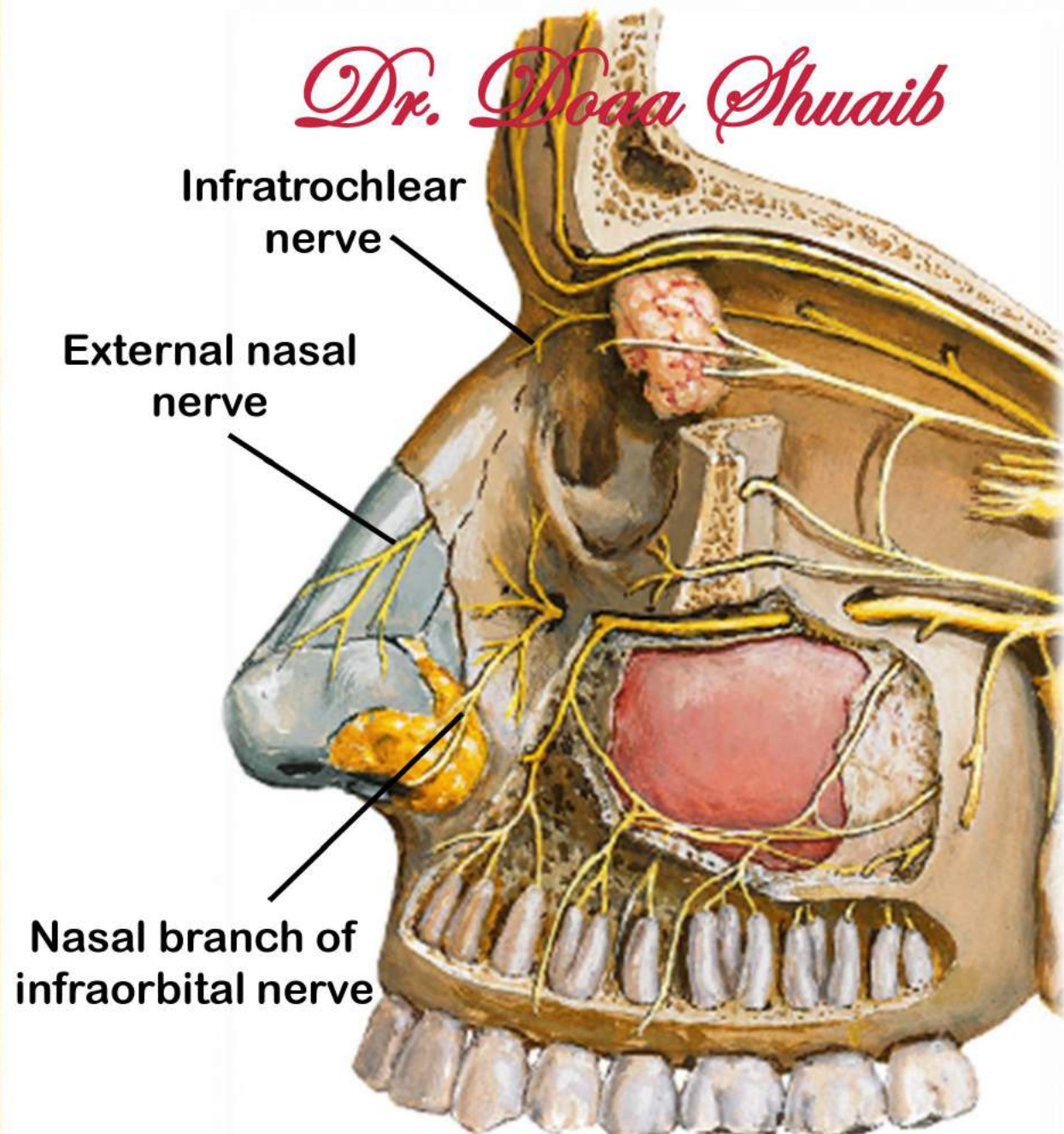
- **Pyramidal in shape** having a root and free apex.
- It is formed of bony and cartilaginous parts.
- **The bony part** consists of nasal bones, frontal processes of maxillary bones and nasal process of frontal bone.
- **The cartilaginous part** consists of median septal cartilage, lateral cartilages (above) and alar cartilages (below).



Dr. Doaa Shuaib

Nerve supply

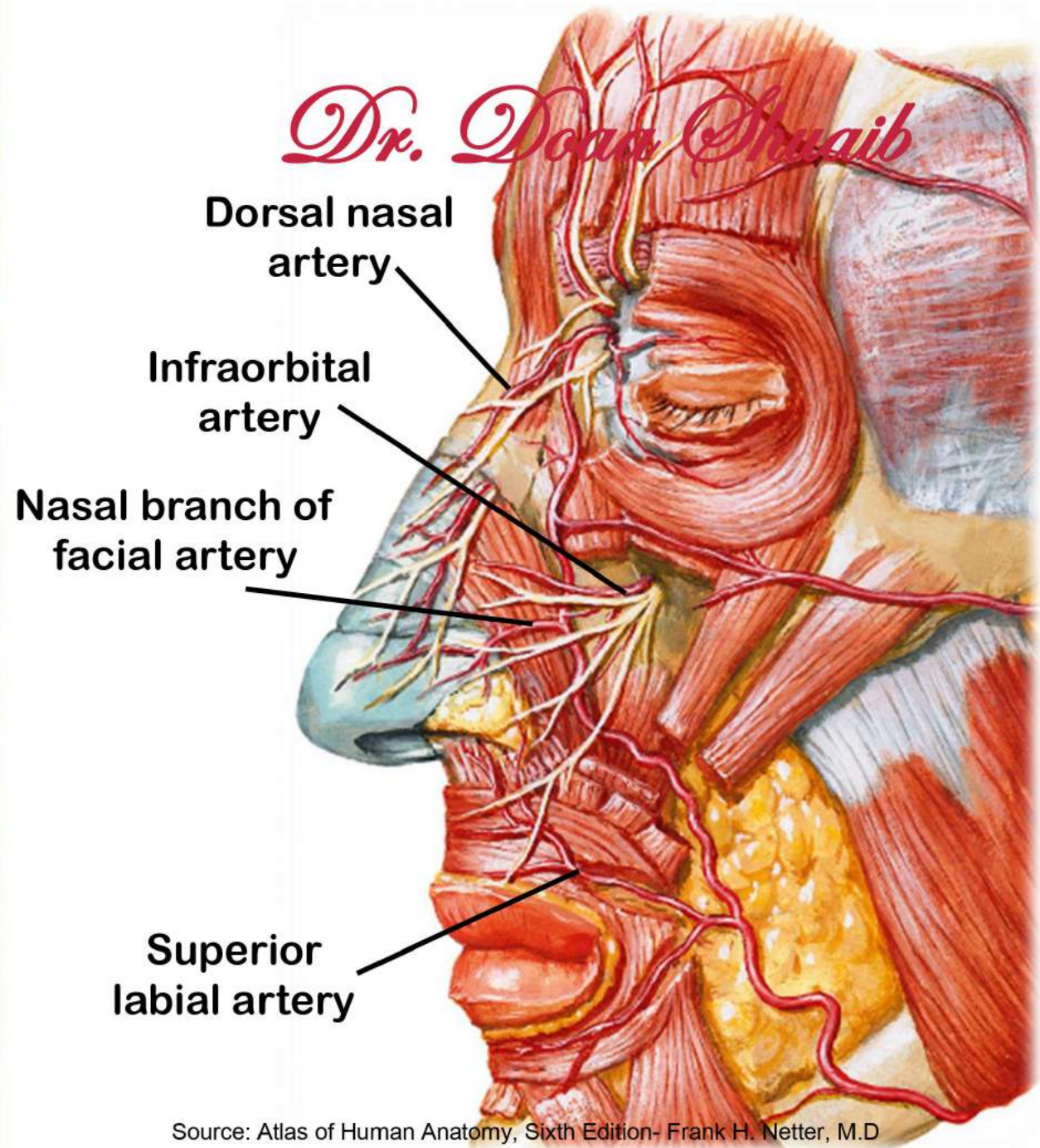
- All the nerves supplying the skin of the nose are derived from the nasociliary branch of the ophthalmic nerve.
- They are:
 - 1- **Infratrochlear nerve** supplies the root of the nose.
 - 2- **External nasal nerve** supplies the dorsum of the nose.
 - 3- **Nasal branch of infraorbital nerve** supplies the side of the nose.



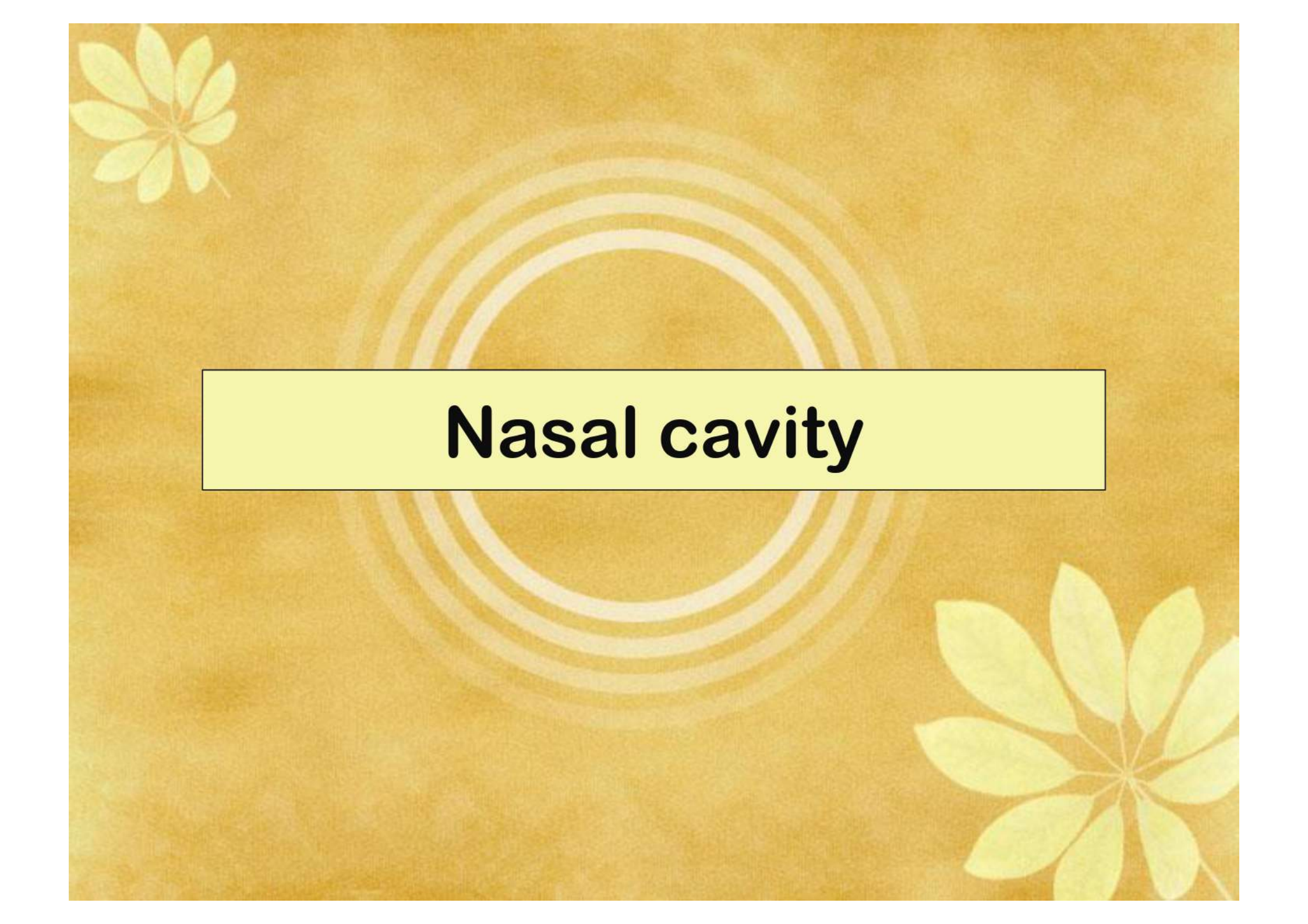
Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Arterial supply

- Nasal branch of infraorbital artery.
- Nasal branch of facial artery.
- Septal branch of superior labial artery.
- Dorsal nasal artery



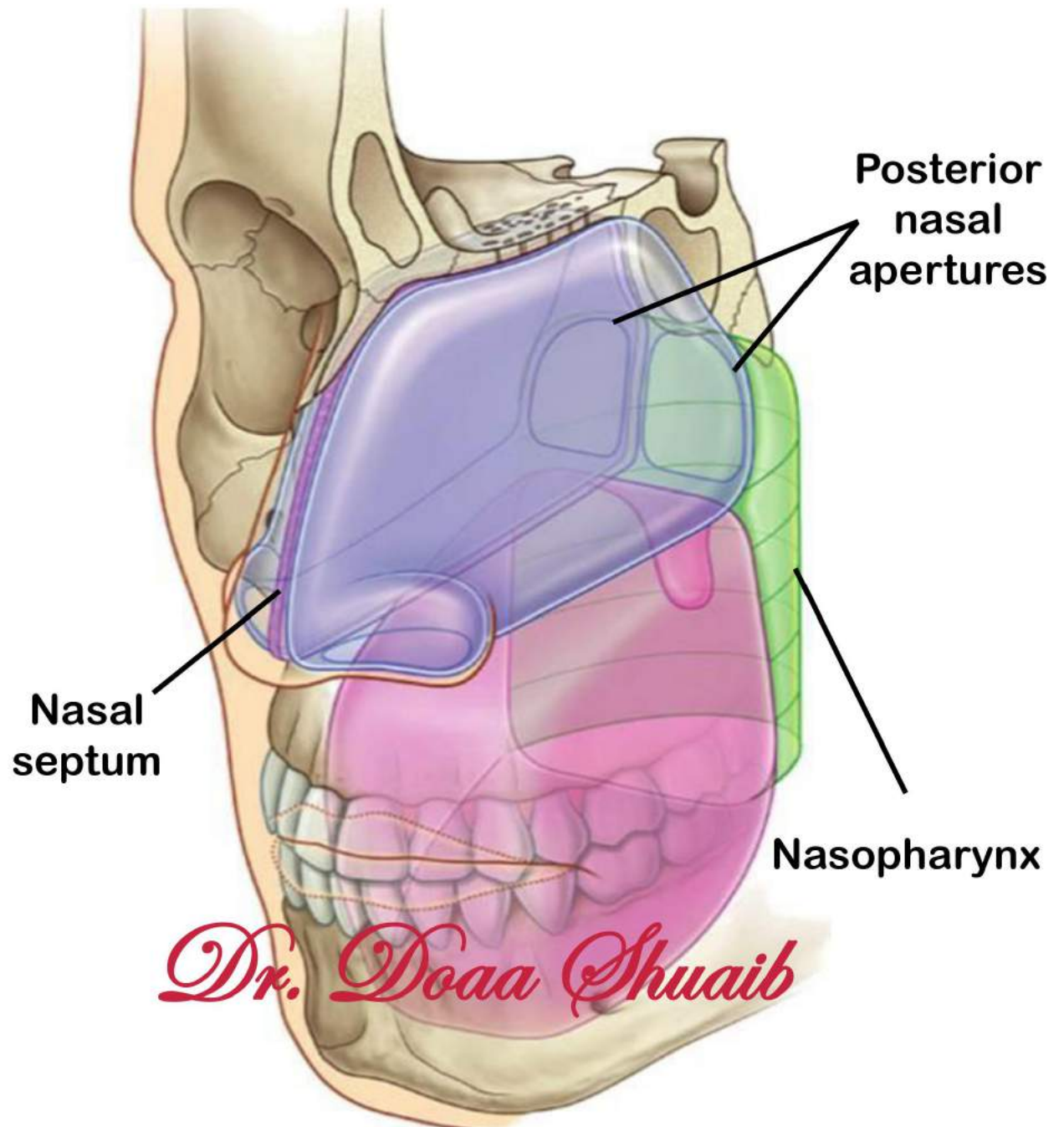
Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

The background is a textured, golden-yellow color. In the center, there are several concentric circles in a lighter shade of yellow. In the top-left and bottom-right corners, there are stylized floral motifs with multiple pointed petals.

Nasal cavity

Nasal cavity

- There are two nasal cavities separated by a nasal septum.
- Each cavity opens on the face through the anterior nasal opening or aperture (anterior nares or nostrils).
- The nasal cavity opens posteriorly in the nasopharynx through the posterior nasal apertures (the choana).

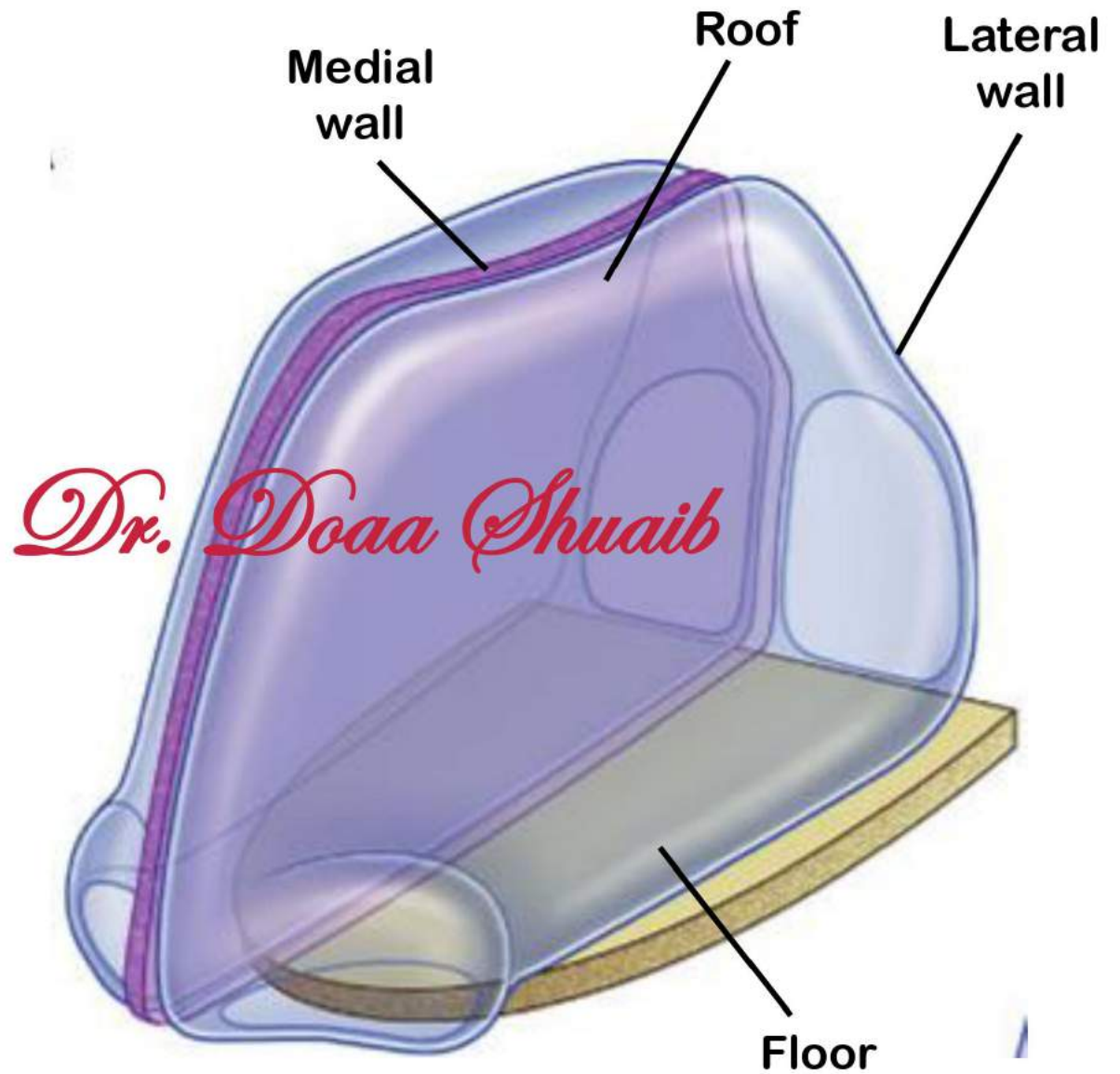


Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

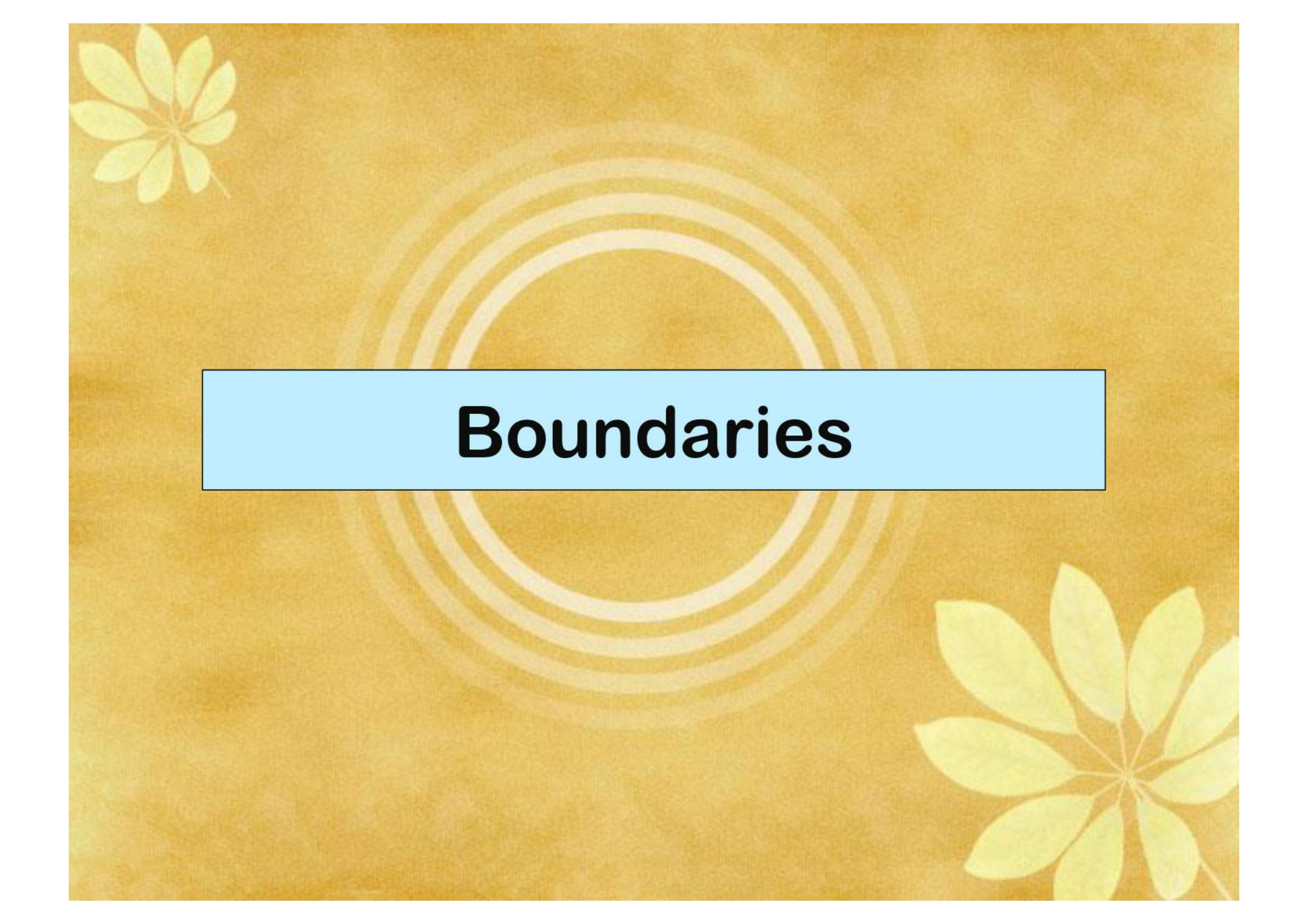
Nasal cavity

Each cavity has:

- Roof
- Floor
- Medial wall
- Lateral wall

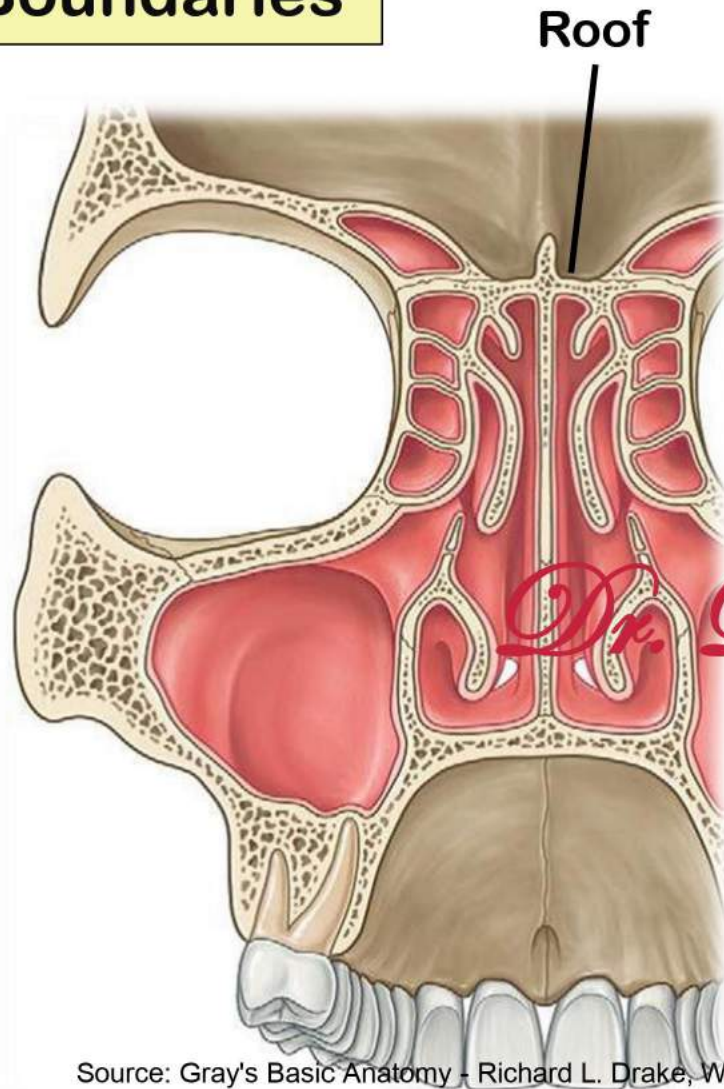


Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

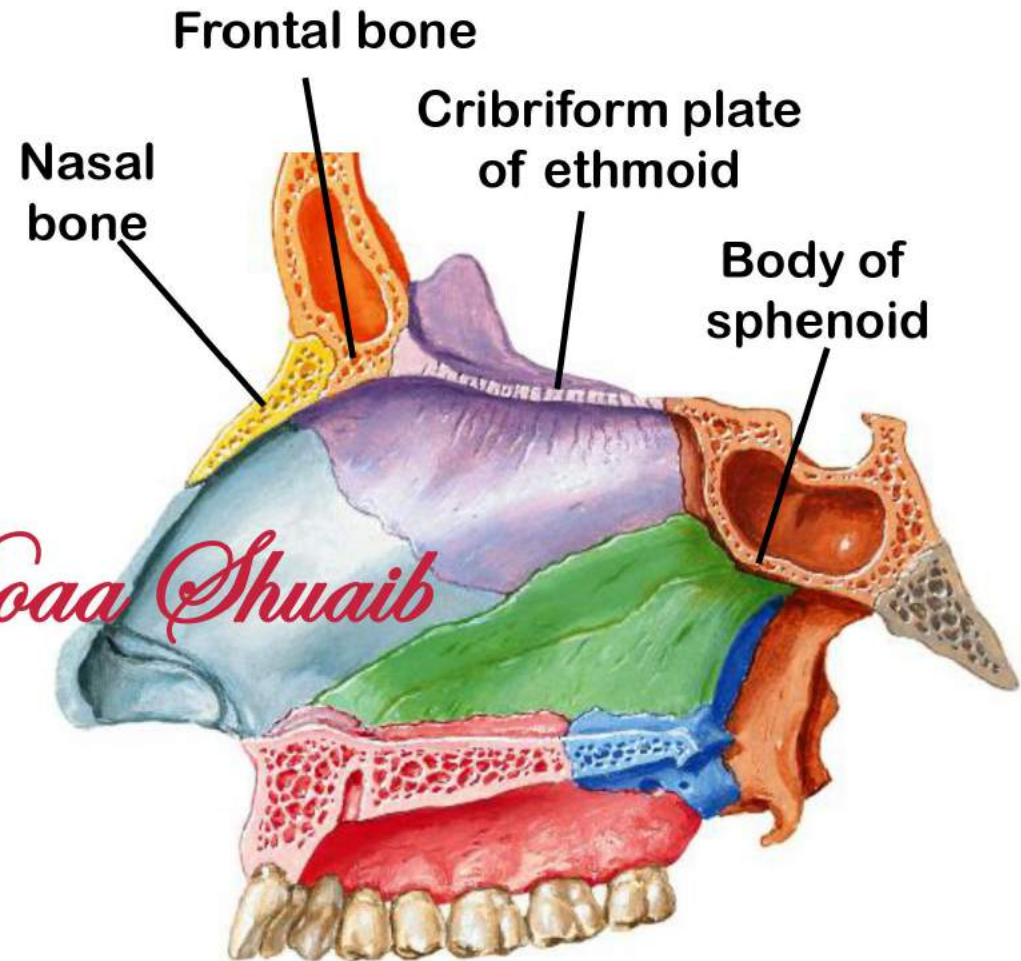


Boundaries

Boundaries



Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

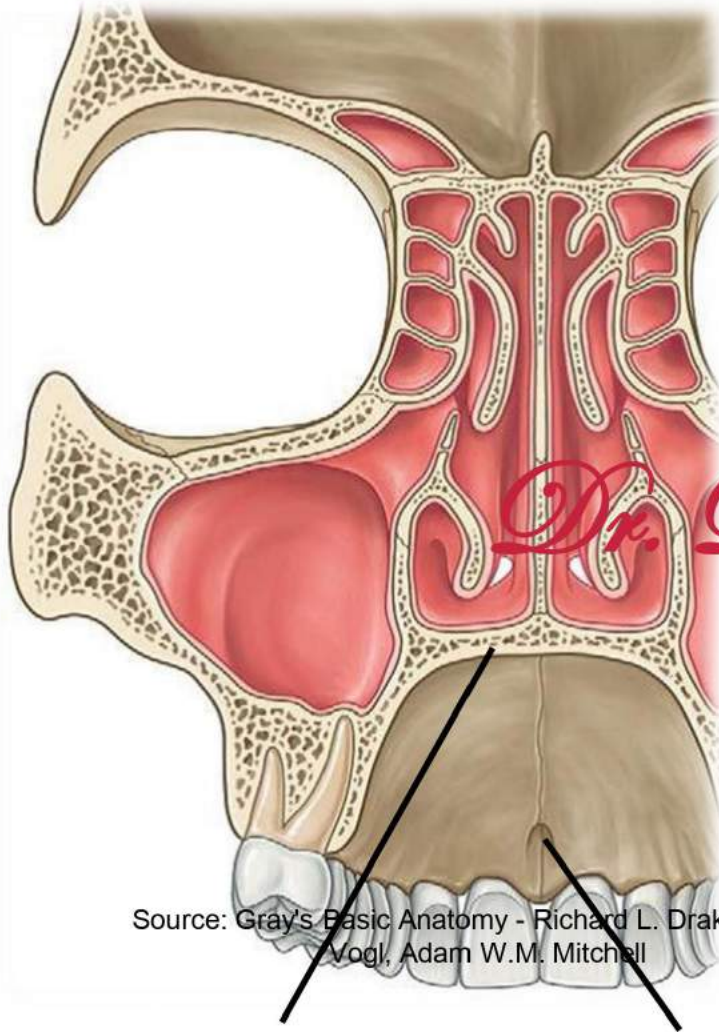


Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Roof

- 1- **Anterior sloping part:** Formed of nasal and frontal bones.
- 2- **Middle horizontal part:** The cribriform plate of ethmoid bone.
- 3- **Posterior sloping part:** Formed of the body of sphenoid with the opening of the sphenoid sinus.

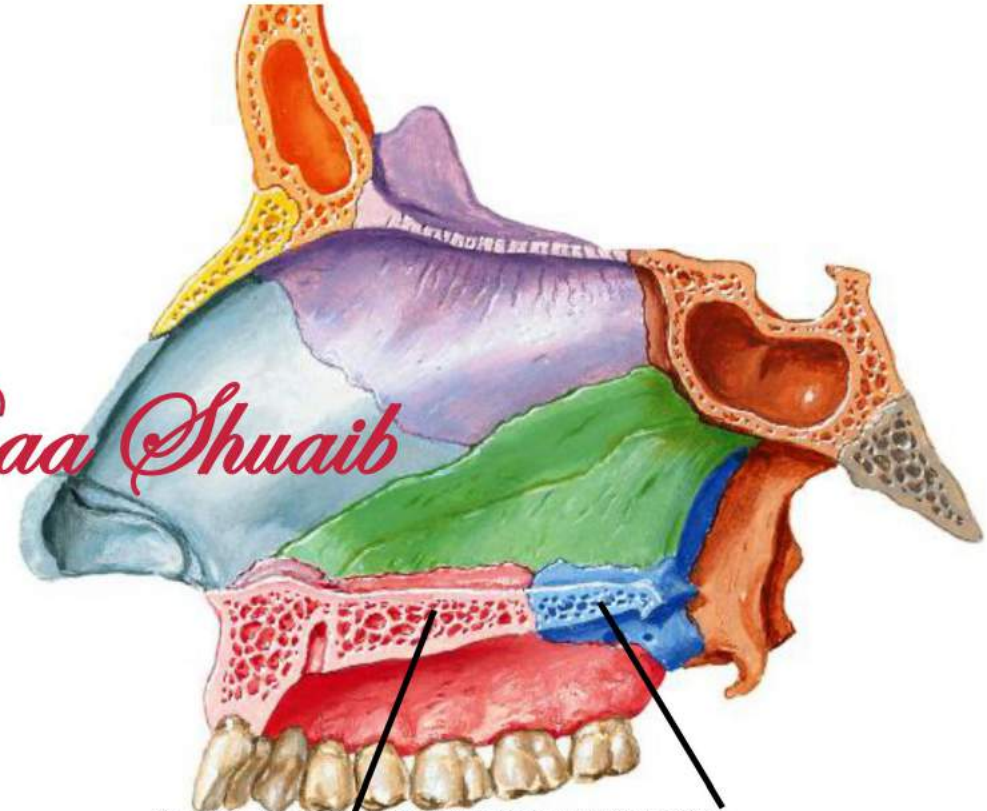
Boundaries



Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

Roof

Incisive fossa



Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D.

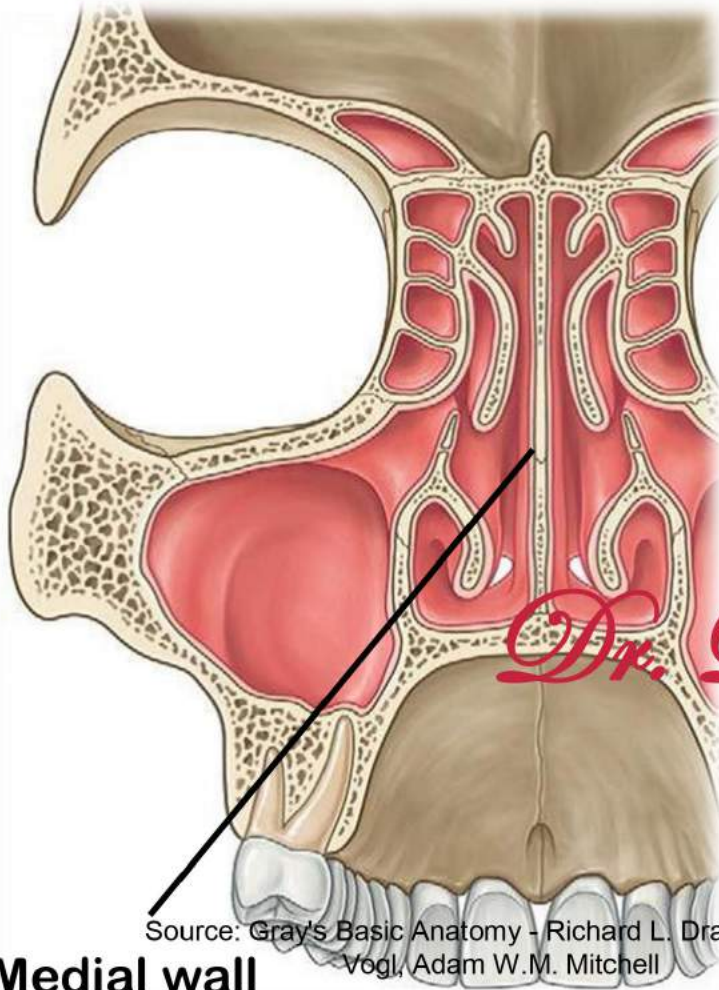
Palatine process
of maxilla

Horizontal plate
of palatine bone

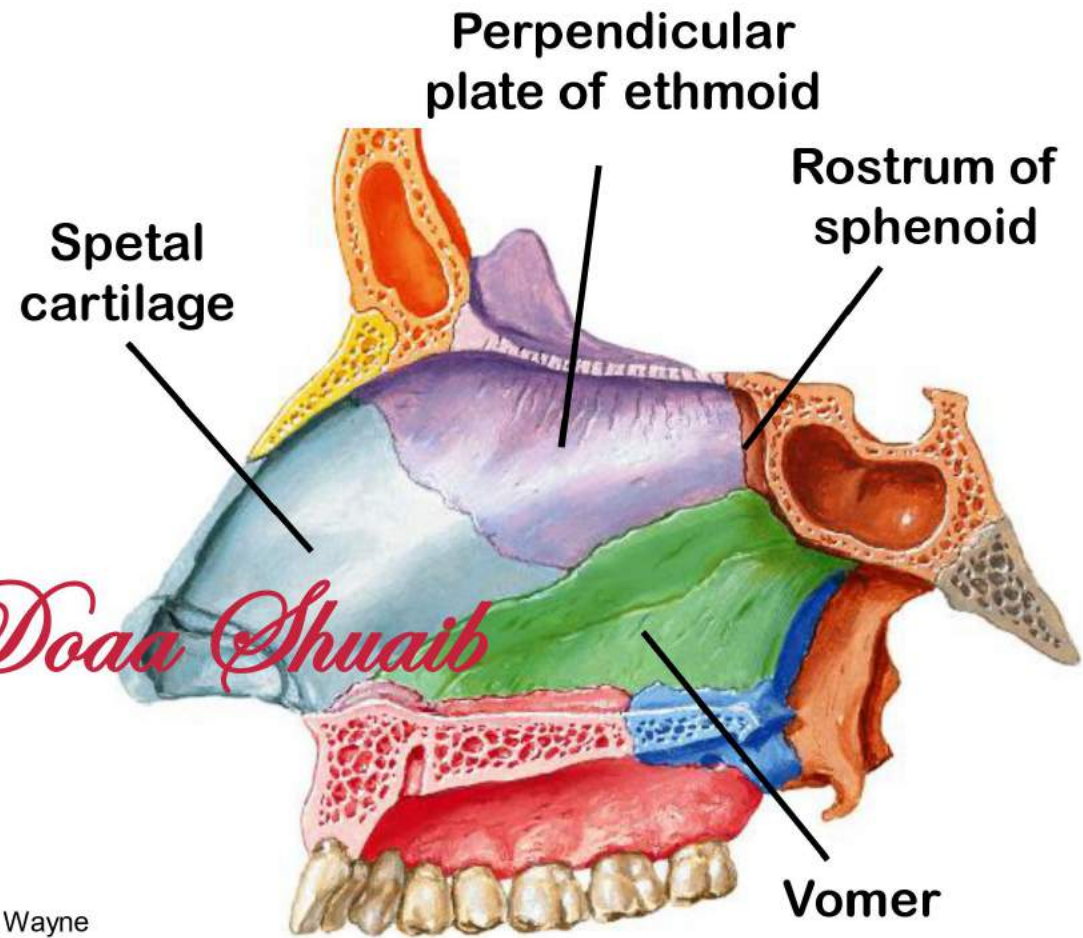
Floor

- It is formed by the 2 parts of the hard palate; palatine process of maxilla anteriorly and horizontal plate of palatine bone posteriorly.
- It has the incisive fossa and canals which lie about 2 cm behind the anterior end.

Boundaries



**Medial wall
(nasal septum)**

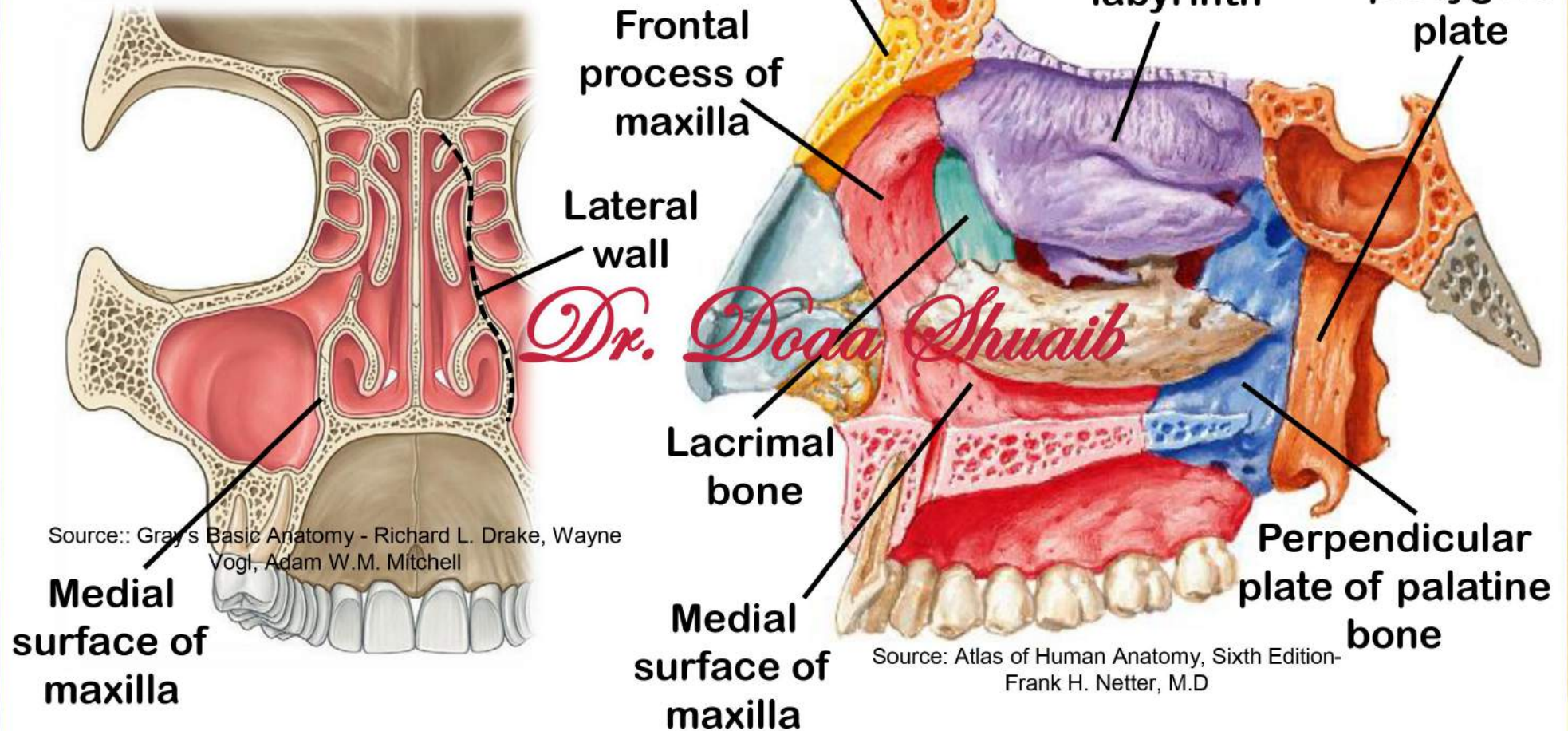


Source: Atlas of Human Anatomy, Sixth Edition - Frank H. Netter, M.D

Medial wall (nasal septum)

- 1- **Septal cartilage:** In front.
- 2- **Perpendicular plate of ethmoid:** Above and behind.
- 3- **Vomer:** Below and behind.
- 4- **Rostrum of sphenoid:** Small posterior part.

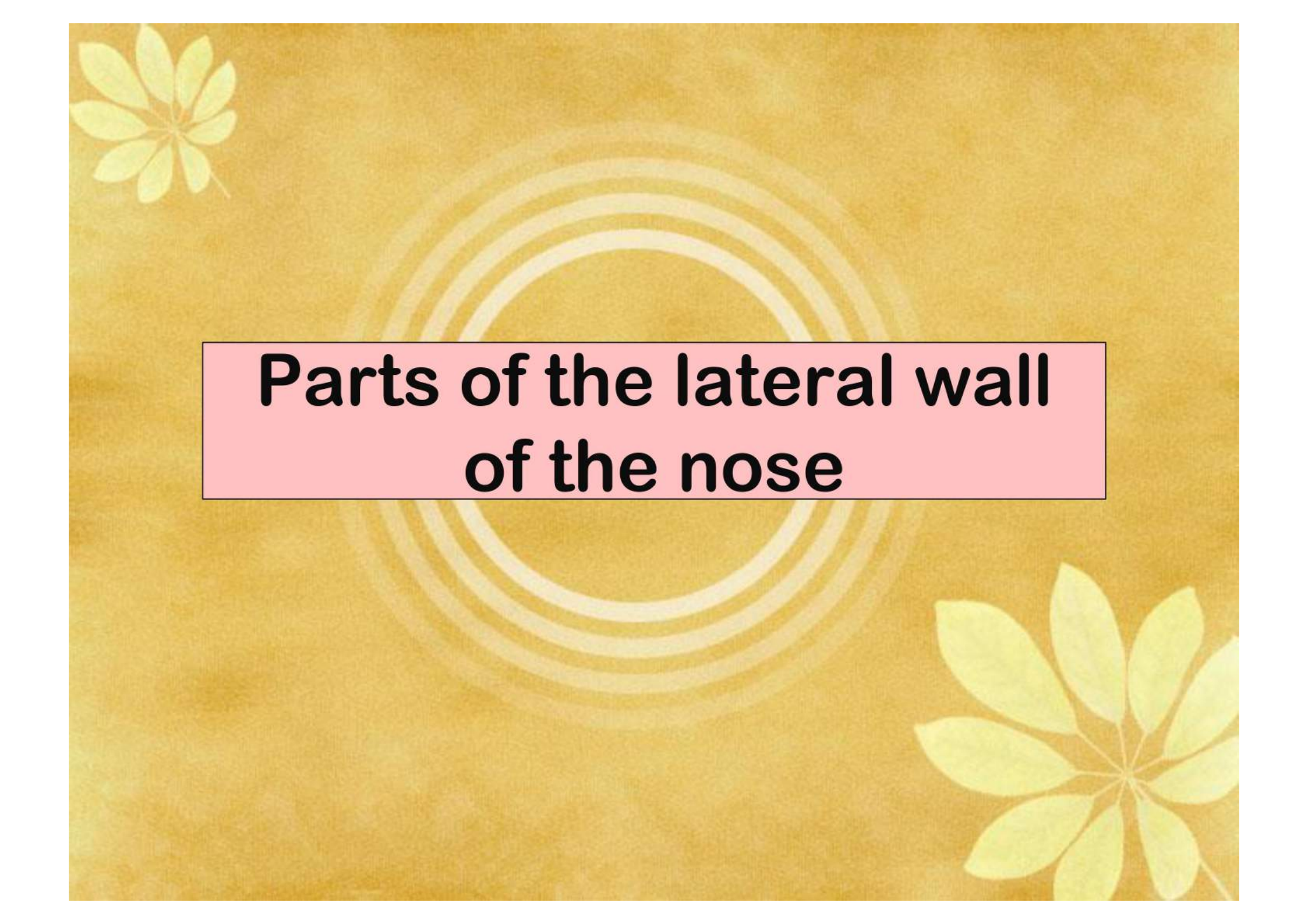
Boundaries



Lateral wall

Nearly flat, showing openings of paranasal sinuses. It is formed of:

- 1- **Medial surface of maxilla:** Lies below and in front and contains the opening of maxillary sinus in its upper posterior part.
- 2- **Perpendicular plate of palatine bone:** Lies behind the maxilla and it contains the sphenopalatine foramen in its upper part.
- 3- **Medial pterygoid plate:** The most posterior part.
- 4- **Medial surface of ethmoidal labyrinth:** The upper part.
- 5- **Nasal, frontal process of maxilla and lacrimal bones:** The upper anterior part.

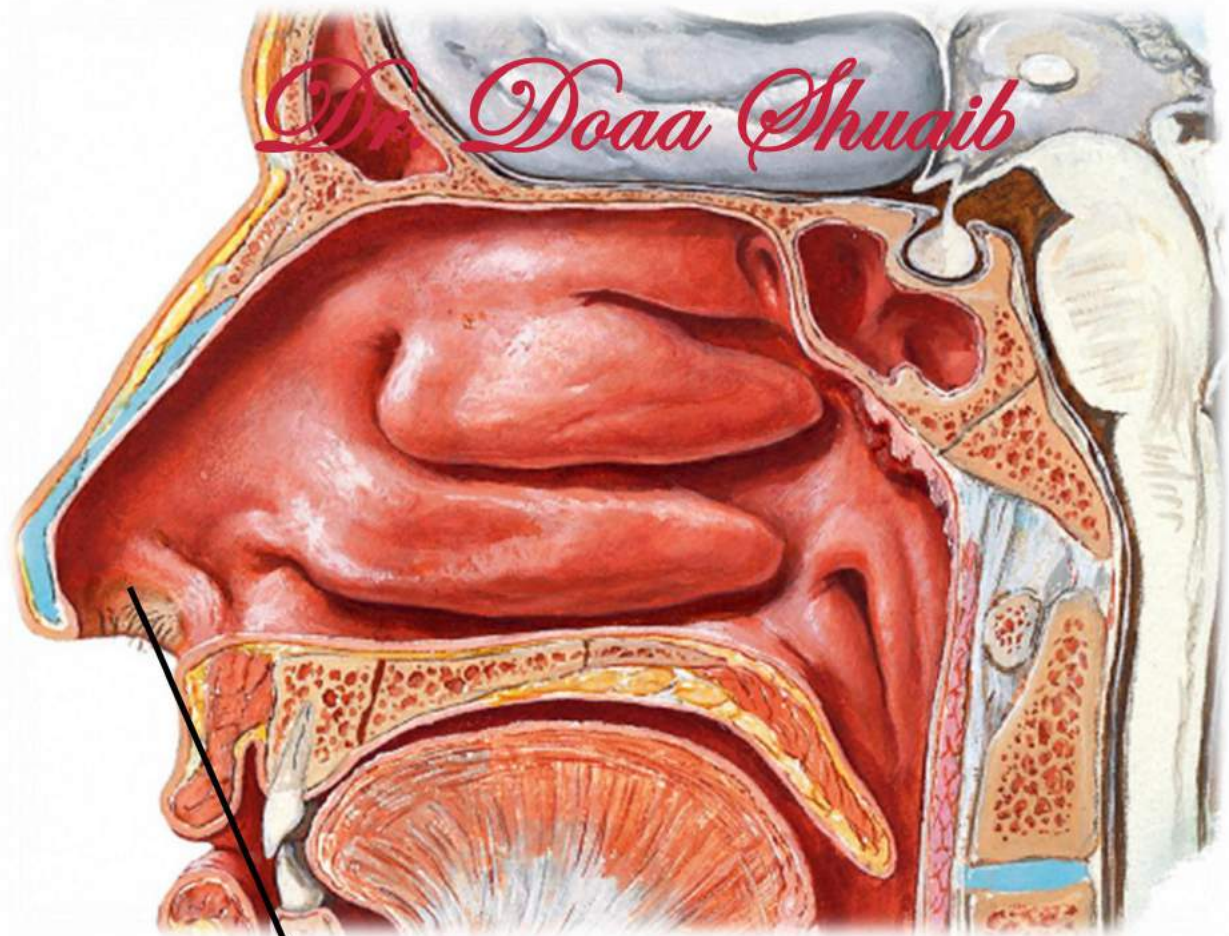


Parts of the lateral wall of the nose

Parts of the lateral wall

A- Vestibule of nose

The small dilated part above the nostril which is lined by skin containing sweat glands, sebaceous glands and coarse hairs for filtration of dust particles and insects.



Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

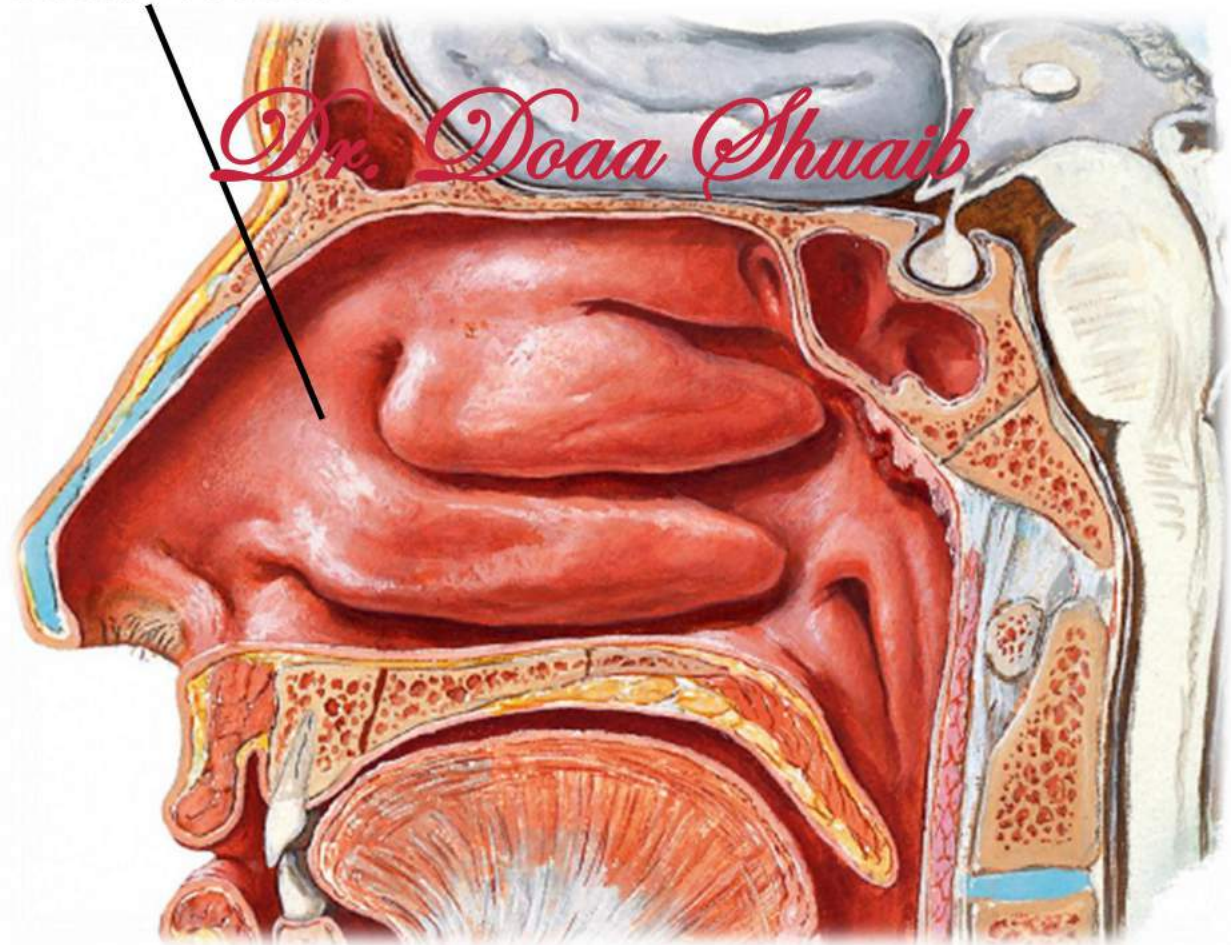
**Vestibule of
the nose**

Parts of the lateral wall

B- Atrium of middle meatus

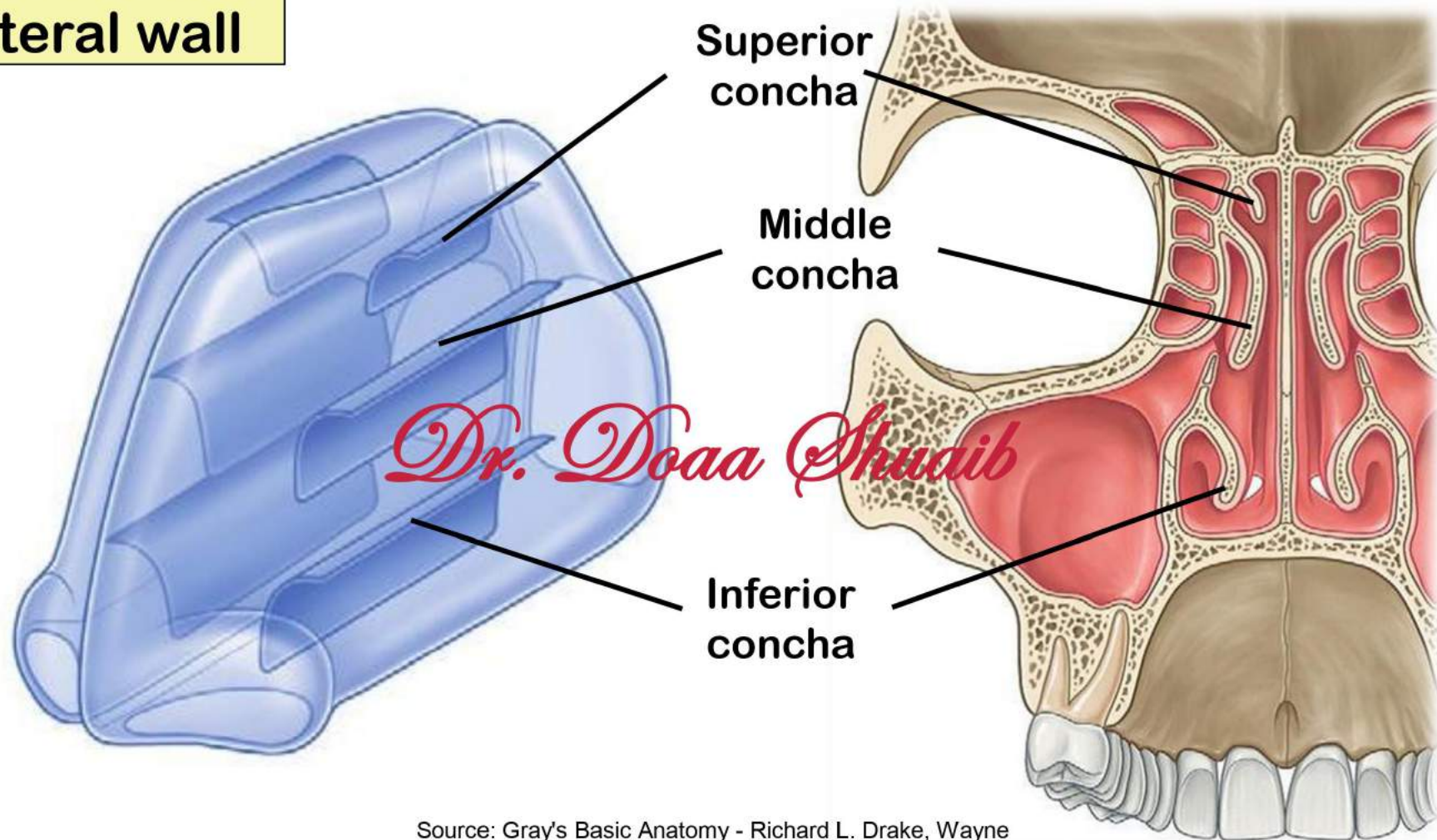
A shallow depression above and behind the vestibule which is continuous posteriorly with the middle meatus.

Atrium of middle meatus



Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Parts of the lateral wall

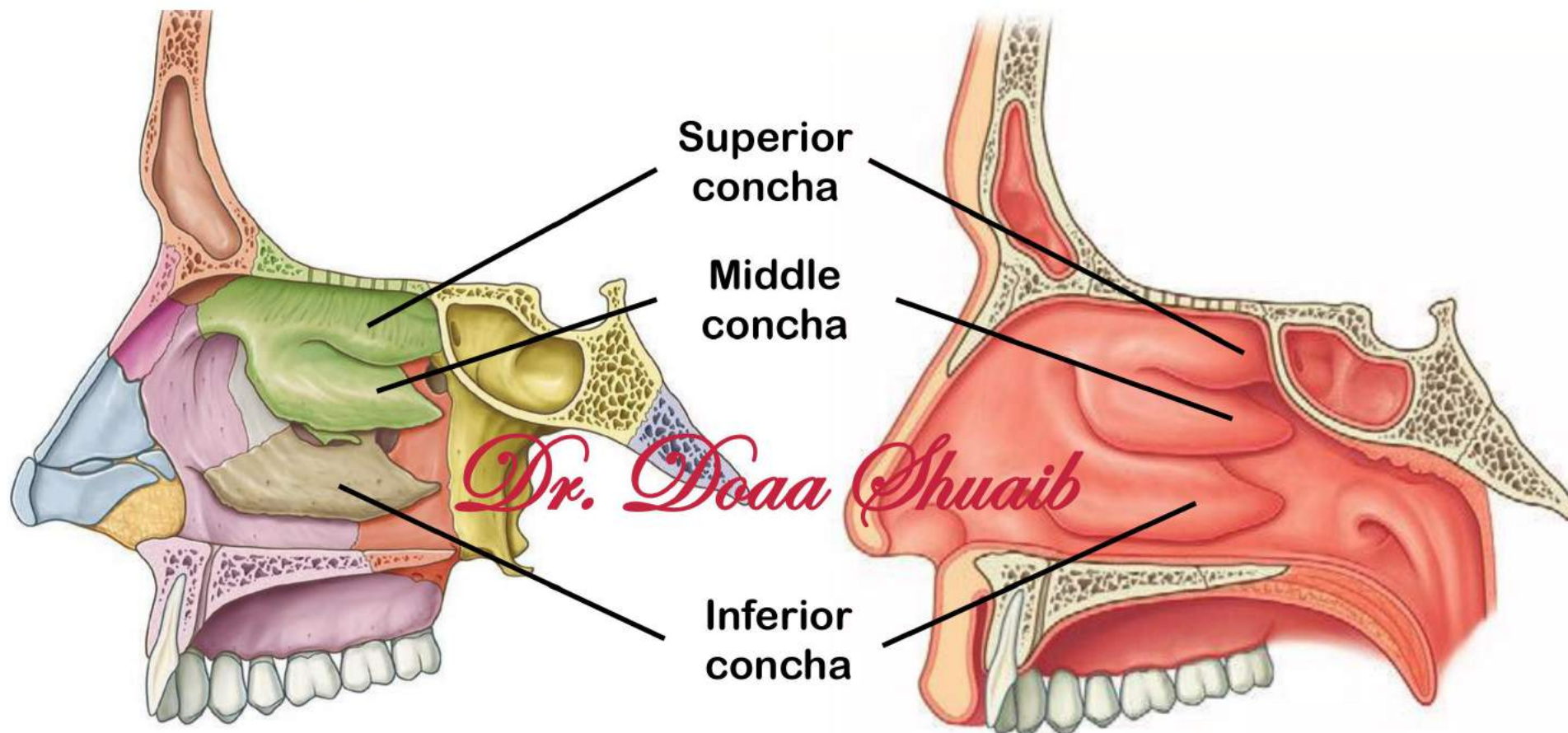


Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

C- Nasal conchae and meatuses

- Three curved bony projections covered with a highly vascular mucosa called nasal conchae.
- They are superior concha (the smallest), middle concha, and the inferior concha (the largest).
- The superior and middle conchae project from the ethmoidal labyrinth while the inferior concha is a separate skull bone.

Parts of the lateral wall



Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

C- Nasal conchae and meatuses

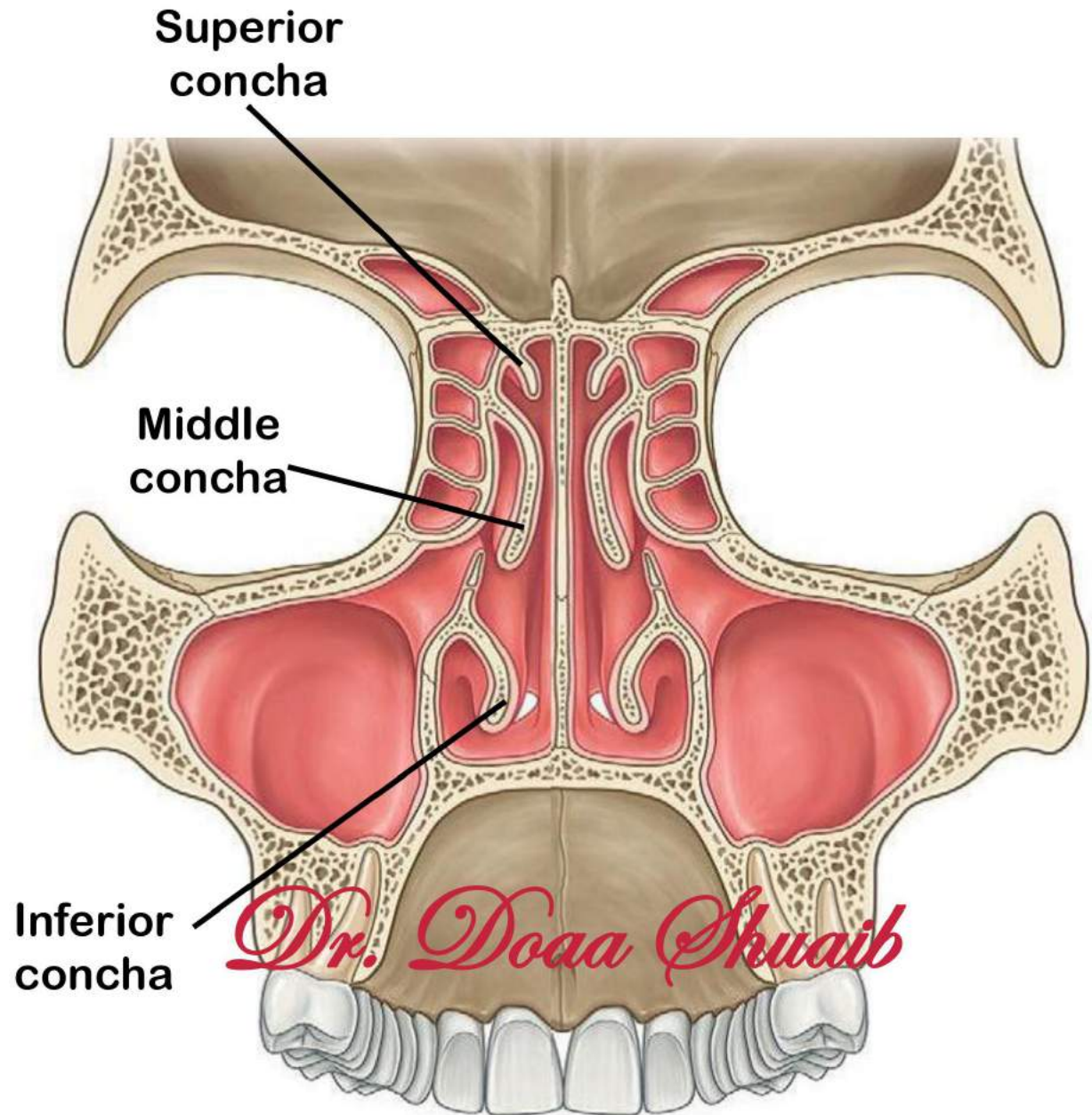
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Parts of the lateral wall

C- Nasal conchae and meatuses

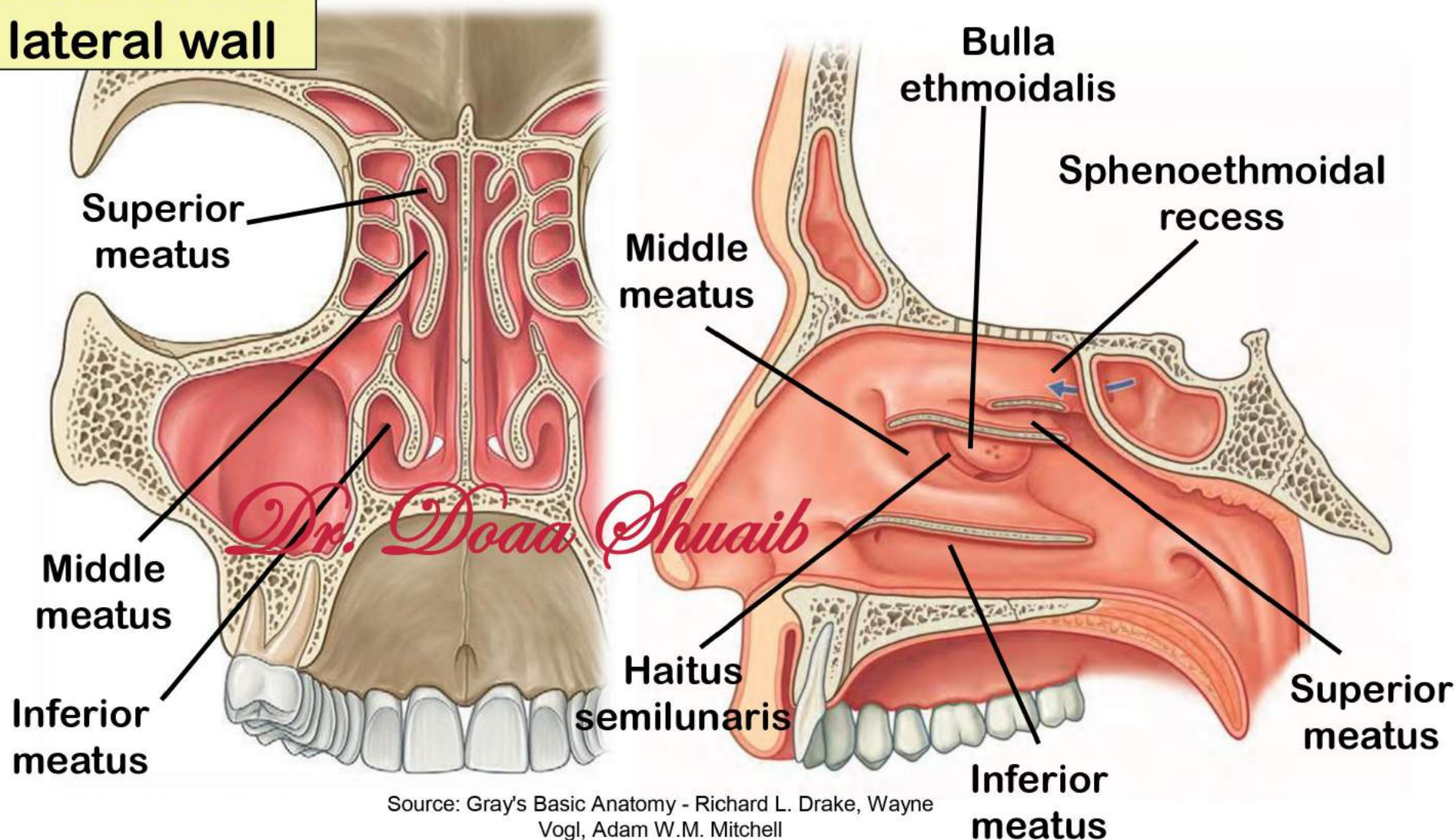
Functions of nasal conchae:

- They increase the surface area of the nasal cavity which magnifies the turbulence of air and thus improves olfaction.
- The excessive mucosal area, increases humidity and warming of inspired air.



Source Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

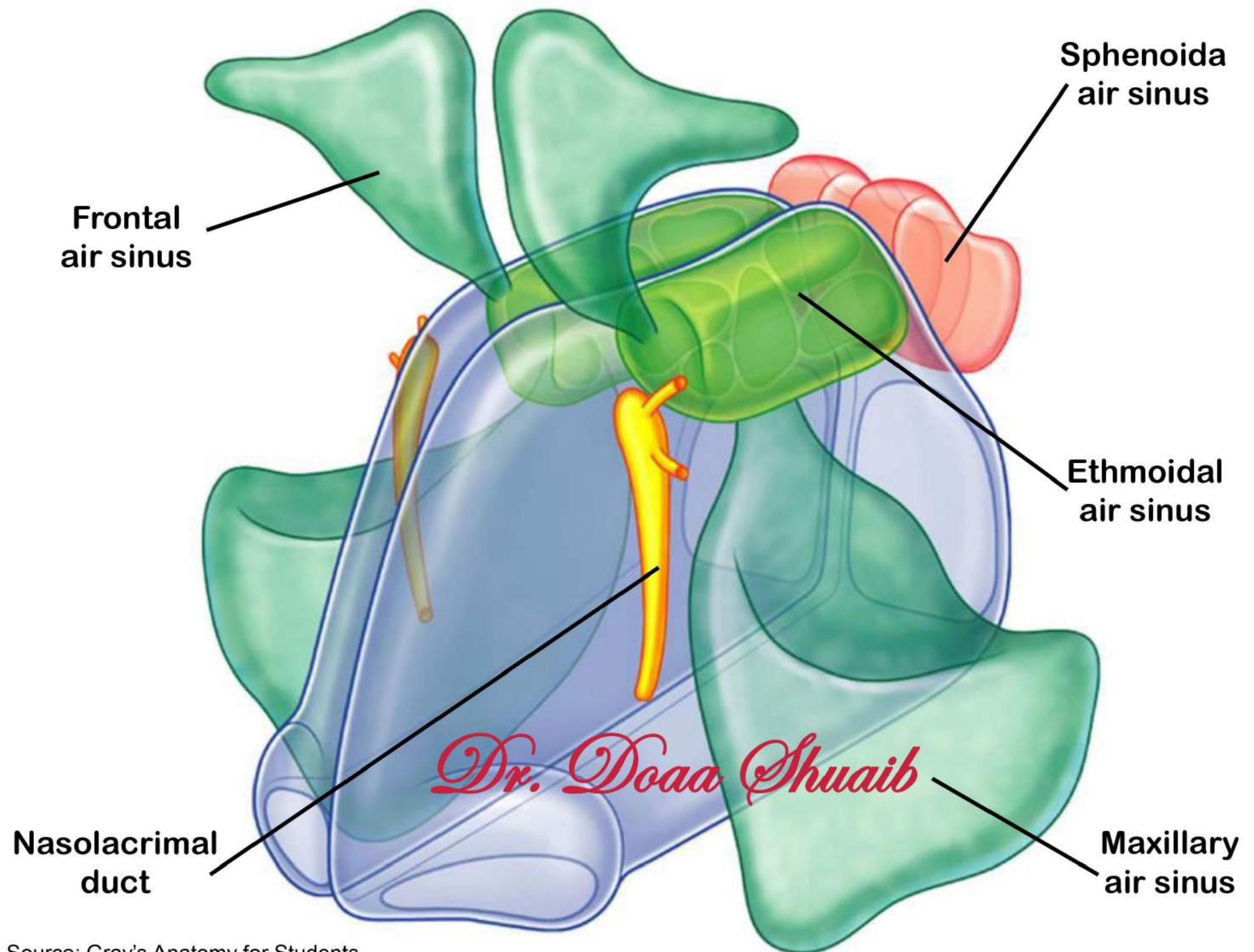
Parts of the lateral wall



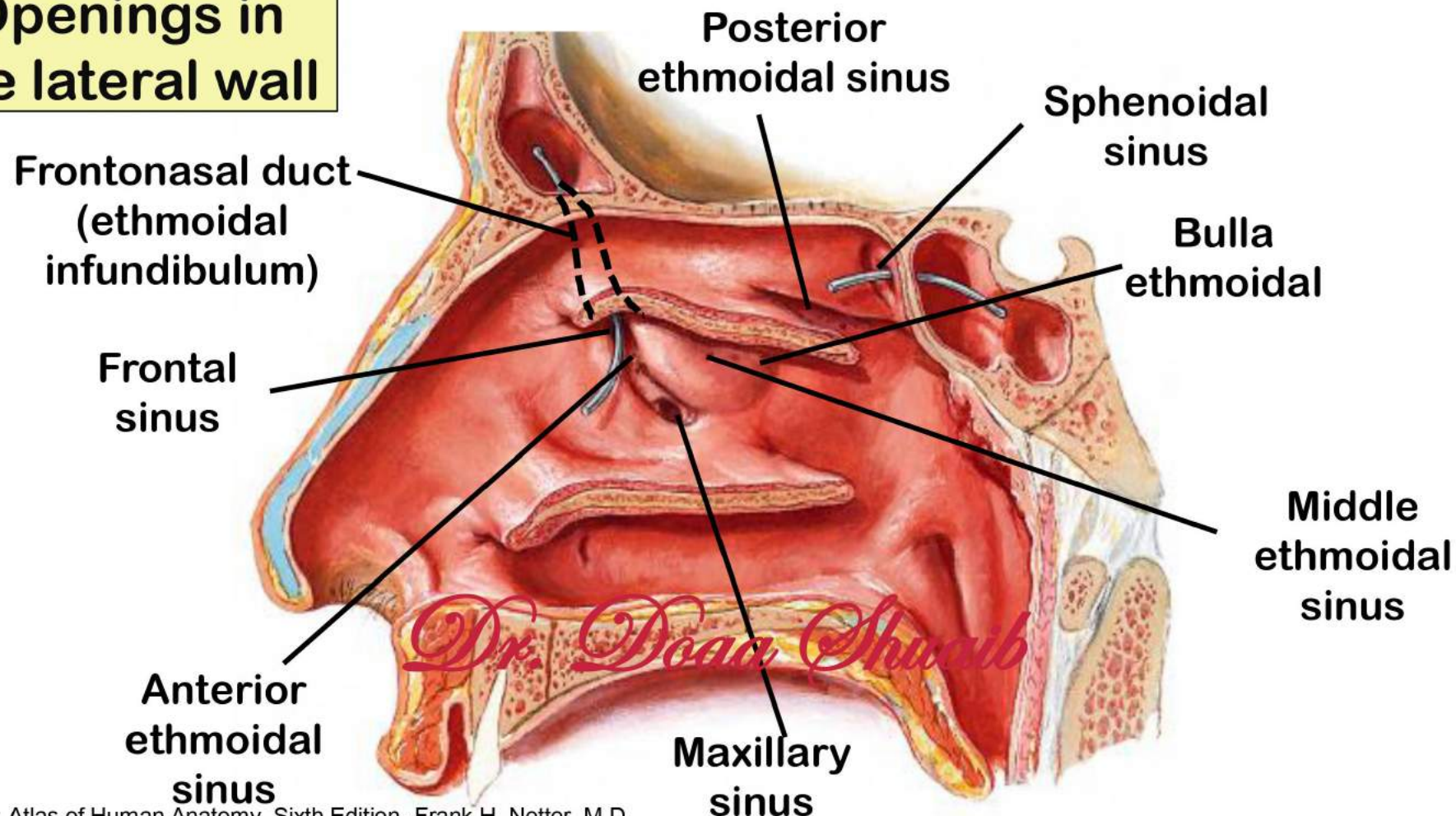
C- Nasal conchae and meatuses

- The localized space below and lateral to each concha is called **nasal meatus**.
- The space above the superior concha is called **sphenoethmoidal recess**. The middle meatus shows a rounded elevation called **bulla ethmoidalis** which is bounded below and in front by a curved groove called **hiatus semilunaris**.

**Openings in the lateral wall of
nose (in nasal cavity)**



Openings in the lateral wall



Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Openings of paranasal sinuses

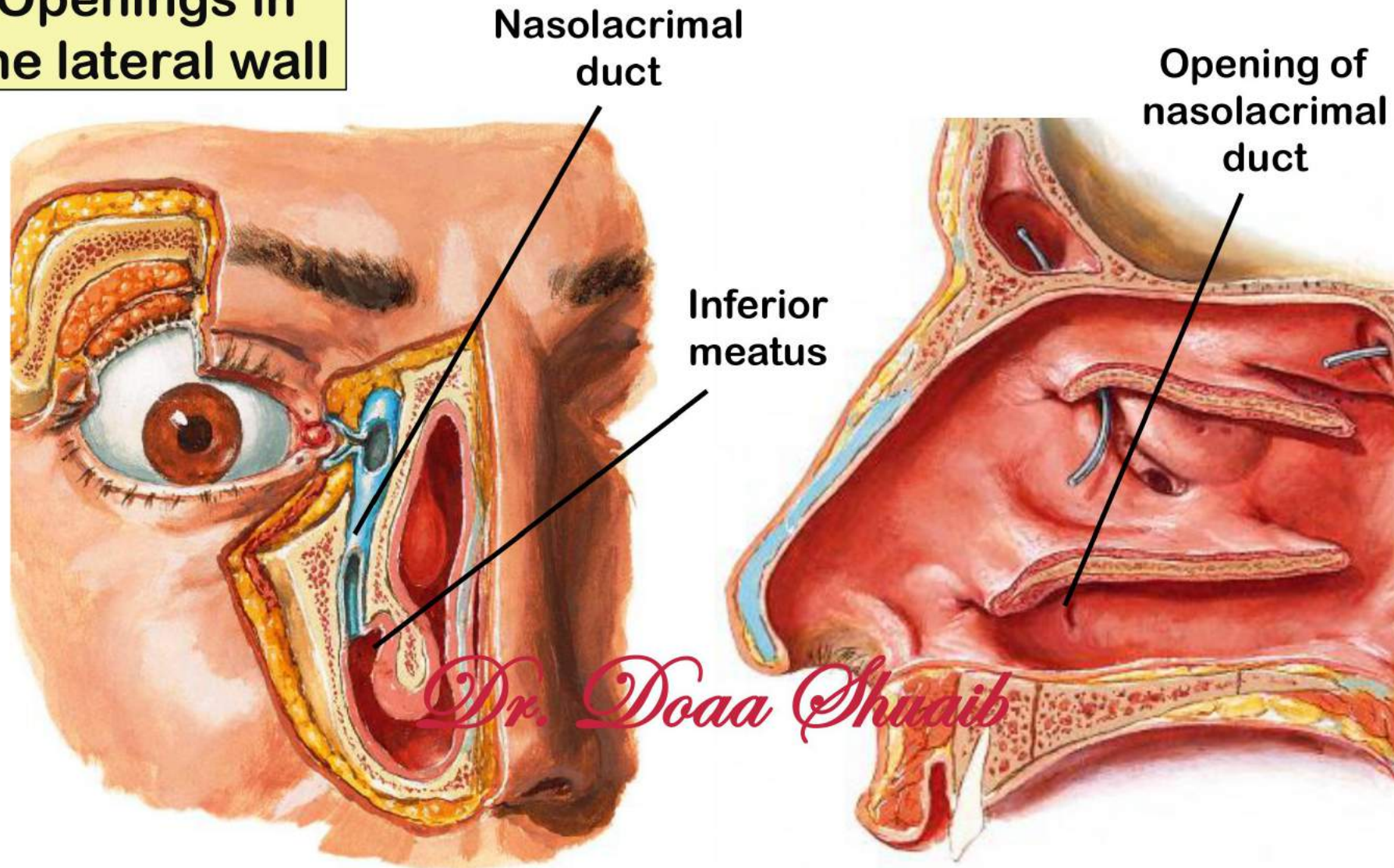
A- Four sinuses open into the middle meatus of the nose (MM):

- 1- Frontal sinus:** Opens in ethmoidal infundibulum which opens in the anterior end of the hiatus semilunaris.
- 2- Anterior ethmoidal sinus:** Opens in ethmoidal infundibulum or in the anterior end of hiatus semilunaris.
- 3- Maxillary sinus:** Opens in posterior end of hiatus semilunaris.
- 4- Middle ethmoidal sinus:** Opens in bulla ethmoidalis.

B- Posterior ethmoidal sinus one sinus opens into the superior meatus

C- Sphenoidal sinus: one sinus opens into sphenothmoidal recess (SER).

Openings in the lateral wall

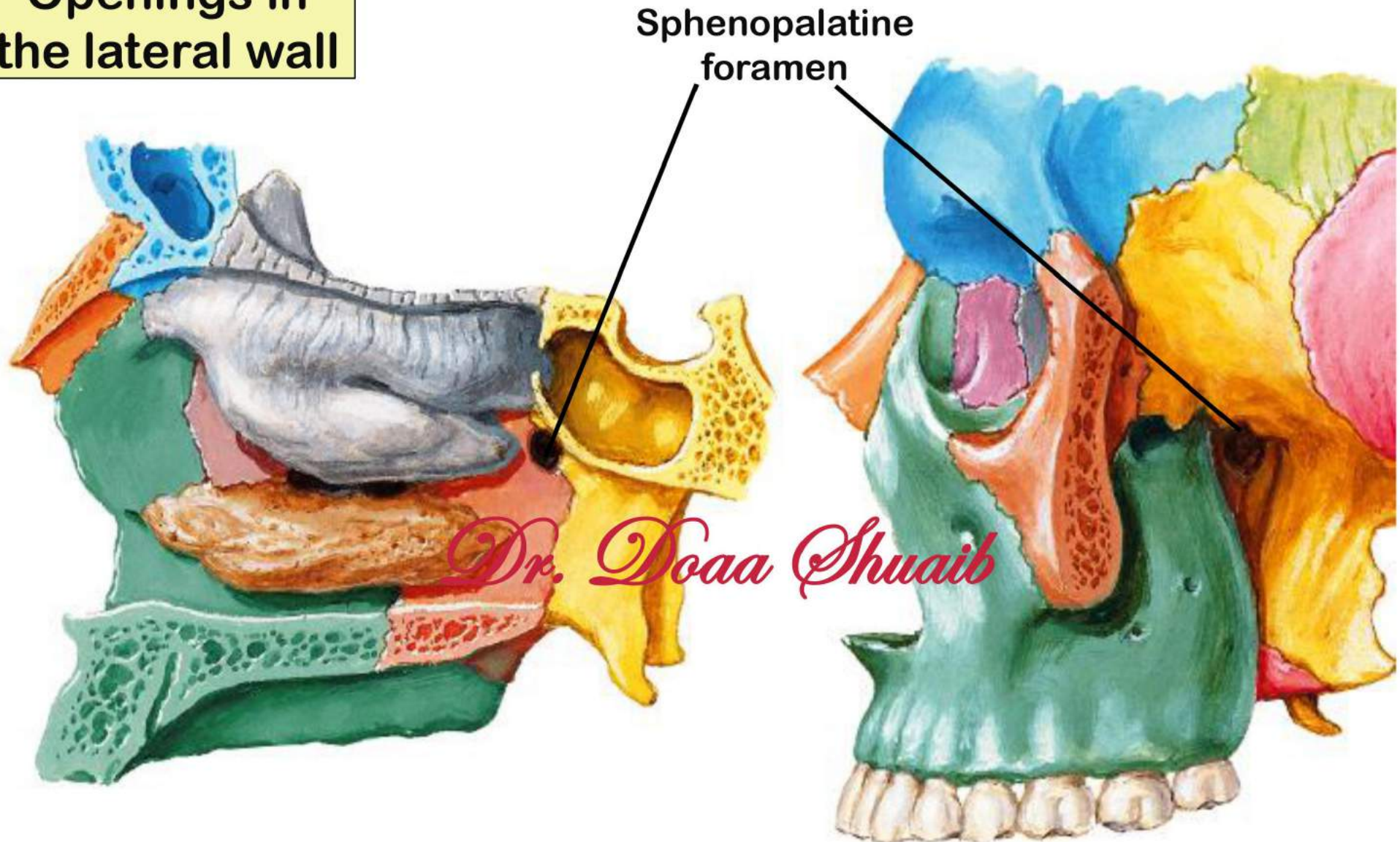


Source: Atlas of Human Anatomy, Sixth Edition-
Frank H. Netter, M.D

Opening of nasolacrimal duct

- in the anterior end of the inferior meatus of nose

Openings in the lateral wall



Source: Atlas of Human Anatomy, Sixth Edition-
Frank H. Netter, M.D

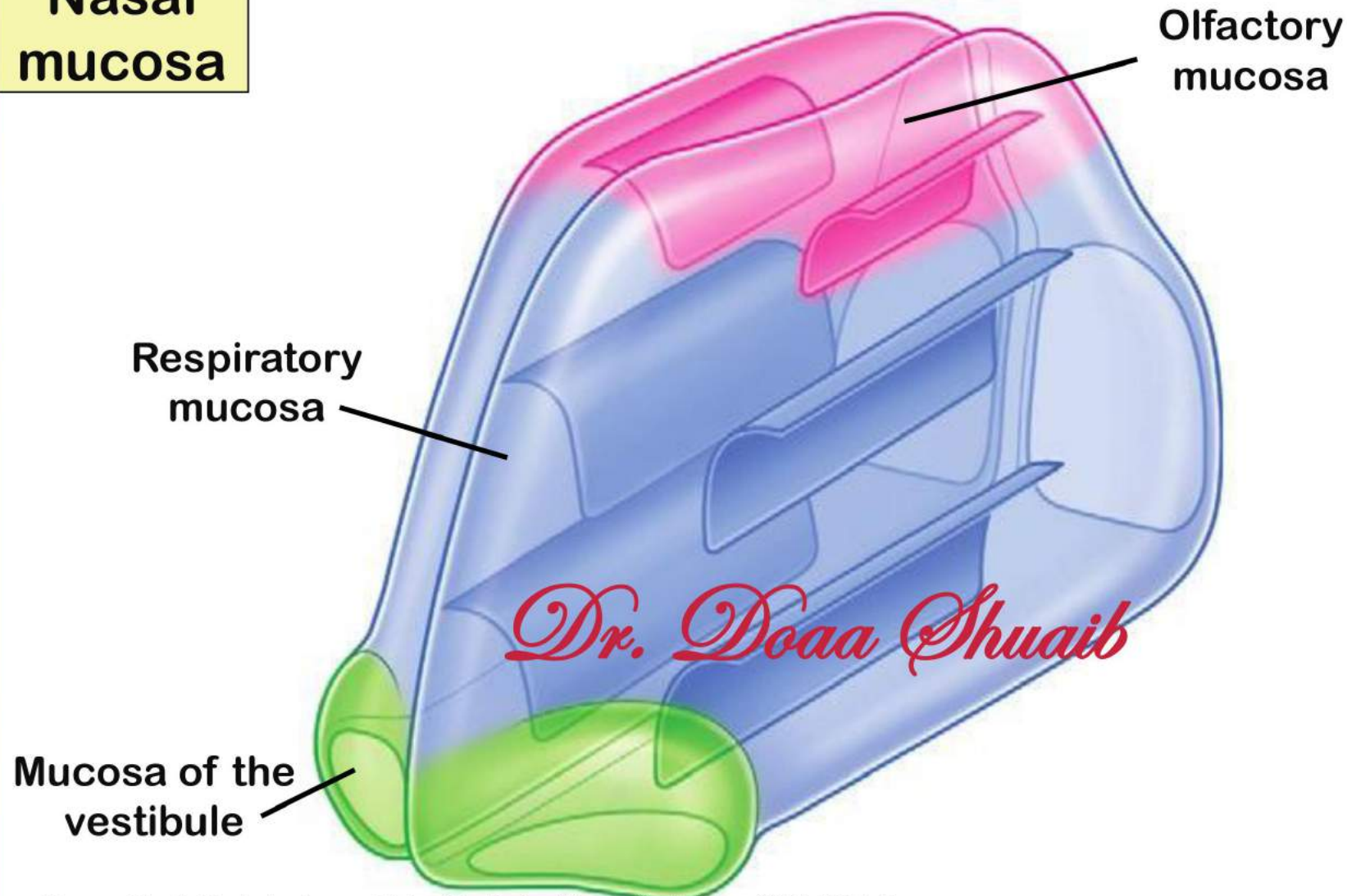
Sphenopalatine foramen

- It lies behind the superior meatus
- It opens in pterygopalatine fossa.

The background is a textured, golden-brown surface. In the center, there are several concentric, light-colored circles that create a ripple effect. In the top-left and bottom-right corners, there are stylized, light-green floral motifs with multiple pointed petals.

Nasal mucosa

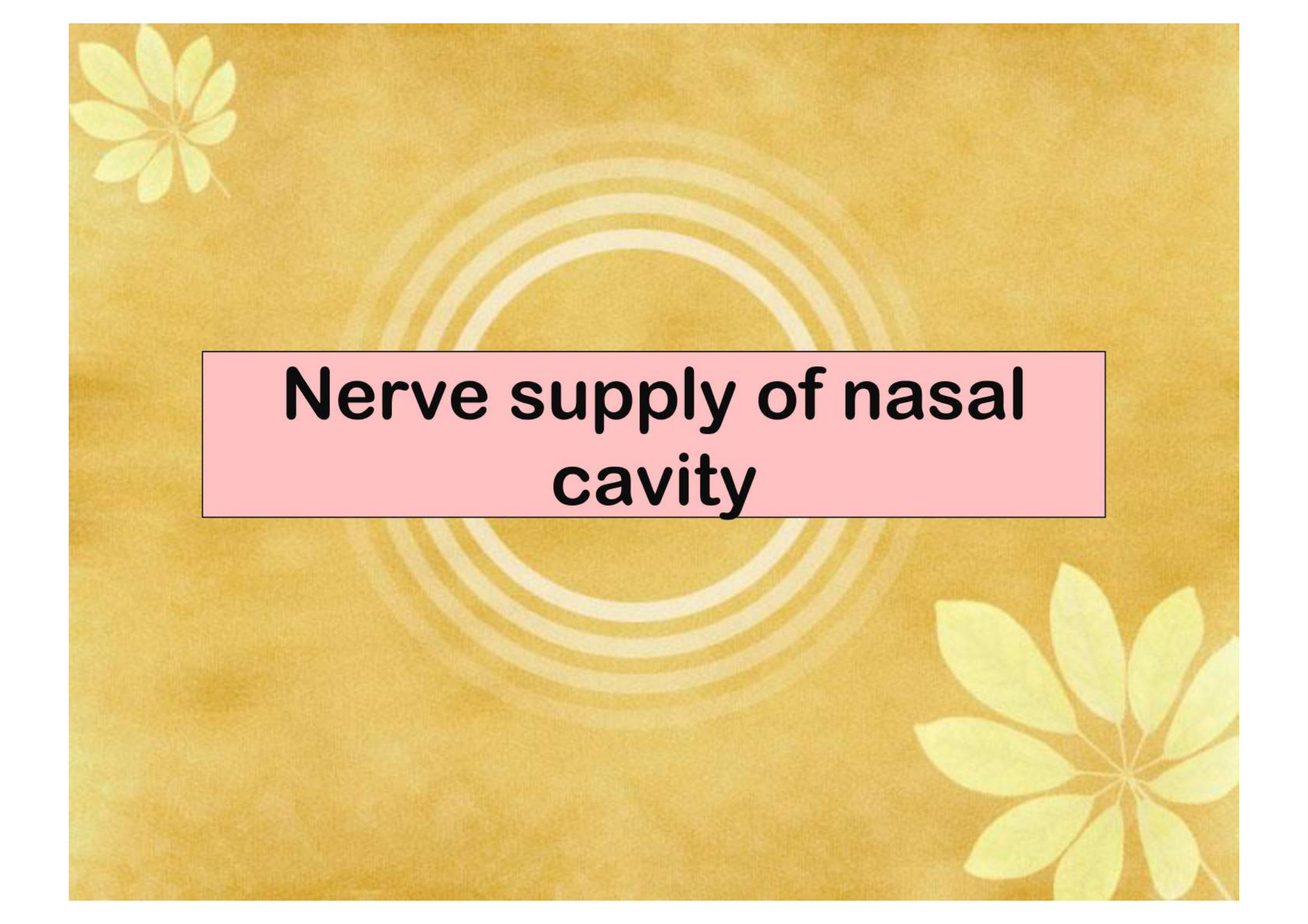
Nasal mucosa



Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

A- Olfactory mucosa: It lines the roof, the upper one cm of nasal septum, the superior concha and the area above it. Olfactory mucosa is yellowish, less vascular and gives origin to the olfactory nerve filaments.

B- Respiratory mucosa: It covers all parts of nasal cavity except the olfactory region and the vestibule. It is pink or red in colour due to its high vasculature to allow rapid warming and moistening of inspired air. It is continuous with the mucosa of paranasal sinuses, nasopharynx and conjunctiva.

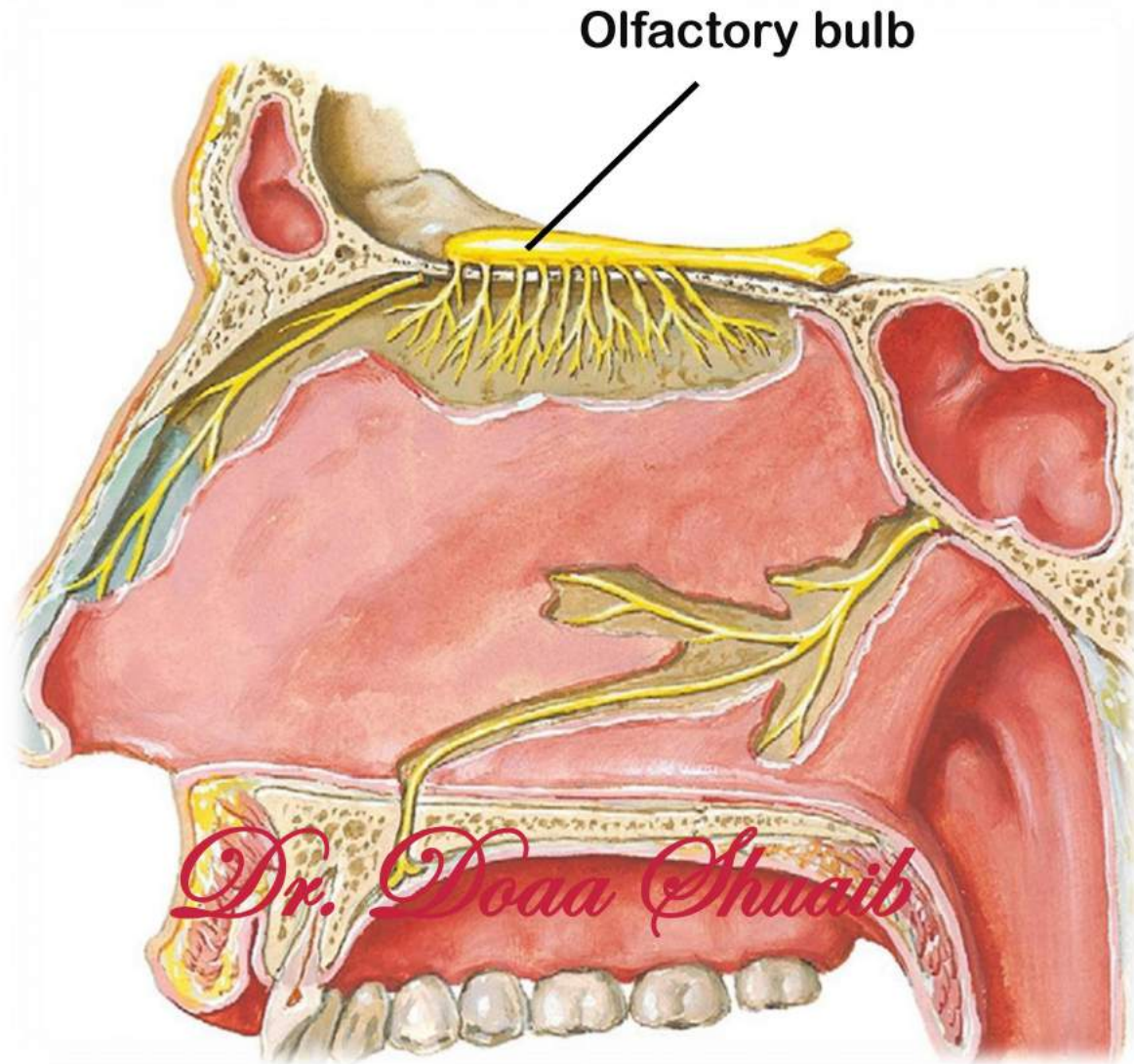


Nerve supply of nasal cavity

Nerve supply of nasal cavity

A- Olfactory nerve

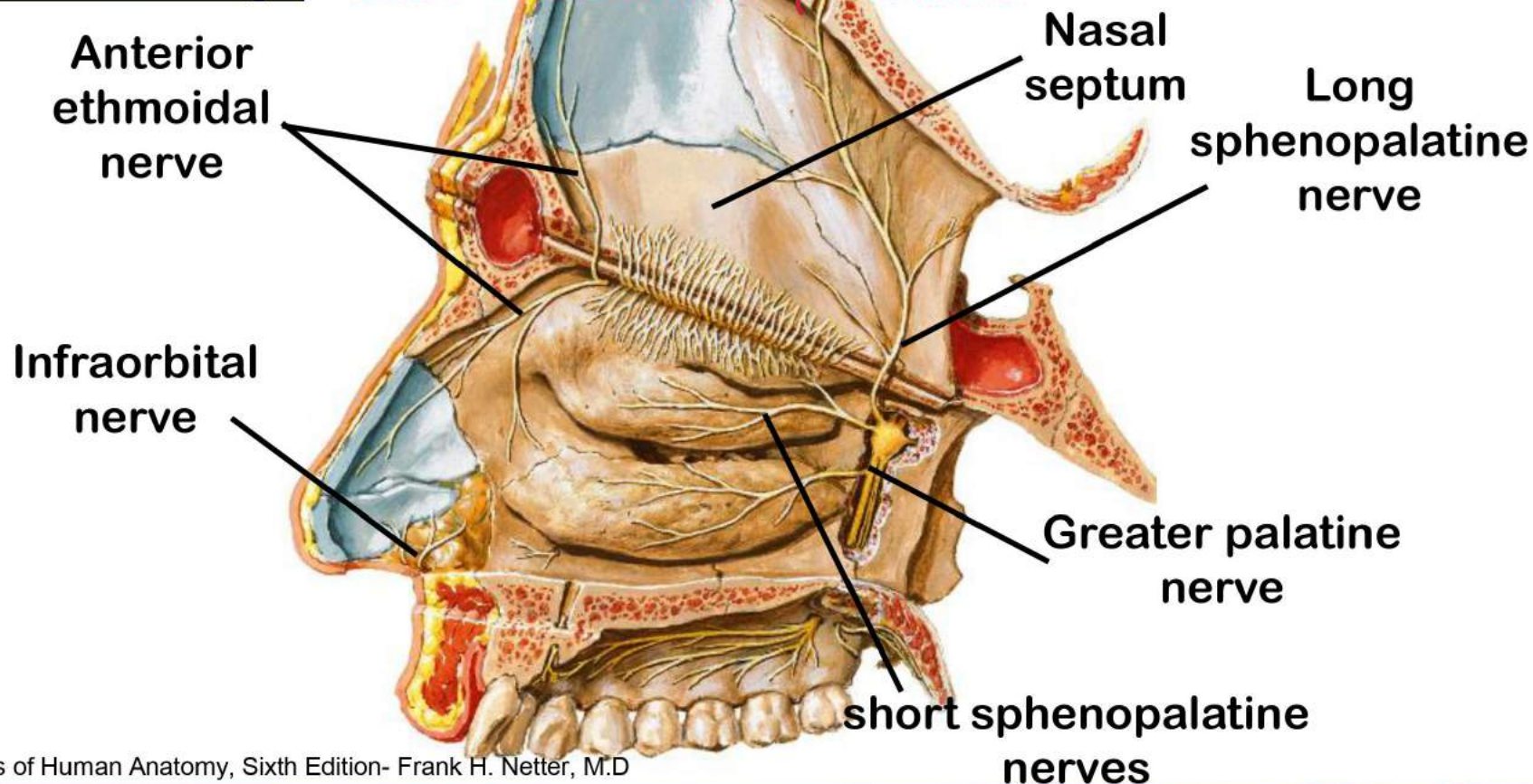
Arises from the olfactory mucosa, about 8-20 filaments passing through the cribriform plate of ethmoid to end in the olfactory bulb.



Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Nerve supply of nasal cavity

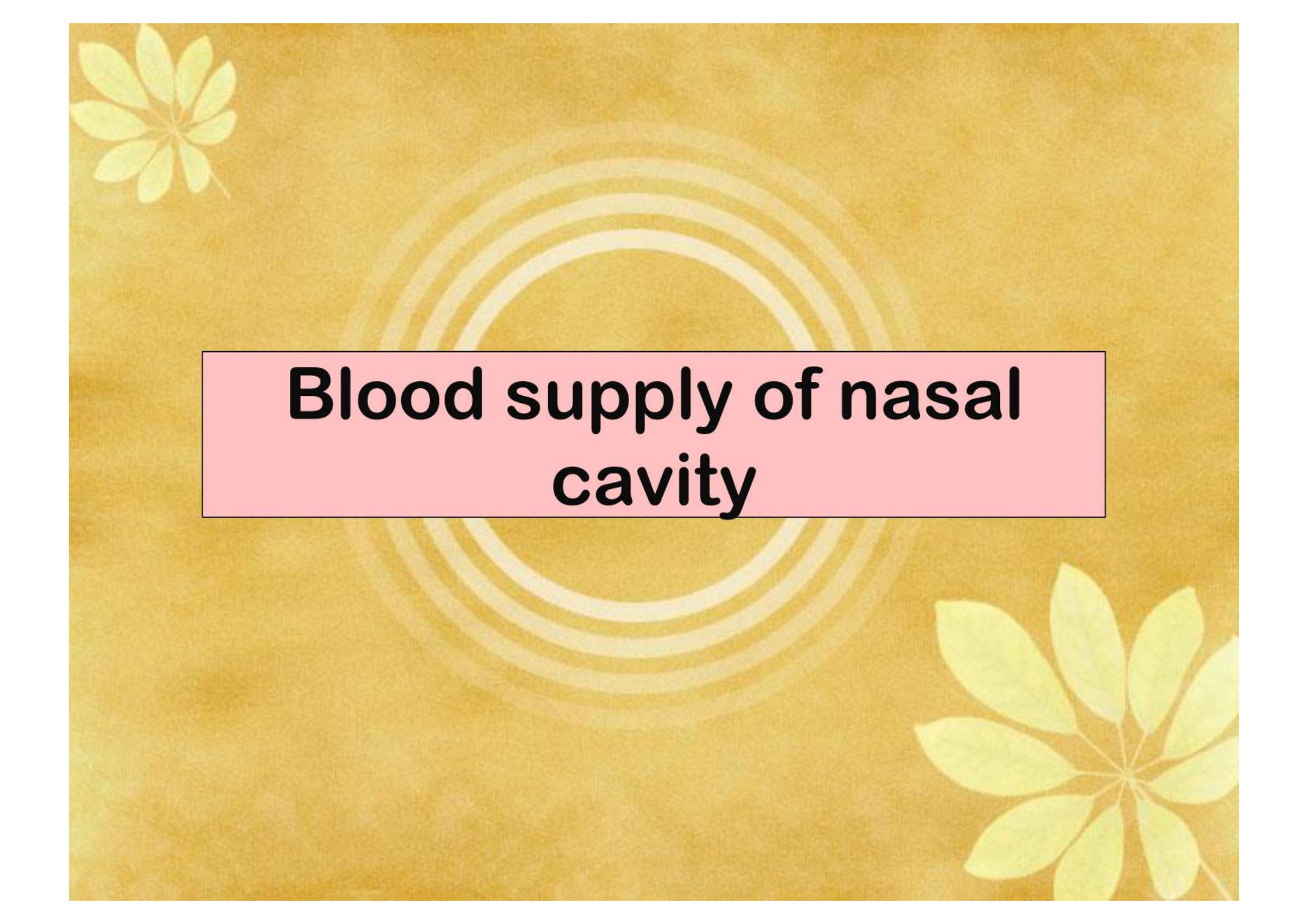
Dr. Doaa Shuaib



Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

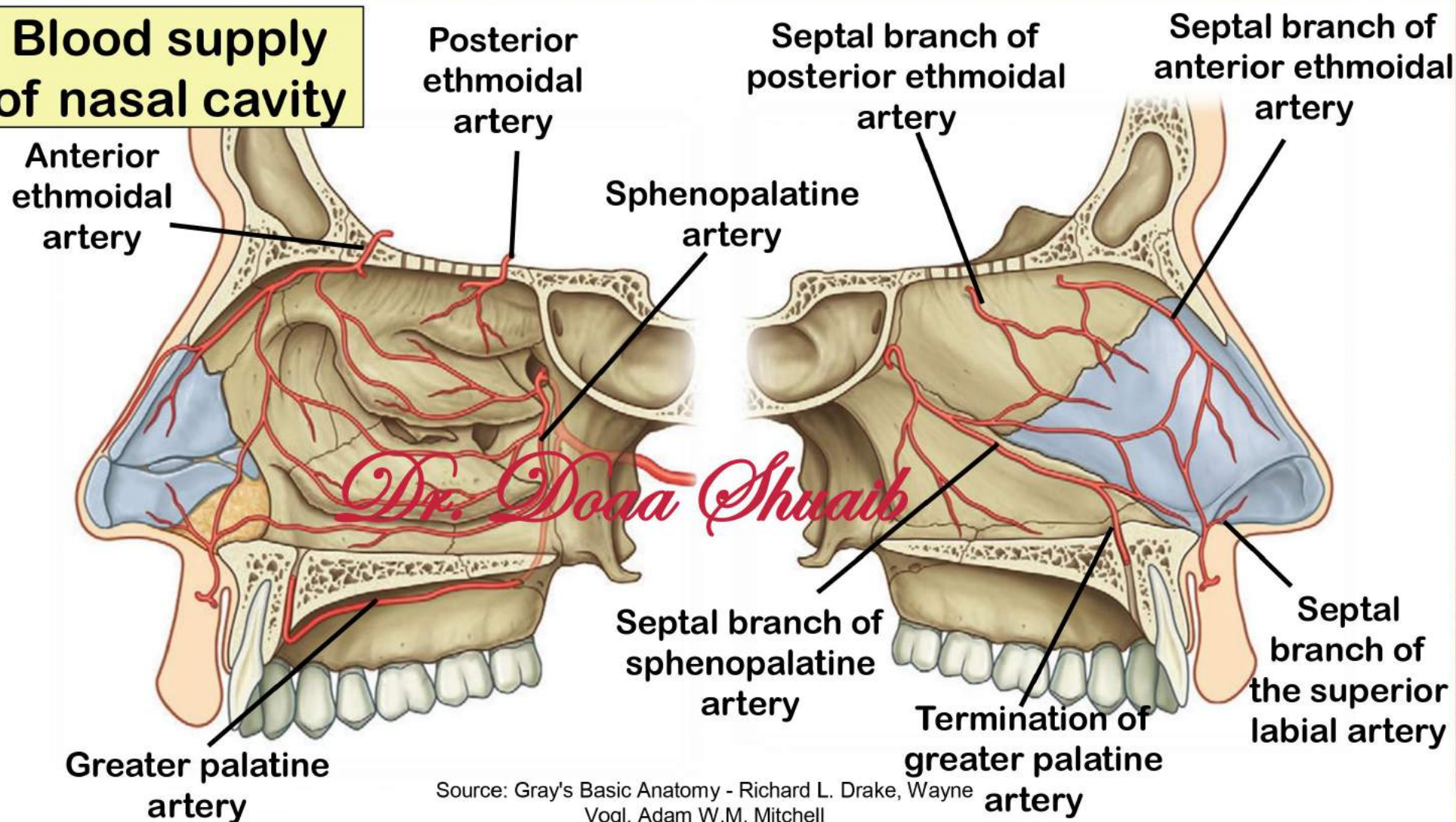
B- Nerves of general sensation

- 1- **Anterior ethmoidal nerve:** Supplies the upper anterior part of the lateral wall and nasal septum.
- 2- **Nasal branches of sphenopalatine ganglion:**
 - a- **Lateral nasal (short sphenopalatine) nerves:** Supply the postero-superior part of the lateral wall of the nose.
 - b- **Medial nasal (long sphenopalatine) nerves:** Supply the posterior part of the nasal septum.
- 3- **Infraorbital nerve:** Supplies the vestibule, lower anterior part of lateral wall
- 4- **Greater palatine nerve:** Supplies the lower posterior part of the lateral wall



Blood supply of nasal cavity

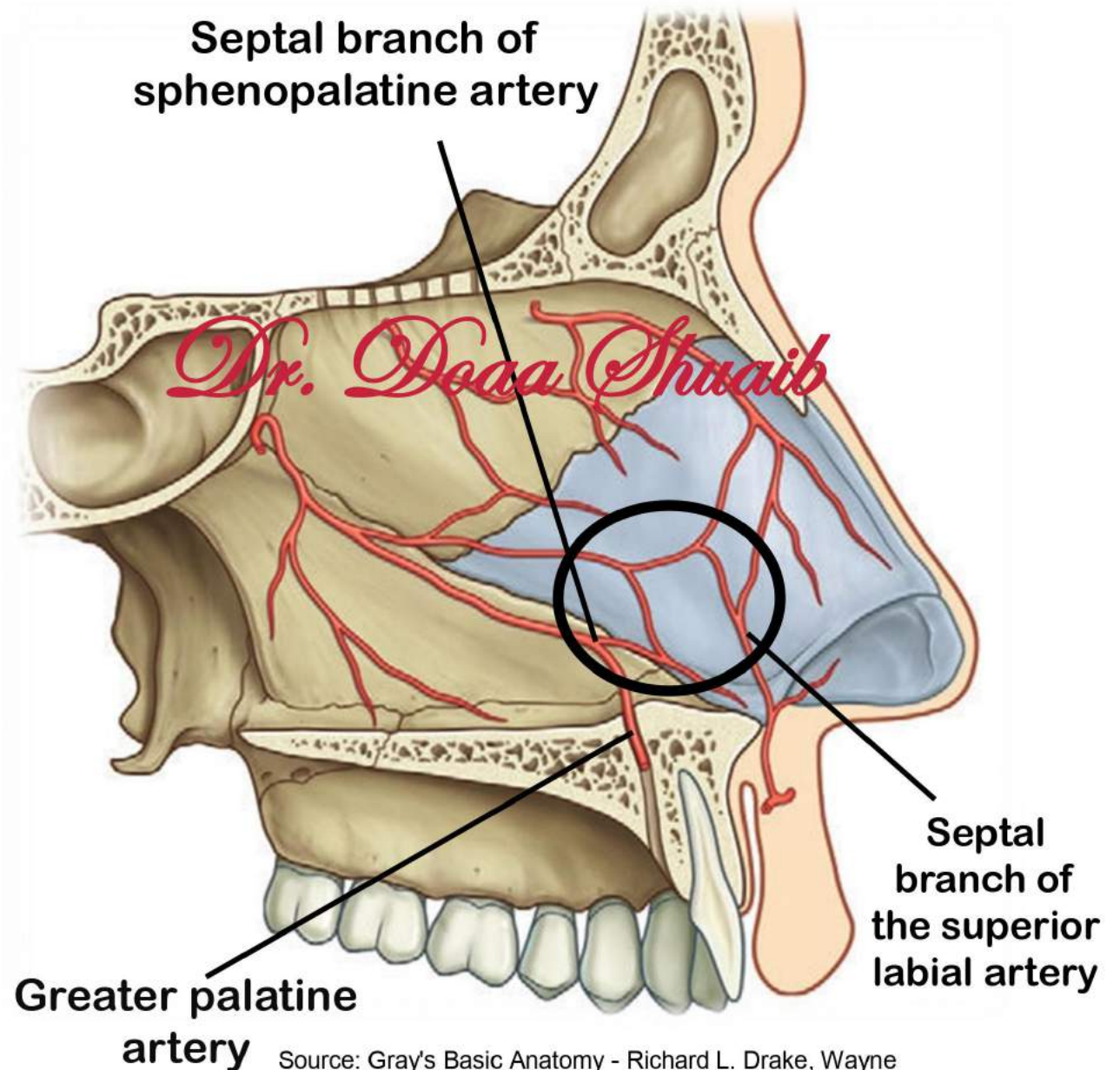
Blood supply of nasal cavity



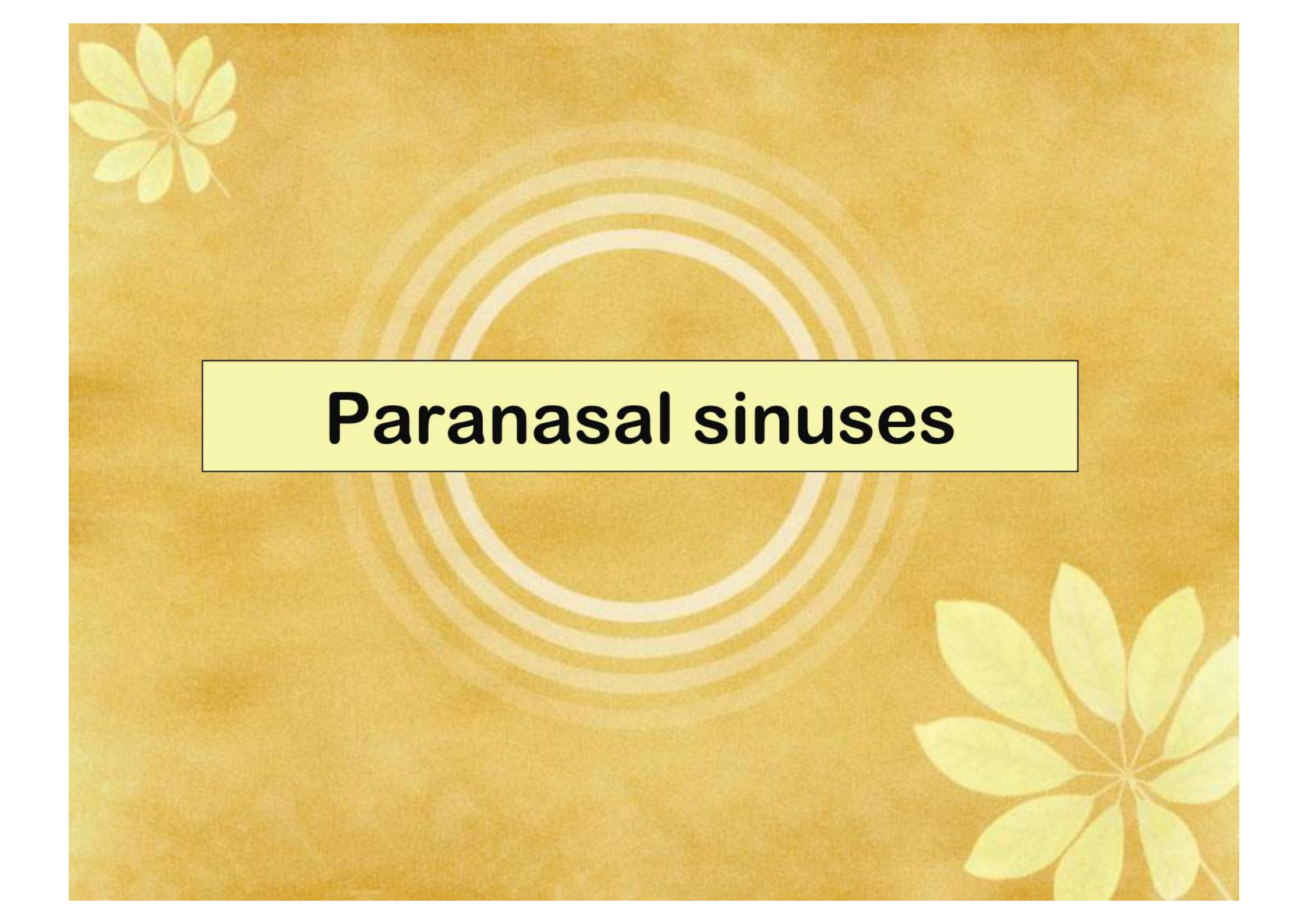
- 1- Anterior and posterior ethmoidal arteries:** They arise from ophthalmic artery and supply the upper anterior and posterior parts of the nasal cavity.
- 2- Sphenopalatine artery:** The main artery of the nose, it arises from 3rd part of maxillary artery and supplies most of nasal septum & lateral wall of nasal cavity.
- 3- Terminal part of greater palatine artery:** Arises from 3rd part of maxillary artery, it ascends through the incisive canal to reach and supplies the lower anterior part of nasal septum.
- 4- Septal branch of the superior labial artery of facial artery:** It supplies the nasal septum in the region of the vestibule.

**Area of epistaxis
(Little's area)
Kiesselbach's area**

- A small area which lies in the anteroinferior part of nasal septum in the region of the vestibule.
- It is an area of anastomosis between the sphenopalatine, greater palatine and septal branch of superior labial artery of facial.
- In 90% of cases, epistaxis (bleeding from nose) occurs from Little's area.



Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

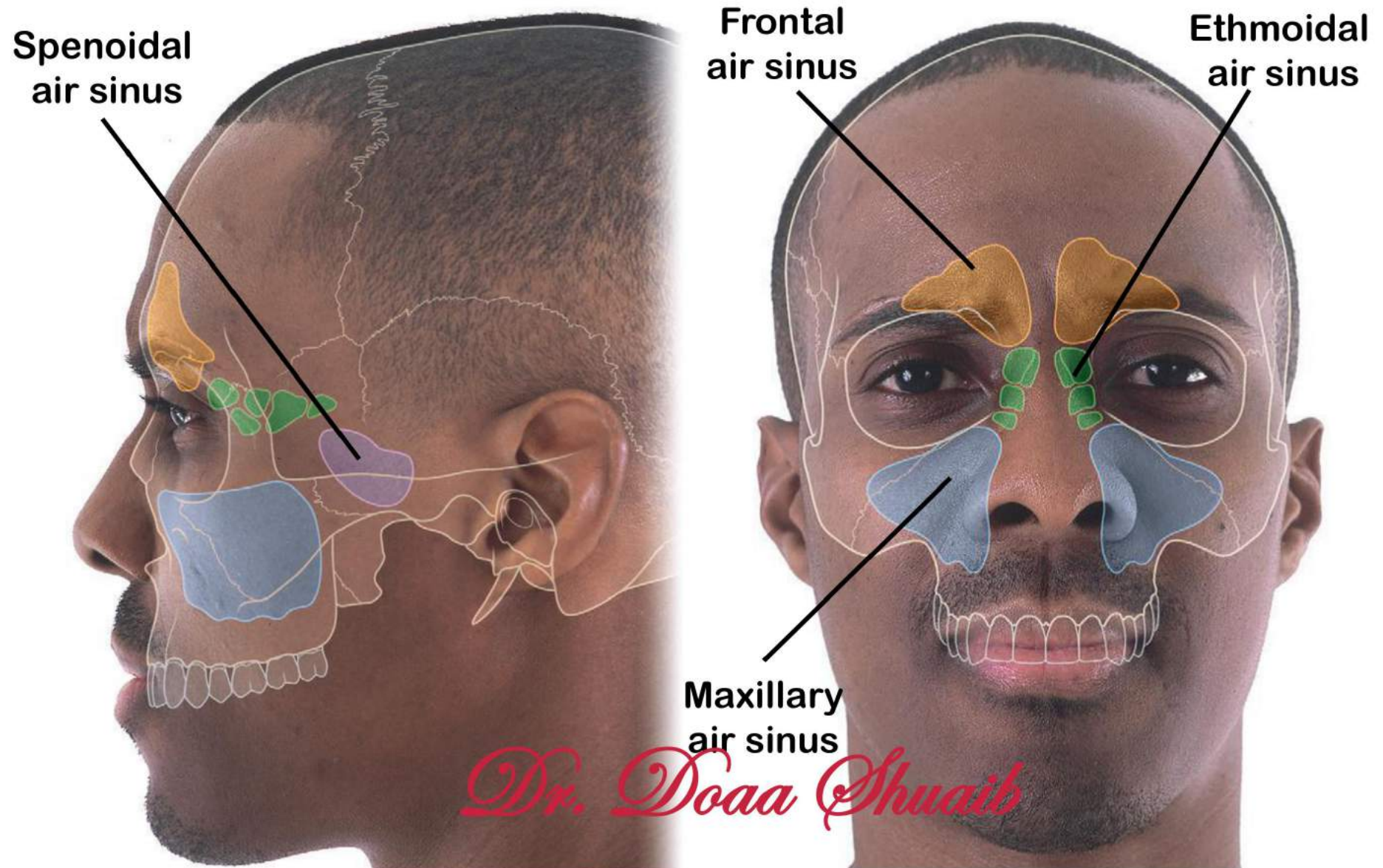
The background is a textured, golden-yellow color. In the center, there are several concentric, light-colored circles that create a subtle ripple effect. In the top-left and bottom-right corners, there are stylized, light-green floral motifs with multiple pointed petals.

Paranasal sinuses

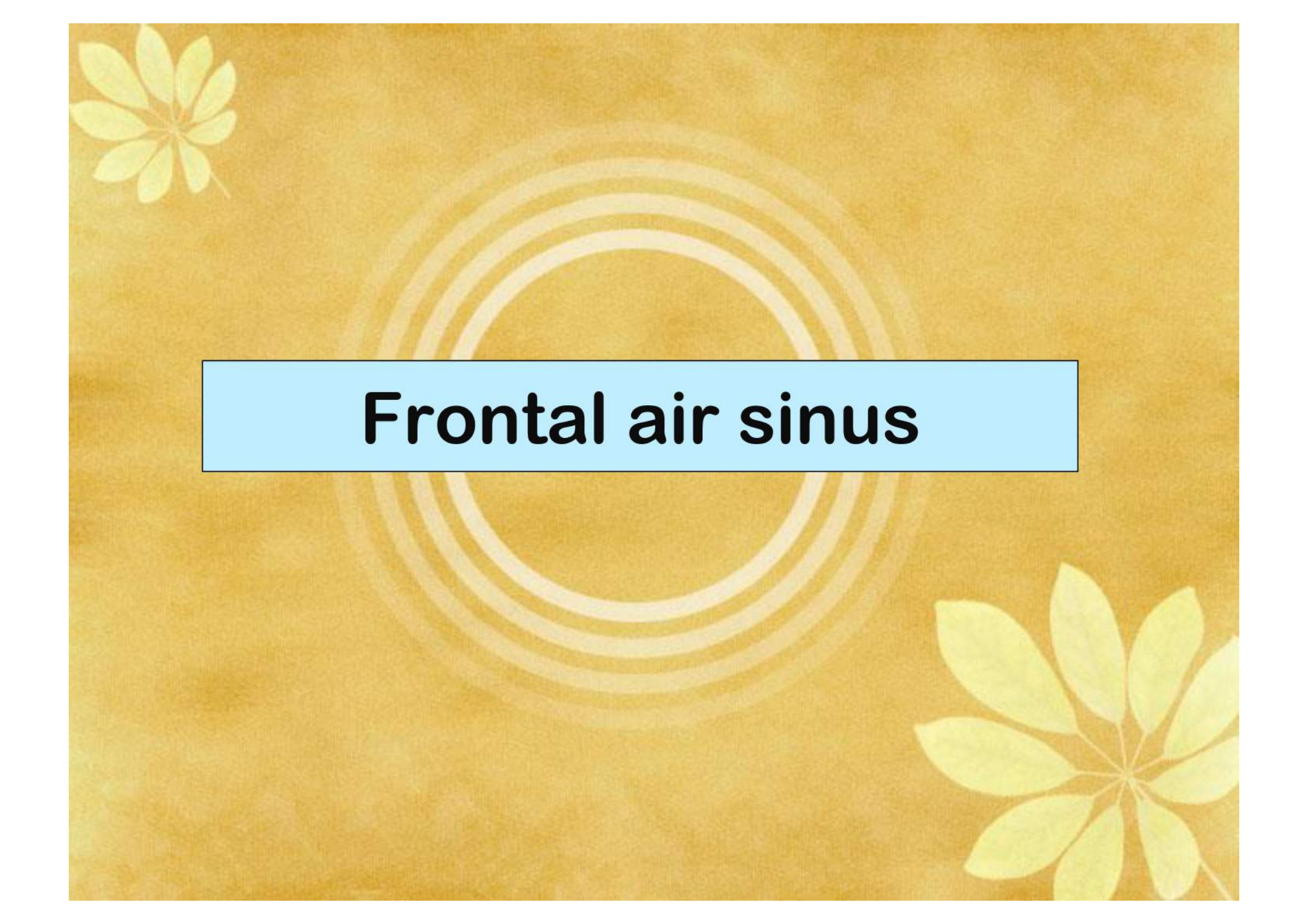
Paranasal sinuses

- They are air-filled spaces in the skull bones surrounding the nose.
- They are formed by absorption of the spongy bone present between the inner and outer tables of the skull bones. They are lined with mucous membrane which is continuous with that of the nose, and they open in the lateral wall of nasal cavity by special foramina.
- The functions of paranasal sinuses:
 - 1- Decrease the weight of the skull due to filling of the sinuses by air.
 - 2- Increase the resonance of voice.
 - 3- Increase the surface area of nasal mucosa, so they warm and moist the inspired air.
- The paranasal sinuses are absent at birth (except the maxillary sinus). They show marked growth at the time of eruption of permanent teeth.

Paranasal sinuses



Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

The background is a textured, golden-yellow surface. In the center, there are several concentric, light-colored circles that create a ripple effect. In the top-left and bottom-right corners, there are stylized, light-green floral motifs with multiple pointed petals.

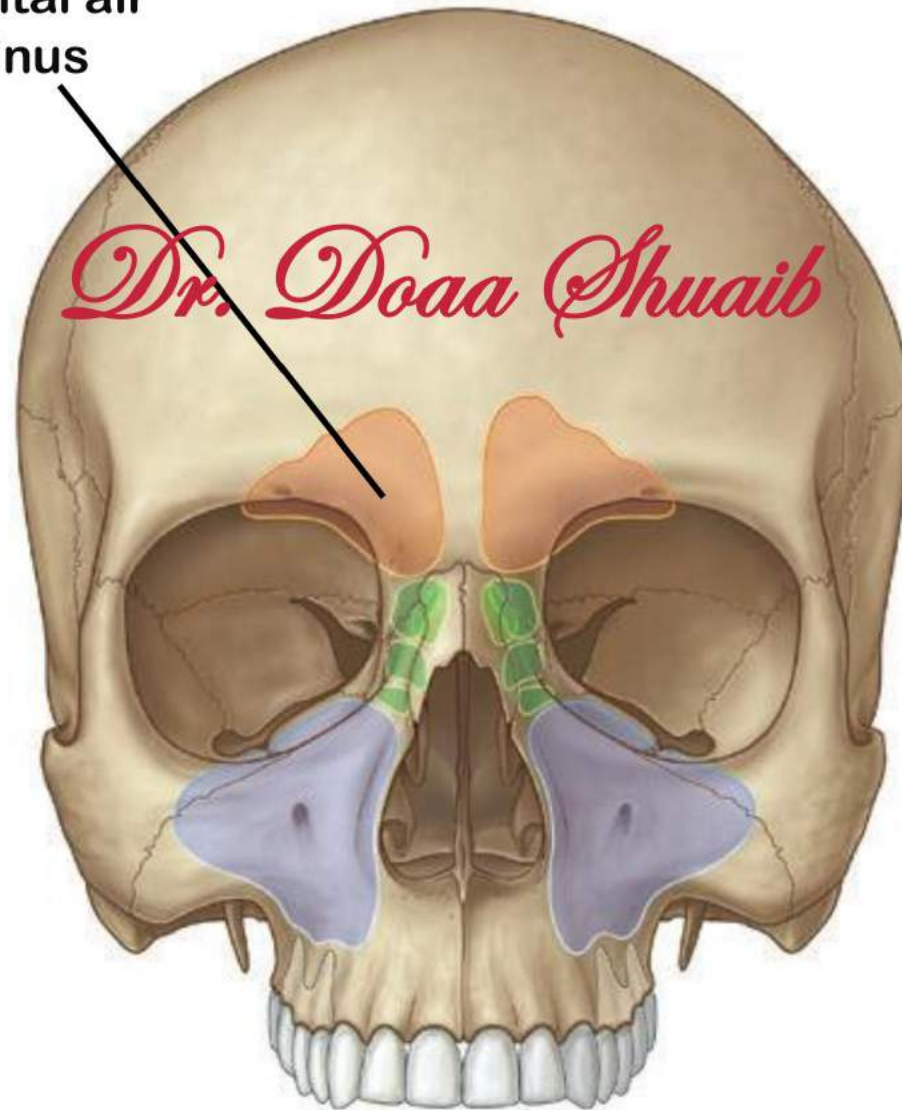
Frontal air sinus

Frontal air sinus

Site

- They are two asymmetrical sinuses present in the squamous part of the frontal bone above and behind the superciliary arches.
- They are separated by a bony septum which is usually deviated to one side

Frontal air
sinus

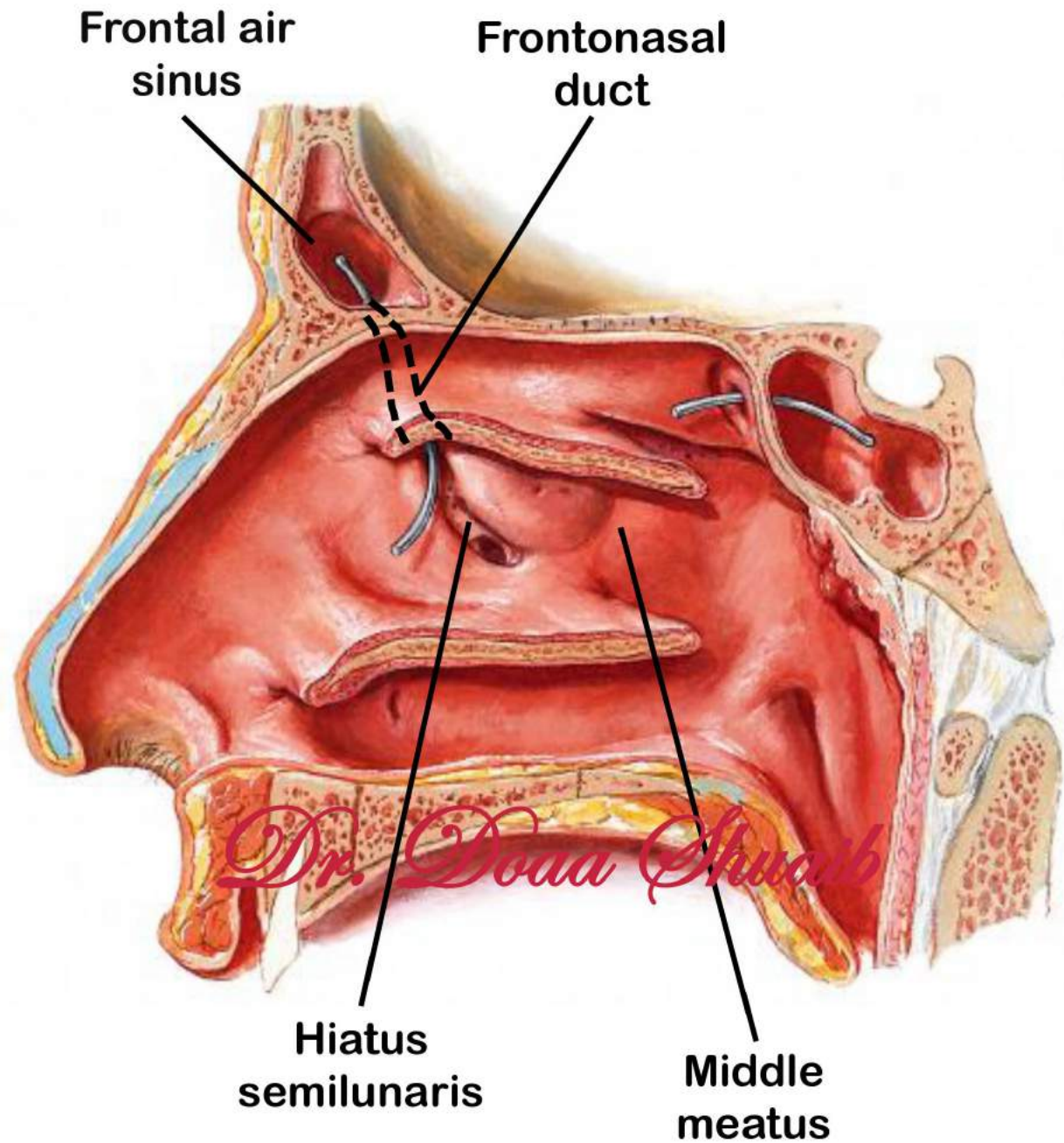


Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

Frontal air sinus

Opening in the nasal cavity

Each sinus opens into the frontonasal duct (ethmoidal infundibulum) which opens in the anterior end of the hiatus semilunaris in the middle meatus of nose

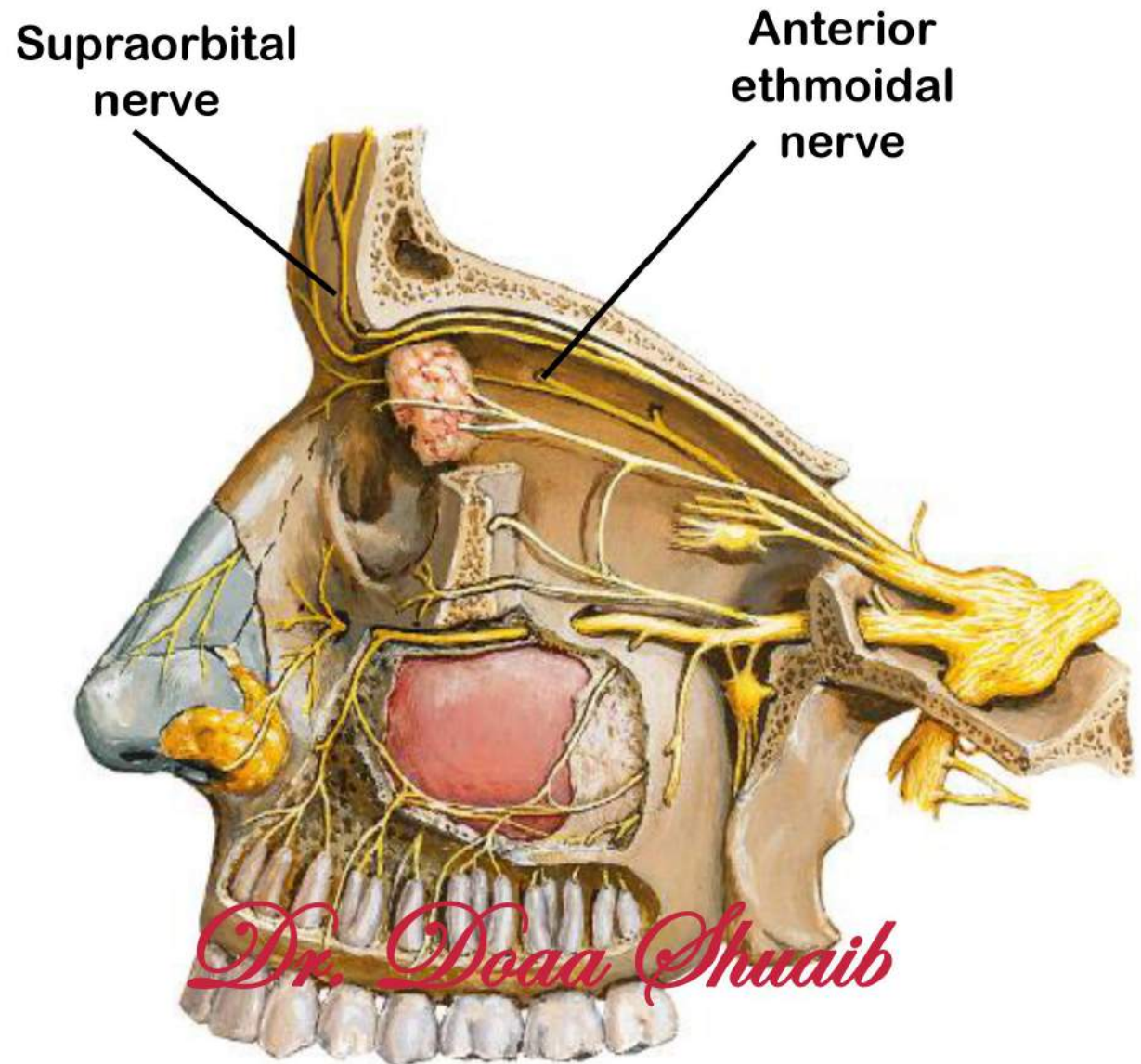


Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Frontal air sinus

Nerve supply

- Supraorbital nerve
- Anterior ethmoidal nerve

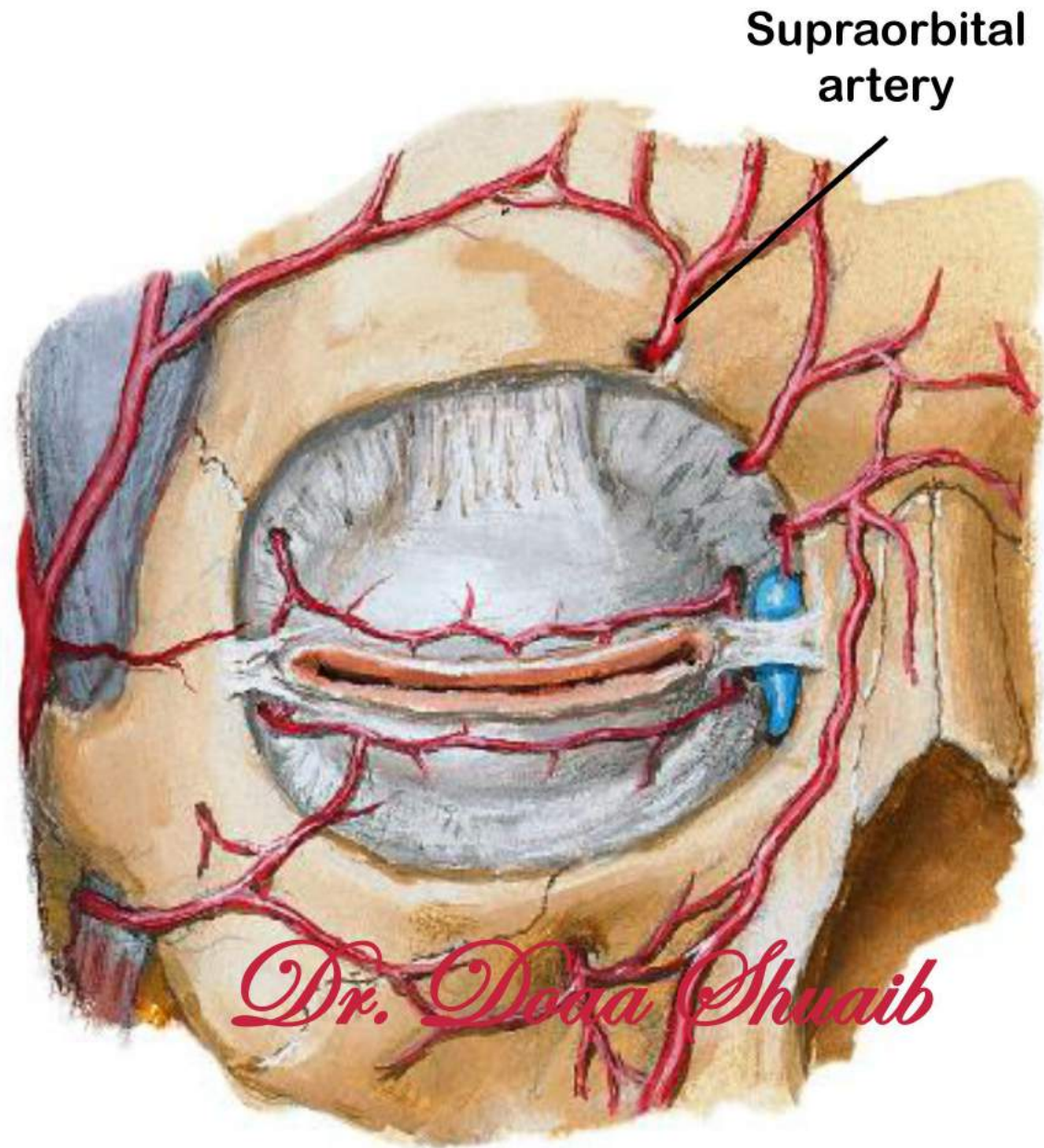


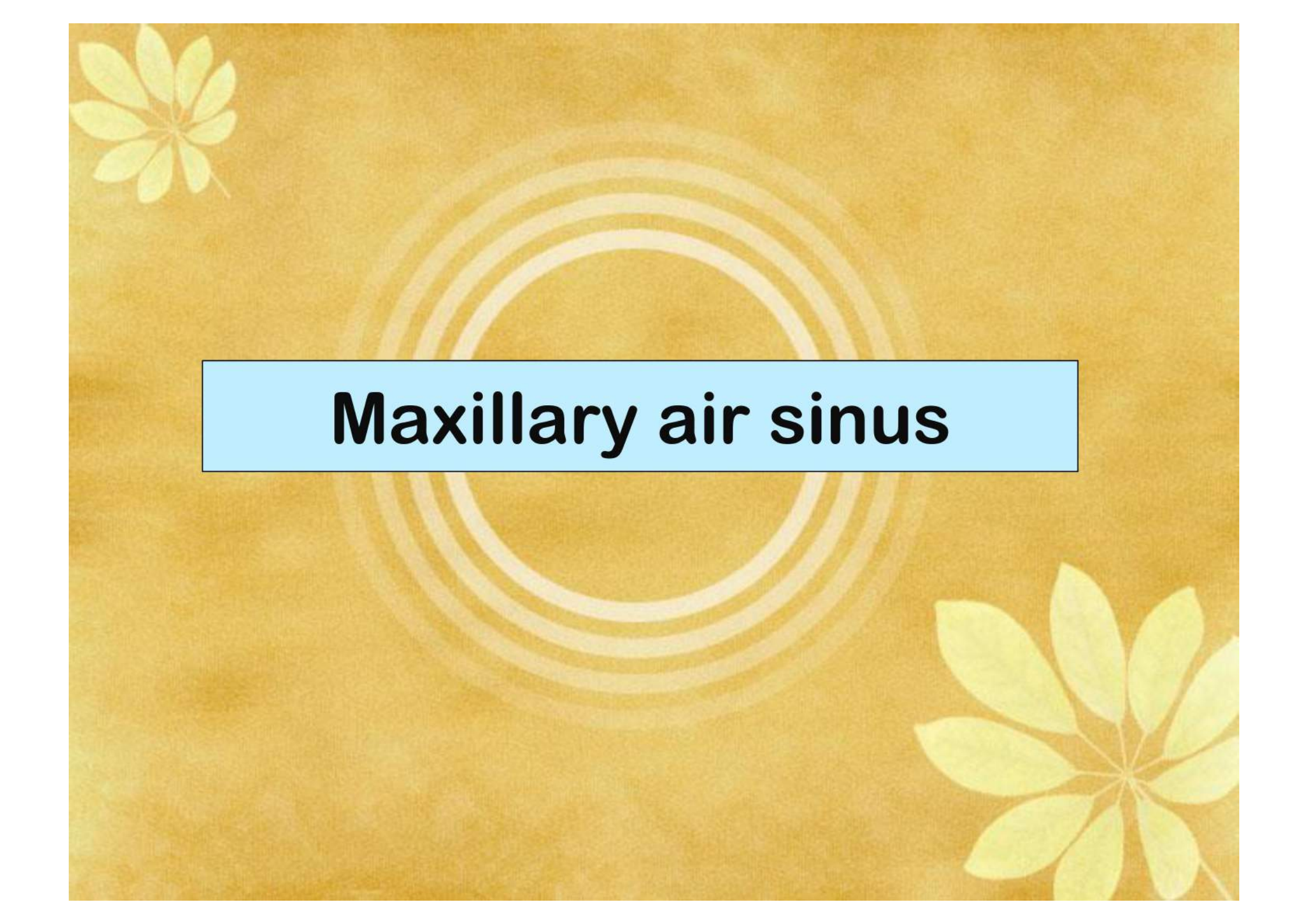
Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Frontal air sinus

Arterial supply

- Supraorbital artery.



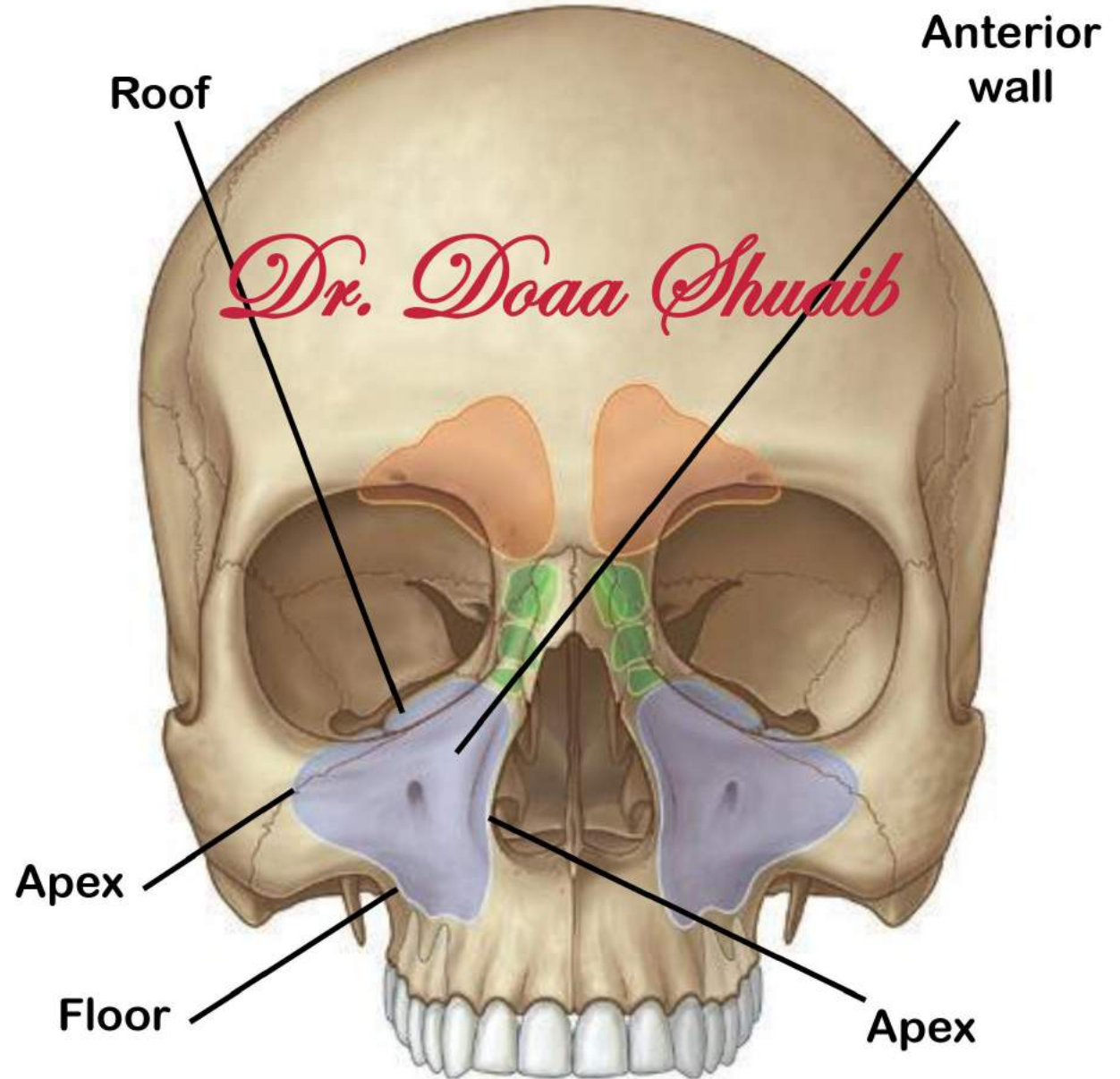
The background is a solid light beige color. In the center, there are several concentric circles in a slightly darker beige tone. In the top-left and bottom-right corners, there are stylized floral motifs with multiple pointed petals in a pale yellow-green color.

Maxillary air sinus

Maxillary sinuses

Site & shape

- The largest air sinus and the only one present at birth.
- It occupies the whole of the body of maxilla
- It is pyramidal in shape:
 - Apex
 - Base
 - Roof
 - Floor
 - Anterior wall
 - Posterior wall

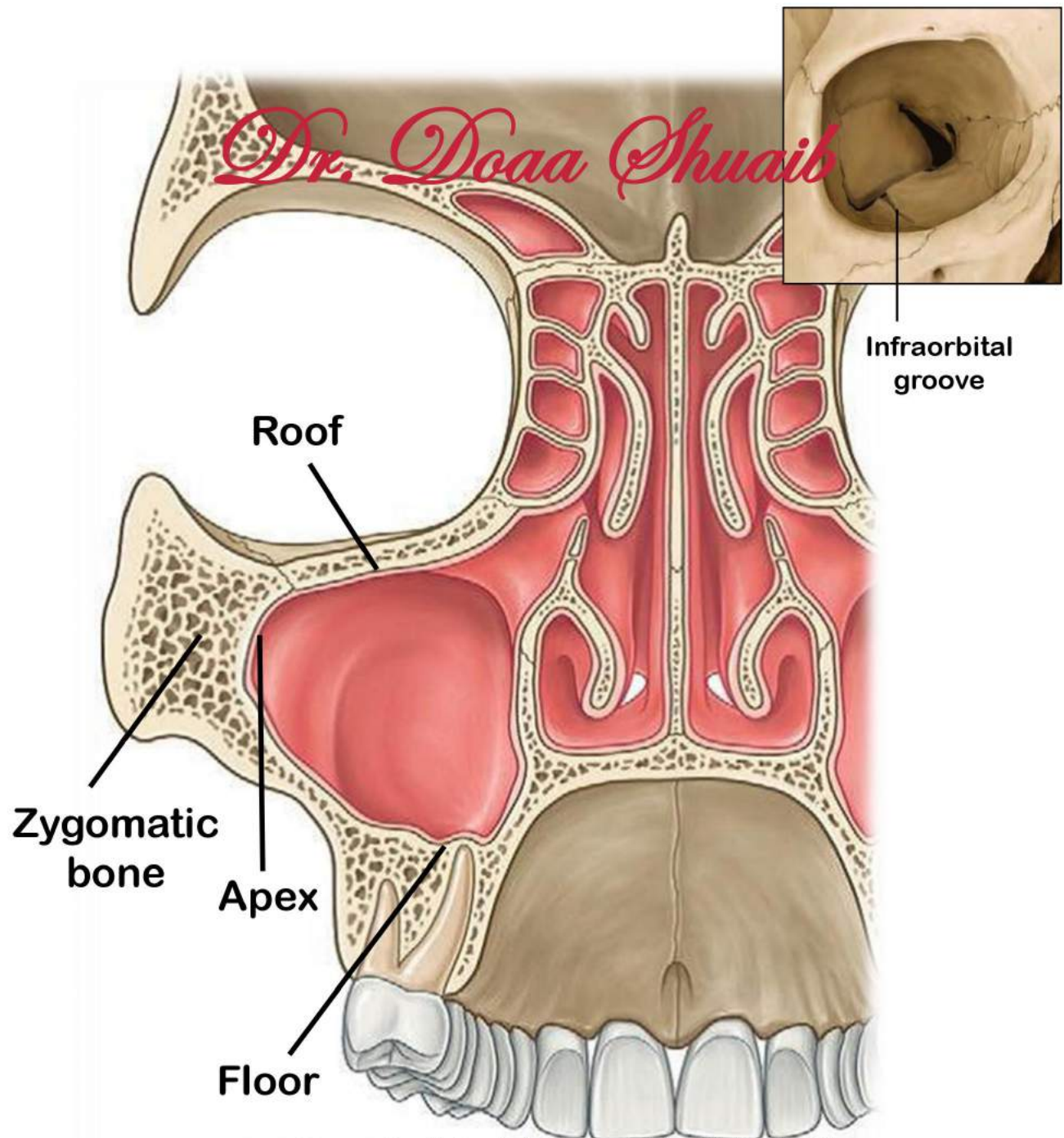


Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

Maxillary sinuses

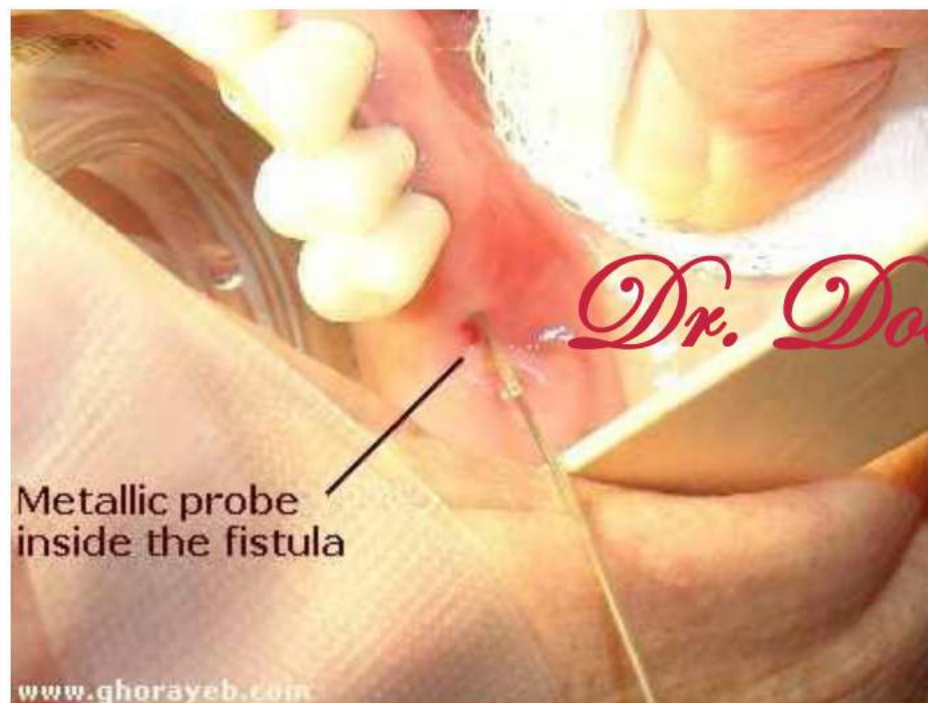
Relations

- **Apex:** Directed laterally towards the zygomatic bone.
- **Base:** Directed medially towards the nasal cavity.
- **Roof:** It is the floor of the orbit, containing infraorbital groove and canal and infraorbital nerve and vessels. It separates the sinus from the contents of the orbit.
- **Floor:** Formed by alveolar process of maxilla

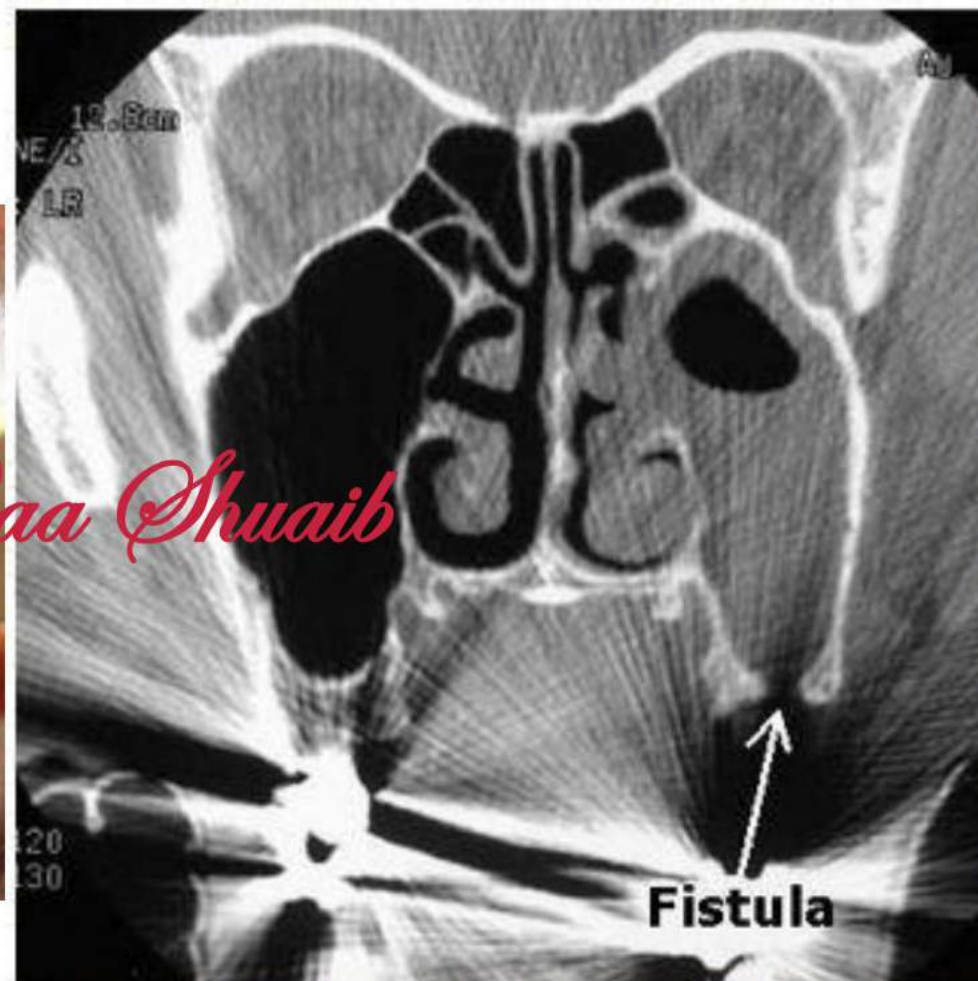


Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

Maxillary sinuses



Dr. Doaa Shuaib



A Coronal CT scan of the sinuses, showed a defect in the floor of the left maxillary antrum, corresponding to the oroantral fistula. Note the opacification of the maxillary sinus, indicating chronic infection.

Source: <http://www.ghorayeb.com/OroantralFistula.html>

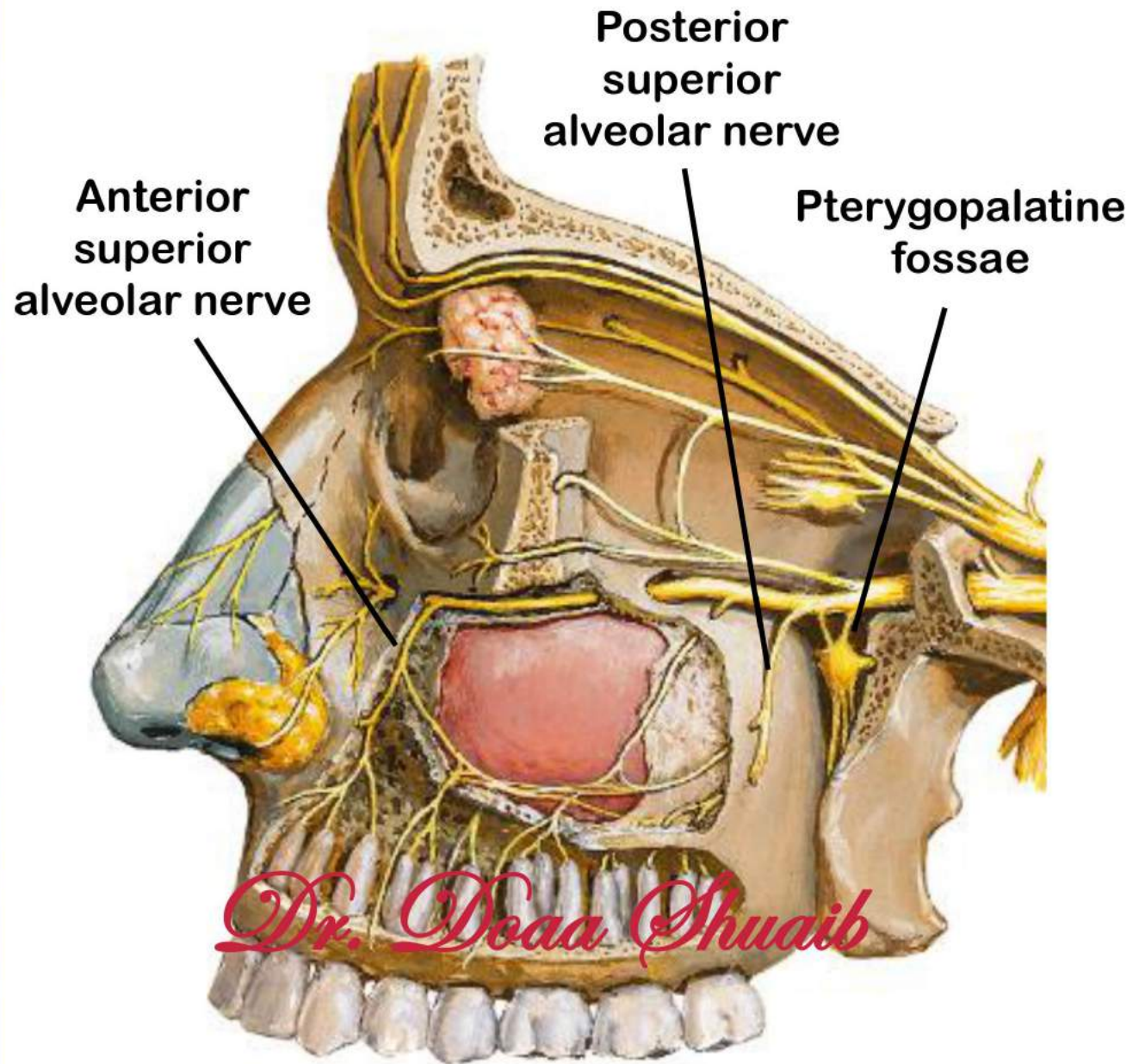
Floor

- Its lower part of the floor lies opposite the 2nd premolar and 1st molar teeth
- Extraction of these teeth may damage and perforate the floor

Maxillary sinuses

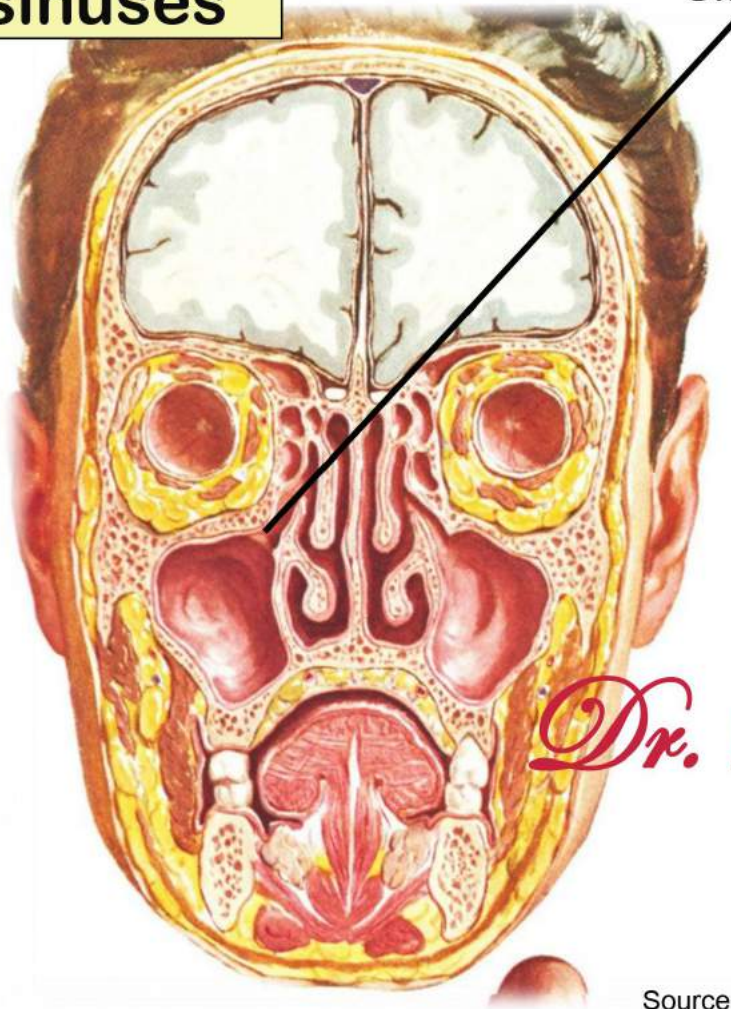
Relations

- **Anterior wall:**
 - Subcutaneous
 - Contains anterior superior alveolar nerve and vessels.
- **Posterior wall:**
 - Separates the sinus from infratemporal and pterygopalatine fossae.
 - It is pierced by posterior superior alveolar nerve and vessels

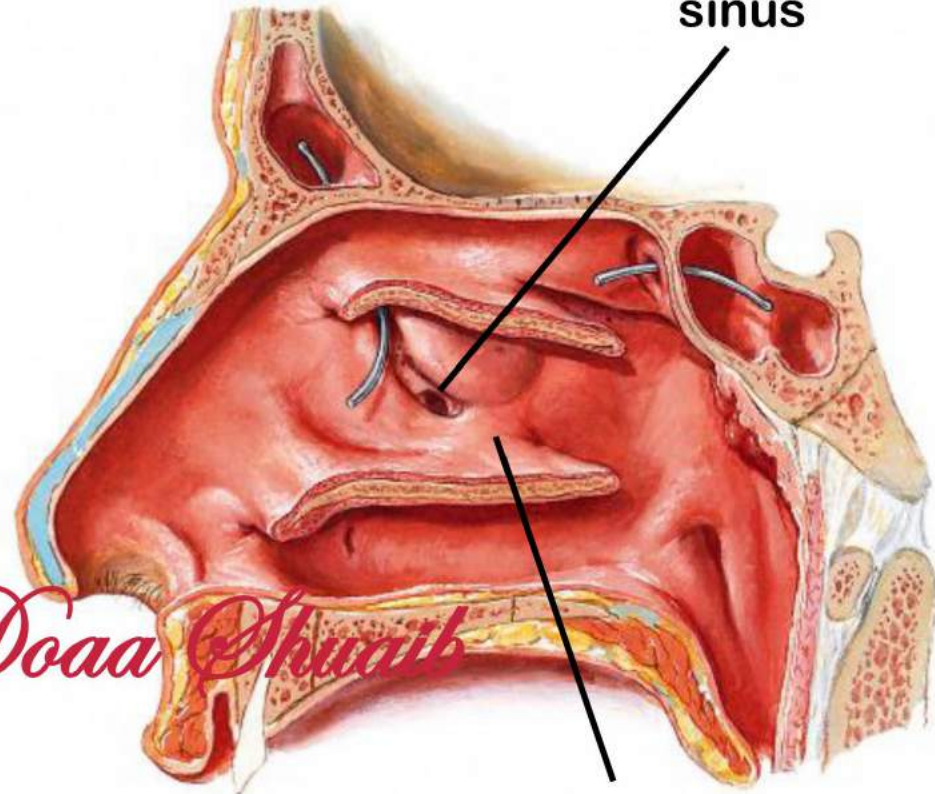


Maxillary sinuses

Opening of the sinus



Opening of the sinus



Dr. Doaa Shuaib

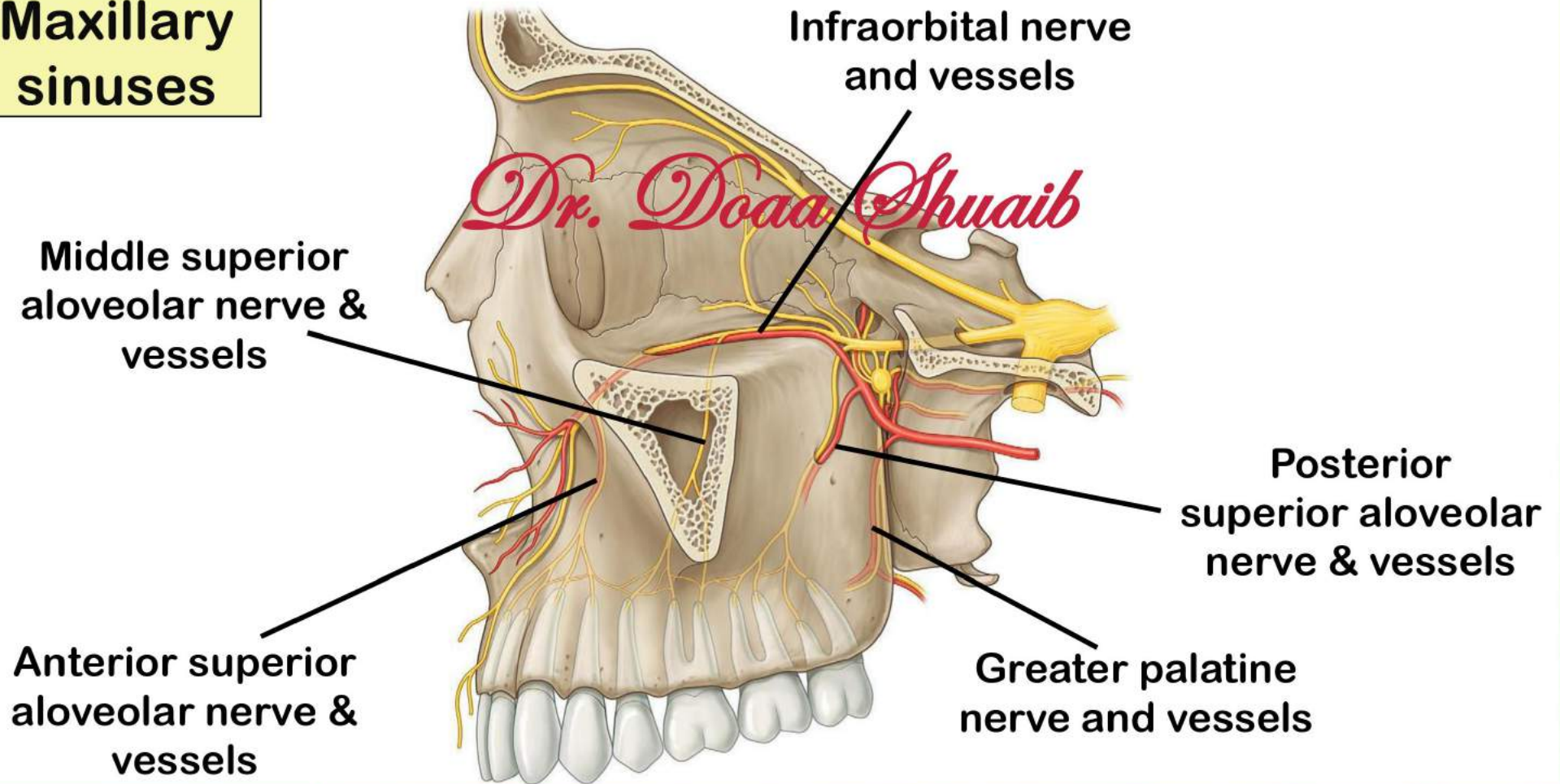
Middle meatus

Source: Atlas of Human Anatomy, Sixth Edition-
Frank H. Netter, M.D

Opening of the sinus

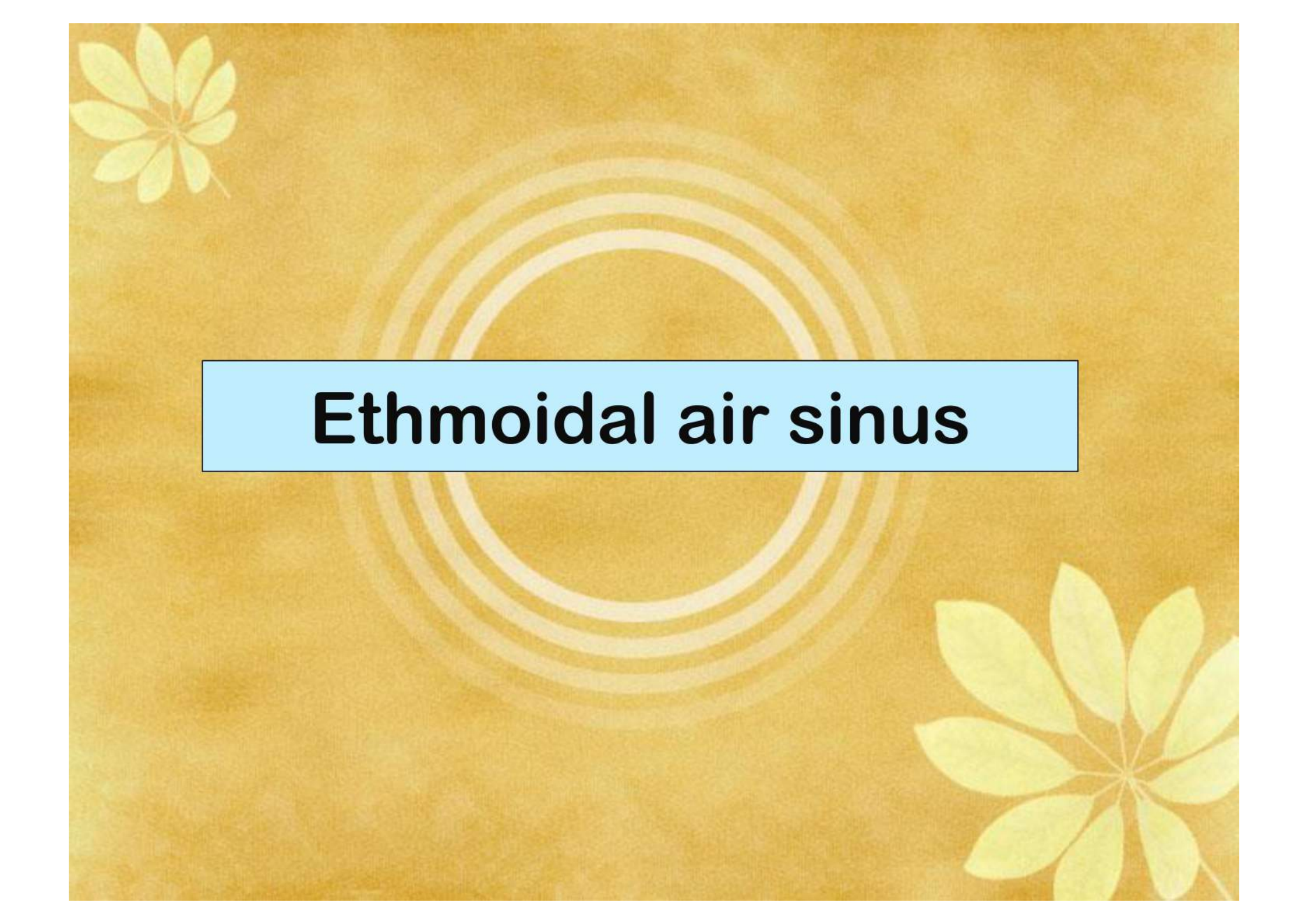
- Large rounded opening, 2 cm in diameter, present in the upper part of the base of the sinus.
- It opens in the middle meatus of the nose at the posterior end of hiatus semilunaris below the bulla ethmoidalis.
- Accessory small openings are usually present behind the main opening

Maxillary sinuses



Nerves and vessels related to maxillary sinus

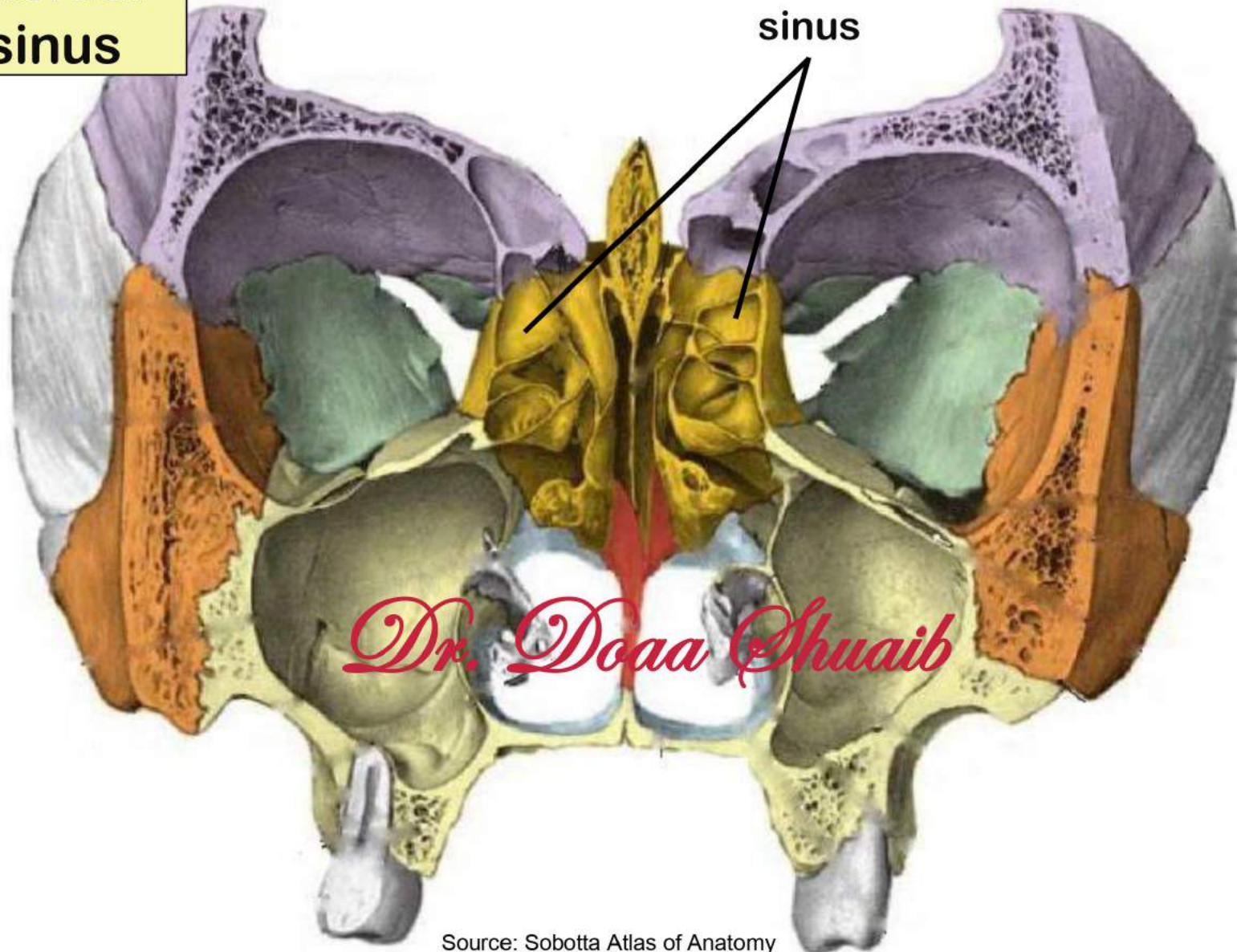
- 1- **Anterior superior alveolar:** From infraorbital nerve and vessels. They descend in the anterior wall supplying it.
- 2- **Middle superior alveolar:** From infraorbital nerve and vessels. They descend in the lateral wall of the sinus to supply it.
- 3- **Posterior superior alveolar:** From maxillary nerve and vessels. They descend and supply the posterior wall of the sinus.
- 4- **Infraorbital nerve and vessels:** They pass in the infraorbital groove and canal through the roof of the sinus.
- 5- **Greater palatine nerve and vessels:** They descend behind the sinus supplying its posterior wall.



Ethmoidal air sinus

**Ethmoidal
air sinus**

**Ethmoidal air
sinus**



Site

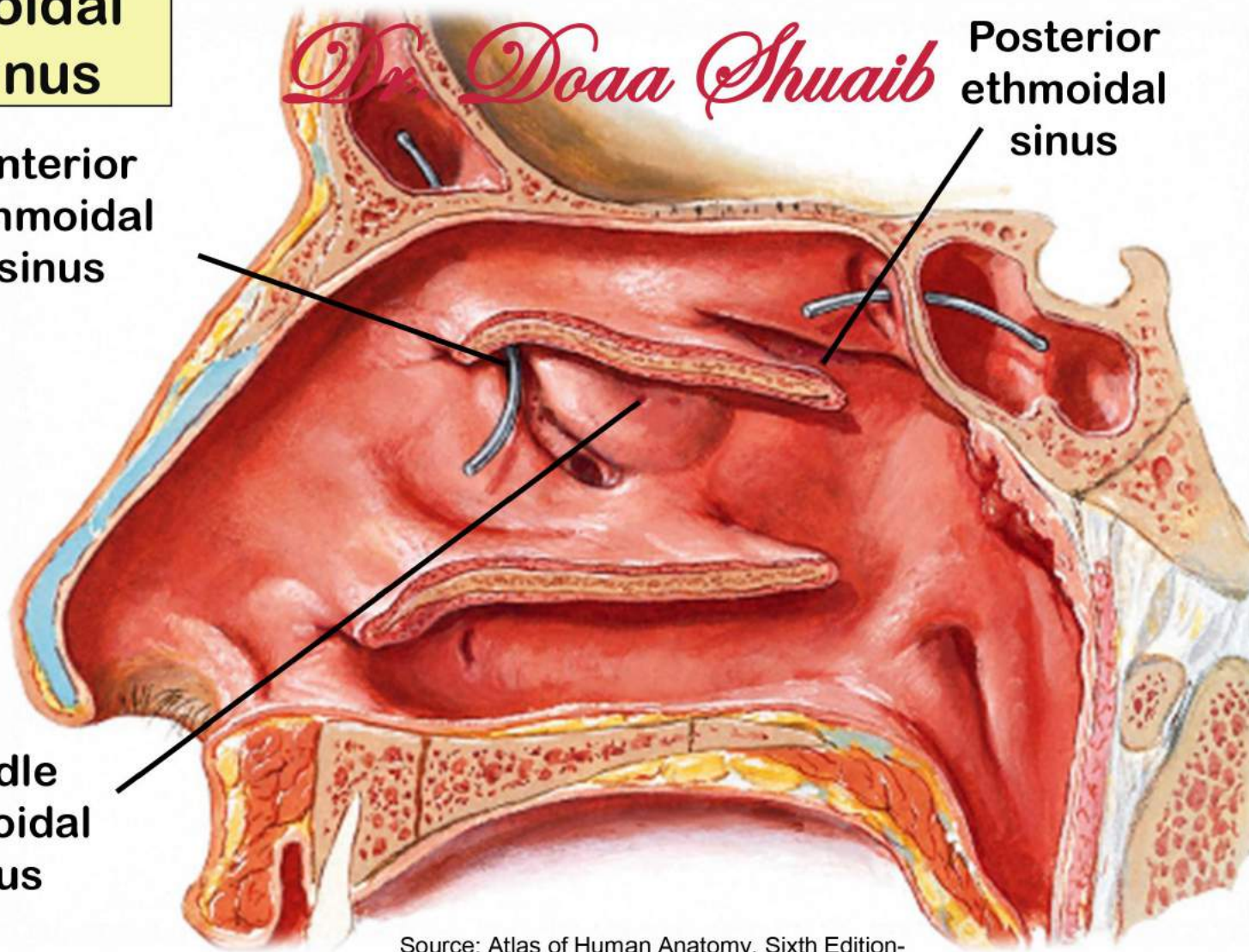
- They are intercommunicating spaces lying inside the ethmoidal labyrinth between the orbit and upper part of nasal cavity.
- They vary in number from 3-18 air cells arranged into 3 groups

Ethmoidal air sinus

Anterior
ethmoidal
sinus

Middle
ethmoidal
sinus

Posterior
ethmoidal
sinus



Source: Atlas of Human Anatomy, Sixth Edition-
Frank H. Netter, M.D

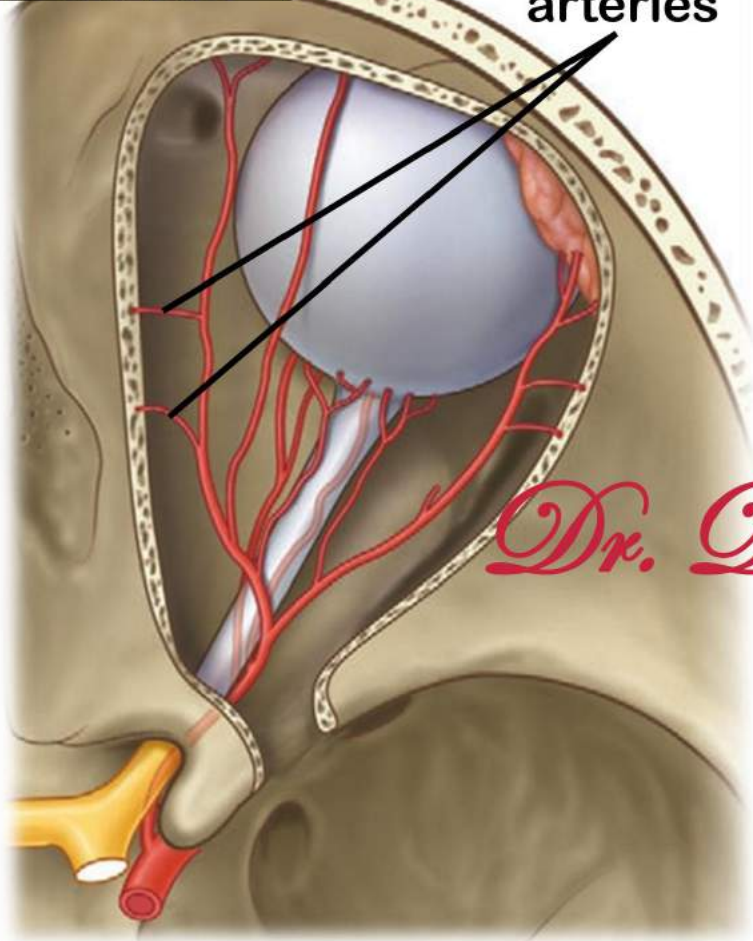
Openings of the sinuses

They vary in number from 3-18 air cells arranged into 3 groups:

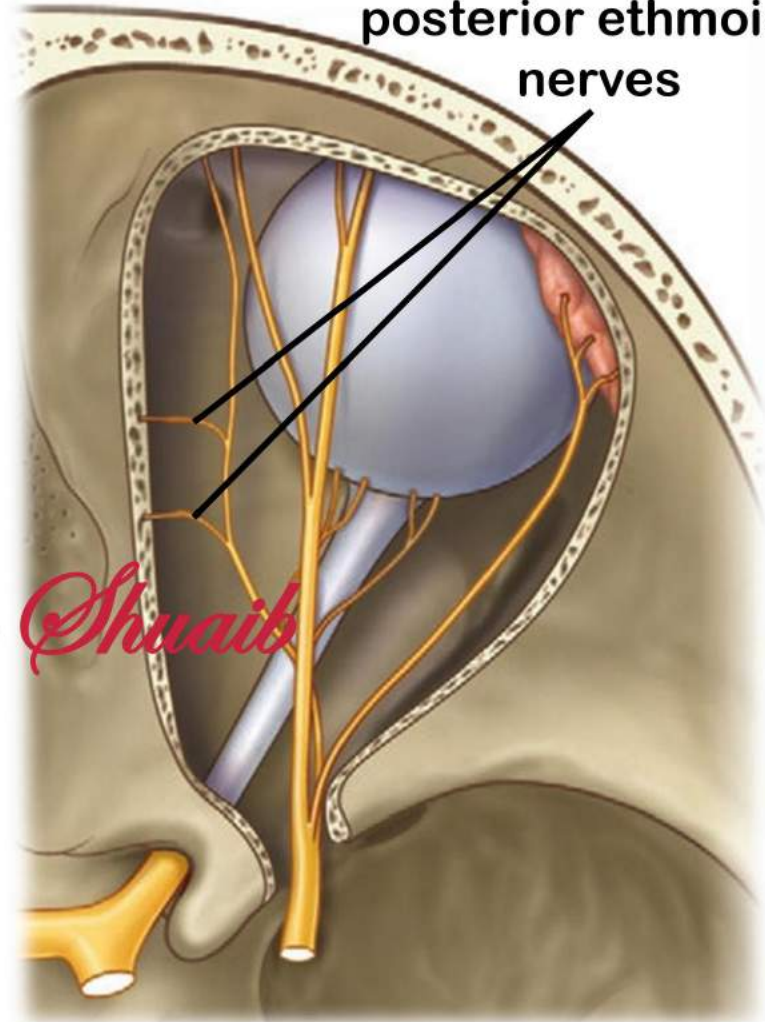
- 1- **Anterior ethmoidal sinus** opens in the ethmoidal infundibulum or in the anterior end of the hiatus semilunaris in the middle meatus of nose.
- 2- **Middle ethmoidal sinus** opens in the bulla ethmoidalis
- 3- **Posterior ethmoidal sinus** opens in the superior meatus

Ethmoidal air sinus

Anterior and posterior ethmoidal arteries



Anterior and posterior ethmoidal nerves



Dr. Doaa Shuaib

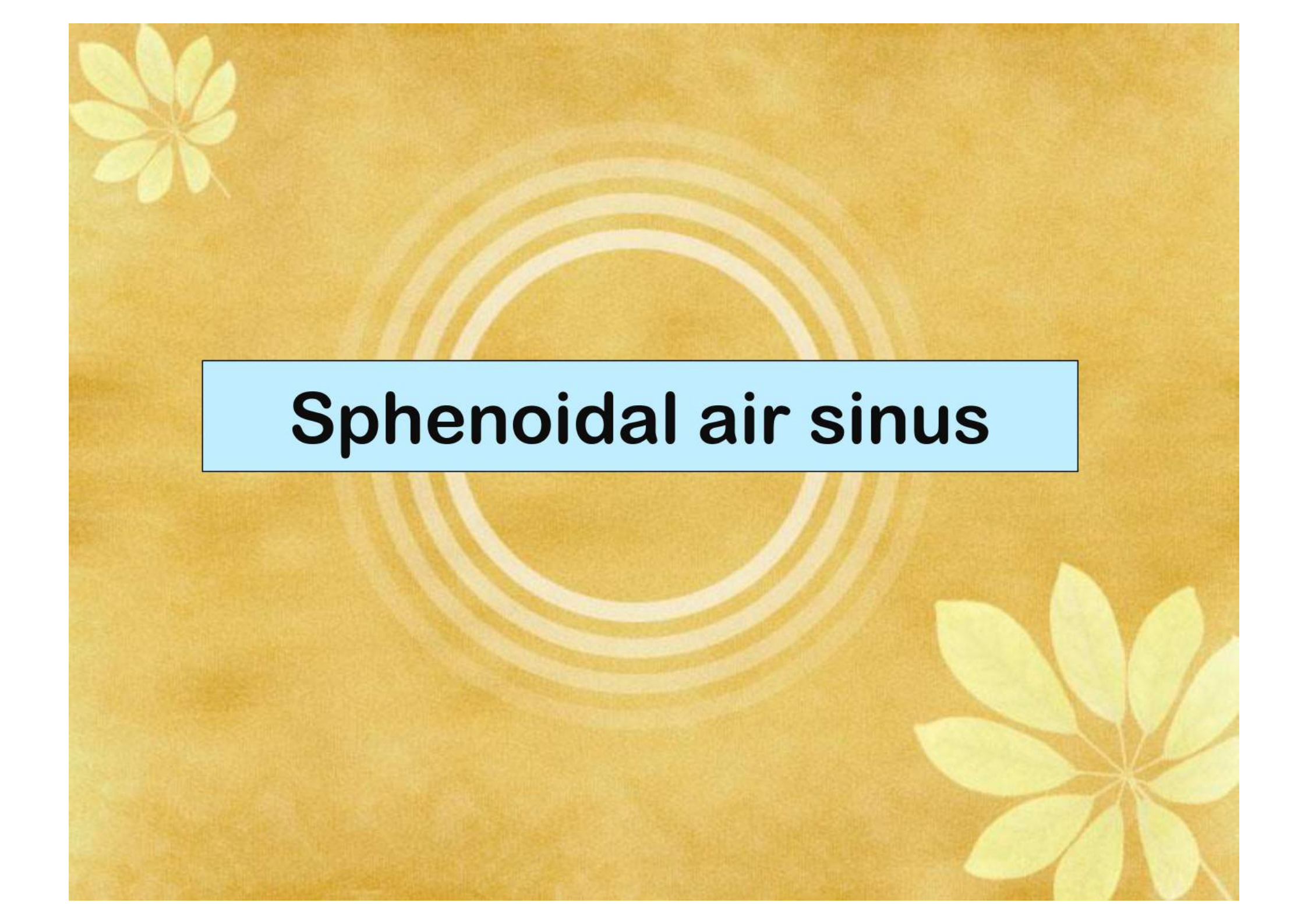
Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

Arterial supply

- Anterior and posterior ethmoidal arteries
- Branches of ophthalmic artery

Nerve supply

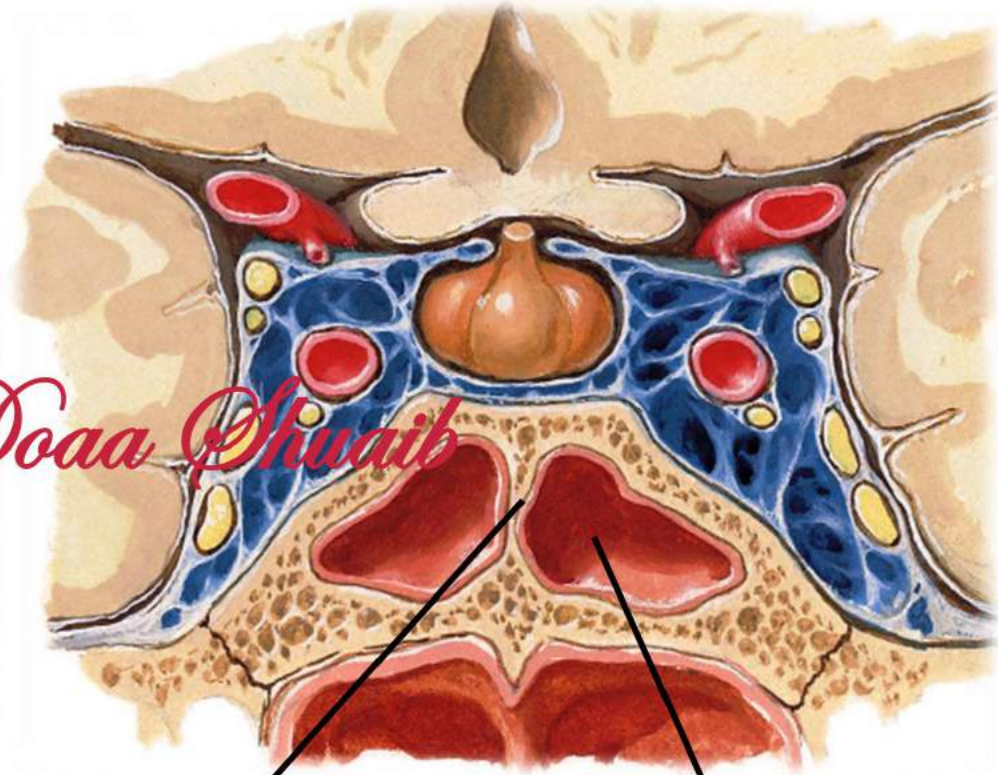
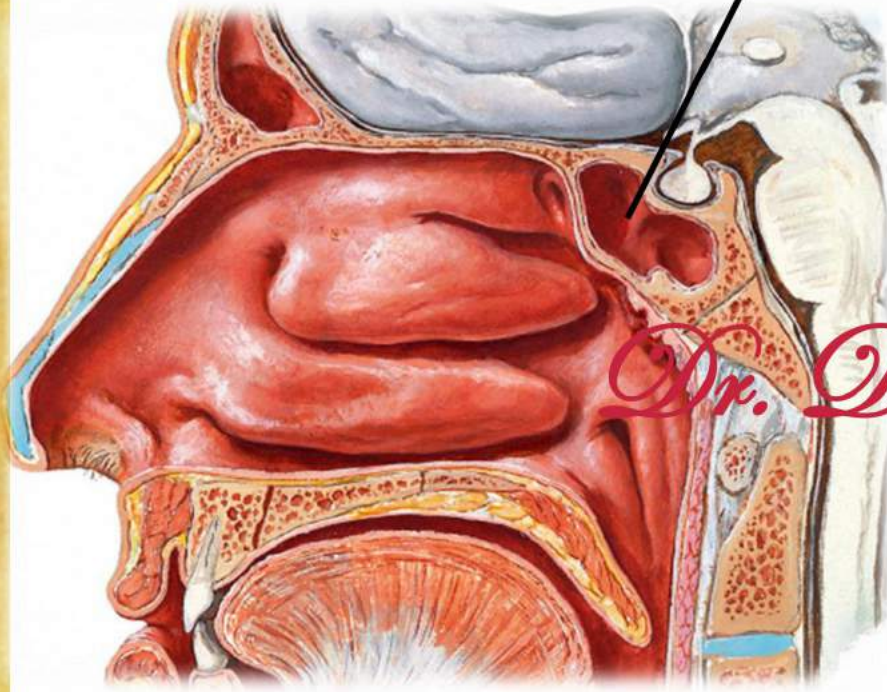
- Anterior and posterior ethmoidal nerves
- Branches of nasociliary nerve

The background is a textured, golden-yellow surface. In the center, there are several concentric, light-colored circles that create a ripple effect. In the top-left and bottom-right corners, there are stylized, light-green floral motifs with multiple pointed petals.

Sphenoidal air sinus

Sphenoidal air sinus

Sphenoidal air
sinus



Bony septum

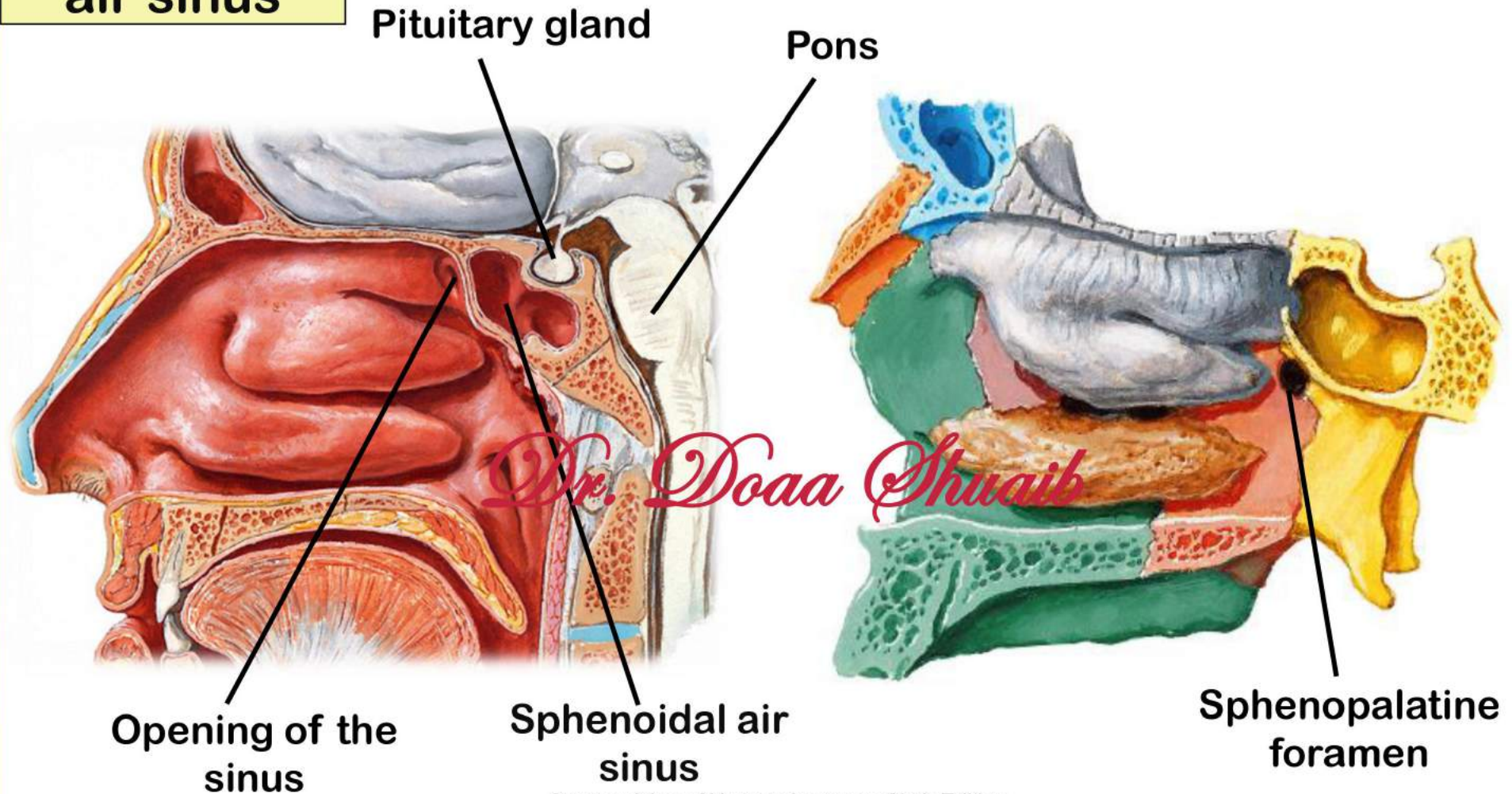
Sphenoidal air
sinus

Source: Atlas of Human Anatomy, Sixth Edition-
Frank H. Netter, M.D

Site

- It occupies the body of sphenoid and lies behind the upper part of nasal cavity.
- The two sphenoid sinuses are separated by a bony septum which lies in the midline or may be deviated to one side in most of the cases

Sphenoidal air sinus



Source: Atlas of Human Anatomy, Sixth Edition-
Frank H. Netter, M.D

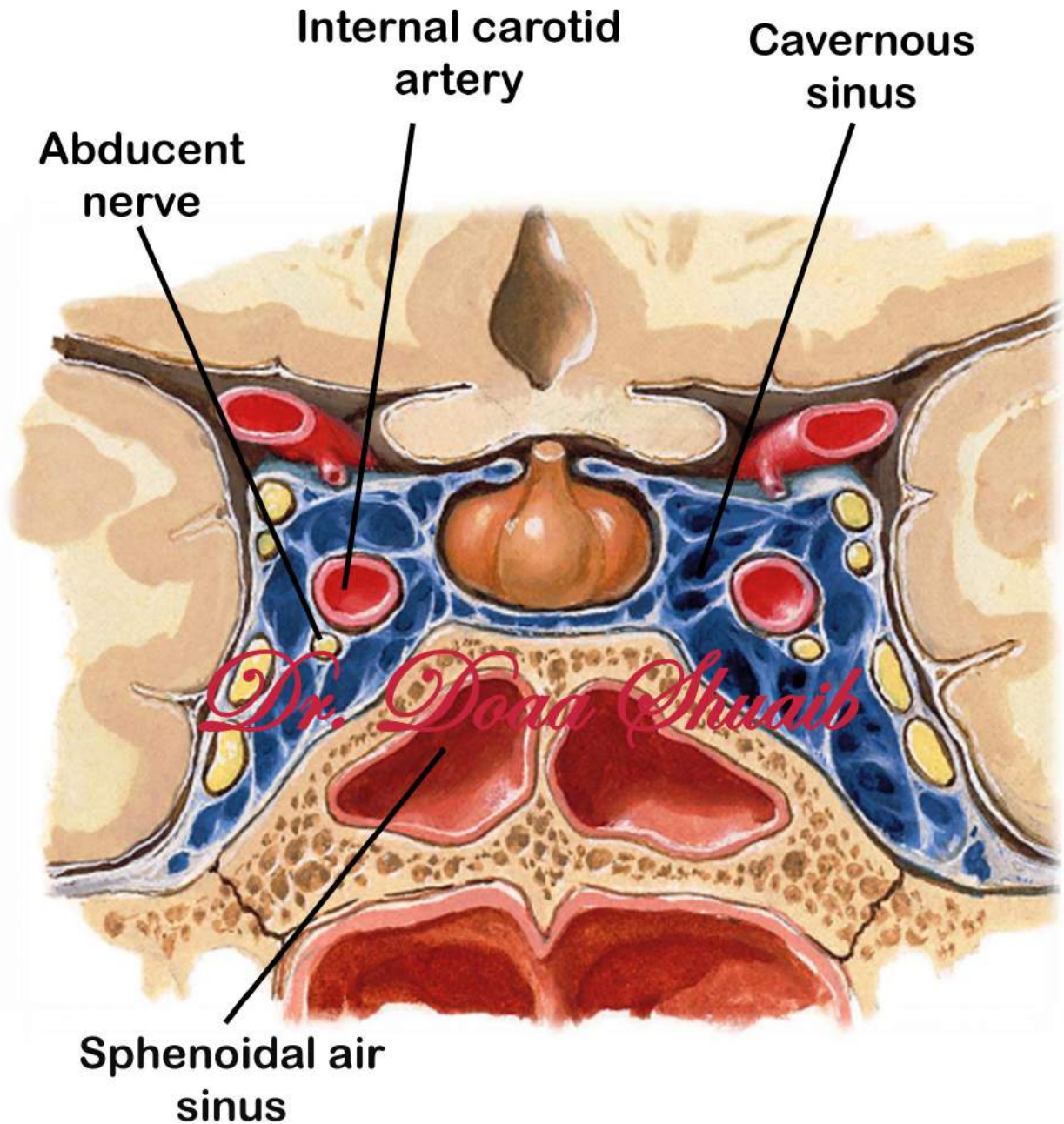
Relations

- **Superiorly:** Pituitary gland and optic chiasma.
- **Posteriorly:** Pons and basilar artery.
- **Anteriorly:** The opening of the sinus lies in the upper part of its anterior wall and it opens in the sphenoidal recess. The sphenopalatine foramen (with structures passing through it) lies anterior to the lower part of the sinus.

Sphenoidal air sinus

Relations

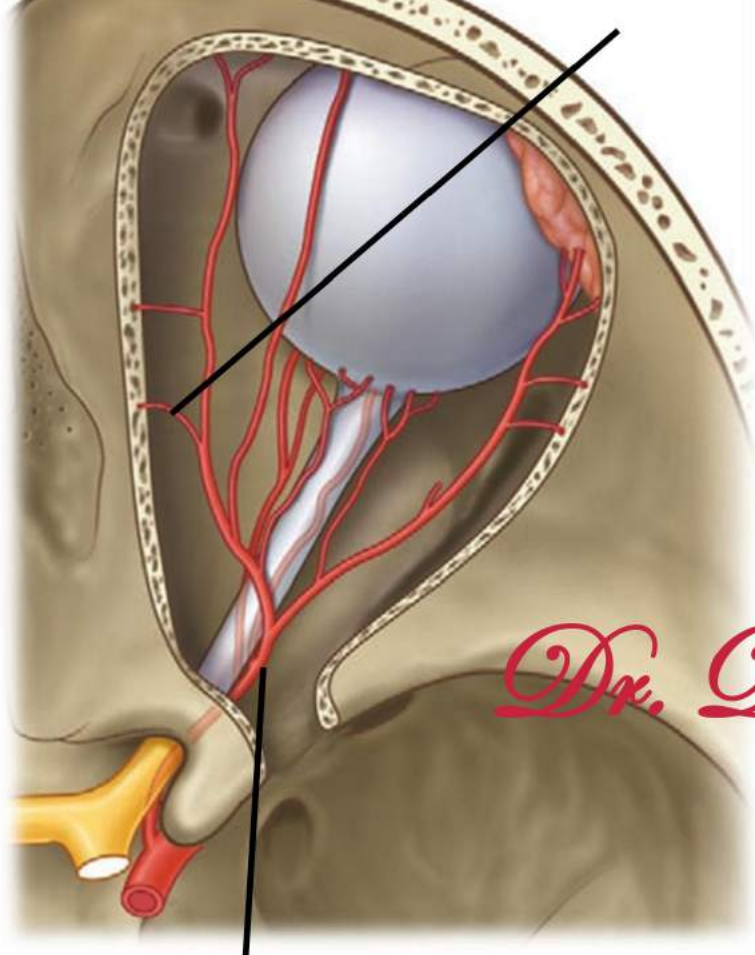
- **Laterally:** On both sides there are cavernous sinuses with the internal carotid arteries and abducent nerves



Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

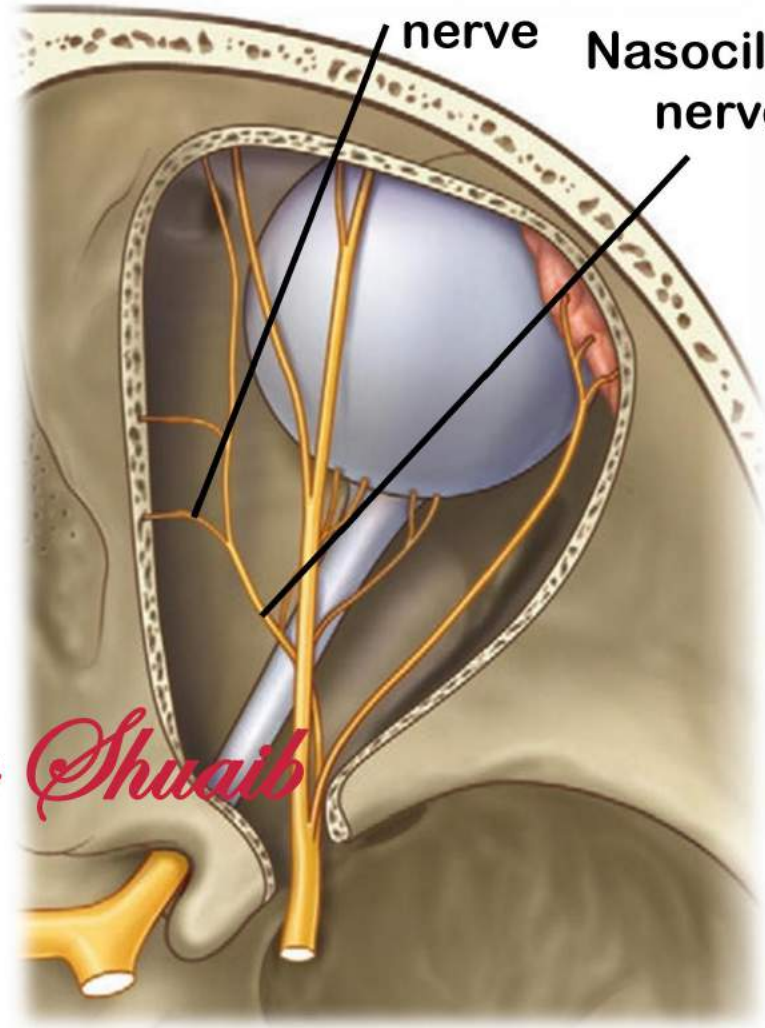
Sphenoidal air sinus

Anterior posterior
ethmoidal artery



Ophthalmic artery

Posterior ethmoidal
nerve
Nasociliary
nerve



Dr. Doaa Shuaib

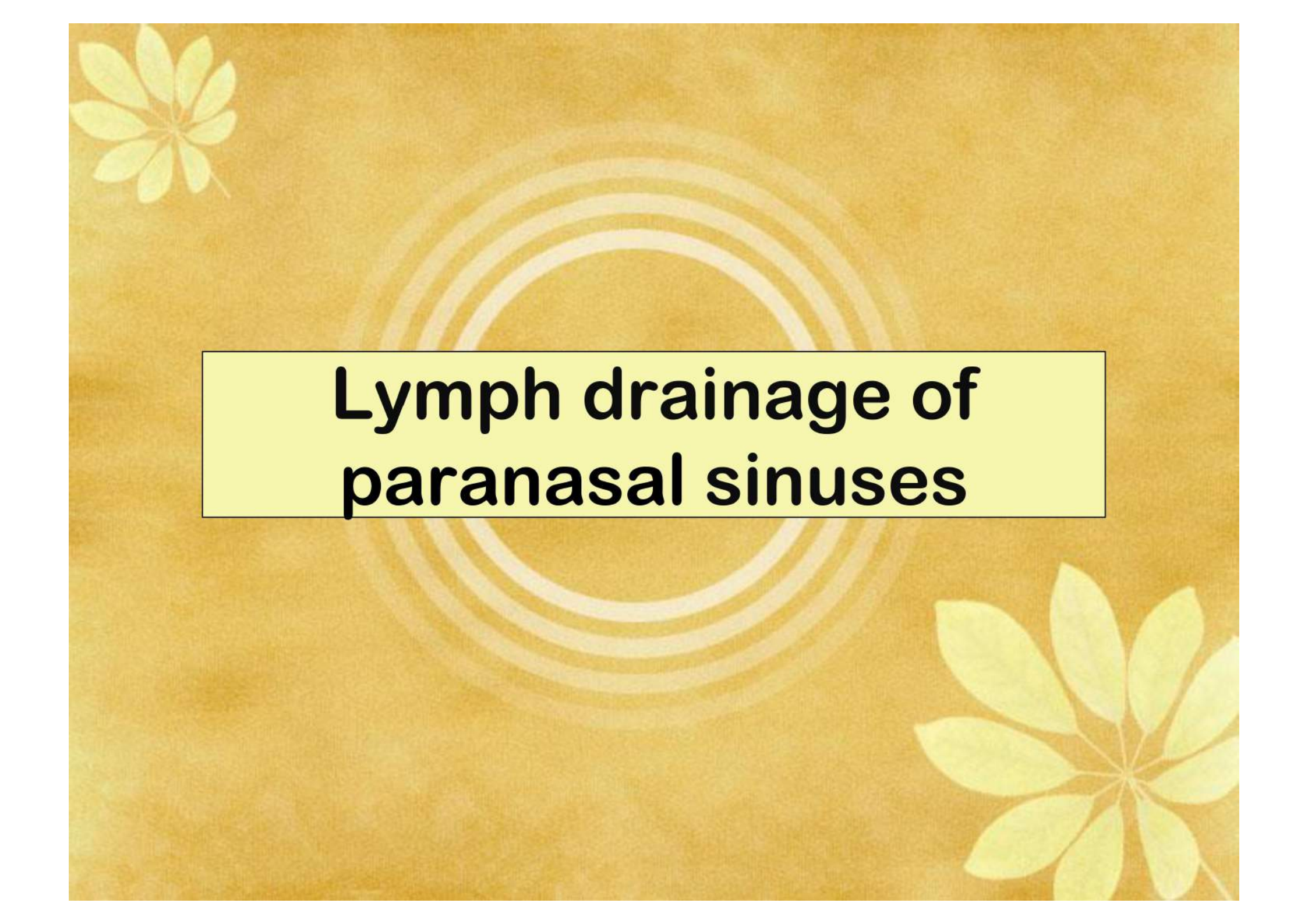
Source: Gray's Basic Anatomy - Richard L. Drake, Wayne
Vogl, Adam W.M. Mitchell

Arterial supply

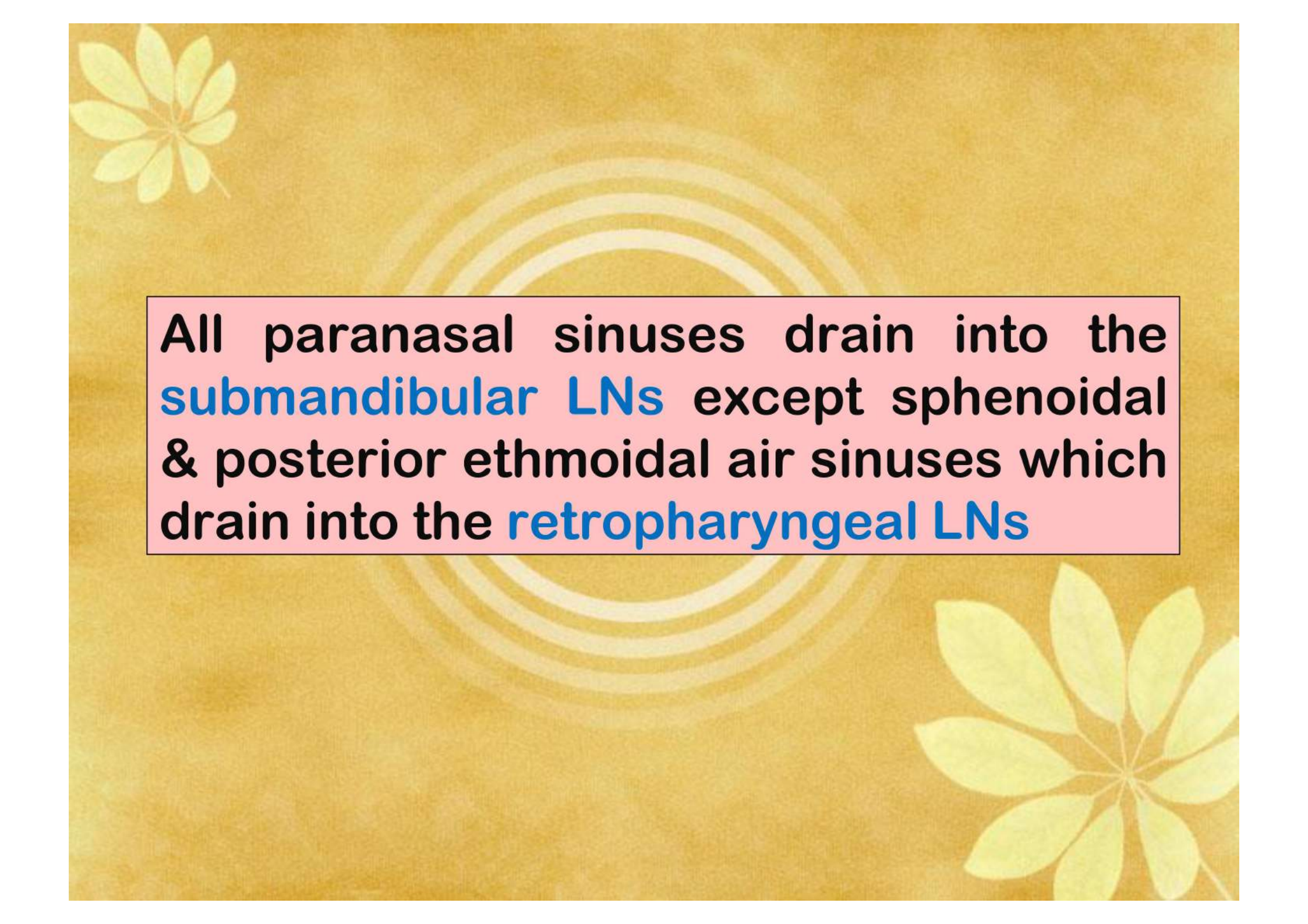
- Posterior ethmoidal artery of ophthalmic artery

Nerve supply

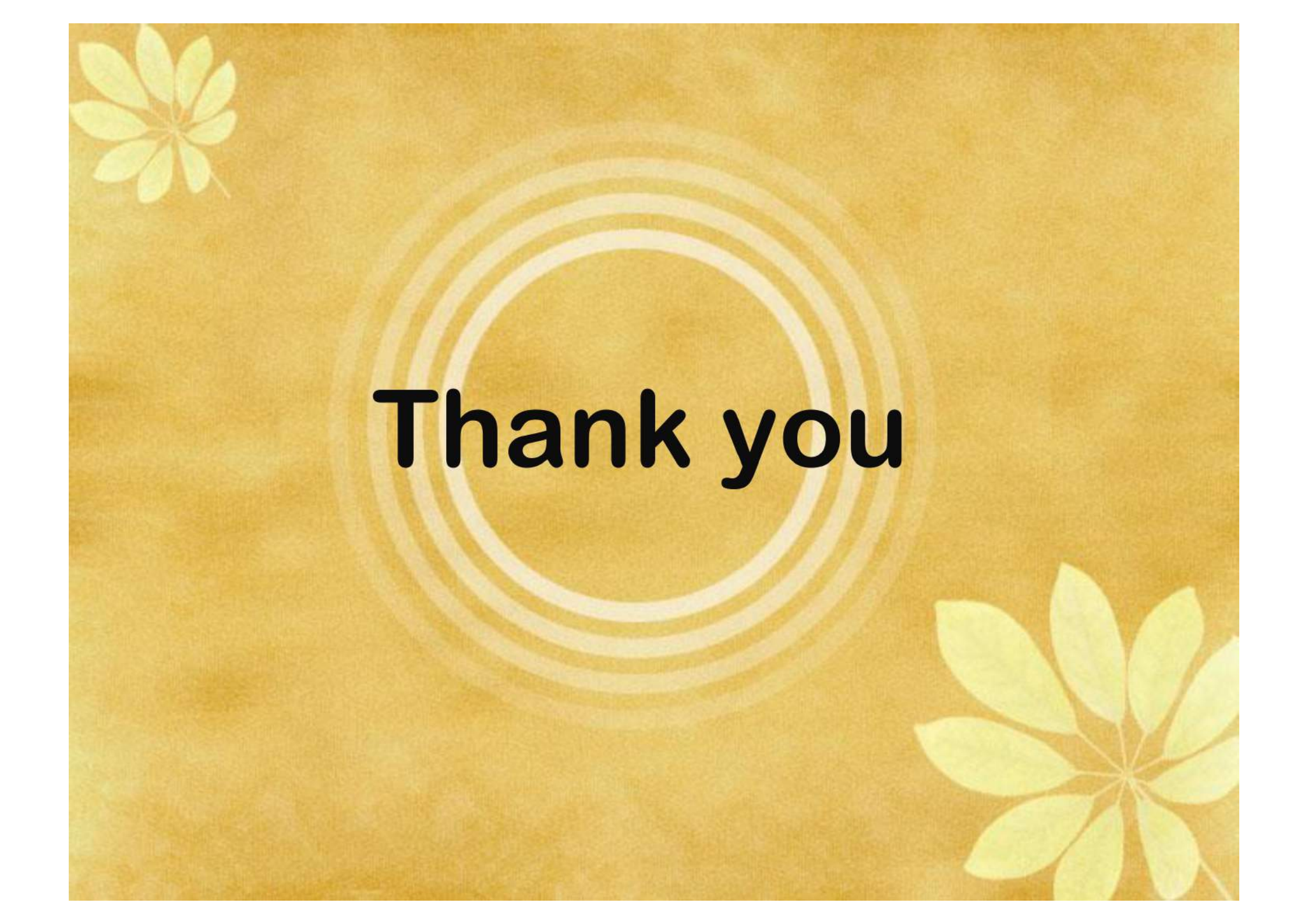
- Posterior ethmoidal branches of nasociliary n.
- orbital branches of sphenopalatine ganglion



Lymph drainage of paranasal sinuses



All paranasal sinuses drain into the **submandibular LNs** except sphenoidal & posterior ethmoidal air sinuses which drain into the **retropharyngeal LNs**



Thank you