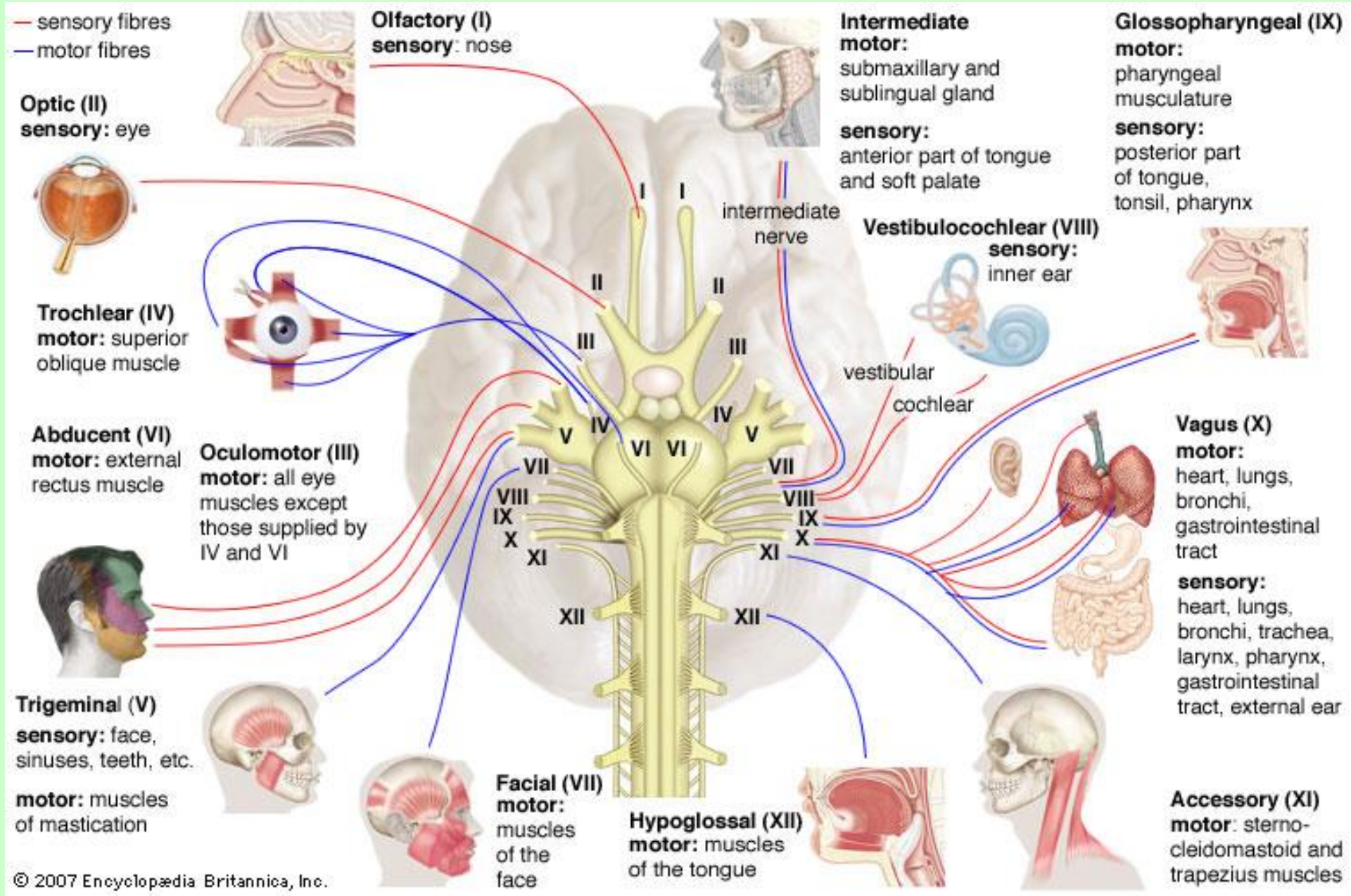
CRANIAL NERVES

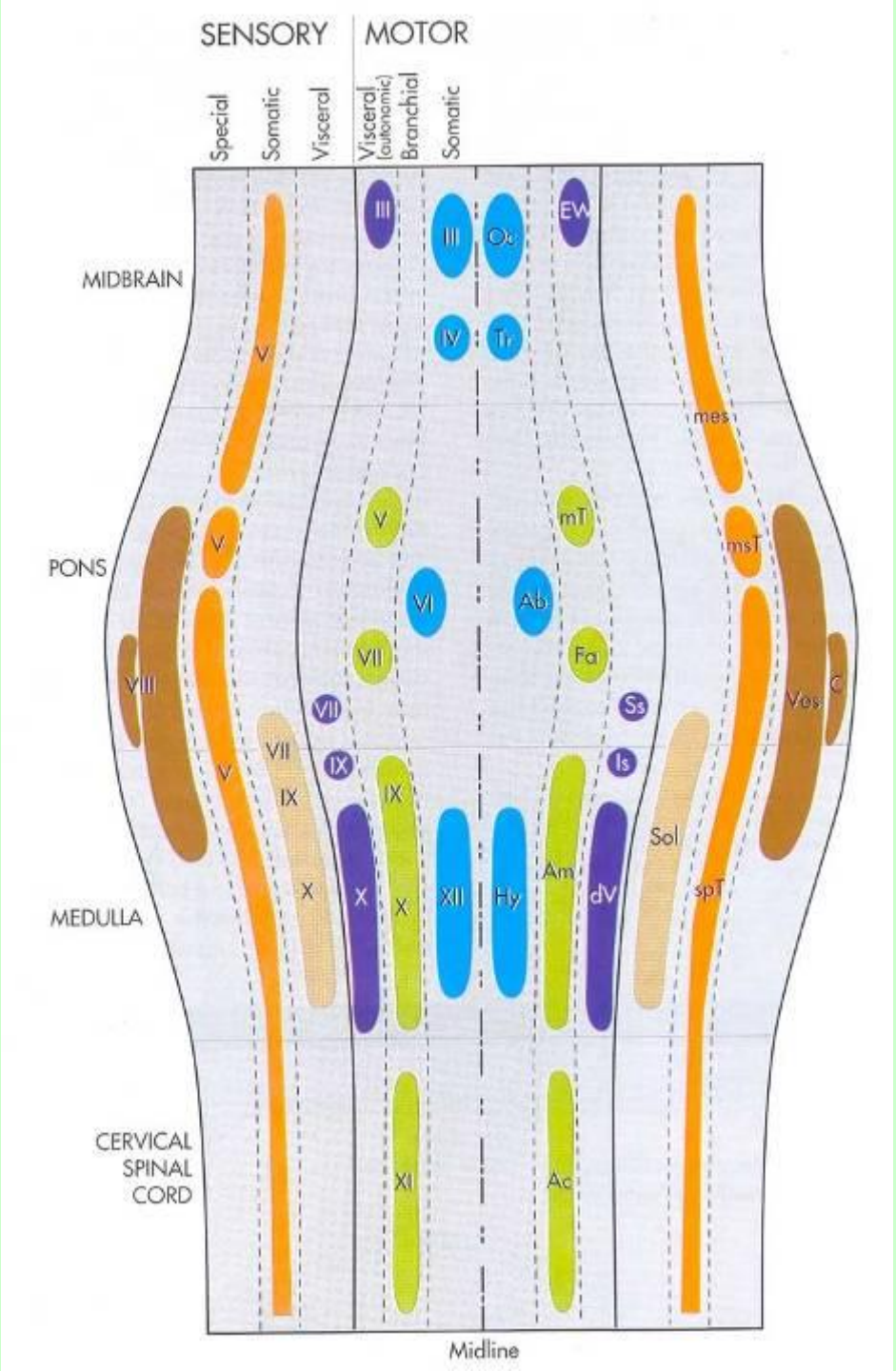
2nd part

David Kachlík

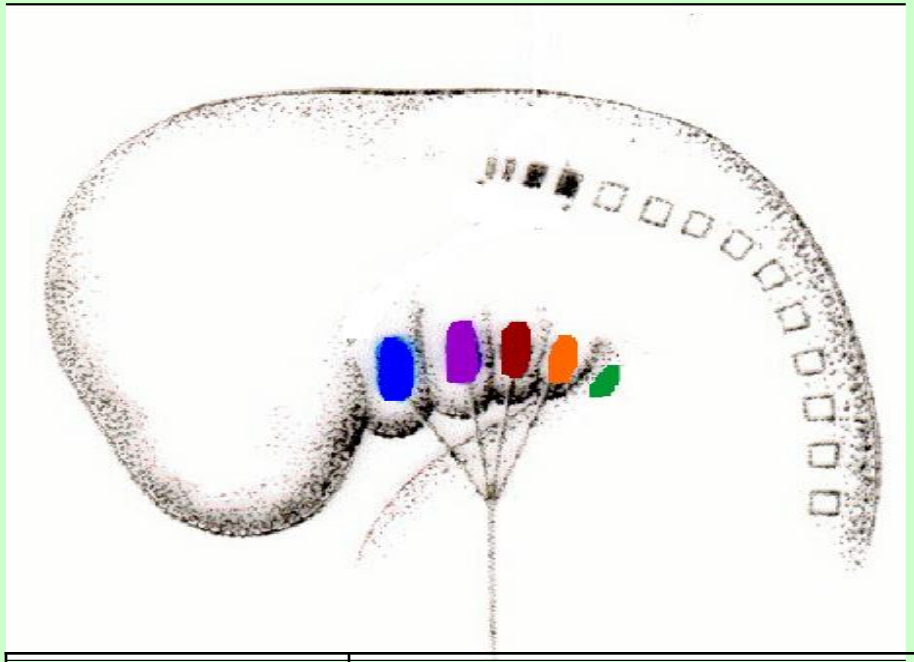


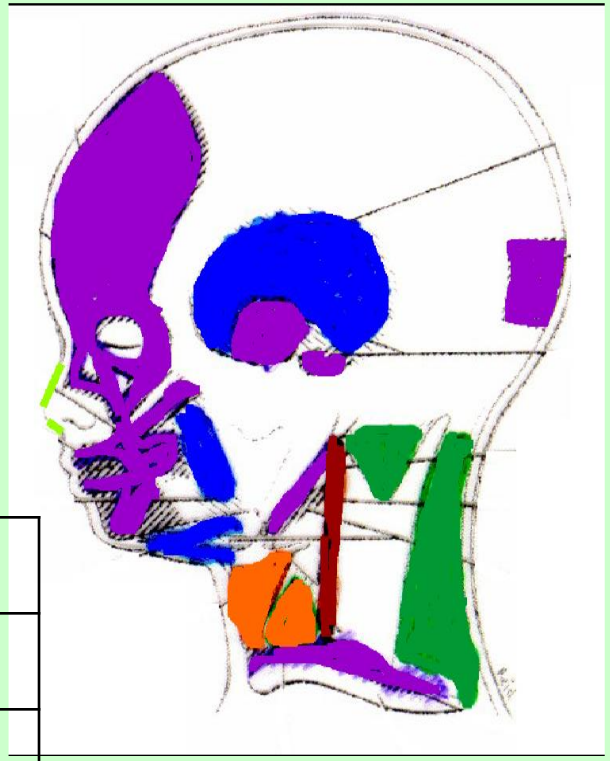
Developmental classification *mediolaterally*

- **somatomotor somatic**
- **somatomotor branchial**
- **visceromotor**
- **viscerosensory**
- **somatosensory**
- **special sensory**



SomatoMotor Branchial CN





1st arch	V.
2nd arch	VII.
3rd arch	IX.
4th arch	X. – n. laryngeus sup.
6th arch	r. int. XI. - n. lar. recurrens

General scheme for CN study

1. number, Latin and English term
2. developmental type of CN
3. nuclei + their location
4. transmitted modalities
5. where CN submerge into skull
6. course of CN + topography
7. branches
8. overview of supplied area
9. clinical examination, reflexes
10. palsy / iritation

VII. = N. facialis

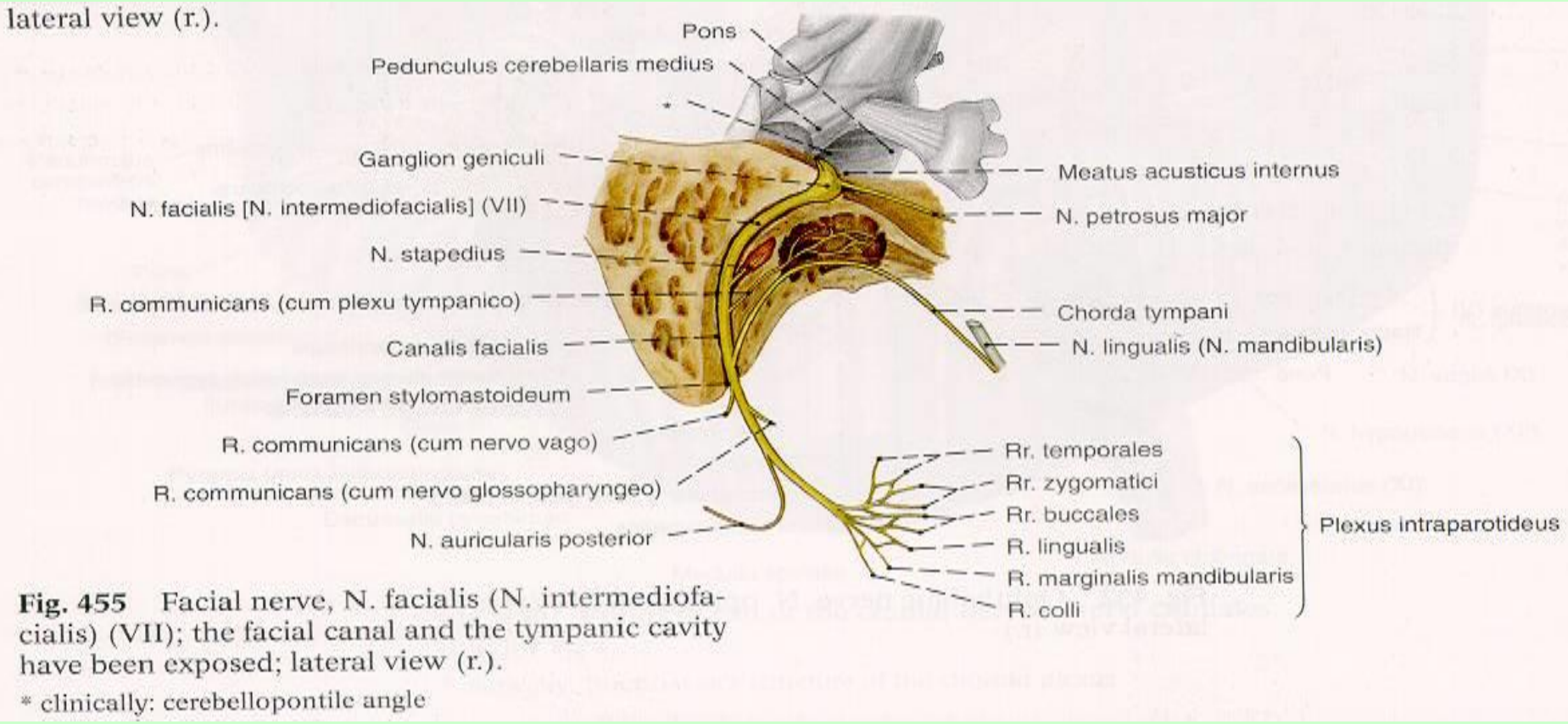


Fig. 455 Facial nerve, N. facialis (N. intermediofacialis) (VII); the facial canal and the tympanic cavity have been exposed; lateral view (r.).

* clinically: cerebellopontile angle

VII. = N. facialis

3 nuclei in pons

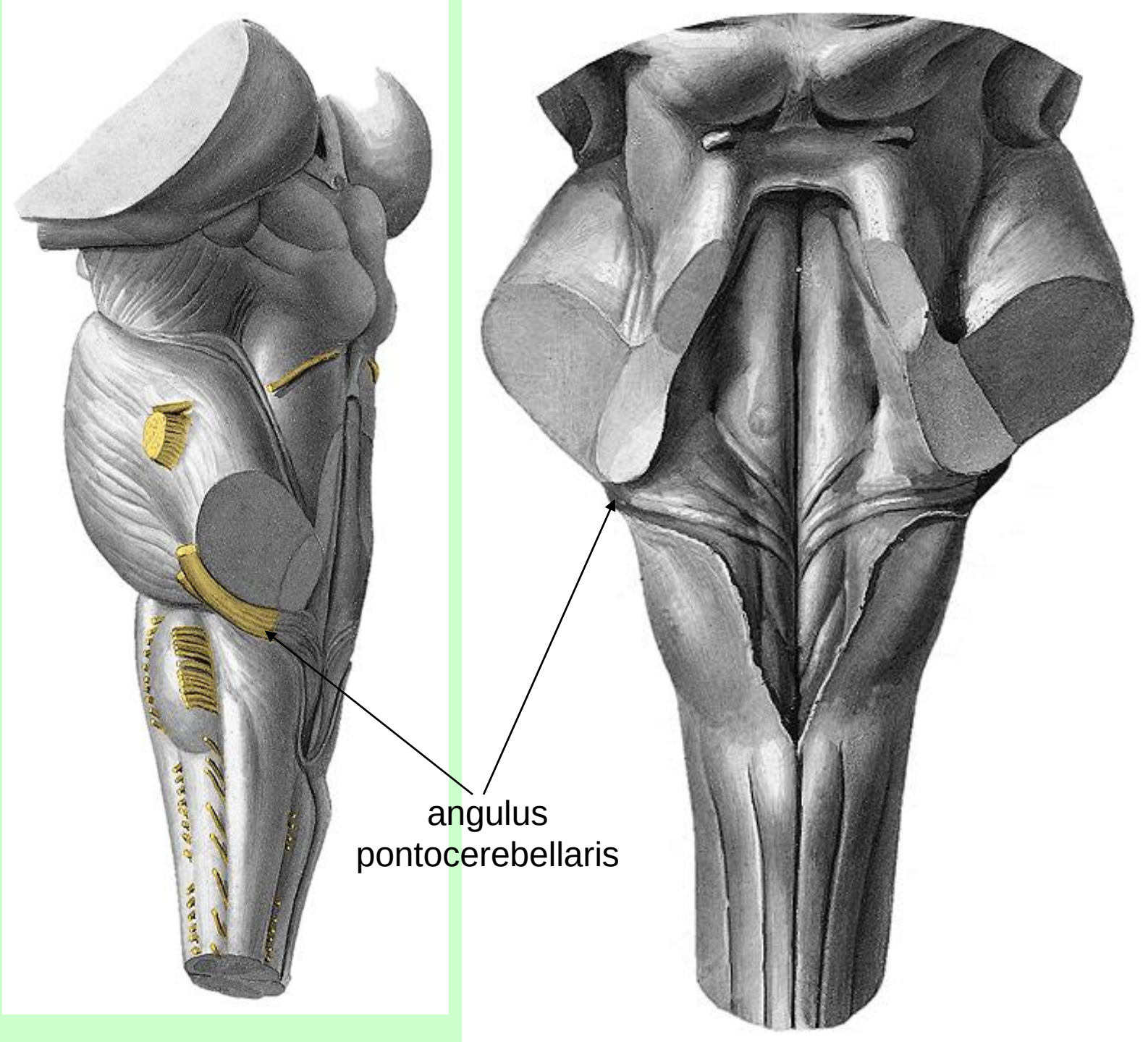
- *somatomotor branchial* (2nd arch) → **ncl. n. VII**
- *visceromotor* (parasympathetic) → **ncl. salivatorius superior**
- **ncl. gustatorius** (rostral part of ncll. tractus solitarii) → *sensory* (taste)

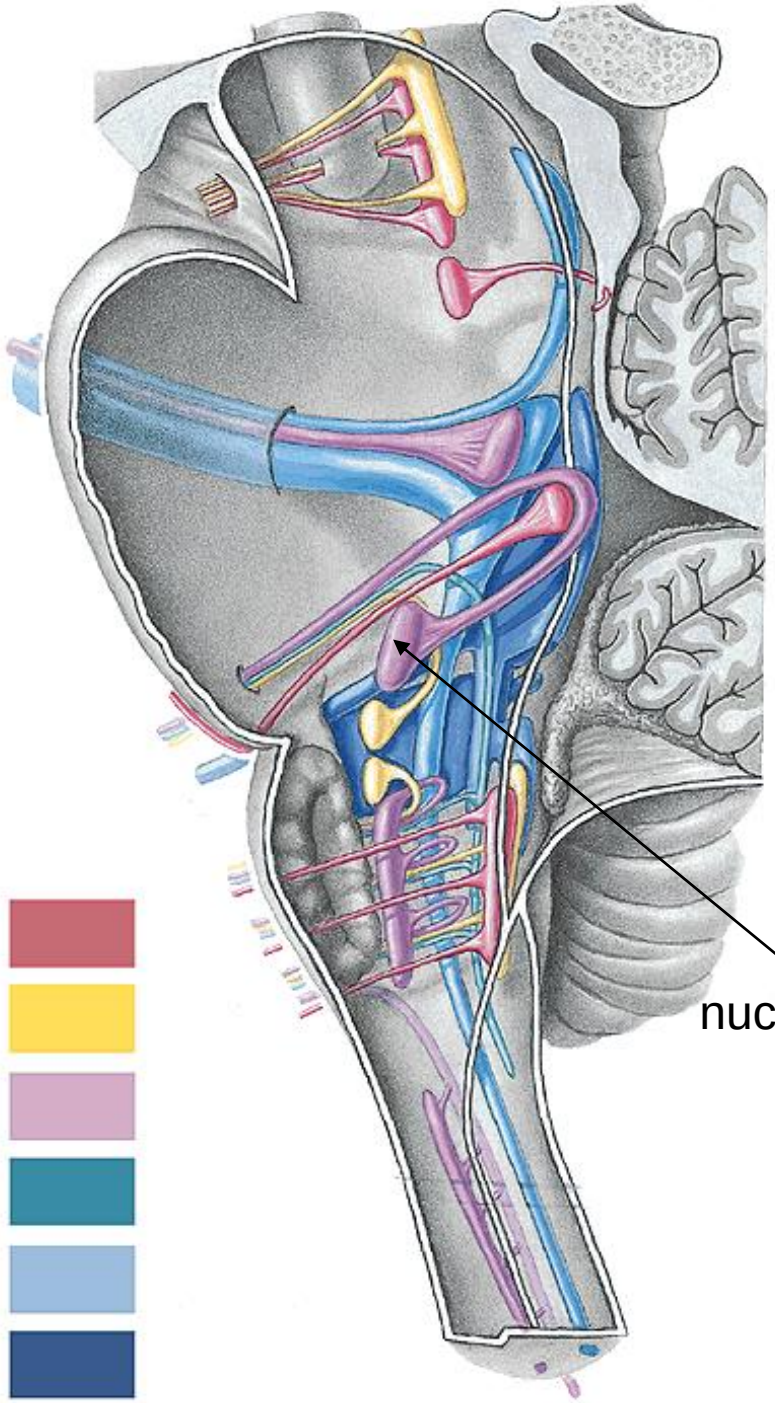
n. intermedius = VM fibres + taste fibres

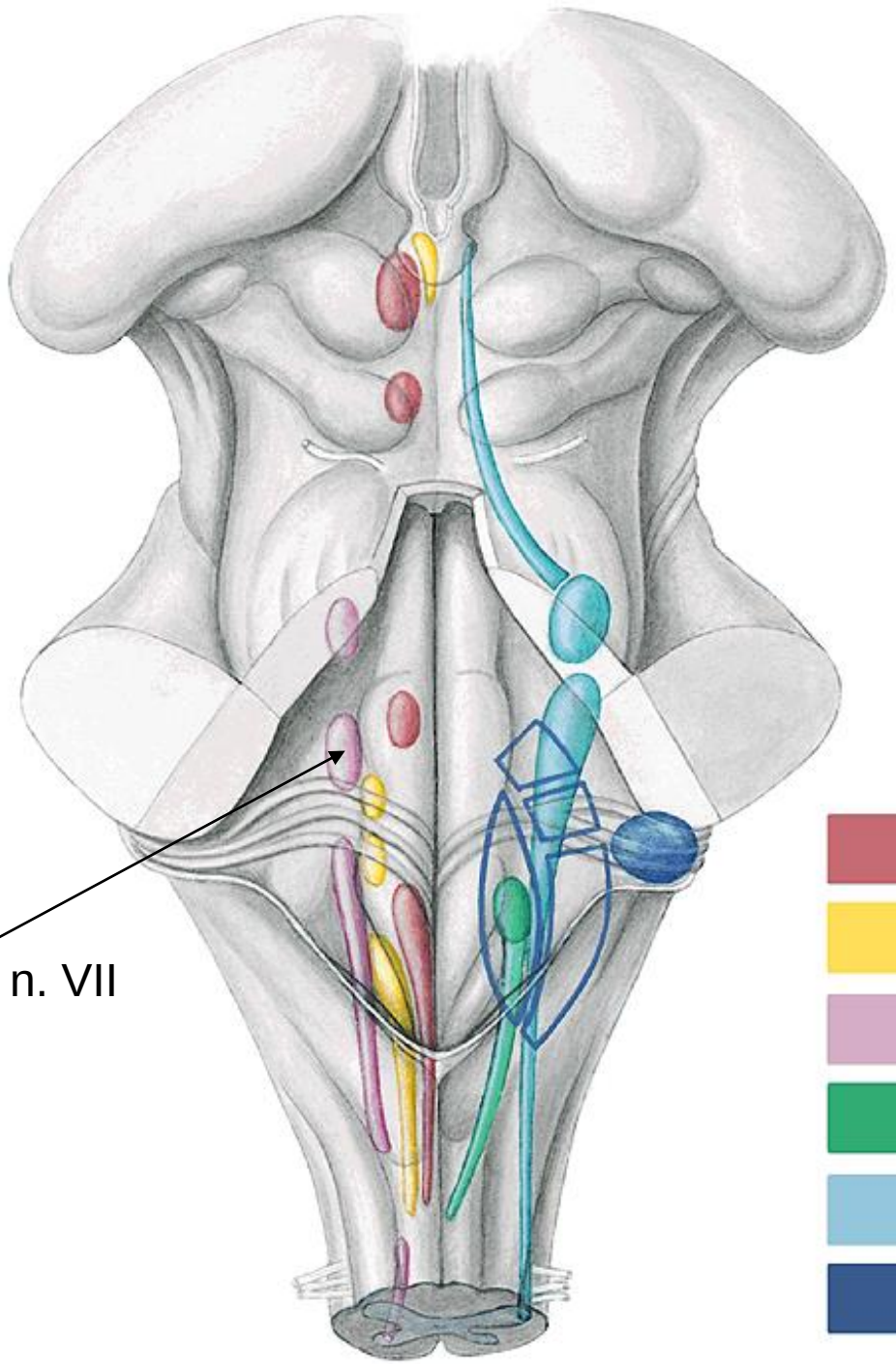
10.000 neurons

70% somatomotor

30% visceromotor + taste = **n. intermedius**

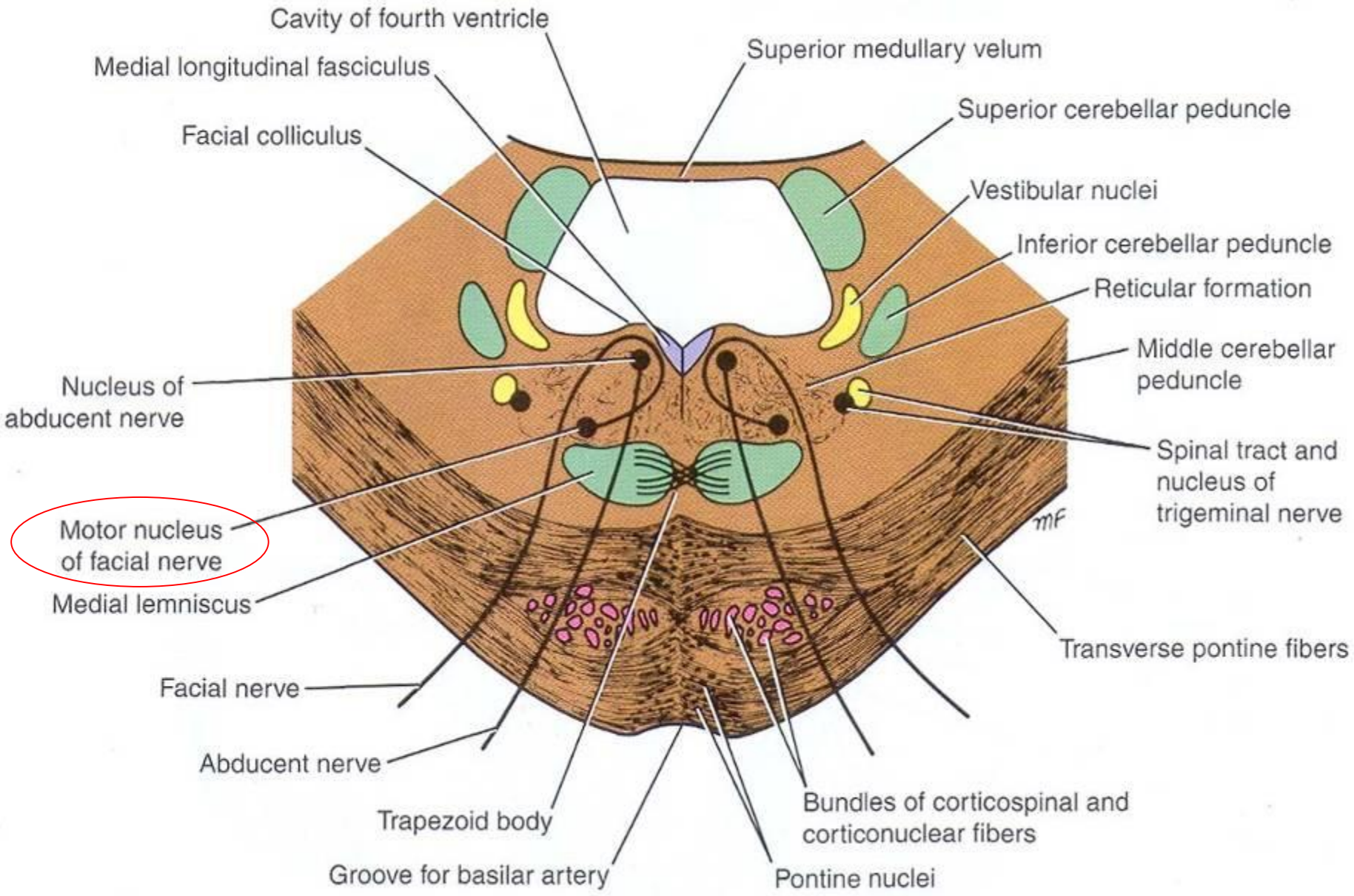

angulus
pontocerebellaris





nucleus n. VII

Pons - sectio in collicule faciale



Course

- angulus pontocerebellaris

→ fossa cranii posterior (cisterna pontocerebellaris

→ porus acusticus internus (cisterna meatus acustici interni)

→ meatus acusticus internus

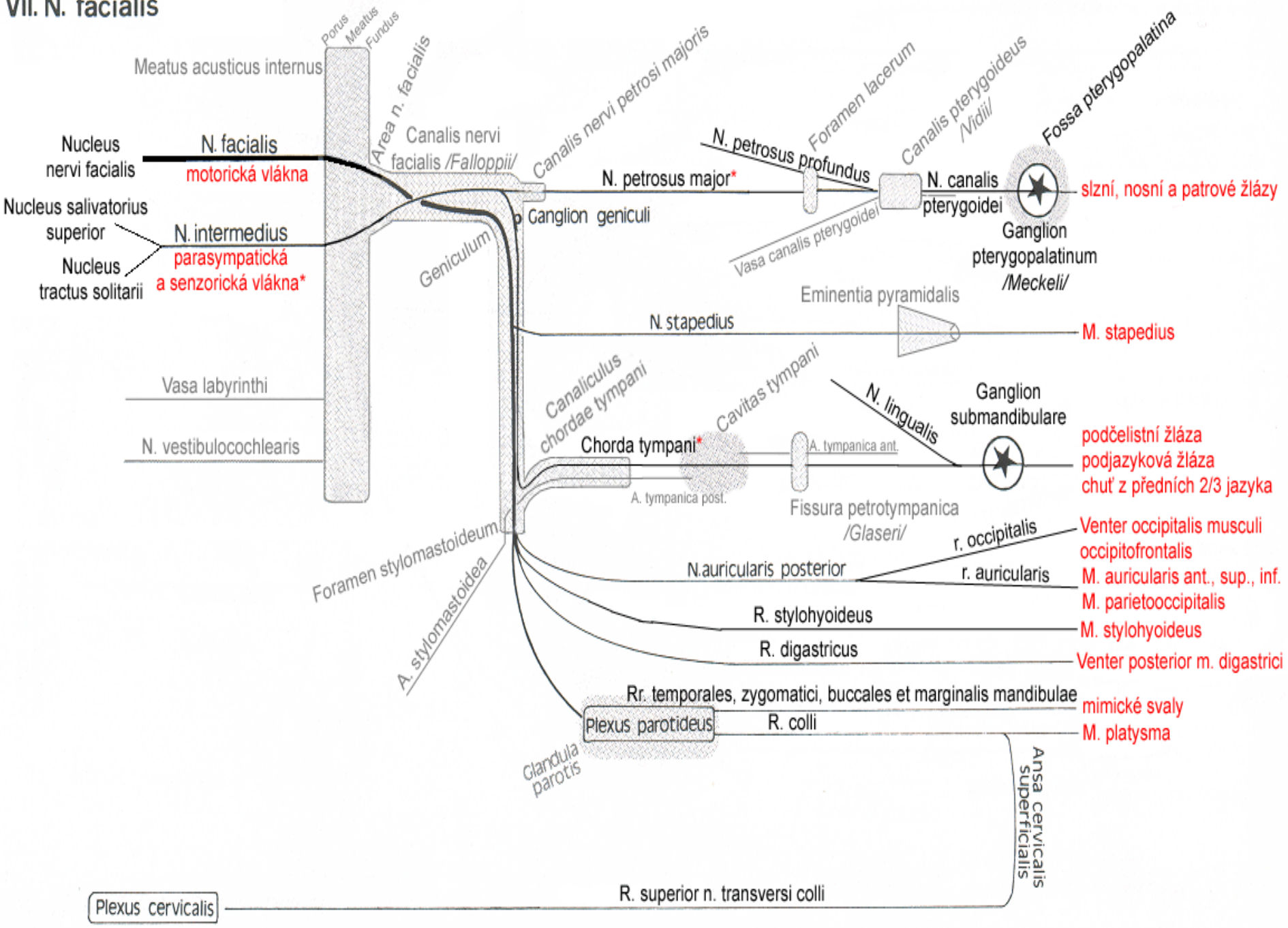
→ fundus m.a.i. (upper anterior quadrant)

→ canalis nervi facialis *Falloppii*

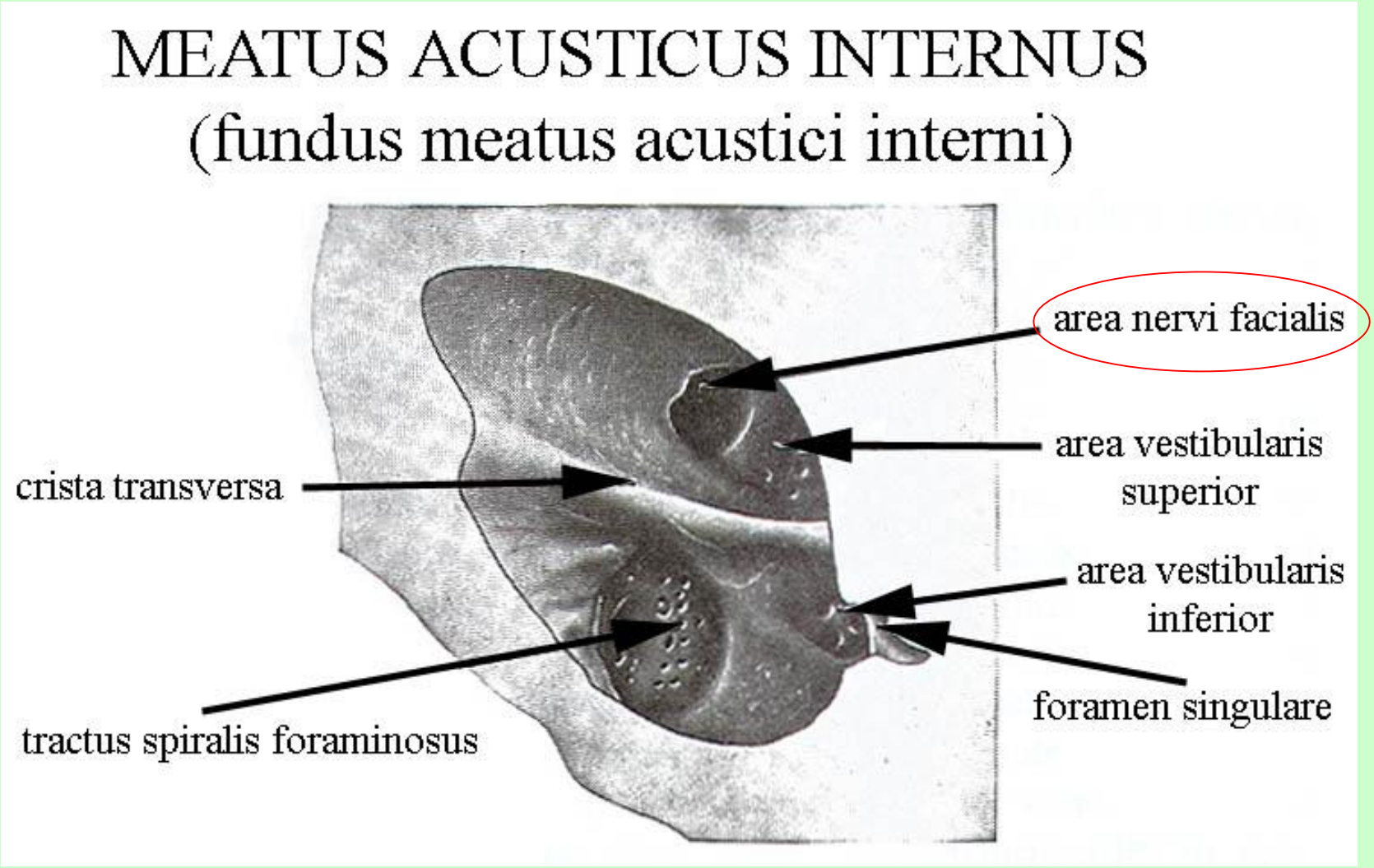
→ foramen stylomastoideum

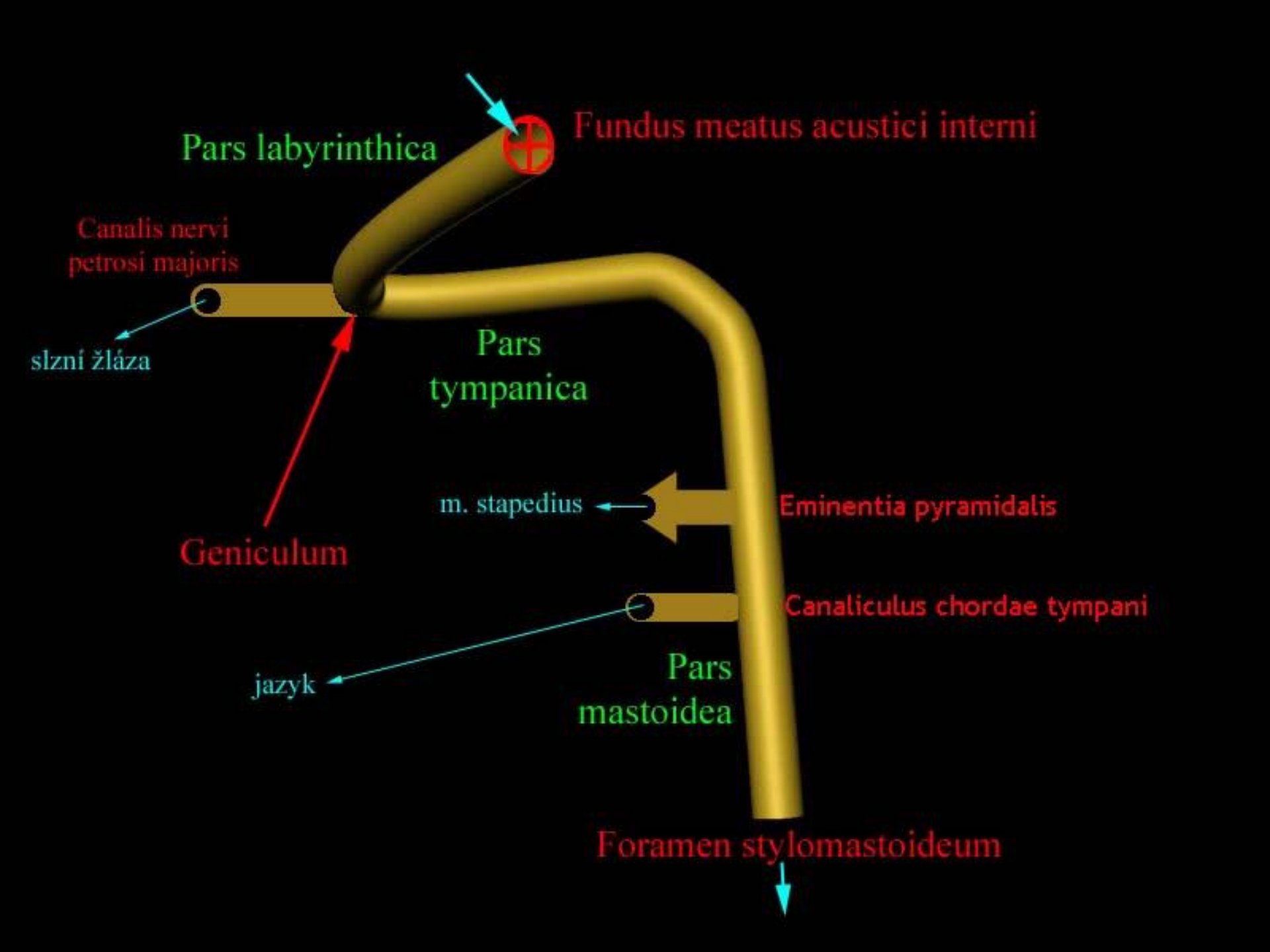
→ glandula parotidea

VII. N. facialis

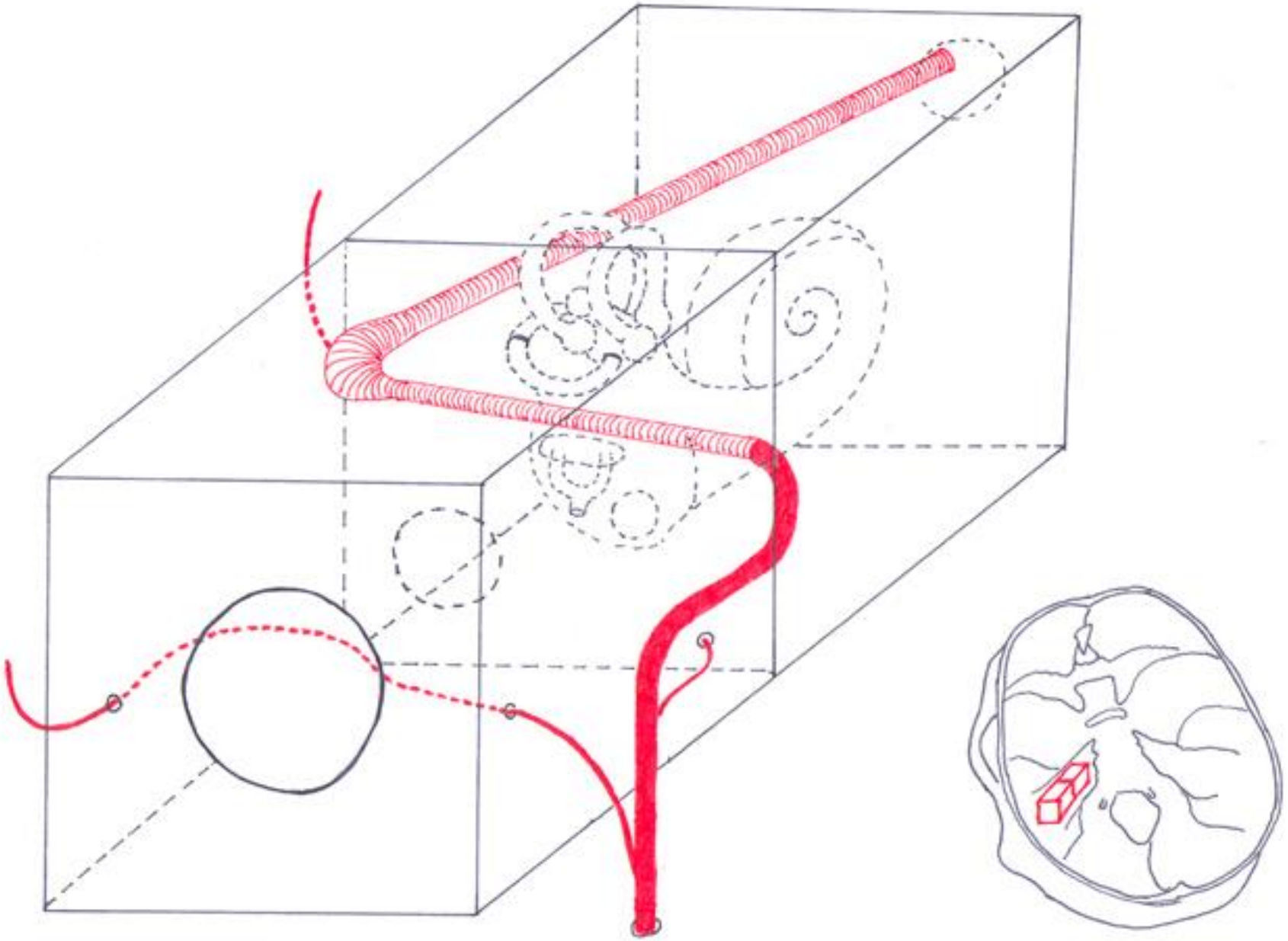


Canalis nervi facialis *Falloppii*




Fundus meatus acustici interni
Pars labyrinthica
Canalis nervi petrosi majoris
slzní žláza
Pars tympanica
m. stapedius
Eminentia pyramidalis
Geniculum
Canaliculus chordae tympani
jazyk
Pars mastoidea
Foramen stylomastoideum

CANALIS NERVI FACIALIS *FALLOPPII* l. sin.



VII. = N. facialis – branches

in canalis nervi facialis

- n. petrosus major – *parasympathetic fibres* → **gll. lacrimalis, nasales, palatinae, nasopharyngeae**
- n. stapedius → **m. stapedius**
- chorda tympani
  - *parasympathetic fibres* → **gll. linguales, submandibularis + sublingualis**
  - *taste* → ventral 2/3 of tongue = **dorsum linguae**

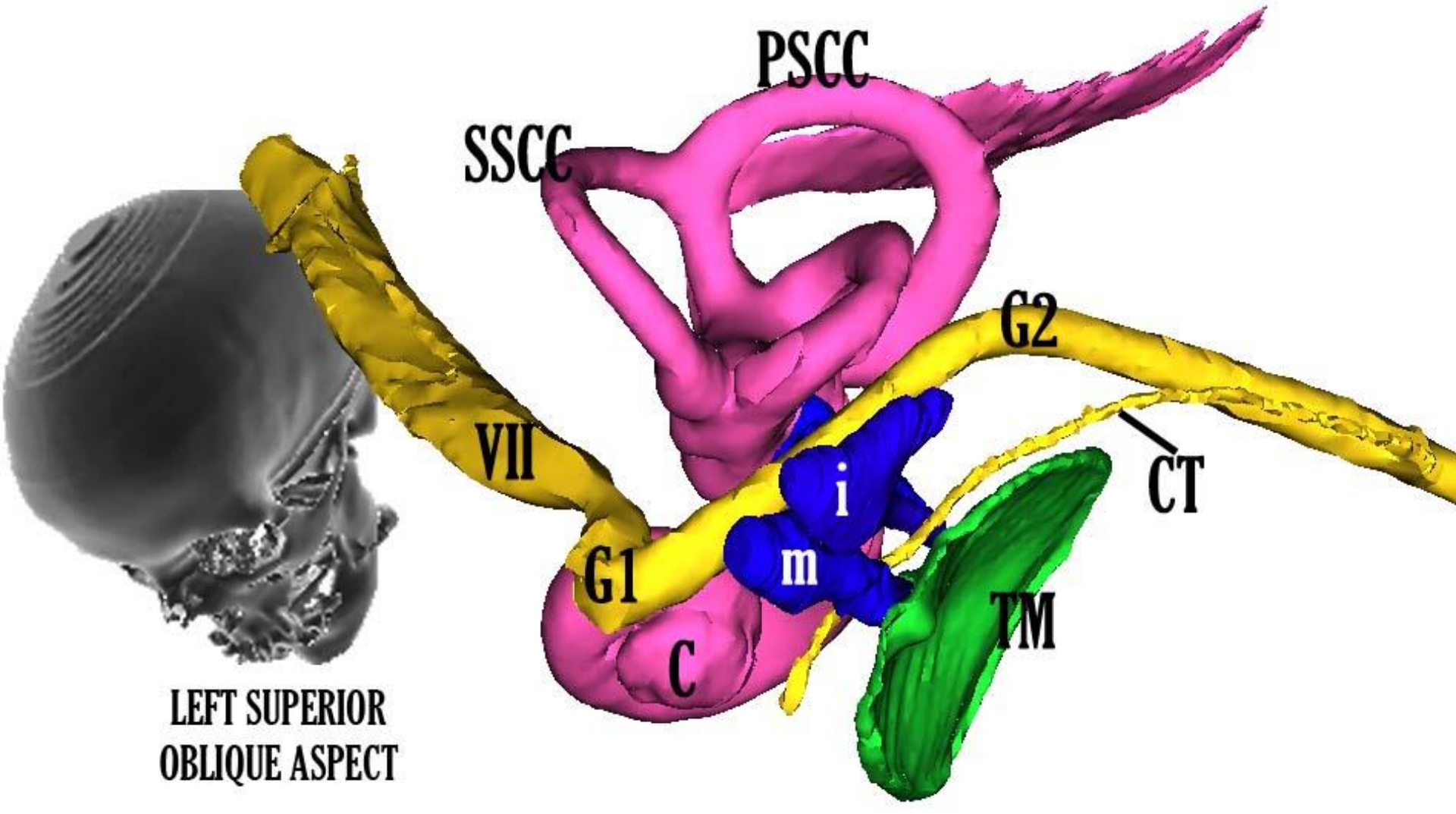
outside skull

- n. auricularis posterior – *somatomotor fibres* → rudimentary muscles of auricle + 3 mm. auriculares
- nn. for m. stylohyoideus + venter post. m. digastrici
- **plexus intraparotideus – 5 branches**

VII. = N. facialis – branches courses

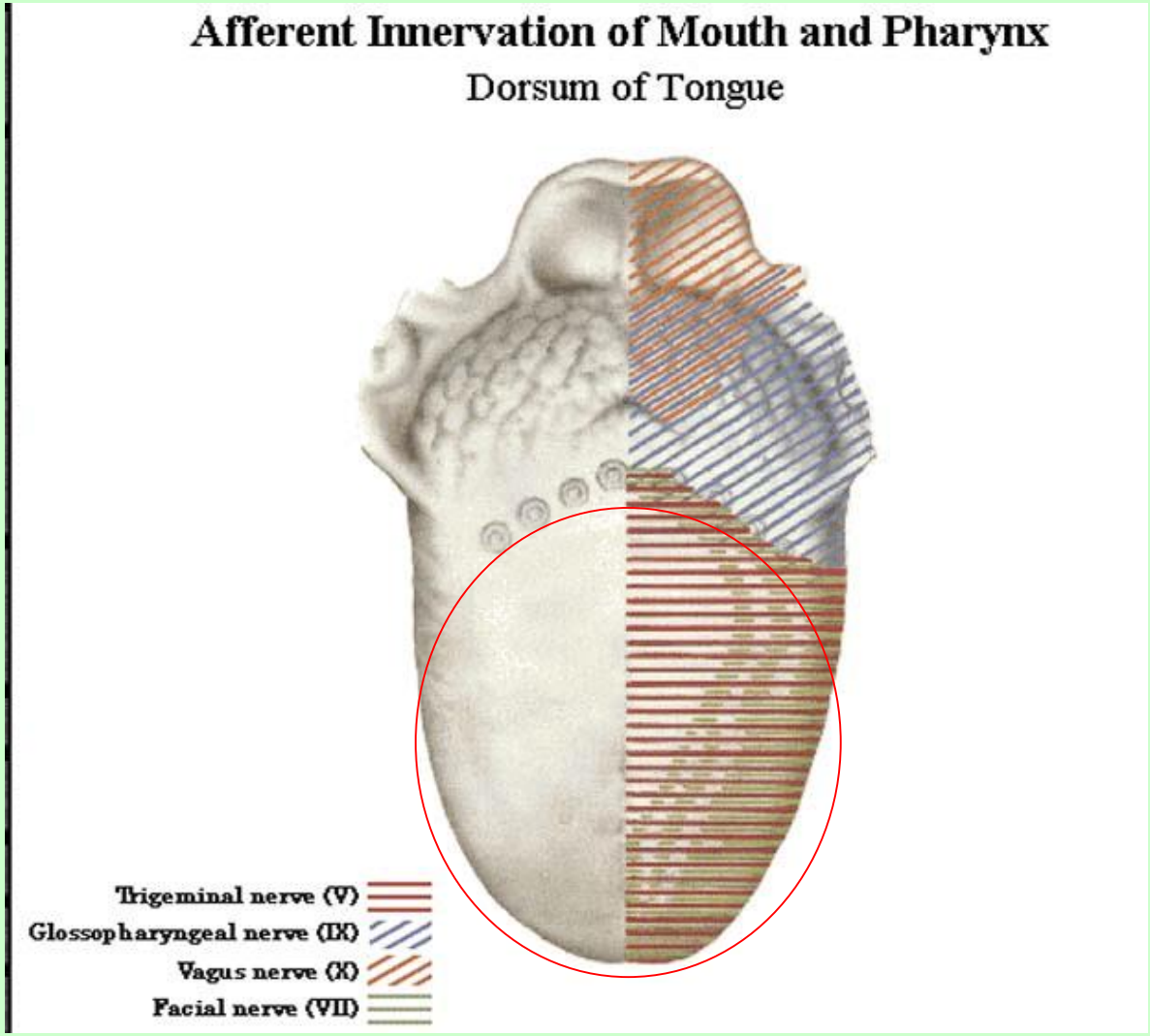
- n. petrosus major – *parasympathetic*
  - canalis n.p.m.→ sulcus n.p.m. → foramen lacerum → canalis pterygoideus *Vidii* → fossa pterygopalatina → ggl. pterygopalatinum → via branches of n.V2 to **gll. lacrimalis, nasales, palatinae, nasopharyngeae**
- n. stapedius – *somatomotor*
  - eminetia pyramidalis: **m. stapedius**
- chorda tympani – *parasympathetic* + *taste*
  - canaliculus ch.t. posterior → cavitas tympani → canaliculus ch.t. anterior → fissura petrotympanica *Glaseri* → fossa infratemporalis → n. lingualis
    - → gg. submandibulare → via branches of n. V3 to **gll. linguales, submandibularis + sublingualis**
    - → ventral 2/3 of tongue = **dorsum linguae – *taste***

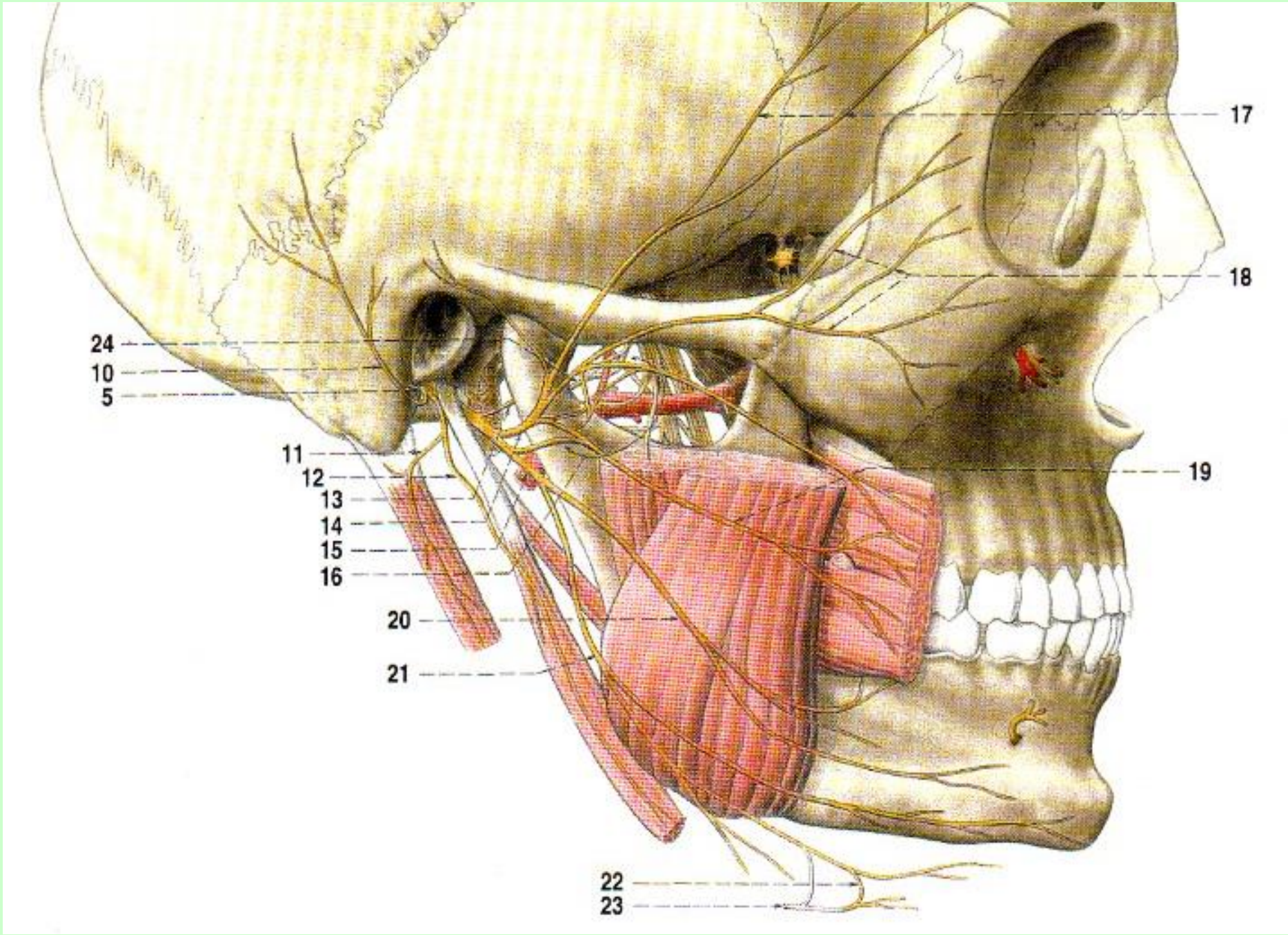
Canalis nervi facialis *Falloppii*



Innervation of tongue

somatosensory x *sensory (taste)*

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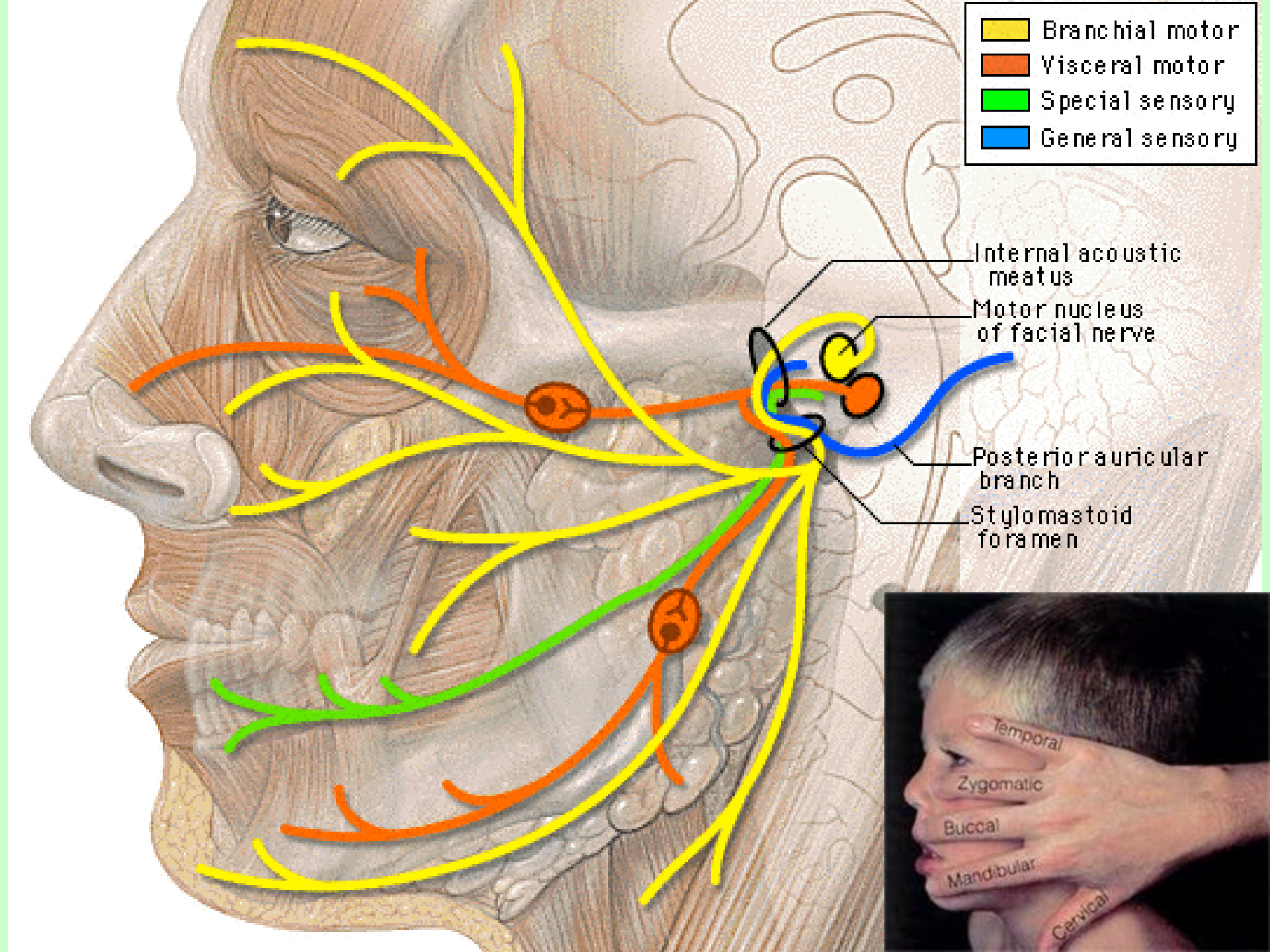
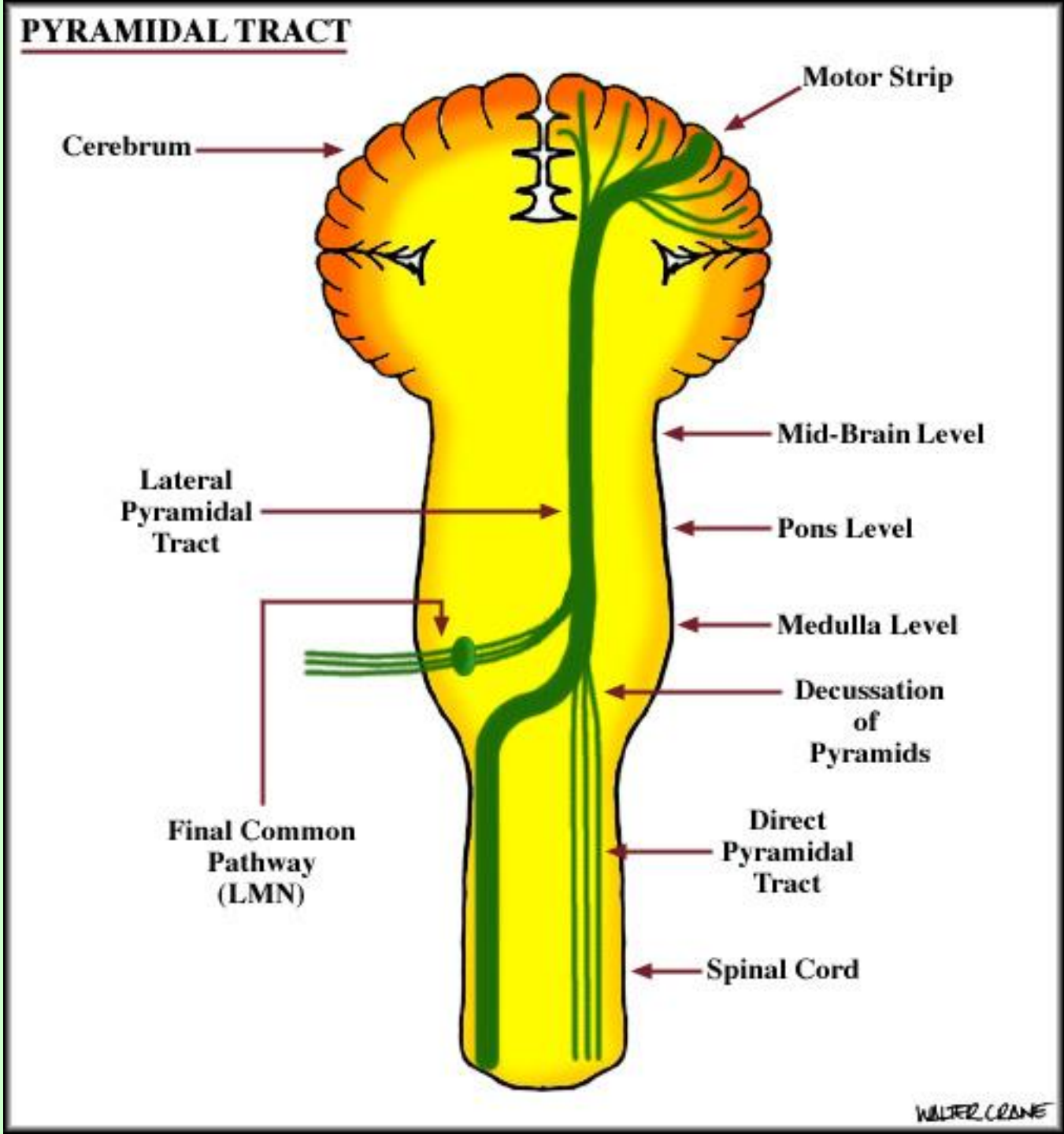

Branchial motor
Visceral motor
Special sensory
General sensory
Internal acoustic meatus
Motor nucleus of facial nerve
Posterior auricular branch
Stylomastoid foramen
Temporal
Zygomatic
Buccal
Mandibular
Cervical

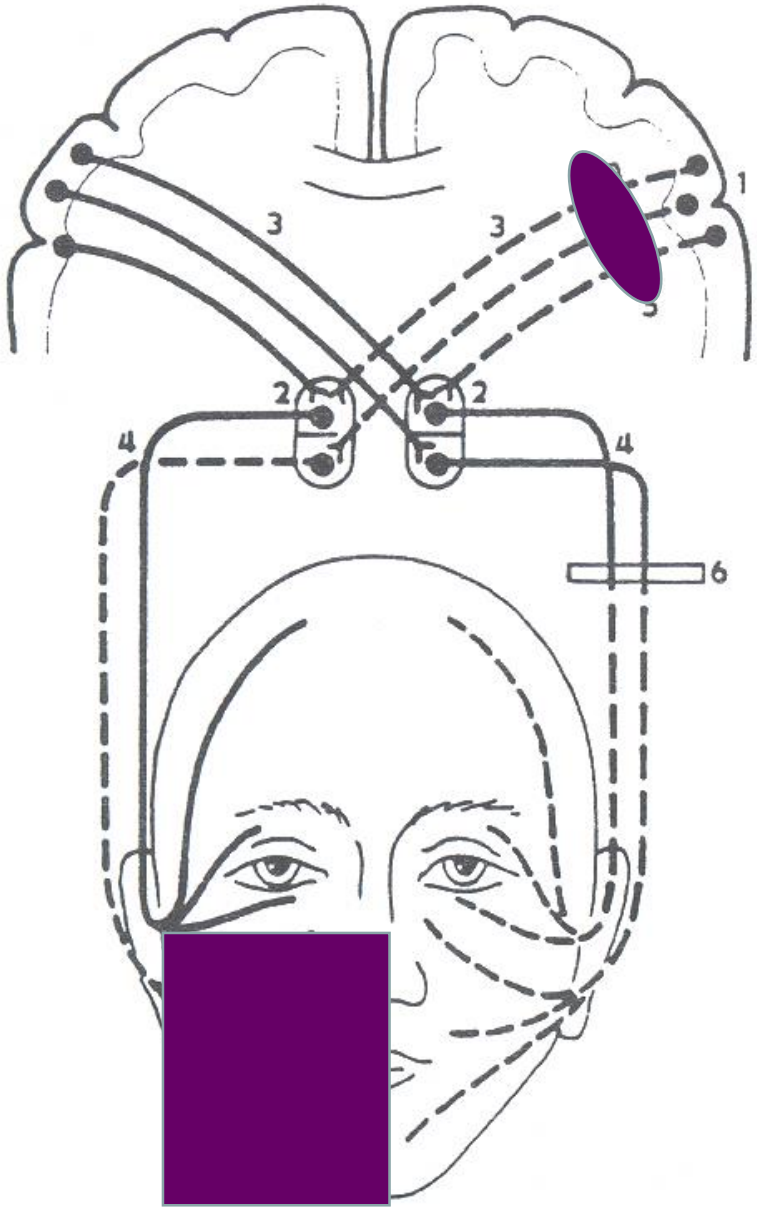
Motor pathway

- tractus pyramidalis
- fibrae cortico-nucleares
- decussated



Central palsy

- supranuclear lesion = affected pathway between cerebral cortex and nucleus in brain stem
- palsy of ***only lower quadrant of face !!!***
- ***contralateral side !!!***

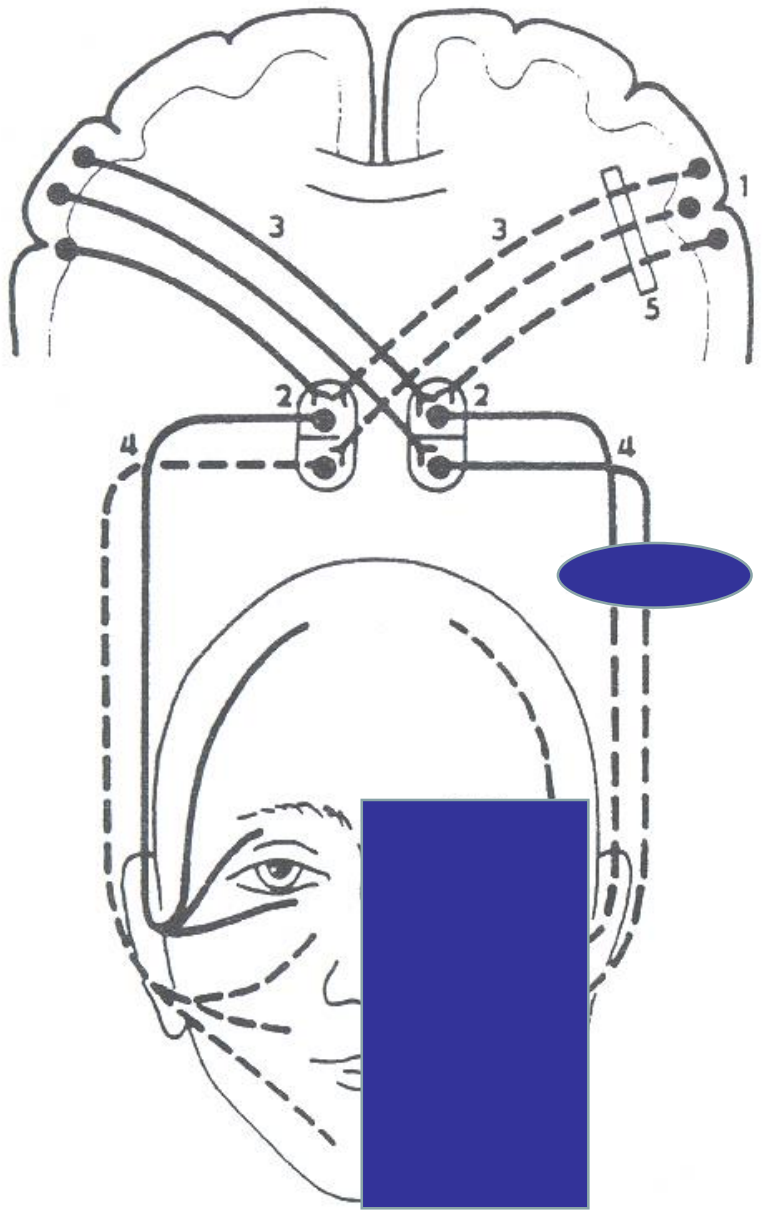


Peripheral palsy

- nuclear lesion

= affected neruon (body or fibers) between nucleus in brain stem and effectors/receptors

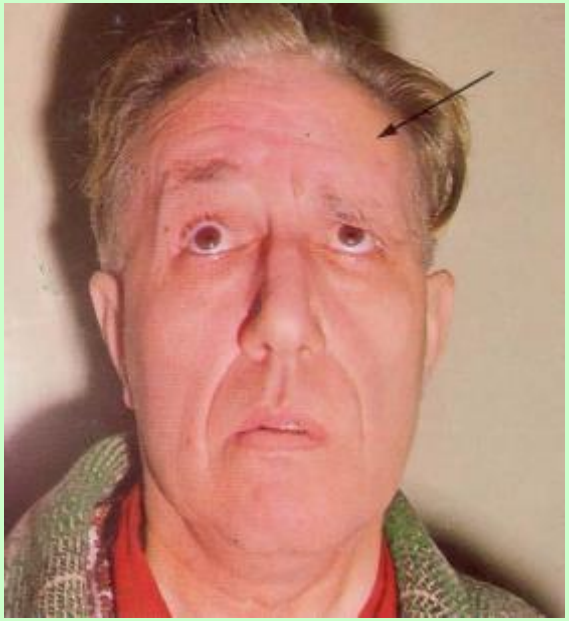
- palsy of ***whole half of face !!!***
- ***ipsilateral (homolateral) side !!!***

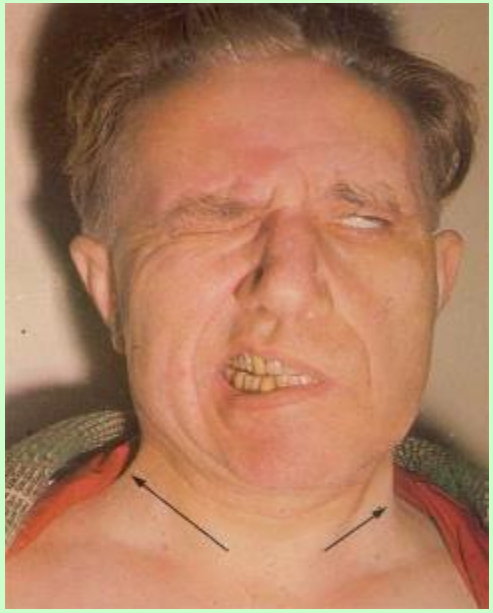


Peripheral palsy – ipsilateral

symptoms related to level of affection and branches of n. VII

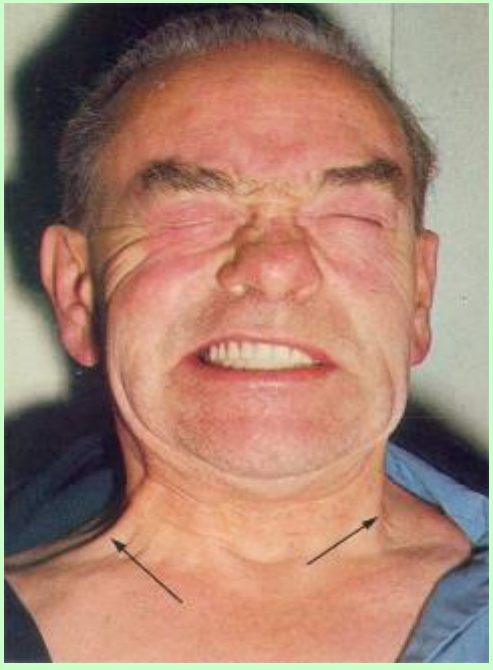
- Bell´s palsy = palsy of **all ipsilateral facial muscles** (sagged mouth angle + dribbling saliva, drooped lower lid = lagophthalmus, no gathers on forehead, smoothed nasolabial groove, no frowning and whistling)
- affection of chorda tympani
  - no taste on ventral 2/3 of tongue = hypogeusia→ageusia
  - dry mouth – no secretion from gl. submandibularis+sublingualis = xerostomia) – *weak symptom*
- affection of m. stapedius (sharp/painful = hyperacusis)
- affection of n. petrosus major
  - dry eye - no secretion from lacrinal gland, dry conjunctiva = xerophthalmia
  - no secretion of gll. nasales, palatinae, nasopharyngeae – *weak symptom*

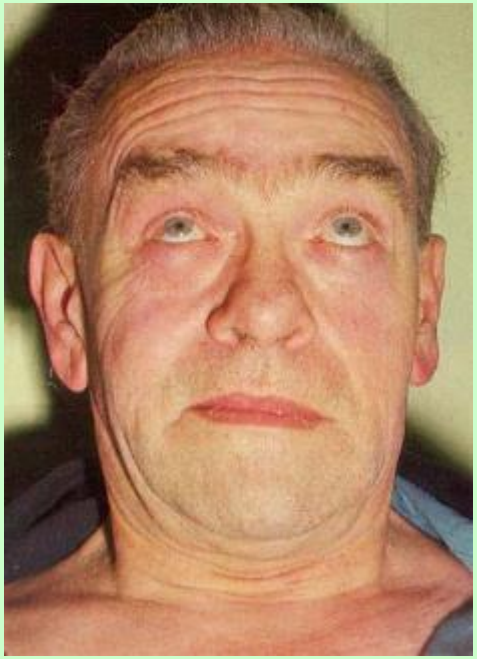




peripheral
„Bell´s“ palsy

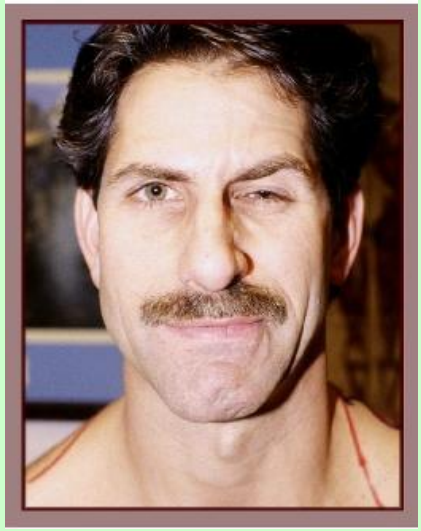
n. VII





central palsy

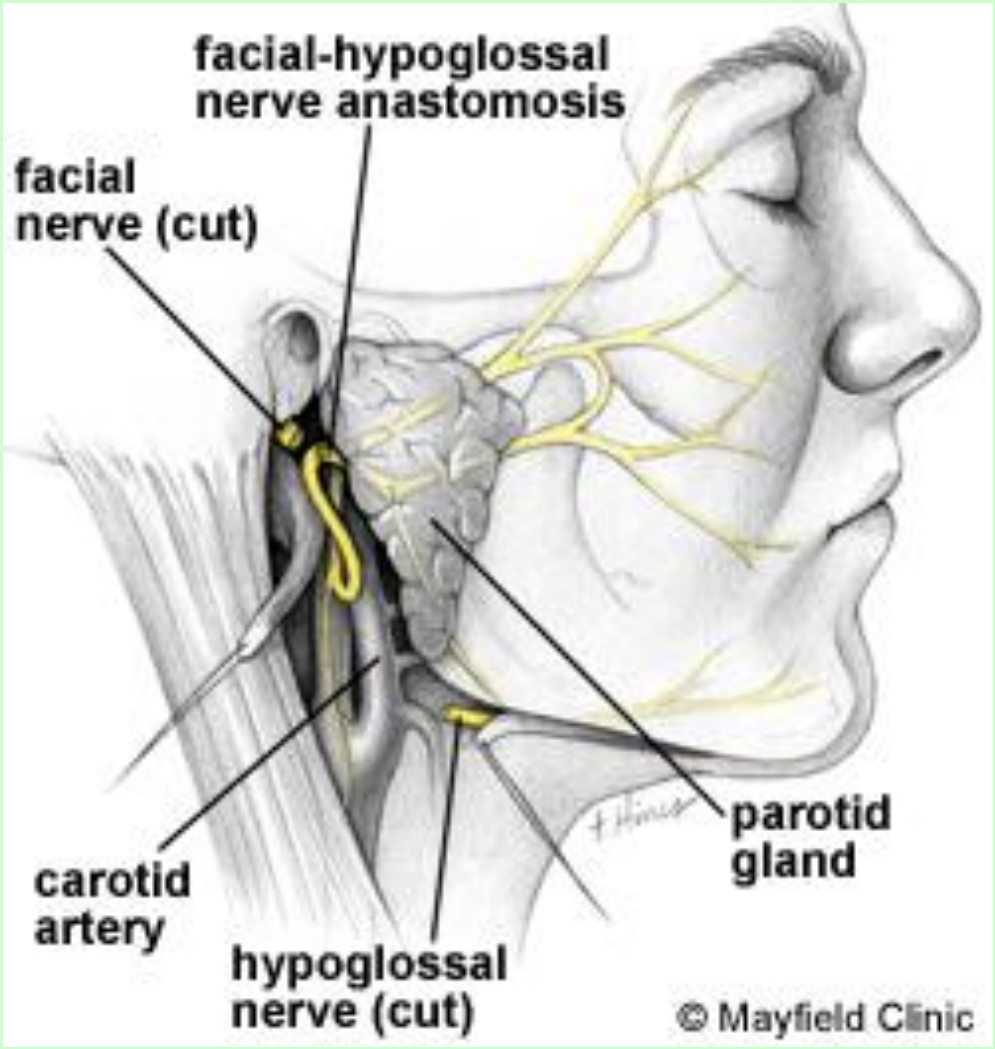
Spasmus hemifacialis = Hemispasmus faciei



- mostly: compression in border of CNS and PNS – contact of sheath of oligodendrocytes and Schwann cells = „Obersteiner-Redlich´s zone)
  - mostly loop of a. cerebelli inferior anterior
  - treatment: microvascular decompression

Treatment of n.VII traumatic injury

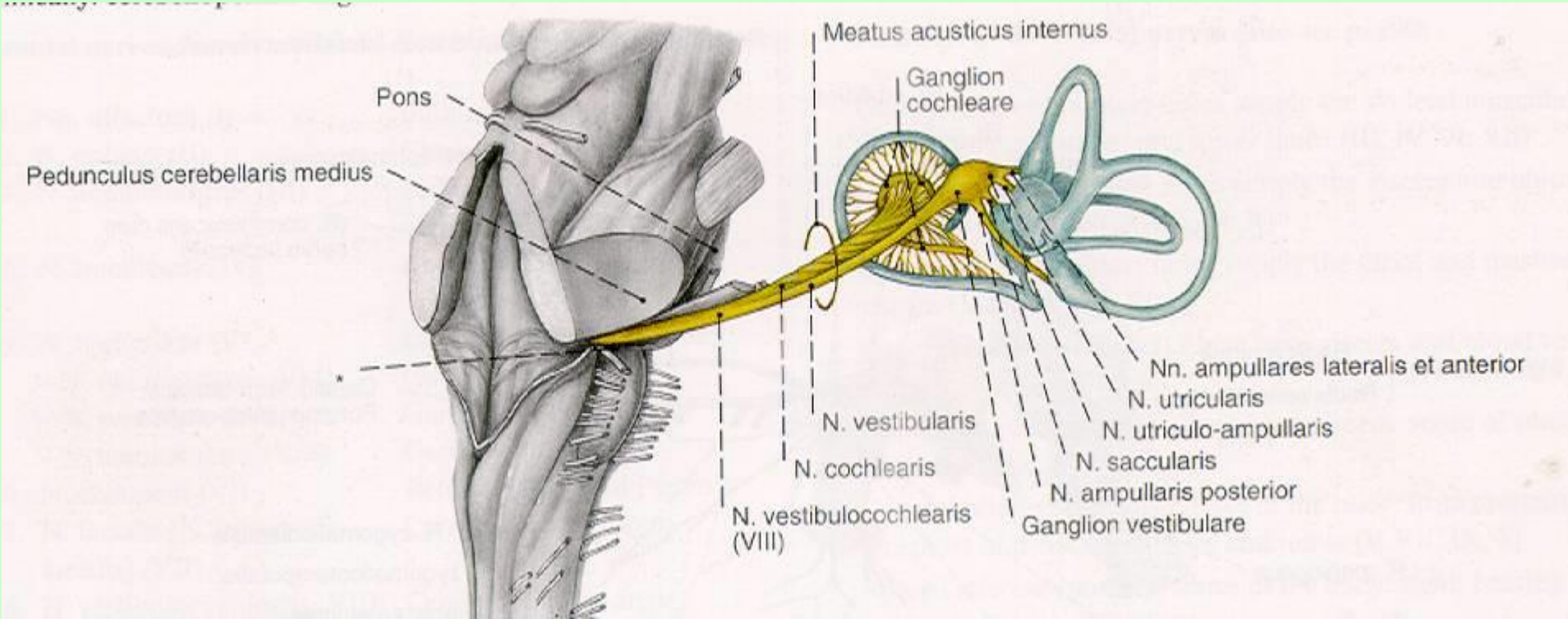
- transplantation
  - n. suralis
- usage of other close nerve
  - n. XII
  - n. auricularis magnus



VIII. - Nervus vestibulocochlearis

obsolete term: n. statoacusticus

- *special sensory – hearing + balance*



VIII. - Nervus vestibulocochlearis

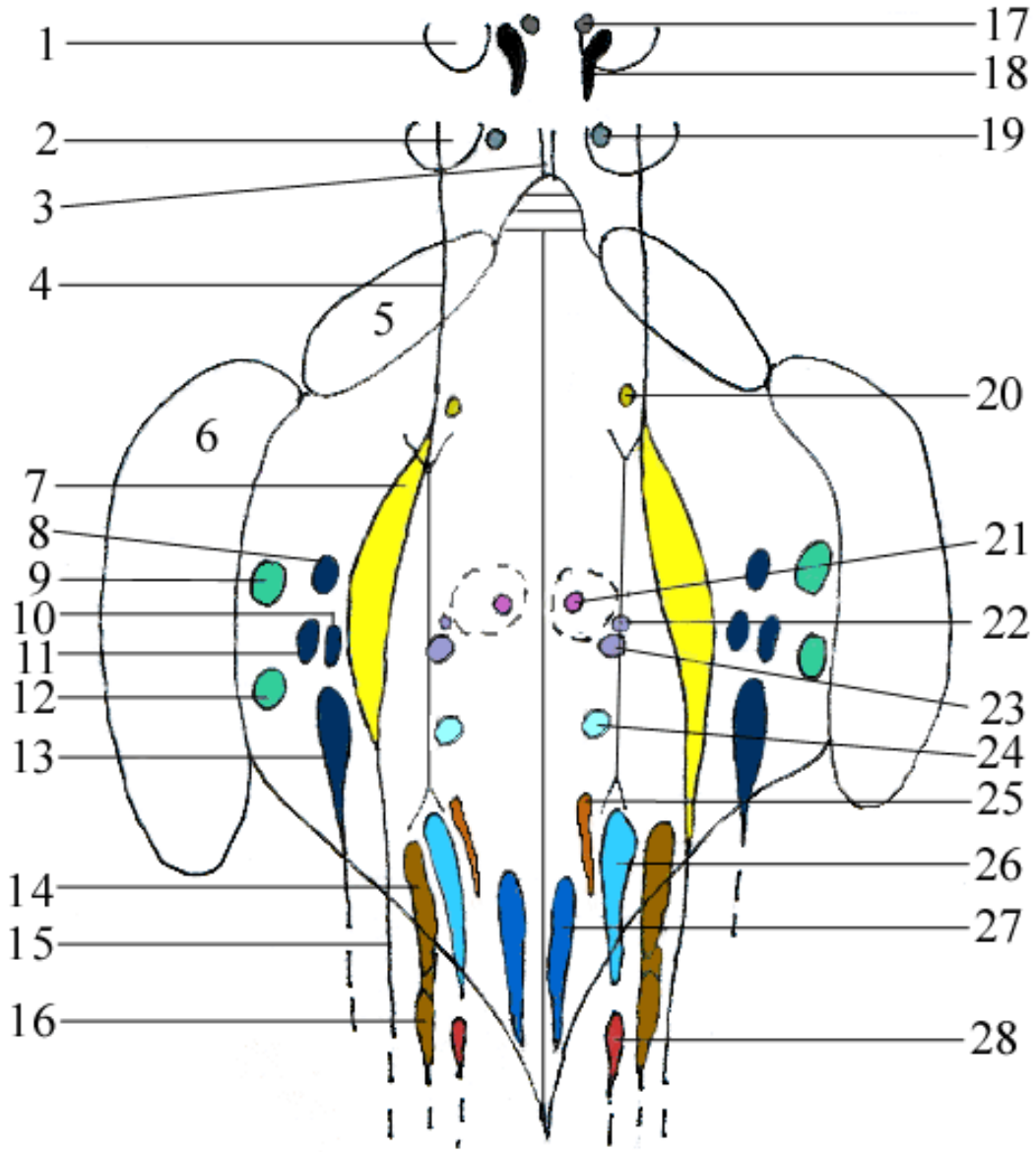
6 nuclei in pons (under recessus lat. fossae rhomboidae)

- 2 cochlear: ncl. cochlearis ant.+post.
- 4 vestibular: ncl. vestibularis sup.+inf.+med.+lat.

course: angulus pontocerebellaris → fossa cranii posterior → porus acusticus internus → meatus a.i. → fundus m.a.i.

- pars vestibularis – ganglion vestibulare *Scarpae* on floor of meatus.a.i. (bipolar neurons)
- pars cochlearis – ganglion cochleare *Corti* inside bony cochlea (spiral shape, bipolar neurons)

FLOOR OF FOURTH VENTRICLE (RHOMBOID FOSSA) WITH SURFACE PROJECTION OF CRANILA NERVES NUCLEI



1 - superior colliculus
2 - inferior colliculus
3 - frenulum of superior medullary velum
4 - mesencephalic tract of n. V.
5 - superior cerebellar peduncle
6 - middle cerebellar peduncle
7 - principal nucleus of n. V.
8 - superior vestibular nucleus */Bechtětrev/*
9 - posterior cochlear nucleus
10 - medial vestibular nucleus */Schwalbe/*
11 - lateral vestibular nucleus */Deiters/*
12 - anterior cochlear nucleus
13 - inferior vestibular nucleus */Roller/*
14 + 16 - nuclei tractus solitarii
15 - spinal tract of n. V.
17 - accessory nucleus of n. III. */Edinger-Wesphal/*
18 - nucleus of n. III.
19 - nucleus of n. IV.
20 - motor nucleus of n. V.
21 - nucleus of n. VI.
22 - superior salivatory nucleus
23 - nucleus of n. VII.
24 - superior salivatory nulceus
25 - posterior nucleus of n. X.
26 - nucleus ambiguus
27 - nucleus of n. XII.
28 - nucleus of n. XI.
(= part of nucleus ambiguus and retroambiguus)

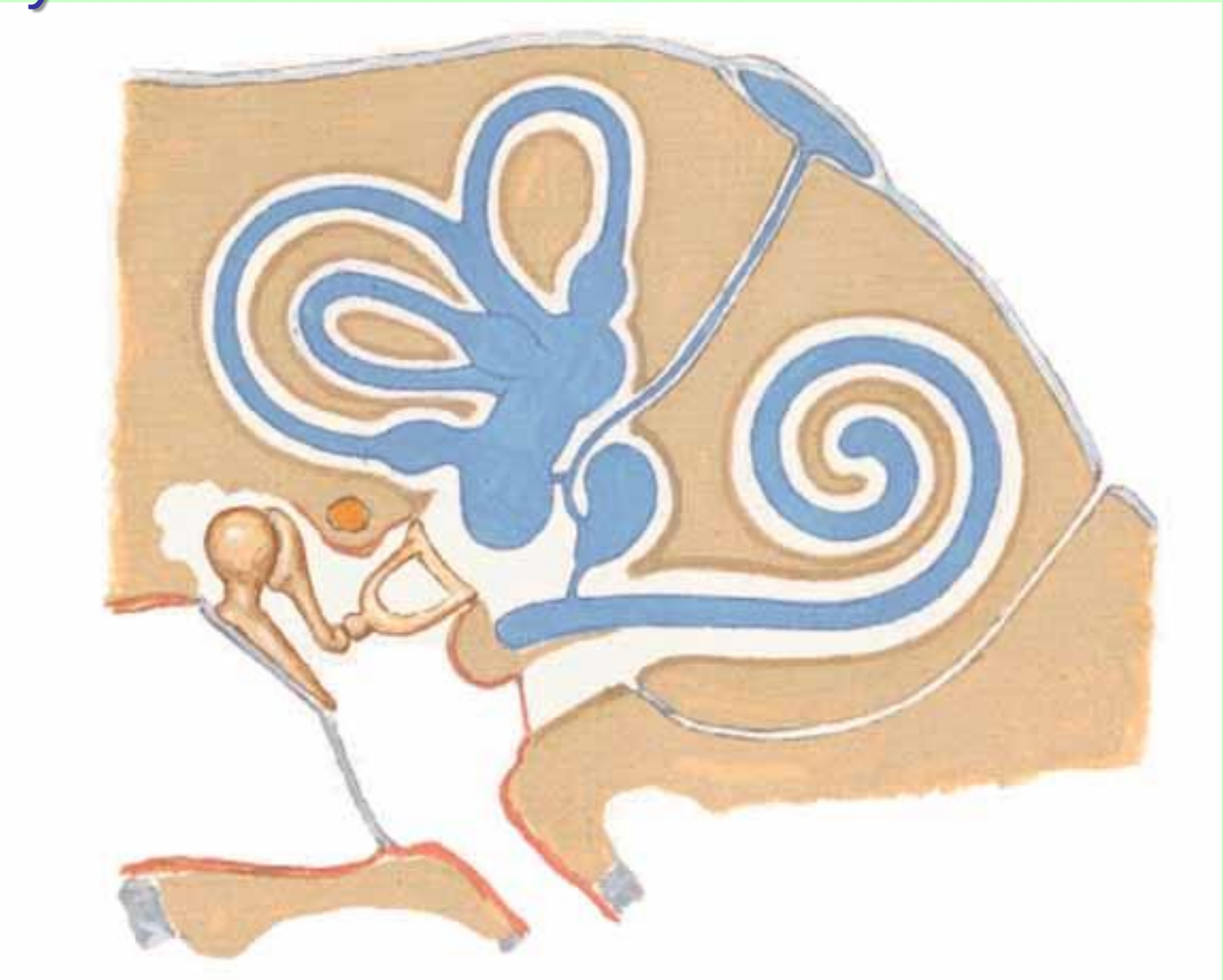
Auris interna = Inner ear
Labyrinthus membranaceus = Membranous l.

- Utriculus – *horizontal movements*
- Sacculus – *vertical movements*
- Ductus semicircularis anterior, lateralis, posterior (ampulla + crura) – *angle acceleration and deccelerétion*
- Cochlea – *hearing*

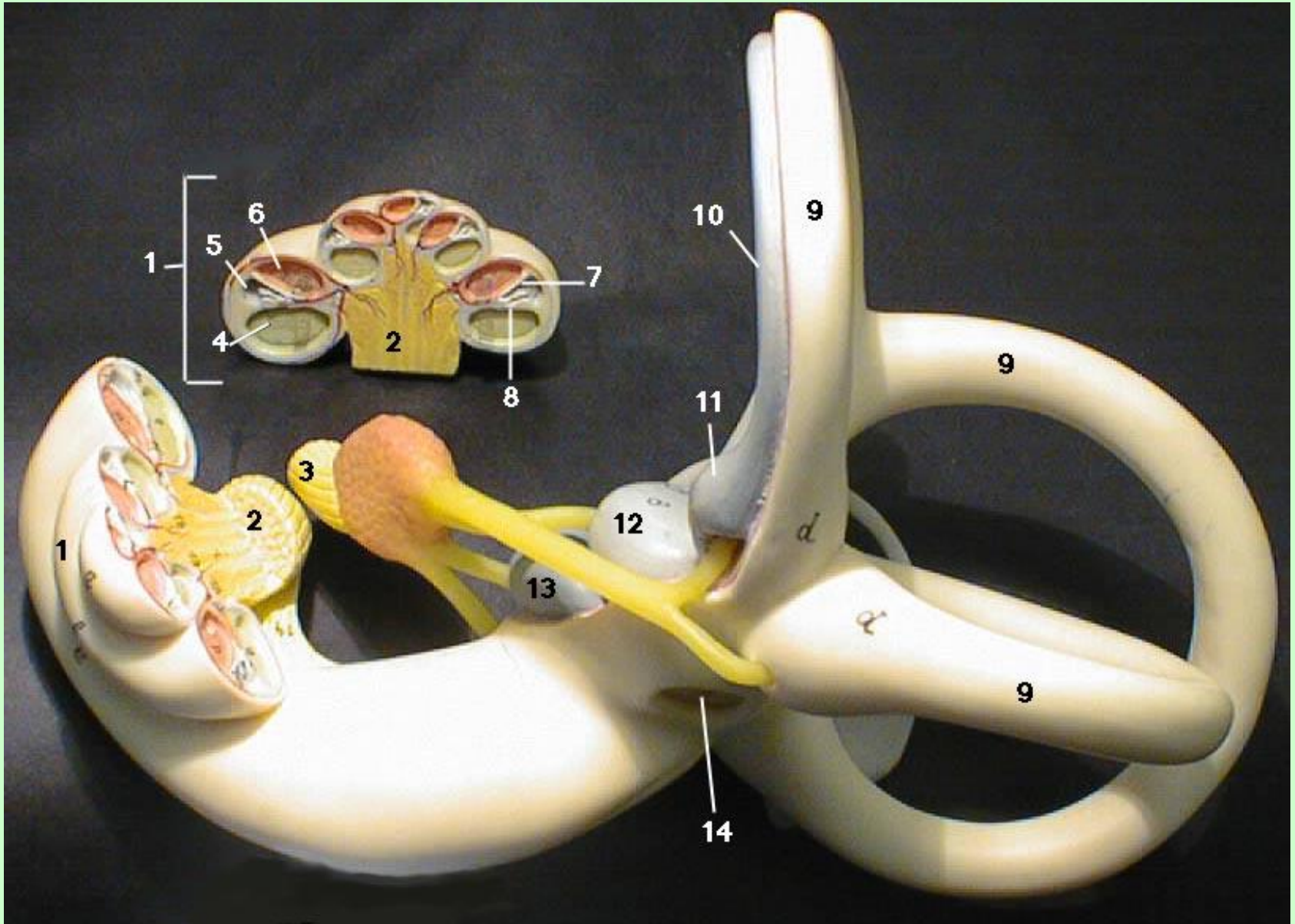
sensory organs:

- macula utriculi / sacculi
- crista ampullaris
- organum spirale *Corti*

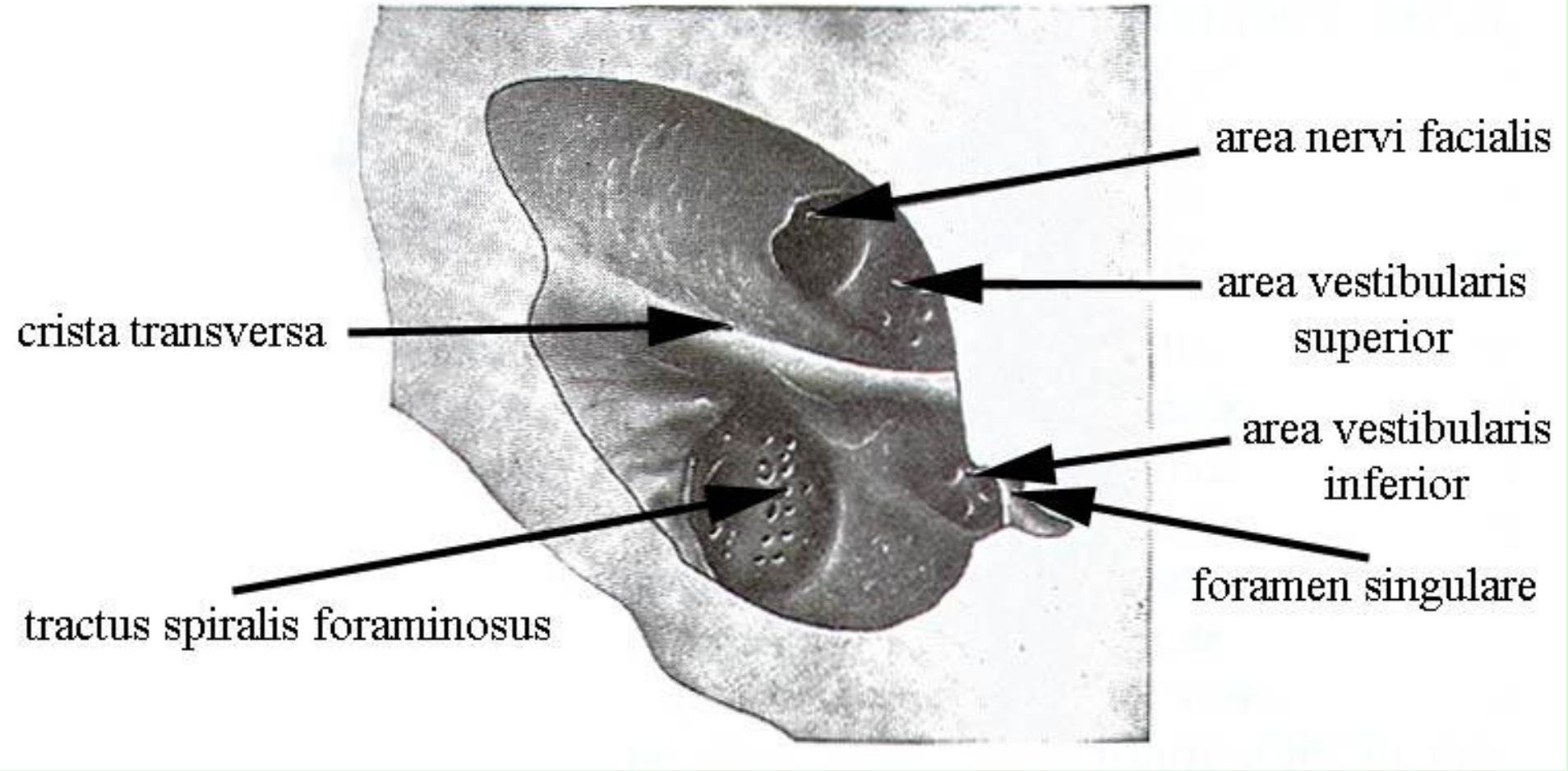
Auris interna = Inner ear
Labyrinthus membranaceus = Membranous l.



Auris interna = Inner ear
Labyrinthus membranaceus = Membranous l.



MEATUS ACUSTICUS INTERNUS
(fundus meatus acustici interni)



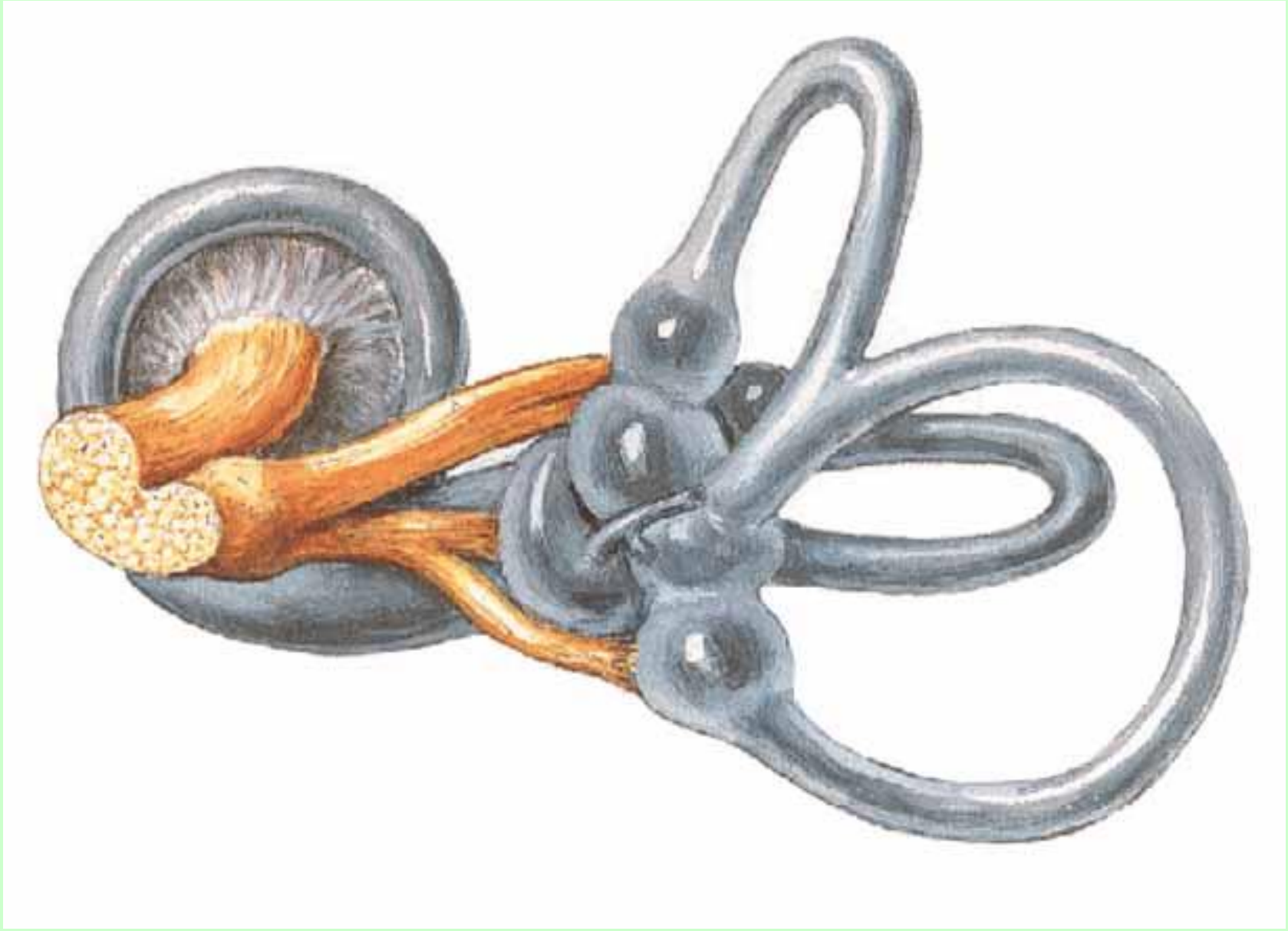
VIII. - Nervus vestibulocochlearis

Nervus vestibularis – ggl. vestibulare *Scarpae inside meatus a.i.*

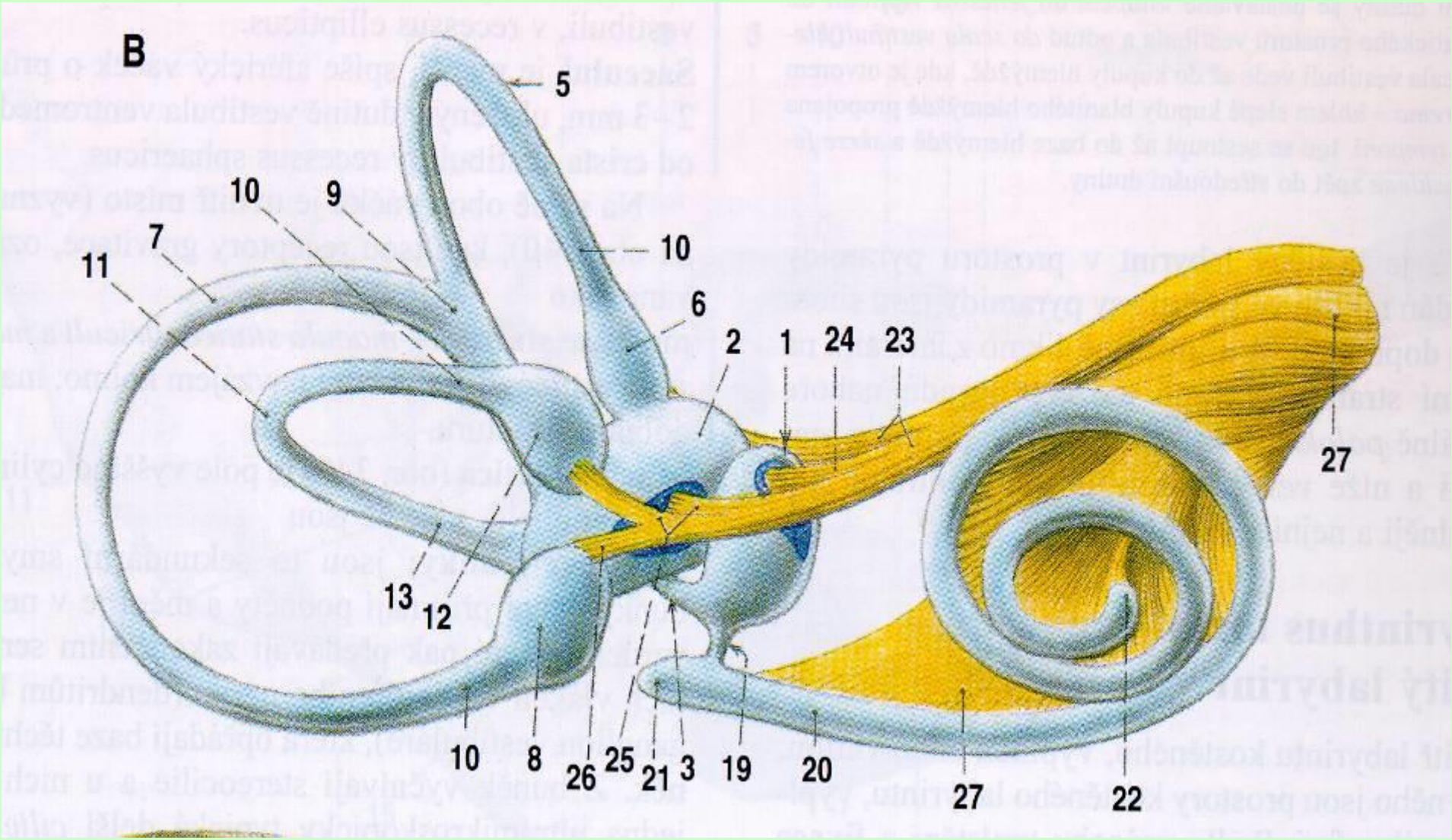
- pars superior – *dorsocranial quadrant*
  - n. utriculoampullaris
- pars inferior
  - n. saccularis – *dorsocaudal quadrant*
  - n. ampullaris posterior – foramen singulare

Nervus cochlearis – *ventrocaudal quadrant* – ggl. cochleare *Corti inside bony cochlea*

VIII. - Nervus vestibulocochlearis



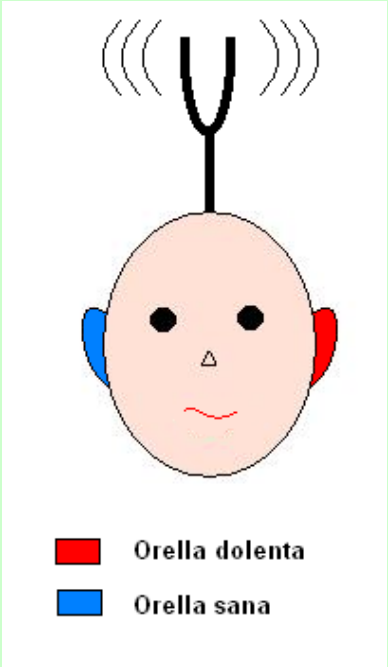
VIII. - Nervus vestibulocochlearis



VIII. - Nervus vestibulocochlearis

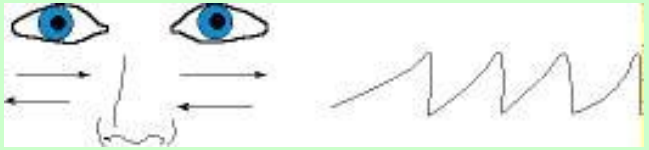
examination

- tuning-fork examination (Rinné, Weber, Schwabach)
- examination of nystagmus (9 direction after Hering)
- Romberg – stand with closed eyes
- Hautant – sit, strecht arms forwards and close eyes
- Unterberger – close eyes and march on site for 30 s



VIII. - Nervus vestibulocochlearis
irritation / palsy

- affection of hearing (= hypacusis → anacusis)
  - deafness (= surditas)



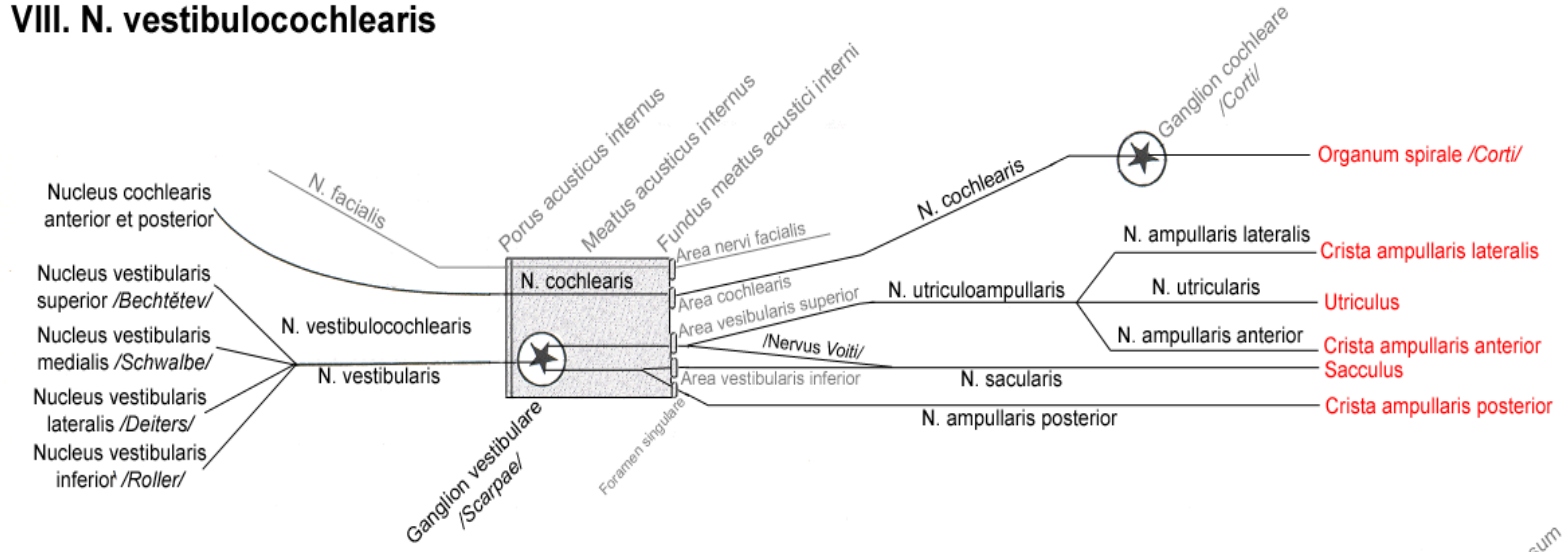
- tinnitus – humming, screeching, ringing…
- dizzines (= vertigo)
- involuntary eye movement (= nystagmus)

= alternating smooth pursuit in one direction and saccadic movements in the other direction.

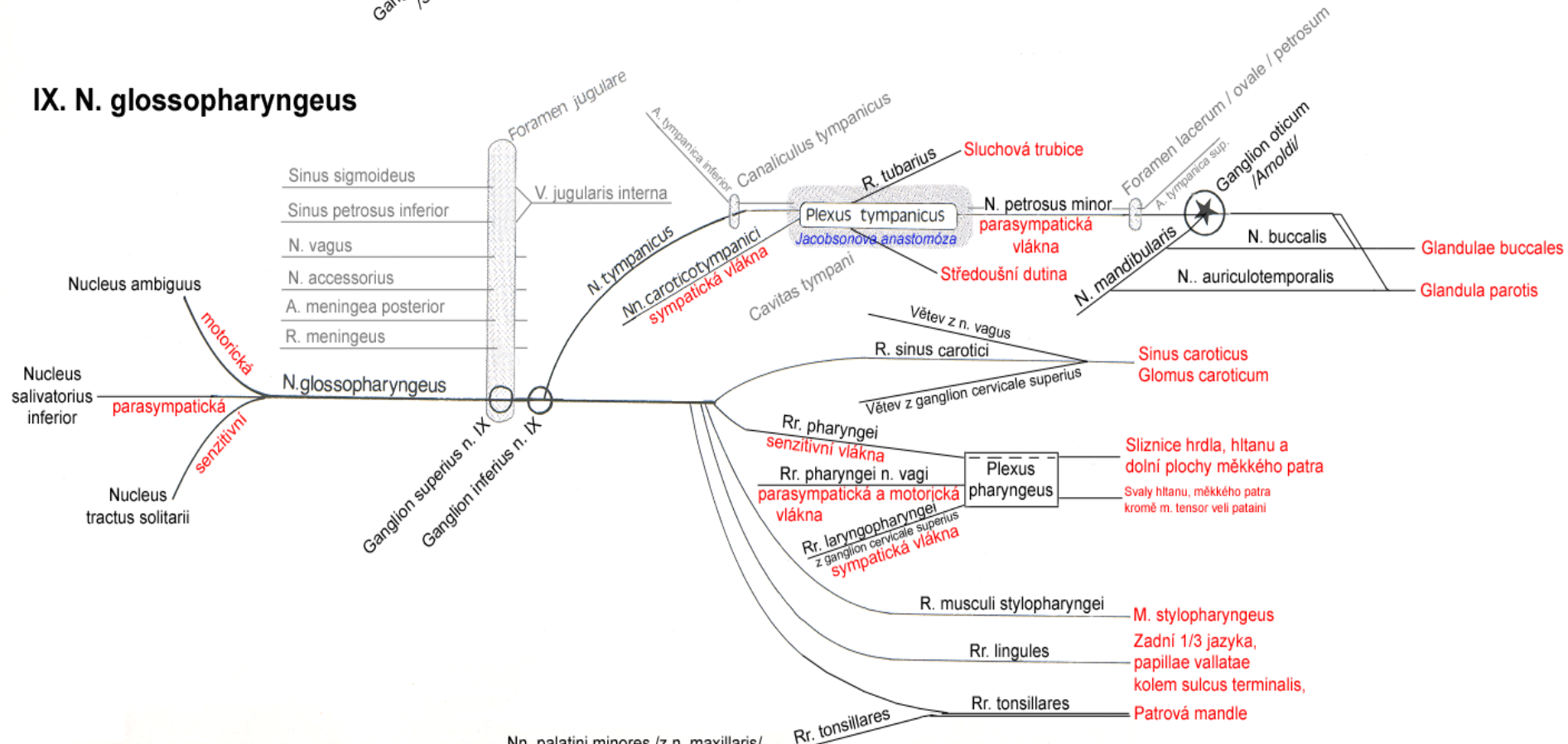
  - slow-phase – stronger side suppresses the weaker one
  - fast-phase – compenstory movements back – serve for description of nystagmus

- disorders of stand and gait (= ataxia)

VIII. N. vestibulocochlearis

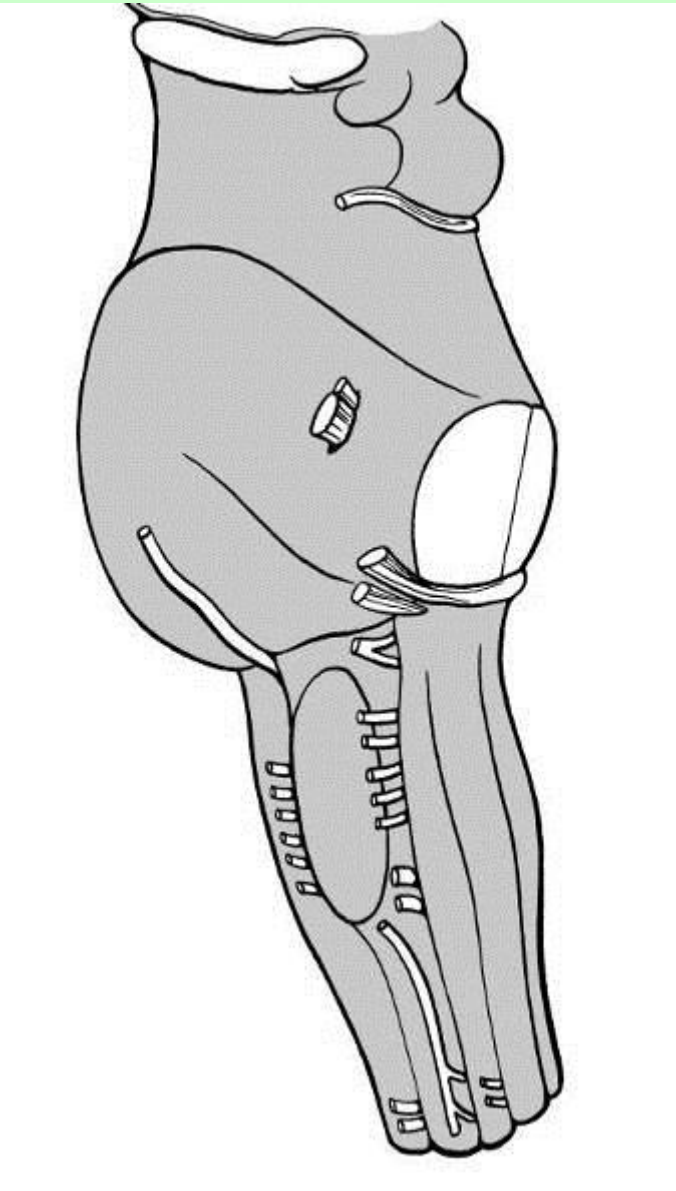


IX. N. glossopharyngeus



Lateral mixed system

- **n.IX + n.X + n.XI**
- roots emerge dorsally to olive from medulla oblongata (= *sulcus retroolivaris*)
- common nuclei
- transmit all types of modalities except sympathetic fibres
- leave skull via foramen jugulare

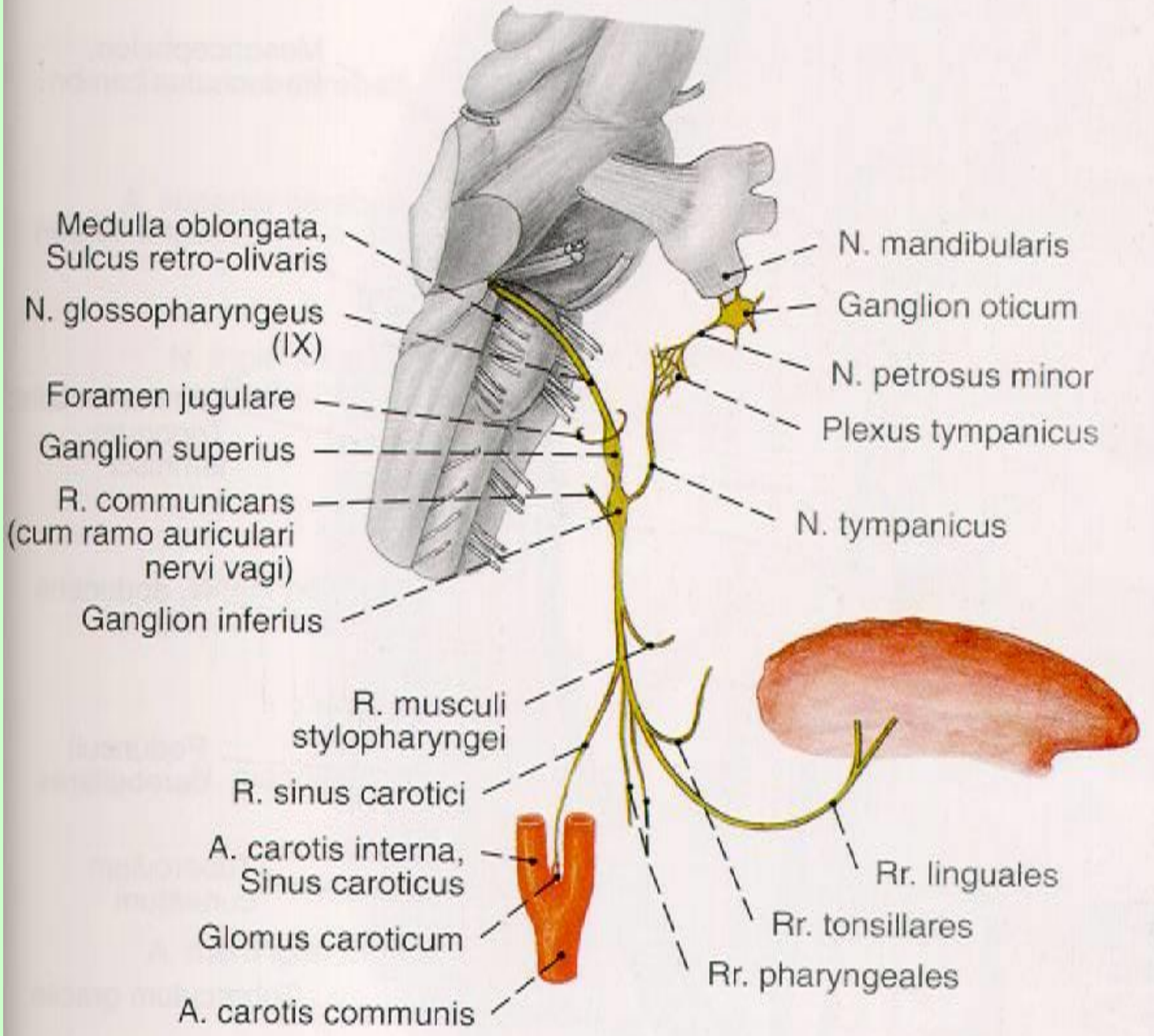


Lateral mixed system

- **Ncl. ambiguus**
  - *somatomotor nucleus*
  - muscles of soft palate, pharynx, larynx, upper oesopagus
- **Ncl. salivatorius inf. (n.IX)**
  - *visceromotor nucleus – parasympathetic*
  - parotid and buccal glands (synapsed in ggl. oticum)
- **Ncl. posterior n. X**
  - *visceromotor nucleus – parasympathetic*
  - glands and smooth muscles of pharynx, lower respiratory tract, foregut and midgut, heart, thymus
- **Ncll. tractus solitarius**
  - its rostral part is called **ncl. gustatorius (n. VII)**
  - *viscerosensory nucleus*
  - taste
  - infomation from lower respiratory tract, foregut and midgut,, spleen, kidneys, suprarenal glands, testes/ovaries, uterine tubes; thymus, heart baroreceptor and chemoreceptors
- **Ncl.spinalis n.V**
  - *somatosensory nucleus*
  - touch from external acoustic meatus, meninges and pharynx

n. IX

- SM
- VM
- SS
- taste
- VS

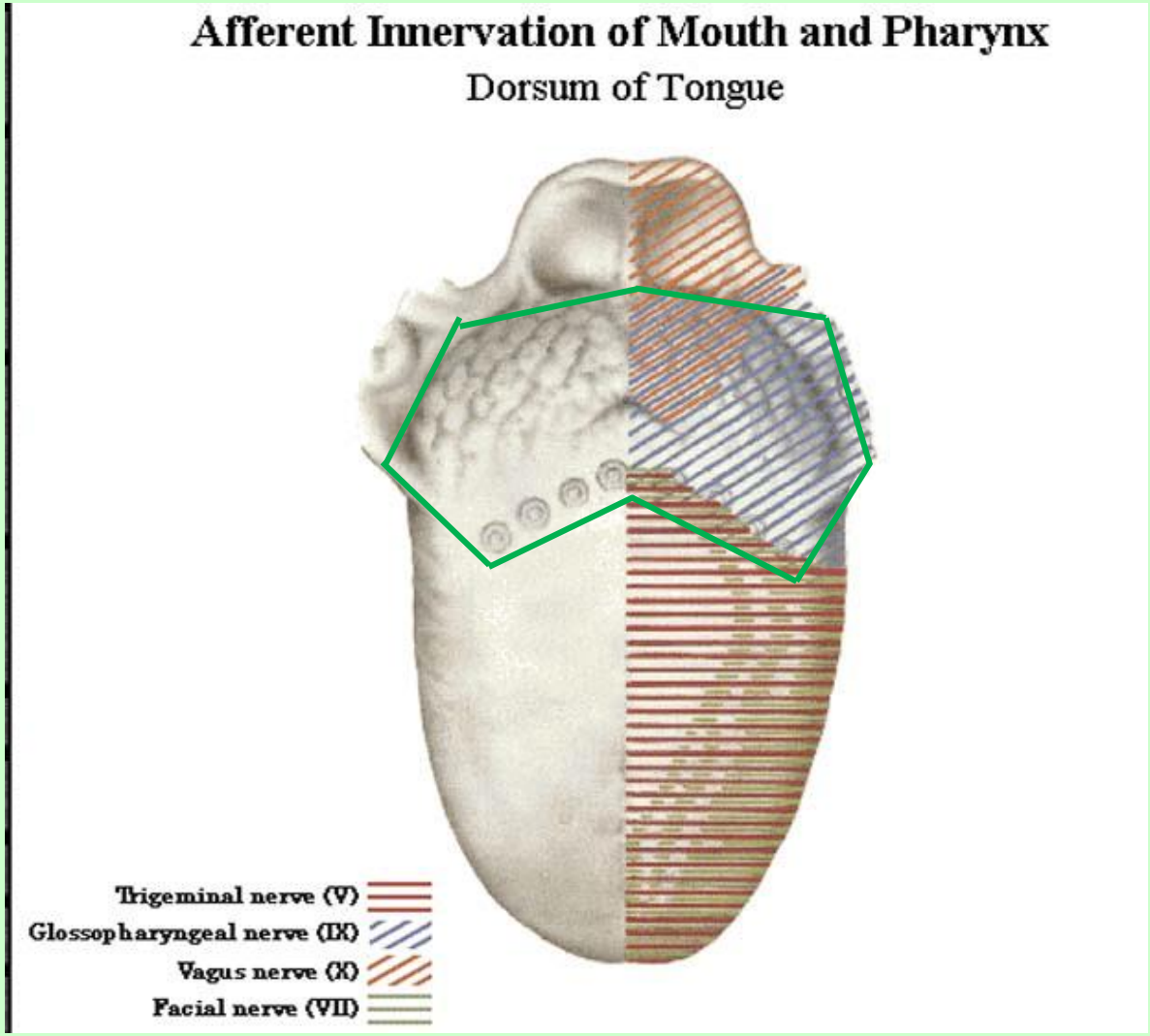


IX. - N. glossopharyngeus

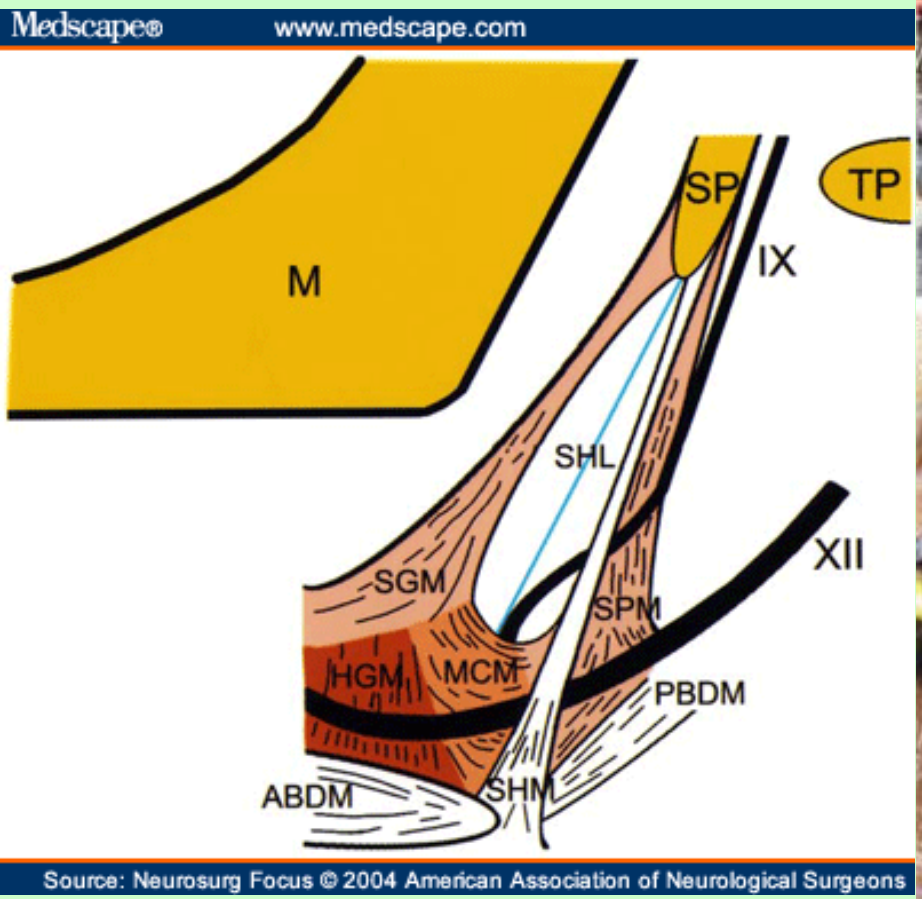
- SM: m. stylopharyngeus – *3rd arch*
- SS-VS: upper half of pharynx, root of tongue, tympanic cavity, ½ tonsilla palatina, sinus caroticus (Hering´s nerve)
- ggl. superius n.IX + inferius n.IX.
- VM: gl. parotidea + gll. buccales
- taste: posterior third of tongue = root of tongue
- Jacobson´s anastomosis: n.IX → n. tympanicus → plexus tympanicus → n. petrosus minor → gll. oticum (→ *gl. parotidea* + *gll. buccales*)

Innervation of tongue

somatosensory + sensory (taste)



n. IX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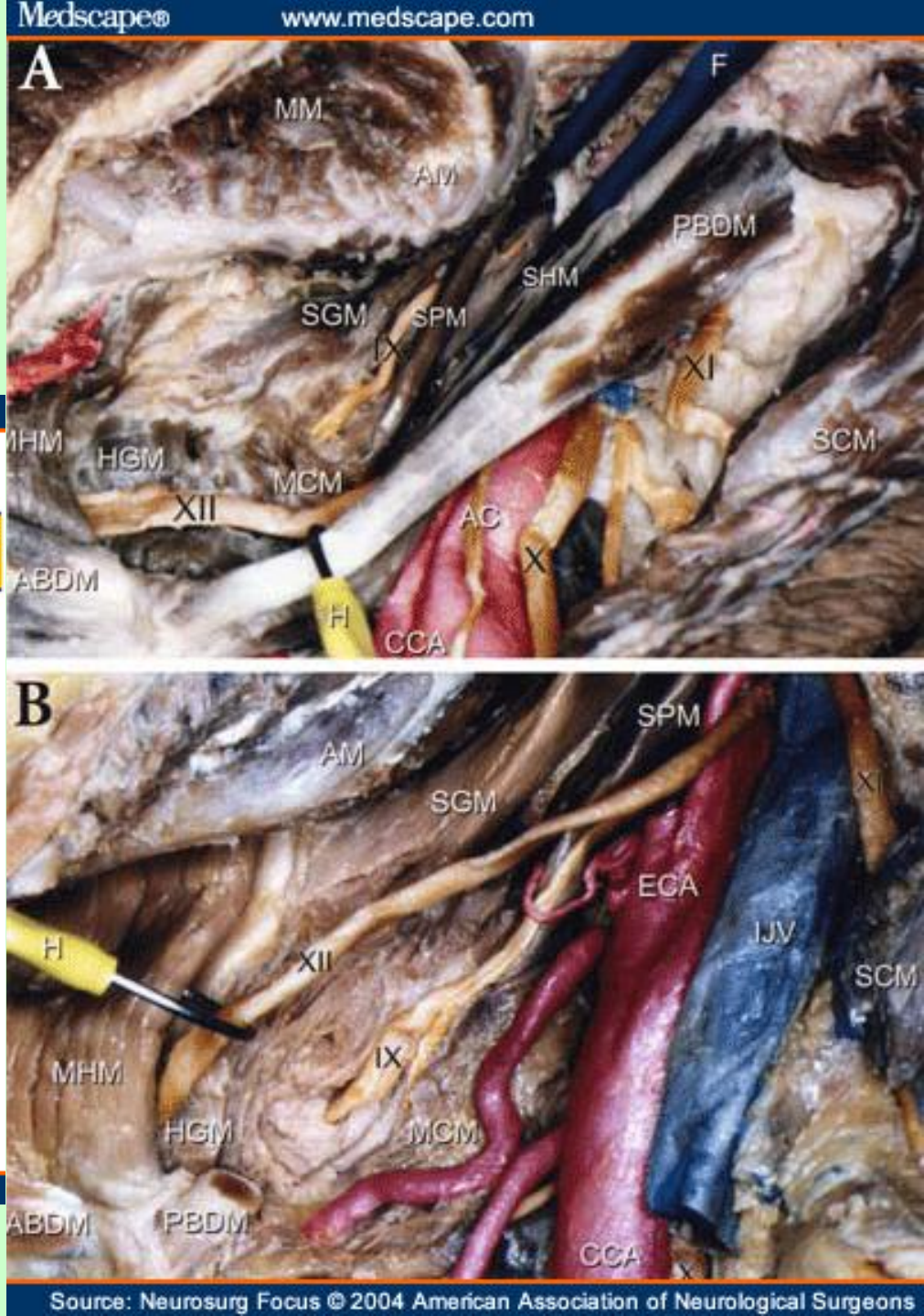
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MHM
IX
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MCM
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CCA
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IX. - N. glossopharyngeus

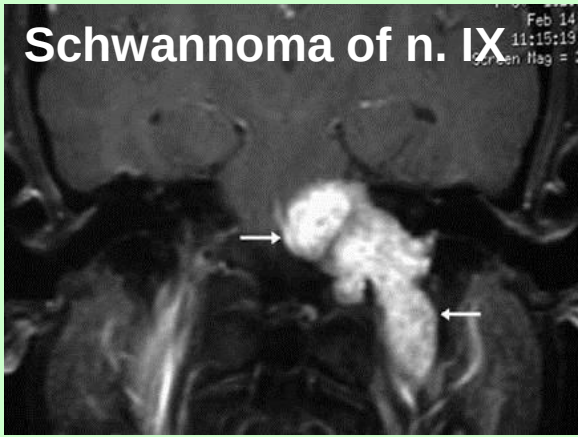
Palsy

unilateral

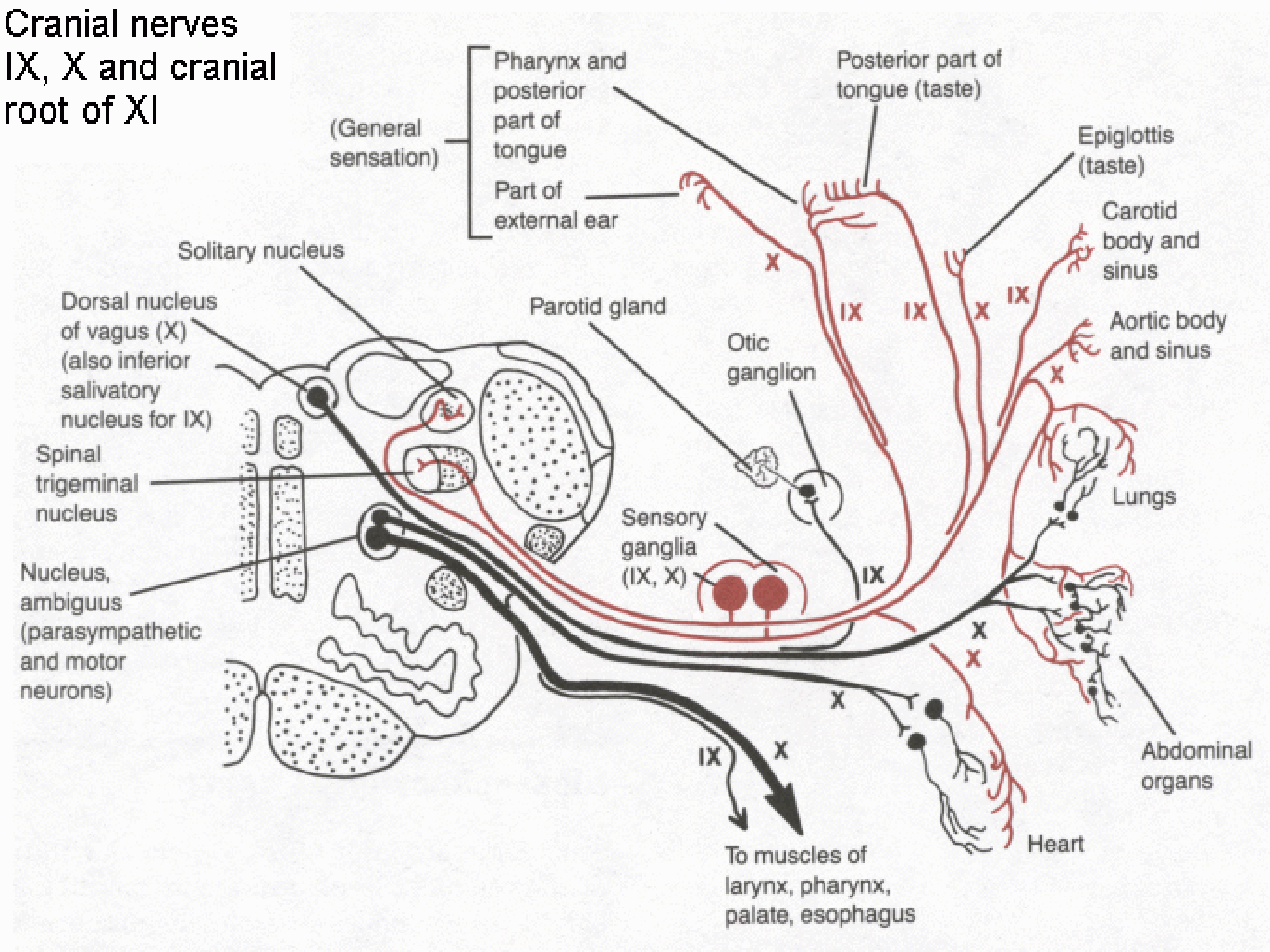
- affected swallowing (= mild dysphagia)
- affected vomiting (no afferentation of vomiting reflex)
- affected sensory fibres, taste and glands – *weak symptom*

<u>Neuralgia glossopharyngea</u>

irritation pain in area innervated by sensory fibres
(ear, palatine tonsil)



Cranial nerves IX, X and cranial root of XI

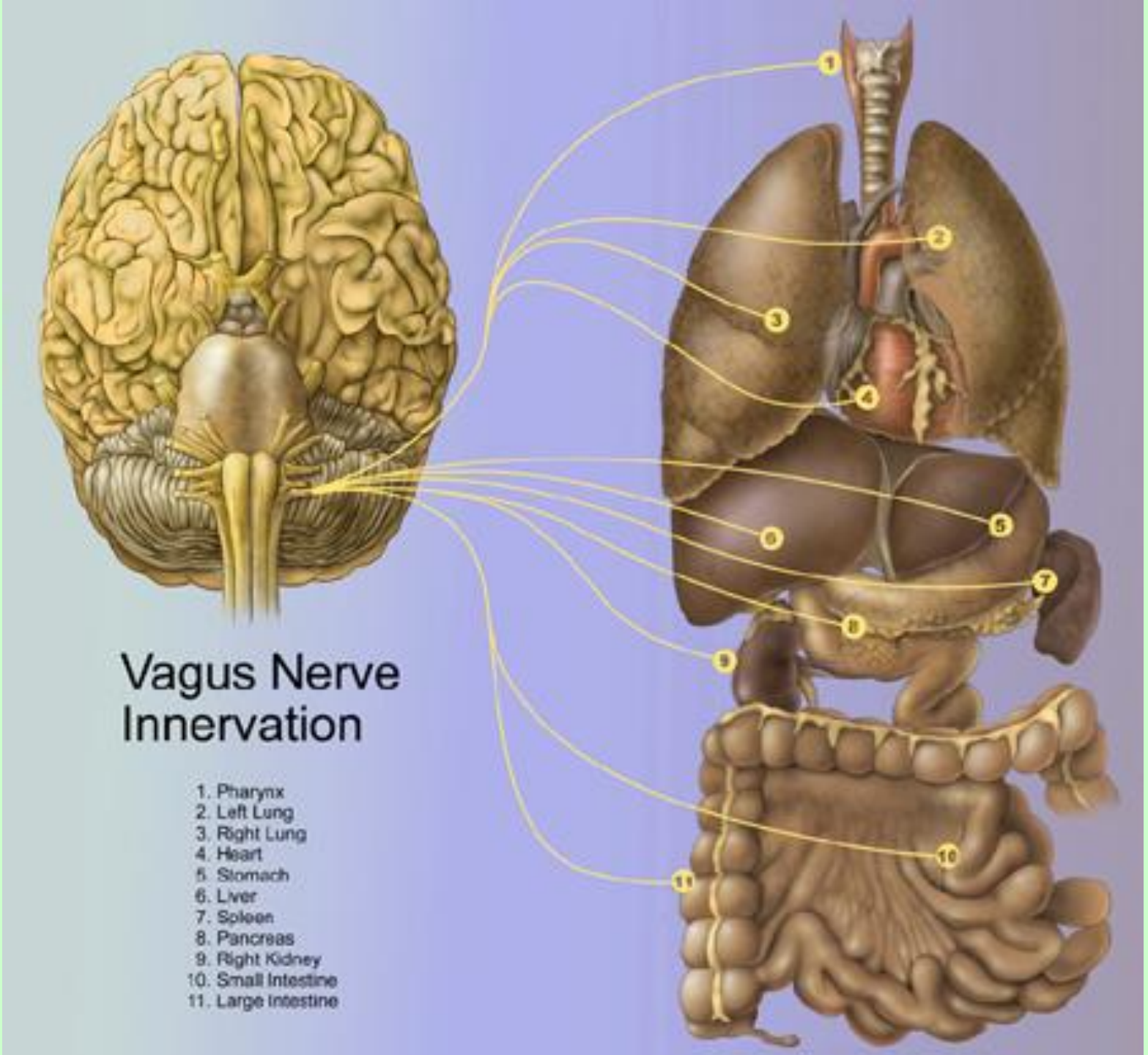


X. - N. vagus

- SM: pharynx (*except m. stylopharyngeus*), soft palate (*except m. tensor veli palatini*), larynx (*4th arch),* upper half of oesophagus
- SS: part of meatus acusticus externus + of meninges, lower ½ of pharynx
- VS: ggl. superius n.X + inferius n.X. (non-painful stimuli)

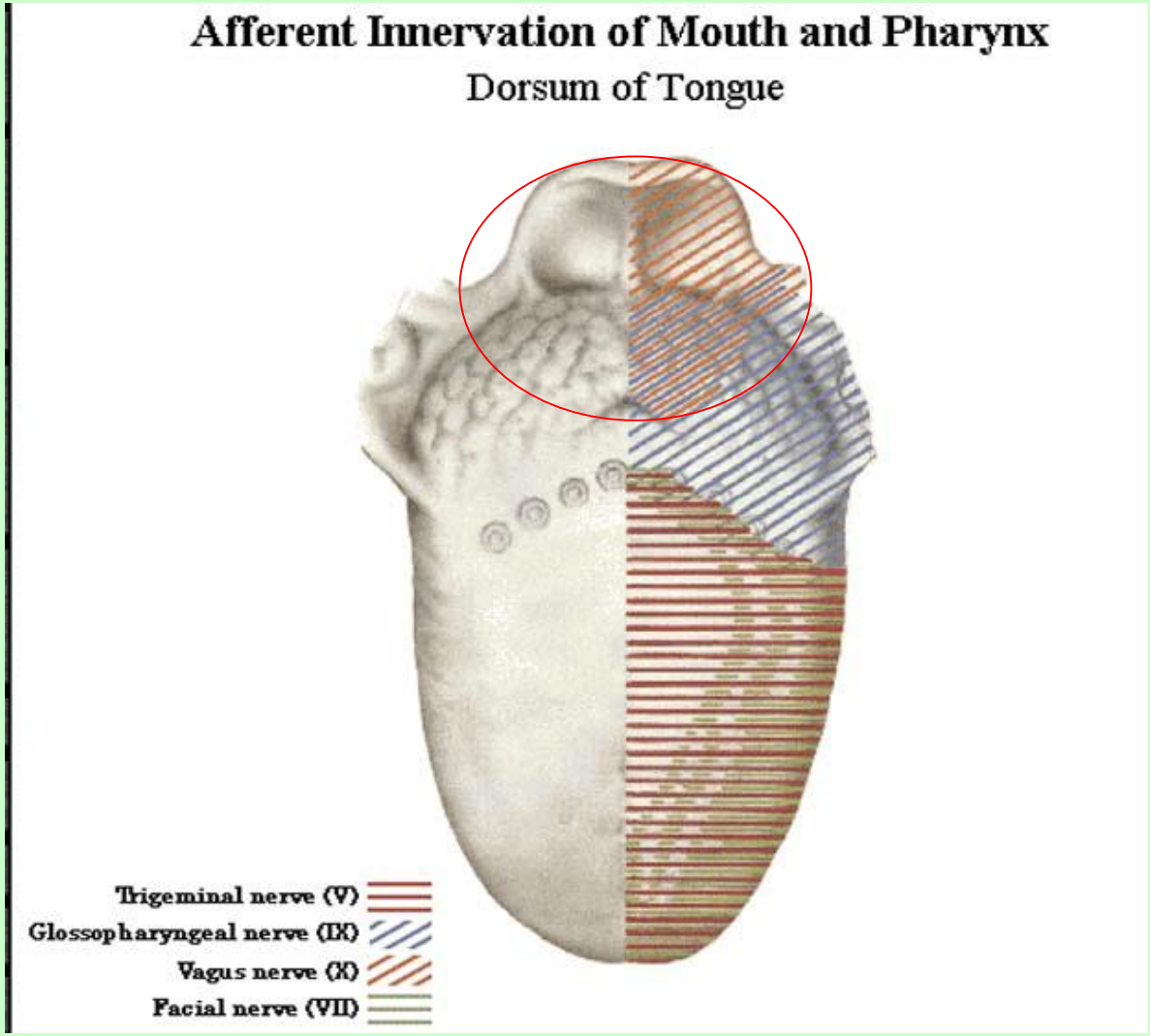
- mucosa of lower respiratory tract, foregut and midgut + liver, gallbladder, pancreas; spleen, kidneys, suprarenal glands, testis/ovaries, ½ of uterine tube; heart, glomera aortica (baroreceptors), glomus coritcusm (chemoreceptor)

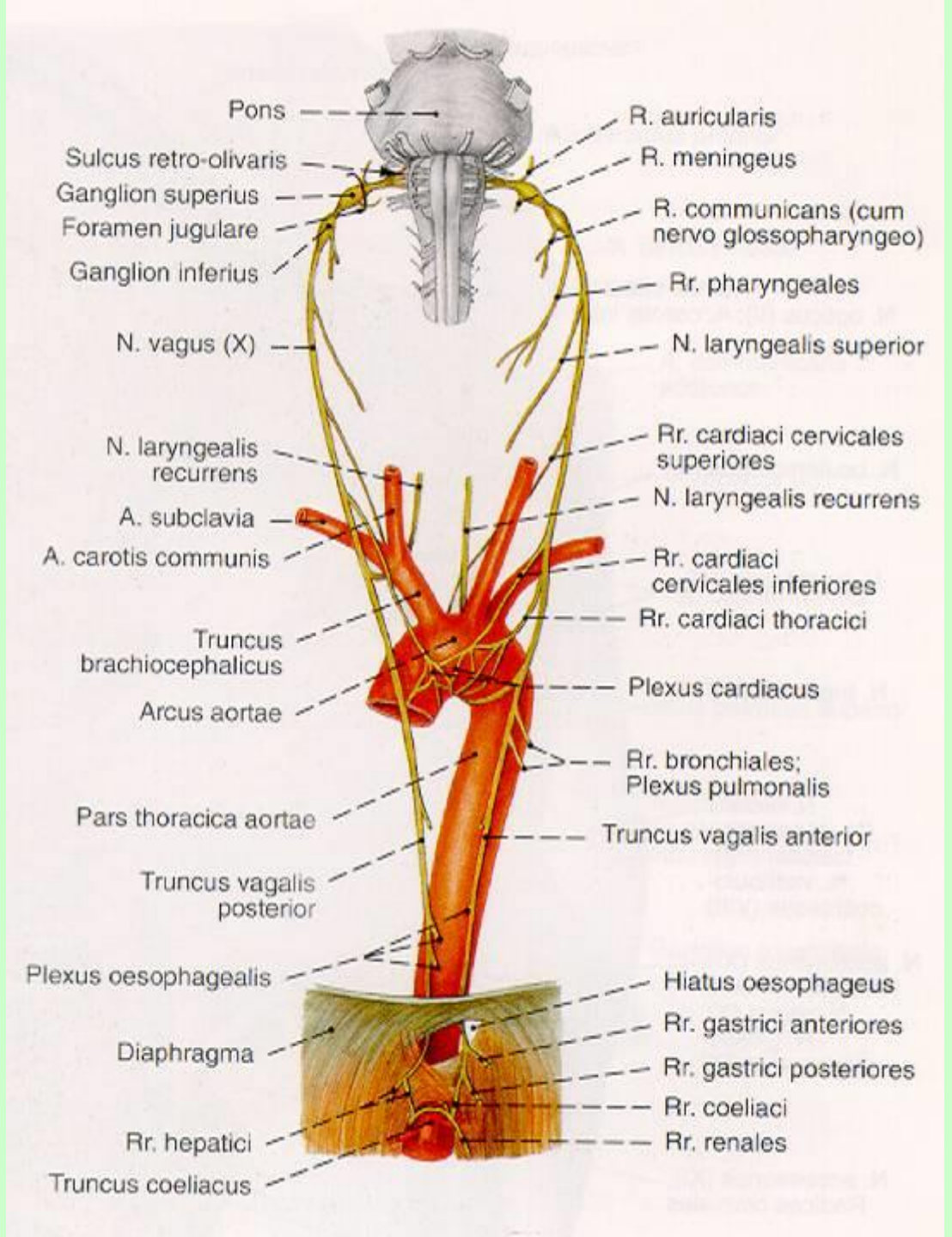
- taste: part of root of tongue, epiglottis
- VM: glands and smooth muscles of pharynx, lower respiratory tract, foregut and midgut, heart, thymus

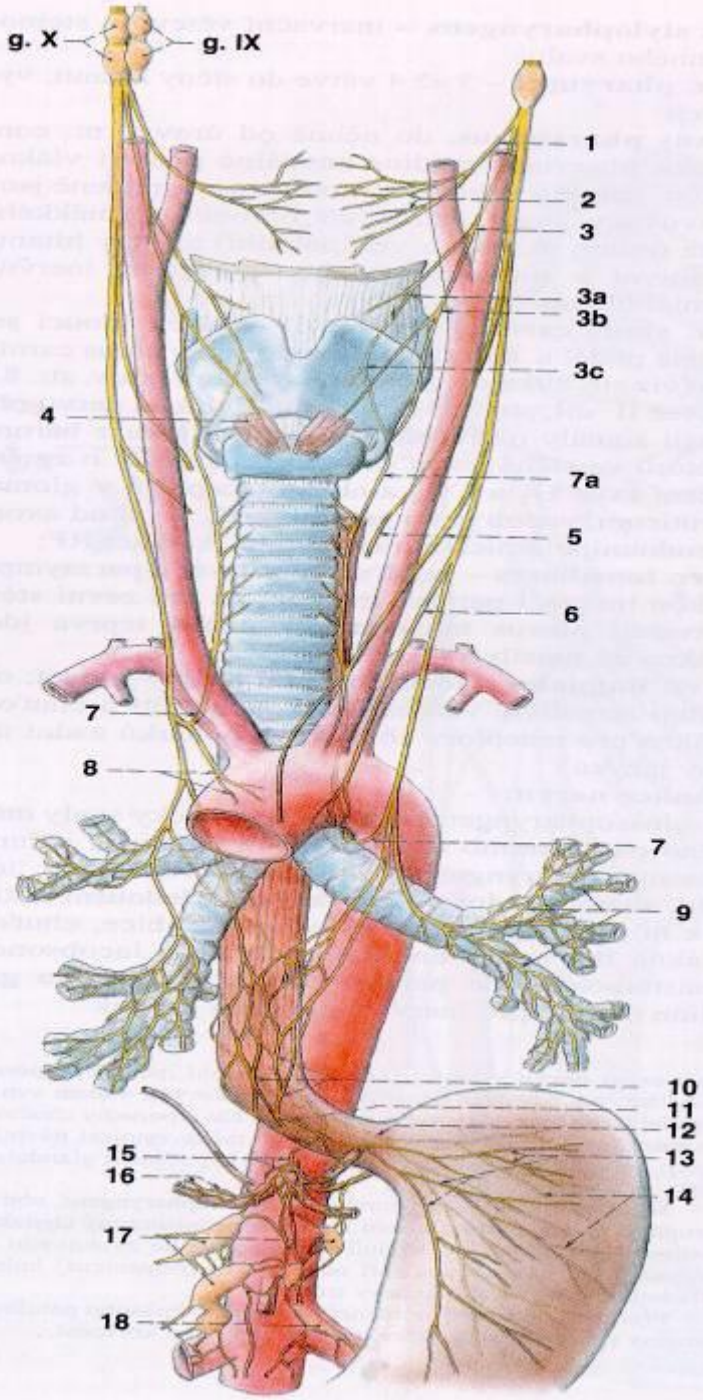

Vagus Nerve Innervation
1. Pharynx
2. Left Lung
3. Right Lung
4. Heart
5. Stomach
6. Liver
7. Spleen
8. Pancreas
9. Right Kidney
10. Small Intestine
11. Large Intestine

Innervation of tongue

somatosensory x *sensory (taste)*




Pons
Sulcus retro-olivaris
Ganglion superius
Foramen jugulare
Ganglion inferius
N. vagus (X)
N. laryngealis recurrens
A. subclavia
A. carotis communis
Truncus brachiocephalicus
Arcus aortae
Pars thoracica aortae
Truncus vagalis posterior
Plexus oesophagealis
Diaphragma
Rr. hepatici
Truncus coeliacus
R. auricularis
R. meningeus
R. communicans (cum nervo glossopharyngeo)
Rr. pharyngeales
N. laryngealis superior
Rr. cardiaci cervicales superiores
N. laryngealis recurrens
Rr. cardiaci cervicales inferiores
Rr. cardiaci thoracici
Plexus cardiacus
Rr. bronchiales; Plexus pulmonalis
Truncus vagalis anterior
Hiatus oesophageus
Rr. gastrici anteriores
Rr. gastrici posteriores
Rr. coeliaci
Rr. renales


g. X
g. IX
1
2
3
3a
3b
3c
4
7a
5
6
7
8
7
9
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11
12
13
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15
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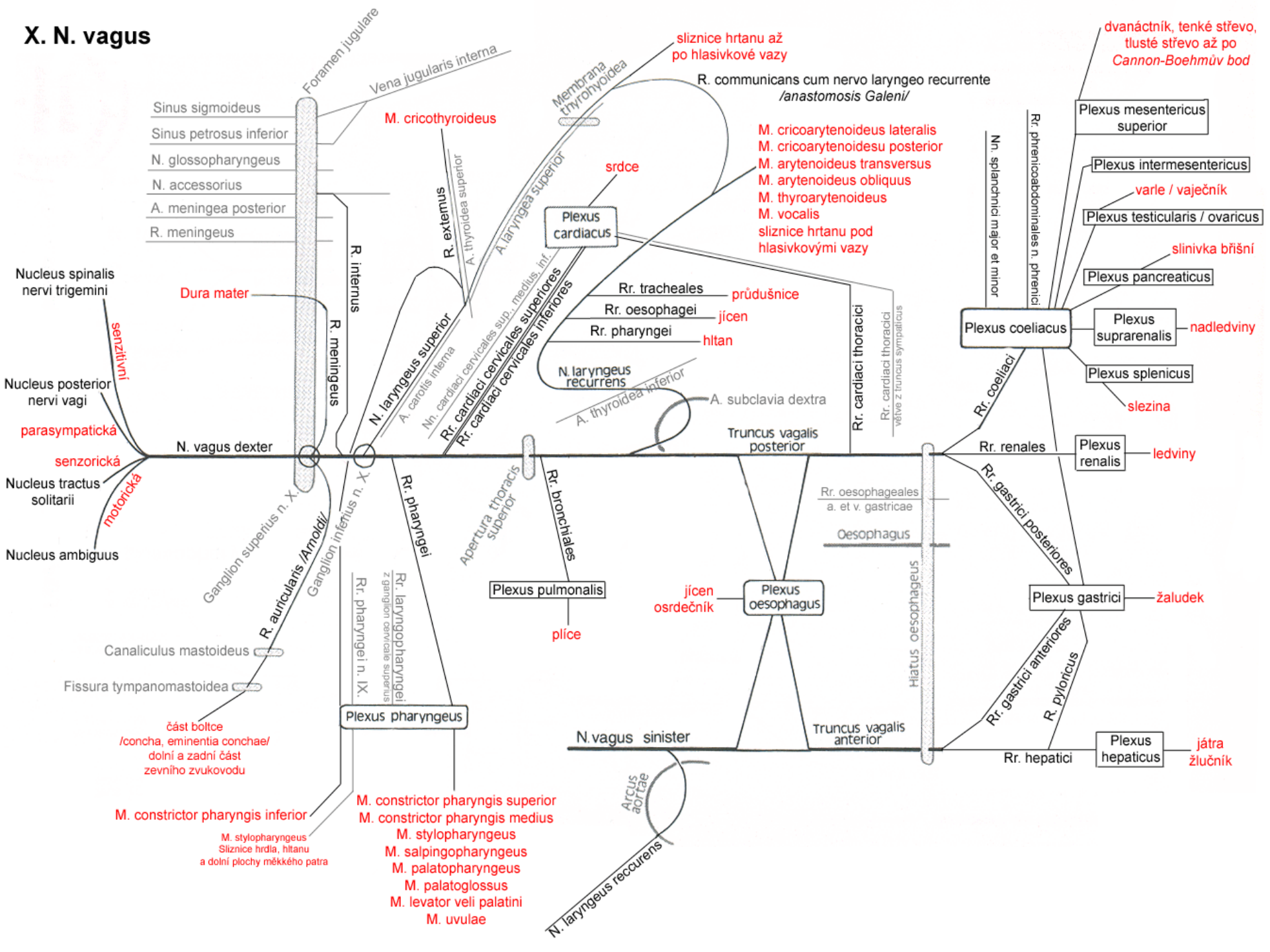
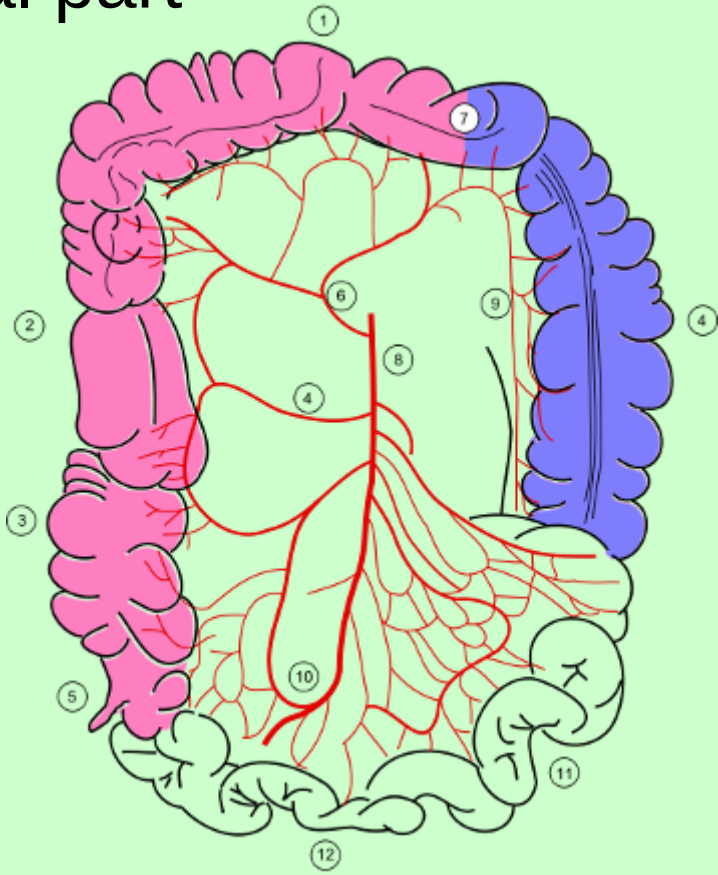
17
18

X. N. vagus

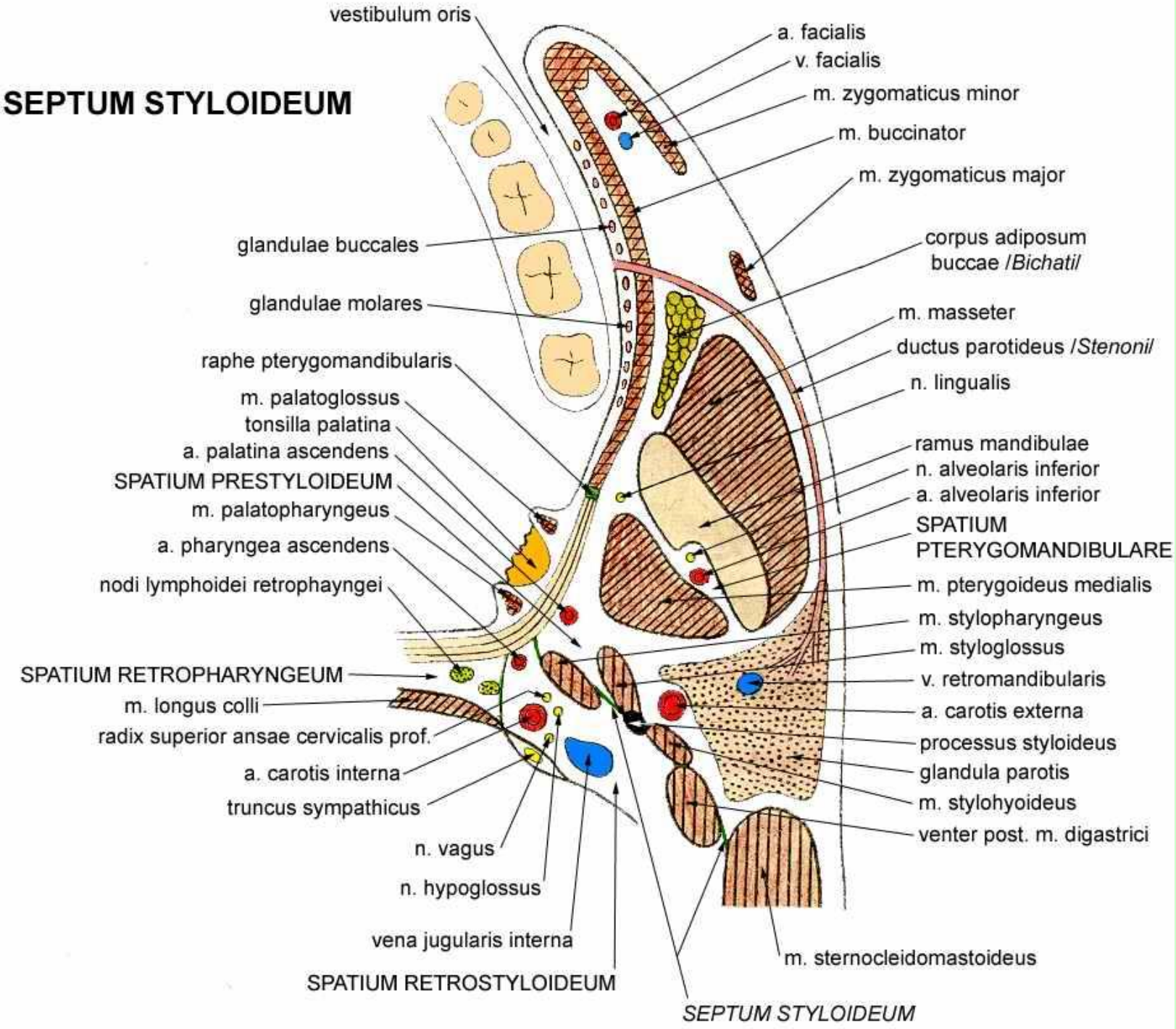

Foramen jugulare
Vena jugularis interna
Sinus sigmoideus
Sinus petrosus inferior
N. glossopharyngeus
N. accessorius
A. meningea posterior
R. meningeus
Dura mater
R. internus
R. meningeus
R. externus
A. thyroidea superior
A. laryngea superior
M. cricothyroideus
Membrana thyrohyoidea
sliznice hrtanu až po hlasivkové vazy
R. communicans cum nervo laryngeo recurrente
/anastomosis Galeni/
M. cricoarytenoideus lateralis
M. cricoarytenoidesu posterior
M. arytenoideus transversus
M. arytenoideus obliquus
M. thyroarytenoideus
M. vocalis
sliznice hrtanu pod hlasivkovými vazy
srdce
Plexus cardiacus
Rr. tracheales
průdušnice
Rr. oesophagei
jícen
Rr. pharyngei
hltan
N. laryngeus recurrens
A. thyroidea inferior
A. subclavia dextra
Rr. cardiaci cervicales superiores
Rr. cardiaci cervicales inferiores
Rr. cardiaci thoracici
Rr. cardiaci thoracici
větve z truncus sympaticus
Nn. splanchnici major et minor
Rr. phrenicoabdominales n. phrenici
Plexus mesentericus superior
Plexus intermesentericus
varle / vaječník
Plexus testicularis / ovaricus
slinivka břišní
Plexus pancreaticus
Plexus coeliacus
Plexus suprarenalis
nadledviny
Plexus splenicus
slezina
Rr. coeliaci
Rr. renales
Plexus renalis
ledviny
Rr. gastrici posteriores
Plexus gastrici
žaludek
Rr. gastrici anteriores
R. pyloricus
Plexus hepaticus
játra
žlučník
Rr. hepatici
Truncus vagalis posterior
Truncus vagalis anterior
Hiatus oesophageus
Rr. oesophageales
a. et v. gastricae
Oesophagus
Plexus oesophagus
jícen
osrdečník
Plexus pulmonalis
plíce
Apertura thoracis superior
Rr. bronchiales
Rr. pharyngei
Rr. laryngopharyngei
z ganglion cervicale superius
Rr. pharyngei n. IX.
Plexus pharyngeus
Ganglion superius n. X.
Ganglion inferius n. X.
R. auricularis /Arnoldi/
Canaliculus mastoideus
Fissura tympanomastoidea
část boltce
/concha, eminentia conchae/
dolní a zadní část
zevního zvukovodu
N. vagus dexter
N. vagus sinister
N. laryngeus recurrens
Arcus aortae
Nucleus spinalis nervi trigemini
senzitivní
Nucleus posterior nervi vagi
parasympatická
senzorická
Nucleus tractus solitarii
motorická
Nucleus ambiguus
M. constrictor pharyngis inferior
M. stylopharyngeus
Sliznice hrdla, hltanu
a dolní plochy měkkého patra
M. constrictor pharyngis superior
M. constrictor pharyngis medius
M. stylopharyngeus
M. salpingopharyngeus
M. palatopharyngeus
M. palatoglossus
M. levator veli palatini
M. uvulae
dvanáctník, tenké střevo,
tlusté střevo až po
Cannon-Boehmův bod

X. - N. vagus - course

- fossa cranii posterior
- foramen jugulare – ventromedial part
- spatium retrostylodeium
- spatium parapharyngeum
- apertura thoracis superior
- mediastinum superius
  →plexus oesophageus → truncus vagalis ant.+post.
- mediastinum inferius posterius
- hiatus oesohageus
- Cannon-Böhm´s point



SEPTUM STYLOIDEUM



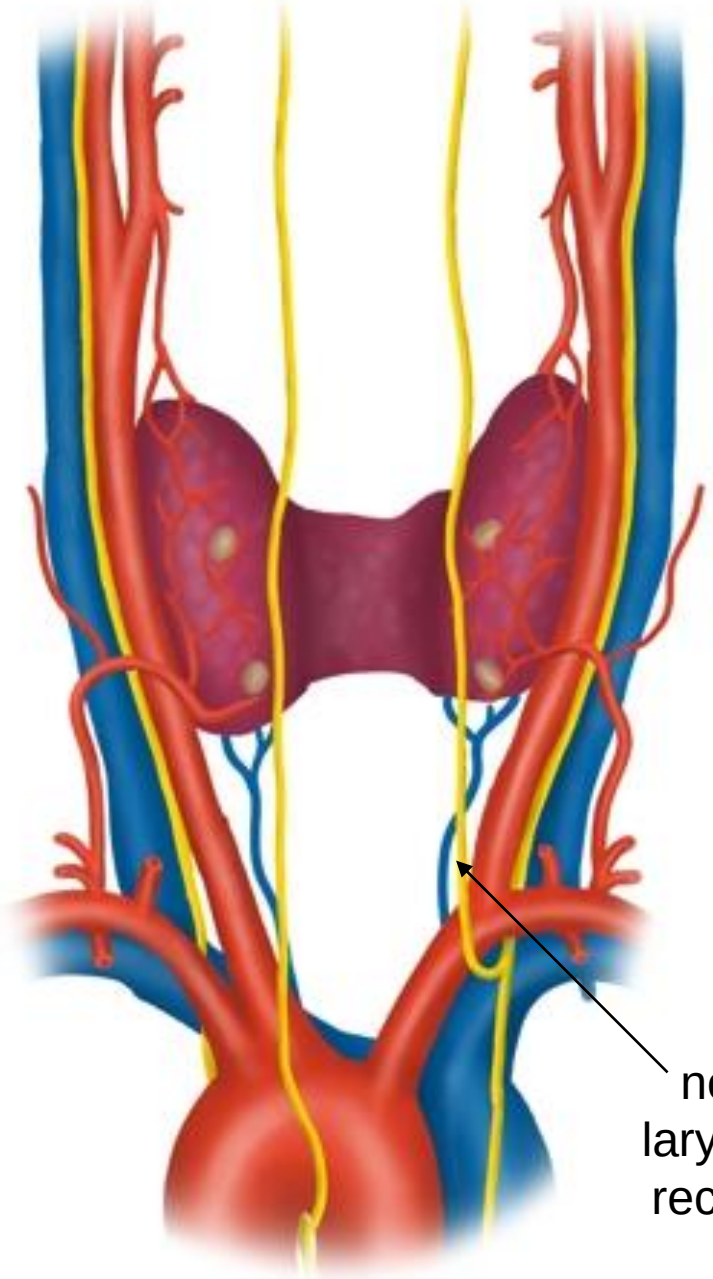
X. - N. vagus - braches

- r. meningeus
- r. auricularis (Arnold´s; Alderman´s nerve) – *Ramsay-Hunt´s zone*

„ALDERMAN (honorary member of the municipal council of the British administrative system) in the times of the Anglo-Saxon empire was habitually eating and then putting some cold water in the ear to stimulate this nerve to initiate vomiting. In this way he could empty his stomach quickly and restart eating“.

X. - N. vagus - branches

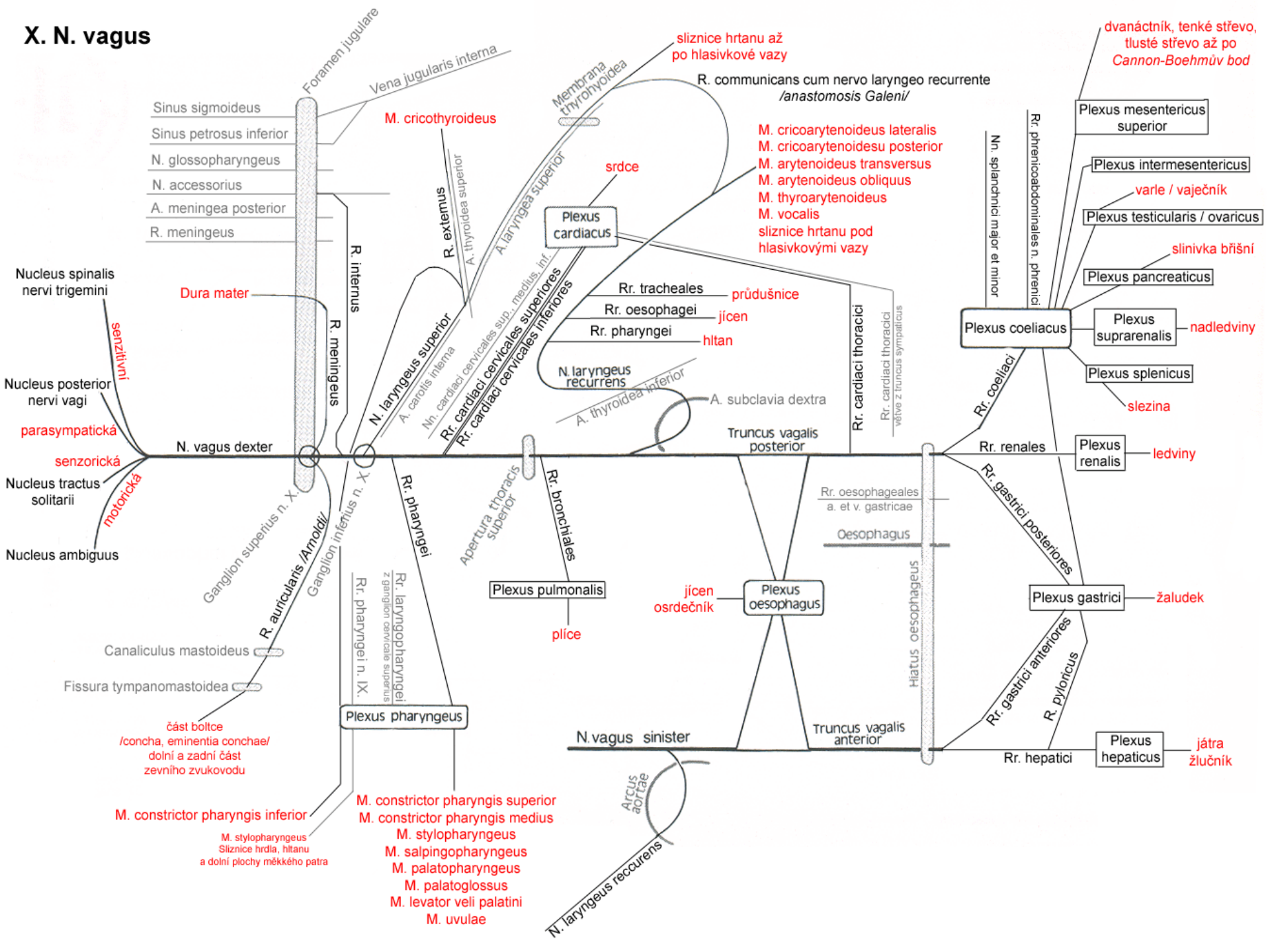
- **rr. pharyngei** – mucosa, glands, muscles
- **n. laryngeus superior** – mucosa, glands, muscles
- **n. laryngeus recurrens** – *idem*
  - right is shorter and passes under a. subclavia dextra
  - left is longer and úasses under arcus aortae
- **rr. cardiaci** cervicales sup.+inf., thoracici
- **rr. bronchiales**
- **rr. coeliaci, hepatici, renales, gastrici ant.+post.**



nervus laryngeus superior

nervus laryngeus recurrens

X. N. vagus


Foramen jugulare
Vena jugularis interna
Sinus sigmoideus
Sinus petrosus inferior
N. glossopharyngeus
N. accessorius
A. meningea posterior
R. meningeus
Dura mater
R. internus
R. meningeus
R. externus
A. thyroidea superior
A. laryngea superior
M. cricothyroideus
Membrana thyrohyoidea
sliznice hrtanu až po hlasivkové vazy
R. communicans cum nervo laryngeo recurrente
/anastomosis Galeni/
M. cricoarytenoideus lateralis
M. cricoarytenoidesu posterior
M. arytenoideus transversus
M. arytenoideus obliquus
M. thyroarytenoideus
M. vocalis
sliznice hrtanu pod hlasivkovými vazy
srdce
Plexus cardiacus
Rr. tracheales
průdušnice
Rr. oesophagei
jícen
Rr. pharyngei
hltan
N. laryngeus recurrens
A. thyroidea inferior
A. subclavia dextra
Rr. cardiaci cervicales superiores
Rr. cardiaci cervicales inferiores
Rr. cardiaci thoracici
Rr. cardiaci thoracici
větve z truncus sympaticus
Nn. splanchnici major et minor
Rr. phrenicoabdominales n. phrenici
Plexus mesentericus superior
Plexus intermesentericus
varle / vaječník
Plexus testicularis / ovaricus
slinivka břišní
Plexus pancreaticus
Plexus coeliacus
Plexus suprarenalis
nadledviny
Plexus splenicus
slezina
Rr. coeliaci
Rr. renales
Plexus renalis
ledviny
Rr. gastrici posteriores
Plexus gastrici
žaludek
Rr. gastrici anteriores
R. pyloricus
Plexus hepaticus
játra
žlučník
Rr. hepatici
Truncus vagalis posterior
Truncus vagalis anterior
Hiatus oesophageus
Rr. oesophageales
a. et v. gastricae
Oesophagus
Plexus oesophagus
jícen
osrdečník
Plexus pulmonalis
plíce
Apertura thoracis superior
Rr. bronchiales
Rr. pharyngei
Rr. laryngopharyngei
z ganglion cervicale superius
Rr. pharyngei n. IX.
Plexus pharyngeus
Ganglion superius n. X.
Ganglion inferius n. X.
R. auricularis /Arnoldi/
Canaliculus mastoideus
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část boltce
/concha, eminentia conchae/
dolní a zadní část
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N. vagus dexter
N. vagus sinister
N. laryngeus recurrens
Arcus aortae
Nucleus spinalis nervi trigemini
senzitivní
Nucleus posterior nervi vagi
parasympatická
senzorická
Nucleus tractus solitarii
motorická
Nucleus ambiguus
M. constrictor pharyngis inferior
M. stylopharyngeus
Sliznice hrdla, hltanu
a dolní plochy měkkého patra
M. constrictor pharyngis superior
M. constrictor pharyngis medius
M. stylopharyngeus
M. salpingopharyngeus
M. palatopharyngeus
M. palatoglossus
M. levator veli palatini
M. uvulae
dvanáctník, tenké střevo,
tlusté střevo až po
Cannon-Boehmův bod

X. - N. vagus

Palsy

- unilateral
- affected swallowing (= dysphagia), hoarsness, blood pressure changes, deviation of uvula

- bilateral
- rhinolalia (= nasal speech), speech disorders (= dysarthria), hypertension, resp. stopped breathing

Irritation of n.X

- bradycardia, spasms of digestive tube (laryngospasmus, oesophagospasmus, pylorospamus)

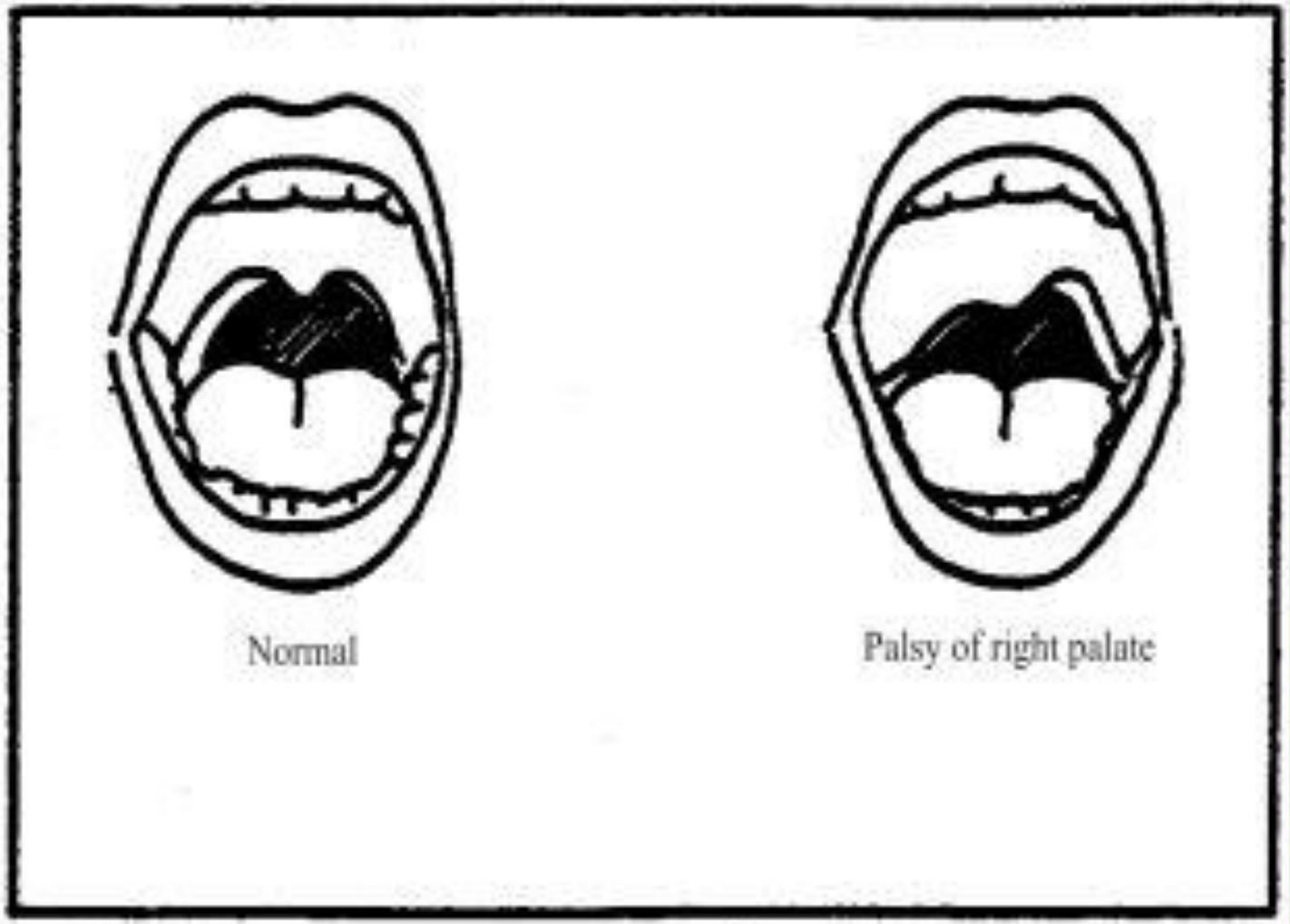
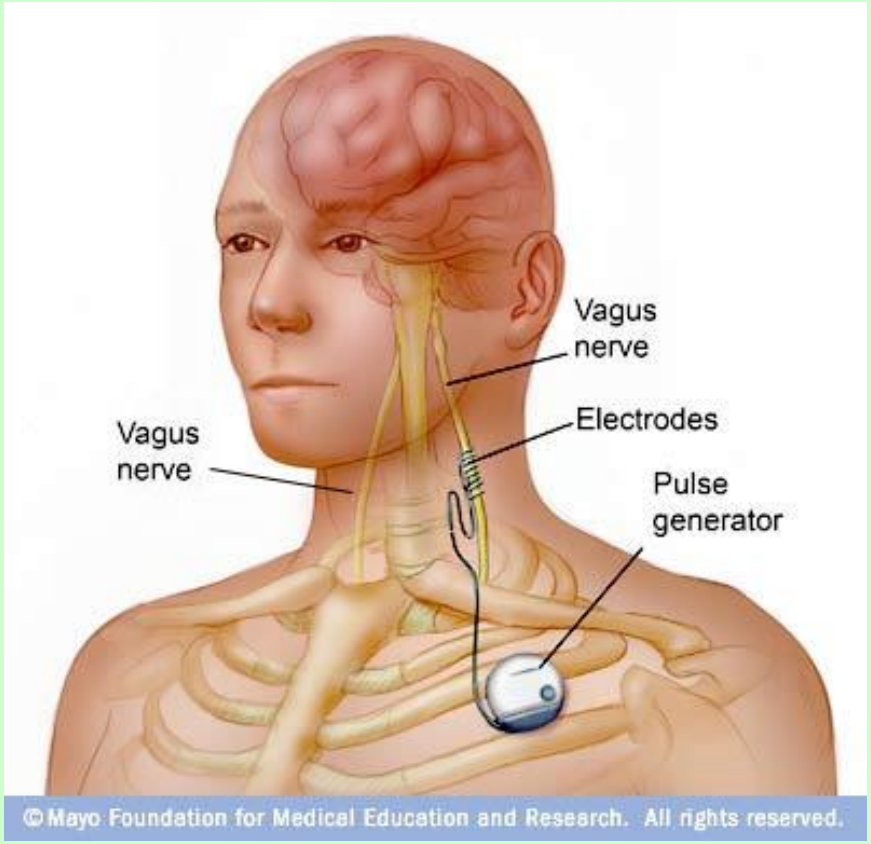


Figure 2-15: A normal soft palate is illustrated on the left. On the right, a right palatal palsy from a lower motor neuron X nerve lesion has resulted in deviation of the uvula to the left.

X. - N. vagus
Clinical notes

- examination: vomiting reflex
- reflexes:
  - oculocardial (Aschner-Dagnini´s reflex)
- stimulation of n.X

epilepsy, depression



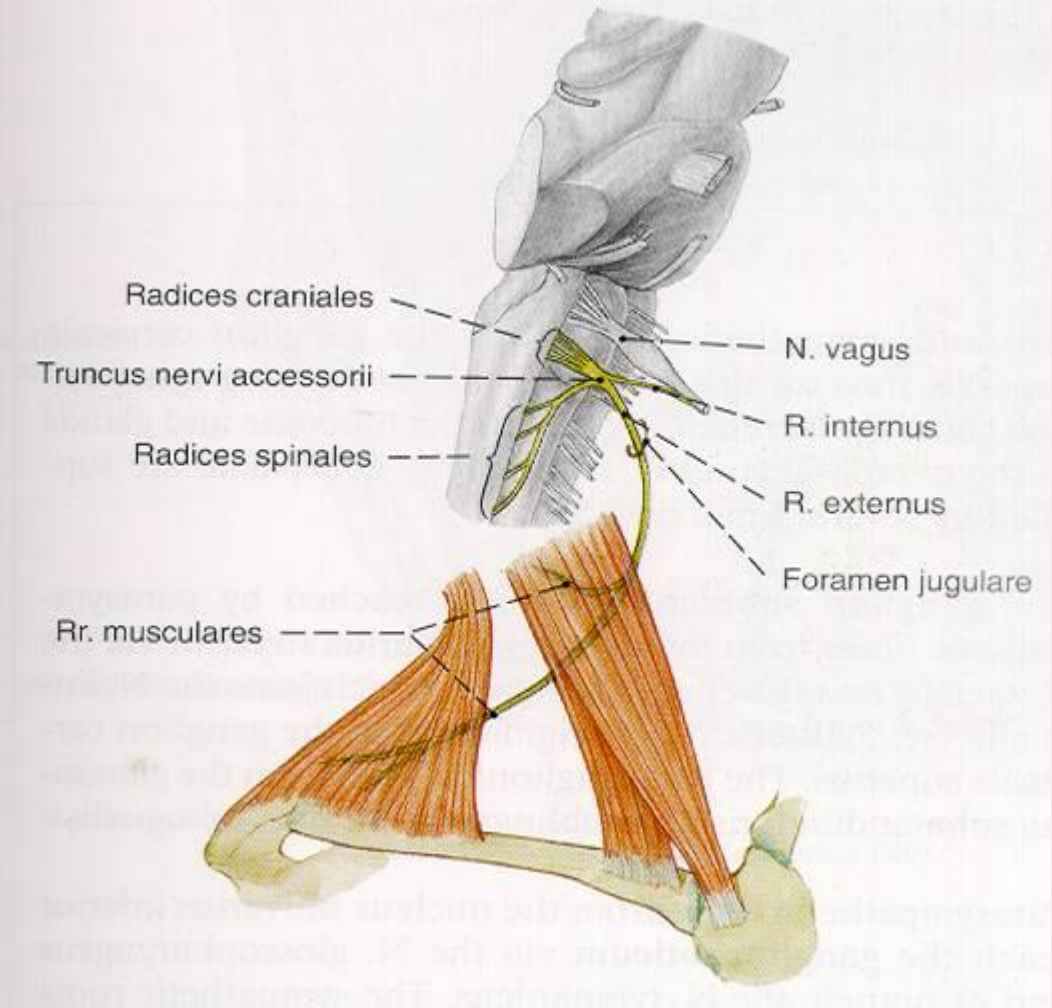
XI. = N. accessorius

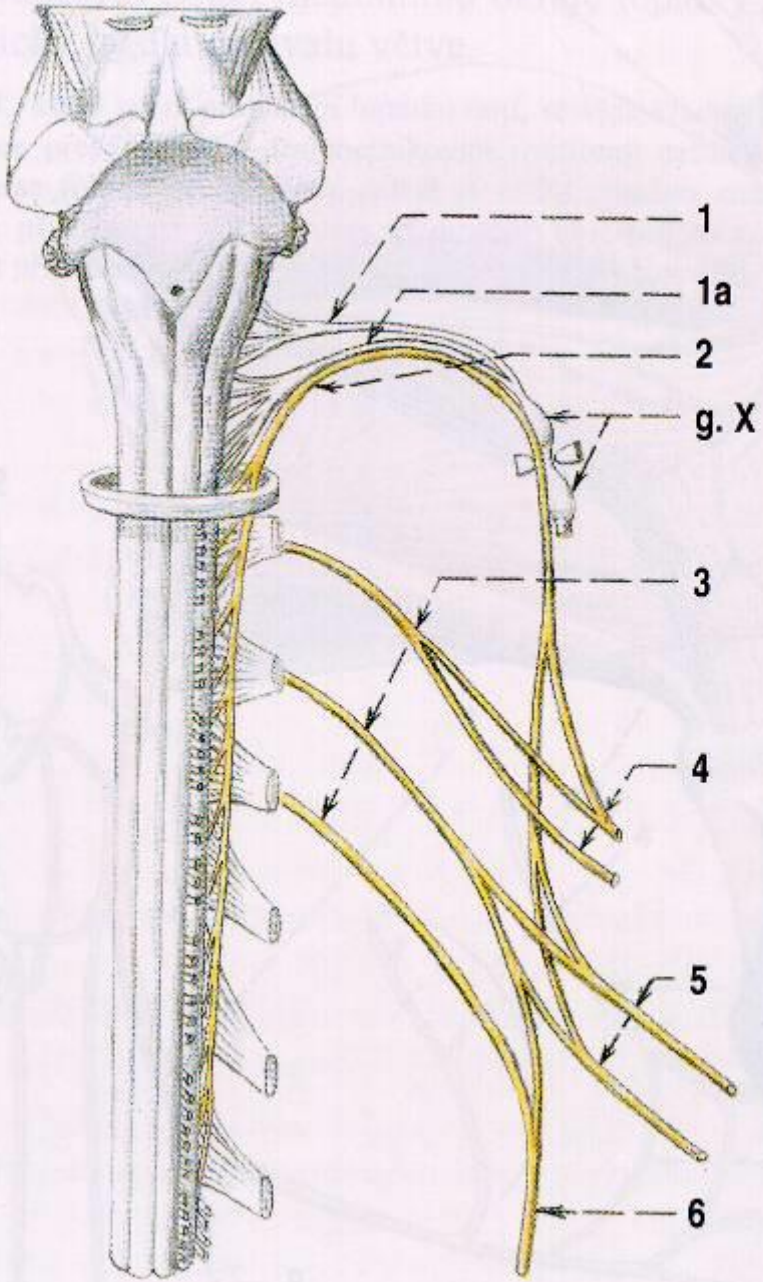
combined nerv (2 independent components grown in one trunk)

2 nuclei → 2 roots → **1 trunk** → 2 branches

- *somatomotor branchial* (6th arch)
  - nucleus in medulla oblongata: ncl. ambiguus → radix cranialis → truncus n.XI → ramus internus → n. X → soft palate muscles (4) + lateral muscle group of larynx (3)
- *somatomotor somite (cervical somites)*
  - nucleus in cervical spinal cord: ncl. n. XI. medullae spinalis → radix spinalis → truncus n.XI → ramus externus → m. sternocleidomastoideus + m. trapezius
  - direct fibres via n. spinalis C2-4 → loop between both ways = *ansa Maubraci*

XI. = N. accessorius





XI. - N. accessorius

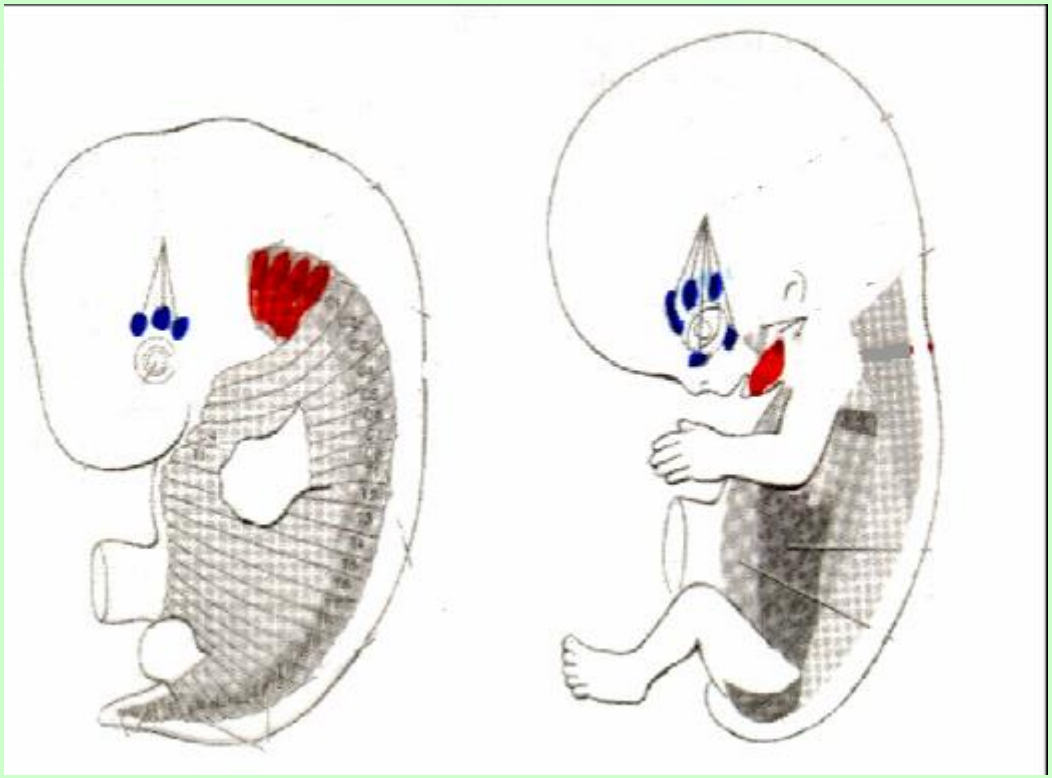
Palsy

unilateral

- palsy of r. internus (*Avelis´ syndrome)*
  - affected soft palate (depressed pharyngeal arches, depressed uvula, affected swallowing and speech)
- palsy of r. externus
  - depressed shoulder, almost no abduction above horizontal plane, affected heard, rotation, winged scapula (= scapula alata)
- palsy of whole nerve (*Schimdt´s syndrome)*
  - very rare!

Winged scapula (= scapula alata)

SomatoMotor somatic CN



• preotic myotoms (somitomers) form external muscles of eyeball – n. III, IV, VI

• **occipital somites form muscles of tongue – n. XII**

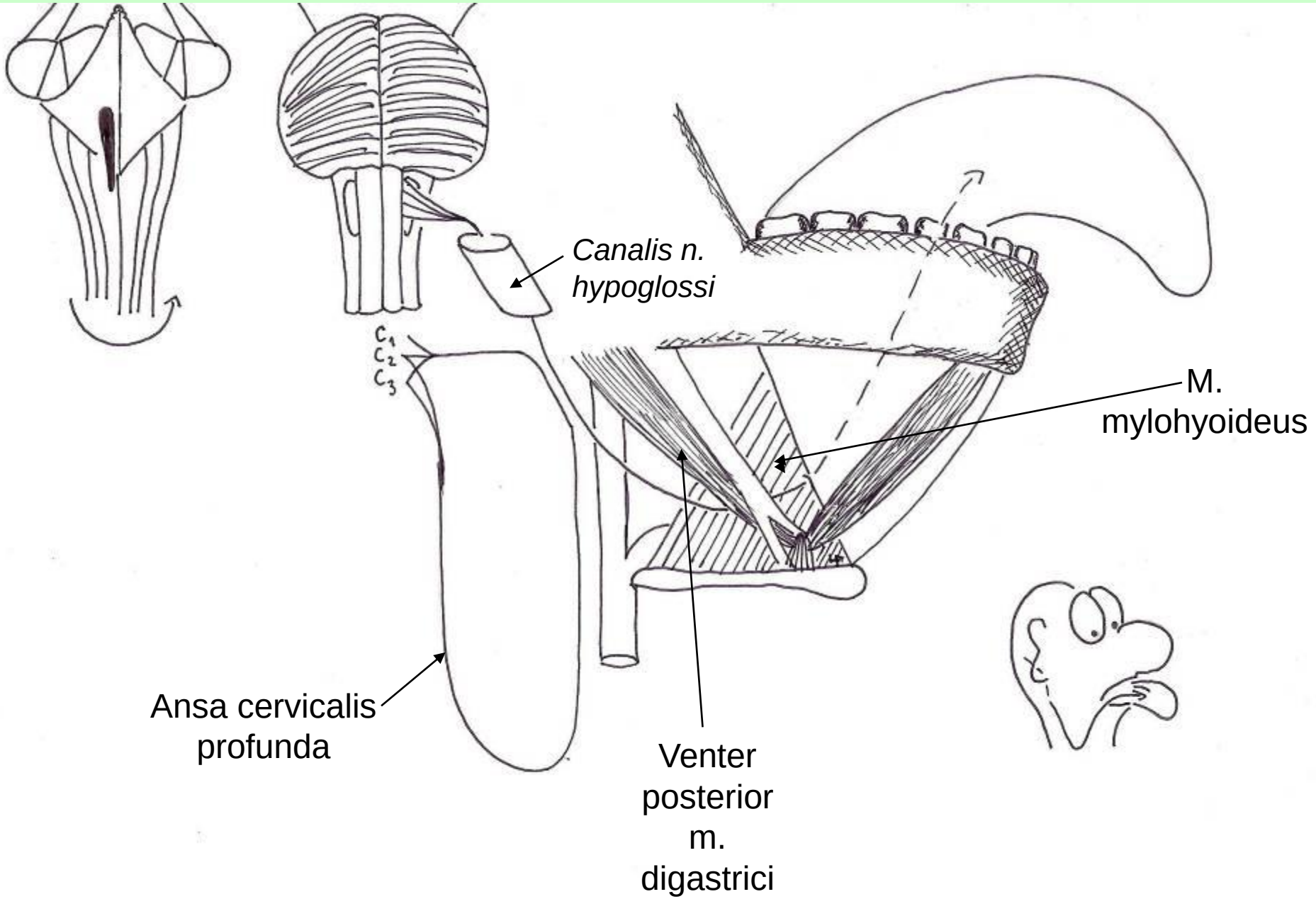
XII. = N. hypoglossus

- *somatomotor somite* (occipital somites)
- 1 nucleus in medulla oblongata: ncl. n. XII

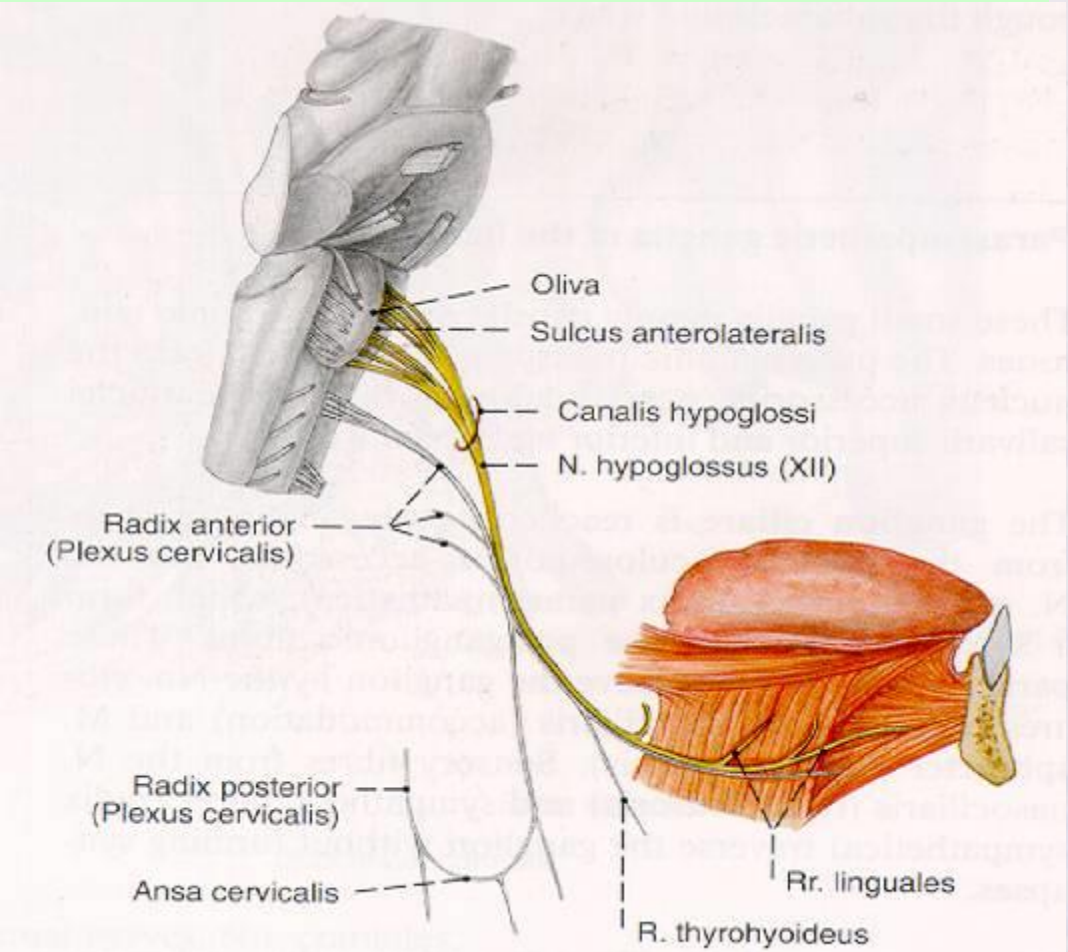
course: ventrally to olive from medulla obongata (= *sulcus preolivaris*) → fossa cranii posterior → canalis nervi hypoglossi → spatium retrostyloideum (spatium parapharyngeum) → trigonum caroticum → trigonum submandibulare → tongue

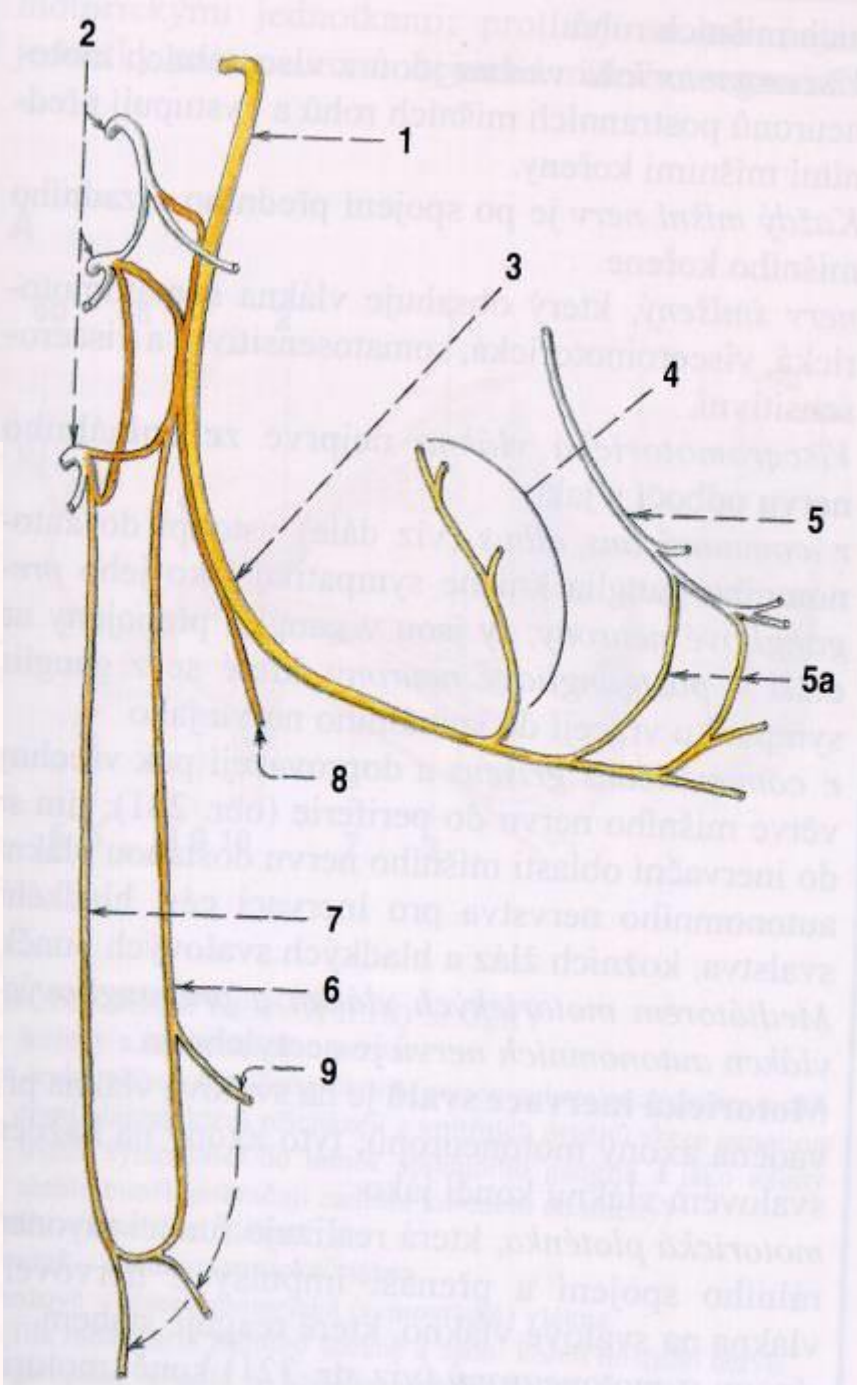
- **7 muscles of tongue**
  - 3 extraglossal and 4 intraglossal

XII. = N. hypoglossus



XII. = N. hypoglossus

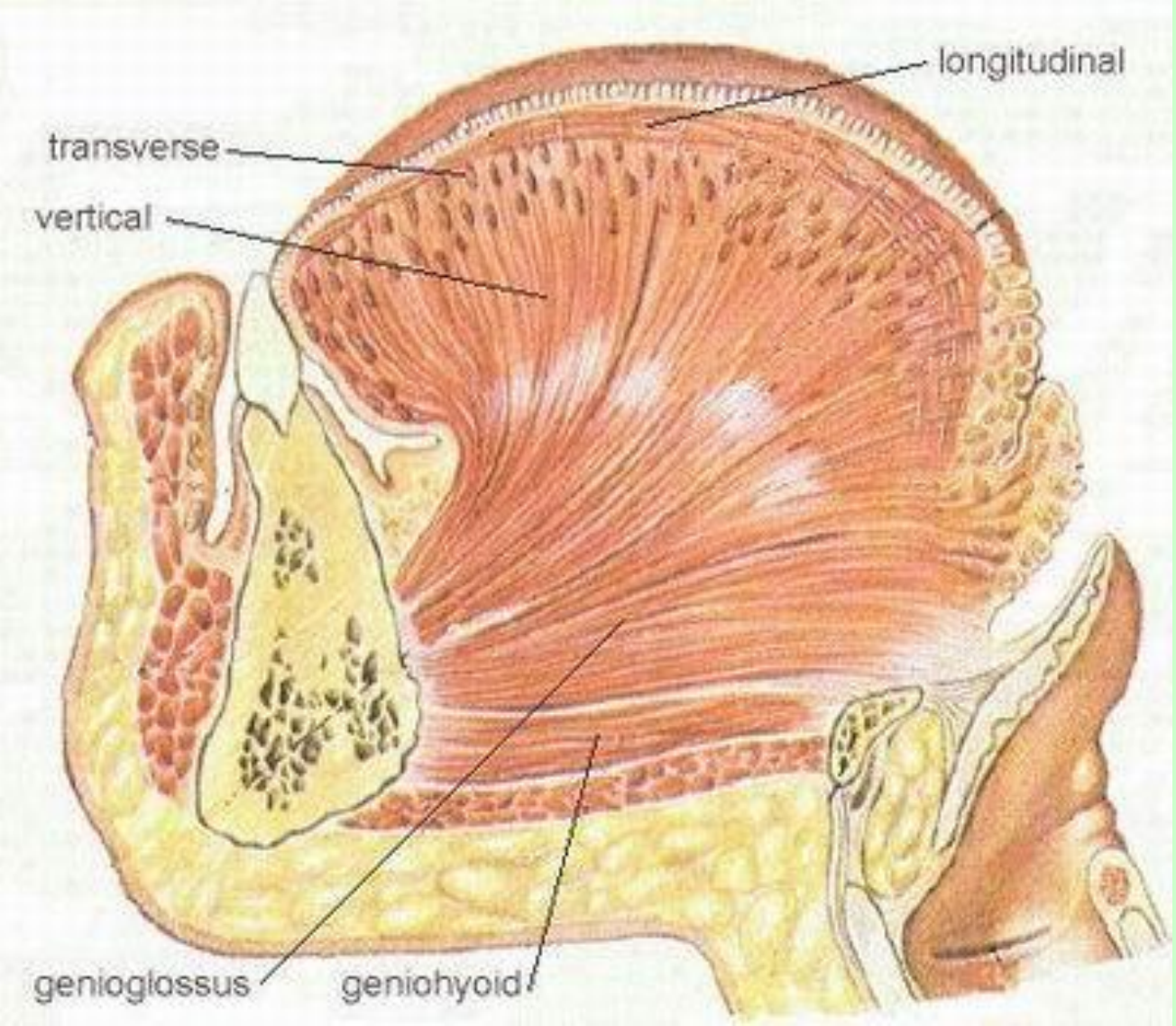




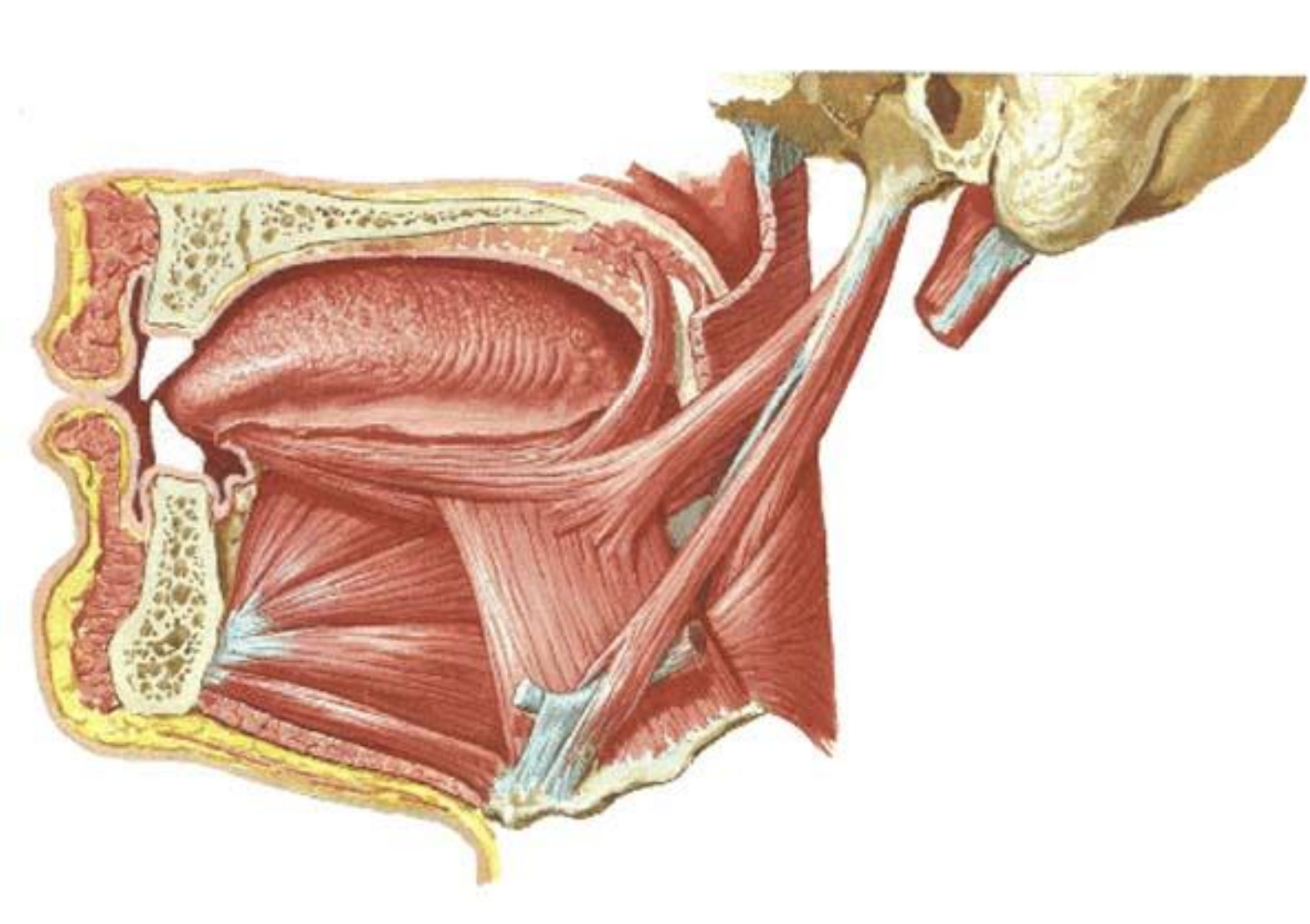
Muscles of tongue

- aponeurosis, septum (*incomplete!*)
- intraglossal – **n. hypoglossus /n. XII/**
  - m. longitudinalis sup. et inf.
  - transversus
  - verticalis
- extraglossal – **n. hypoglossus /n. XII/**
  - m. genioglossus /n.XII./
  - hyoglossus /n.XII./
  - styloglossus /n.XII./
  - palatoglossus - !exception! – n. vagus /n.X./

Muscles of tongue



Muscles of tongue



Hemiglossoplegia