



UNIVERSITATEA
DE MEDICINĂ ȘI FARMACIE
„VICTOR BABEȘ” DIN TIMIȘOARA

LAURA OCTAVIA GRIGORIȚĂ
SORIN LUCIAN BOLINTINEANU
ALEXANDRA CORINA FAUR
ALINA MARIA ȘISU
LAURA ANDREEA GHENCIU
CODRUȚA ILEANA PETRESCU
IULIA CAMELIA CIOBANU
LOREDANA GABRIELA STANA

Human Anatomy - Sense Organs

2nd Edition, Revised and Expanded



Laura Octavia Grigoriță

Senior lecturer, MD, PhD,
Department of Anatomy and Embryology, Medicine
Victor Babeș University of Medicine and Pharmacy, Timisoara

Sorin Lucian Bolintineanu

Full Professor, MD, PhD, Habil.
Head of Department of Anatomy and Embryology, Medicine
Victor Babeș University of Medicine and Pharmacy, Timisoara

Alexandra Corina Faur

Full Professor, MD, PhD, Habil.
Department of Anatomy and Embryology, English Section, Medicine
Victor Babeș University of Medicine and Pharmacy, Timisoara

Alina Maria Șișu

Full Professor, MD, PhD, Habil.
Department of Anatomy and Embryology, English Section, Medicine
Victor Babeș University of Medicine and Pharmacy, Timisoara

Laura Andreea Ghenciu

Senior lecturer, MD, PhD,
Department of Functional Sciences, Medicine
Victor Babeș University of Medicine and Pharmacy, Timisoara

Codruța Ileana Petrescu

Assistant Professor, MD, PhD,
Department of Anatomy and Embryology, Medicine
Victor Babeș University of Medicine and Pharmacy, Timisoara

Iulia Camelia Ciobanu

Assistant Professor, MD, PhD,
Department of Anatomy and Embryology, Medicine
Victor Babeș University of Medicine and Pharmacy, Timisoara

Loredana Gabriela Stana

Assistant Professor, MD, PhD,
Department of Anatomy and Embryology, Medicine
Victor Babeș University of Medicine and Pharmacy, Timisoara

Editura „Victor Babeș”

Piața Eftimie Murgu nr. 2, cam. 316, 300041 Timișoara

Tel./Fax 0256 495 210

e-mail: evb@umft.ro

<https://www.umft.ro/ro/organizare-evb/>

Director: Prof. univ. dr. Sorin Ursoniu

Colecția: MANUALE

Coordonatori colecție: Prof. univ. dr. Codruța Șoica

Prof. univ. dr. Daniel Lighezan

Referent științific: Prof. univ. dr Liana Dehelean

Indicativ CNCIS: 324

© 2026

Toate drepturile asupra acestei ediții sunt rezervate.

Reproducerea parțială sau integrală a textului, pe orice suport, fără acordul scris al autorilor este interzisă și se va sancționa conform legilor în vigoare.

ISBN 978-606-786-574-5

Contents

I. ORGAN OF THE SIGHT/ THE EYE (<i>Organon Visus</i>) *	
L.A. Ghenciu, S.L. Bolintineanu	5
1. The fibrous tunic/layer (<i>Tunica fibrosa oculi</i>)	7
2. The vascular tunic (<i>Tunica vasculosa oculi</i>)	9
3. The retina (<i>Tunica interna</i>)	14
4. The refracting media	18
5. The accessory organs (<i>Organa oculi accessoria</i>)	20
II. ORGAN OF THE HEARING AND EQUILIBRIUM/THE EAR	
(<i>Organon Auditus</i>) * L.O. Grigoriță, I.C. Ciobanu	30
1. The external ear	30
2. The middle ear or tympanic cavity (<i>Cavum tympani</i>).....	37
3. The internal ear or the labyrinth (<i>Auris interna</i>)	50
III. ORGAN OF THE TASTE (<i>Organon gustus</i>) *	
L.O. Grigoriță	63
IV. THE ORGAN OF THE SMELL/THE NOSE (<i>Organon</i>	
<i>olfactorius</i>) * L.G. Stana	68
1. The external nose (<i>Nasus externus</i>)	68
2. The Nasal Cavity (<i>Cavum nasi</i>).....	72
3. The olfactory nerve.....	80
V. THE COMMON INTEGUMENT/ THE SKIN (<i>Integumentum</i>	
<i>Commune</i>) * A.C. Faur.....	100
VI. THE CRANIAL NERVES * A.M. Șișu	111
VII. <i>NOMINA ANATOMICA</i> TRANSLATED INTO ENGLISH *	
A.M. Șișu, C.I. Petrescu.....	115
VIII. REFERENCES.....	129

I. ORGAN OF THE SIGHT/ THE EYE (*Organon Visus*) *

L.A. Ghenciu, S.L. Bolintineanu

The eyeball (*bulbus oculi*), or organ of sight, is lodged in the orbital cavity.

Accessory structures of the eyeball consist of:

- muscles,
- fasciæ,
- eyebrows,
- eyelids,
- conjunctiva,
- lacrimal apparatus.

The eyeball is protected by the fat of the orbit, being separated from it by the *fascia bulbi*, which is a membranous sac.

The eyeball consists of:

- a. The anterior is transparent, and is one-sixth of the bulb.
- b. The posterior segment, opaque, is five-sixths of the bulb.

The anterior pole is situated on the anterior curve, the posterior pole on the posterior curve.

- A line that unites the two poles forms the optic axis.
- The axes of the two eyes are not parallel.
- They do not correspond to the axes of the orbital cavities.

The optic nerves (CNII, or second cranial nerves) are running toward the axes of the orbits.

The antero-posterior diameter is 24 mm, the vertical diameter 23.5 mm.

The layers of the eyeball

From external to internal there are three layers:

I. A conjunctive layer, consisting of the sclera posterior and the cornea anterior;

II. A vascular pigmented layer, formed of the choroid, ciliary body, and iris;

III. A nervous layer, the retina.

1. The fibrous tunic/layer (*Tunica fibrosa oculi*)

- The sclera and cornea form the fibrous layer of the eyeball.
- The sclera is opaque, forming the posterior 5/6th of the layer.
- The cornea is transparent, forming the anterior 1/6th.

The sclera

- The sclera is very dense and hard. It maintains the form of the eyeball.
- It is thicker posteriorly than anteriorly.
- Its external surface is white, opaque.
- Its anterior part is covered by the conjunctive membrane.
- Its internal surface is brown. It contains grooves, in which the ciliary nerves and vessels exist.
- Posteriorly it is pierced by the optic nerve.
- The optic nerve passes through the sclera.
- This area is called the *lamina cribrosa scleræ*.
- One of the orifices, the largest, is located in the center of the lamina.
- Through this are transmitted the central artery and vein of the retina.

- The ciliary vessels and nerves are also passing through these.
- There are four orifices for the transmission of tortuous veins (*venæ vorticosæ*).
- Anteriorly, the sclera is directly continuous with the cornea.
- This unit is called the sclero-corneal junction.

The cornea

- The cornea is the transparent part of the external layer.
- It forms the anterior 1/6th of the surface of the eyeball.
- It is convex anteriorly, being dense and thick.
- The cornea is formed of four layers:

1. corneal epithelium, continuous with that of the conjunctiva;

2. *substantia propria*

3. posterior elastic lamina (*lamina elastica posterior*; membrane of Descemet;

4. endothelium of the anterior chamber.

- The cornea is not vascularized.
- The capillary vessels are branches of anterior ciliary arteries.
- The nerves are branches from the ciliary nerves.

2. *The vascular tunic (Tunica vasculosa oculi)*

The vascular tunic of the eye is formed from posterior to anterior by the:

- choroid,
 - ciliary body,
 - iris.
- The choroid forms the posterior 5/6th of the eyeball.
 - The ciliary body connects the choroid to the iris.
 - The iris is a circular diaphragm posterior to cornea.
 - It presents in the center an aperture, the pupil.

The choroid (*Chorioidea*)

- The choroid is a thin, vascularized membrane.
- It has got a dark brown colour.
- It forms the posterior 5/6th eyeball.
- It is travelled by the optic nerve.
- It is thicker posterior than anterior.
- Its external surface is closely situated to the sclera.
- Its internal surface is attached to the pigmented layer of the retina.

- The choroid consists of small arteries and veins.
- The choroid proper consists of two rows of cells: external and internal.
 - The external layer (*lamina vasculosa*) consists, of the short ciliary arteries which run anteriorly between the veins.
 - Then, they are ending in the capillaries.
 - Is formed of veins, and they are named *venæ vorticosæ*.
 - The internal layer (*Lamina choriocapillaris*) consists of fine capillary plexuses.



Figure 1: A sagittal section of eyeball. The retina and its vessels can be seen, also the choroid layer.

The ciliary body (*Corpus ciliare*)

The ciliary body is formed of the followings:

- *orbiculus ciliaris*,
 - ciliary processes,
 - *ciliaris muscle*.
- The ciliary processes (*Processus ciliares*) are formed by the choroid, the choroid proper and the *lamina basalis*.
 - The process is called the folding.
 - They are arranged in a circle.
 - They are attached by their periphery to the ridges of the *orbiculus ciliaris*.
 - Their posterior surfaces are in connection with the suspensory ligament of the lens.
 - The ciliary muscle (*M. ciliaris*) consists of smooth fibers.
 - The ciliary muscle is the main agent in accommodation, in adjusting the eyeball to the vision of objects situated closely.

The iris

- The iris is a circular, contractile disk, suspended in the aqueous humor.
- It is located in between cornea and lens.

- It is pierced in the middle by a round aperture, the pupil.
- Its lateral part is continuous with the ciliary body.
- The iris separates the space between the lens and the cornea into an anterior and a posterior subspaces.
- They are called chambers.
- The anterior chamber of the eyeball is limited anteriorly by the posterior surface of the cornea.
- It is limited posteriorly by the anterior surface of the iris and the central part of the lens.
- The posterior chamber is smaller than the anterior.
- It has limits the peripheral part of the iris, and anterior to the suspensory ligament of the lens, the ciliary processes.

The iris is formed of:

- Anterior is a layer of endothelial cells situated on a hyaline basal membrane.
- The stroma of the iris consists of fibers and cells.
- The muscular fibers are not voluntary commanded.
- They are circular and radiate fibers.
- The circular fibers enter into the *Sphincter pupillæ muscle*.

- The radiate fibers form the *Dilatator pupillæ* muscle.
- The arteries to vascularize the iris are arteries of the long and anterior ciliary arteries.
- The nerves for the choroid and iris innervation are the long and short ciliary.
- The short ones are branches of the nasociliary nerve.
- Others come from the motor root of the ciliary ganglion (the oculomotor nerve).



Figure 2: The eyeball layers

3. *The retina (Tunica interna)*

- The retina is a nervous membrane.
- Its role is of capturing the images of objects.
- Its external surface is in relations with the choroid.
- Its internal surface is in relation with the hyaloid membrane of the vitreous body.
- It is continuous posteriorly with the optic nerve.
- It decreases in thickness from back to front, until the ciliary body.
- It finishes into the *ora serrata*.
- The retina is not completely transparent. It has got a brown aspect, due to a pigment, rhodopsin.
- It becomes opaque exposing to sunlight.
- In the middle part of the retina there is a point in which the sense of vision is perfect, a yellowish area, the *macula lutea*.
- In the *macula lutea* there is a depression, the *fovea centralis*.
- At the *fovea centralis* level the retina has a dark color.
- At the nasal area of the *macula lutea* is the orifice of the optic nerve (optic disk).

- The central retinal artery enters the center of the optic disk.
- This is the part of the retina not sensitive to light, the blind spot.



Figure 3: The optic nerve and the vessels of the eyeball

- The retina is formed of an external pigmented layer and an internal nervous layer or the retina proper.



Figure 4: The refracting media and the retina, the nervous layer of the eyeball

The Retina proper

The elements of the retina proper are disposed in the layers as follows:

- *Stratum opticum.*
- Ganglionic layer.
- Internal plexiform layer.
- Internal nuclear granular layer.
- External plexiform layer.
- External nuclear granular layer.

- Layer of rods and cones.

1. The *stratum opticum* represents the layer of nerve fibers.

It consists of fibers of the optic nerve.

2. The ganglionic layer consists of a *stratum* of ganglion cells.

Macula lutea is an exception.

3. The internal plexiform layer is formed by dendrites of the ganglion cells.

4. The internal nuclear granular layer.

5. The bipolar cells.

They are divided into rod bipolars and cone bipolars.

6. The layer of rods and cones

The structures forming the layer are of two kinds, rods and cones.

The cones are conical-shaped.

They are closely related to *membrana limitans externa*.

Macula lutea and *fovea centralis*

- In the *macula lutea* there are no rods.
- There are only cones.
- In the *fovea centralis* are present only the cones.

- The (the central artery of the retina) *arteria centralis retinæ* and its vein enter the optic nerve and the eyeball through the *porus opticus* /the optic pore.
- The artery splits into a superior and an inferior branch.
- At their turn, each artery consists of a medial or nasal and a lateral or temporal artery.
- The *macula lutea* is vascularized by two branches (superior and inferior macular arteries), coming from the temporal branches and from the central artery.
- The *fovea centralis* has got no blood vessels.

4. The refracting media

The refracting media:

- Aqueous humor
- Vitreous body
- Crystalline lens.

The aqueous humor (*Humor aqueus*)

The anterior and posterior chambers of the eyeball are filled with aqueous humor.

It has got watery consistency.

The vitreous body (*Corpus vitreum*)

- The vitreous body forms 4/5th of the eyeball.
- It is transparent and is composed of an albuminous fluid wrapped into the hyaloid membrane.
- In its center there is a canal, the hyaloid canal, containing lymph.
- The hyaloid membrane envelops the vitreous body.
- The portion anterior to the *ora serrata* has got radial fibers, forming the *zonula ciliaris* (zonule of Zinn).
- The *zonula ciliaris* divides into two layers, one that lines the hyaloid fossa, and the other, called the suspensory ligament of the lens is attached to the capsule of the lens.

The crystalline lens (*Lens crystallina*)

- The crystalline lens is situated posterior to the iris and anterior of the vitreous body.
- The capsule of the lens (*Capsula lentis*) is transparent.
- It is elastic and is situated in the hyaloid fossa in the anterior part of the vitreous body.
- It comes in relation anteriorly with the free border of the iris.

- It forms the posterior chamber of the eye.
- The lens is a transparent, biconvex structure.
- It consists of two prominences, the anterior and posterior poles.
- A line in between the poles is called the equator.
- In the adult, the lens is transparent and without vessels.
- The arteries of the eyeball are the long, short, and anterior ciliary arteries, and the central artery of retina.
- The ciliary veins are located on the choroid, called the *venæ vorticosæ*.
- All veins are tributaries to the ophthalmic veins.
- The ciliary nerves come from the nasociliary nerve and ciliary ganglion.

5. *The accessory organs (Organa oculi accessoria)*

The accessory organs of the eyeball are:

- the ocular muscles,
- the *fasciæ*,
- the eyebrows,
- the eyelids,
- the conjunctiva,
- the lacrimal apparatus.

The muscles of the eyeball (*Musculi oculi*)

The ocular muscles are the:

- *M. Levator palpebræ superioris*
- *M. Rectus superior*
- *M. Rectus inferior*
- *M. Rectus medialis.*
- *M. Rectus lateralis.*
- *M. Obliquus superior.*
- *M. Obliquus inferior*
- The *Levator palpebræ superioris* muscle:
 - It has origin on the inferior surface of the small wing of the sphenoid, superior and anterior to the optic foramen.
 - At its origin ends anteriorly in a broad aponeurosis, dividing into three *lamellæ*.
 - The four *Recti* muscles have origin from a fibrous ring (*Annulus tendineus communis*).

The parts of this fibrous ring are:

- the ligament of Zinn, for attachment of the *Rectus inferior*, the *Rectus internus*, and the *Rectus lateralis*;
- A part serving for the attachment of the *Rectus superior*, the *Rectus medialis*, and the *Rectus lateralis*.

- The two fascicles of the *Rectus lateralis* give passage to the oculomotor nerve, the nasociliary nerve, the abducent nerve, and the ophthalmic vein.

These muscles have the same origin, into the sclera.

- The *Obliquus oculi superior* is a muscle situated at the superior and medial side of the orbit.
- It has origin above the optic foramen, superior and medial to the origin of the Rectus superior muscle.
- The tendon is inserted into the sclera, between the *Rectus superior* and *Rectus lateralis* muscles.

The *Obliquus oculi inferior* is a muscle located close to the floor of the orbital cavity.

- It has origin from the orbital surface of the maxilla.
- It is inserted on the sclera, between the *Rectus superior* and *Rectus lateralis* muscles.



Figure 5: The extraocular muscles. In white, the sclera layer and optic nerve.

- The *Levator palpebrae superioris*, *Obliquus inferior*, and the *Recti superior*, *inferior*, and *medialis* are supplied by the oculomotor nerve.
- The *Obliquus superior* is supplied by the trochlear nerve.
- The *Rectus lateralis* is innervated by the abducent /abducens nerve.
- The *Levator palpebrae* lifts the superior eyelid, being the antagonist of the *Orbicularis oculi* muscle.

- The four *Recti* muscles are attached to the eyeball in a way that, acting singly, they will turn its anterior surface either superior, inferior, medially, or laterally.
- The contraction of the *Rectus lateralis* or *Rectus medialis* produces only a horizontal move.

The *fascia bulbi* (Capsule of Tenon) is a layer which envelops the eyeball.

- The fascia is travelled from posterior by the ciliary vessels and nerves.
- Anteriorly, it blends with the ocular conjunctiva, being attached to the ciliary region.
- There is a thickness in the inferior part of the *fascia bulbi*, the suspensory ligament of the eye.
- The eyebrows (*Supercilia*) are two arched eminences of the skin, which surmount the superior circumference of the orbits.
- The eyebrows consist of thickened skin, connected with the *Orbicularis oculi*, *Corrugator*, and *Frontalis* muscles.



Figure 6: Orbicularis oculi muscle and the palpebral rim

- The eyelids (*Palpebræ*) are two thin, movable folds, placed anterior to the eye.
- They have a protective role.
- The superior eyelid is the larger, and the more movable.
- It has got an elevator muscle, the *Levator palpebræ superioris*.
- When the eyelids are open, there is present a space, the palpebral fissure (*Rima palpebrarum*).
- When the superior and inferior eyelids come in contact a palpebral commissures (*canthi*) is formed.

- The lateral palpebral commissure (*Commissura palpebrarum lateralis*)
- The medial palpebral commissure (*Commissura palpebrarum medialis*)
- At the base of *lacus lacrimalis*, there is a small elevation, the lacrimal papilla.
- Its tip is perforated by a small orifice, the *punctum lacrimale*.
- From it starts the *ductus lacrimalis*.
- The eyelashes (*Cilia*) are attached to the free borders of the eyelids.
- They are short, thick, curved hairs.
- The *tarsi* (tarsal plates) are two thin, elongated plates.
- The superior *tarsus* (*Tarsus superior*), has a semilunar form.
- It has the attachment of the *Levator palpebræ superioris* muscle.
- The inferior tarsus (*Tarsus inferior*), is ellipsoidal in form.
- The orbital septum (*Septum orbitale*) is a membranous layer, attached to the border of the orbit.

The tarsal glands (*Glandulæ tarsals*)

- The tarsal glands are situated superior to the internal surfaces of the eyelids, between the tarsi and conjunctiva.
- The tarsal glands are modified sebaceous glands.
- The conjunctiva is the mucous layer of the eyeball.
- It lines the internal aspect of the eyelids.
- The palpebral portion (*Tunica conjunctiva palpebrarum*) is opaque and vascularized.
- The bulbar portion (*Tunica conjunctiva bulbi*)
- Superior to the *sclera* the conjunctiva is loosely attached to the eyeball. It is thin, transparent and poorly vascular.
- The *caruncula lacrimalis* is a small structure, into the medial palpebral commissure.

The lacrimal apparatus (*Apparatus lacrimalis*) consists of:

- the lacrimal gland produce the tears.

Through the excretory ducts these convey the tears to the surface of the eye.

- the lacrimal ducts,
- the lacrimal sac,
- the nasolacrimal duct.

It conveys them into the nasal cavity.

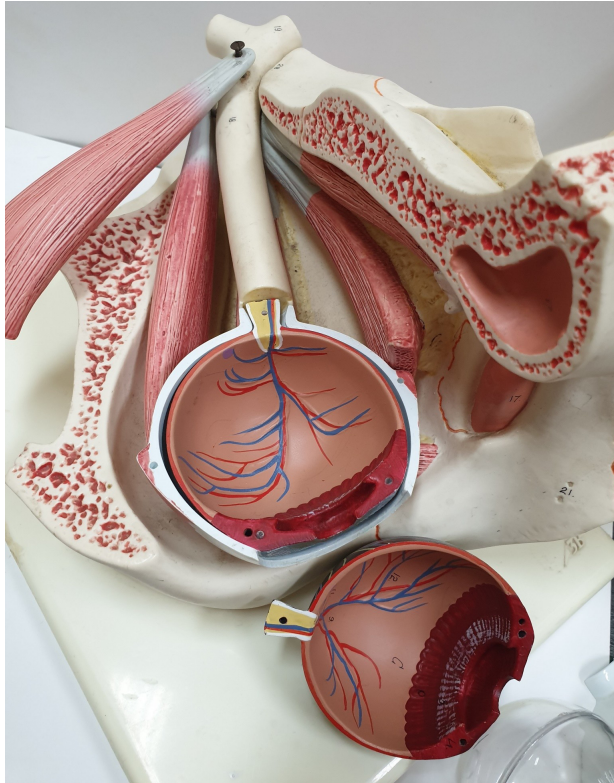


Figure 7: The orbital cavity. Are present the layers of the eyeball, the optic nerve and the extraocular muscles.

➤ The lacrimal gland (*Glandula lacrimalis*)

The lacrimal gland is located into the lacrimal fossa.

It is situated on the medial side of the zygomatic process (frontal bone).

➤ The lacrimal ducts (*Ductus lacrimalis*)

The lacrimal ducts start at small orifices, *puncta lacrimalia*, on the tips of the *papillæ lacrimales*.

There are a superior duct and an inferior duct.

➤ The lacrimal sac (*Saccus lacrimalis*)

The lacrimal sac is the superior enlarged part of the nasolacrimal duct.

Its inferior part is continued with nasolacrimal duct.

➤ The nasolacrimal duct (*Ductus nasolacrimalis*)

The nasolacrimal duct is ending by an orifice that has got *plica lacrimalis*.

II. ORGAN OF THE HEARING AND EQUILIBRIUM/THE EAR (*Organon Auditus*) L.O. Grigoriță, I.C. Ciobanu

The ear or organ of hearing is divided into three parts:

1. the external ear,
2. the middle ear or tympanic cavity,
3. the internal ear or labyrinth.

1. The external ear



Figure 8: The skull, norma lateralis, showing 1, the external acoustic meatus.

- The external ear has got a part named the *auricula* or *pinna*, and the external acoustic meatus.
- *Pinna* collects the vibrations of the air.
- The external acoustic meatus transmits the vibrations to the tympanic cavity.

The *auricula* or *pinna*

- It has an ovoid form, its larger end superiorly.
- Its lateral surface is irregular and concave, presenting eminences and depressions.
- The elevation part of the *auricula* is named the helix.
- It presents a small tubercle, the auricular tubercle of Darwin.
- Parallel with the helix there is the antihelix.
- In between there is a triangular depression, *fossa triangularis*.
- The depression in between the helix and the antihelix is called the *scapha*.
- The antihelix forms a curvature around a cavity, the concha.
- Anterior to concha is an eminence, the tragus.

- Opposite the tragus is a tubercle, the antitragus. In between there is the intertragus notch.
- The ligaments of the *auricula* (*Ligamenti auricularia*) consist of two types: extrinsic, and intrinsic.



Figure 9: The external ear, the *Pinna*/the auricle. 1. External acoustic meatus, 2. Helix, 3. Antihelix, 4. Antitragus, 5. Lobule.

The muscles of the auricula consist of:

- The extrinsic, which connect it with the skull and scalp and move the *auricula*,
- the intrinsic, which link parts of the auricle.

The extrinsic muscles are:

- The *auricularis anterior (Attrahens aurem)*, is having origin from the *galea aponeurotica*.

Its fibers go to be inserted anterior to the helix.

- The *auricularis superior (Attolens aurem)*, is having origin from the *galea aponeurotica*.

It is inserted into the *auricula*.

- The *auricularis posterior (Retrahens aurem)* is having origin onto the mastoid portion of the temporal bone.

It is inserted into the inferior part of the concha.

These muscles are not acting too much:

The *auricularis anterior* draws the auricula anterior and superior.

The *auricularis superior* raises *auricula*.

The *auricularis posterior* draws auricula posteriorly.

The intrinsic muscles are the:

- *Helicis major*
- *Helicis minor*.
- *Tragicus*.
- *Antitragicus*.
- *Transversus auriculæ*
- *Obliquus auriculæ*

The *Helicis major* is situated onto the anterior part of the helix.

It has origin onto the *spina helicis*.

It is inserted onto the helix.

- The *Helicis minor* is an oblique muscle that covers the *crus helicis*.
- The *Tragicus* is situated on the lateral surface of the *tragus*.
- The *Antitragicus* has origin from the external part of the *antitragus*. It has got insertion both, on *cauda helicis* and antihelix.
- The *Transversus auriculæ* extends from the *eminentia conchæ* to the *scapha*.
- The *Obliquus auriculæ* extends from the superior and posterior part of the *concha* to the part superior to it.

- The *auriculares anterior* and *superior* and the intrinsic muscles innervation: the temporal branch of the facial nerve.
- The *auricularis posterior* and the intrinsic muscles innervation: the posterior auricular branch of the facial nerve.

The arteries of the *auricula* are:

- the posterior auricular artery , (external carotid artery),
- the anterior auricular artery, (superficial temporal artery),
- an artery from the occipital artery.

The veins accompany the corresponding arteries.

The sensory nerves are:

- the greater auricular nerve(from the cervical plexus);
- the auricular branch (from the vagus nerve);
- the auriculotemporal (from the mandibular nerve);
- the lesser occipital nerve (from the cervical plexus).

The external acoustic meatus (*Meatus acusticus externus*)

- It extends from the concha until the tympanic membrane.
- It is directed internal, anterior, and superior (*Pars externa*).
- It passes internal and posterior (*Pars media*), and internal, anterior and inferior (*Pars interna*).
- The tympanic membrane closes the internal end of the meatus and has an oblique direction.
- The external acoustic meatus is formed by cartilage, membrane, and bone.

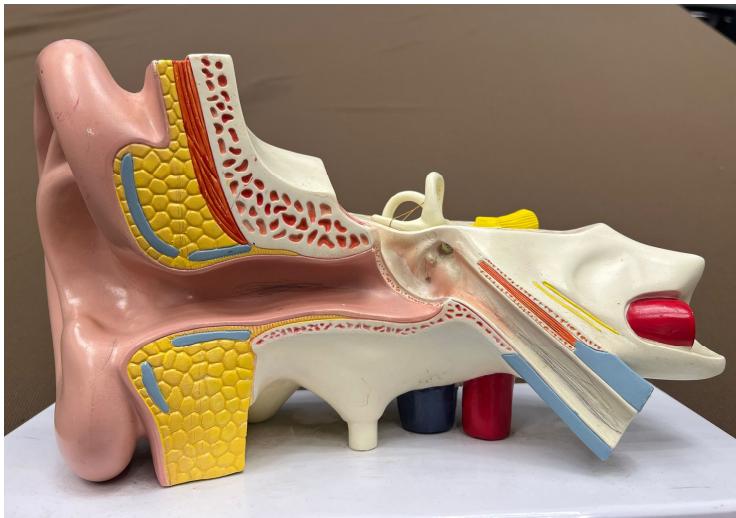


Figure 10: Section through the petrous part of temporal bone. External acoustic meatus, middle ear and pharyngotympanic tube are present.

- The cartilaginous portion (*Meatus acusticus externus cartilagineus*) is continuous with the cartilage of the *auricular*.
- The osseous portion (*Meatus acusticus externus osseus*) is presenting the *tympanic sulcus*.
- This gives attachment to the tympanic membrane.
- The arteries vascularizing the meatus are branches from the posterior auricular artery, internal maxillary artery, and temporal artery.
- The nerves are: the auriculotemporal nerve, (mandibular nerve) and the auricular branch (vagus nerve).

2. *The middle ear or tympanic cavity (Cavum tympani)*

- The middle ear or tympanic cavity is an irregular space located into the temporal bone.
- It contains air, conveyed from the nasopharynx into the auditory tube.
- It contains a chain of movable bones.
- They convey the vibrations reached to the tympanic membrane to the internal ear.

The tympanic cavity consists of two parts:

- tympanic cavity proper,

- attic or epitympanic recess.
- The tympanic cavity is limited laterally by the tympanic membrane.
- Medially it is bordered by the lateral wall of the internal ear.
- Posterior to it there is the tympanic *antrum*.
- It contains the mastoid air cells.



Figure 11: The ossicles of the middle ear, semicircular canals, cochlea, and CNVIII.

- The tegmental wall or roof is formed by a bony plate, the *tegmen tympani*. It separates the cranial and tympanic cavities.
- It is situated in the petrous portion of the temporal bone.
- Anteriorly it covered by the *Tensor tympani* muscle.

- The jugular wall/floor consists of a bony plate that limits it from the jugular fossa.
- Near the labyrinthic wall there is a small aperture for the passage of the tympanic nerve (glossopharyngeal nerve).
- The membranous or lateral wall is formed by the tympanic membrane.
- Through this wall the *chorda tympani* nerve enters the cavity.
- The petrotympanic fissure is called the *Glaserian*.
- The fissure opens superior and inferior of bone into which is inserted the tympanic membrane.
- The anterior tympanic (the internal maxillary artery) travels it.
- The *iter chordæ anterioris* is located at the medial end of the petrotympanic fissure.
- The *chorda tympani* nerve leaves the tympanic cavity via this structure.
- The tympanic membrane (*Membrana tympani*) separates the tympanic cavity from the external acoustic meatus.
- It is a thin, membrane, obliquely, inferior and internally.

- The larger part of the circumference is thick, and forms a fibrocartilaginous ring, fixed in the tympanic groove
- . This groove is incomplete superiorly.
- From here there are two fascicles, the anterior and posterior malleolar folds.
- The smaller part of the tympanic membrane is situated superiorly, being called the *pars flaccida*.
- The lateral surface of the membrane has got a depression, *the umbo*.

The arteries of the tympanic membrane are:

- deep auricular (the internal maxillary artery),
- stylomastoid (the posterior auricular artery),
- tympanic (the internal maxillary artery).

The superficial veins drain into the external jugular vein.

The tympanic membrane it is innervated by:

- auriculotemporal nerve (mandibular nerve);
- auricular nerve(vagus nerve),
- tympanic nerve (glossopharyngeal nerve).

The labyrinthine or medial wall presents:

- *fenestra vestibuli*,
- *fenestra cochleæ*,
- promontory,
- prominence of the facial canal.

The *fenestra vestibule (Fenestra ovalis)*

- It is a small space lasting from the tympanic cavity until the vestibule of the internal ear.
- It is occupied by the base of the stapes.
- The *fenestra cochleæ (Fenestra rotunda)* is situated inferior and a posterior to *fenestra vestibule*.
- It is separated from it by an elevation, the promontory.
- The promontory (*Promontorium*) is a rounded prominence, formed by the first twist of the cochlea.
- The prominence of the facial canal marks the facial nerve location.

The mastoid or posterior wall is wider superior than inferior, presenting:

- entrance to the tympanic *antrum*,
- pyramidal eminence,

➤ *fossa incudis*.

- The entrance to the *antrum* is an opening, lasting from the epitympanic recess until the tympanic/ mastoid antrum.
- The *antrum* communicates posterior and inferior with the mastoid cells, filled with air.
- On the medial wall of the entrance to the *antrum* is an elevation, the prominence of the facial canal.
- It corresponds of the ends of the superior and lateral semicircular canals.
- The pyramidal eminence is situated posterior the *fenestra vestibule*, containing the *Stapedius muscle*.
- The *fossa incudis* is a small depression in the inferior and posterior part of the epitympanic recess, lodging a part of the *incus*.
- The carotid or anterior wall corresponds to the carotid canal.
- Above it, there is an orifice for the *Tensor tympani* muscle and the tympanic orifice of the auditory tube.
- These are separated by the *septum canalis musculotubarii*.
- This semicanal is situated inferior to the *tegmen tympani*.

- It extends from the labyrinthine wall of the tympanic cavity to the *fenestra vestibuli*.
- The *septum canalis musculotubarii* expands superior the anterior end of *the fenestra vestibuli*.

The auditory tube or Eustachian tube

- It is a canal in between the tympanic cavity and the nasopharynx.
- Its osseous portion is in the carotid wall of the tympanic cavity.
- It finishes at the angle of junction of the squama and the petrous portion of the temporal bone.
- Its cartilaginous portion is formed of an elastic fibrocartilage.
- Its base forms the *torus tubarius*.

The auditory ossicles (*Ossicula auditus*)

The tympanic cavity contains the following ossicles:

1. *Malleus* /hammer,
2. *Incus*/anvil,
3. Stapes/ stirrup.

1. The *malleus* is attached to the tympanic membrane.

- The incus is placed in between.
- Both are connected bones via joints.

1. The *malleus* or hammer

- It consists of a head, neck, and three processes: the *manubrium*, the anterior and the lateral processes.



Figure 12:1. Tympanic membrane, 2. Malleus, 3 Incus., 4. Stapes, 5. Semicircular canals, 6. Cochlea, 7. Vestibulocochlear nerve

- The head articulates posteriorly with the *incus*.
- The neck is the narrow part, posterior to the head.
- The *manubrium mallei* handle is connected with the tympanic membrane.
- On its medial side is attached the tendon of the *Tensor tympani* muscle.
- The anterior process is anterior to the petrotympanic fissure.



Figure 13: Tympanic membrane, ossicles of the middle ear and bony semicircular canals.

- The lateral process is attached to the superior part of the tympanic membrane.

2. The *incus*

- It received its name from its resemblance to an anvil.
- It consists of a body and two *crura*.
- The body articulates with the head of the *malleus*.
- The two *crura* diverge from one another at right angles.
- The short *crus* is attached to the *fossa incudis*.
- The long *crus* is posterior and parallel to the manubrium of the *malleus*, being articulated with the head of the stapes.

3. The stapes

- It resembles to a stirrup, is formed of a head, neck, two *crura*, and a base.
- The head articulates with the lenticular process of the *incus*.
- The neck affords insertion to the *Stapedius* muscle.

Joints of the auditory ossicles

- The incudo-malleolar joint is a saddle-shaped diarthrosis.
- It is covered by an articular capsule.
- The incudo-stapedial joint is an enarthrosis.
- It is covered by an articular capsule.

Ligaments of the ossicles

They are:

- The anterior ligament of the *malleus*
- The superior ligament of the *malleus*
- The lateral ligament of the *malleus*
- The posterior ligament of the *incus*.
- The superior ligament of the *incus*
- The annular ligament of the base of the stapes



Figure 14: Tympanic membrane, ossicles of the middle ear and, bony semicircular canals.

The muscles of the tympanic cavity are:

- The *tensor tympani* muscle, contained in the bony canal, superior the auditory tube.
 - It has origin from the cartilaginous portion of the auditory tube.
 - It is inserted into the manubrium (*malleus*).
 - It is supplied by a fillets of the mandibular nerve.
- The *stapedius* has origin from the interior of the pyramidal eminence.
 - It is inserted into the posterior surface of the neck of the stapes.
 - It is supplied by a branch of the facial nerve.
- The *Tensor tympani* muscle draws the tympanic membrane medially.
- The *Stapedius* pulls the head of the stapes posteriorly.

The arteries are:

- The tympanic branch (from the internal maxillary artery) for supplying the tympanic membrane,
- The stylomastoid branch (from the posterior auricular artery), for supplying the tympanic cavity and mastoid cells.

The veins empty in the pterygoid plexus and the superior petrosal sinus.

The nerves form the tympanic plexus, consisting by:

- the tympanic branch of the glossopharyngeal nerve;
- the caroticotympanic nerves;
- the lesser superficial petrosal nerve;
- a filet from greater superficial petrosal nerve
- The tympanic branch of the glossopharyngeal.
- It is also called the *Jacobson's nerve*.
- It enters the tympanic cavity by an aperture, close to the labyrinthic wall.
- The superior and inferior caroticotympanic nerves from the carotid plexus of the sympathetic anastomose with the twigs of the tympanic branch of the glossopharyngeal nerve.
- A branch is for the *fenestra vestibuli*, another for the *fenestra cochleæ*, and the last one for the auditory tube.
- The *chorda tympani* nerve crosses the tympanic cavity.
- It is given off from the facial nerve.

3. The internal ear or the labyrinth (*Auris interna*)

- The internal ear is the essential structure of the organ of hearing.
- Here there are found the final branches of the auditory nerve.
- It is named the labyrinth, due to complexity of its shape.



Figure 15: The internal ear

It consists of two parts:

- the osseous labyrinth: there are spaces (in petrous part of the temporal bone),
- the membranous labyrinth: there are communicating membranous sacs and ducts.

The osseous labyrinth (*Labyrinthus osseus*)

The osseous labyrinth consists of:

- the vestibule,
- the semicircular canals,
- the cochlea.

These are cavities containing a transparent fluid, the perilymph.

Here also there is the membranous labyrinth.

The vestibule

The vestibule is situated in the middle part of the osseous labyrinth.

Limits:

- medially to the tympanic cavity.
- posterior the cochlea,
- anterior the semicircular canals.

- In its lateral or tympanic wall is the *fenestra vestibuli*, and annular ligament.
- On its medial wall is the *recessus sphæricus*.
- At its anterior and inferior part is pierced by foramina for the passage of filaments of the acoustic nerve.
- Posterior of it is a ridge, *crista vestibuli*.
- It bifurcates inferiorly to enclose a small depression, the *fossa cochlearis*.
- As the inferior part of the medial wall is the orifice of the *aquæductus vestibuli*.
- It contains a tubular part of the membranous labyrinth, the *ductus endolymphaticus*.

The bony semicircular canals (*Canales semicirculares osseï*)

- The bony semicircular canals are: superior, posterior, and lateral.
- They are situated superior and posterior the vestibule.
- Each presents a dilatation, the *ampulla*.
- They open into the vestibule.
- The superior semicircular canal is vertical, in petrous portion of the temporal bone.

- The posterior semicircular canal is vertical, parallel to the posterior aspect of the petrous.
- The lateral or horizontal canal is horizontal in direction, at right angles to the other two.

The cochlea

- The cochlea looks like a snail shell.
- It forms the anterior part of the labyrinth, being placed horizontally anterior of the vestibule.
- Its apex is directed anterior and lateral.
- Its base corresponds with the deepest part of the internal acoustic meatus.
- It is perforated by apertures for the passage of the cochlear filets of the acoustic nerve.
- It consists of a conical shaped central axis, the *modiolus*.

The internal wall is formed by:

- a central axis, spirally around it for two turns and 3/4, from the base to the apex.
- a thin osseous spiral lamina, projecting from the *modiolus*.

- a basilar membrane.
- It separates the canal into two passages, which communicate with each other at the level of the *modiolus* by an opening, the helicotrema.
 - The *modiolus* is a conical central axis/ pillar of the cochlea.
 - It is perforated by foramina.
 - Through these are passing filaments of the cochlear part of the acoustic nerve.
 - They are forming the spiral canal of the *modiolus* that contains the spiral ganglion of Corti.
 - The bony canal of the cochlea turns 2 and 3/4 around the *modiolus*.
 - From the base to the apex it ends in the *cupula*, forming the apex of the cochlea.
 - It diverges from the *modiolus* toward the tympanic cavity and vestibule.
 - It presents three openings.
 - One, the *fenestra cochleæ*, communicates with the tympanic cavity.
 - Another one opens into the vestibule.

- The third one is the aperture of the *aquæductus cochleæ*.
- The osseous spiral lamina is a bony layer projecting from the *modiolus* into the interior of the cochlea, twisting 2 and 3/4 turns around the *modiolus*.
- It divides its cavity into two passages or *scalæ*.
- The superior is named the *scala vestibuli*.
- The lower is termed the *scala tympani*.
- To the upper part of the cochlea the *lamina* ends in a hook-like process, the *hamulus laminæ spiralis*.
- It forms the limit of a small opening, the helicotrema, through which the two *scalæ* communicate with each other.

The *osseous labyrinth* is lined by a membrane.

- One aspect is smooth, covered with epithelium.
- It secretes a fluid, the perilymph.

The membranous labyrinth (*Labyrinthus membranaceus*)

- The membranous labyrinth is contained into the bony cavities.

- It is separated from the bony walls by a fluid, the perilymph.
- The membranous labyrinth contains another fluid, the endolymph, surrounded by the filets of the acoustic nerve.
- In the osseous vestibule the membranous labyrinth consists of two membranous enlargements, the utricle, and the saccule.

The Utricle (*Utriculus*)

- The utricle, the biggest, occupies the superior and posterior part of the vestibule.
- Through its anterior wall exit the *ductus utriculosaccularis*.
- It opens into the *ductus endolymphaticus*.

The Saccule (*Sacculus*)

- The saccule is the smaller out of the two.
- Its anterior part presents the *macula acustica sacculi*, which receives the saccular filaments of the acoustic nerve.

- From the posterior wall a canal, the *ductus endolymphaticus* is united by the *ductus utriculosaccularis*.
- It passes along the *aquæductus vestibuli*, finishing in *saccus endolymphaticus*.

The semicircular ducts

- The semicircular ducts present at one extremity an *ampulla*.
- They open into the utricle.
- The walls of the utricle, saccule, and semicircular ducts are formed by three layers of cells.
- *Otoconia*, small structures, consists of small grains of calcium carbonate, kept together in the endolymph.

The *ductus cochlearis*

- The *ductus cochlearis* consists of a spirally tube, enclosed in the *cochlea*.
- A basilar membrane is taking part to the *scala tympani*.
- A second membrane, the vestibular membrane of *Reissner*, is covering the bony lamina, being attached superiorly the external border of the basilar membrane.

- A canal, the *ductus cochlearis* or *scala media*, is situated in between the *scala tympani* inferiorly and the *scala vestibuli* superiorly.
- The *ductus cochlearis* is coming into continuity with the saccule by the *canalis reuniens* of Hensen.
- On the *membrana basilaris* stays the spiral organ of Corti.
- The superior part of the spiral ligament contains a lot of capillary sinusoids and small bloodvessels, the *stria vascularis*.
- In between the two layers of spiral lamina, there are canals for the passage the twigs of the acoustic nerve.

Basilar membrane

- The basilar membrane goes from the tympanic border of the osseous spiral lamina until the basilar crest.
- It is formed by two parts, an internal and an external.
- On it stays the spiral organ of Corti.

The spiral organ of Corti (*Organon spirale* of Corti)

- It is formed of epithelial structures, located on the internal part of the basilar membrane.

- There are rod-like bodies, the internal and external rods or pillars of Corti.
- The bases of these are supported on the basilar membrane.

The Rods of Corti

- Each consists of a base, a body, and a head.
- The internal rods are 6,000 in number.
- Their bases are situated on the basilar membrane.
- The external rods are 4,000 in number.
- Their heads are convex internally.
- The tectorial membrane is situated above the *sulcus spiralis internus*.
- The spiral organ of Corti is attached to the *limbus laminæ spiralis*.

The acoustic nerve (*N. acusticus*) or nerve of hearing or vestibulo-cochlear nerve

It divides from the internal acoustic meatus into an anterior or cochlear nerve and a posterior or vestibular nerve.

The Vestibular Nerve (*N. vestibularis*)

It innervates:

- The utricle,
- The saccule,
- The *ampullæ* of semicircular ducts.
- In the internal acoustic meatus is found the vestibular ganglion (*ganglion of Scarpa*).
- The fibers of the nerve have origin in the cells of this ganglion.
- The nerve divides into a superior, an inferior, and a posterior branches.
- The posterior branch goes at the postero-inferior part of the deep of the meatus and divides into fillets.
- These are supplying the *ampulla* of the posterior semicircular duct.

The Cochlear Nerve (*N. Cochlearis*)

- It divides into a lot of filaments at the base of the *modiolus*.
- The fillets for the basal and middle spirals pierce the foramina in the *tractus spiralis foraminosis*.

- The fillets for the apical spiral travel through the *canalis centralis*.
- They are lodged into the spiral canal of the *modiolus*, the spiral ganglion of the cochlea or the ganglion of Corti.
- The ganglion of Corti consists of bipolar nerve cells.
- These constitute the cells of origin of this nerve.
- On the external border of the osseous spiral lamina the fibers of the nerve are passing via the foramina in the tympanic area.
- The cochlear nerve gives off a vestibular branch for the *ductus cochlearis*.
- The filaments of this branch are passing through the *foramina* in the *fossa cochlearis*.

The arteries of the labyrinth are as follows:

- the internal auditory artery (from the basilar artery),
- the stylomastoid artery (branch of the posterior auricular artery).
- The internal auditory artery divides into two branches: cochlear artery and vestibular artery.
- The cochlear artery subdivides in more than ten arteries.

- Traversing the *modiolus*, they provide blood to the *lamina spiralis* and basilar membrane.
- The vestibular artery vascularizes: the utricle, the saccule, and the semicircular ducts.
- The veins of the vestibule and semicircular canals go together with the arteries, receiving the veins that come from cochlea, close to the base of the *modiolus*.
- They then unite to form the internal auditory veins.
- These finish into the posterior part of the superior petrosal sinus or into the transverse sinus.

III. ORGAN OF THE TASTE (*Organon gustus*) * L.O. Grigoriță

- The peripheral gustatory or taste organs consist of epithelial cells.
- They are specialized.

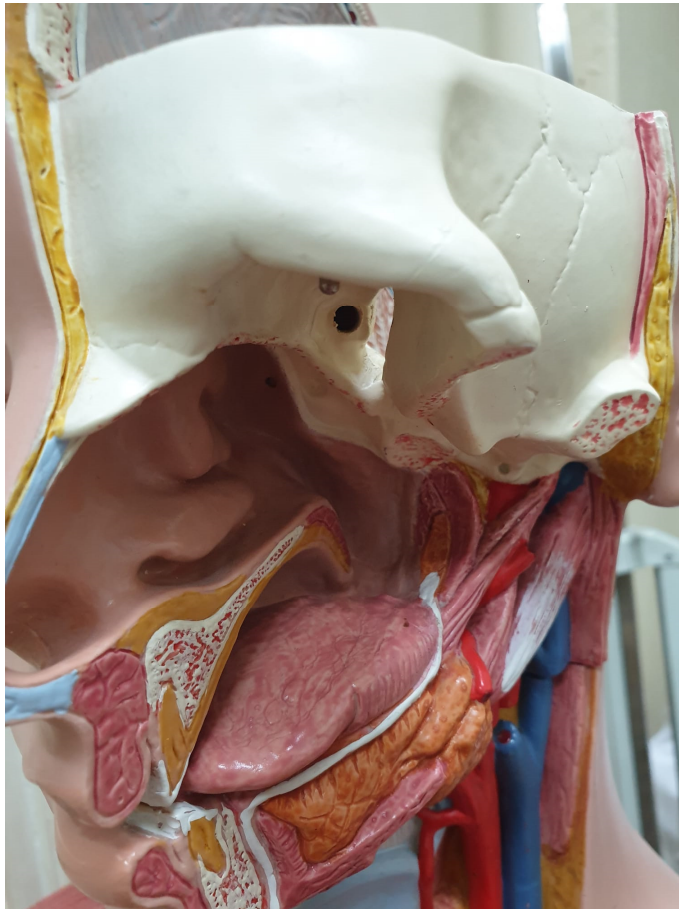


Figure 16: The tongue in the oral cavity

- These are arranged in flask-shaped groups, the gustatory *calyculi* (taste buds).
- They are found on the tongue surfaces and its surrounding parts.
- They occupy nests-like spaces in the stratified epithelium.
- They are sent in large numbers on the sides of the *papillæ vallatæ*.
- They are also found on the fungiform *papillæ* into the posterior part and sides of the tongue.
- They are also present on the inferior surface of the soft palate, and on the posterior surface of the *epiglottis*.
- Its base stays onto the *corium*. Its neck is opening by an orifice, the gustatory pore.



Figure 17: The oral cavity and its contents, above it the nasal cavity with meatuses and sinuses and inferior nasal concha

- The bud consists of two kinds of cells: supporting cells and gustatory cells.
- The gustatory cells are situated into the central part of the bud.

- Each has got a big, spherical *nucleus*, situated in the center of the cell.
- The peripheral end finishes at the gustatory pore in a gustatory hair.
- The central process passes to the deep end of the bud, and there ends in single or bifurcated fillets.

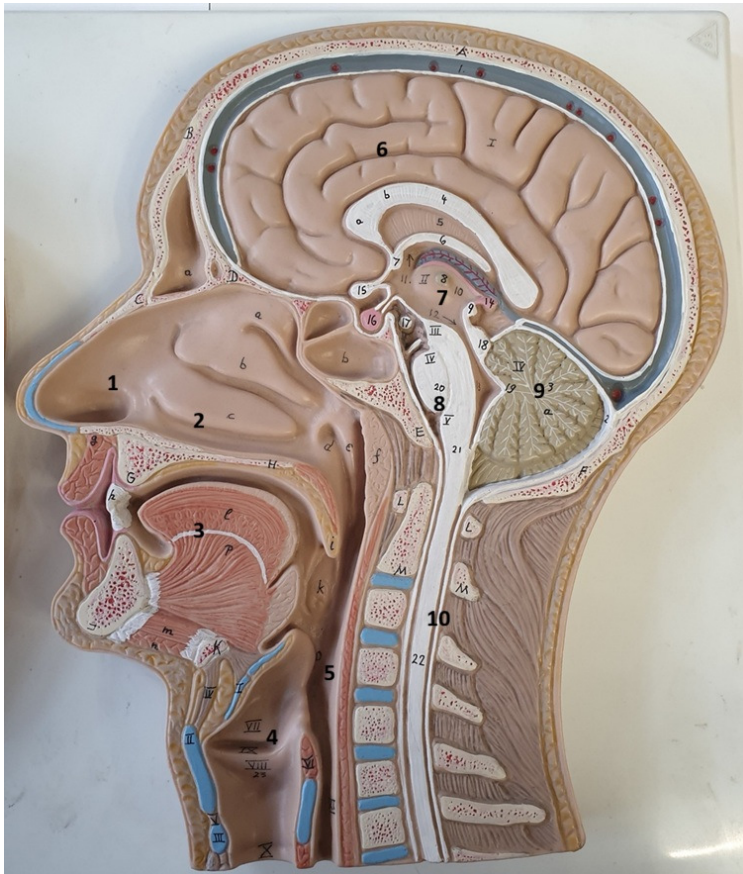


Figure 18: The sagittal section through the head and neck. 1. Nasal cavity, 2. Inferior nasal concha, 3. Tongue, 4. Larynx, 5. Pharynx, 6. Cerebral hemispheres, 7. Thalamus, 8. Midbrain, 9. Cerebellum, 10. Spinal cord.

- The nerve fibrils enter the taste bud.
- They end in between the gustatory cells.
- Some nerve filets ramify in between the supporting cells and terminate in small extremities.
- These are nerves of normal taste and not gustatory nerves.
- Nerves involved in the sense of tasting
- The *chorda tympani* nerve comes from the facial.
- It is the nerve of taste for the anterior 2/3rd of the tongue.
- The nerve for the posterior 1/3rd is the glossopharyngeal nerve.

IV. THE ORGAN OF THE SMELL/THE NOSE (*Organon olfactorius*) * L.G. Stana

- It is called also the nose.
- The olfactory organ (organ of smell) consists of two parts:
 - an external, the external nose, situated in the center of the face;
 - an internal, the nasal cavity.

These are separated by a septum into right and left nasal cavities/ nostrils.

1. *The external nose (Nasus externus)*

- The external nose has got a pyramidal form.
- Its superior angle is connected with the frontal bone.
- Its free part is named the apex.
- Its base is pierced by two orifices, the *nares*.
- These are separated by a sagittal septum, the *columna*.
- The lateral surfaces of the nose are fused in the middle line of the face, forming the *dorsum nasi*.
- The superior part it is supported by the nasal bones, named the bridge.

- The lateral surface finishes in a rounded eminence, *ala nasi*.
- The frame of the external nose consists of bones and cartilages.
- The skin covers it.
- A mucous membrane lines it.
- The frame occupies the superior part of the organ.
- It is formed by the nasal bones, and the frontal processes of the *maxillæ*.
- The cartilaginous frame consists of the following parts of the cartilage of the septum:
 - two lateral,
 - two greater alar cartilages,
 - lesser alar cartilages.

The cartilage of the septum

- It is quadrilateral in form.
- It covers the divisions between the nasal cavities anteriorly.
- Its anterior margin is united with the nasal bones.
- Its posterior margin articulates with the perpendicular plate of the ethmoid bone.

- Its inferior border articulates with the vomer and the palatine processes of the *maxilla*.
- The most inferior part of the nasal septum is formed by the medial *crura* of the greater alar cartilages and by the skin.
- It is termed the *septum mobile nasi*.



Figure 19: The skull. In blue the frontal bone, 2. In pink the nasal bones, in green the maxilla bone, in white the mandibula bone, in orange the zygomatic bone, in yellow the sphenoid bone.

- The greater alar cartilage is a plate situated inferior the lateral cartilage.
- The two parts forming the medial wall form together the *septum mobile nasi*.
- The portion that takes part to the lateral wall corresponds with the *ala* of the nose.
- It is connected with the frontal process of the maxilla.
- The skin of the dorsum and sides of the nose is connected with the inferior parts.
- The arteries of the external nose are the alar and septal branches of the facial artery, vascularizing the *alæ* and septum.
- The *dorsum* and laterals are vascularized from the dorsal nasal artery. This comes from the ophthalmic artery.
- Also, the infraorbital branch of the internal maxillary artery supplies it.
- The veins empty in the anterior facial vein and ophthalmic veins.
- The nerves for the muscles of the nose are filets from the facial nerve.
- The skin is innervated from the infratrochlear and nasociliary branches of the ophthalmic nerve.
- Also has got supply from the infraorbital branch of the maxillary nerve.

2. The Nasal Cavity (*Cavum nasi*)

- The nasal cavities are situated on either side of the median plane of the body.
- They open forward through the *nares*.
- They communicate posteriorly with the nasopharynx through the *choanæ*.
- *The nares* are apertures, being located anteriorly.
- The *choanæ* are two openings, situated posteriorly.
- In the opening of the nostril there is the vestibule.
- This is bordered laterally by the *ala* and lateral *crus* of the greater *alar* cartilage.
- It is limited medially by the medial *crus* of the cartilage.
- It is lined by skin.
- Each nasal cavity is separated into two parts:
 - an olfactory region, formed by the superior nasal concha;
 - a respiratory region, the rest of the cavity.

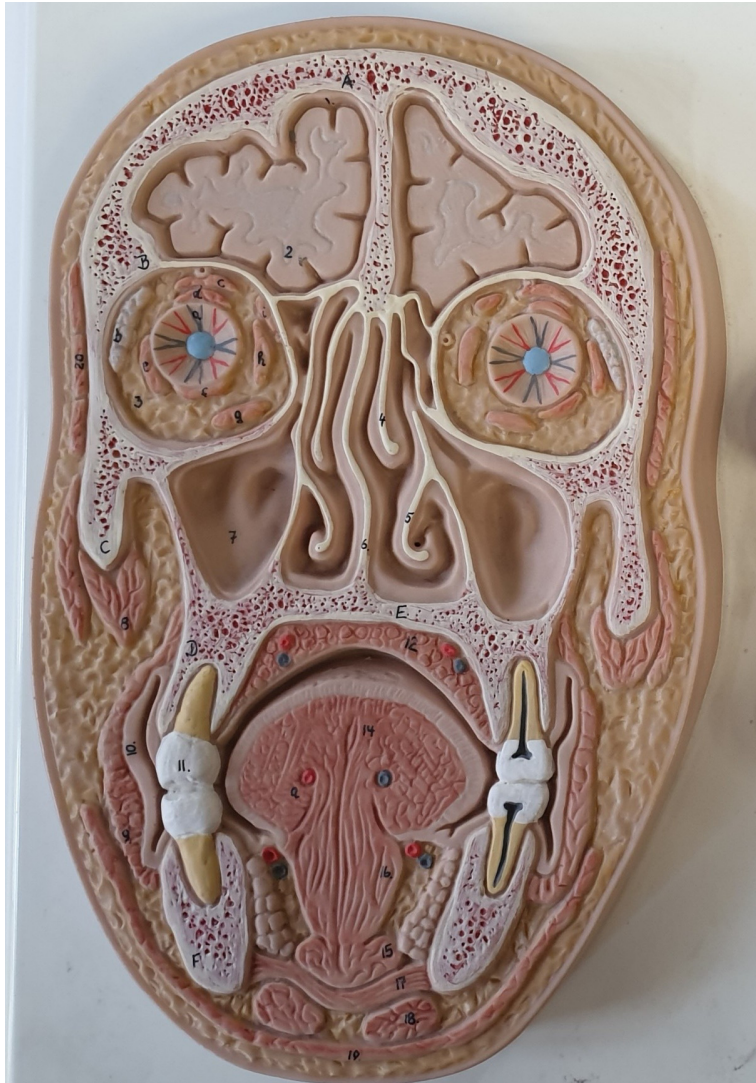


Figure 20: Coronal section of the head

On the lateral wall there are:

- the superior nasal *concha*,
- the middle nasal *concha*,

- the inferior nasal *concha*.
- Inferior and lateral to each concha is the corresponding *meatus*.
- The superior *meatus* is a canal, lining the superior border of the middle concha.
- The posterior ethmoidal cells open into it.
- The middle *meatus* is situated inferior and lateral to the middle concha.
- There is an elevation, the *bulla ethmoidalis*.
- Inferior and anterior of it there is a fista, the *hiatus semilunaris*.
- In the *bulla ethmoidalis* the middle ethmoidal cells open.
- The *hiatus semilunaris* is limited inferiorly by the uncinat process of the ethmoid bone, ending in the *infundibulum*.
- The anterior ethmoidal cells open in the infundibulum.
- The inferior *meatus* is situated inferior and lateral to the inferior nasal concha.
- The medial wall or the *septum* presents superior to the incisive canal the nasopalatine recess.



Figure 21: Lateral aspect of the skull.

The roof of the nasal cavity is divided, from posterior to anterior into:

- a sphenoidal part,
- an ethmoidal part,
- a fronto-nasal part.

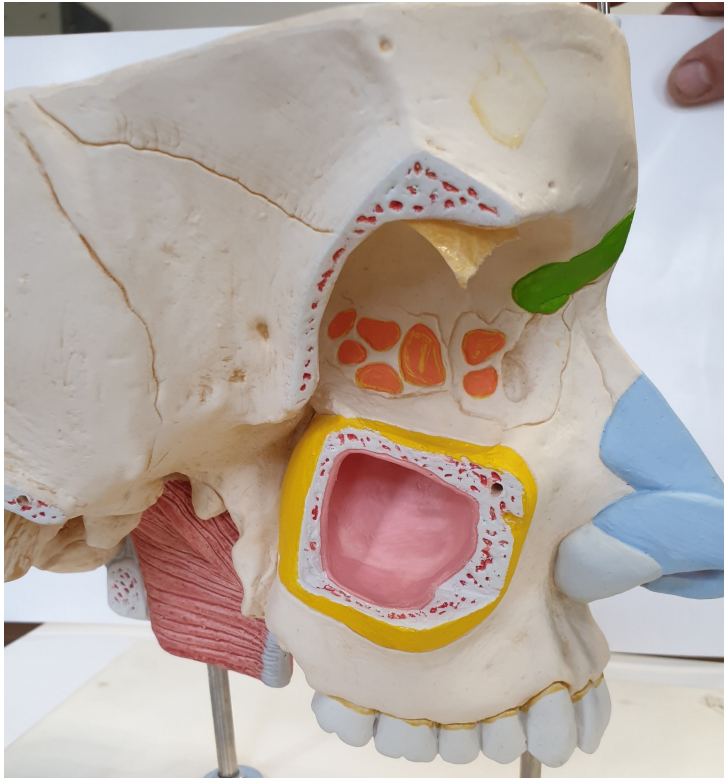


Figure 22: Lateral aspect of the skull, section through the malar and maxilla bones. The picture exhibits the maxillary sinus in the middle, the medial wall of the orbital cavity, part of the infratemporal fossa.

- The floor is horizontal.
- Its anterior 3/4th is formed by the palatine process (maxilla).
- Its posterior 1/4th is formed by the horizontal process (palatine).

The arteries of the nasal cavities are:

- the anterior and posterior ethmoidal branches (the ophthalmic artery);
- the sphenopalatine branch,
- the septal branch of the superior labial artery (the facial artery);
- the infraorbital and alveolar branches (the internal maxillary artery);
- the pharyngeal branch (the internal maxillary artery).

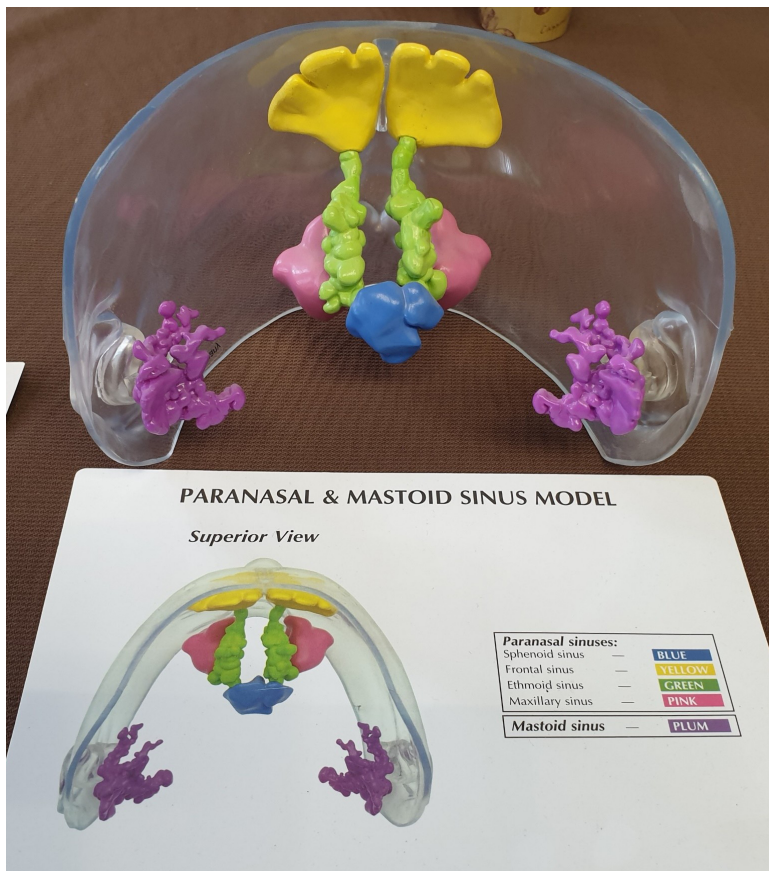


Figure 23: The head sinuses

The veins form plexuses.

- Some of the veins open into the sphenopalatine vein.
- Some accompany the ethmoidal arteries, ending in the ophthalmic veins.

The nerves are:

- the nasociliary nerve of the ophthalmic nerve,
- the filaments from the anterior alveolar nerve of the maxillary nerve,
- the nerve of the pterygoid canal,
- the nasopalatine nerve,
- the anterior palatine nerve,
- the nasal nerves of the sphenopalatine ganglion.

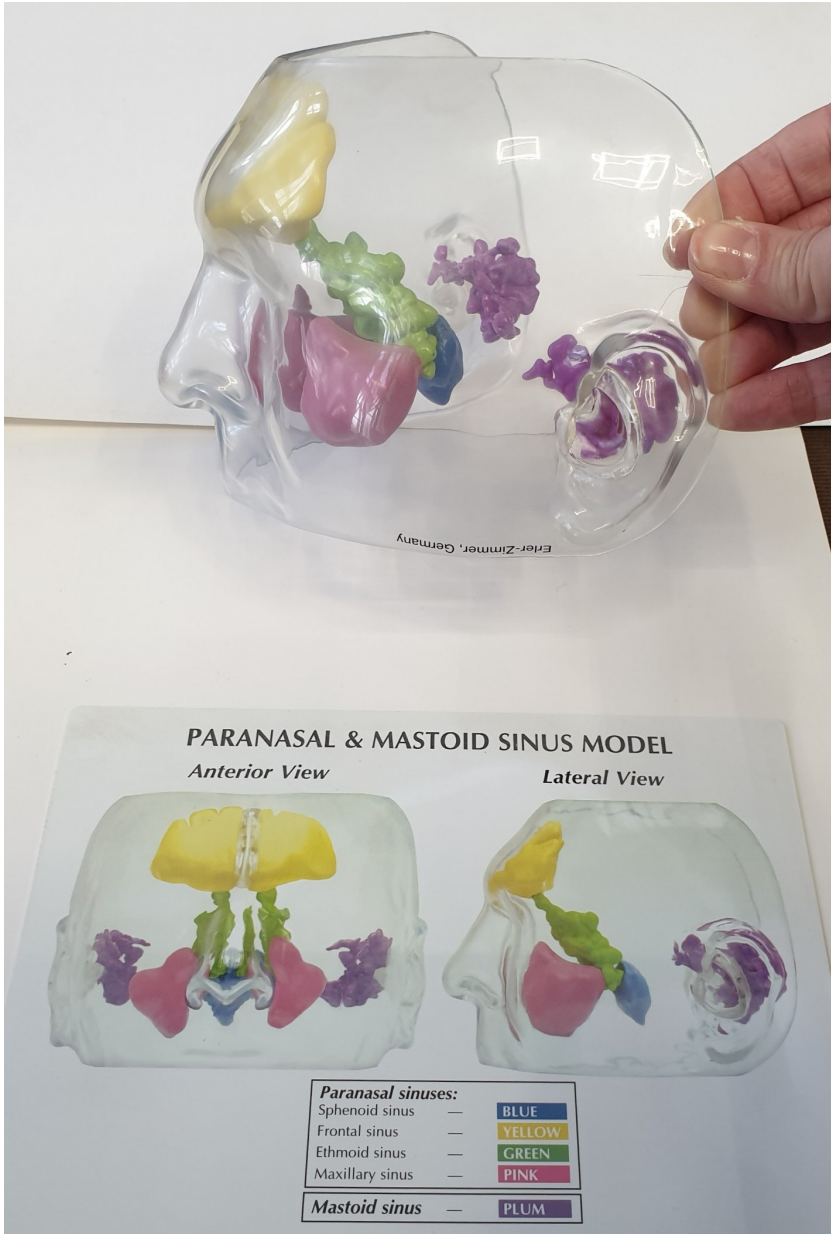


Figure 24: Plastic models representing the sinuses of the head

3. The olfactory nerve

- It is the special nerve of the sense of smell, distributed to the olfactory region.
- Its fibers are given off by the bipolar olfactory cells.
- They unite in *fasciculi*, forming a plexuses.
- They go in canals of the ethmoid bone.
- Then, they pass into the skull through the *foramina* in the cribriform plate of the ethmoid.
- They enter the inferior surface of the olfactory bulb.
- They ramify and form synapses with the dendrites of the mitral cells.

The accessory sinuses or air cells of the nose are:

- the frontal,
- the ethmoidal,
- the sphenoidal,
- the maxillary.



Figure 25: Sagittal section through the head, exhibiting the nasal sinuses, palatum durum and the olfactory filets in yellow.

The External Nose - vascularization

- The blood supply is coming from branches of the ophthalmic and maxillary arteries.
- They supply with blood the skin of the external nose.
- Other branches are coming from the facial artery, CNVII.
- They supply the skin of the wings and the inferior part of the septum of the nose.

The External Nose - Sensory Innervation

- It is provided by branches coming from the infra trochlear nerve and external nasal branches of the ophthalmic nerve.
- They innervate the bridge of the nose.
- Also, the infraorbital branch of the maxillary nerve supplies the lateral parts of the nose.

The Nasal Cavity

- The nasal cavity extends from the nostrils, situated anteriorly, to the posterior nasal apertures (*choanae*), located posteriorly.
- Through this, the nasal cavity communicates with the nasopharynx.
- The nasal vestibule is the space of the nasal cavity situated into the nostrils.
- The atrium is the door to the middle *meatus*.
- It is located superiorly to the vestibule.
- The nasal *septum* divides the nasal cavity into right and left halves.

The walls of the nasal cavity

Each half of the nasal cavity has a roof, floor, lateral wall, and medial wall.

Roof (Apex)

- The roof is narrow.
- It is formed anteriorly by the nasal and frontal bones.
- Its middle part is composed by the cribriform plate of the ethmoid bone.
- Its posterior part is formed by the body of the sphenoid bone.

The Floor (Base)

- The floor of the nasal cavity is also the superior surface of the hard palate.
- It is formed by the palatine process of the maxilla and the horizontal plate of the palatine bone.

The Lateral Wall

- The lateral wall consists of three cone-shaped parts of bone: the superior, middle, and inferior nasal conchae.
- The superior and middle nasal conchae are parts of the ethmoid bone.
- The inferior concha is considered as a self-stated bone.
- The space below each concha is called meatus.
- There are three meatuses superior, middle, and inferior.
- The sphenoethmoidal recess is a small area located superiorly the superior concha.
- Here, the sphenoidal sinus opens.
- The superior meatus is located inferior the superior concha.
- Here, the posterior ethmoid sinuses open.
- The middle meatus is situated inferior the middle concha.
- It has got some anatomical spaces and openings, named the *bullae ethmoidalis*, the *hiatus semilunaris*, and the *infundibulum*.
- The maxillary sinus opens into the middle meatus via the hiatus semilunaris.
- The inferior meatus is situated inferior the inferior concha bone.
- The nasolacrimal duct is opening there.

The Medial Wall

- The nasal septum forms the medial wall.
- The vertical (perpendicular) plate of the ethmoid bone forms the superior 2/3rd.

- The inferior 1/3rd is made by the vomer, while its anterior part consists of the septal cartilage.

The Nasal Cavity-the Mucous Membrane

The vestibule is lined with modified integument and has hairs.

A small olfactory region situated superiorly the superior concha is lined with olfactory mucous membrane.

It is traversed by the nerve endings sensitive to the sense of smelling.

The olfactory area contains

- the roof of the nasal cavity,
- the phenoethmoidal recess,
- the superior surface of the superior concha,
- and the superior edge of the nasal septum.

The rest of the nasal cavity it is the respiratory region.

It is lined with respiratory mucous membrane.

The Nasal Cavity - innervation

- The olfactory nerves from the olfactory mucous membrane ascend through the cribriform plate of the ethmoid bone in order to reach the olfactory bulb.
- The nerves of general sensation are coming from the ophthalmic nerve and the maxillary nerve of the trigeminal nerve.

The Nasal Cavity- vascularization

- The arterial supply to the nasal cavity is coming from branches of the maxillary artery, a terminal branch of the external carotid artery.
- The most important artery is the sphenopalatine artery.

- The sphenopalatine artery anastomoses with the septal arterial twig of the superior labial artery of the facial artery in the vestibular area.
- The submucous venous plexus drains into veins that accompany the arteries.
- The lymph vessels drain the vestibule in the submandibular nodes.
- Other vessels drain by vessels that pass to the superior cervical lymphnodes.

The Paranasal Sinuses

- The paranasal sinuses are cavities in the maxilla, frontal, sphenoid, and ethmoid bones.
- They are lined with mucosa.
- They usually contain air.

Type of sinus	Site of emptiness
Maxillary sinus	Middle <i>meatus</i> through <i>hiatus semilunaris</i>
Frontal sinuses	Middle meatus through <i>infundibulum</i>
Sphenoid sinuses	Spheno ethmoidal recess
Ethmoid sinuses	-
Anterior group	<i>Infundibulum</i> and into the middle <i>meatus</i>
Middle group	Middle meatus on or above <i>bulla ethmoidalis</i>
Posterior group	Superior <i>meatus</i>

- The paranasal sinuses decrease the weight of the skull.
- They give resonance to the voice.
- The development of the paranasal sinuses is responsible for the growth of the facial skeleton after birth.

The Maxillary Sinus

- The maxillary sinus is located in the body of the maxilla bone, posteriorly to the cheek.
- The floor of the orbit forms its superior wall.
- Its inferior wall is related to the roots of the premolars and molars.

The Frontal Sinuses

- The frontal bone contains the two frontal sinuses.
- They are separated from each other by a bony septum.
- Each goes superiorly, above the medial part of the eyebrow and posteriorly in the upper wall of the orbital cavity.

The Sphenoid Sinuses

- The two sphenoidal sinuses are situated in the body of the sphenoid bone.
- There is a *septum* that separates them.

The Ethmoid Sinuses

- The ethmoid bone contains three pairs of sinuses (anterior, middle, and posterior).
- They are located in between the nasal cavity and the orbital cavity.

The olfactory/smelling receptors

- It is stated that humans can recognise about 10 000 different odours.
- The nasal mucosa contains 10 million to 100 million receptors for the sense of smelling or olfaction.
- The area means the roof of the nasal cavity, part of the lamina cribrosa, and the superior nasal concha.

The olfactory epithelium consists of three types of cells:

- olfactory receptor cells,
- supporting cells,
- basal cells.

The olfactory receptor cells are the first-order neurons of the olfactory pathway, being a bipolar neuron.

The axon projects through the cribriform plate of the ethmoid bone.

It finishes in the olfactory bulb.

Their dendrites are olfactory cilia.

The supporting cells are columnar epithelial cells of the mucous membrane.

The basal cells are stem cells located between the supporting cells.

The olfactory receptor cells are considered as neurons.

Within the olfactory epithelium are olfactory/ Bowman's glands.

They are innervated by parasympathetic neurons of the filets of the facial nerve.

The olfactory pathway

In each nostril, there are unmyelinated axons of olfactory receptor cells.

These ascend in the cribriform plate of the ethmoid bone.

All of them form the right and left olfactory nerves.

The olfactory nerves finish in the brain in the olfactory bulbs.

These are located inferiorly the frontal lobes of the brain.

Here, the terminal axons synapse with the dendrites, forming the olfactory pathway.

Axons of olfactory bulb neurons form finally the olfactory tract.

Some axons reach the primary olfactory area of the cerebral cortex.

It is situated inferiorly and medially of the surface of the temporal lobe.

Olfactory sensations are reaching the cerebral cortex without first synapsing in the thalamus.

There are some axons of the olfactory tract that have connections in the limbic system and hypothalamus.

From this olfactory area the nerves extend to the frontal lobe.

An important region for odour identification is the orbitofrontal area (11 Brodman).

Clinical Considerations Regarding the Nasal Cavity

- ✓ In order to visualize the choanae and the posterior margin of the nasal septum, a speculum or a mirror can be inserted into the nasopharynx.
- ✓ The septal deviation is another common situation occurred in both genders, as congenital disease.
- ✓ This could become as issue in case of drainage of the nose and the paranasal sinuses.
- ✓ The fractures involving the nasal bones are slightly frequent.
- ✓ The septum is the one affected.
- ✓ Infection of the nasal cavity can spread in many parts, due to communications with the nasopharynx and auditory tube in the middle ear.
- ✓ It is possible that infection to ascend to the meninges of the anterior cranial fossa and to affect the brain.
- ✓ The first pair of cranial nerves, the olfactory nerves that pass through the cribriform plate can produce meningitis if the infection is present in the nasal cavity.

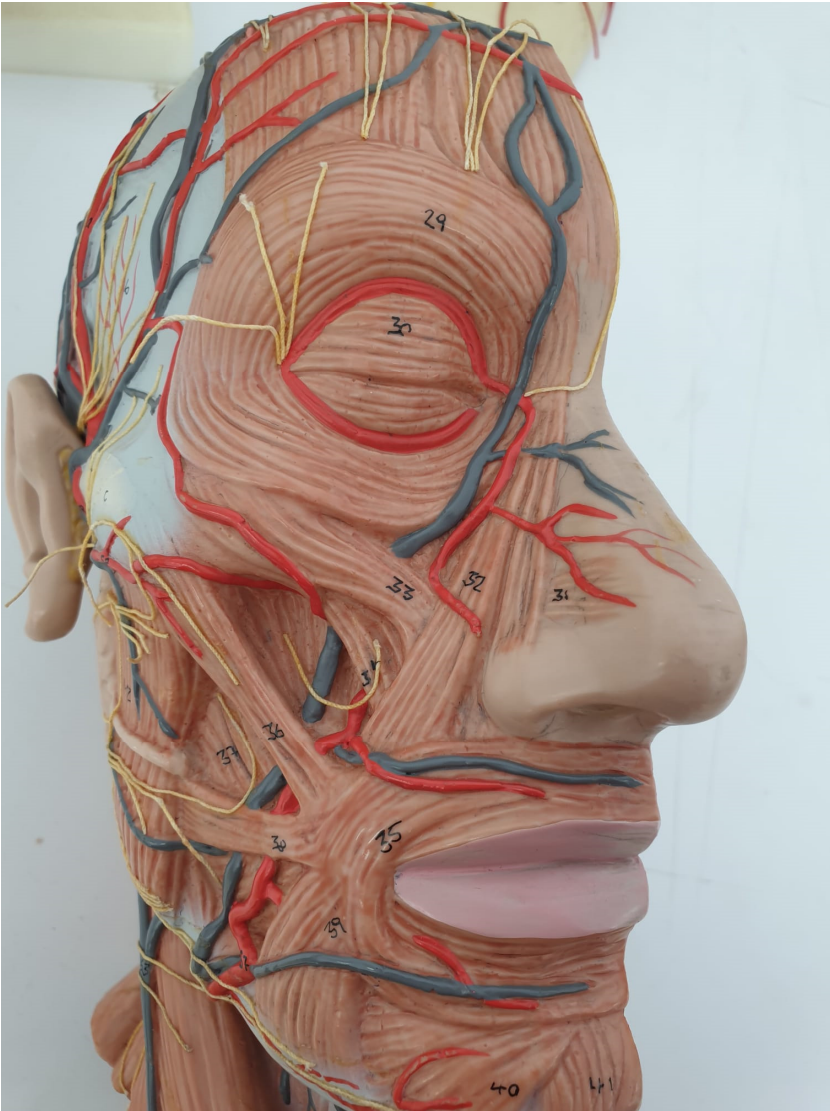


Figure 26: The external nose. Can be seen the muscles around the nasal orifices, like *Levator Labii Superioris* *Aleque nasii*, *Procesus, Transversus Nasalis*.

- ✓ The foreign bodies in the nose are common in children.
- ✓ Different kind of small pieces like toys, peas, etc, can stuck them in between the conchae.
- ✓ The bleeding in the nasal cavity, called epistaxis, is also a common condition. Hyper arterial pressure is one of the causes, also a local trauma.
- ✓ The bleeding may be arterial or venous.
- ✓ Most bleedings occur on the anteroinferior portion of the septum and involve the septal branches of the sphenopalatine and facial vessels.
- ✓ The trans nasal approach surgery for reaching the pituitary gland is used by ENT specialists.
- ✓ The surgeon pierces the sphenoid, traverses the sphenoid sinus, and enters the sella turcica from inferior part.



Figure 27: The skull, anterior view, showing in the middle the nasal piriformis aperture, with the turbinated bones, meatuses, vomer, and the perpendicular plate of the ethmoid bone, forming the nasal septum. Each side of the nasal cavities exhibits the maxilla bone, with the infraorbital foramina, which afford passage to the infraorbital vessels and nerves.

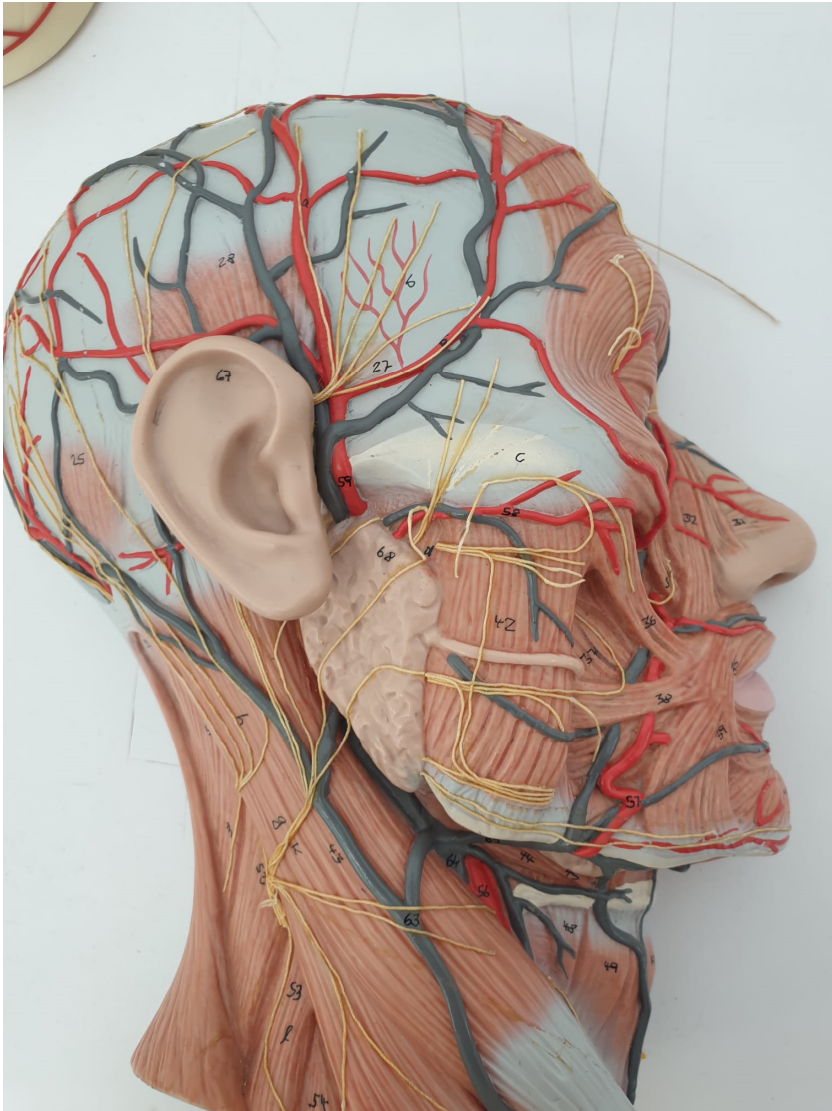


Figure 28: Lateral aspect of the plastic model of the head and neck, exhibiting the muscles and vessels of the region. The nasal part is covered by the muscles situated around the nostrils. Also, can be seen the vessels which supply the nasal region.

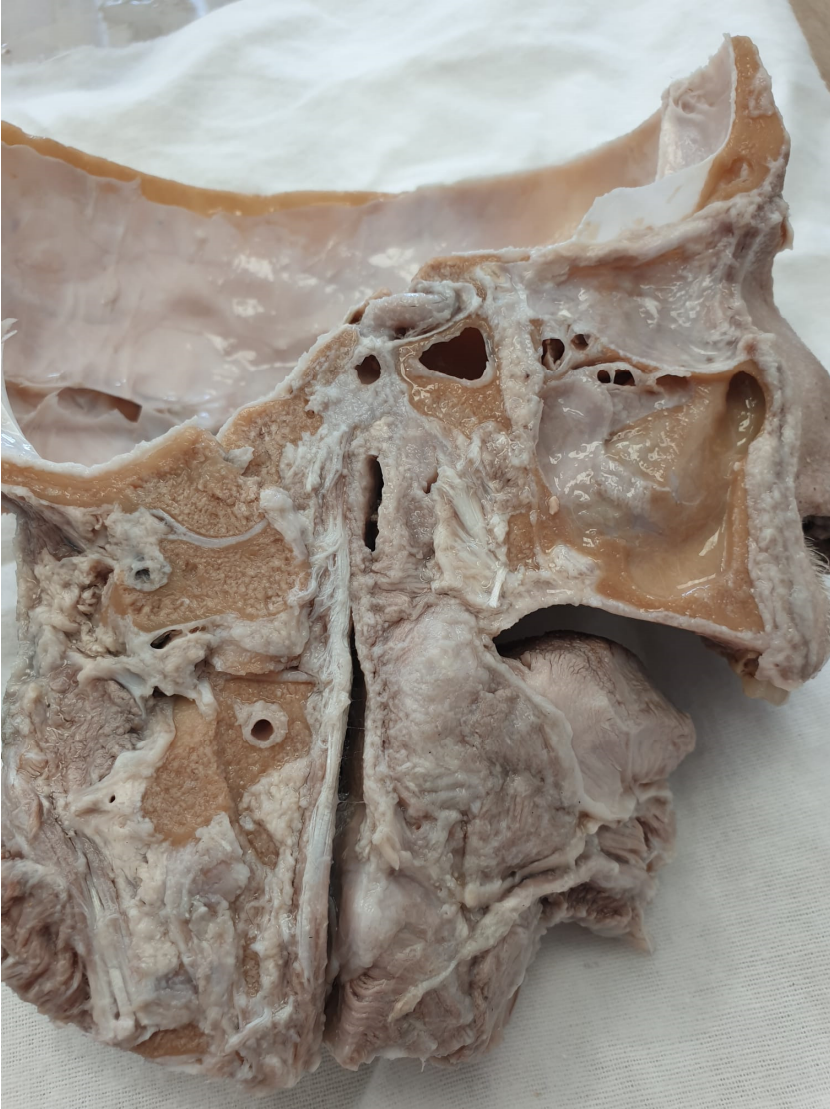


Figure 29: Dissection picture, lateral view, sagittal section. There can be seen the nasal cavity contents, the mucosa, the oral cavity and the tongue, the pharynx.

Paranasal Sinus Clinical

- ✓ Infection of the paranasal sinuses is a common complication of nasal infections.
- ✓ Maxillary sinusitis is extension from a dental abscess.
- ✓ The frontal sinus can be examined by pressing the finger superior under the medial end of the superior orbital margin.
- ✓ The ethmoid sinuses can be palpated by pressing the finger medially against the medial wall of the orbit.
- ✓ The maxillary sinus can be examined for tenderness by pressing the finger against the anterior wall of
- ✓ The infraorbital nerve may reveal.
- ✓ Radiologic examination of the sinuses is also most helpful in making a diagnosis.
- ✓ Both sinuses must be compared
- ✓ The supraorbital nerve innervates the frontal sinus.
- ✓ It also supplies the skin of the forehead and scalp as far back as the vertex.
- ✓ The infraorbital nerve innervates the maxillary sinus.
- ✓ The pain is referred to the upper maxilla, including the teeth.

- ✓ The frontal sinus drains into the hiatus semilunaris, via the infundibulum, close to the orifice of the maxillary sinus on the lateral wall of the nose.
- ✓ The maxillary sinus is particularly prone to infection because its drainage orifice through the hiatus semilunaris is badly placed near the roof of the sinus.

The Anosmia

- ✓ A human adult can distinguish approximately 10 000 different smells!
- ✓ The olfactory epithelium detects odour molecules that have entered your nose and are trapped in mucous.
- ✓ As the molecules dissolve in the mucous they reach the olfactory receptor cells, causing nerve impulses to be fired and sent to the temporal lobe in the brain for processing.
- ✓ The inability to smell a scent is called anosmia.
- ✓ There are many types of anosmia.
- ✓ A person with allicin anosmia cannot smell garlic, whereas individuals with eugenol anosmia cannot smell cloves.
- ✓ Sometimes, individuals cannot smell anything at all.

- ✓ Some people are born with full anosmia and in others it may be the result of an accident that has damaged the olfactory epithelium.
- ✓ If the olfactory epithelium becomes swollen because of an immune response triggered by an infection it can diminish your sense of smell.

The Olfactory Pathway

- ✓ On each side of the nose, about 40 bundles of the slender, unmyelinated axons of olfactory receptor cells extend through about 20 olfactory foramina in the cribriform plate of the ethmoid bone.
- ✓ These 40 or so bundles of axons collectively form the olfactory nerves.
- ✓ The olfactory nerves terminate in the brain in paired masses of grey matter called the olfactory bulbs.
- ✓ These are located below the frontal lobes of the cerebrum and lateral to the crista galli of the ethmoid bone.
- ✓ Within the olfactory bulbs, the axon terminals of olfactory receptor cells form synapses with the dendrites and cell bodies of olfactory bulb neurons in the olfactory pathway.

- ✓ Axons of olfactory bulb neurons extend posteriorly and form the olfactory tract.
- ✓ Some of the axons of the olfactory tract project to the primary olfactory area of the cerebral cortex;
- ✓ Located at the inferior and medial surface of the temporal lobe, the primary olfactory area is where conscious awareness of smell begins.
- ✓ The olfactory sensations are the only sensations that reach the cerebral cortex without first synapsing in the thalamus.
- ✓ Other axons of the olfactory tract project to the limbic system and hypothalamus.
- ✓ These connections account for our emotional and memory evoked responses to odours.
- ✓ From the primary olfactory area, pathways also go to the frontal lobe.
- ✓ An important region for odour identification and discrimination is the orbitofrontal area 11 Brodman.
- ✓ People who suffer damage in this area have difficulty identifying different odours.

V. THE COMMON INTEGUMENT/ THE SKIN (*Integumentum Commune*) * A.C. Faur

It is also called the skin.

The peripheral endings of the nerves are associated with general sensations.

Also, the muscular sense and the senses of heat, cold, pain, and pressure, are found everywhere in the body.

Free nerve-endings

They occur mainly in the *epidermis* and in the epithelium.

They are covering mucous membranes.

They are seen in the stratified squamous epithelium of the cornea, in the root-sheaths and *papillæ* of the hairs, and around the bodies of the sudoriferous glands.

The special end-organs have the same terminal nerve *fibrillæ*, enveloped by a capsule.

They are:

- the end-bulbs of Krause,
- the corpuscles of Grandry,
- the corpuscles of Paccini,
- the corpuscles of Golgi and Mazzoni,

- the corpuscles of Wagner and Meissner,
- the neurotendinous spindles,
- the neuromuscular spindles.

The end-bulbs of Krause

End-bulbs are found in:

- the conjunctiva of the eye,
- in the mucous membrane of the lips and tongue,
- in the epineurium of nerve trunks
- in the penis and the clitoris, under the name of genital corpuscles.

The Pacinian corpuscles

- They are found in the adipose tissue.
- The nerves of the palm of the hand and sole of the foot contain these structures.
- They can be present in connection with the nerves of the joints.

The Corpuscles of Golgi- Mazzoni

- They are found in the adipose tissue of the pulp of the fingers.

Tactile corpuscles of Wagner- Meissner occur in:

- the *papillæ* of the *corium* of the hand and foot,
- the anterior part of the forearm,
- the skin of the lips,
- the tip of the tongue,
- the palpebral conjunctiva,

Corpuscles of Ruffini

- They are found at the junction of the *corium* with the adipose tissue.
- Neurotendinous spindles
- They are found near the junctions of tendons and muscles.
- They have a distinctly fusiform appearance.

Integument

- It has many roles: covers the body, protects the deeper tissues from injury, from drying and also prevents the body from invasion.
- It contains the peripheral endings of the sensory nerves.

- They play an important part in the regulation of the body temperature.
- It has limited excretory and absorbing powers.

It consists mainly of:

- a layer of vascular connective tissue, the *corium* or *cutis vera*,
- an external layer covering of epithelium, the *epidermis* or cuticle.

The epidermis or scarf skin

It consists of a stratified epithelium.

In the palms of the hands and soles of the feet it is thicker.

The *epidermis* consists of stratified epithelium, arranged in four layers from internal to external:

- *stratum mucosum*,
- *stratum granulosum*,
- *stratum lucidum*,
- *stratum corneum*.

The *stratum mucosum*

- It is composed of several layers of cells.
- This deepest layer is termed the *stratum germinativum* or germinal layer.
- The next layers consist of cells with the contents soft, opaque, granular.

The *stratum granulosum*

- It comprises two- three layers of flat cells which contain an intermediate substance in the formation of keratin.

The *stratum lucidum*

- It is composed of packed cells and small minute granules of a substance named keratohyalin.

The *stratum corneum*

- It consists of epithelial scales which contain granules having resemblance of beeswax.
- The pigment consists of small, black granules.
- The main goal of *epidermis* is that of protection.

The *corium, dermis*

- It is flexible, elastic and varies in thickness in different parts of the body.
- It is thick in the palms and sole.
- It is thicker on the posterior parts of the body, and on the lateral sides of the limbs.
- In the eyelids, scrotum, and penis it is very thin.
- It consists of connective tissue, elastic fibers and blood vessels, lymphatics, nerves.

The connective tissue is arranged in two layers:

- deeper, reticular,
- superficial, papillary.

The reticular layer

- It consists of bands of fibrous tissue, containing fibers of elastic tissue.
- Inferior to the reticular layer is the fat areolar tissue.

The papillary layer

- It consists of numerous small, sensitive, vascular eminences, the *papillæ*.

- These are small conical eminences with rounded extremities.
- Each *papilla* consists of small and interlacing bundles of tissue.
- The arteries supplying the skin form a network in the subcutaneous tissue.
- They form branches to supply the sudoriferous glands, the hair follicles, and the fat.
- The lymphatic vessels of the skin form two networks, one superficial and one deep.
- The nerves of the skin end in the *epidermis* and in the *corium*.

The appendages of the skin

The appendages of the skin are:

- the nails,
- the hairs,
- the sudoriferous,
- the sebaceous glands.

The nails (*Ungues*)

- They are flattened, elastic structures, placed on the posterior aspect of the terminal phalanges of the fingers and toes.
- Each nail has an external surface, an internal one, being implanted by the root, into a groove of the skin.
- The exposed portion is called the body, and the distal extremity the free border.
- Near the root the *papillæ* are less vascular.
- This white portion is called the *lunula*.
- The cuticle pass anterior on the dorsal surface of the finger or toe.
- The superficial part of the nail consists of *stratum lucidum, stratum corneum*.
- The deep part consists of *stratum mucosum*.

The hair

- It is found on almost every part of the surface of the body.
- It is not present in the palms, the soles, the dorsal surfaces of the terminal phalanges, the glans penis, the prepuce, internal surfaces of the *labia*.

- A hair consists of:
- a root, implanted in the skin;
- a shaft.

The hair follicle consists of two layers: an external or dermic, and an internal or epidermic.

The external or dermic layer

- It is formed of fibrous tissue.
- It is highly vascular, being innervated by a lot of nervous filaments.
- It consists of three layers.
- The innermost is a hyaline membrane.
- This layer goes from the follicle until the ducts of the sebaceous glands.
- Externally is a layer of connective tissue, in which are present bloodvessels and nerves.
- The inner or epidermic layer is intimately adherent to the root of the hair.
- It consists of two layers, the external and internal root sheaths.

The internal root sheath consists of:

- a thin cuticle next the hair;
 - the Huxley's layer;
 - the Henle's layer.
- The shaft of the hair consists of three parts, the *medulla*, the cortex, and the cuticle.
- The cortex constitutes the main part of the shaft.
- The cuticle consists of a single layer from inferior to superior.
- Close to the hair follicles there is an involuntary muscular, the *Errectores pilorum*.
- It has origin from the superficial layer of the *corium*.
- It is inserted into the hair follicle.

The sebaceous glands (*Glandulæ sebaceæ*)

- They are small, sacculated, glandular organs, located into the *corium*.
- They are found in the skin, abundant in the scalp and face.
- They are disposed in the apertures of the anus, nose, mouth, and external ear.
- Each gland consists of a single duct.

The sudoriferous glands (*Glandulæ sudoriferæ*)

- They are found in almost every part of the skin.
- They are situated in small pits on the inferior surface of the *corium*, in the subcutaneous areolar tissue, surrounded by adipose tissue.
- They are large in regions where the amount of perspiration is great, as in the *axillæ*.
- They are large in the groin.
- They are a lot on the palms and on the soles.
- They are least numerous in the neck.
- They are absent in the deeper portion of the external auditory meatus, the prepuce and the *glans penis*.
- The tube consists of two layers, an external, of an areolar tissue, and an internal, the epithelium.
- The external layer is continuous with the superficial *stratum* of the *corium*.
- The ducts are not presenting muscular fibers.
- They are formed of a basement membrane.
- The ceruminous glands from the external acoustic meatus are sudoriferous glands, but special.

VI. THE CRANIAL NERVES * A. M. Şişu

1. OLFACTORY NERVES, CN I

In the olfactory bulb/tract as apparent origin.

They exit via the cribriform plate of ethmoid.

They are sensorial nerves.

2. OPTIC NERVES, CN II

In the optic chiasm/lateral geniculate body as apparent origin.

They exit via the optic canal of the sphenoid.

They are sensorial nerves.

3. OCCULOMOTOR NERVES, CN III

In the interpeduncular fossa (anterior aspect) as apparent origin.

They exit via the superior orbital fissure of the sphenoid.

They are motor nerves.

4. TROCHLEAR NERVES, CN IV

On the posterior surface of the brainstem as apparent origin.

They exit via the superior orbital fissure of the sphenoid.

They are motor nerves.

5. TRIGEMINAL NERVES, CN V

On the lateral aspect of the pons as apparent origin.

They are mixt nerves.

CN V1=OPHTHALMIC NERVES

They exit via the superior orbital fissure.

They are sensorial nerves.

CN V2= MAXILLARY NERVES

They exit via the foramen rotundum.

They are sensorial nerves.

CN V3= MANDIBULAR NERVES

They exit via the foramen ovale.

They are mixt nerves.

6. ABDUCENT/ABDUCENS NERVES, CN VI

In the pontomedullary junction (medial) as apparent origin.

They exit via the superior orbital fissure.

They are motor nerves.

7. FACIAL NERVES, CN VII

In the pontomedullary junction (lateral) as apparent origin.

They exit via the internal acoustic meatus.

They are mixt nerves.

8. VESTIBULO COCHLEAR NERVES, CN VIII

In the pontomedullary junction (lateral to CN VII) as apparent origin.

They exit via the internal acoustic meatus.

They are sensorial nerves.

9. GLOSSOPHARYNGEAL NERVES, CN IX

In the retro-olivary sulcus as apparent origin.

They exit via the jugular foramen.

They are mixt nerves.

10. VAGI /PNEUMOGASTRIC NERVES, CN X

In the retro-olivary sulcus as apparent origin.

They exit via the jugular foramen.

They are mixt nerves.

11. ACCESSORY/SPINAL NERVES, CN XI

In the medulla and spinal cord as apparent origin.

They exit via the jugular foramen.

They are motor nerves.

12. HYPOGLOSSAL NERVES, CN XII

In the pre-olivary sulcus as apparent origin.

They are motor nerves.

They exit via the hypoglossal canal.

VII. NOMINA ANATOMICA TRANSLATED INTO ENGLISH * A.M. Şişu, C.I. Petrescu

Organa sensum=sense organs

Pars olfactoria tunicae mucosae nasi=olfactory part of nasal mucosa, olfactory area

Glandulae olfactoriae=olfactory glands

Oculus et structurae pertinentes=eye and related structures

Bulbus oculi=eyeball

Polus anterior=anterior pole

Polus posterior=posterior pole

Equator=equator

Meridian=meridians

Axis bulbi externus=external axis of eyeball

Axis bulbi internus=internal axis of eyeball

Axis opticus=optic axis

Segmentum anterius=anterior segment

Segmentum posterius=posterior segment

Tunica fibrosa bulbi=fibrous layer of eyeball

Sclera=sclera

Sulcus sclerae=sclera groove

Reticulum trabeculare=trabecular tissue
Pars corneoscleralis=corneoscleral part
Pars uvealis=uveal part
Calcar sclerae=scleral spur
Sinus venosus sclerae=scleral venous sinus
Lamina episcleralis=episcleral layer
Substantia propria sclerae=proper substance of sclera
Lamina fusca sclerae=suprachoroid lamina
Lamina cribrosa sclerae=lamina cribrosa of sclera
Cornea=cornea
Anulus conjunctivae sclerae=conjunctival ring
Limbus corneae=corneoscleral junction, corneal limbus
Vertex corneae=corneal vertex
Facies anterior=anterior surface
Facies posterior=posterior surface
Epithelium anterius= anterior epithelium
Lamina limitans anterior=anterior limiting lamina
Lamina limitans posterior=posterior limiting lamina
Substantia propria=proper substance
Epithelium posterius= posterior epithelium
Tunica vasculosa bulbi=vascular layer of eyeball

Choroidea=choroid

Lamina suprachoroidea=suprachoroid lamina

Spatium perichoroideum=perichoroidal space

Lamina vasculosa=vascular lamina

Lamina choroidocapillaris=capillary lamina

Lamina basalis=basal lamina

Vasa sanguinea choroideae=choroid blood vessels

Corpus ciliare=ciliary body

Corona ciliaris=corona ciliaris

Processus ciliares=ciliary process

Plicae ciliares=ciliary folds

Orbiculus ciliaris=orbiculus ciliaris

M. ciliaris=ciliary muscle

Fibrae meridionales=meridional fibres

Fibrae longitudinales=longitudinal fibres

Fibrae radiales=radial fibres

Fibrae circulares=circular fibres

Lamina basalis=basal lamina

Iris=iris

Margo pupillaris=pupillary border

Margo ciliaris=ciliary border

Facies anterior=anterior surface

Facies posterior= posterior surface

Anulus iridis major=outer border of iris

Anulus iridis minor=inner border of iris

Plicae iridis=folds of iris

Pupilla=pupil

M. sphincter pupillae=sphincter muscle of pupil

M. dilatator pupillae= dilatator muscle of pupil

Stroma iridis=iris stroma

Epithelium pigmentosum=pigmented epithelium

Spatia anguli iridocornealis=spaces of iridocorneal angle

Circulus anteriorus iridis major=major anterior circle of iris

Circulus anteriorus iridis minor=minor anterior circle of iris

Tunica interna bulbi=inner layer of eyeball

Retina=retina

Pars caeca retinae=nonvisual retina

Pars ciliaris retinae=ciliary part of retina

Pars iridica retinae=iridial part of retina

Ora serrata=ora serrata

Pars optica retinae=optic part of retina

Stratum pigmentosum=pigmented layer

Stratum nervosum=neural layer

Stratum segmentorum externorum et internorum=layer of inner and outer segments

Stratum limitans externum=outer limiting layer

Stratum nucleare externum=outer nuclear layer

Stratum plexiforme externum=outer plexiform layer

Stratum nucleare internum=inner nuclear layer

Stratum plexiforme internum=inner plexiform layer

Stratum ganglionicum=ganglionic layer

Stratum neurofibrarum=layer of nerve fibres

Stratum limitans internum=inner limiting layer

Discus nervi optici=optic disc

Macula lutea=macula

Fovea centralis=fovea centralis

Nervus opticus=optic nerve

Pars intracranialis=intracranial part

Pars canalis=part in canal

Pars orbitalis=orbital part

Pars intraocularis=intra-ocular part

Vagina externa=outer sheath

Vagina interna=internal sheath

Spatium intervaginale subarachnoidale=subarachnoid space

Vasa sanguinea retinae=retinal blood vessels

A. centralis retinae, pars intraocularis=central retinal artery, intraocular part

Circulus vasculosus nervi optici=Vascular circle of optic nerve

Arteriola temporalis retinae superior=superior temporal retinal arteriole

Arteriola temporalis retinae inferior=inferior temporal retinal arteriole

Arteriola nasalis retinae superior=superior nasal retinal arteriole

Arteriola macularis superior=superior macular arteriole

V. centralis retinae, pars intraocularis=central retinal vein, intraocular part

Venula nasalis retinae superior=superior nasal retinal venule

Lens=lens

Capsula lentis=lens capsule

Zonula ciliaris=ciliary zonule

Camerae bulbi=chambers of eyeball

Humor aquosus=aqueous humor

Camera anterior= anterior chamber

Angulus iridocornealis=iridocorneal angle

Camera posterior=posterior chamber

Camera vitrea=vitreous chamber

Corpus vitreum=vitreous body

Humor vitreus=vitreous humor

Structurae oculi accessoriae=accessory visual structures

Septum orbitale=orbital septum

Vagina bulbi=fascial sheath of eyeball

Lig. suspensorium bulbi=suspensory ligament of eyeball

Spatium episclerale=episcleral space

Musculi externi bulbi oculi=extra ocular muscles, extrinsic muscles of eyeball

M. orbitalis=orbital muscle

M. rectus superior=superior rectus/straight muscle

M. rectus medialis= medial straight muscle

Anulus tendineus communis=common tendinous ring, common annular tendon

M. obliquus superior=superior oblique muscle

Trochlea=trochlea, pulley

M. levator palpebrae superioris=Levator palpebrae superior muscle, lifting superior eyelid muscle

Supercilium=eyebrow

Palpebrae=eyelids

Palpebra superior=superior eyelid

Facies anterior palpebrae=anterior surface of eyelid

Plica palpebronasalis=medial canthic fold

Rima palpebrarum=palpebral fissure

Commissura lateralis palpebrarum=lateral palpebral commissure

Angulus oculi lateralis=lateral angle of eye

Limbus anterior palpebrae=anterior palpebral margin

Cilia=eyelash

Tarsus superior=superior tarsus

Lig. palpebrale laterale=lateral palpebral ligament

Glandulae tarsale=tarsal glands

Tunica conjunctiva=conjunctiva

Plica semilunaris=semilunar fold

Caruncula lacrimalis=lacrimal caruncle

Tunica conjunctiva bulbi=bulbar conjunctiva

Saccus conjunctivalis=conjunctival sac

Apparatus lacrimalis=lacrimal apparatus

Glandula lacrimalis=lacrimal gland

Pars orbitalis=orbital part

Rivus lacrimalis=lacrimal pathway

Lacus lacrimalis=lacrimal lake

Punctum lacrimale=lacrimal point

Ductus nasolacrimalis=nasolacrimal duct

Plica lacrimalis=lacrimal fold

Auris=ear

Auris externa=external ear

Auricula=auricle, pinna

Lobulus auriculae=lobe of ear

Cartilage articulae=articular cartilage

Helix=helix

Spina helicis=spine of helix

Cauda helicis=tail of helix

Antihelix=antihelix

Fossa triangularis=triangular fossa

Scapha=scapha

Cymba concae=cymba of concae

Tragus=tragus

Antitragus=antitragus

Incisura anterior=anterior notch

Incisura intertragica=intertragic notch

Sulcus posterior auricule= posterior auricular groove

Ligg. auricularia= ligaments of auricle

Mm. auriculares=auricular muscles

Meatus acusticus externus=external acoustic meatus

Porus acusticus externus=external acoustic pore, external acoustic aperture

Incisura tympanica=tympanic notch

Membrana tympanica= tympanic membrane

Pars flaccida=pars flaccida

Umbo=umbo

Anulus fibrocartilagineus=fibrocartilaginous ring

Auris media=middle ear

Cavitas tympani=tympanic cavity

Paries tegmentalis=tegmental wall, tegmental roof

Paries jugularis=jugular wall, floor

Paries labyrinthicus= labyrinthine wall, medial wall

Fenestra vestibuli=oval window

Fossula fenestrae vestibuli= fossa of oval window

Promontorium=promontory

Sinus tympani=sinus tympani

Fenestra cochleae=round window

Paries mastoideus=mastoid/posterior wall

Aditus ad antrum mastoideum=aditus to mastoid antrum

Prominentia canalis facialis=prominence of facial canal

Prominentia canalis semicircularis lateralis=prominence of lateral semicircular canal

Fossa incudes=fossa of incus

Apertura tympanica canaliculi chordae tympani=tympanic aperture of canaliculus for chorda tympani

Antrum mastoideum=mastoid antrum

Cellulae mastoideae=mastoid cells

Paries caroticus=carotid wall

Paries membranaceus=membranous /lateral wall

Ossicula auditus, ossicula auditoria=auditory ossicles

Stapes=stapes

Crus anterius=anterior limb

Incus=incus

Corpus incudis= body of incus

Malleus=hammer

Manubrium mallei=handle of malleus

Processus lateralis=lateral process

Tuba auditiva, tuba auditoria=pharyngotympanic tube, auditory tube

Pars ossea=bony part

Auris interna=internal ear

Organum vestibulocochleare=vestibulocochlear organ

Vestibulum=vestibule

Labyrinthus osseus=bony labyrinth

Crista vestibuli=vestibular crest

Pyramis vestibuli=pyramid of vestibule

Canales semicirculares=semicircular canals

Cochlea=cochlea

Canalis spiralis cochleae=spiral canal of cochlea

Apertura interna canaliculi cochleae=internal opening of cochlear canaliculi

Modiolus cochleae= modiolus

Scala vestibuli=vestibular scale

Helicotrema=helicotrema

Scala tympani=tympanic scale

Meatus acusticus internus=internal acoustic meatus

Porus acusticus internus=internal acoustic pore/opening

Crista verticalis=vertical crest

Area vestibularis superior=superior vestibular area
Perilympa=perilymph
Aqueductus vestibuli=vestibular aqueduct
Aqueductus cochleae=cochlear aqueduct
Labyrinthus membranaceus=membranous labyrinth
Endolympha=endolymph
Labyrinthus vestibularis=vestibular labyrinth
Utriculus=utricle
Sacculus=sacculle
Ductus semicirculares=semicircular duct
Ductus utricosaccularis=utricosaccular duct
Ductus endolymphaticus=endolymphatic duct
Macula utriculi=macula of utricle
Crista ampullaris=ampullary crest
Labyrinthus cochlearis=cochlear labyrinth
Scala media=middle scale
Ductus cochlearis=cochlear duct
Membrana tectoria=tectorial membrane
Membrana reticularis=reticular membrane
Ganglion spirale cochleae=spiral ganglion
Organum gustus=gustatory organ

Porus gustatorius=taste pore

Calculus gustatorius=taste bud

Integumentum commune=the integument/skin

Cutis=skin

Epidermis=epidermis

Dermis=dermis

Pili=hairs

Lanugo=primary hair

Capili=hairs of head

Supercilia=eyebrows

Barba=beard

Unguis=nail

Lunula=lunule

Mamma=breast

Hypodermis=hypodermis

VIII. REFERENCES

1. Alina Maria Şişu, Sorin Lucian Bolintineanu, *Human Anatomy-Sense Organs-Textbook*, Editura „Victor Babeş” Timișoara, ebook, 2021
2. Alina Maria Sisu, *Anatomy of the Sense Organs*, Ed. Eurostampa, 2019
3. Gray, Henry. 1918. *Anatomy of the Human Body* - Bartleby.com.
4. Henry Gray, *Gray`s Anatomy for students*, 2010.
5. www.shutterstock.com
6. www.virtualmedicalcentre.com
7. www.canstockphoto.com
8. www.teachmeanatomy.com
9. www.barewalls.com