

CRANIAL NERVES

PART - 1



DR HIMANSHU CHAMPANERI
CONSULTANT NEUROSURGEON
MEDANTA HOSPITAL, GURUGRAM

CRANIAL NERVES

■ 12 pairs of cranial nerves

- 1 Olfactory
- 2 Optic
- 3 Oculomotor
- 4 Trochlear
- 5 Trigeminal
- 6 Abducens
- 7 Facial
- 8 VC
- 9 GP
- 10 Vagus
- 11 Accessory
- 12 Hypoglossal

Ocular
Motor
N
II

- Muscles from cranial myotomes

- 3, 4, 6, 12 — *Tongue*
eyeball

- Muscles from branchial arches

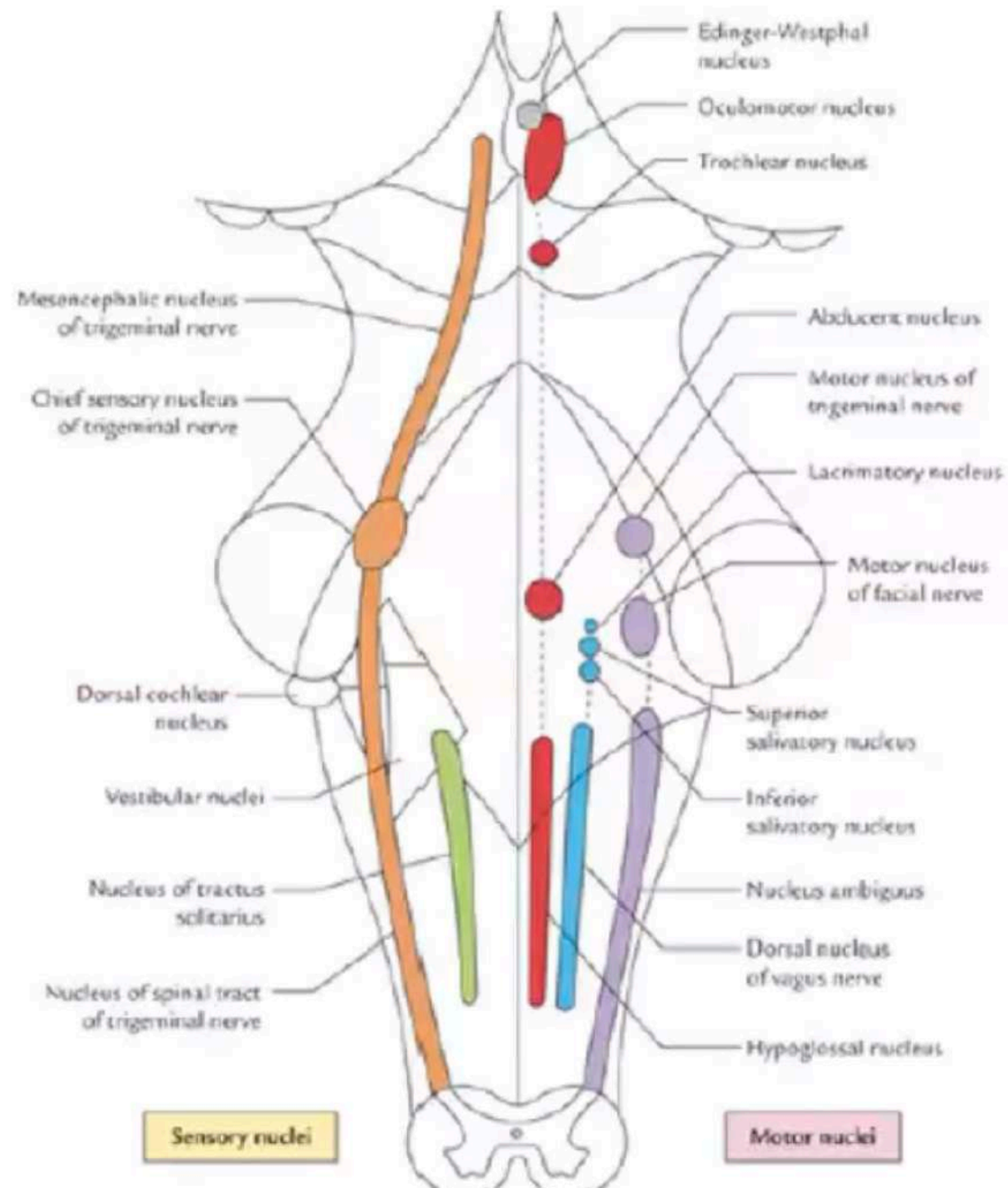
- 5, 7, 9, 10, 11

- Special sense organs

- 1, 2, 8

- Functional columns
 - General somatic efferent
 - Special visceral efferent
 - General visceral efferent
 - General visceral afferent
 - Special visceral afferent
 - General somatic afferent
 - Special somatic afferent

GSE column	SVE column	GVE column	GVA/SVA column	GSA column	SSA column
• Oculomotor nucleus	• Motor nucleus of trigeminal n.	• Edinger-Westphal nucleus	• Nucleus of solitary tract (nucleus tractus solitarius)	• Sensory nuclei of trigeminal n.	• Vestibular nuclei
• Trochlear nucleus	• Motor nucleus of facial n.	• Lacratory nucleus		1. Chief	• Cochlear nuclei
• Abducent nucleus	• Nucleus ambiguus	• Superior salivatory nucleus		2. Mesencephalic	
• Hypoglossal nucleus		• Inferior salivatory nucleus		3. Spinal	
		• Dorsal nucleus of vagus nerve			



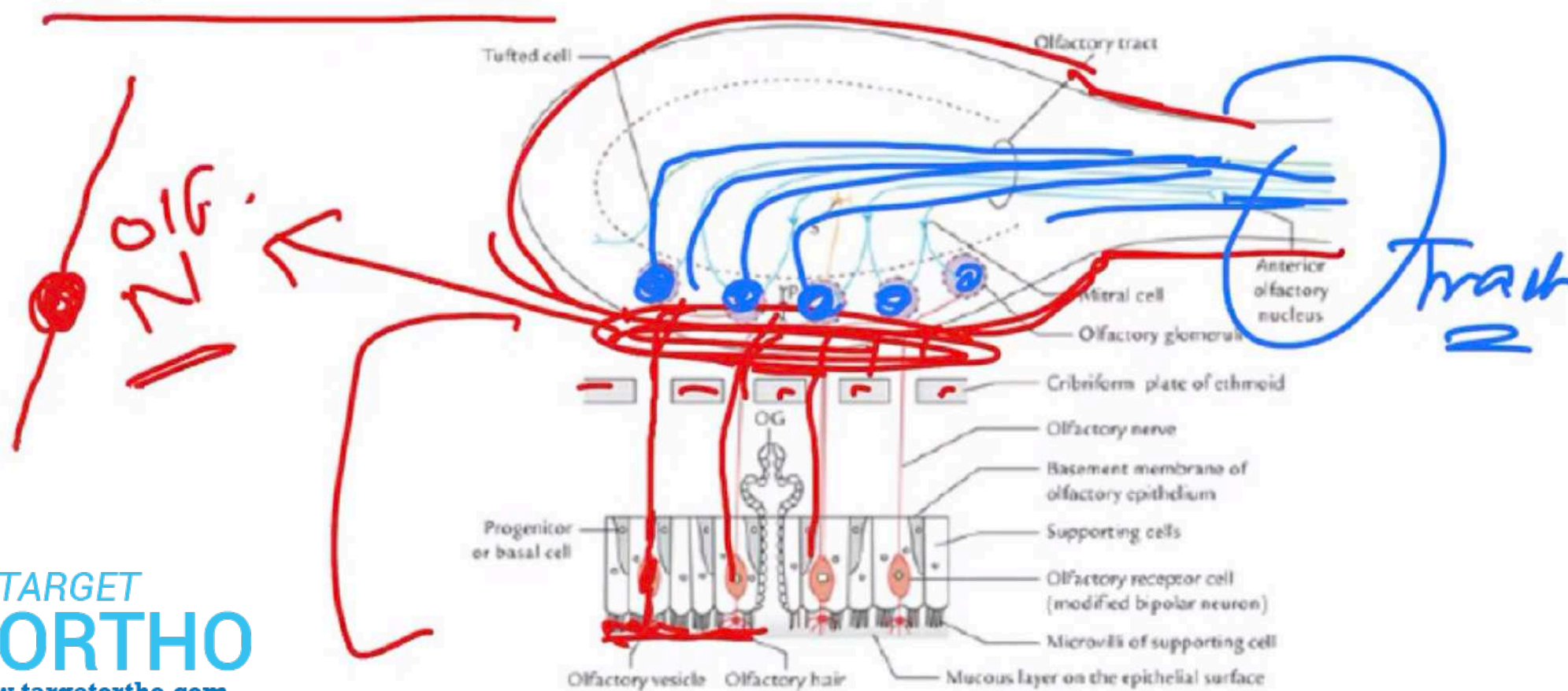
OLFACTORY NERVE

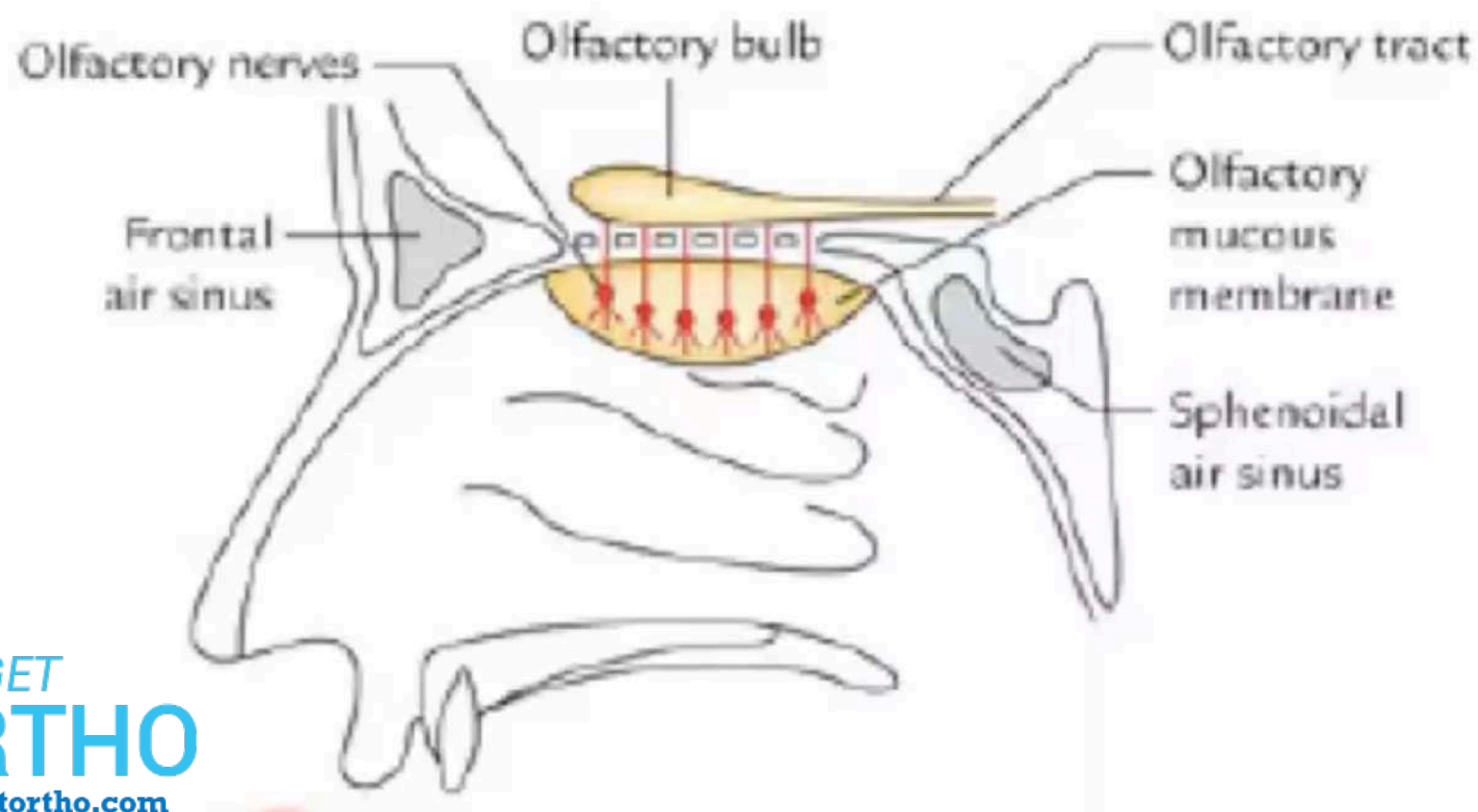
THE OLFACTORY SYSTEM

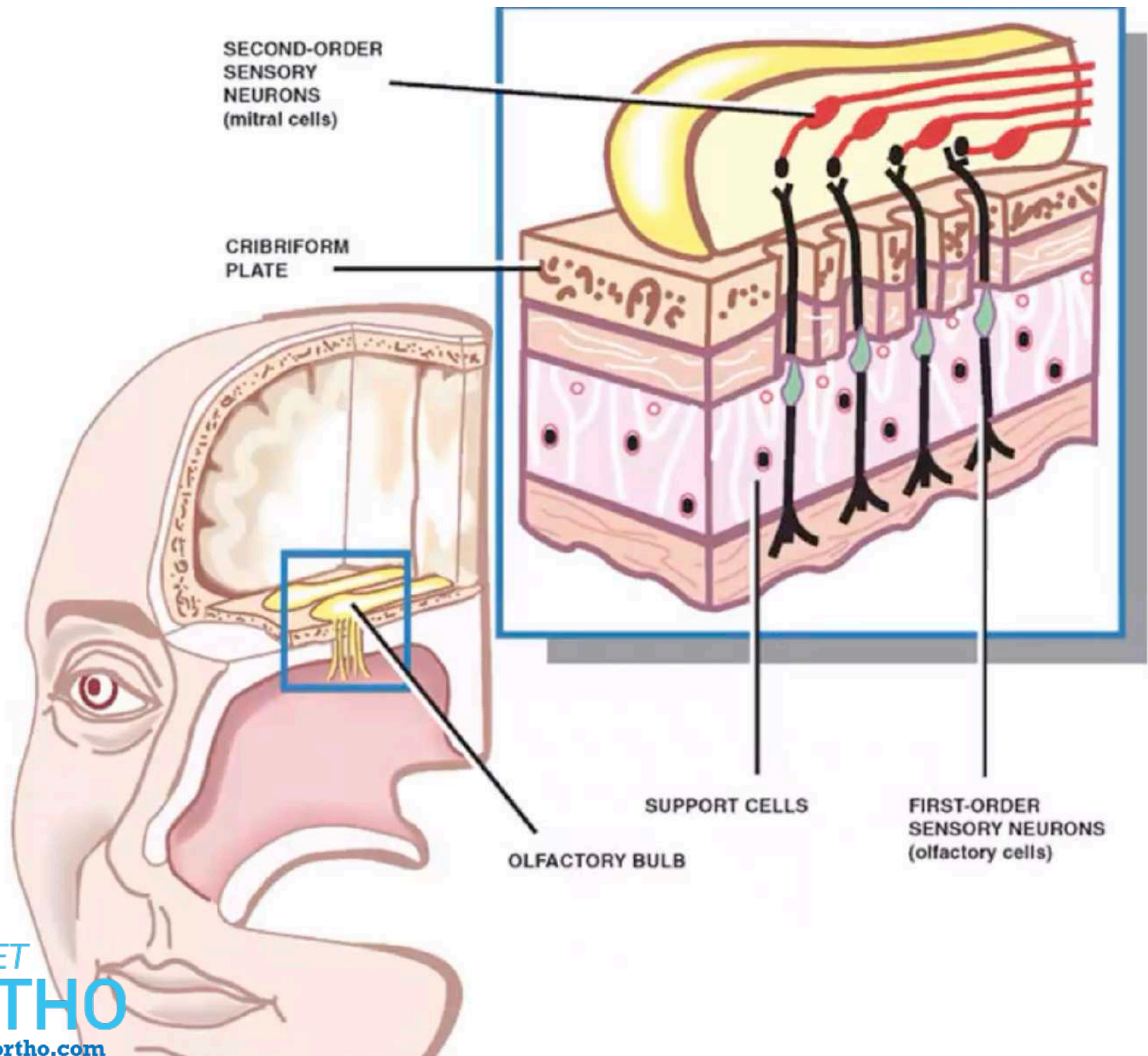
- Olfactory epithelium and nerves
- Olfactory bulb, tract and striae
- Olfactory cortical areas

OLFACTORY EPITHELIUM AND NERVES

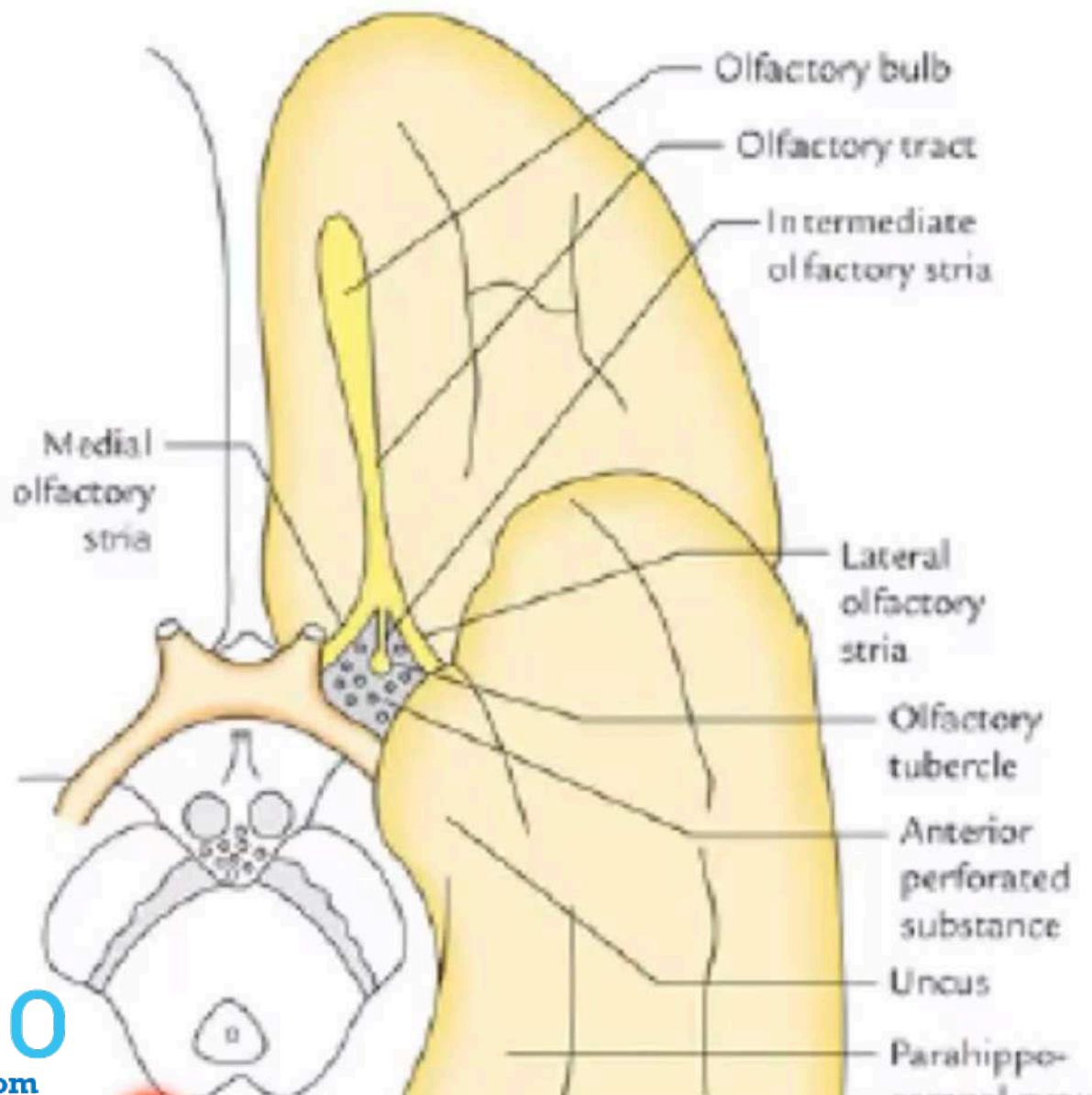
- Olfactory receptor cells
- Supporting cells
- progenitor/basal cells

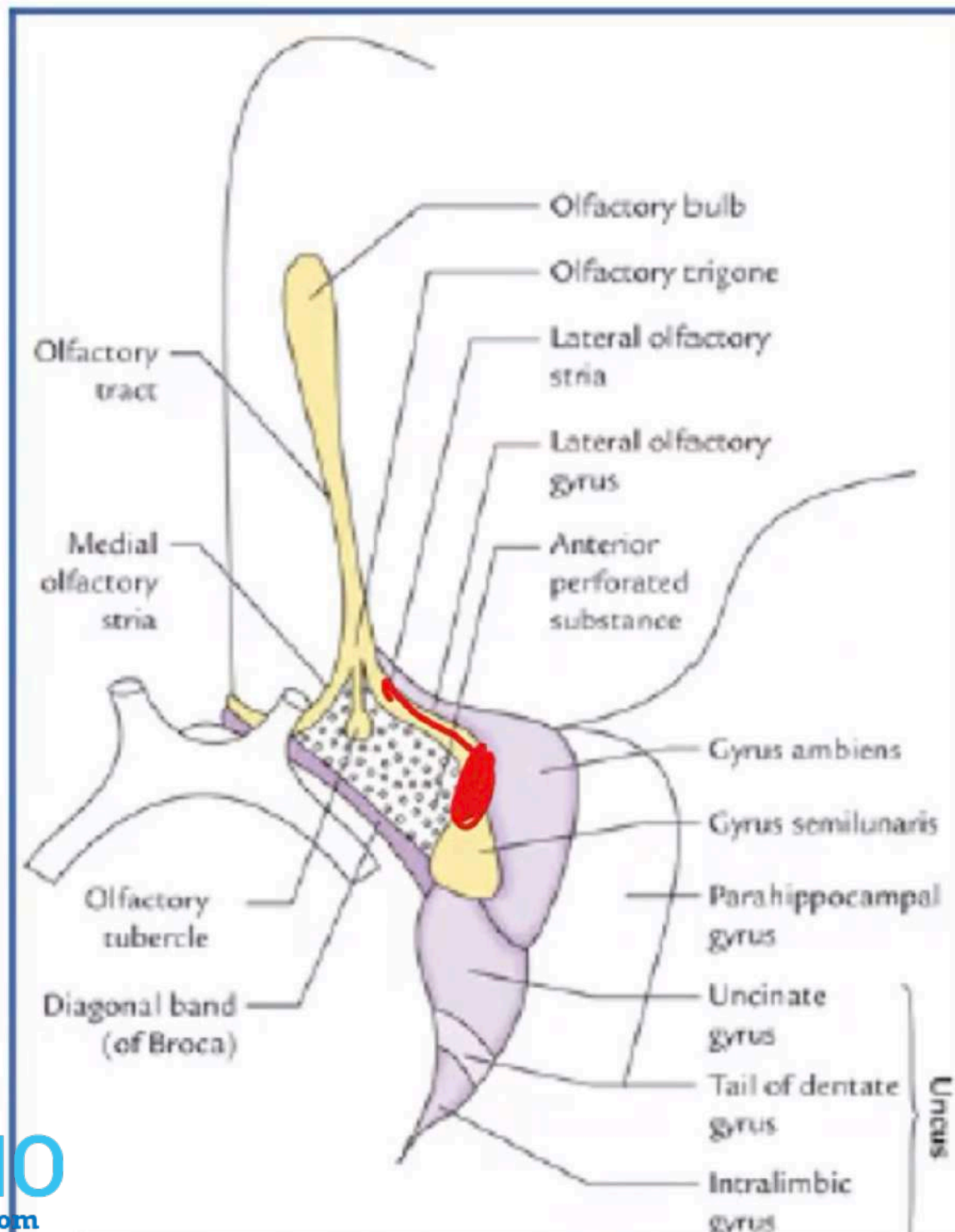






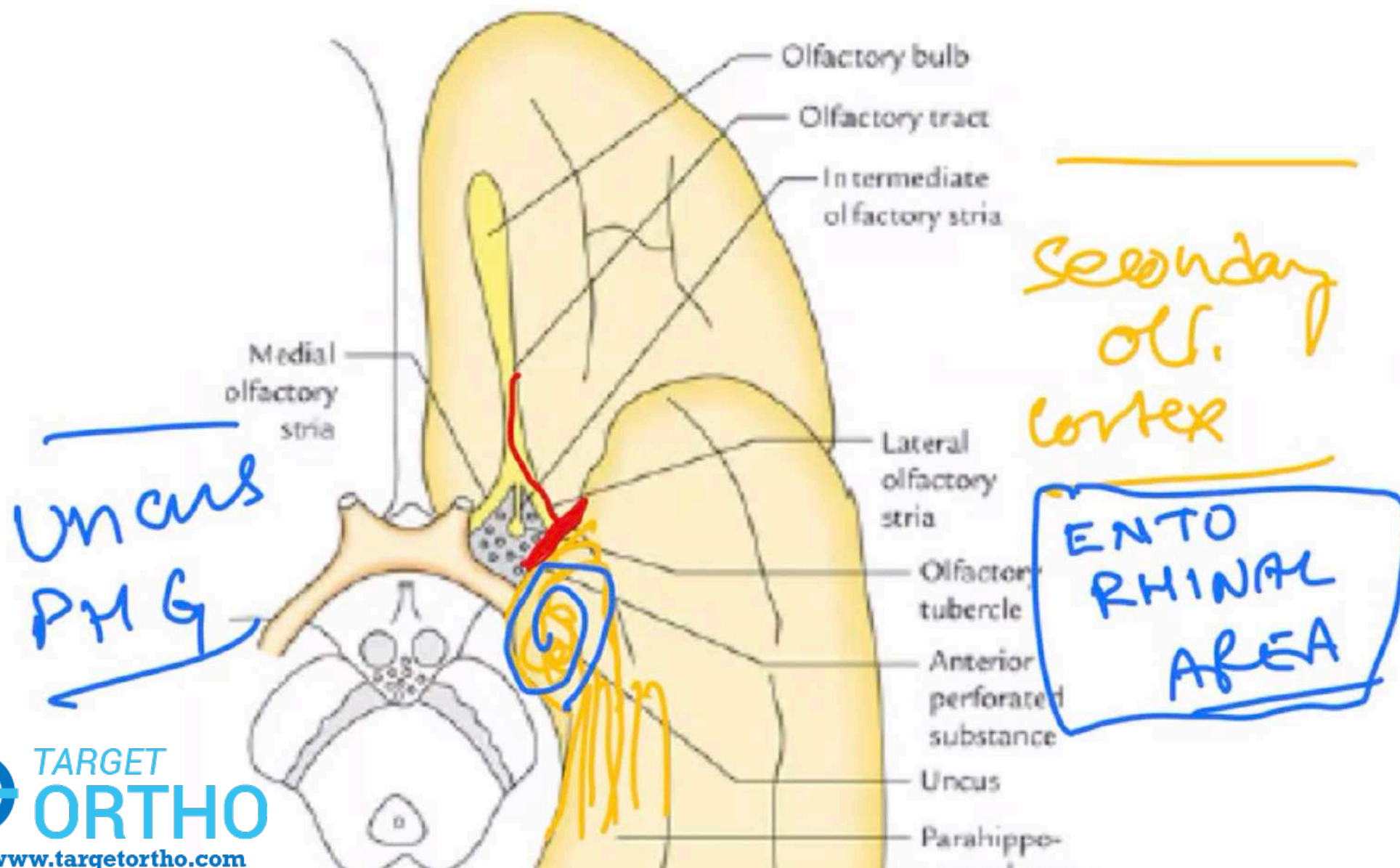
OLFACTORY BULB, TRACT AND STRIAE



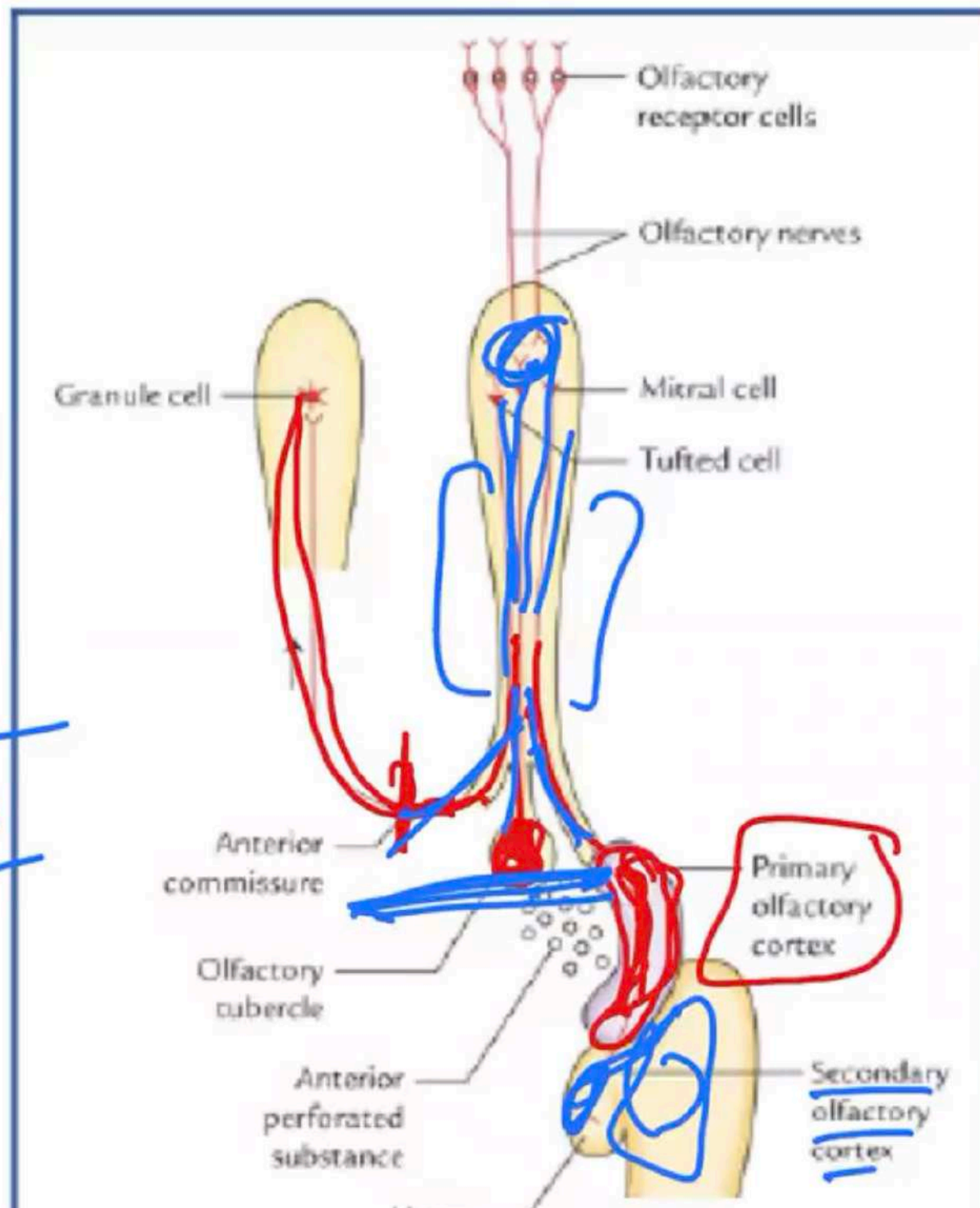


Primary
olf. cort

OLFACTORY BULB, TRACT AND STRIAE



Diagonal
Band of
BROCA



UNIQUE FEATURES

- Only two orders of neurons
- No relay in thalamus
-

OPTIC NERVE

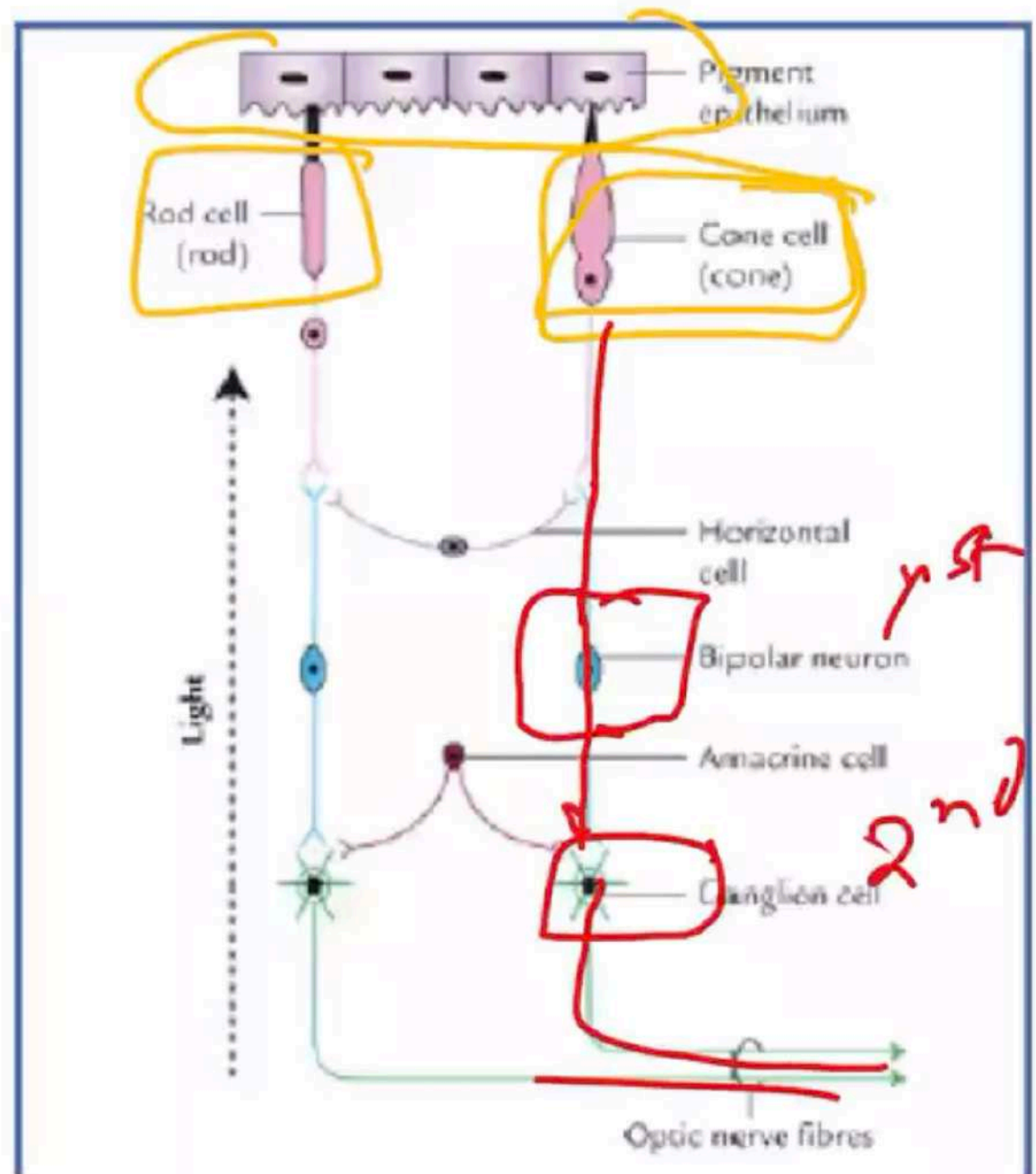
THE VISUAL SYSTEM

■ Components

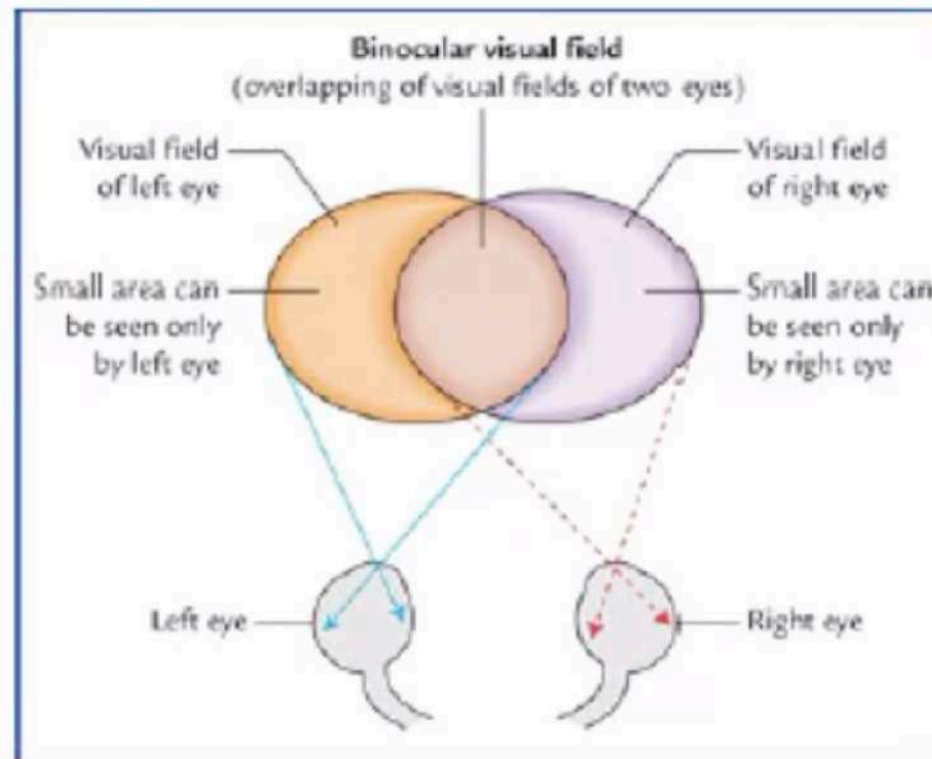
- Retina
- Optic nerve
- Optic chiasma
- Optic tract
- Lateral geniculate body — Thalamus
- Optic radiation ←
- Visual cortex

RETINA

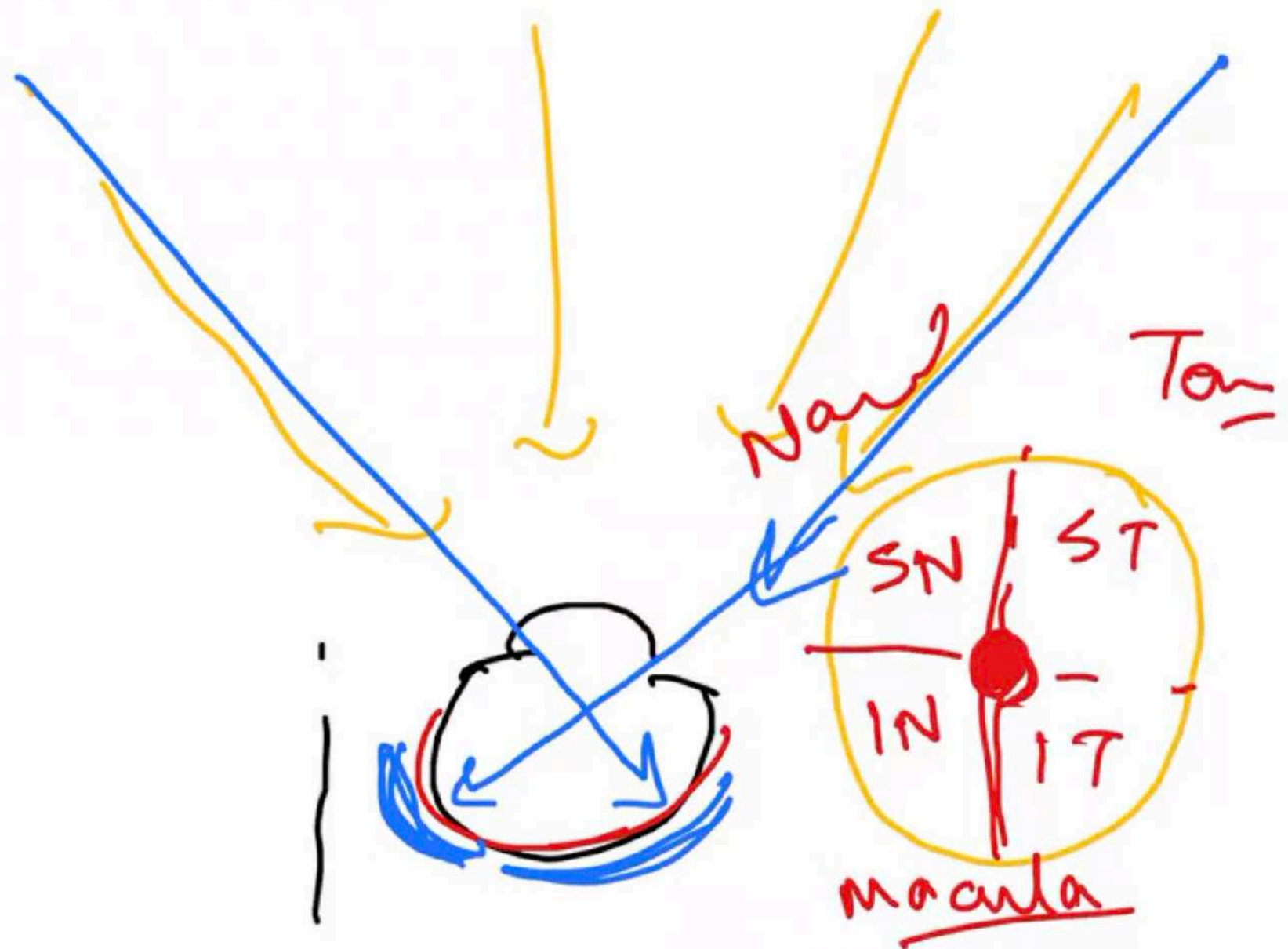
- Inner neural layer
- Outer pigment layer

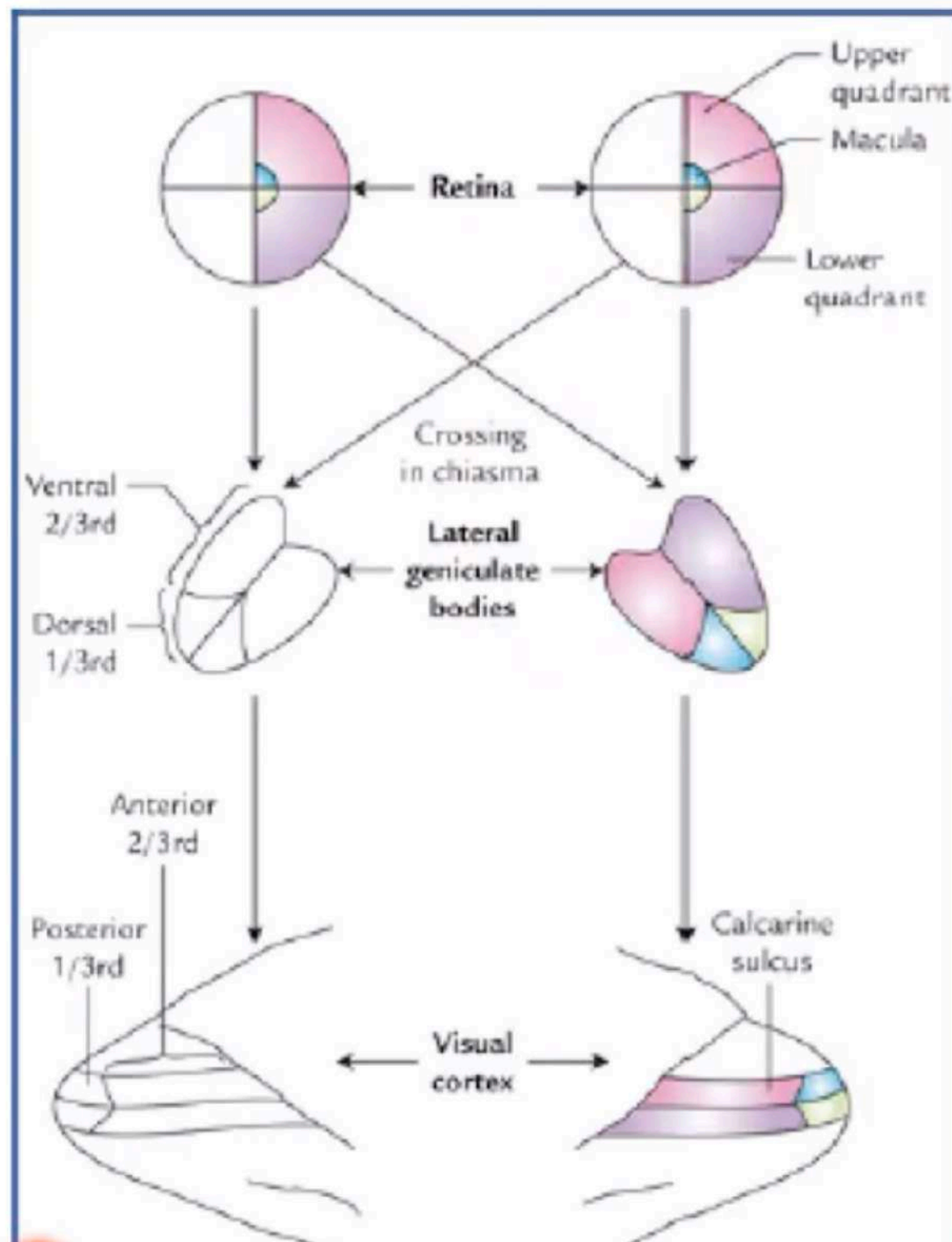


VISUAL FIELD AND RETINAL QUADRANTS

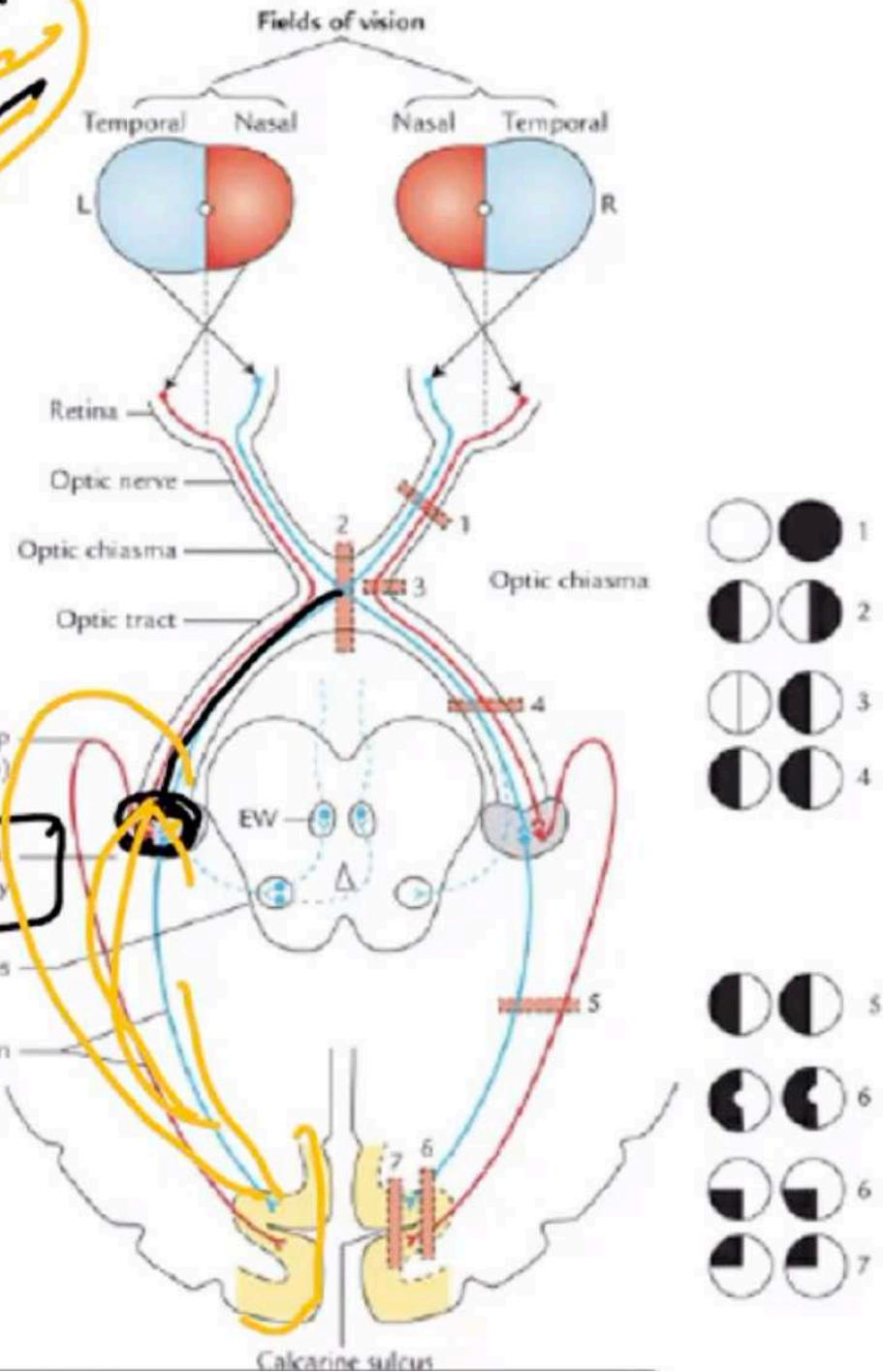
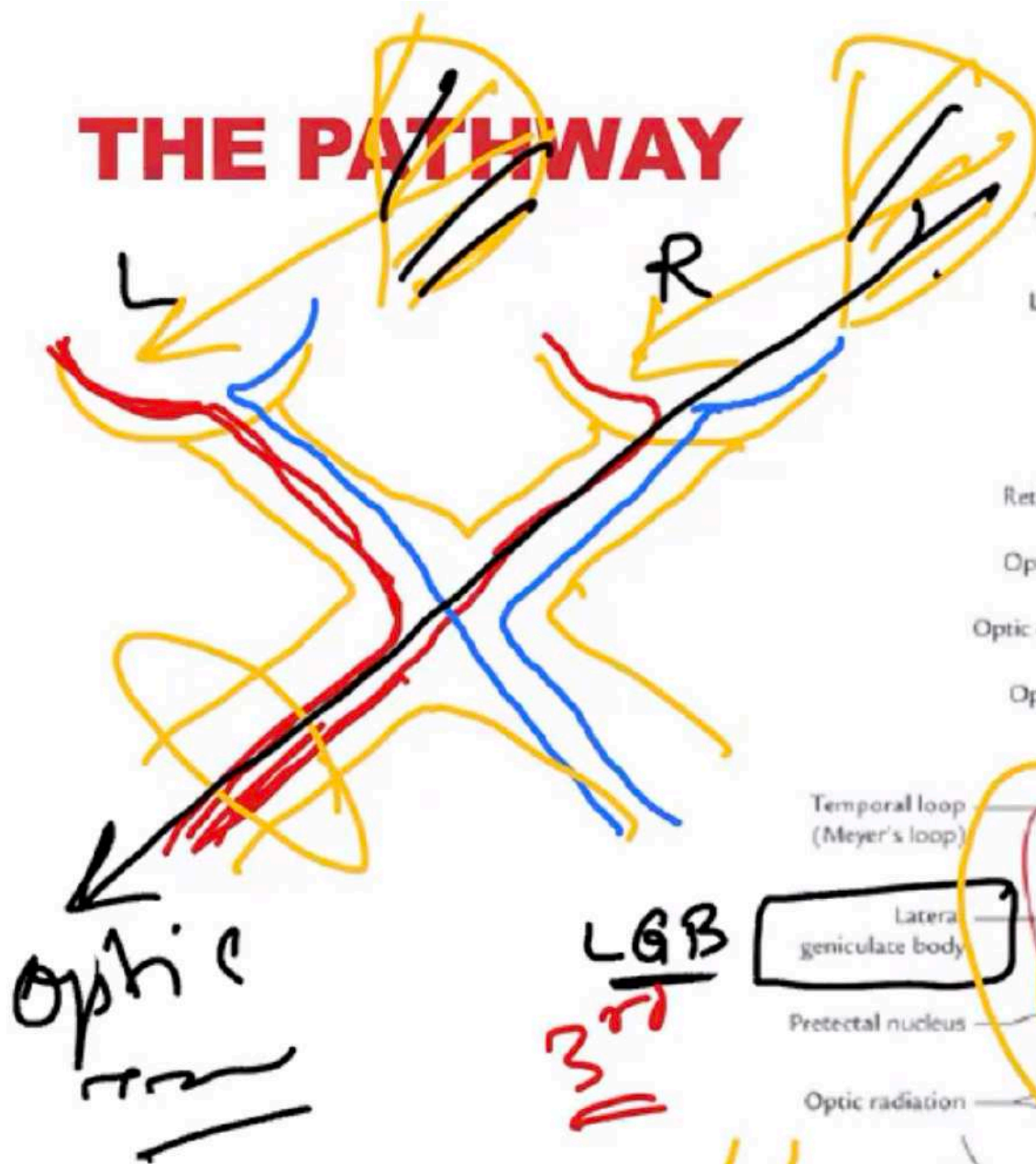


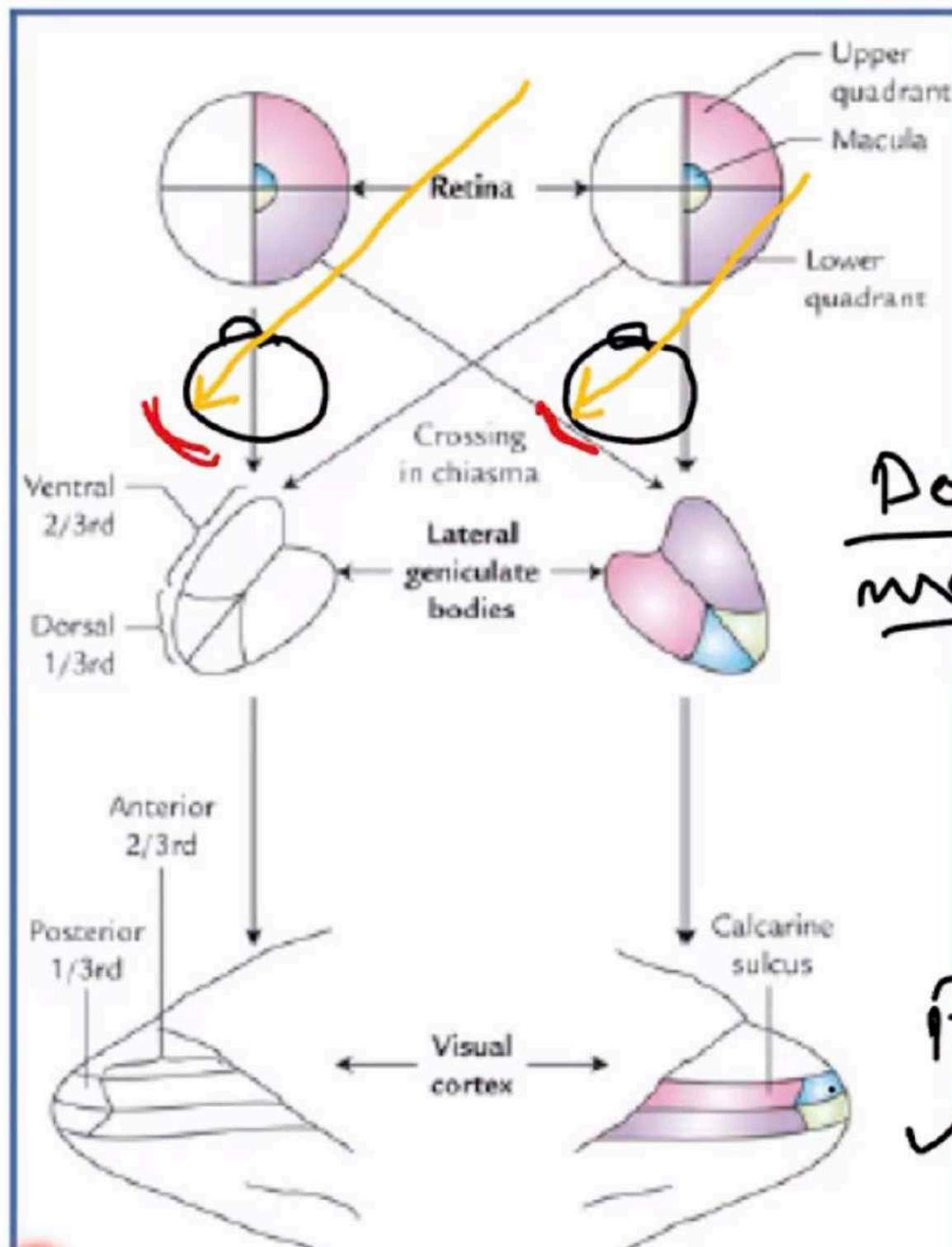
VISUAL QUADRANTS





THE PATHWAY





261

Dorsal
macula

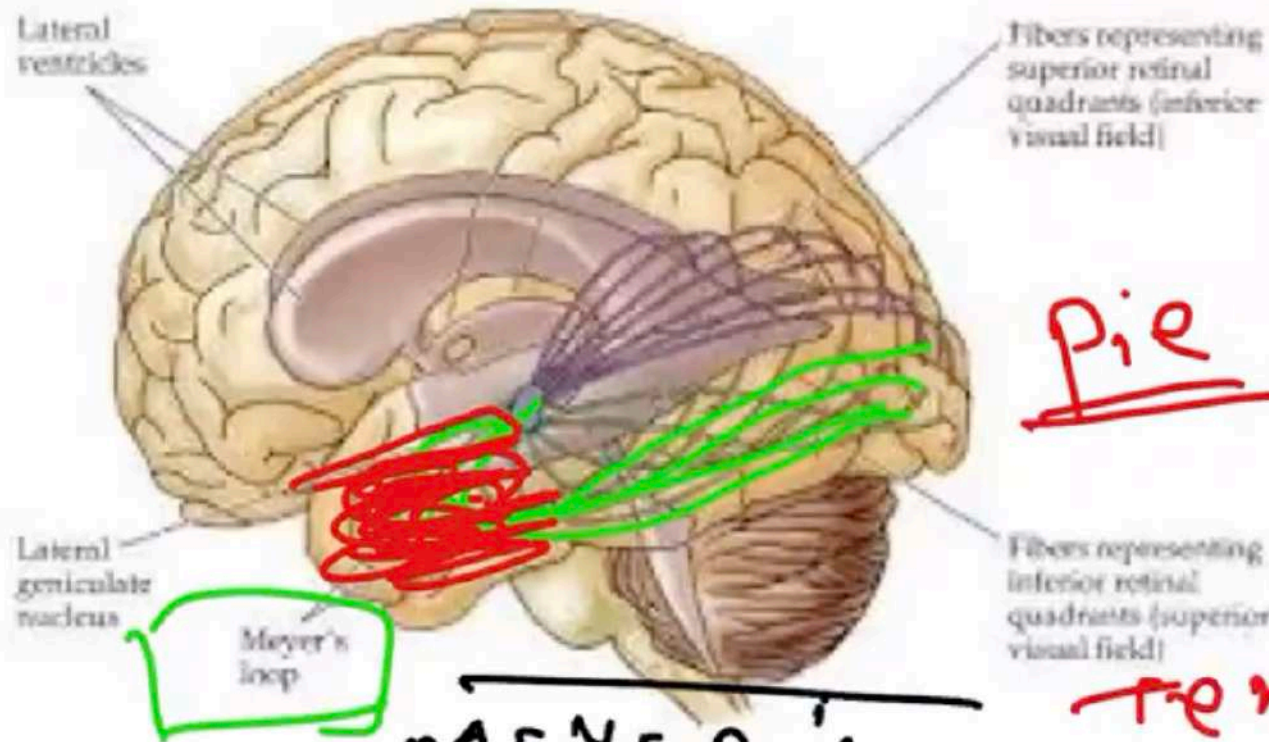
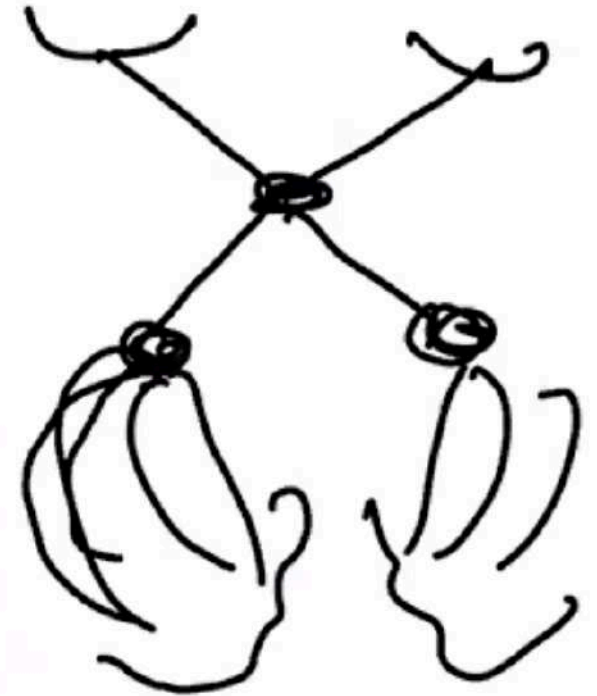
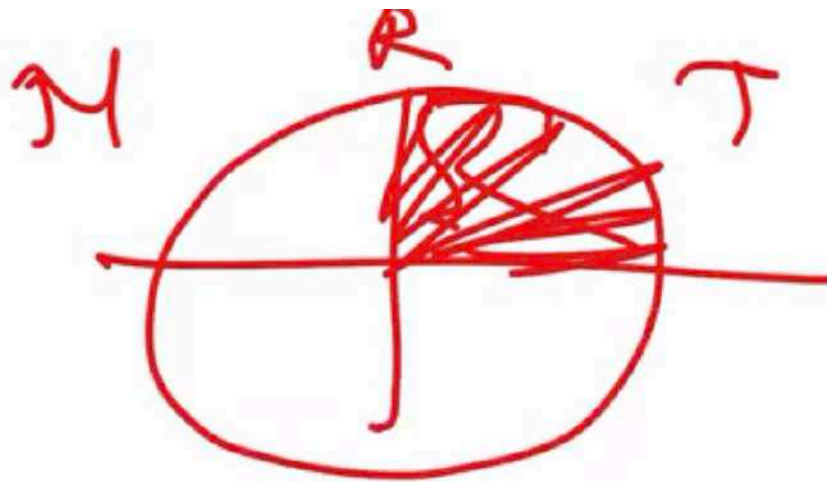
Posterior
macula

UNIQUE FEATURES

- First order neurons - bipolar cells
- Second order neurons - multipolar neurons in retina
- Third order neurons - located in the LGB

- Not a nerve, but a tract - prolongation of the brain
- Covered by 3 meninges
- Devoid of neurilemmal sheath
- Myelinated by oligodendrocytes

optic



Fibers representing superior retinal quadrants (inferior visual field)

Fibers representing inferior retinal quadrants (superior visual field)

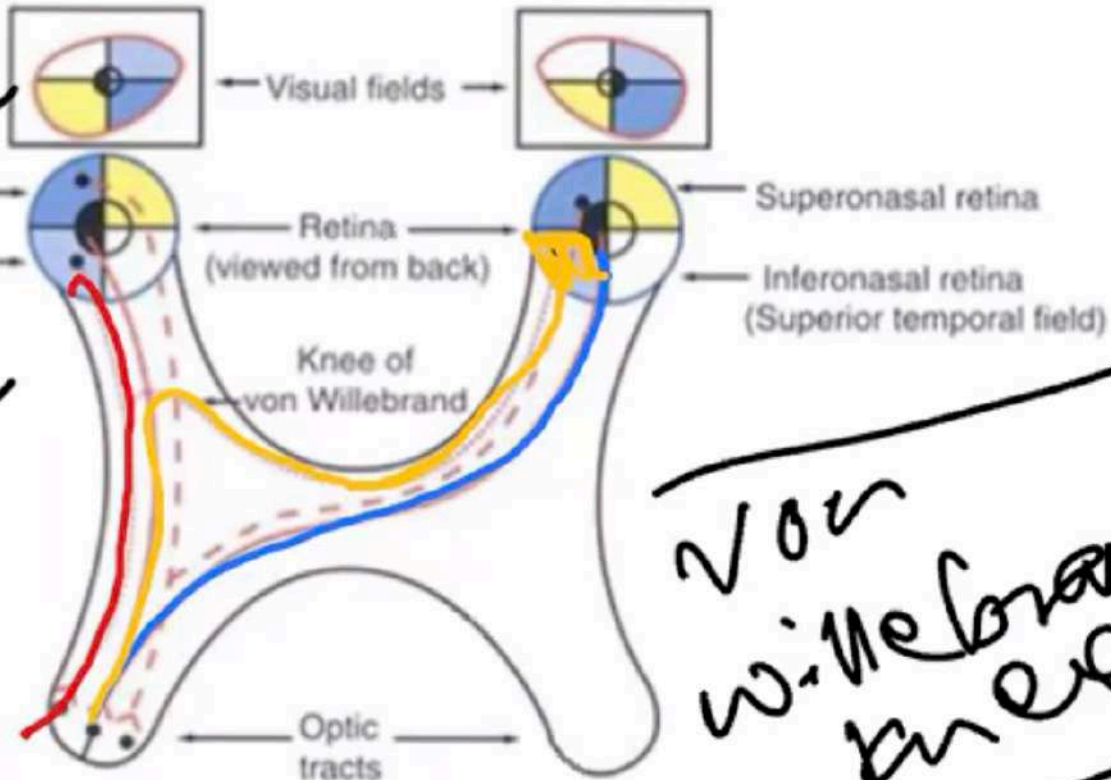
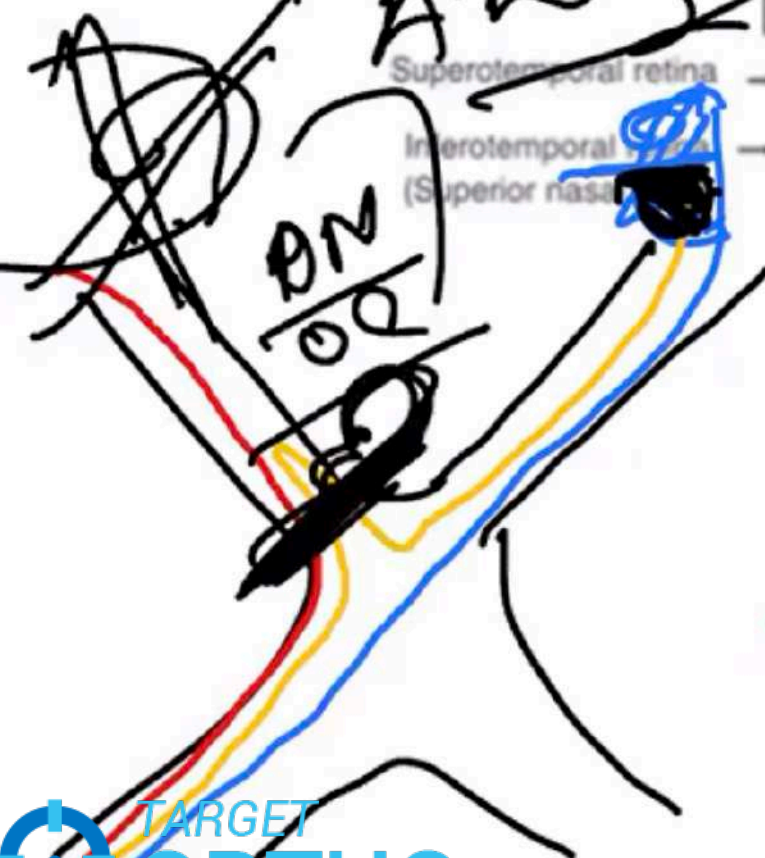
Pie

temporal Horn 2V

MEYER'S loop

Clinical
meninges

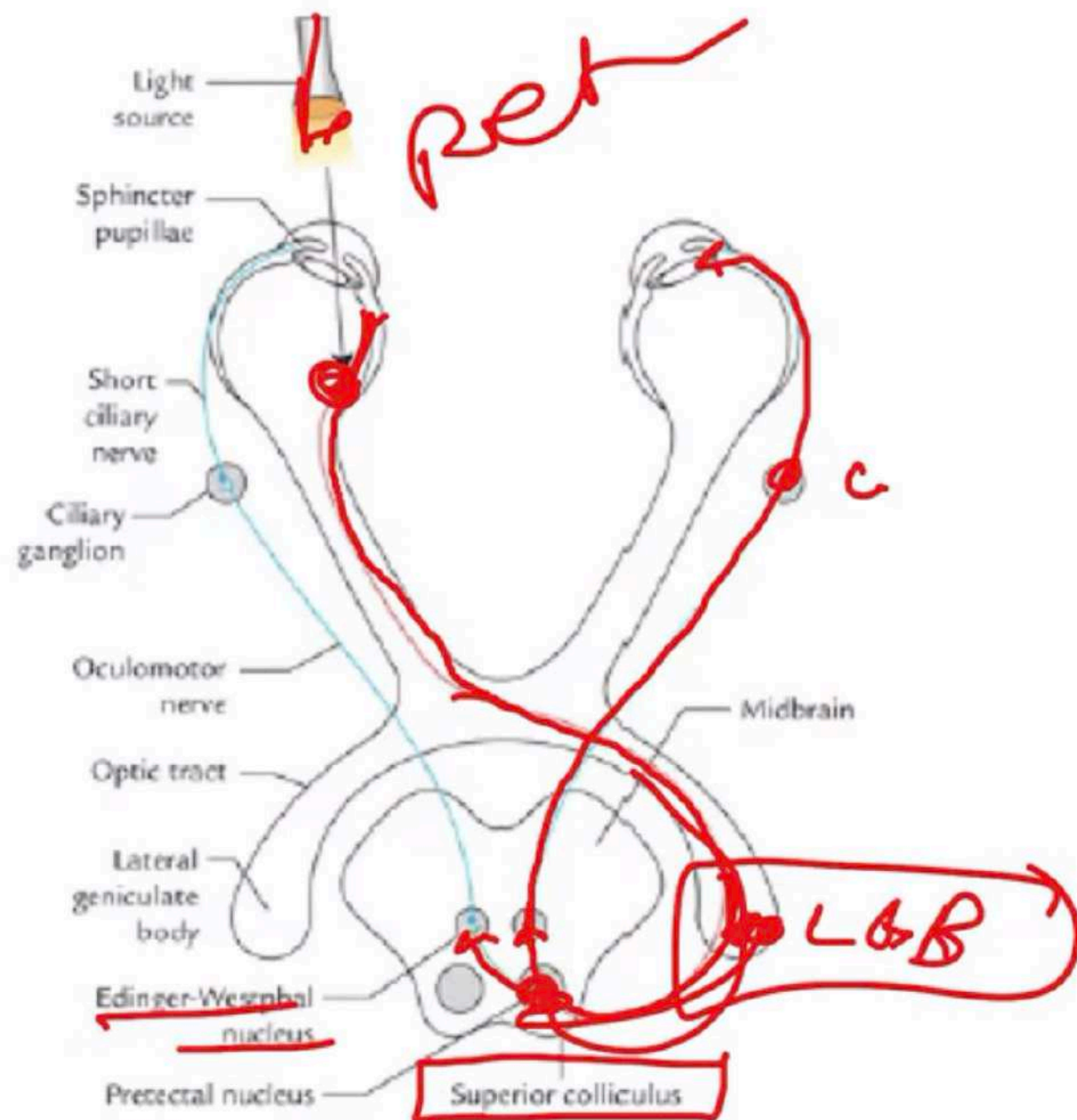
Oph.
Anes

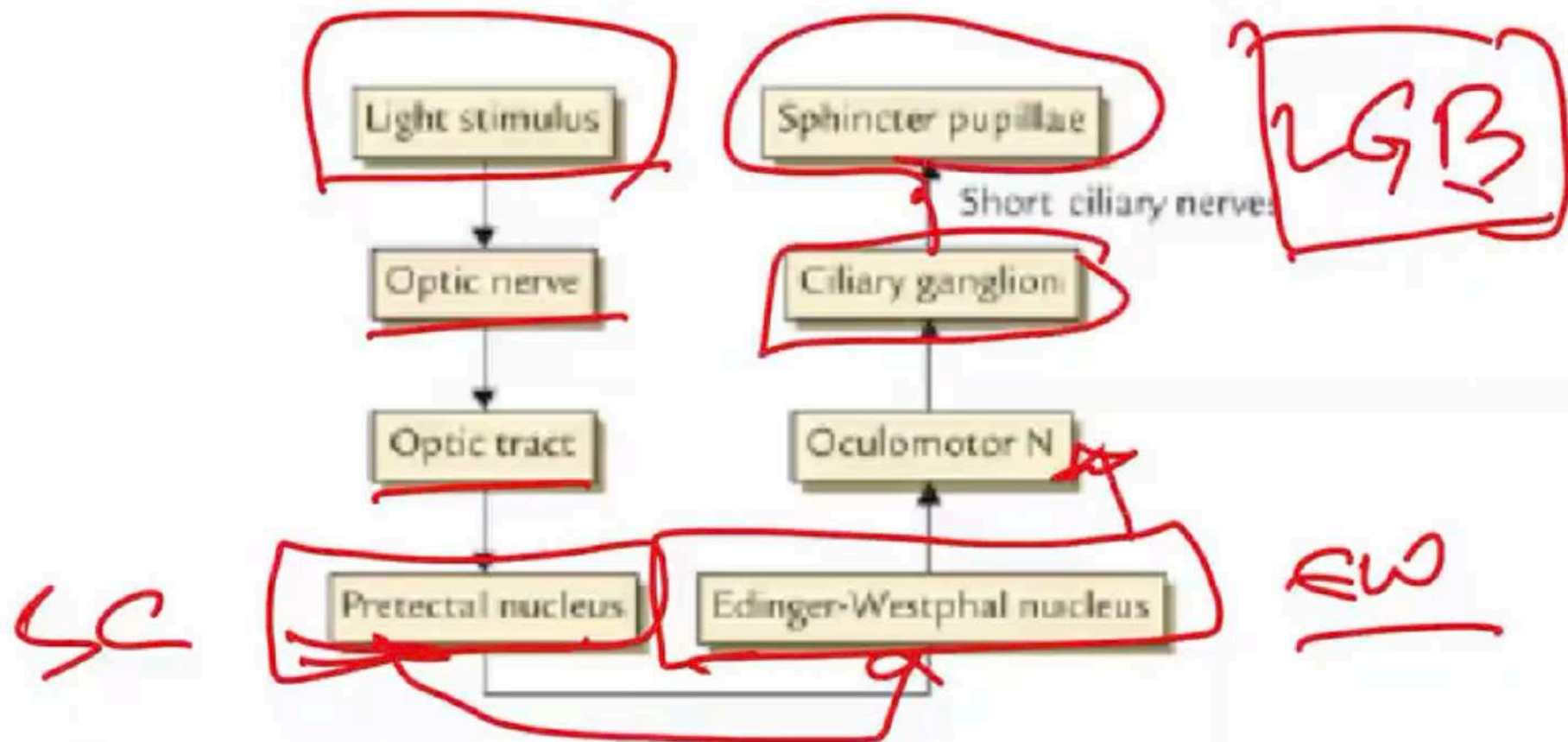


Von
Willebrand
knee

LIGHT REFLEX

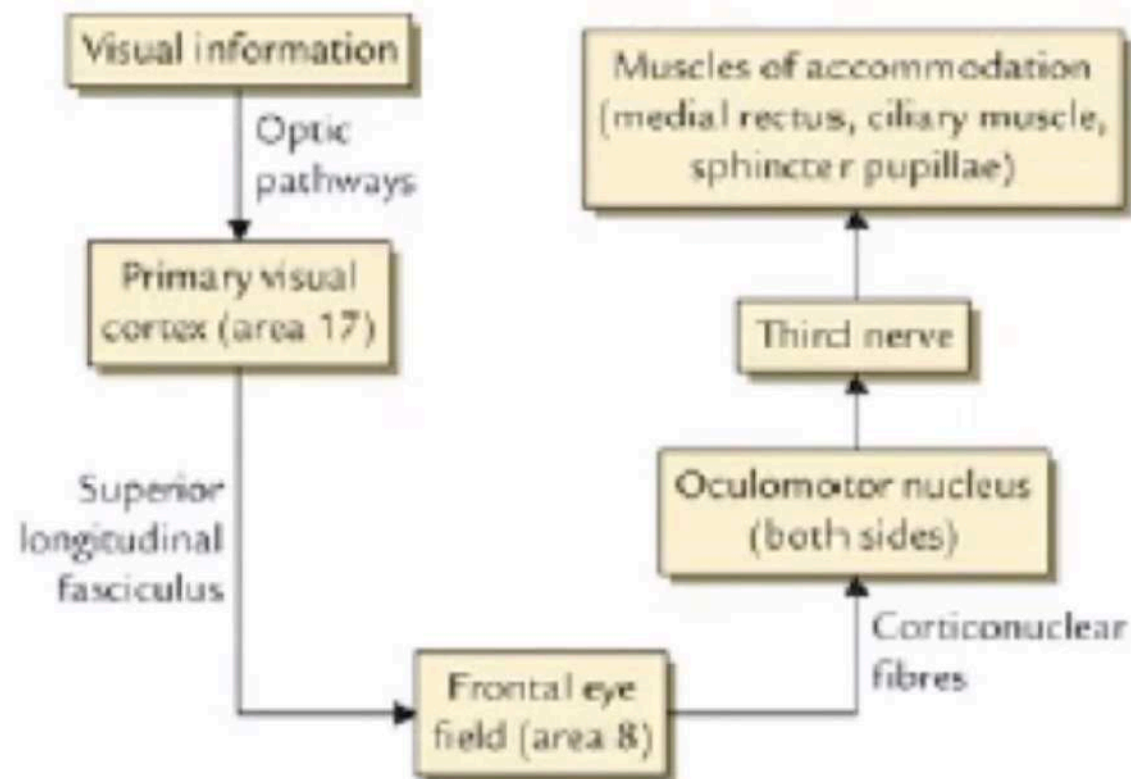
Superior
colliculus
E.W. Nu





ACCOMODATION REFLEX

Frontal cortex



OCULOMOTOR NERVE

COMPONENTS

4 recti
2 oblique

■ General somatic efferent (GSE)

- Supply extrinsic muscles of the eyeball
- incl. Levator palpebrae superioris (LAS)
- exc. lateral rectus and superior oblique

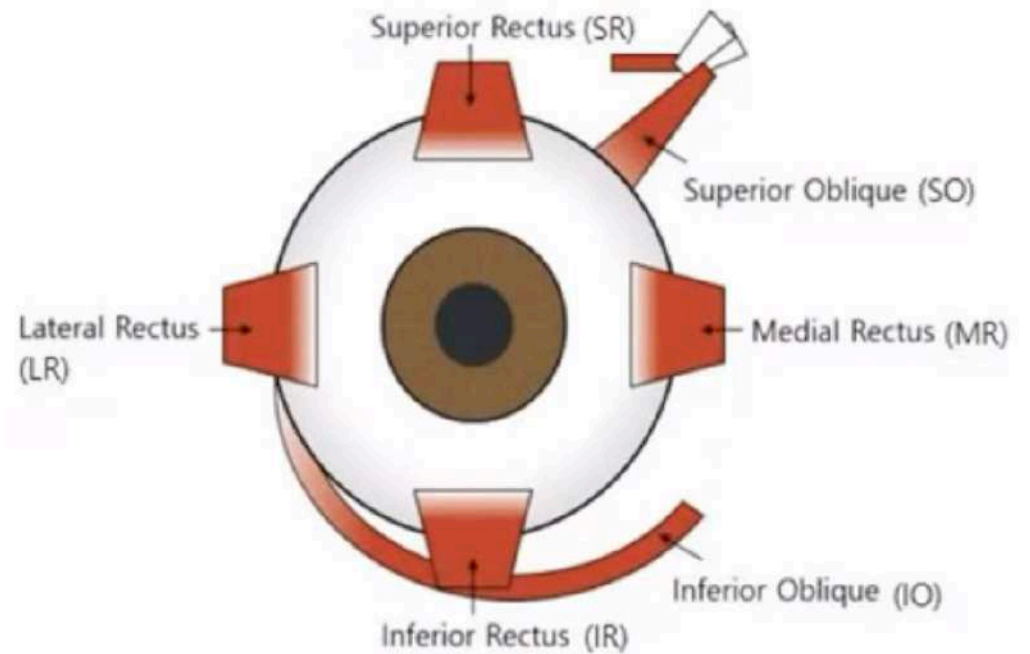
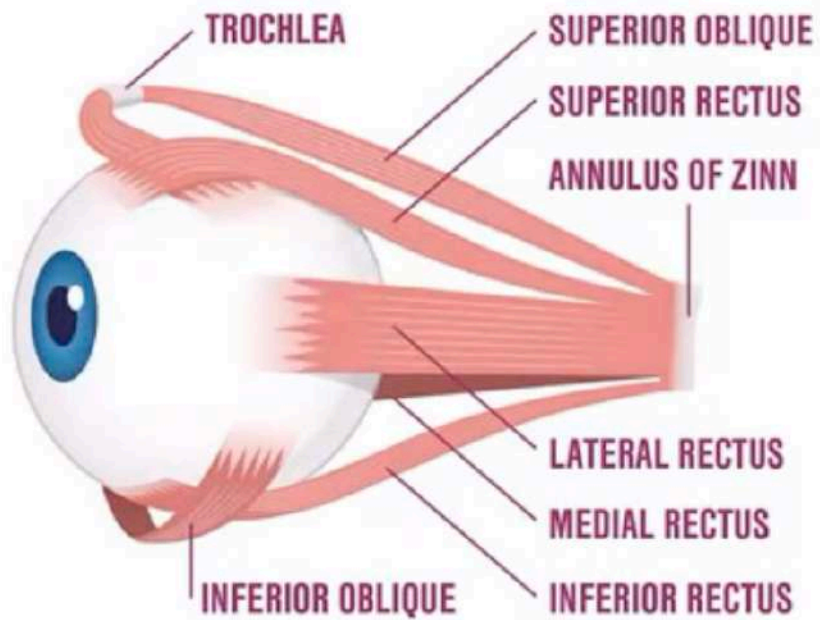
LR6
SO4

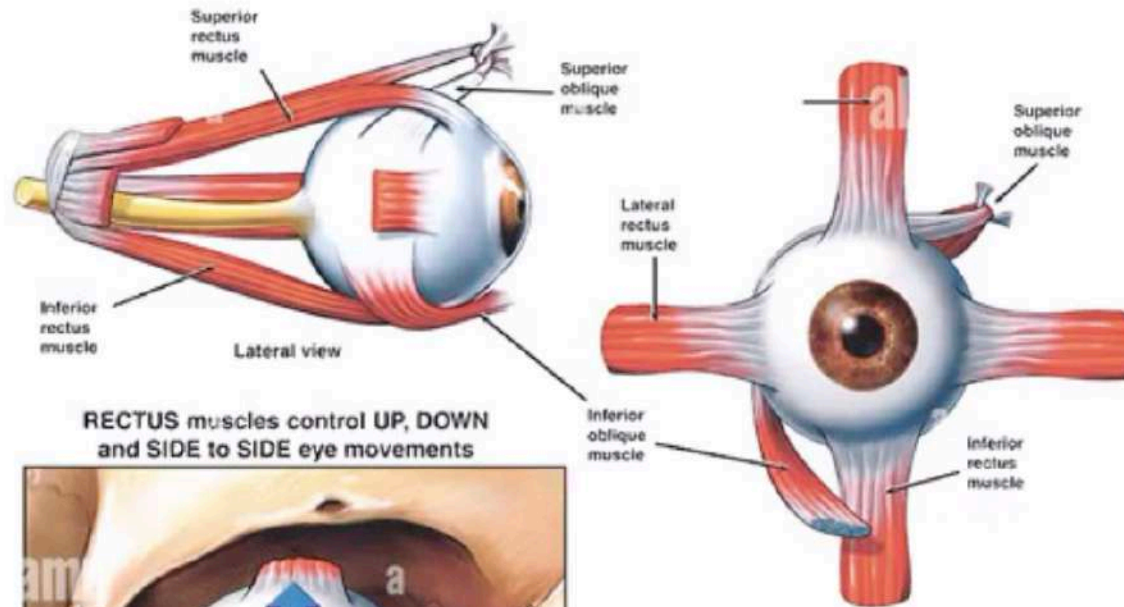
■ General visceral efferent (GVE)

- From the EW nucleus
- Ciliary ganglion
- Sphincter pupillae & ciliary muscles

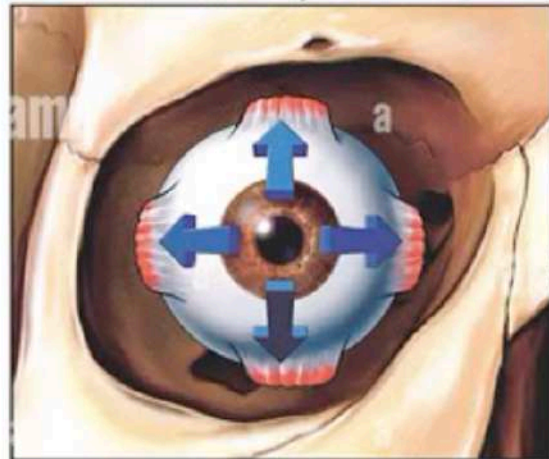
Sphincter pupillae

Ciliary

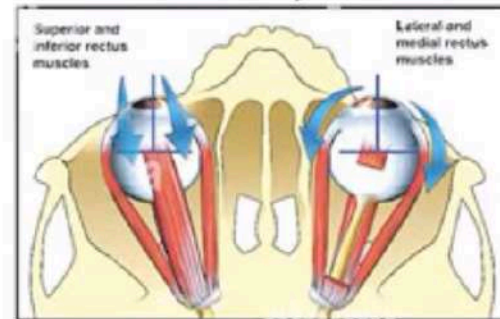




RECTUS muscles control UP, DOWN and SIDE to SIDE eye movements

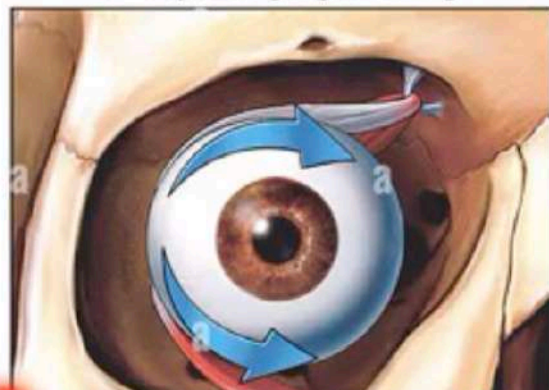


RECTUS muscles control UP, DOWN and SIDE to SIDE eye movements

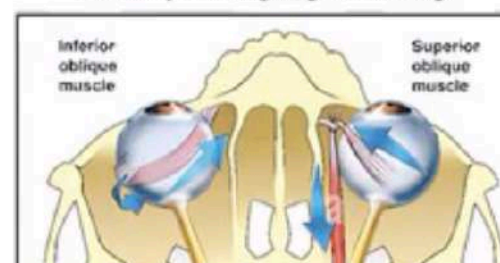


Superior view

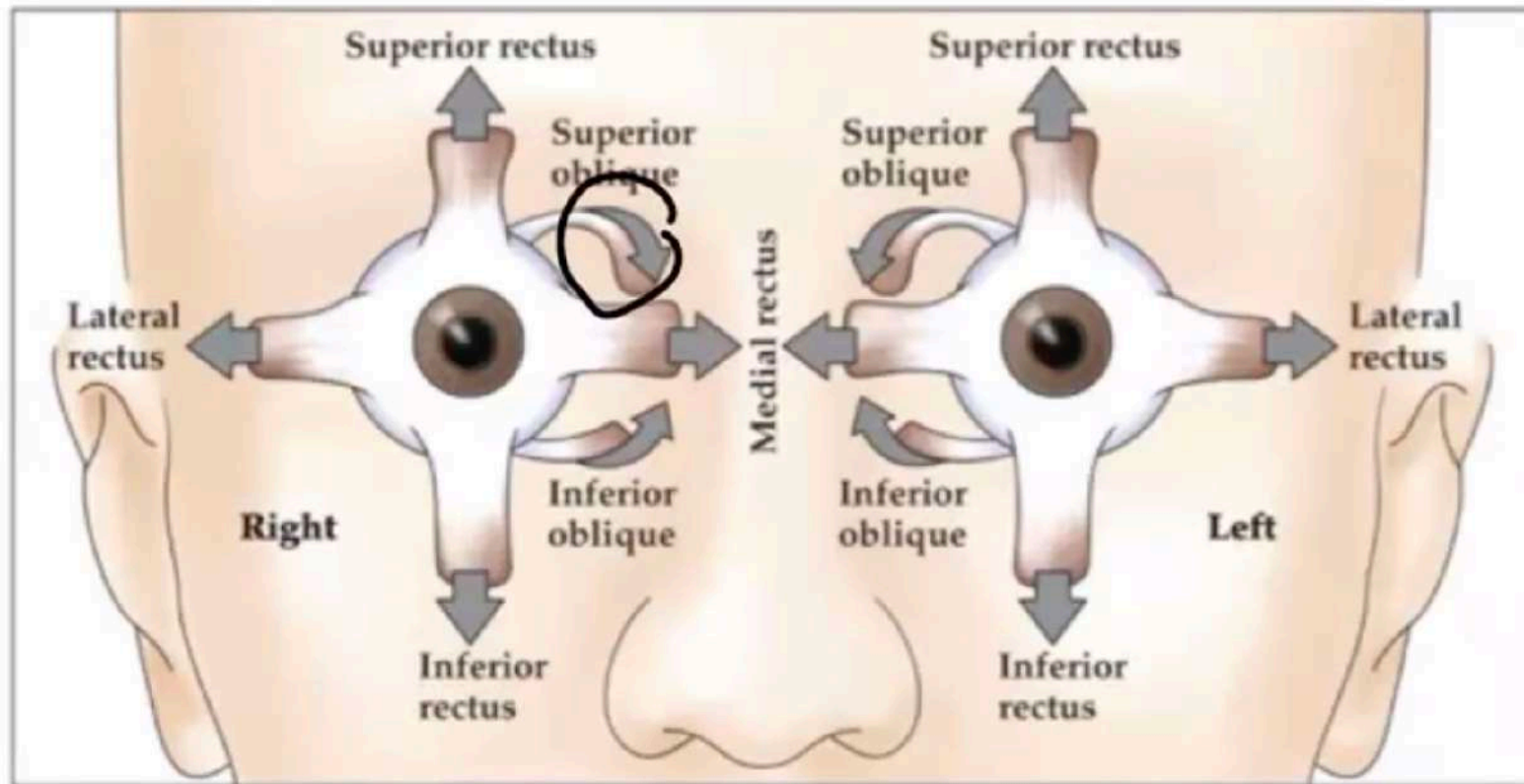
OBLIQUE muscles control ROTATION of the eye during angled viewing.



OBLIQUE muscles control ROTATION of the eye during angled viewing.

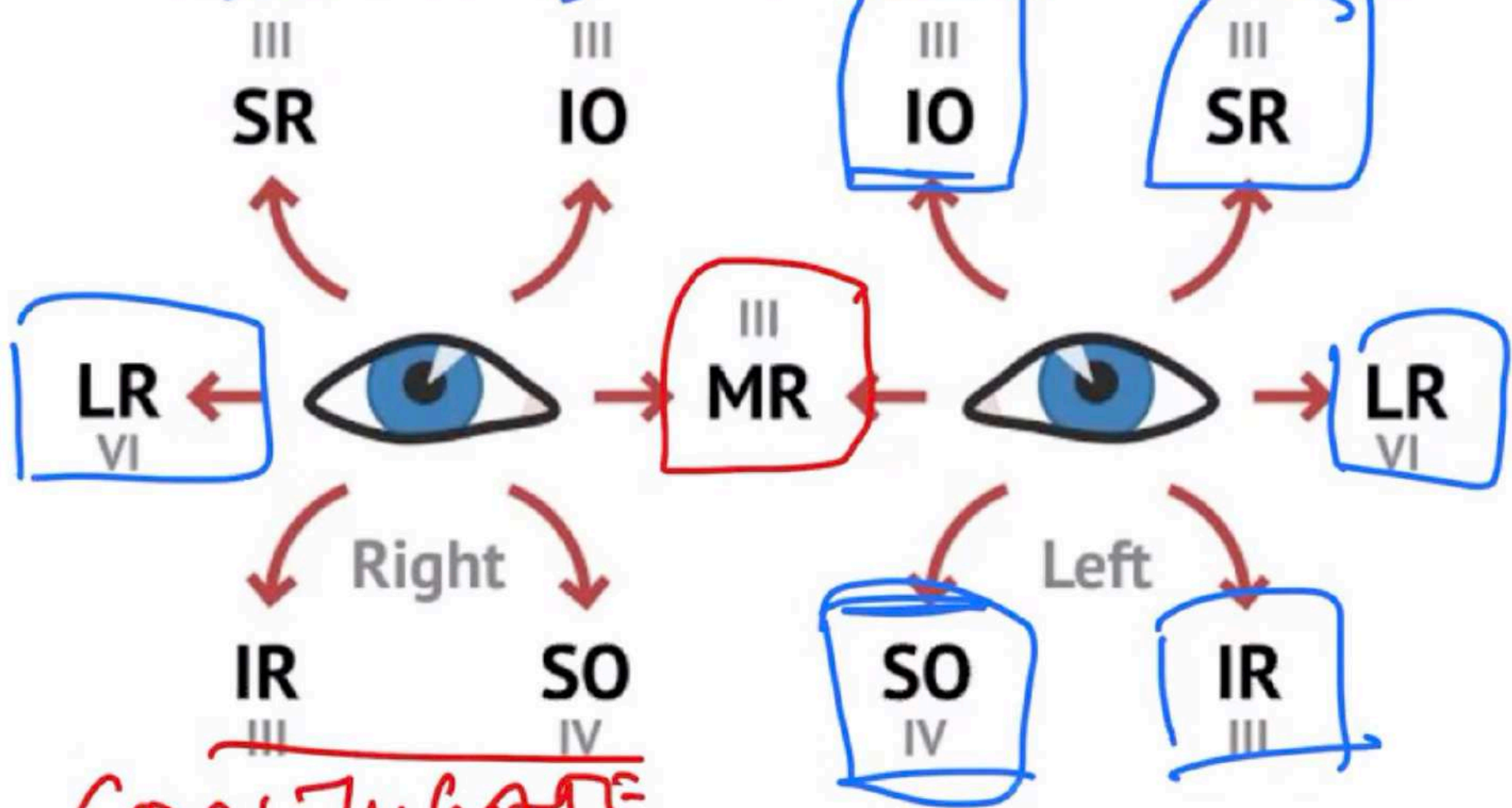


SO → Intorhion
IO → Extension



Obliques → Upgaze → Adducted Eye
 Downgaze

Recti → V → Abducted Eye



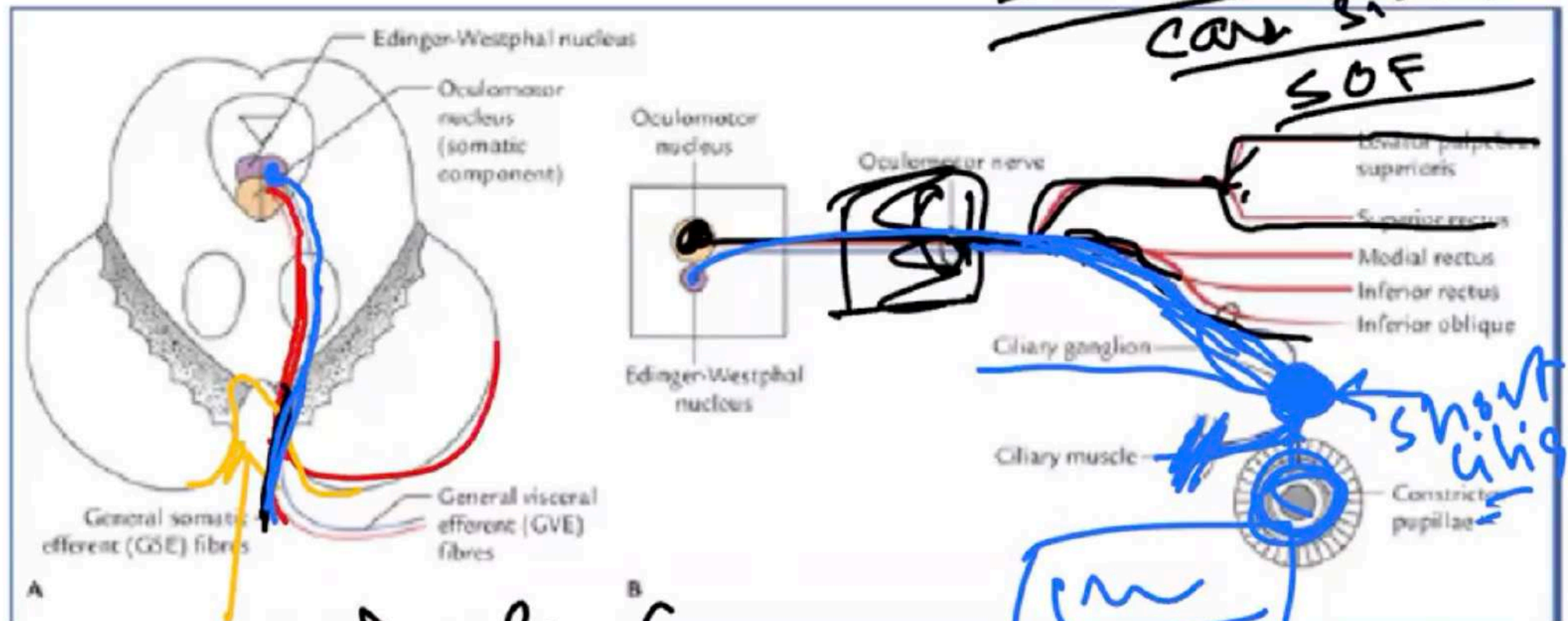
CONJUGATE GAZE

THE NERVE

MID-Brain

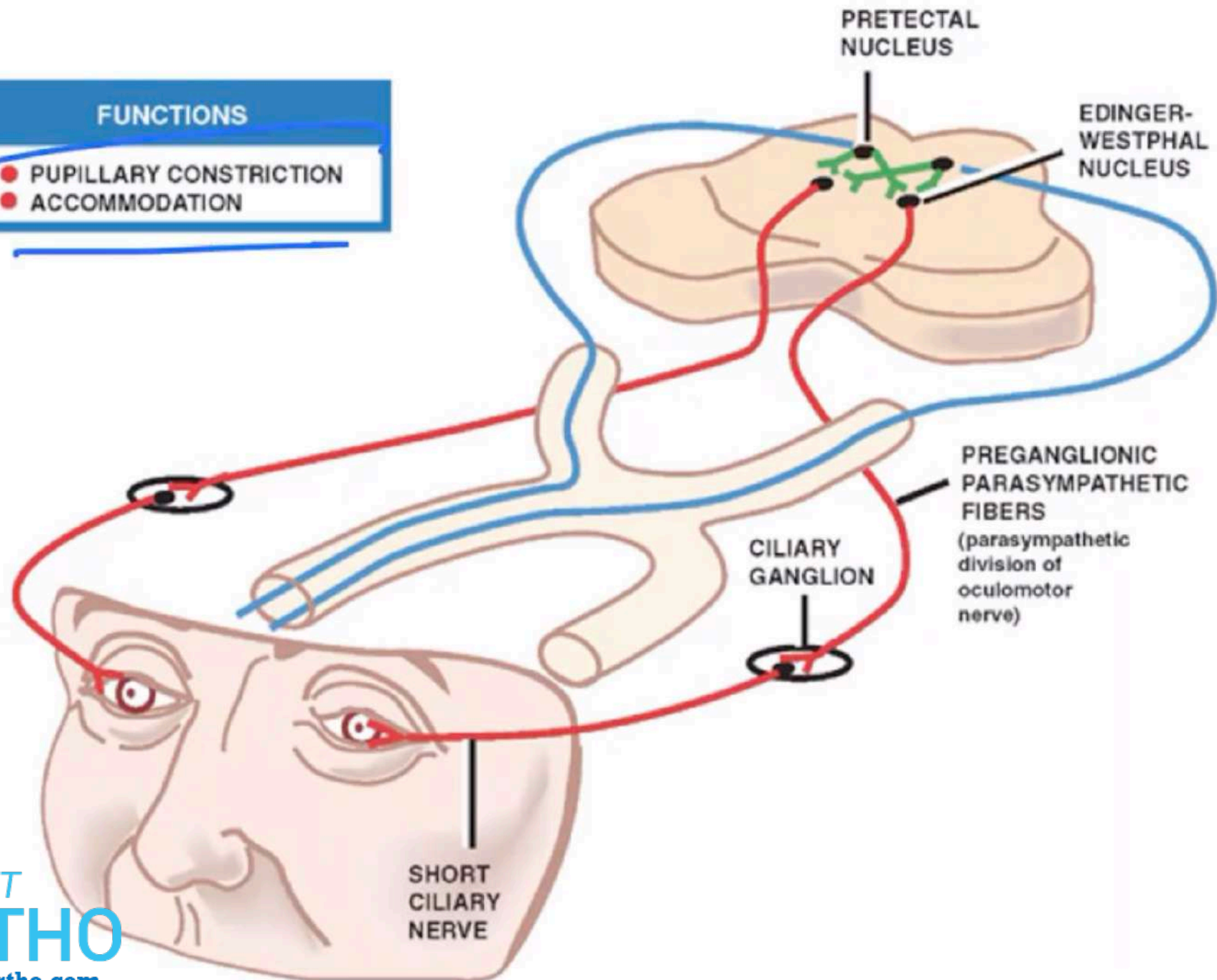
Red Nucleus
Cerebral Peduncles

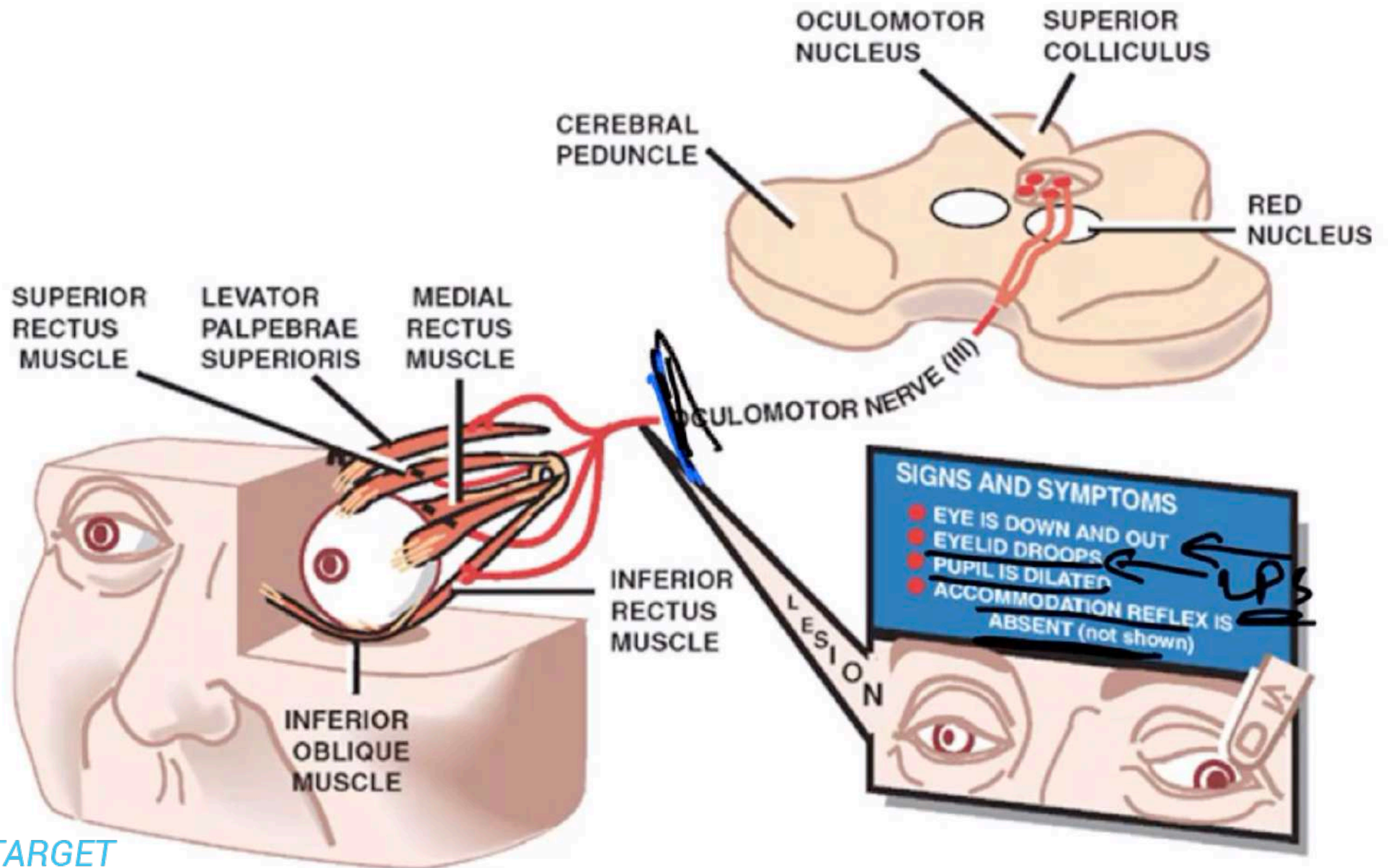
IP Fossa
can sim
SOF



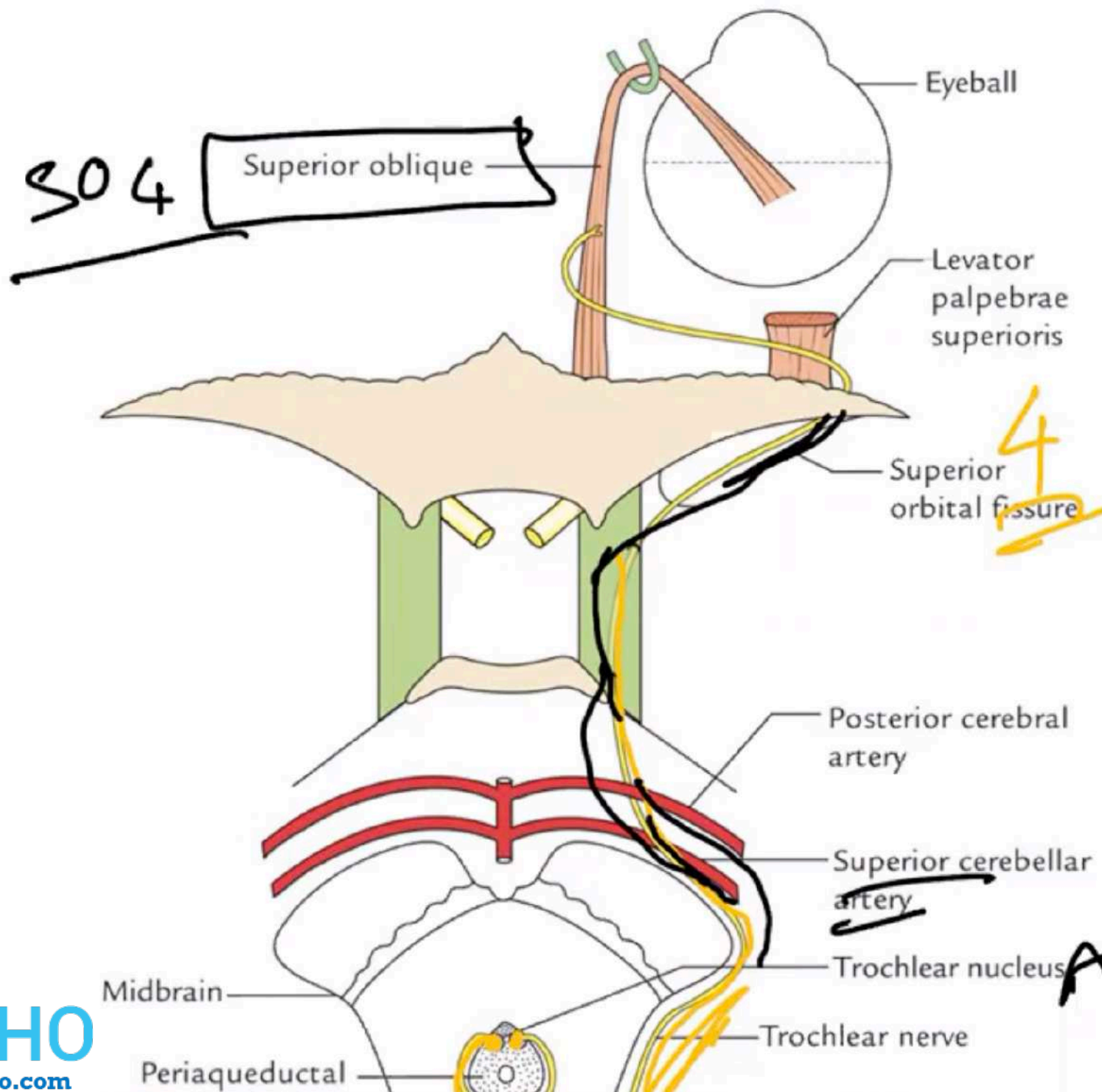
Inter peduncula for





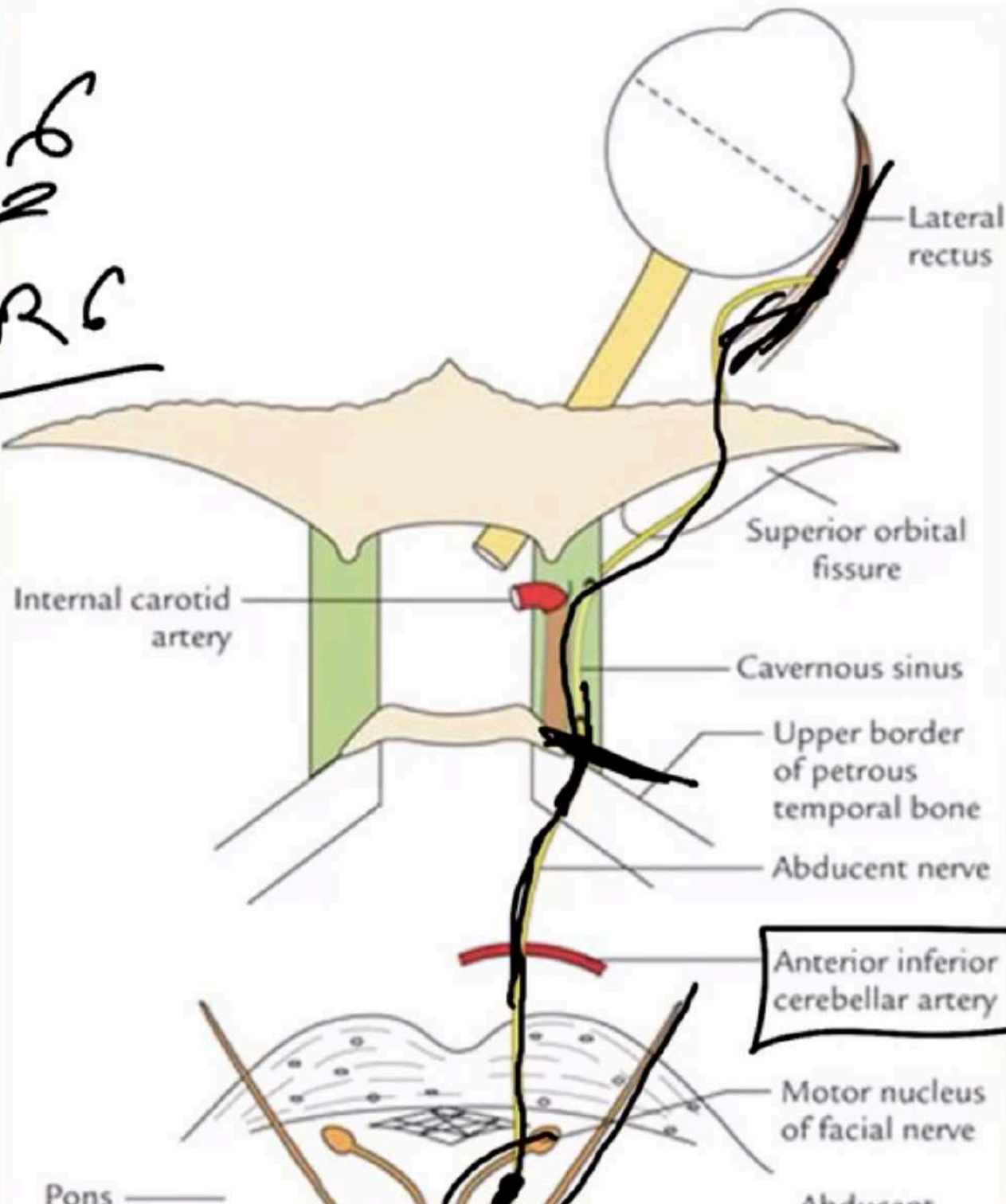


TROCHLEAR NERVE



Pons

LR6



Petro
sclera
s
Gruber

