

Pranayama

Teachers Training

Level 1 2023

Anatomy & Physiology

Class 4

Nose • Nostrils • Air Pathways



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ॐ ॐ ॐ

श्री गुरुभ्यो नमः हरिः ॐ

Om Om Om

Sri Gurubhyo Namah Harih Om

Salutations to the Gurus!

ॐ सह नाववतु ।
सह नौ भुनक्तु ।
सह वीर्यं करवावहै ।
तेजस्वि नावधीतमस्तु मा विद्विषावहै ।
ॐ शान्तिः शान्तिः शान्तिः ॥

oṃ saha nāvavatu saha nau bhunaktu
saha vīryaṃ karavāvahai
tejasvi nāvadhītamastu mā vidviṣāvahai
oṃ śāntiḥ śāntiḥ śāntiḥ

May that Brahman protect us together. May it nourish us together. May we both gain great vitality. May our learning be brilliant. May we never argue. Om peace, peace, peace.

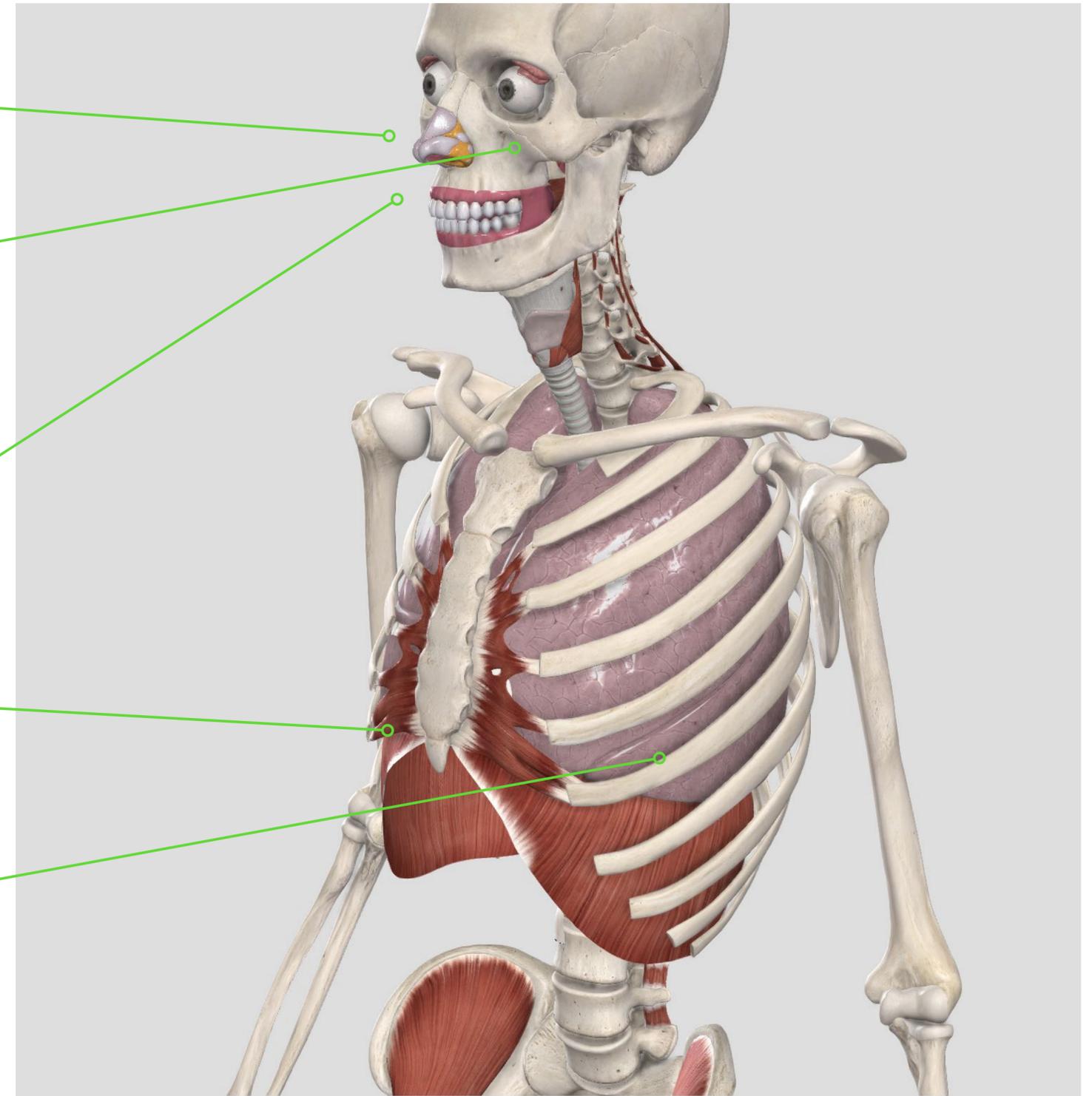
Respiratory organs and muscles

The nose is the most external part of the respiratory system and the principle organ of the olfactory system

The nose is the organ of respiration

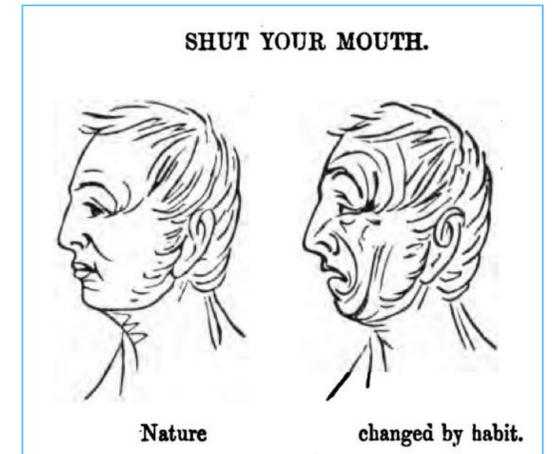
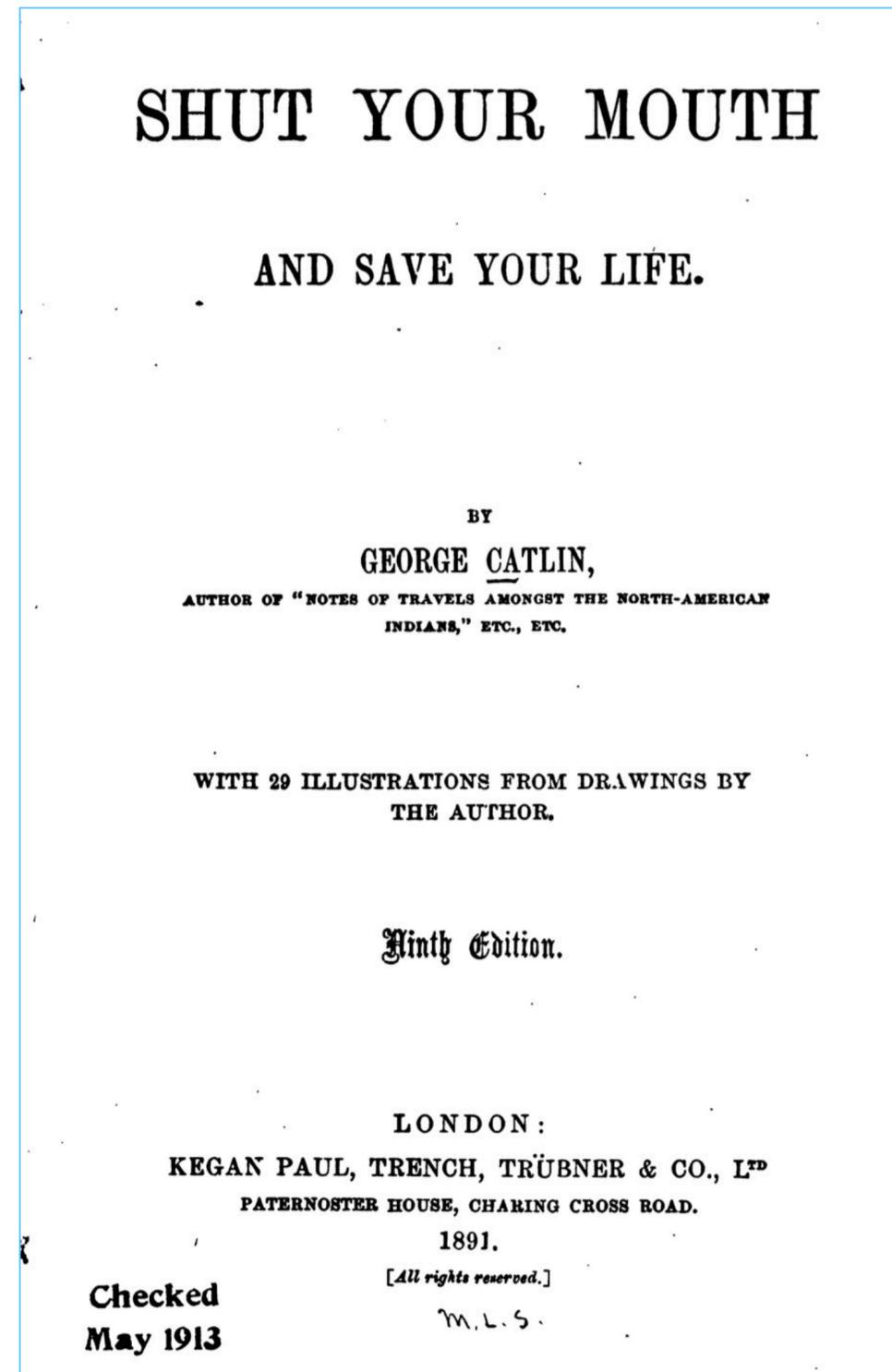
The diaphragm and intercostals are the muscles of respiration

The lungs are the organ of gas exchange



Why breathe through the nose - and not the mouth!

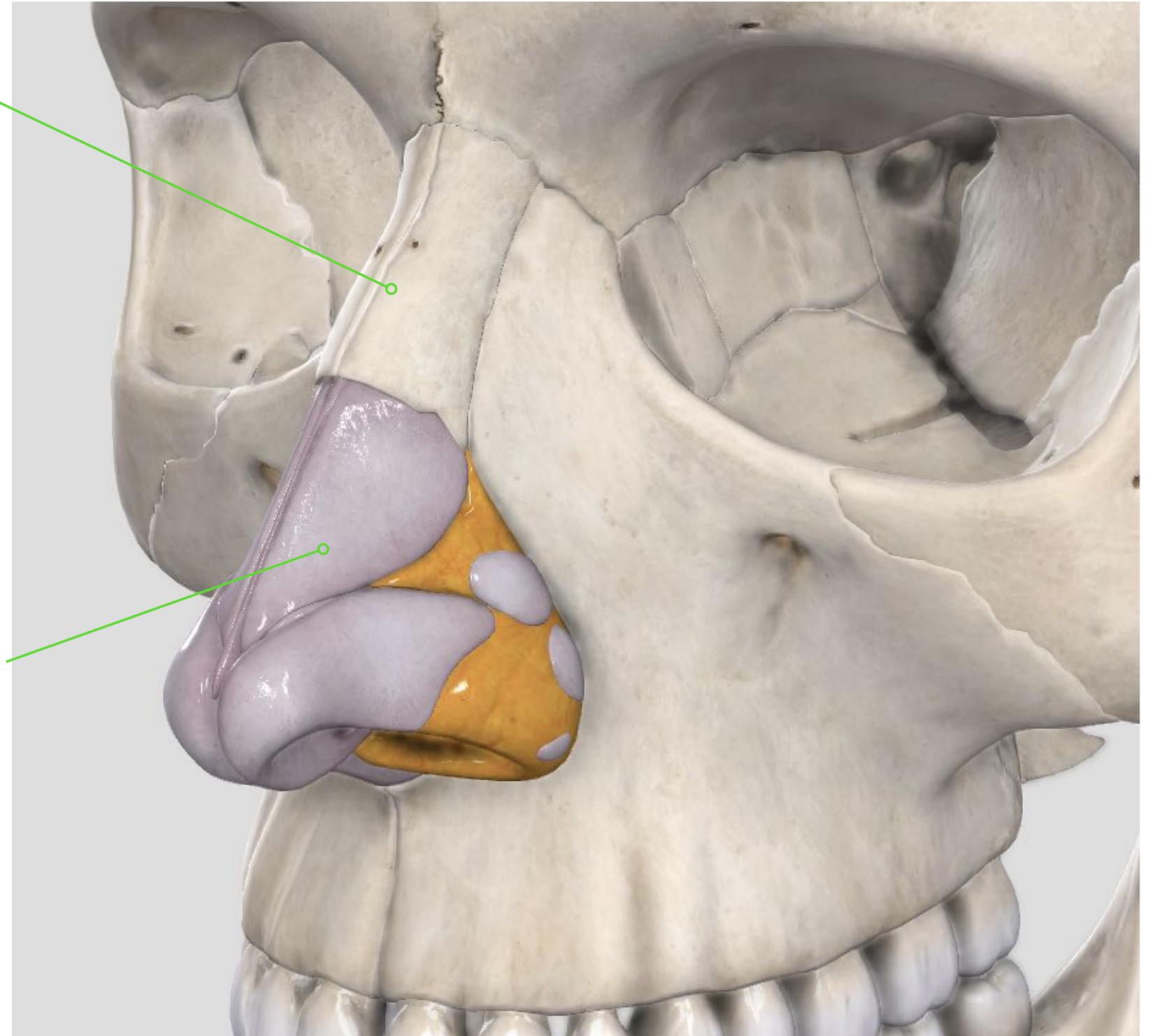
- Nose hairs filter the air
- Nose warms and humidifies the air
- Nitric Oxide (NO) - antiviral, antimicrobial, antibacterial, vasodilator, increases blood flow
- Increases O2 flow to tissues & cells
- Induces slow breathing sending calming messages to the brain to relax
- Normalizes breathing volume ensuring optimal O2 and CO2 levels
- Activates parasympathetic nervous system - calming
- More O2 to the brain areas associated with emotions and memory
- Synchronizes brain waves associated with behavior and emotions
- Better sleep, better recovery, better everything



Anatomy of the Nose

The hard bridge at the top of your nose is made of bone

The outer walls of your nose are made of cartilage and covered in skin. The walls form your nasal cavities and your nostrils. The skin covering the nose is continuous from its outer layer wrapping to the inside of the nose



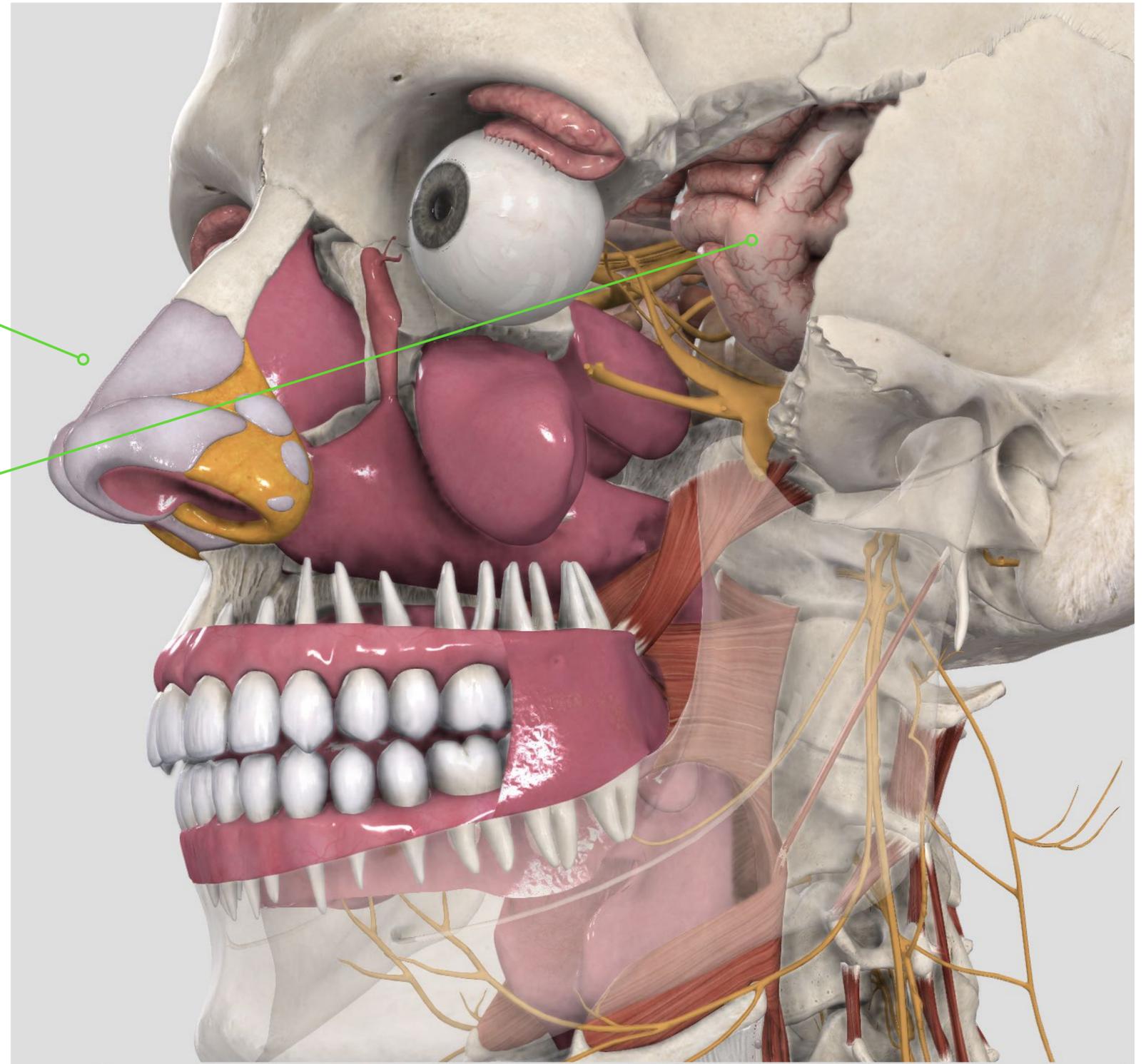
The nose

Allows air to enter the body

Filters dust, pathogens, and other particles

Warms and moistens the air

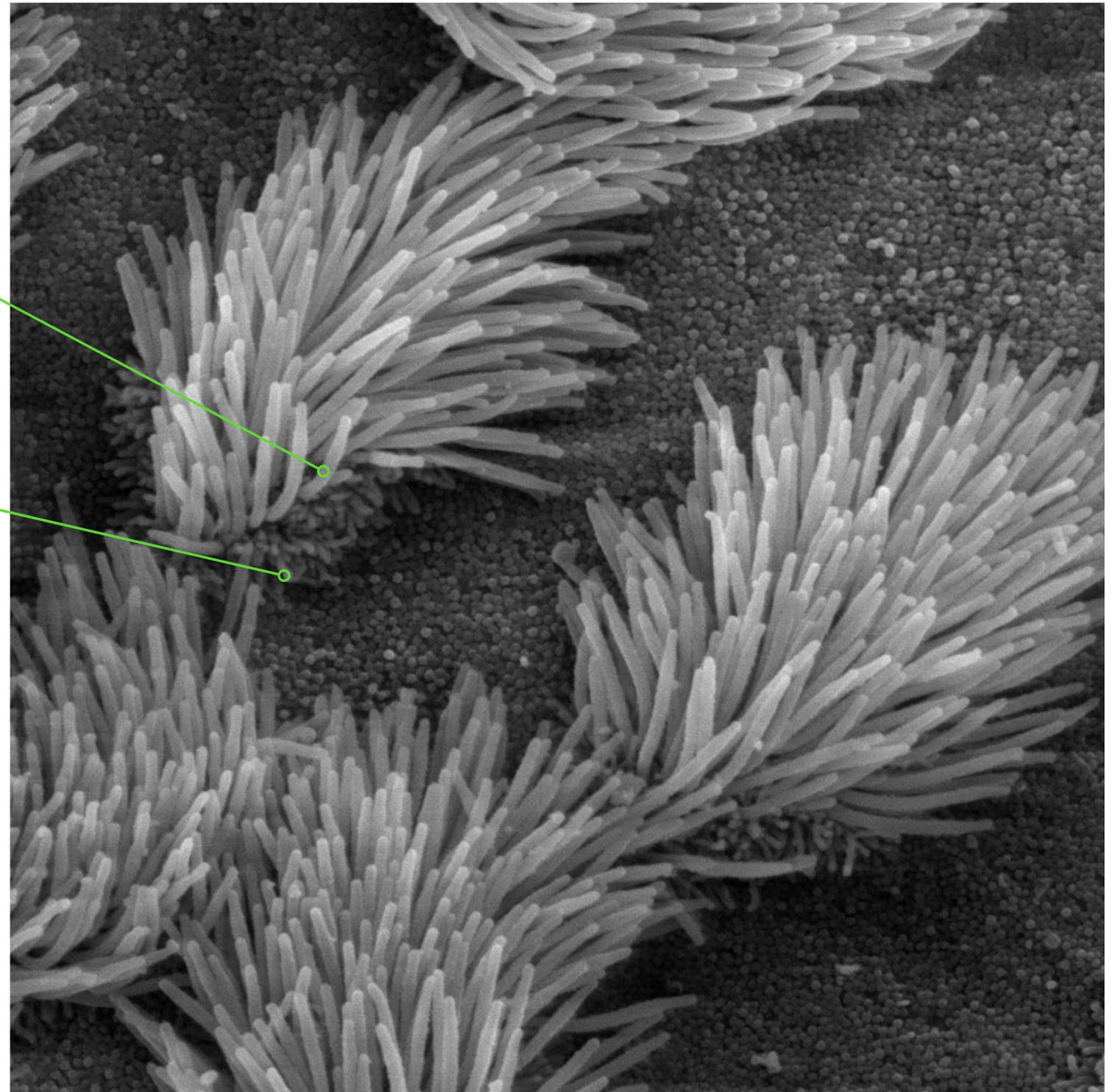
Has nerve endings for sense of smell



Anatomy of the Nose

Hair and cilia (tiny, hairlike structures) inside your nose trap dirt and particles

Cells have cilia on them which move mucous out of the lungs and nose

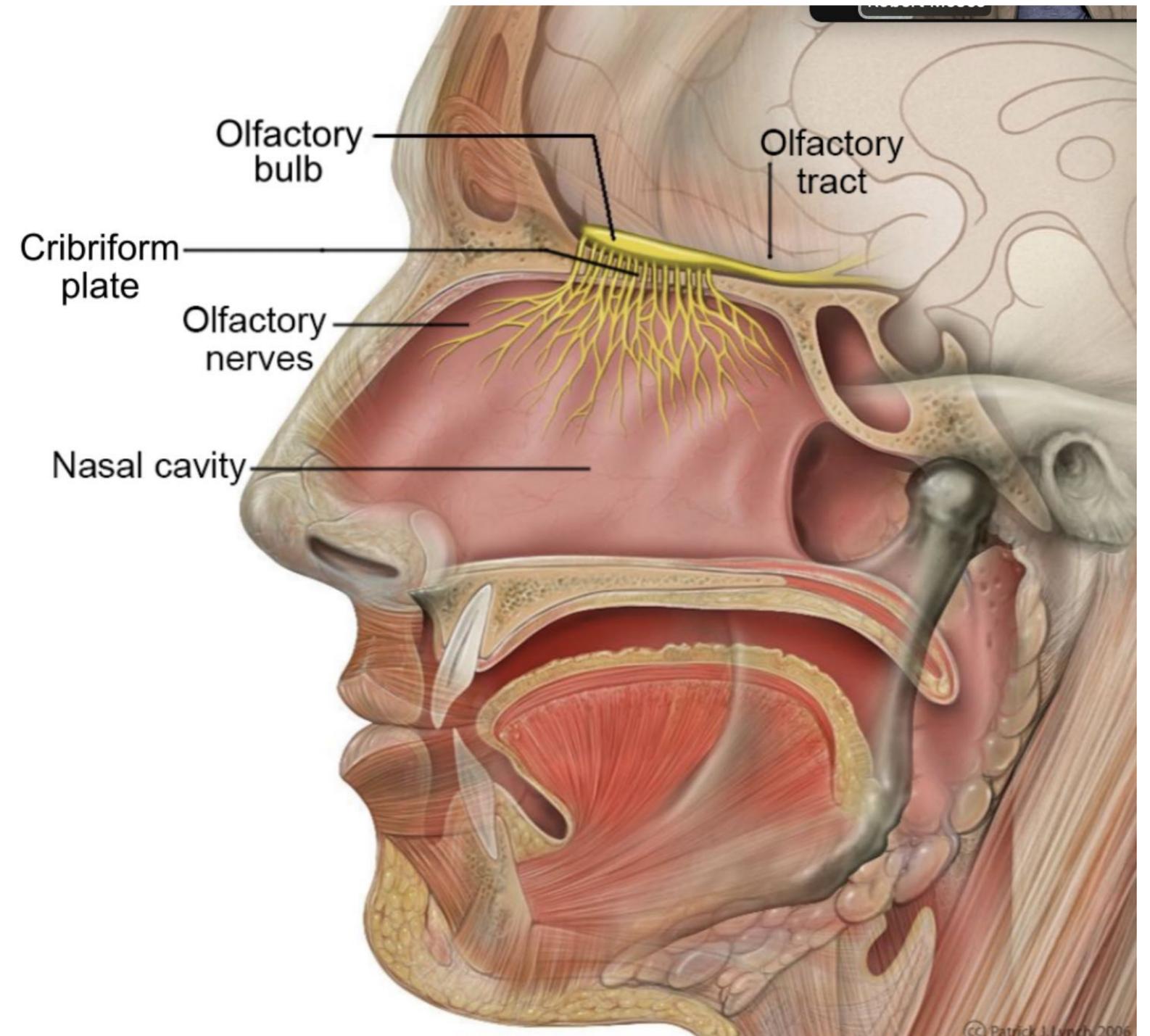


*Scanning electron microscope image of lung trachea epithelium.
(Charles Daghlian/ Wikimedia Commons)*

Anatomy of the Nose

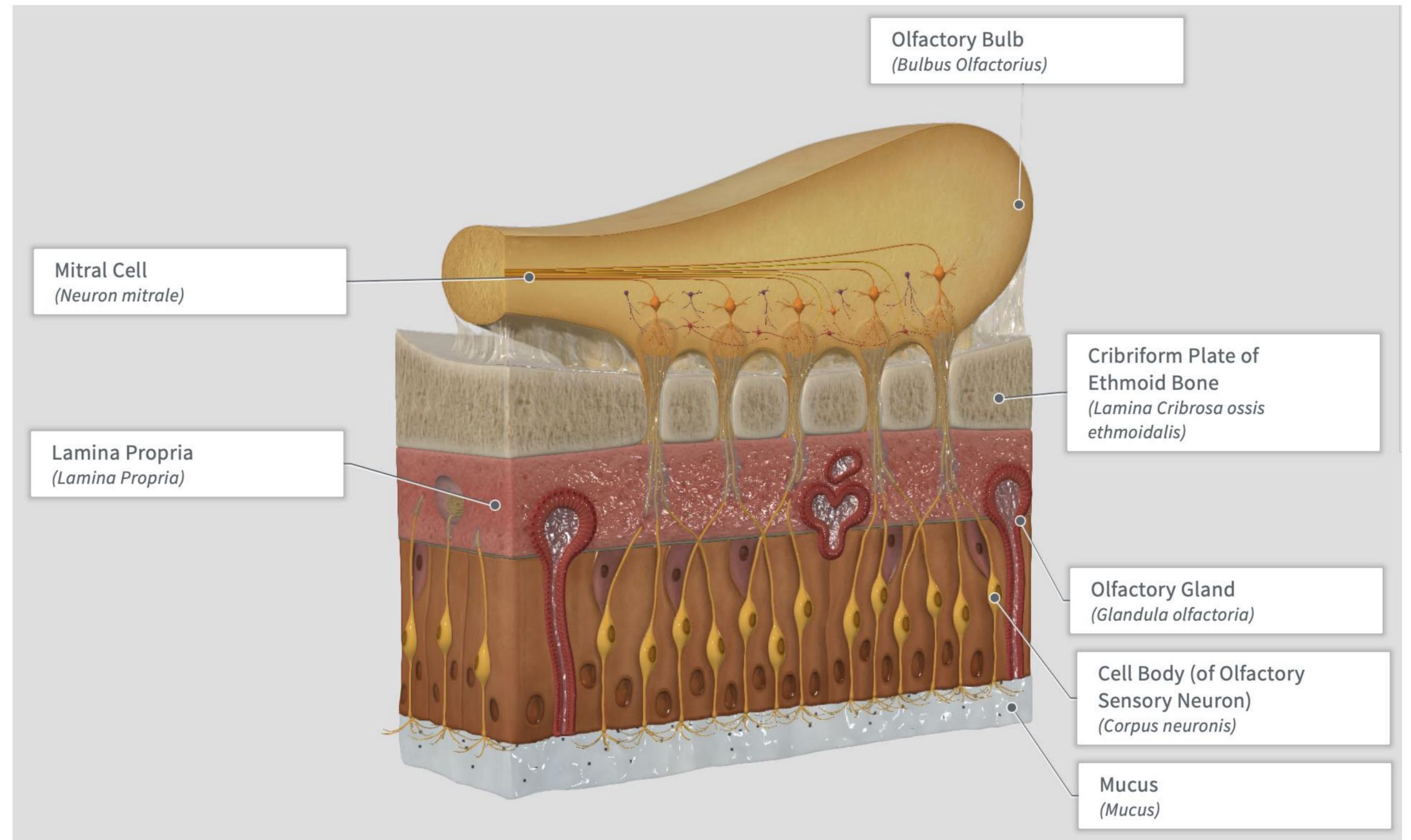
The nose has two nasal cavities, hollow spaces where air flows in and out. They are lined with mucous membranes

Olfactory nerve cells communicate with your brain to provide a sense of smell



Olfactory organ

Complete Anatomy
for 3D details.



Anatomy of the Nose

Nostrils (nares): These are the openings to the nasal cavities that are on the face

Septum: The septum is made of bone and firm cartilage. It runs down the center of your nose and separates the two nasal cavities, dividing the inside of the nose into two parts



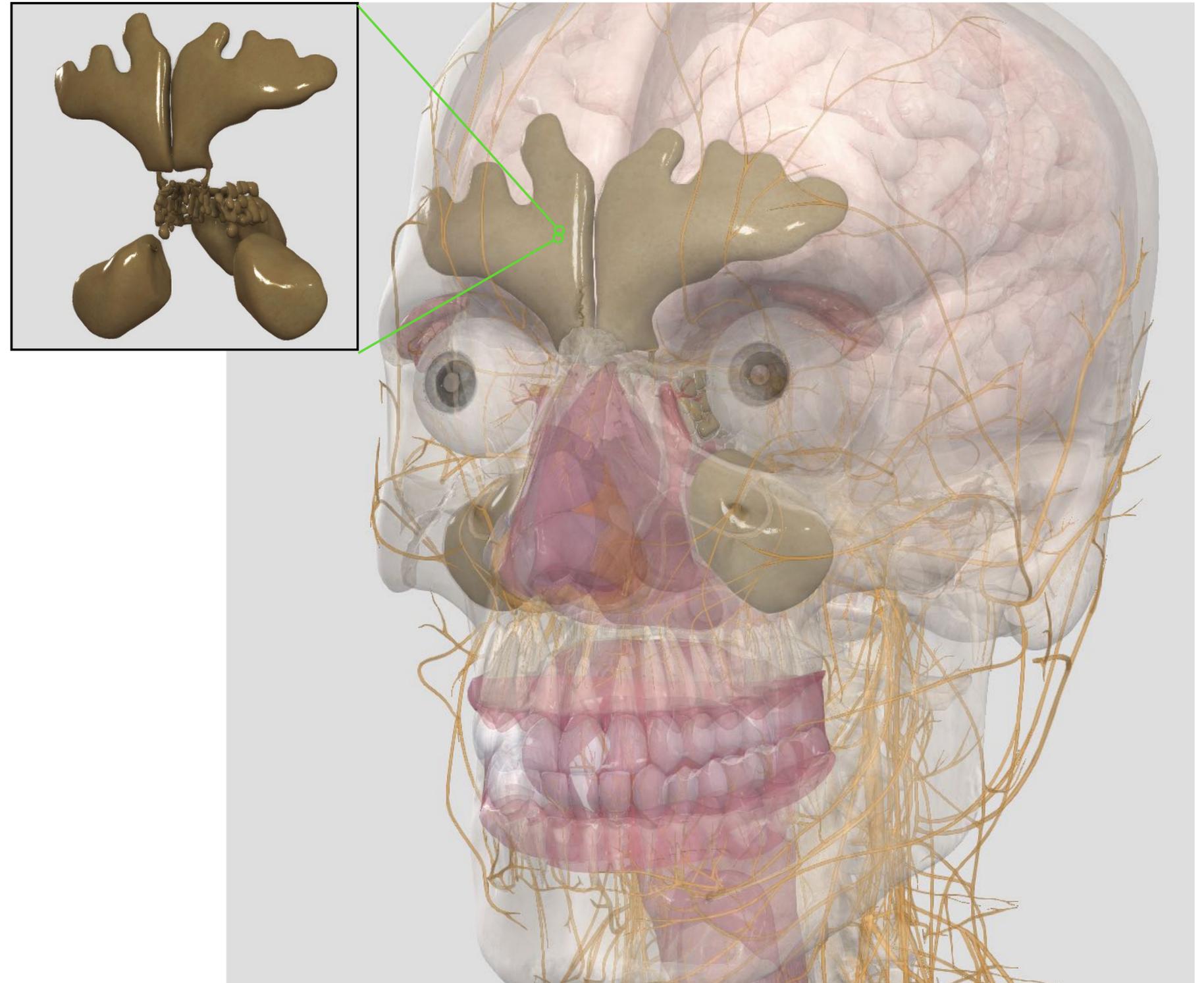
Anatomy of the Nose

Paranasal sinuses:

There are four pairs of sinuses

These are air-filled pockets in the skull connected to the nasal cavities

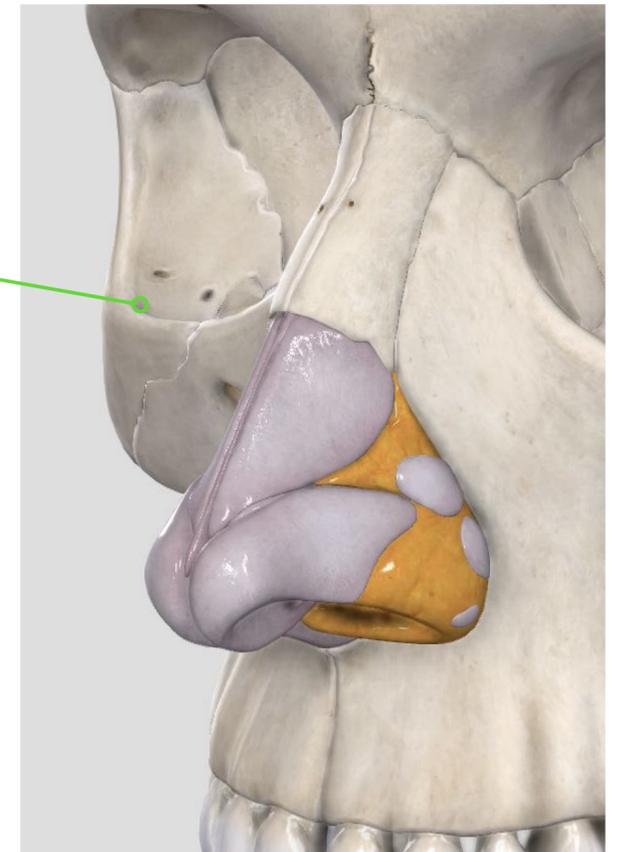
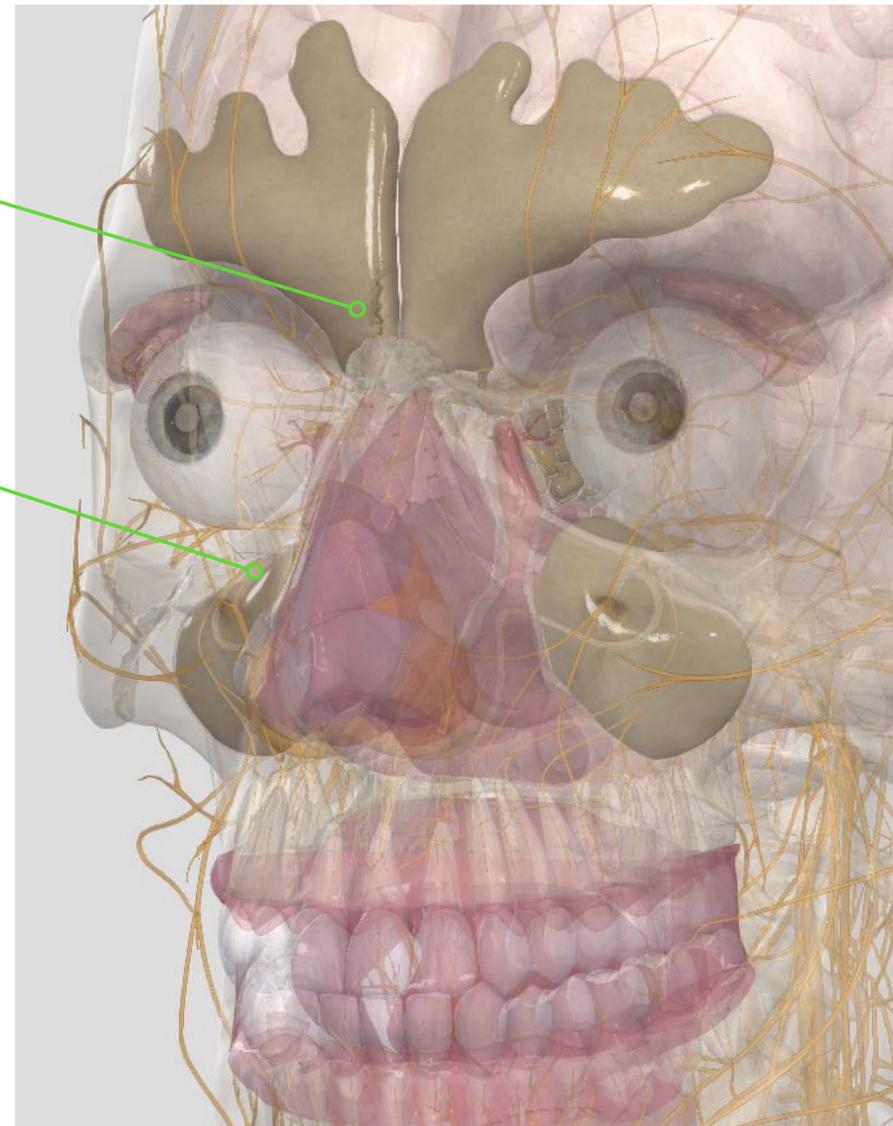
They produce the mucus that keeps your nose moist and play a part in vocalization



Speech and the nose

Nasal vowels and and consonants are created in the resonant chambers of the face

The paranasal sinuses act as amplifiers of sound that help us modify vocalization

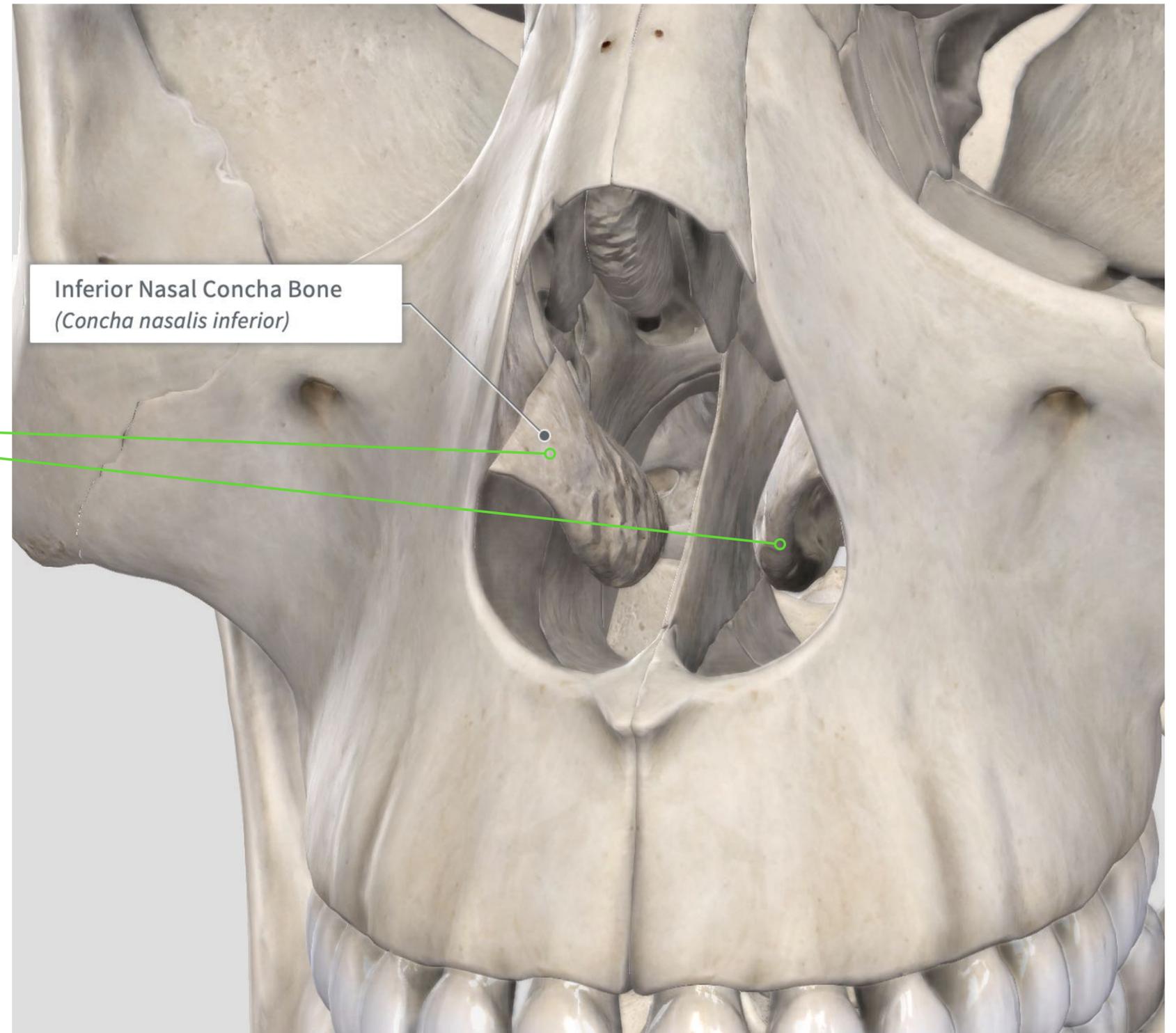


Turbinates (conchae)

Air filtration system

There are three pairs of turbinates located along the sides of both nasal cavities that direct air inwards in different ways

They help warm and moisten air and help with nasal drainage



Nasal Cycle

Nasal septum allows for the slowing down of inhaled air through the nasal cycle

Partial congestion or occlusion of one side of the nostril

Controlled by the hypothalamus

Ultradian rhythm, changes every 90 minutes to three hours

Reflects brain activity

Subject of the Siva Svarodaya

Related to brain hemispheric dominance



Nasal Cycle

Alternate nostril breathing balances and supports overall function of this ultradian rhythm much like regular sleep balances the circadian rhythm or sleep cycle

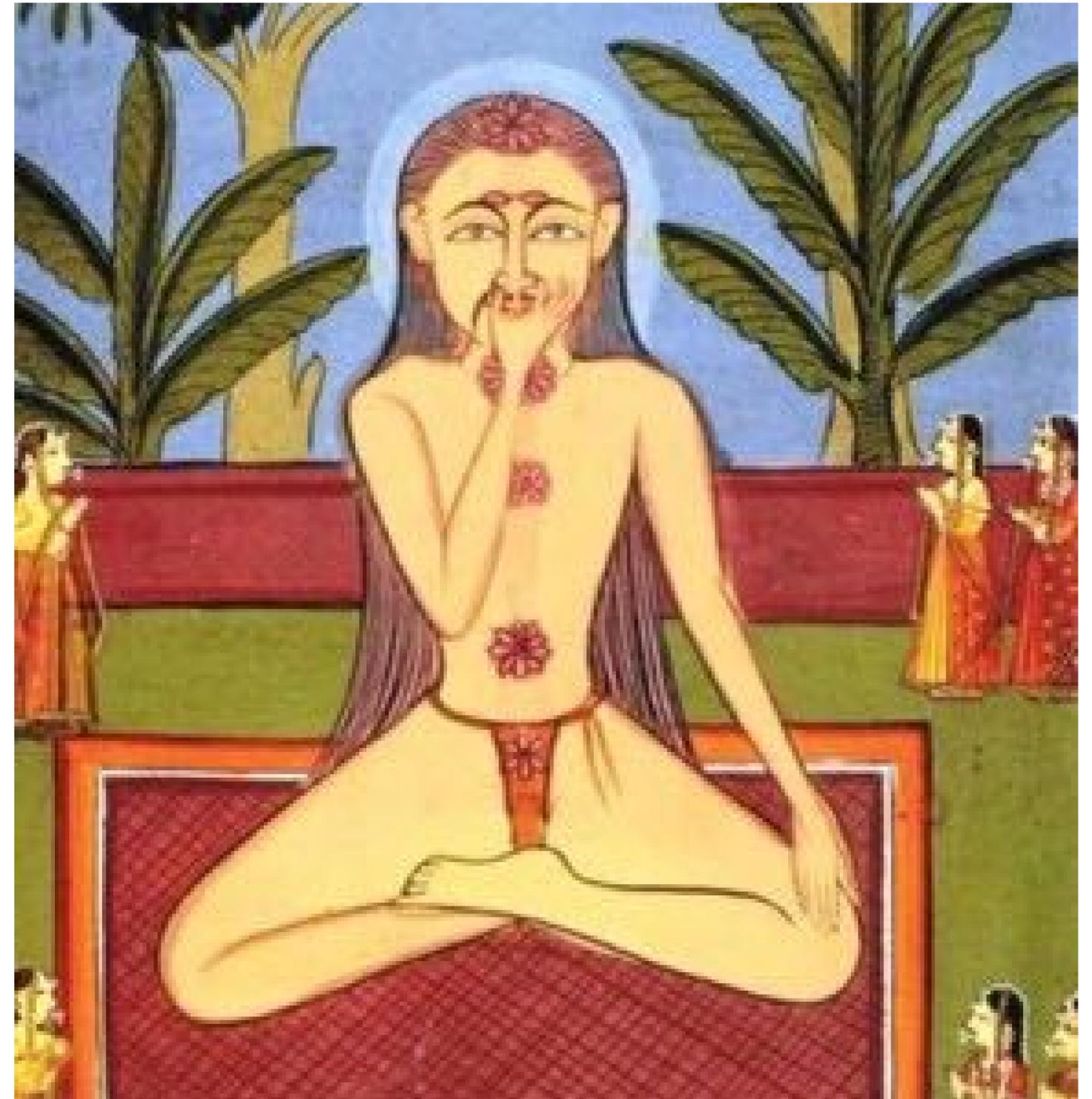
Reflects activity of the sympathetic and parasympathetic nerve endings in the nose

Sympathetic Nervous system causes vasoconstriction (obstruction) of the blood vessels in the nose

Parasympathetic Nervous system causes dilation (opens)

Related to HRV

Stress is reflected through changes in nasal dominance



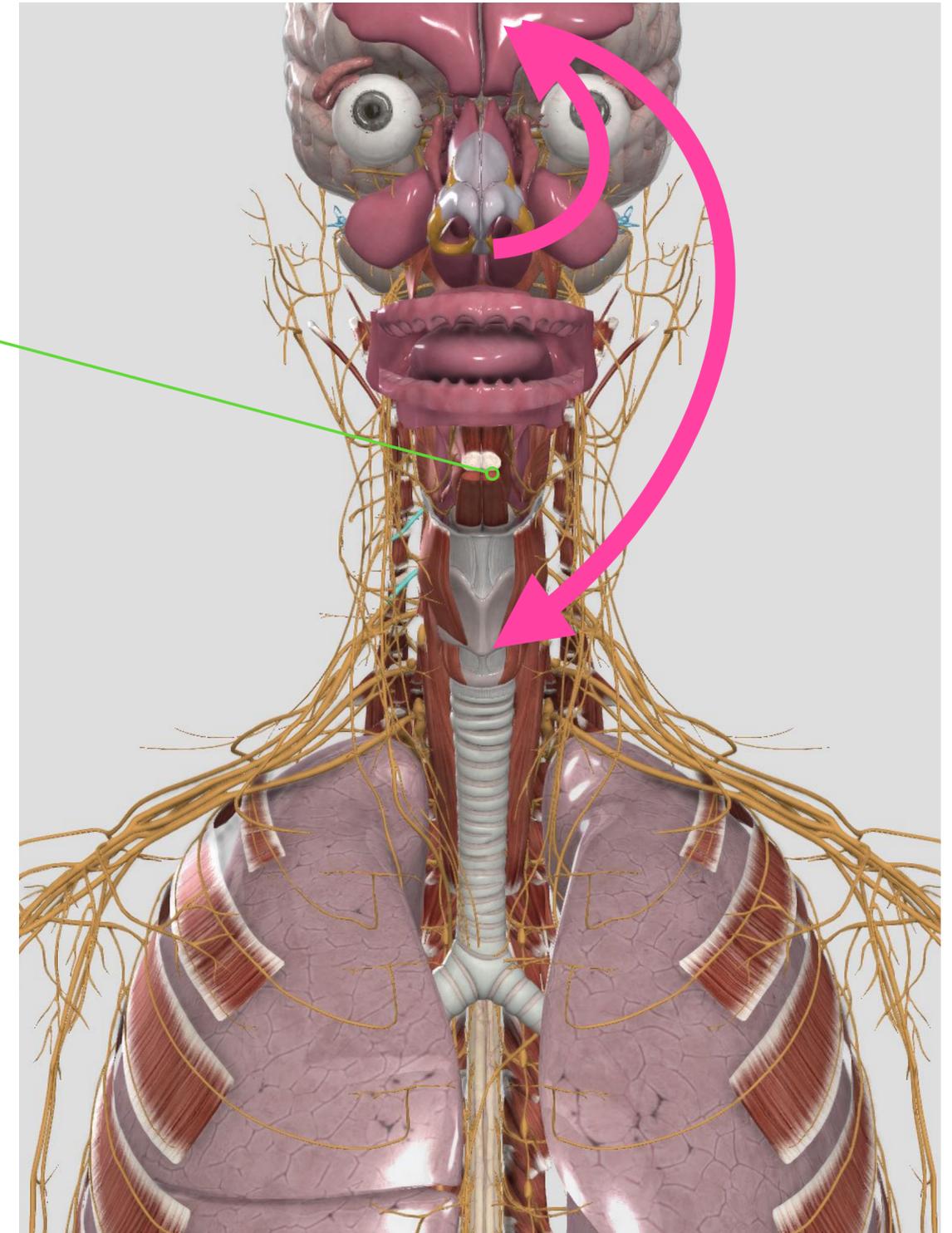
Smell

- Smell was our first sense to develop as single-celled organisms
- Scent is an important sense perception associated with memory and emotion
- Olfactory nerves grow directly out from the brain into the nostrils
- We have six to ten million sensory neurons carrying information to the olfactory bulb of the brain, which is then processed as smell
- The olfactory nerves are the first of the twelve cranial nerves
- Smell is a survival function. It can lead us to food, away from danger, towards a suitable mate, and anyway from decay or sickness



Respiratory rhythm - Olfactory receptors

- Olfactory receptors respond to smells and irritants and trigger defensive actions eg. broncho-constriction or coughing.

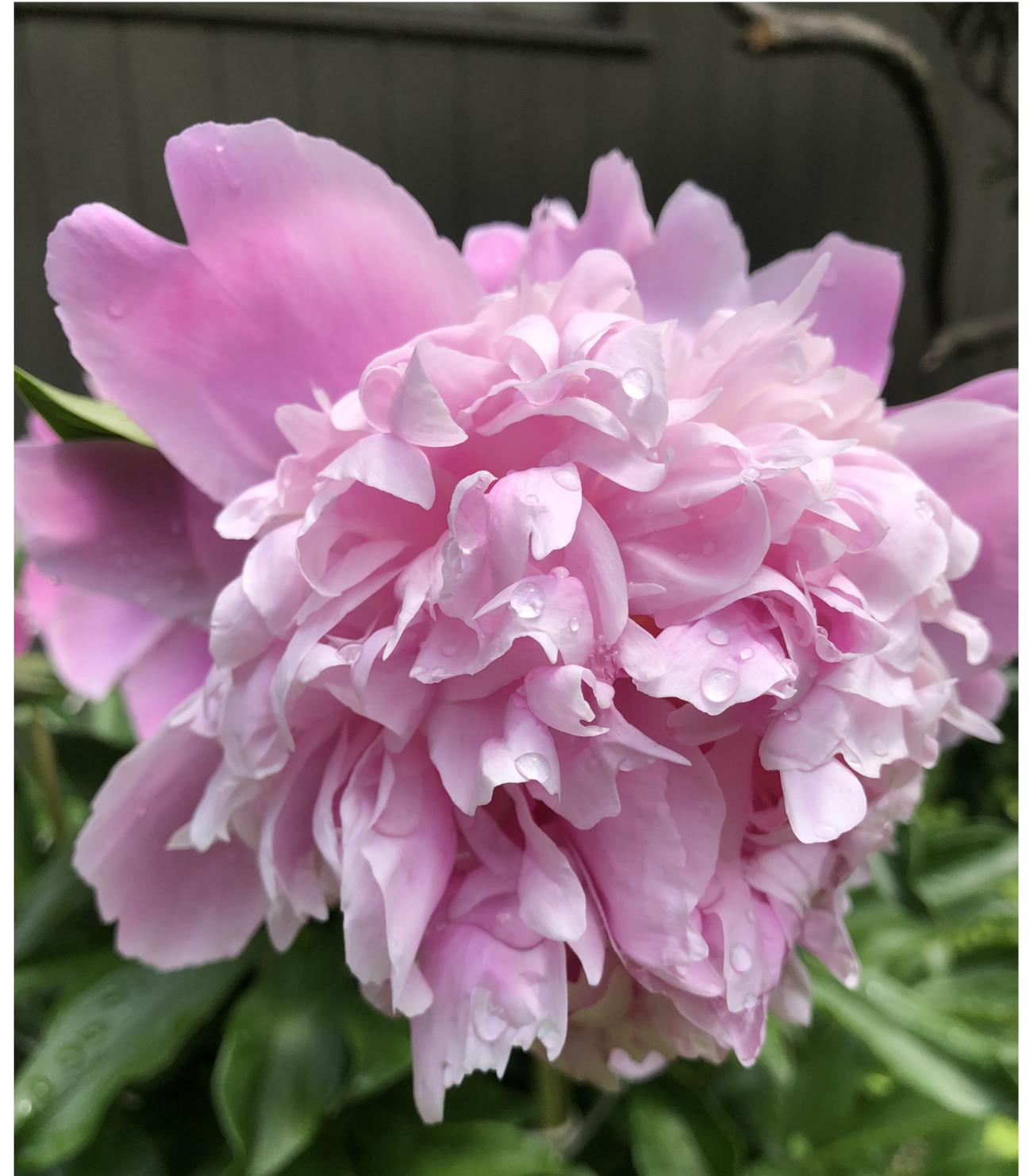


Smell

In the Yoga Sutras, meditation on the tip of the nose is said to bring divine or heavenly scents to the nose of the practitioner

Smell is associated with the consolidation of memory, primarily long-term memory, coming in through nasal respiration, moving into the olfactory bulb, and entering into our memory networks

Exercise: Rose breathing of Andre Van Lysbeth from *Pranayama, The Yoga of Breathing* — one of the essential publications on pranayama by a Westerner



A peony is not a rose but the smell is as divine

ॐ सर्वे भवन्तु सुखिनः
सर्वे सन्तु निरामयाः ।
सर्वे भद्राणि पश्यन्तु
मा कश्चिद्दुःखभाग्भवेत् ।
ॐ शान्तिः शान्तिः शान्तिः ॥

oṃ sarve bhavantu sukhinaḥ
sarve santu nirāmayāḥ
sarve bhadrāṇi paśyantu
mā kaścid duḥkha bhāgbhavet
oṃ śāntiḥ śāntiḥ śāntiḥ

May all be happy, may all be free from disease, may all see goodness,
may none suffer from sorrow.

ॐ असतो मा सद्गमय ।
तमसो मा ज्योतिर्गमय ।
मृत्योर्मा अमृतं गमय ।
ॐ शान्तिः शान्तिः शान्तिः ॥ हरिः ॐ तत्सत् ॥

asato mā sadgamaya
tamasomā jyotir gamaya
mrityormāamritam gamaya
Om śhānti śhānti śhāntiḥ harih om tat sat

Lead me from changing existence to unchanging being,
lead me from the darkness of tamas to the light of knowledge,
lead me from death to immortality. Harih om that is truth.