

Augenmuskulatur und Augenbewegungen. Konjugierte Augenbewegungen, Strabismus. Neuroanatomische Grundlagen des plastischen Sehens. Organa accessoria.

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Semmelweis Universität

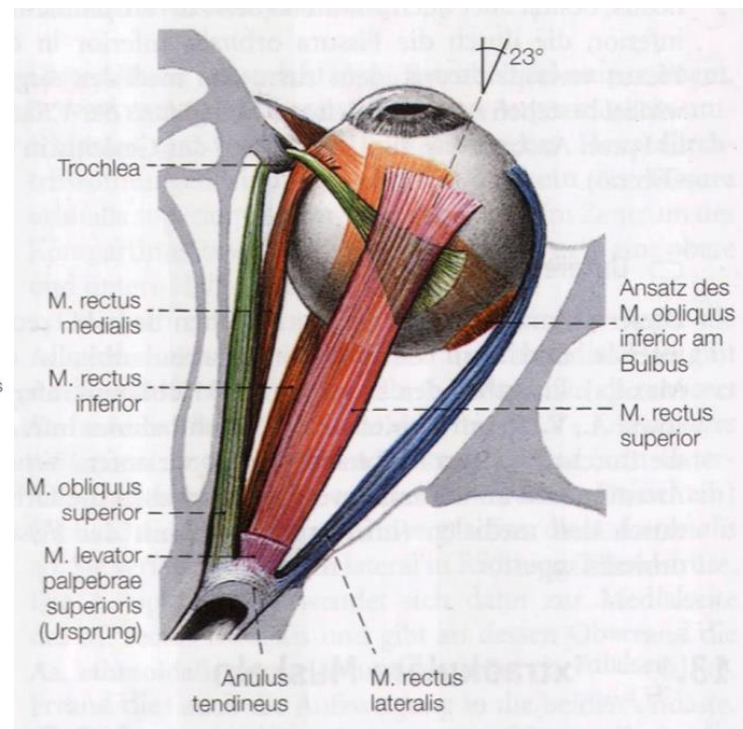
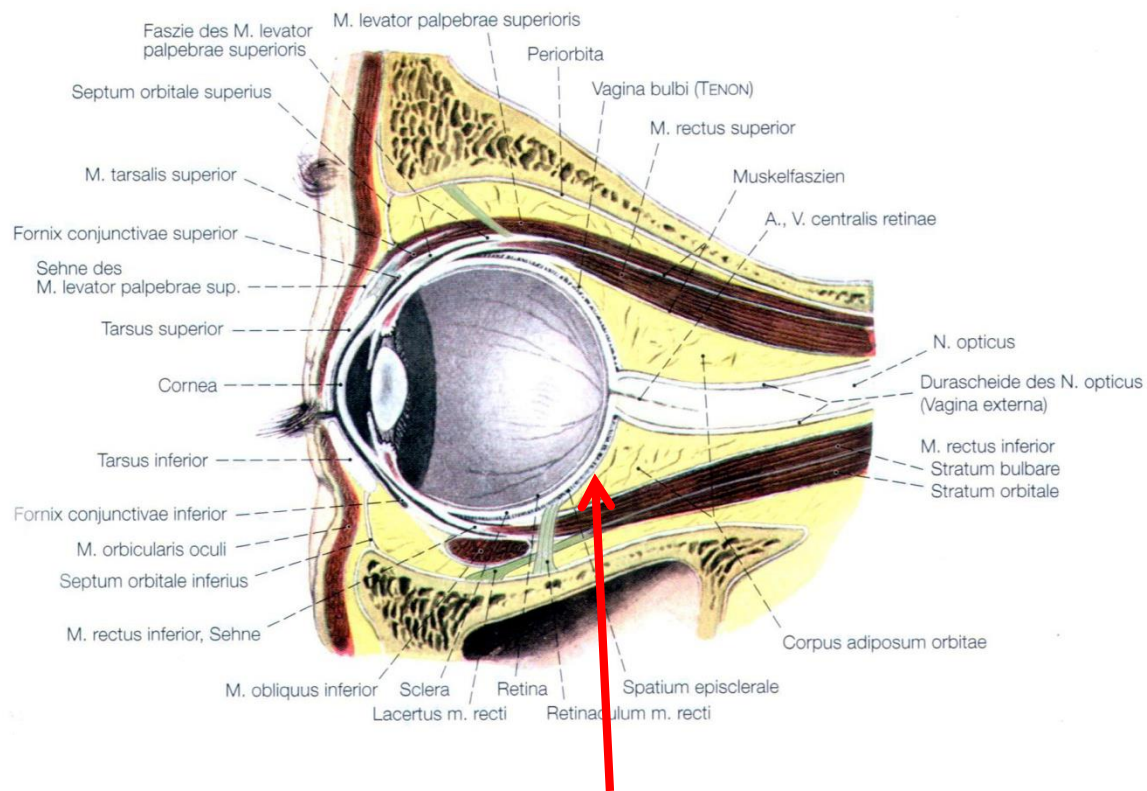
Anatomisches. Histologisches und Embryologisches Institut

12. November 2019



Jacques-René Tenon
(1724 -1816)

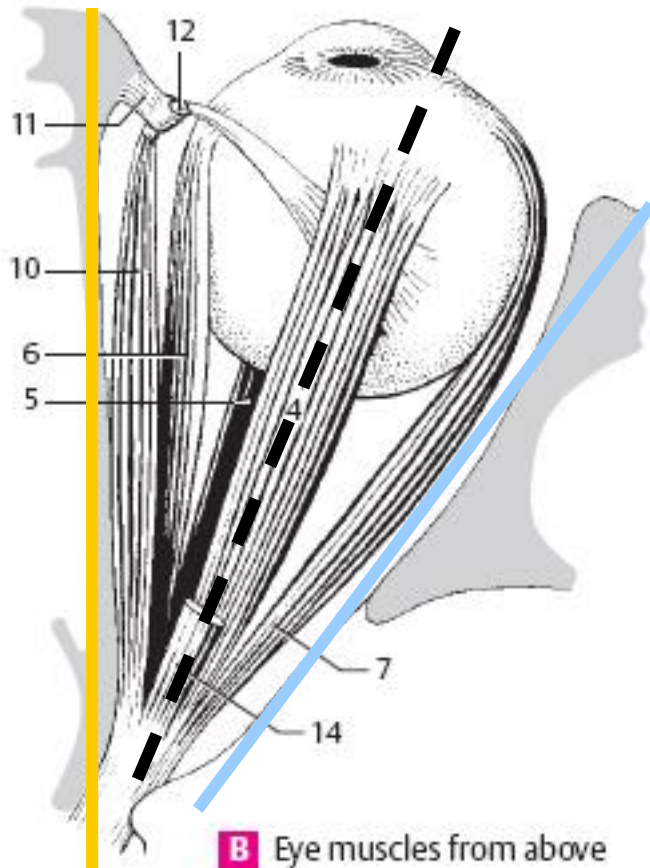
Musculi bulbi externi



Vagina bulbi (Tenon-Kapsel)

Anatomie der Orbita: Axen

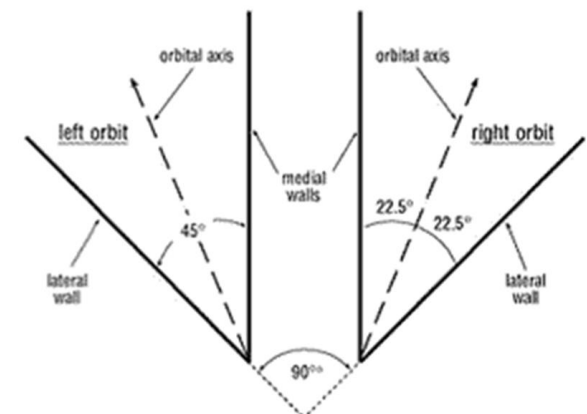
Axe der Orbita



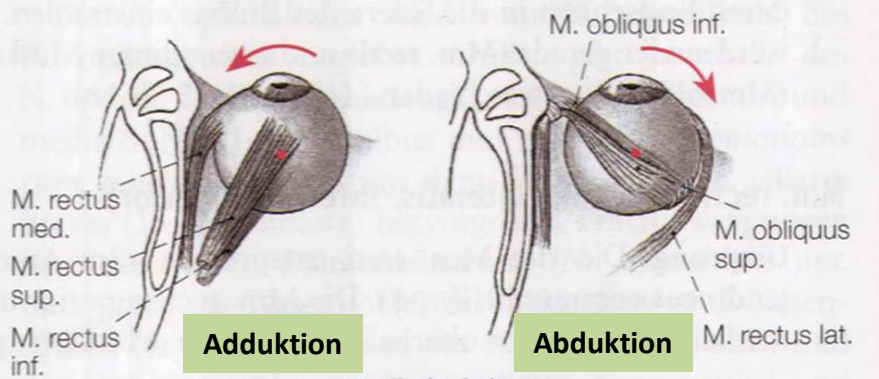
Die mediale Orbitawand zieht sagittal

Die laterale Orbita weicht von der Sagittalebene 45° nach lateral ab

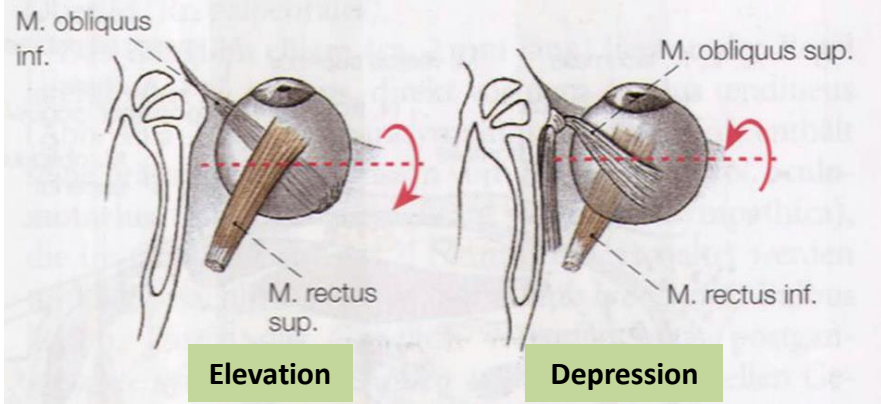
Die anteroposteriore Axe des Auges zieht sagittal



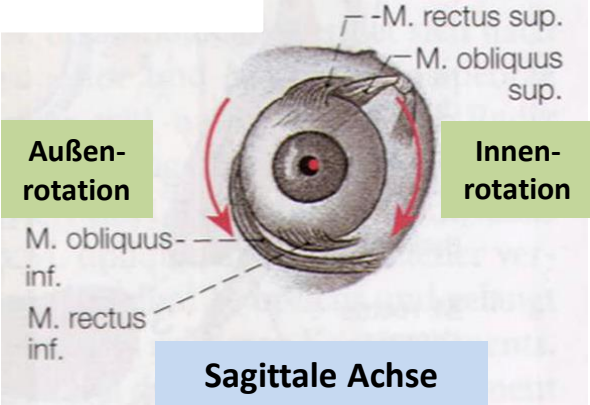
Augenbewegungen



Verticale Achse

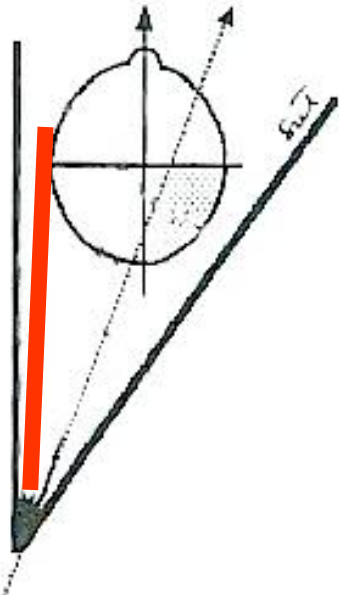


Transversale Achse



Sagittale Achse

Musculus rectus medialis

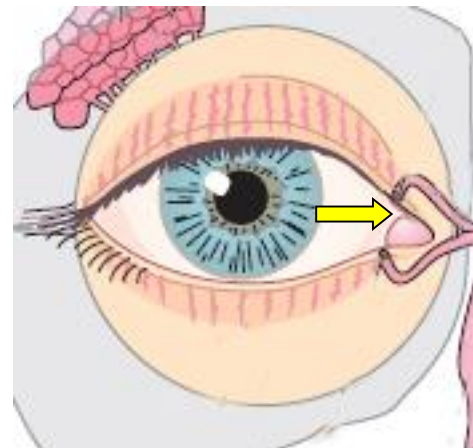
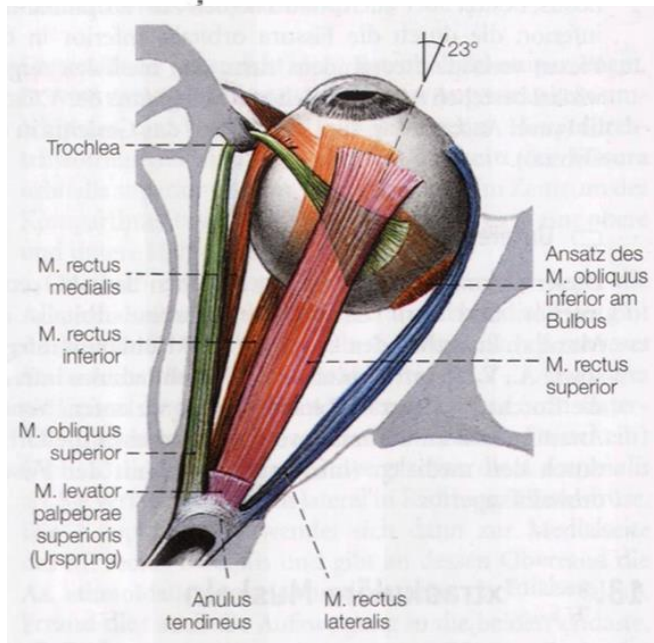


Vertikale Axe: Adduktion

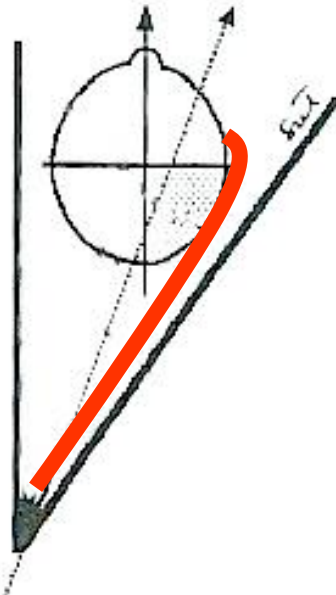
Transversale Axe: -

Sagittale Axe: -

Innervation: N. III.



Musculus rectus lateralis

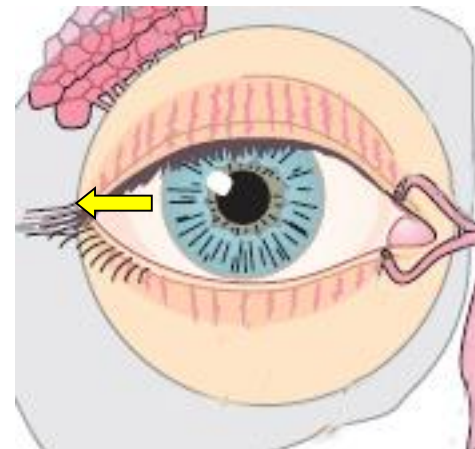
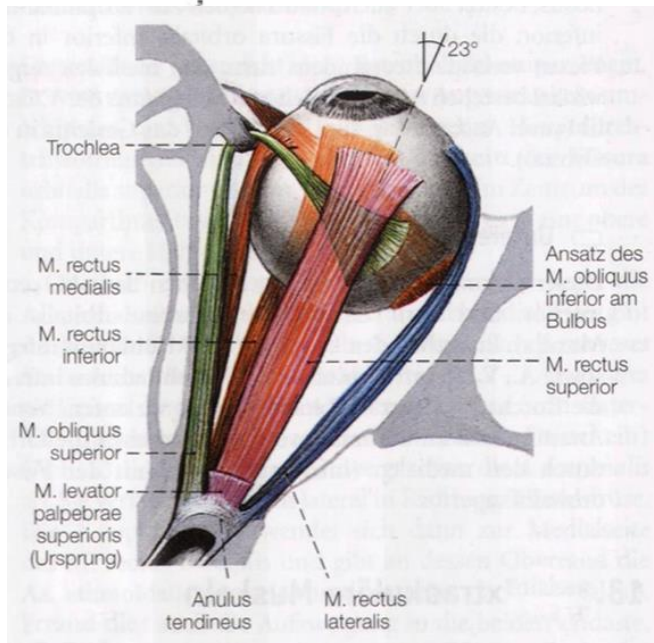


Vertikale Axe: Abduktion

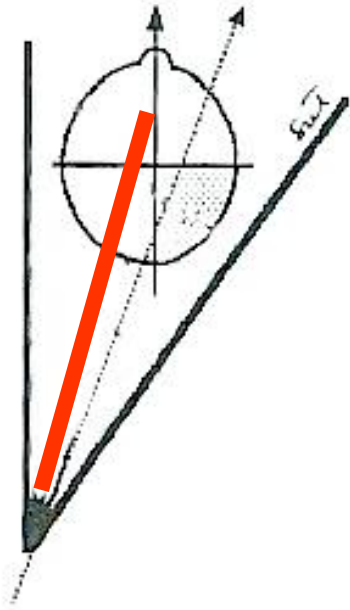
Transversale Axe : -

Sagittale Axe: -

Innervation: N. VI.



Musculus rectus superior



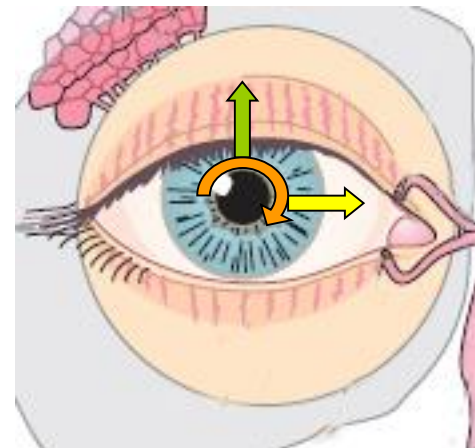
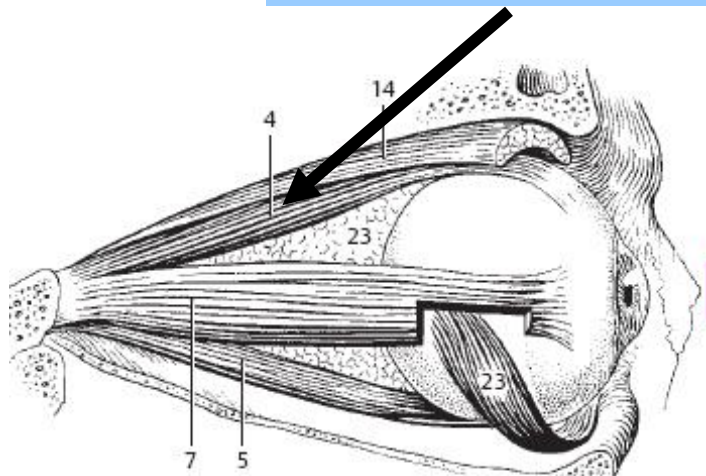
Vertikale Axe: Adduktion

Transversale Axe: Elevation

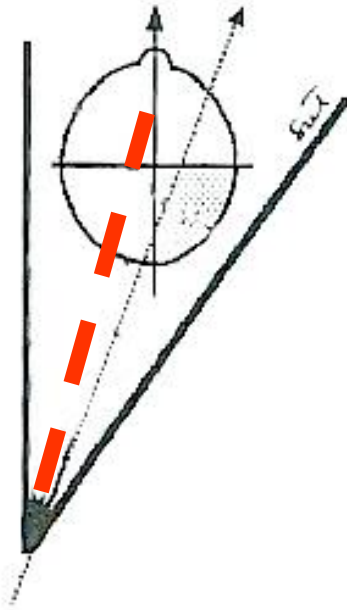
Sagittale Axe: Innenrotation

Innervation: N. III.

M. rectus superior



Musculus rectus inferior



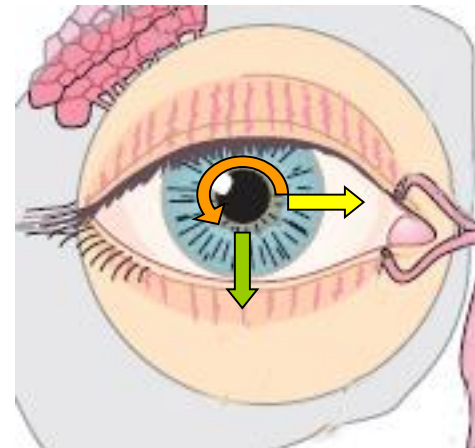
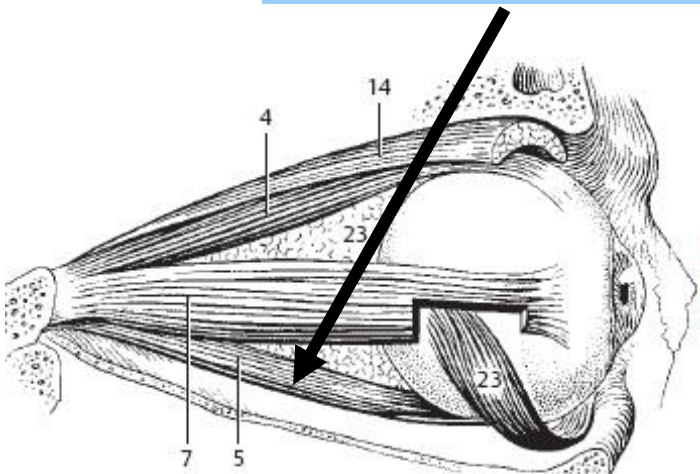
Vertikale Axe: Adduktion

Transversale Axe : Depression

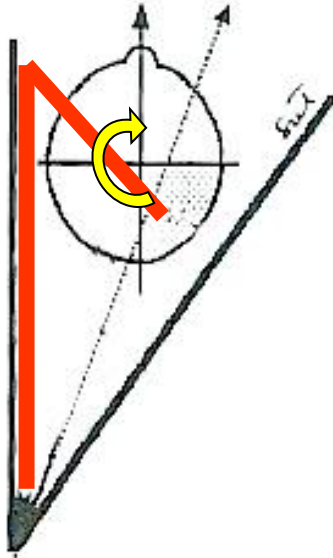
Sagittale Axe: Außenrotation

Beidegzés: N. III.

M. rectus inferior



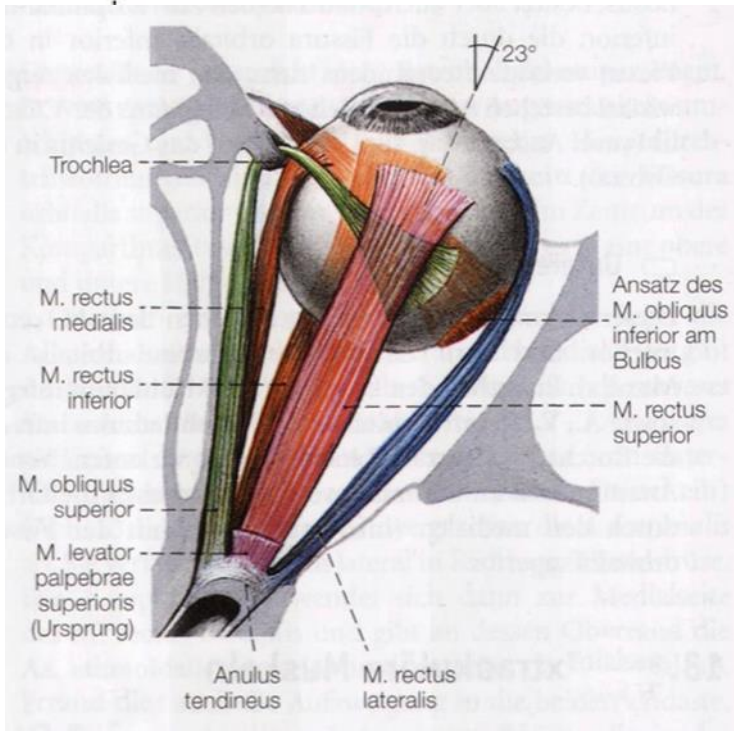
Musculus obliquus superior



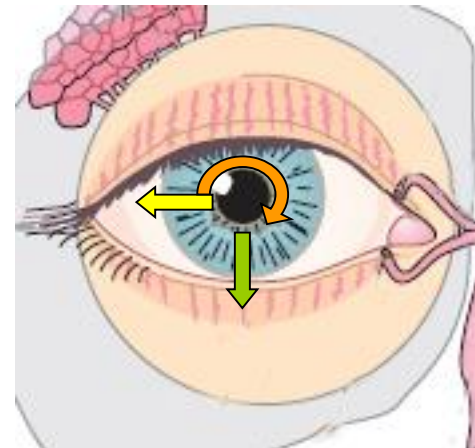
Vertikale Axe : Abduktion

Transversale Axe : Depression

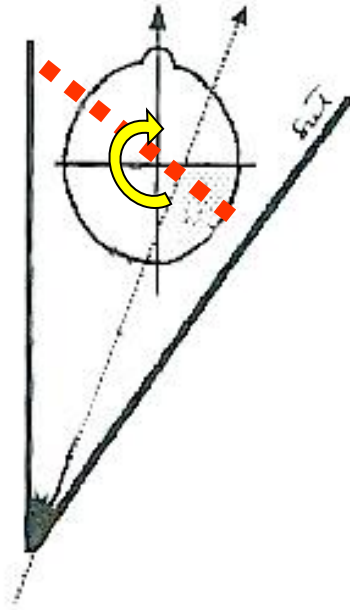
Sagittale Axe: Innenrotation



Innervation: N. IV.



Musculus obliquus inferior

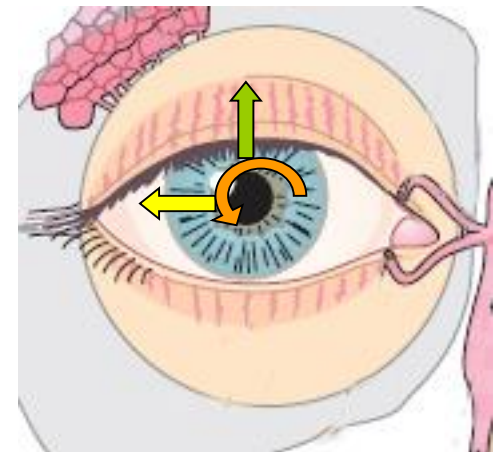
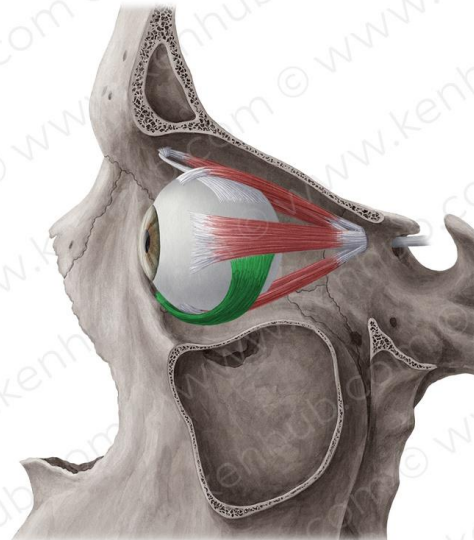
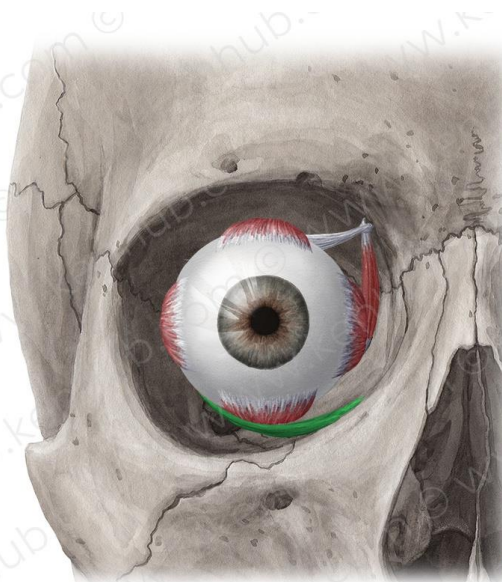


Vertikale Axe : Abduktion

Transversale Axe: Elevation

Sagittale Axe: Außenrotation

Innervation: N. III.



Schema der Augenbewegungen

NERVUS OCULOMOTORIUS

Musculus rectus superior

Musculus obliquus inferior

NERVUS ABDUCENS

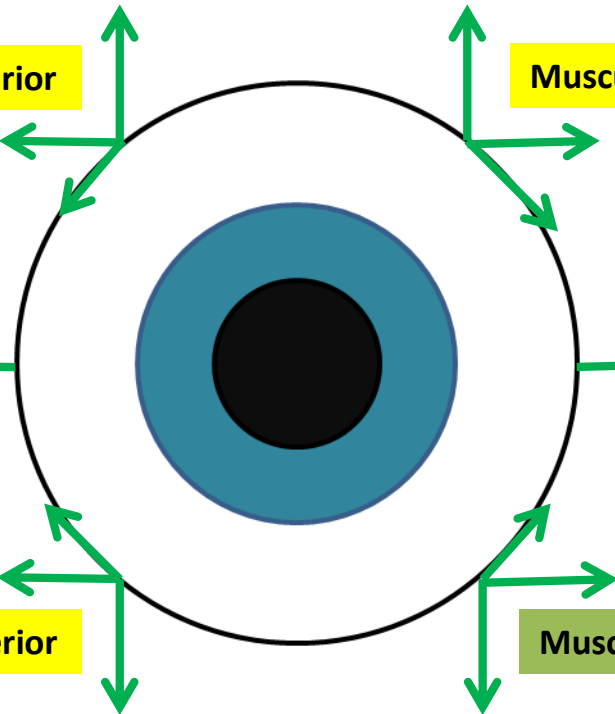
Musculus rectus medialis

Musculus rectus lateralis

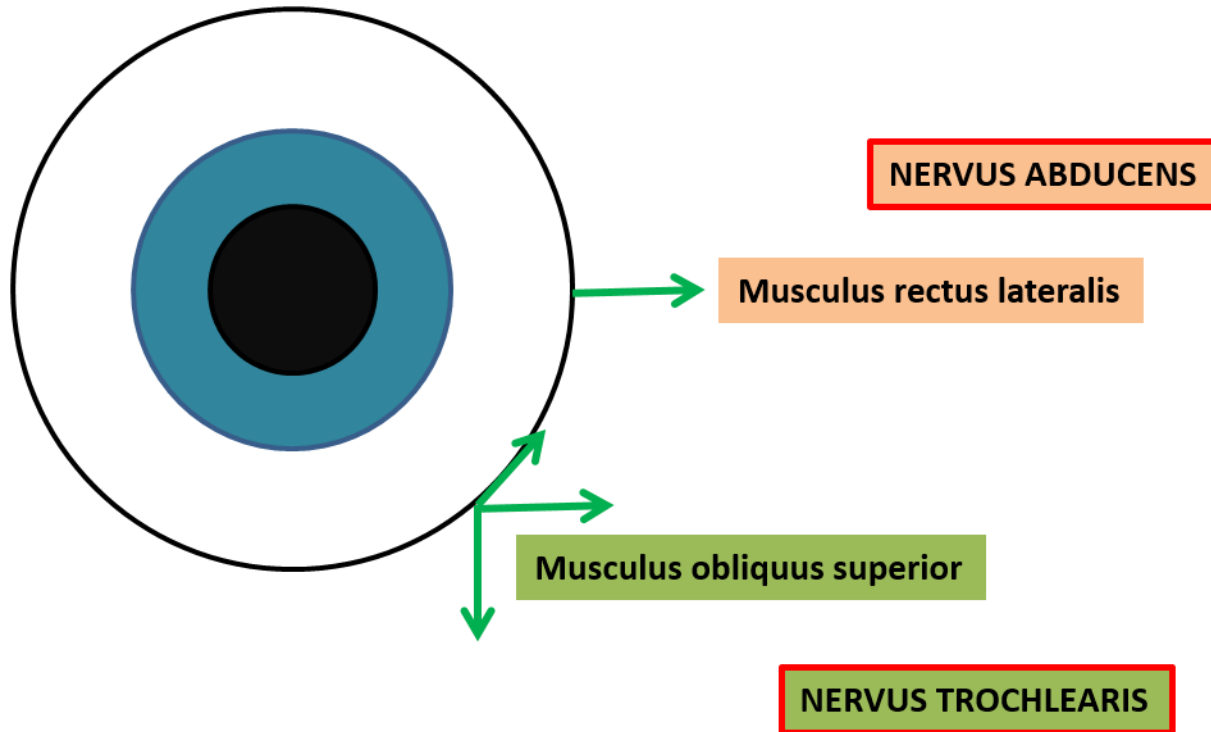
Musculus rectus inferior

Musculus obliquus superior

NERVUS TROCHLEARIS



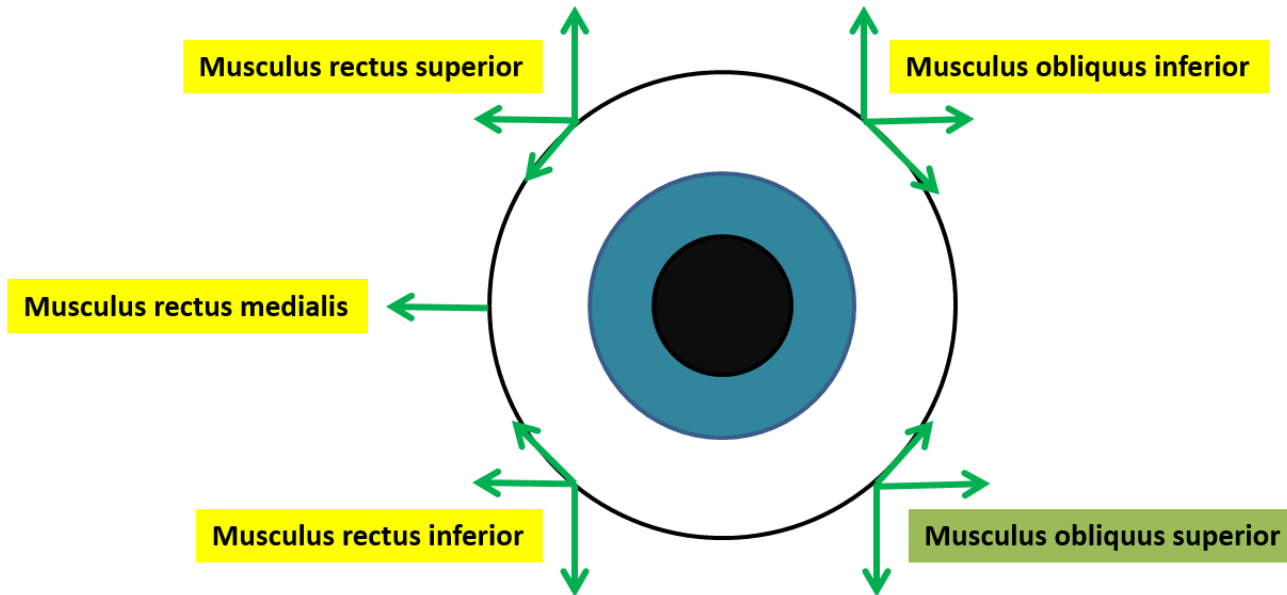
Lähmung des Nervus oculomotorius



- + **Akkomodationsfehler** (M. ciliaris)
- + **Ptoxis** (M. levator palpebrae sup.)
- + **Mydriasis** (M. sphingter pupillae)

Lähmung des Nervus abducens

NERVUS OCULOMOTORIUS



NERVUS TROCHLEARIS

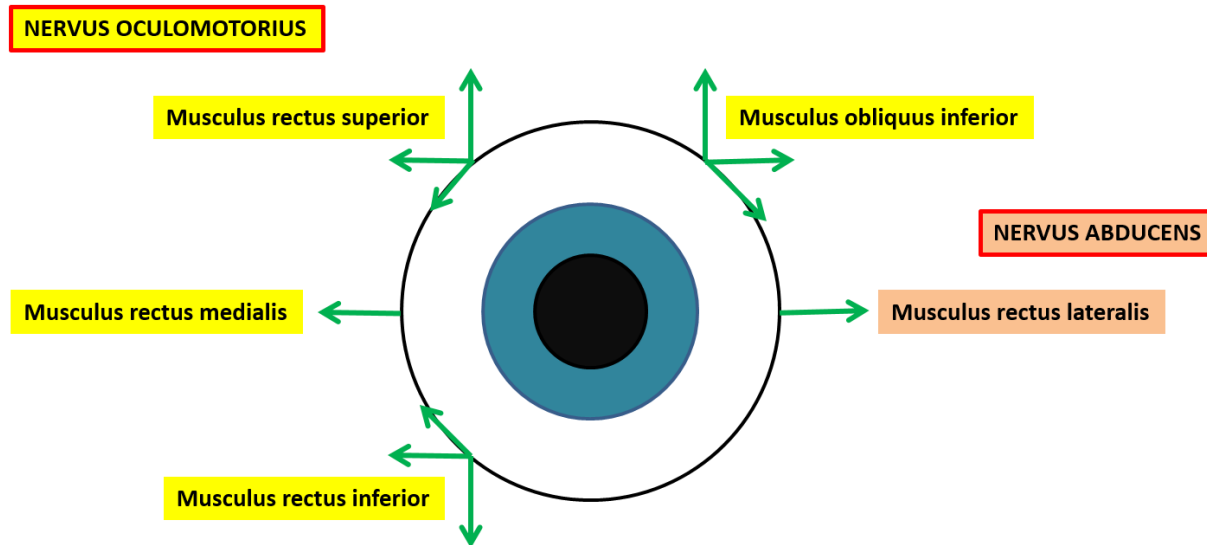


Der Blick in die Richtung der unbetreffenen Seite ist ungestört.



Beim Blick auf die betroffene Seite fällt die Abduktion des befallenen Auges weg.

Lähmung des Nervus trochlearis

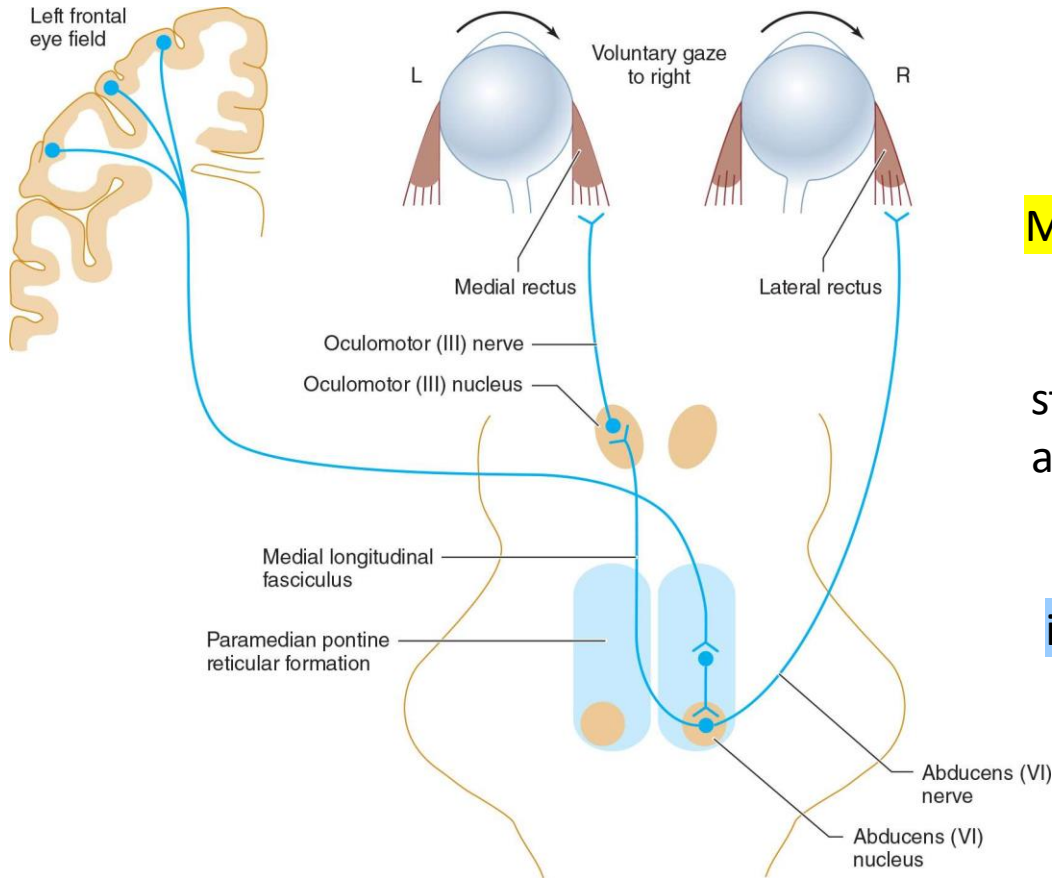


Wegen der fehlenden Innenrotation des M. obliquus superior neigt der Kranke seinen Kopf auf die gesunde Seite.
„Der Hals tut mir weh.“



Beim Neigen des Kopfes auf die betroffene Seite schwebt das befallene Auge leicht nach oben.

Konjugierte horizontale Augenbewegungen



Frontales Blickzentrum (Brodmann 8)



Kontralaterales Blickzentrum in der Brücke (paramediane pontine Formatio Reticularis)



Kontralaterale Nucleus nervi abducentis



Kontralateraler M. rectus lateralis



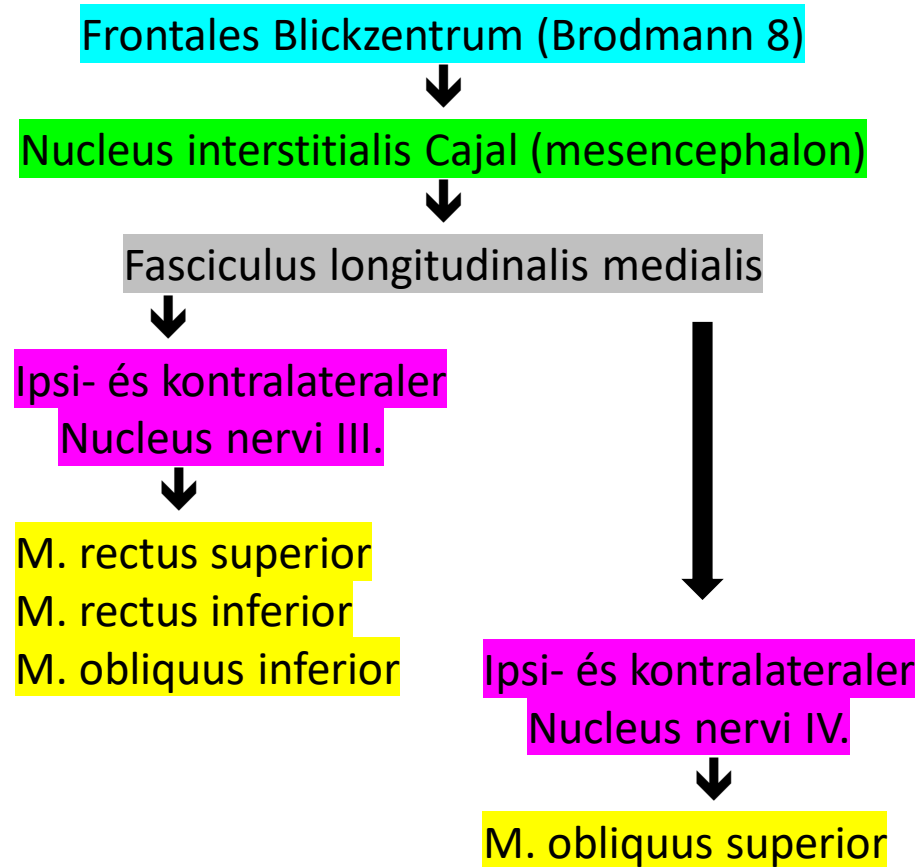
Die sog. *internukleären Neruone* des steigen im Fasciculus longitudinalis medialis auf und kreuzen die Seite (sie kehren zu der Seite des Frontales Blickzentrums zurück) und erregen die Motoneuronen des ipsilateralen Nucleus motorius nervi III., die den Musculus rectus medialis versorgen



Ipsilateraler M. rectus medialis

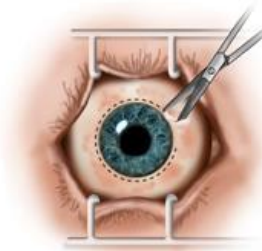
Folge: Blick zu der Gegenseite

Konjugierte vertikale Augenbewegungen

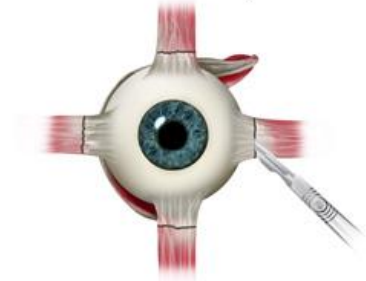


Enucleation of the right eye

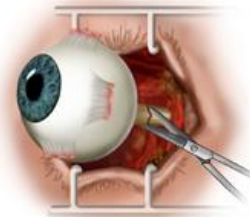
A. The conjunctiva is opened with blunt scissors.



B. The four rectus muscles are removed from their attachments to the eye.



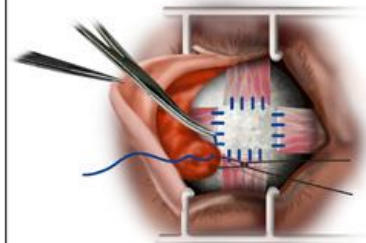
C. The eyeball is rotated partially out of the socket allowing for the optic nerve and the oblique muscles to be cut.



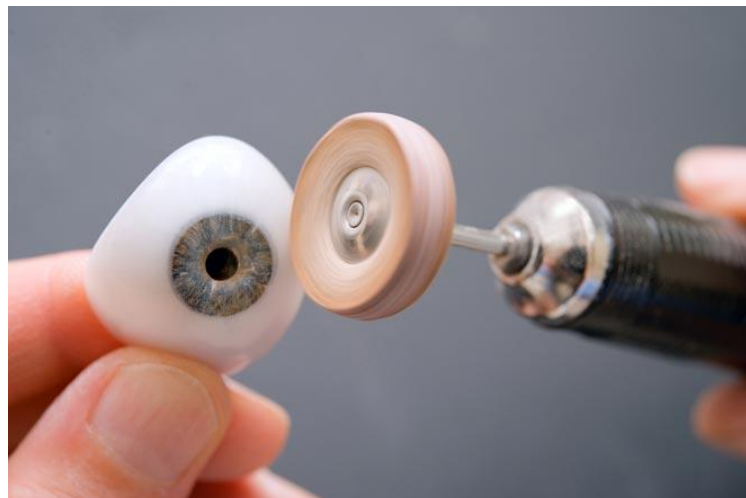
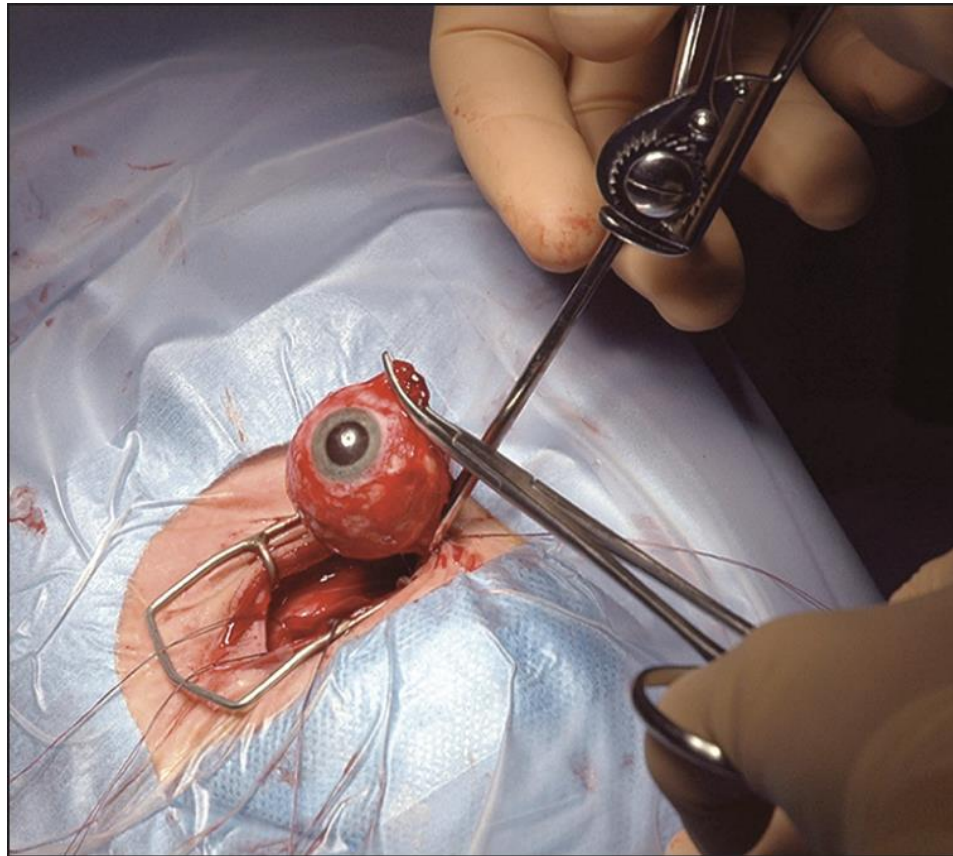
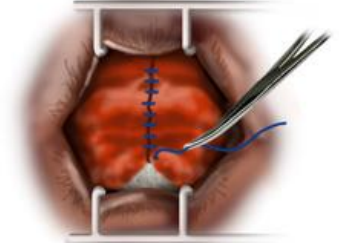
D. After the eye is removed, a synthetic globe is placed into the empty socket. The remaining muscle stumps are then attached to the synthetic globe which has been wrapped in sclera (protective eye covering) from a donor eye.



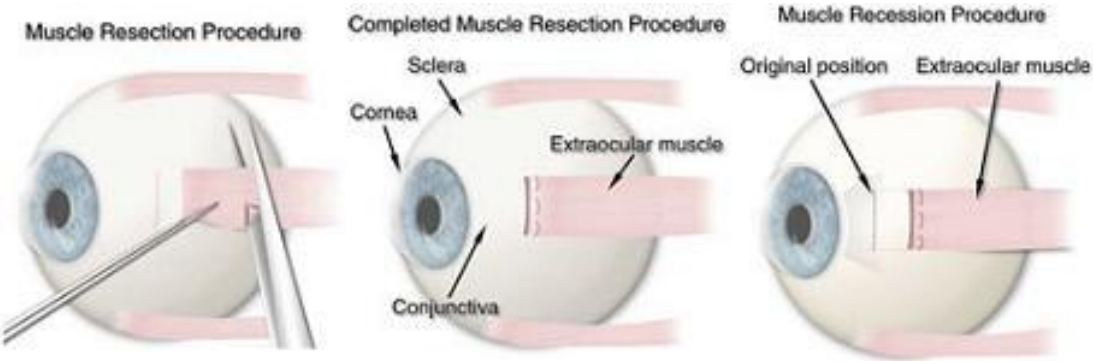
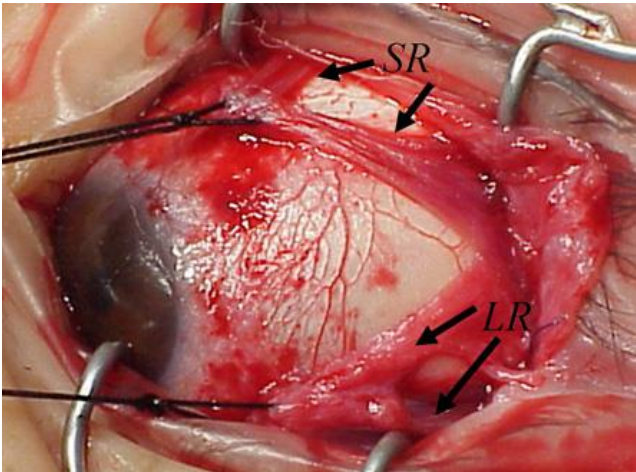
E. Muscles attaching to implant. Since the muscles will be attached to the prosthesis, the eye movement will be transferred to the prosthesis.



F. Conjunctiva (skin of the eye) closed over the implant.



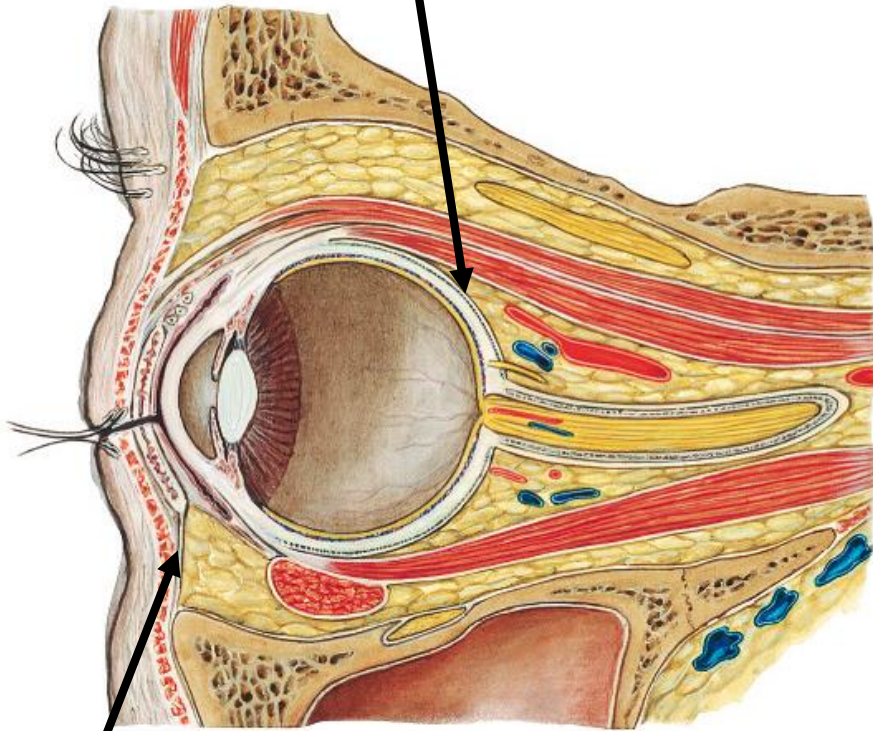
Strabismus (Schielen)



Das Bindegewebe und die glatte Muskulatur der Orbita

Vagina bulbi (Tenon-tok)

Abb. 9.54



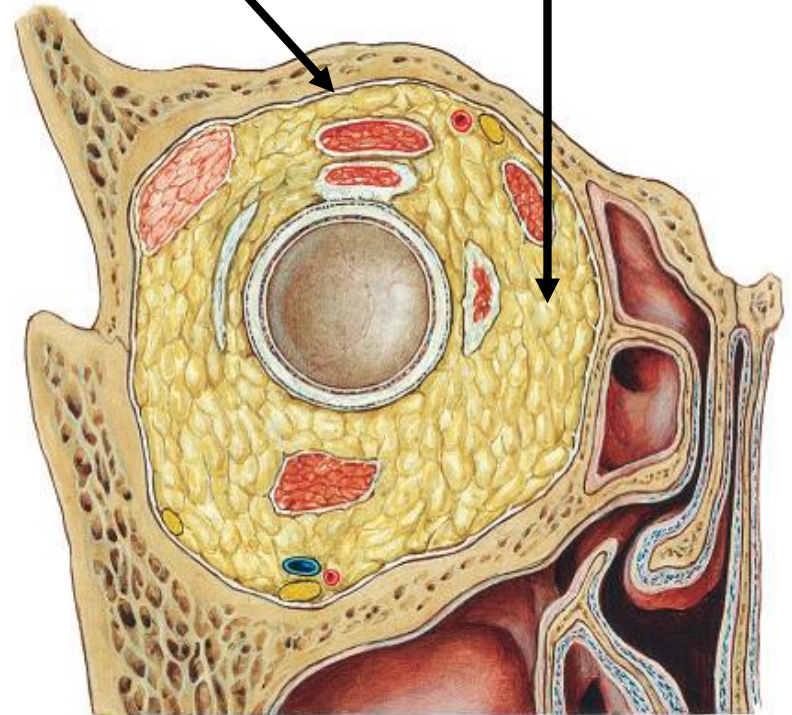
Sobotta - Atlas der Anatomie des Menschen, 23. A. 2010, © Elsevier GmbH, München

Septum orbitale

Periorbita

Corpus adiposum orbitae

Abb. 9.55



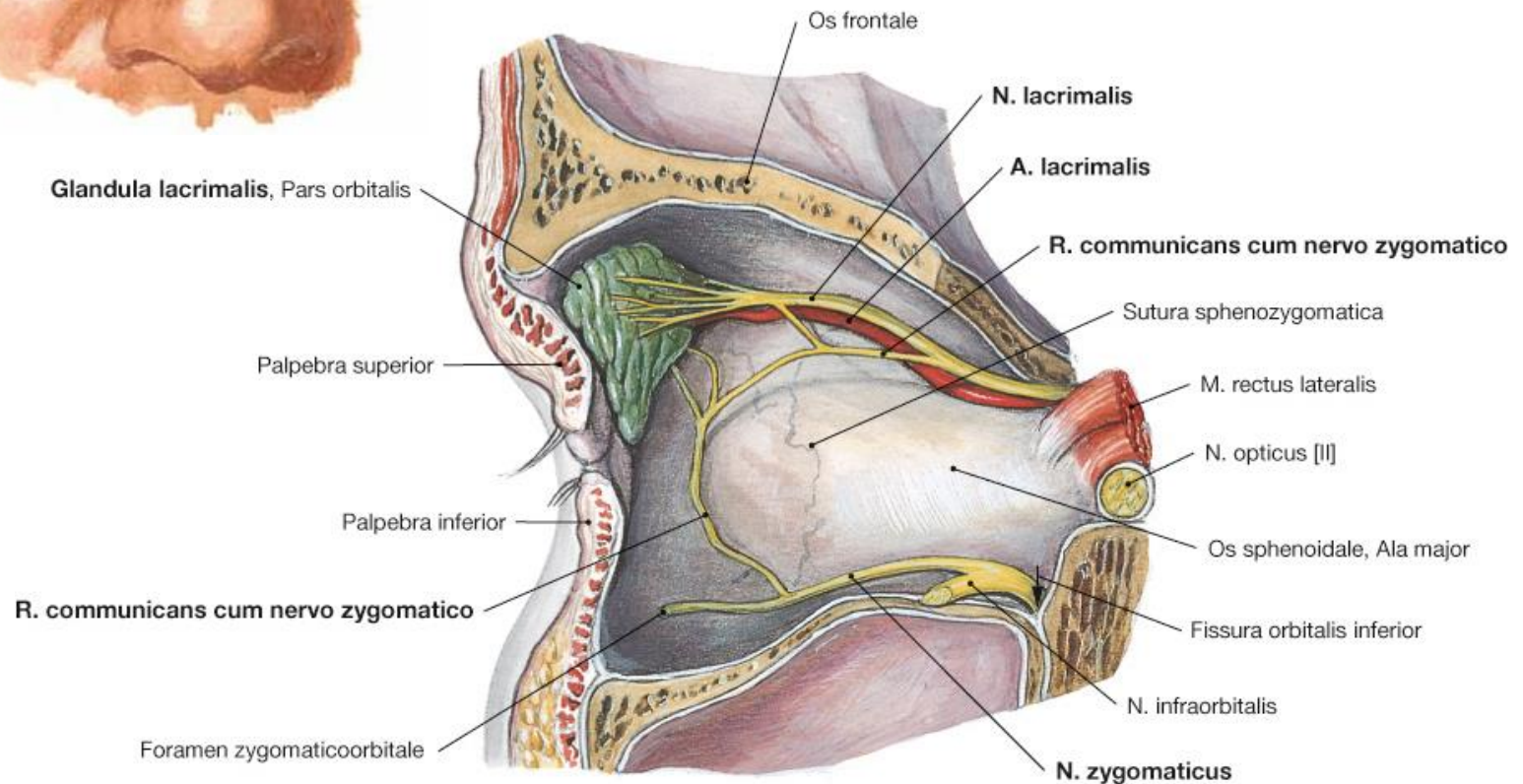
Sobotta - Atlas der Anatomie des Menschen, 23. A. 2010, © Elsevier GmbH, München

Musculus orbitalis: schwache mit der Periorbita verwachsene glatte Muskulatur bei der Fissura orbitalis inferior

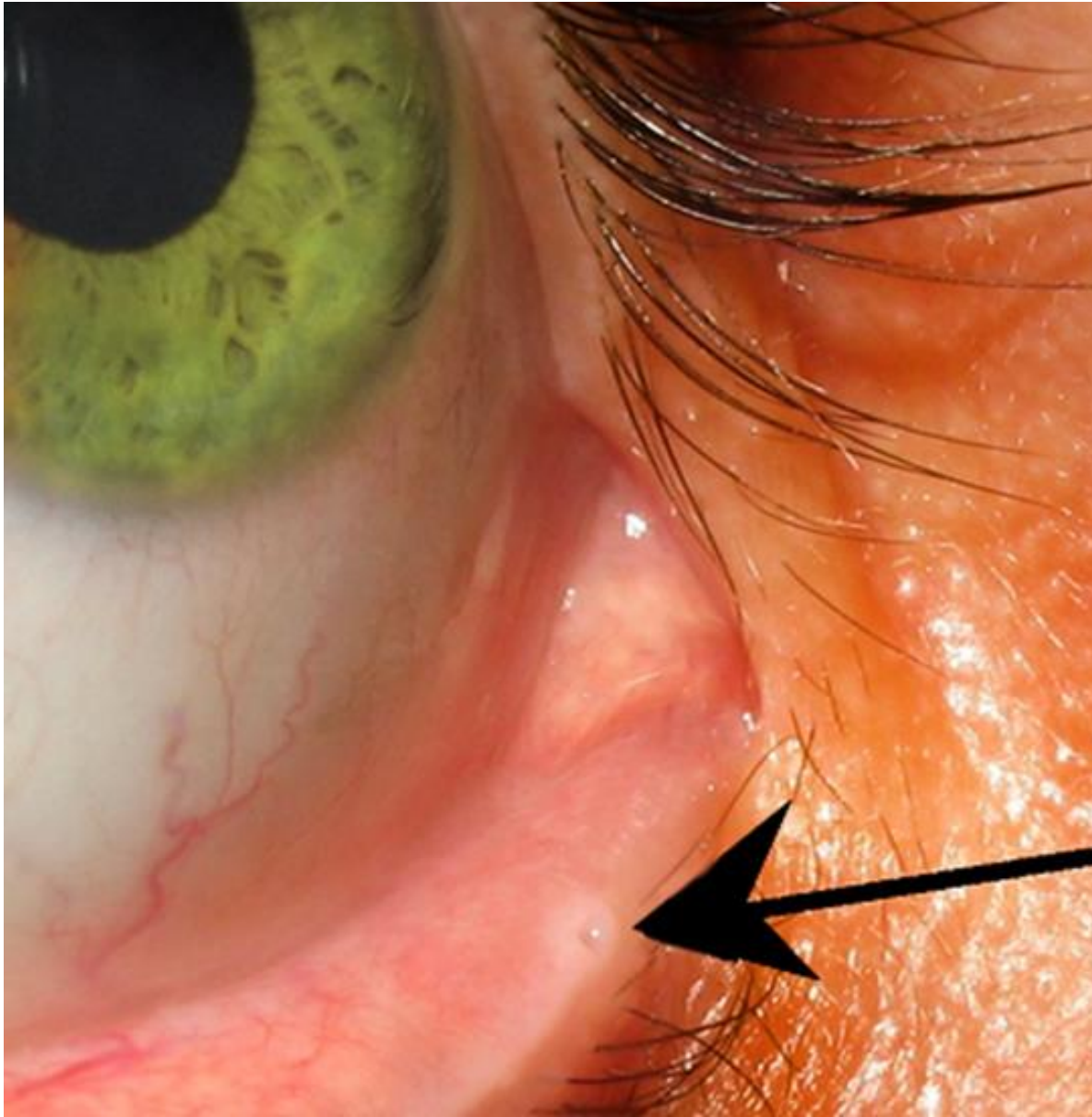
Glandula lacrimalis

Allg. somatoafferente Innervation: Nervus trigeminus

Parasympathische Innervation: Nervus facialis



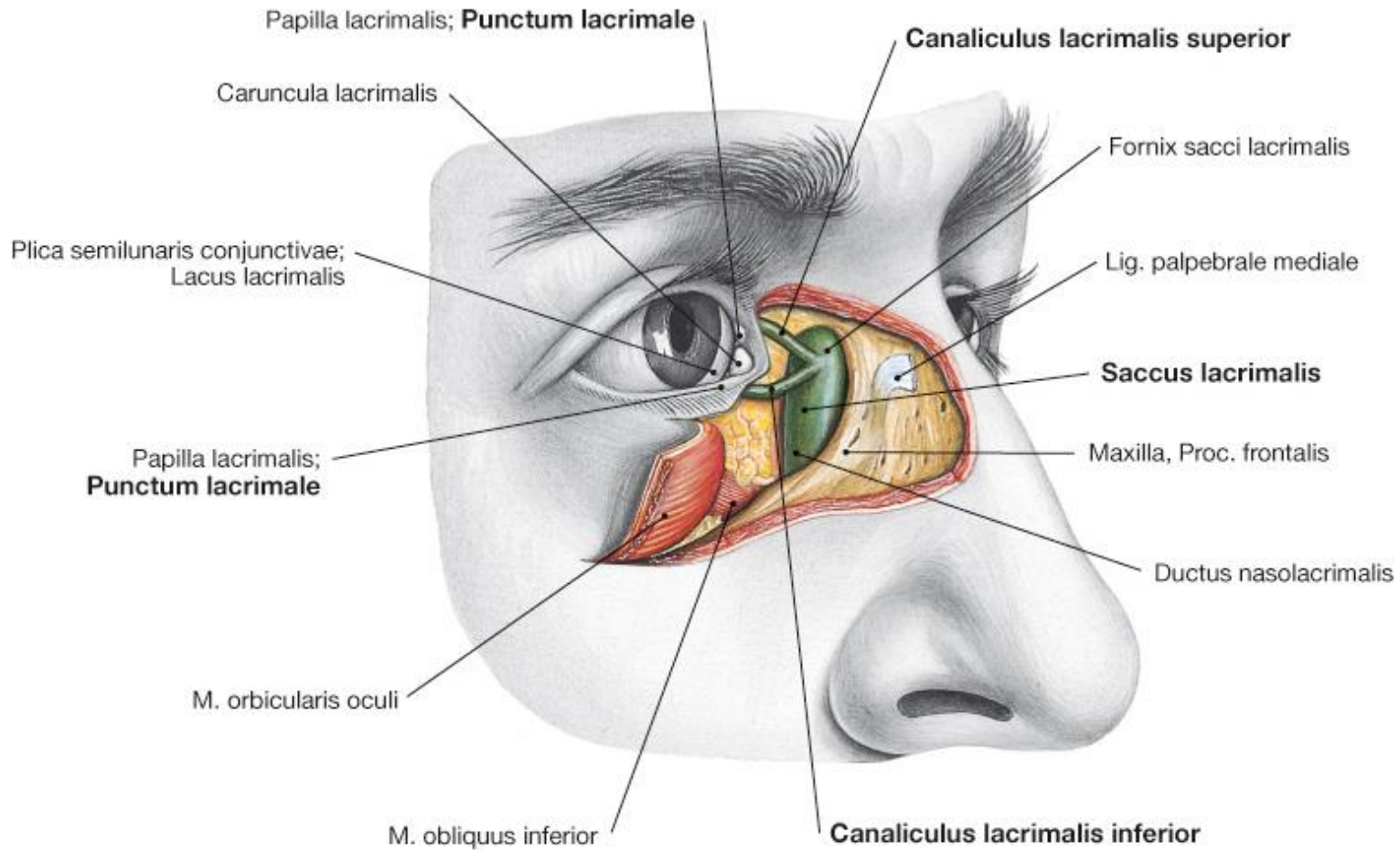
Tränenwege: Punctum lacrimale



Tränenwege

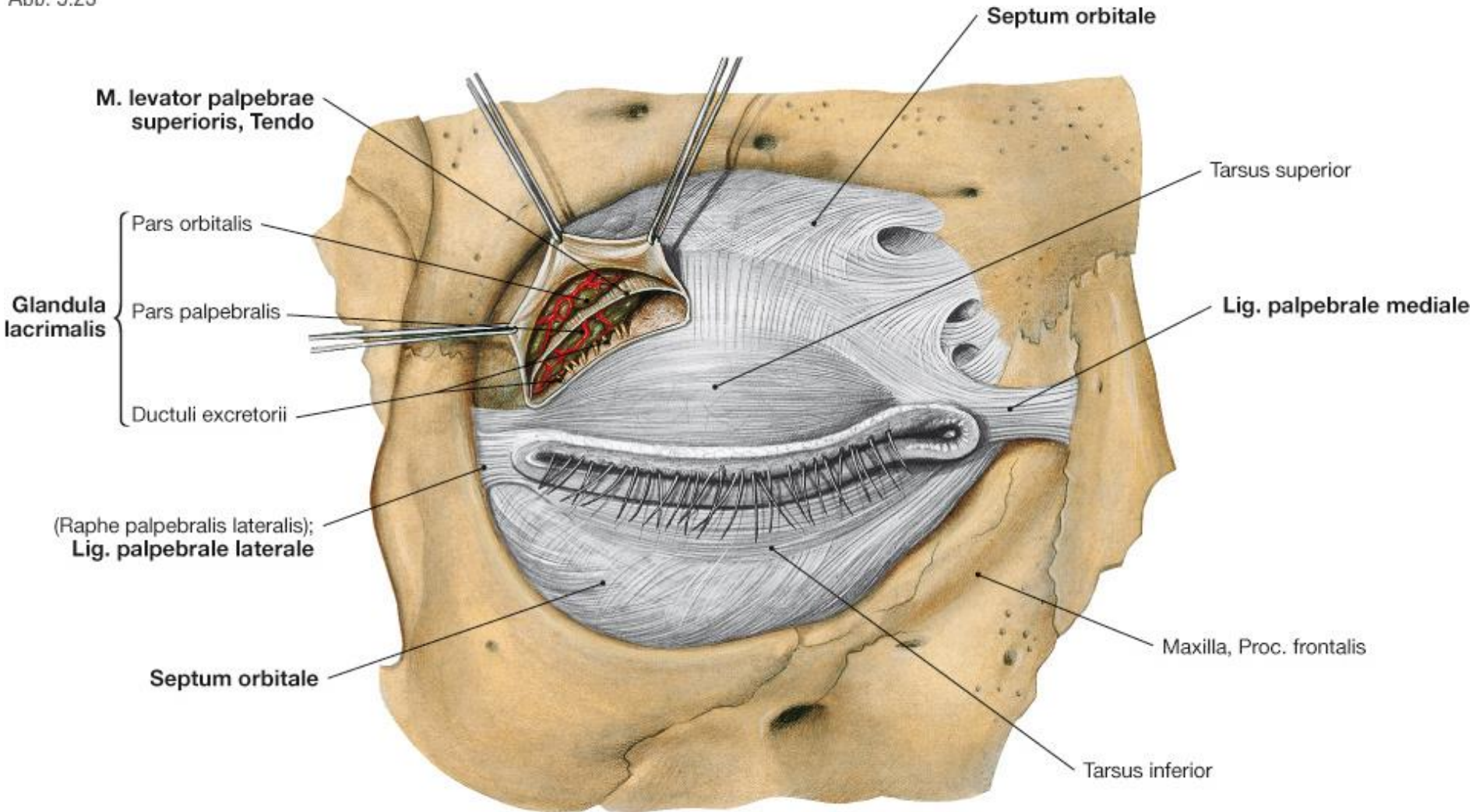


Abb. 9.32



Palpebra: Tarsus

Abb. 9.23





Eduard Zeis
(1807 – 1868)



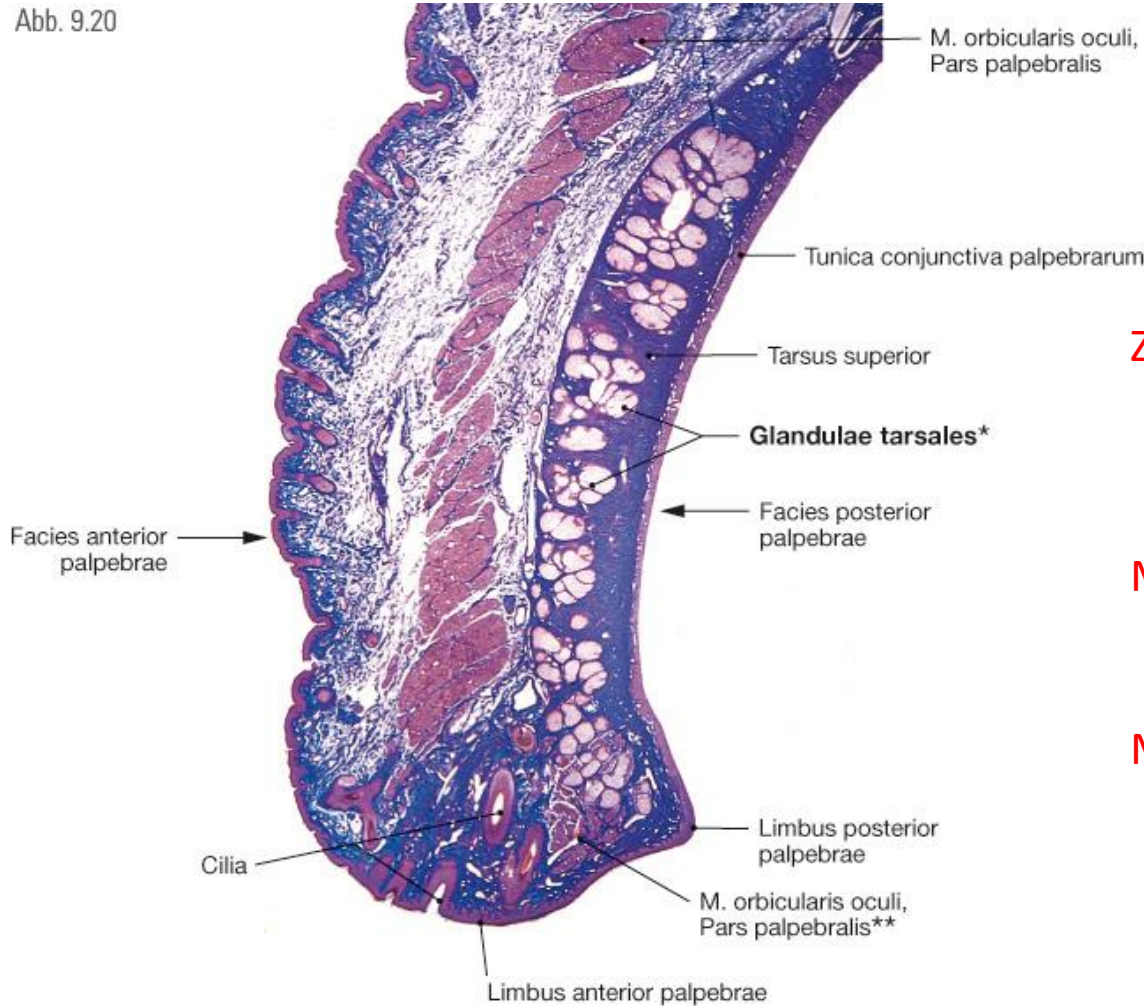
Heinrich Meibom
(1638 – 1700)



Jacob Anton Moll
(1832 – 1914)

Palpebra: Drüsen

Abb. 9.20



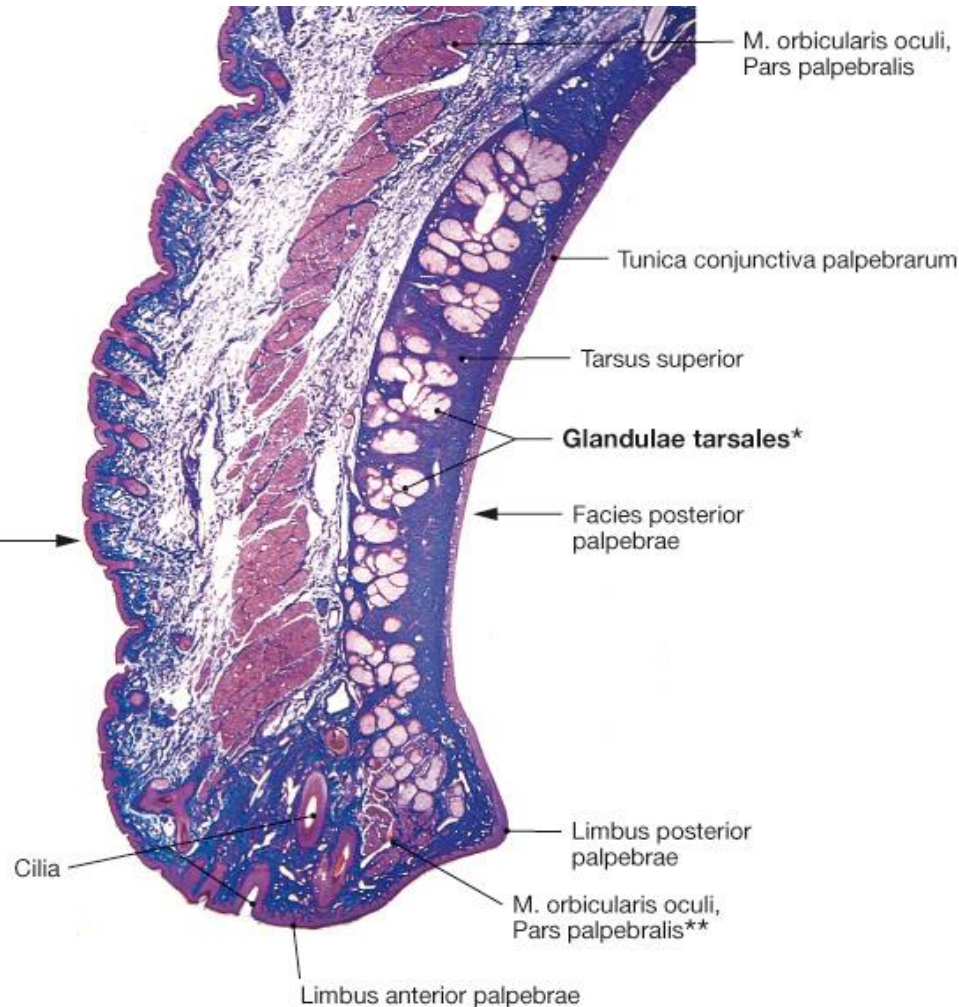
Zeis-Drüse: Haarfollikel-assoziierte Talgdrüse

Meibom-Drüse: Talgdrüsen im Tarsus

Moll-Drüse: Apokrine Drüse

Palpebra: Muskeln

Abb. 9.20



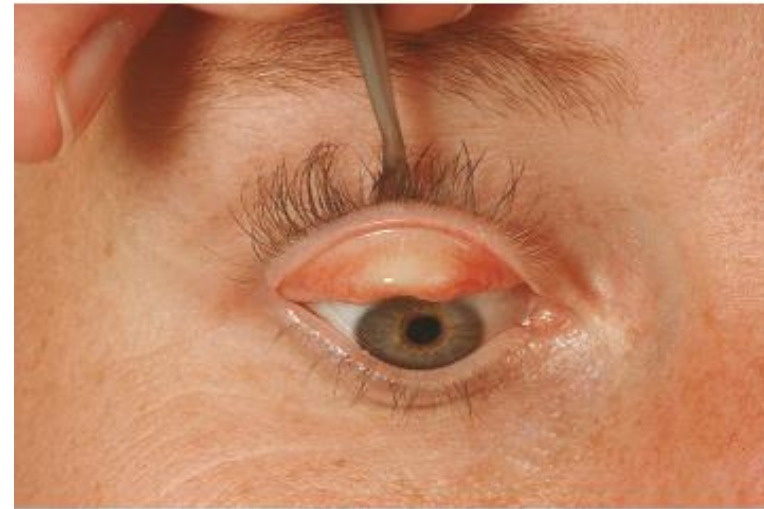
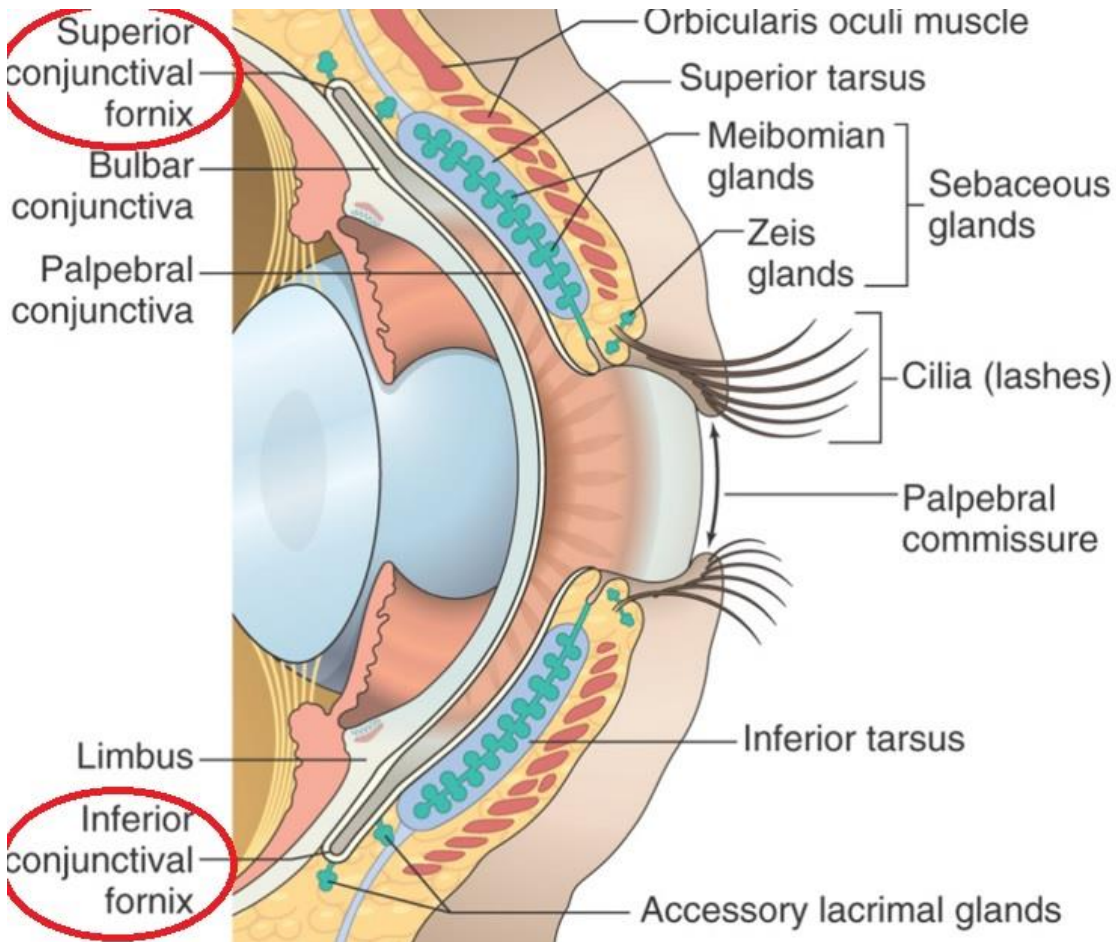
M. levator palpebrae sup.
(N. oculomotorius)

M. orbicularis oculi
(N. facialis)

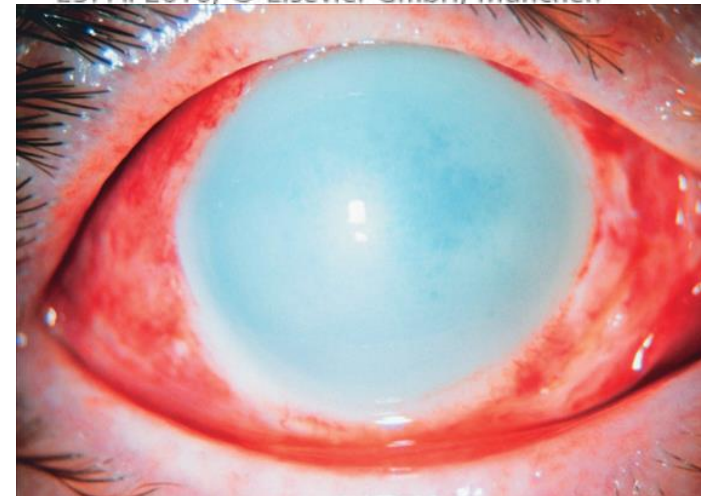
M. tarsalis
(glatte Muskulatur - Sympathikus)

Klinische Bezüge: Fremdkörper

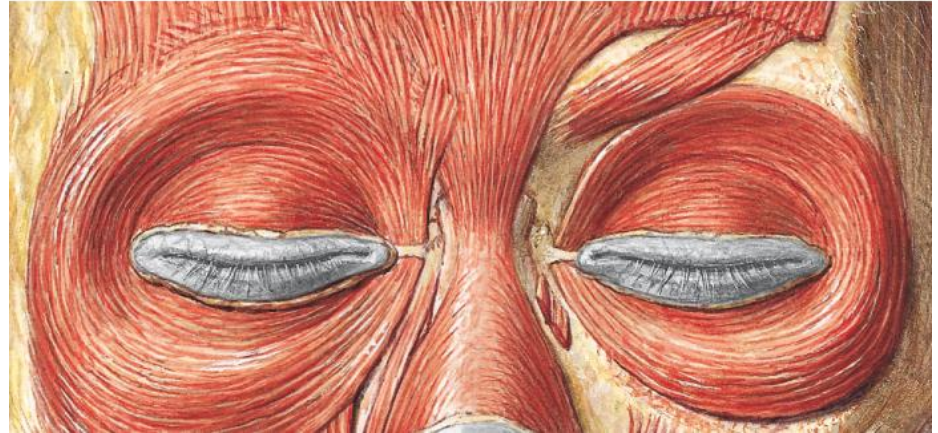
Abb. 9.17



Sobotta – Atlas der Anatomie des Menschen, 23. A. 2010, © Elsevier GmbH, München



Klinische Bezüge: Lagophthalmus



Nervus facialis Parese!!!

Klinikai vonatkozások: Ptosis (Ptose)



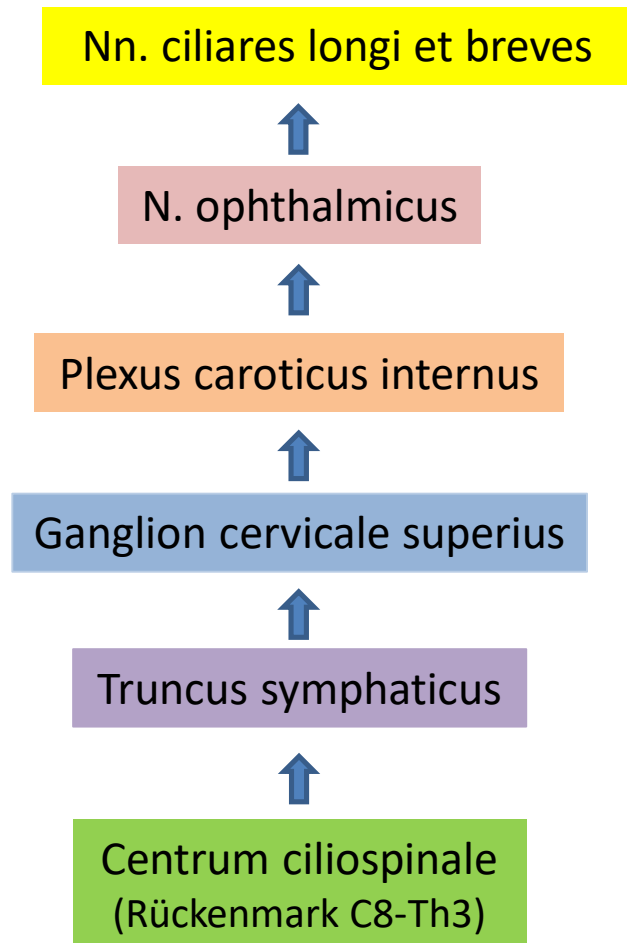
- Habitual (Angeboren)
- M. levator palpebrae sup. (N. oculomotorius)
- M. tarsalis (Sympathikus)

Klinische Bezüge : Horner-Trias



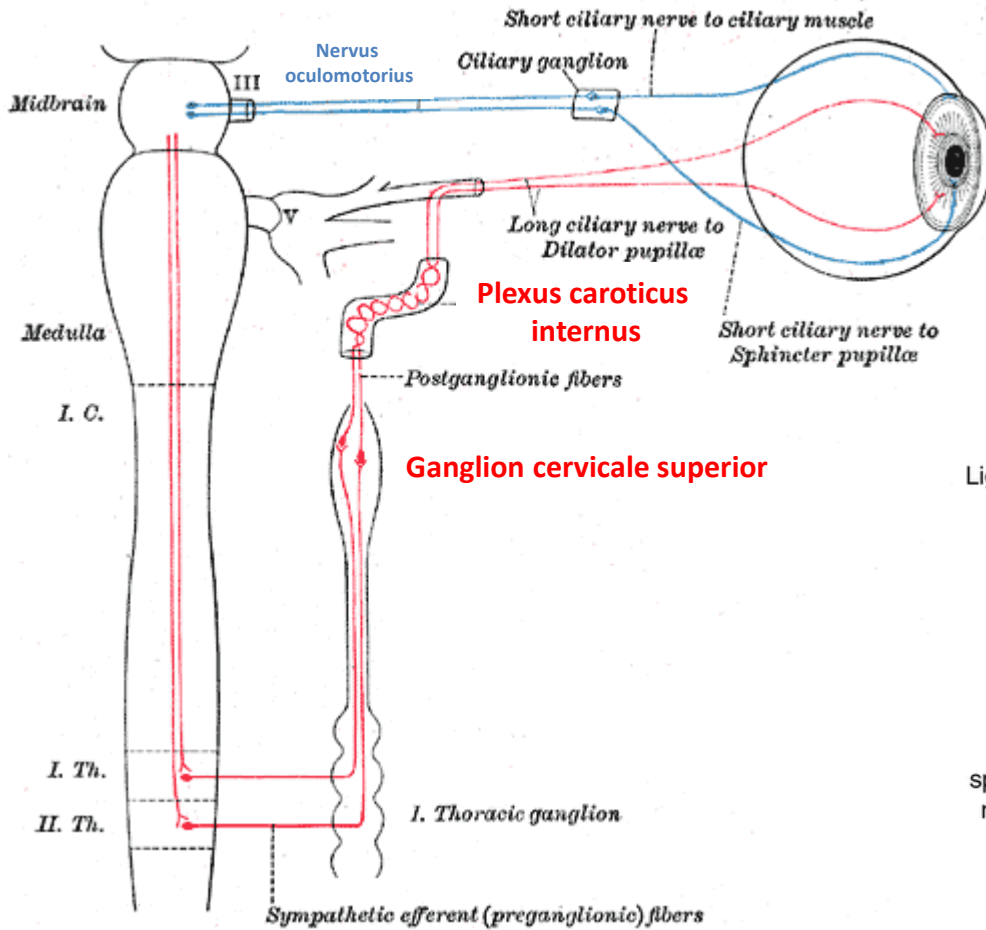
Johann Friedrich
Horner
(1831 – 1886)

Sympathische Innervation des Auges

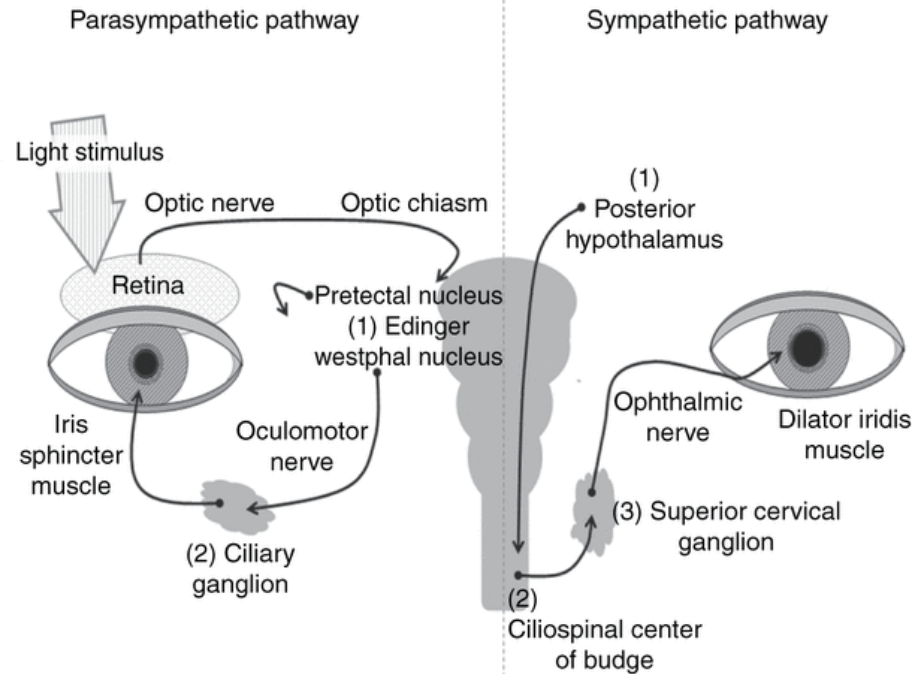


Horner-Trias: Ptosis (m. tarsalis)
Miosis (m. dilatator pupillae)
Enophthalmus (m. orbitalis)

Sympathische Innervation



**Centrum ciliospinale
(C8-Th2/3)**



Mesencephalon

Ganglion ciliare

Vegetative Innervation des Auges

N. Westphal-Edinger (III.)

M. ciliaris,
M. sphincter pupillae

Nn. ciliares breves

R. inf. n. oculomotorii
Radix brevis (motoria)

Pons

Ganglion trigeminale

Ganglion ciliare

Lemniscus trigeminalis

Nucleus sensorius n. V.

N. nasociliaris
Radix longa (sensoria)

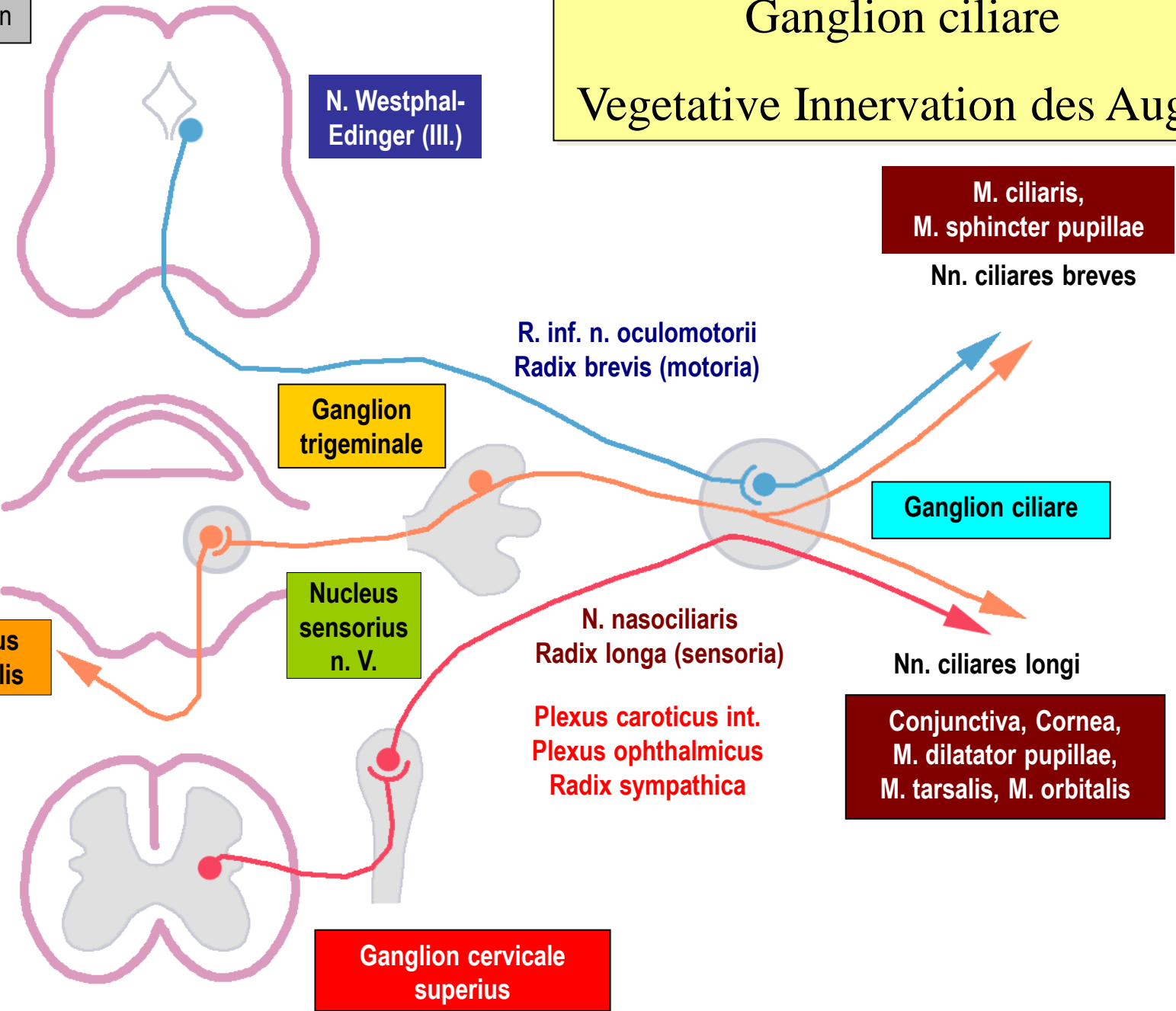
Nn. ciliares longi

Plexus caroticus int.
Plexus ophthalmicus
Radix sympathica

Conjunctiva, Cornea,
M. dilatator pupillae,
M. tarsalis, M. orbitalis

Medulla spinalis

Ganglion cervicale superius



Angewendete Literatur

- Benninghoff, Drenckmhahn: Anatomie, *16. Auflage, Elsevier Urban Fischer, Stuttgart*
- Paulsen, Waschke: Sobotta Atlas der Anatomie des Menschen, *23. Auflage Urban & Fischer Verlag*
- Schünke, Schulte, Schumacher, Voll, Wesker: Prometheus LernAtlas der Anatomie, *1. Auflage, Thieme*
- Drake, Vogl, Mitchell: Gray's Anatomie für Studenten, *1. Auflage Urban & Fischer Verlag*
- <http://12cranialnerves.wordpress.com/>