

# LEBKA A VÝVOJ HLAVY



# Vývoj kostí

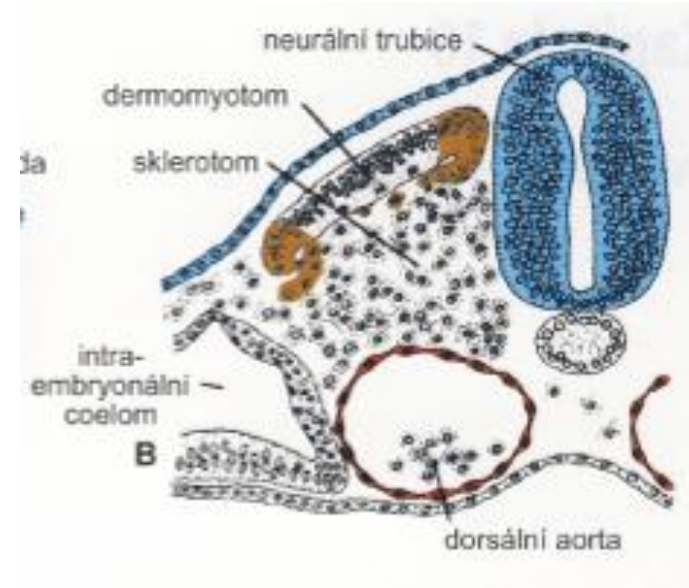
**kosterní systém** má 3 základy:

- paraaxiální mezoderm
  - tvoří segmenty = **somity**
    - chybějí v hlavové části
- mezoderm laterální ploténky (= somatopleura)
- neurální lišta

somit se koncem 4. týdne diferencuje ve ventromediální sklerotom a dorzolaterální dermatomyotom

sklerotom – pojivová tkáň = mezenchym

- diferenciací v různé typy buněk (fibroblasty, chondroblasty, osteoblasty)



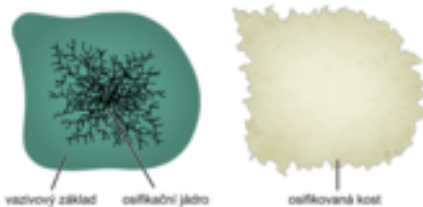
5 týdnů, 14 somitů

# Osifikace kostí

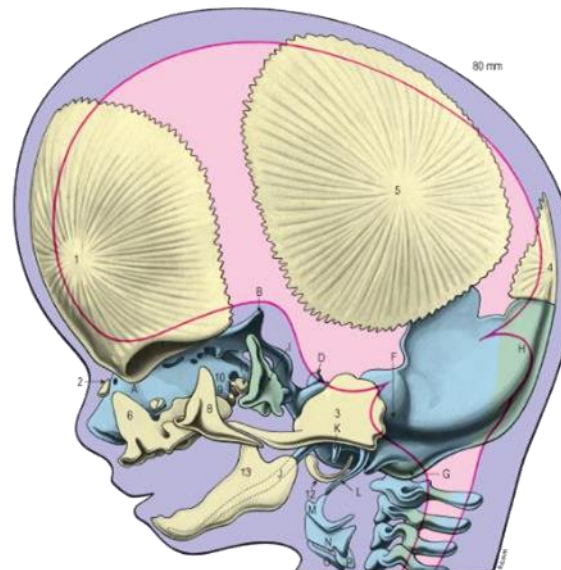
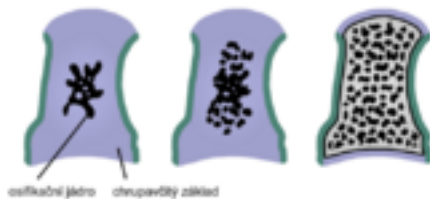
- dezmogenní (endezmální) osifikace
  - kost vzniká přímo z mezenchymu
- chondrogenní (enchondrální) osifikace
  - mezenchymový základ → chrupavčitý model kosti (hyalinní chrupavka) → kostní tkáň



Desmoženní osifikace ploché kosti



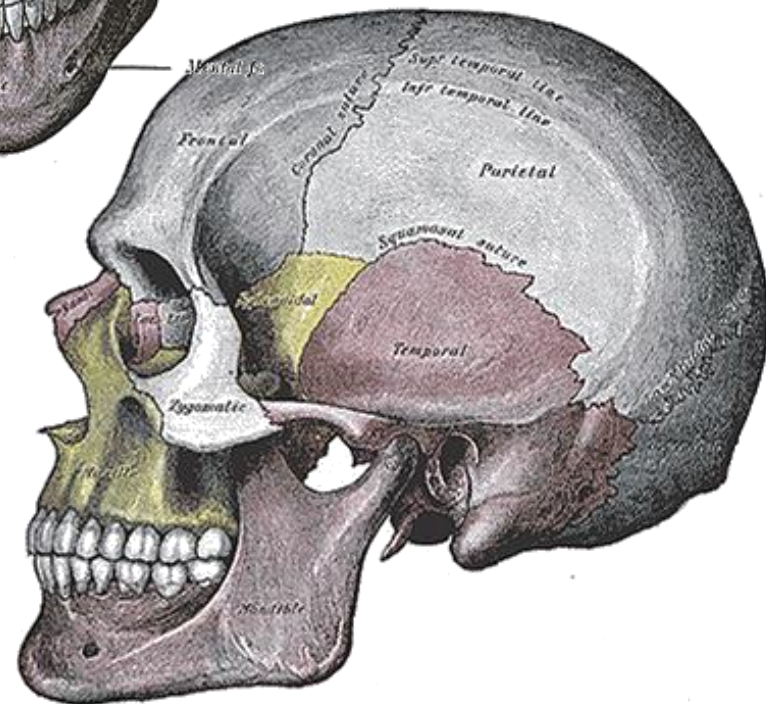
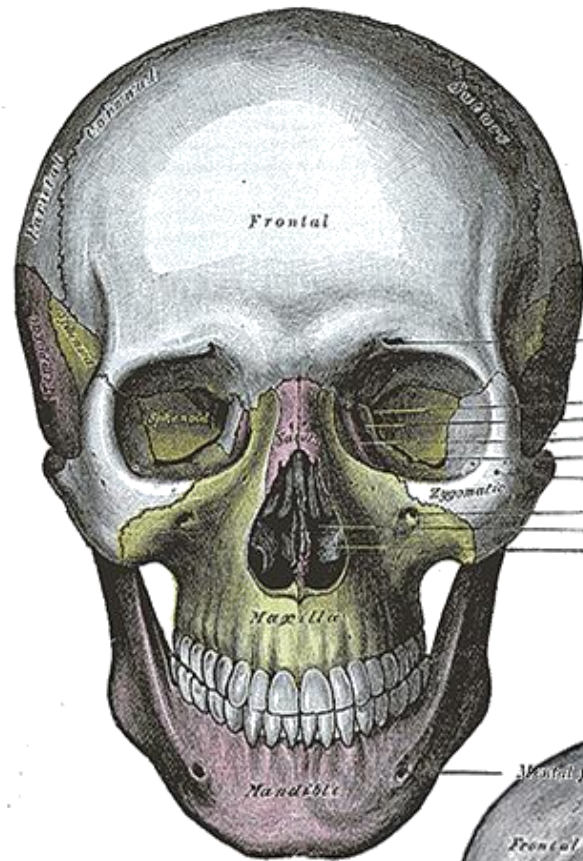
Enchondrální osifikace krátké kosti



# Lebka

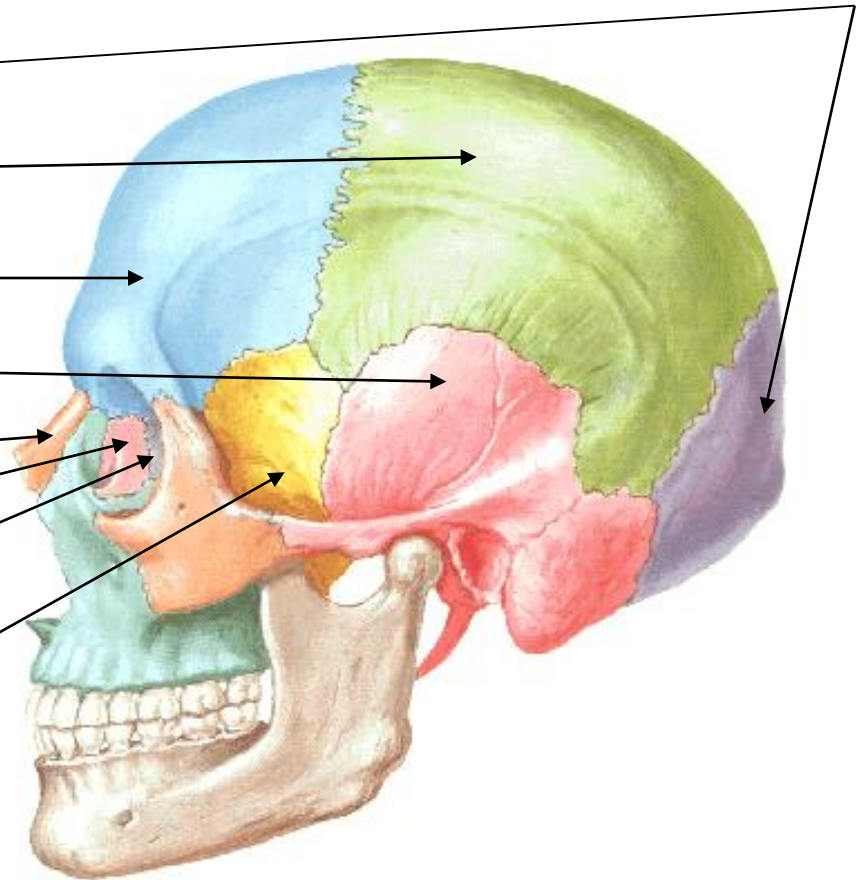
## *Cranium*

- *neurocranium*  
(mozkována)
  - obklopuje mozek a smyslové orgány
- *viscerocranium*  
(*splanchnocranium*, obličejovna)
  - obličejová část
  - kolem začátku trávicí a dýchací soustavy



# Neurocranium

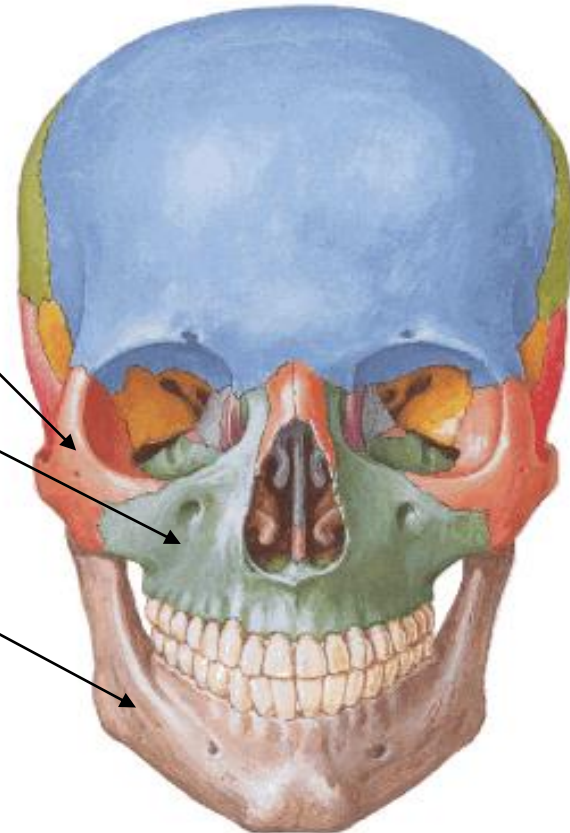
- os occipitale
- os parietale
- os frontale
- os temporale
- os nasale
- os lacrimale
- os ethmoidale
- os sphenoidale
- vomer
- concha nasalis inferior



# Viscerocranium



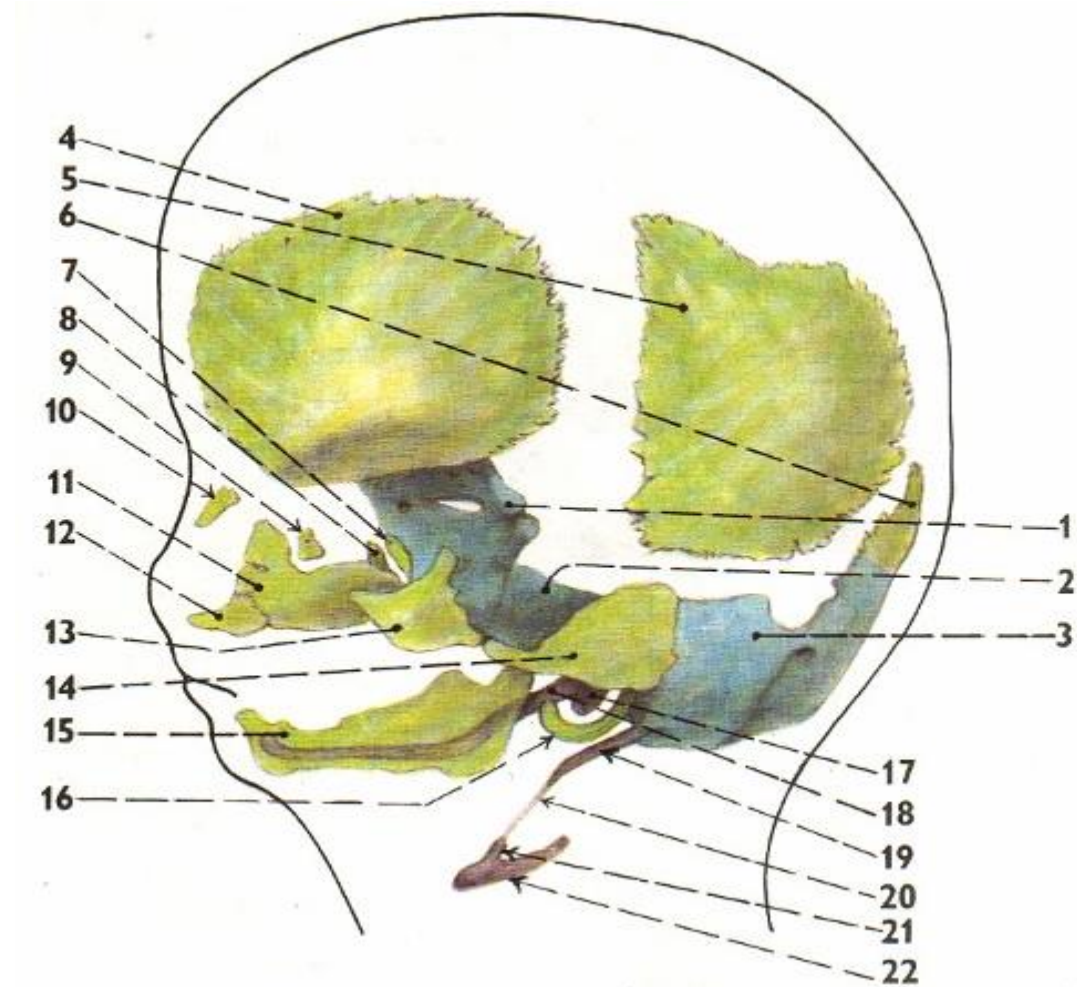
- os zygomaticum
- maxilla
- mandibula
- os palatinum
- os hyoideum
- ossicula auditus



# Osifikace neurokrania

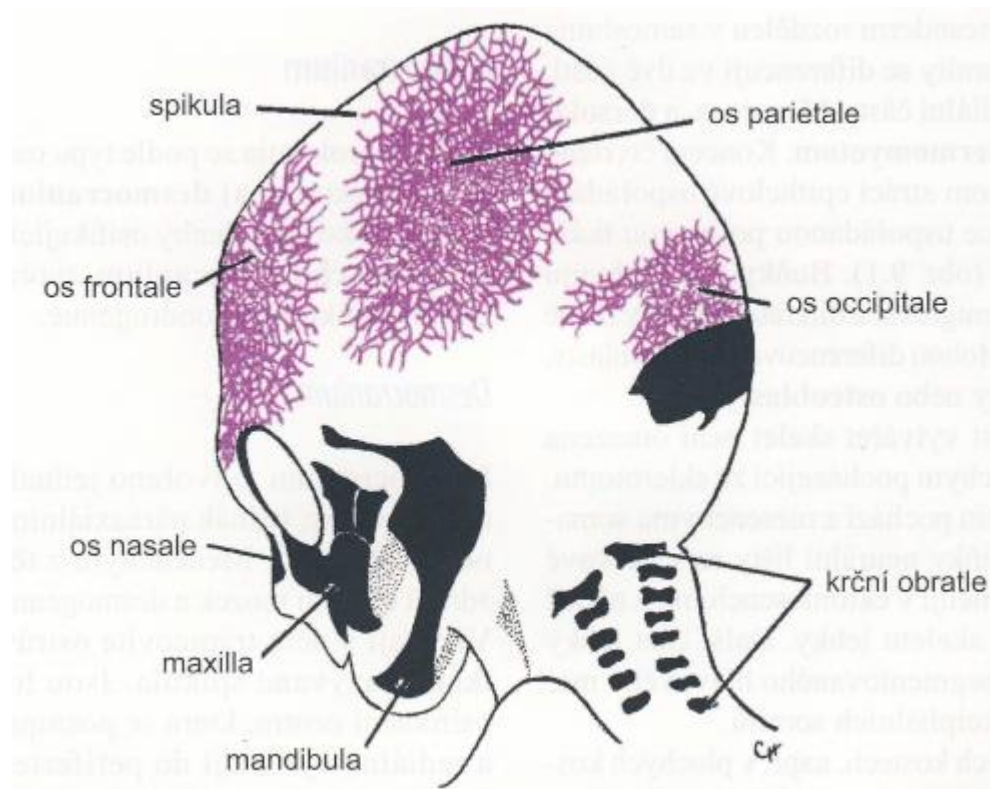
dle osifikace dělíme na:

- **desmocranium**
  - ploché kosti lebeční klenby s desmogenní osifikací (**krycí kosti**)
- **chondrocranium**
  - kosti lebeční spodiny s chondrogenní osifikací (**náhradní kosti**)



# Desmocranium

- tvořeno buňkami neurální lišty a paraaxiálním mezodermem
- ektomezenchym obklápí mozek a dezmozogenně osifikuje
- primární osifikační centra
- růst ve fetálním i postnatálním období
- apozice, resorpce



Kosti lebky 3-měsíčního plodu



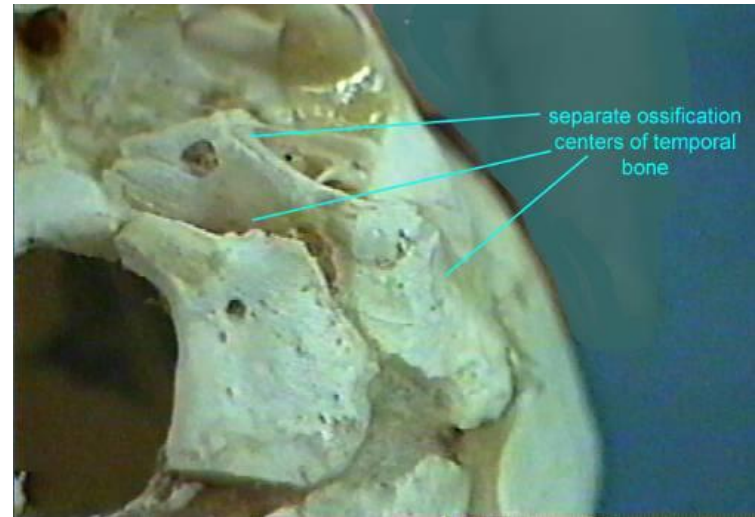
# Dysostosis cleidocranialis\*

- 1 : 1.000.000
- nebolestivé zduření v oblasti klíční kosti se objeví ve 2.-3. roce
- obvykle chybí laterální část klíční kosti (v 10 % celá)
- prognatie dolní čelisti kvůli hypolázii horní čelisti
- nevymizelé fonticuli
- nadpočetné zuby, neprořezané trvalé zuby
- poruchy růstu kloubů a kostí



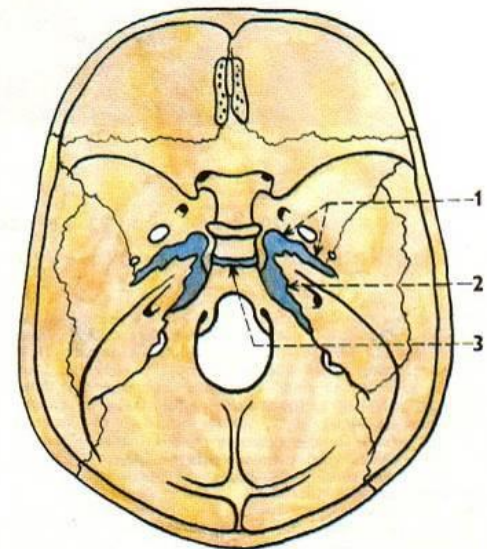
# Chondrocranium

- několik chrupavčitých základů pro každou kost lebeční spodiny
- splývání základů
- chrupavčité spoje jsou růstová centra, osifikace během dospívání



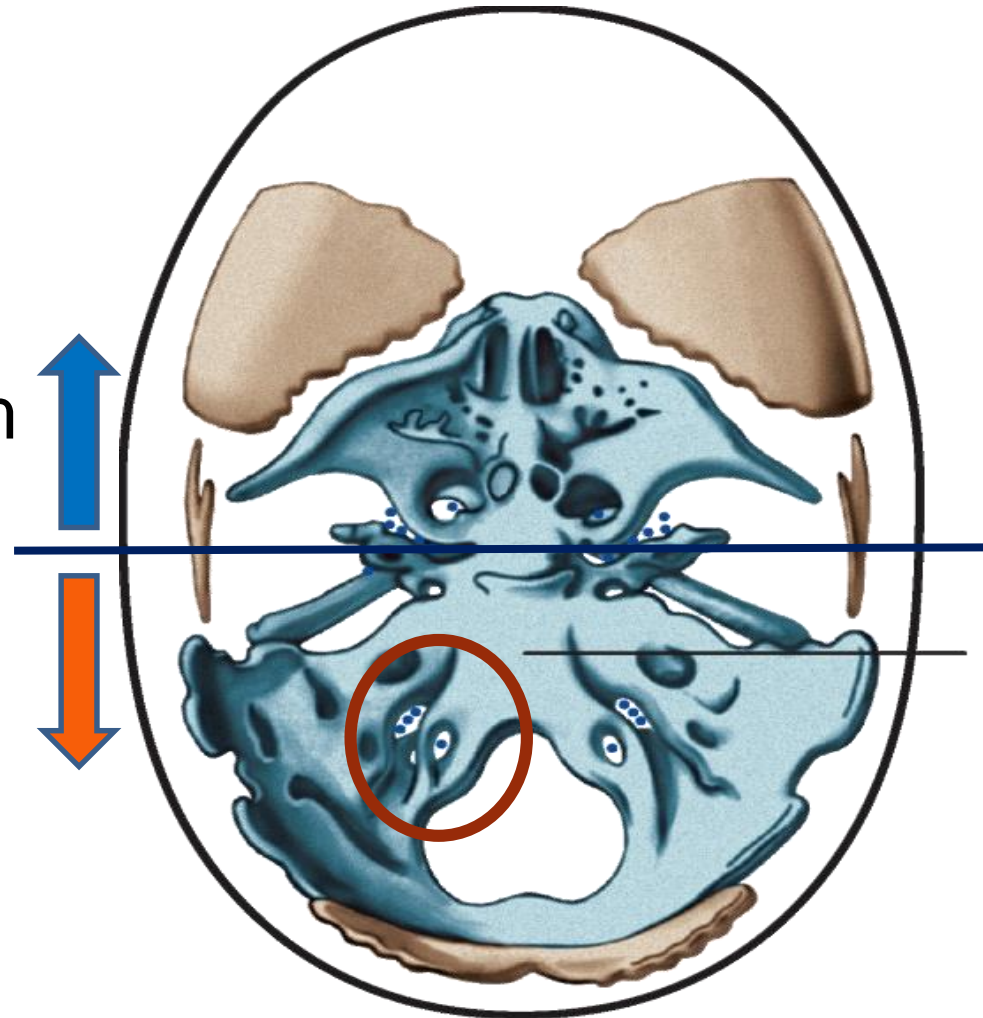
přetrvávají:

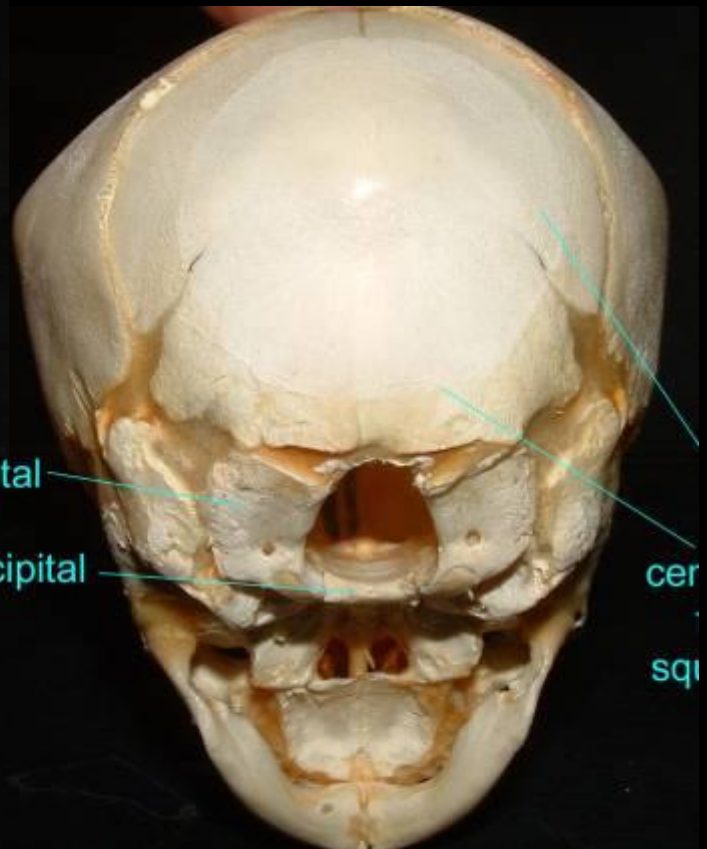
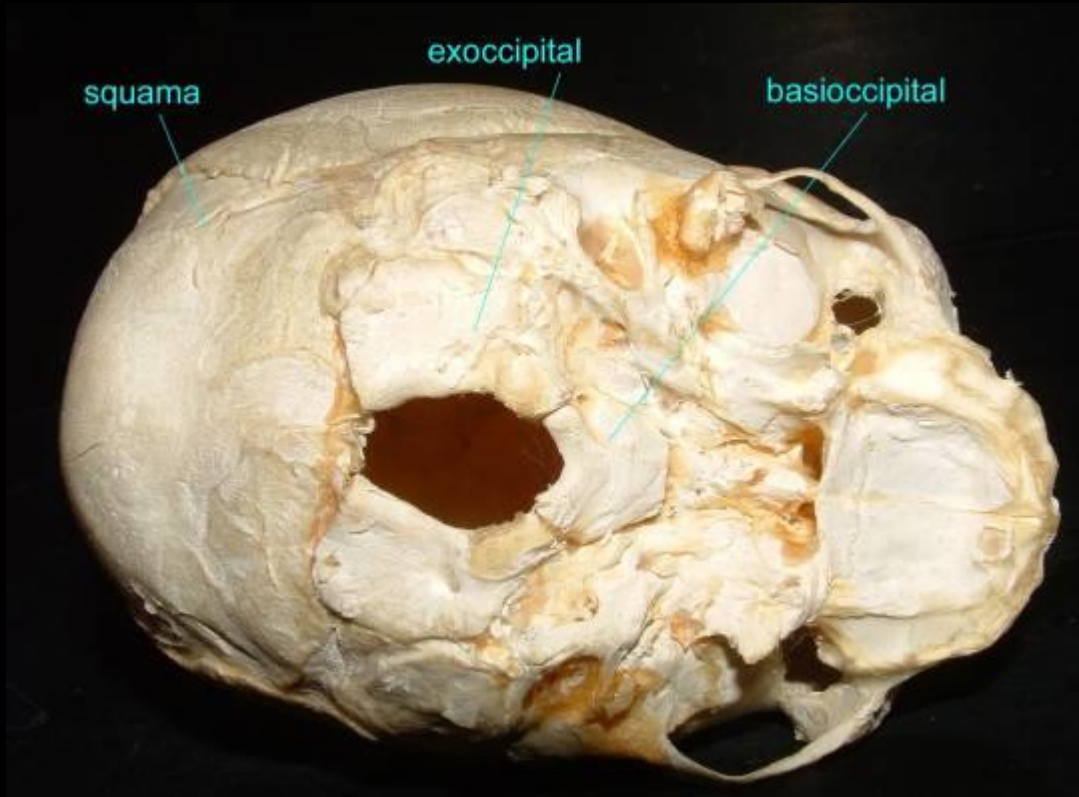
1. *synchondrosis sphenopetrosa*
2. *synchondrosis petrooccipitalis*



# Chondrocranium

- **prechordální** chondrocranium  
z neurální lišty
- **chordální** chondrocranium  
z nesegmentovaného  
paraaxiálního mezodermu
- **partes laterales** ossis  
occipitalis  
z týlních somitů





— sensory fibres  
— motor fibres

**Optic (II)**  
**sensory:** eye



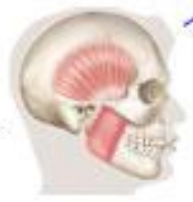
**Trochlear (IV)**  
**motor:** superior oblique muscle

**Abducent (VI)**  
**motor:** external rectus muscle



**Trigeminal (V)**  
**sensory:** face, sinuses, teeth, etc.  
**motor:** muscles of mastication

**Oculomotor (III)**  
**motor:** all eye muscles except those supplied by IV and VI



**Olfactory (I)**  
**sensory:** nose



**Intermediate motor:** submaxillary and sublingual gland  
**sensory:** anterior part of tongue and soft palate



**Glossopharyngeal (IX)**  
**motor:** pharyngeal musculature  
**sensory:** posterior part of tongue, tonsil, pharynx



**Vestibulocochlear (VIII)**  
**sensory:** inner ear



**Vagus (X)**  
**motor:** heart, lungs, bronchi, gastrointestinal tract  
**sensory:** heart, lungs, bronchi, trachea, larynx, pharynx, gastrointestinal tract, external ear



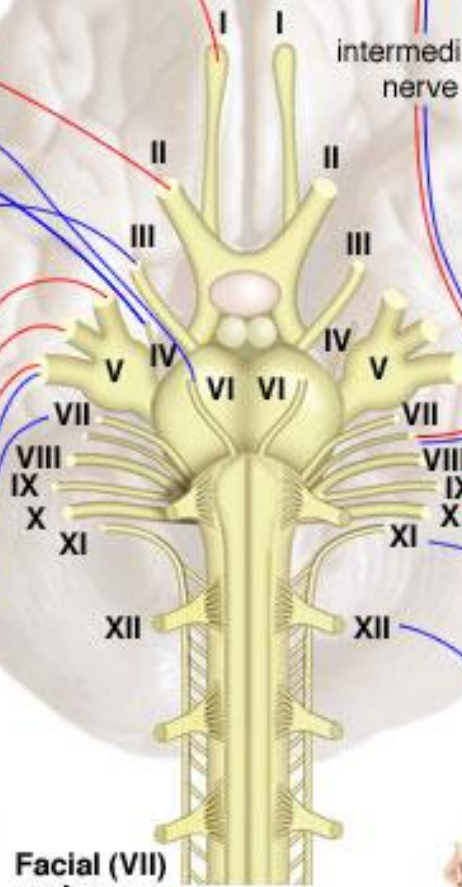
**Accessory (XI)**  
**motor:** sternocleidomastoid and trapezius muscles



**Hypoglossal (XII)**  
**motor:** muscles of the tongue



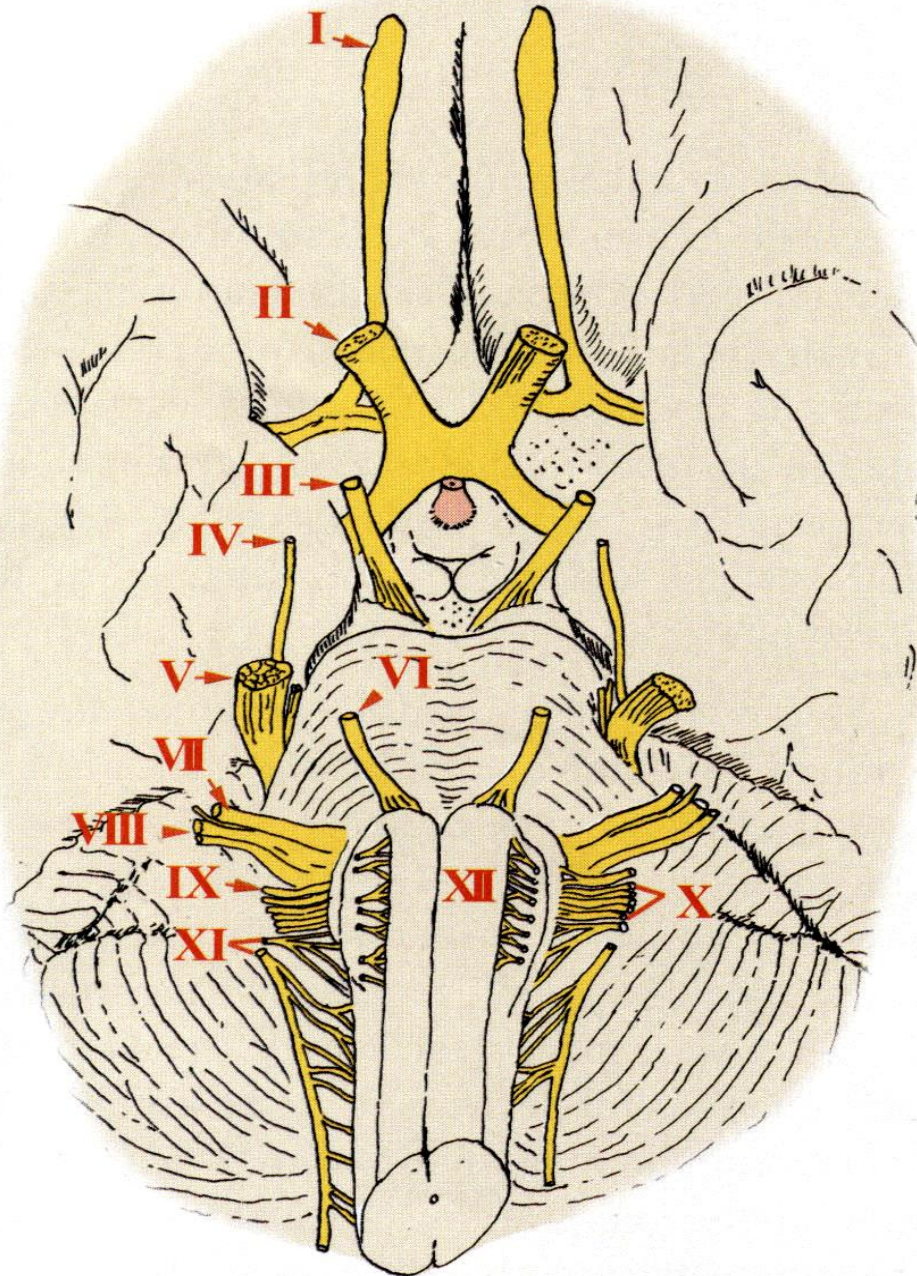
**Facial (VII)**  
**motor:** muscles of the face



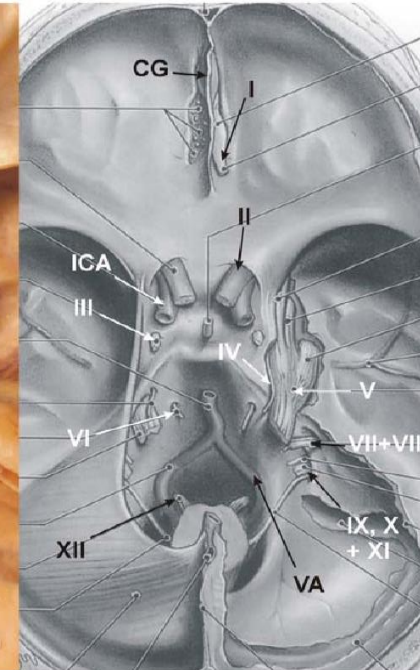
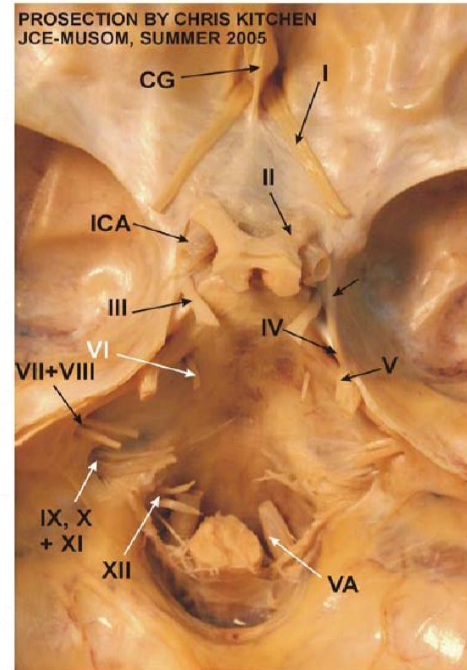
# Hlavové nervy (*Nervi craniales*)

Číslo	Latinský název	Český název
I	N. olfactorius	Čichový nerv
II	N. opticus	Zrakový nerv
III	N. oculomotorius	Okohybný nerv
IV	N. trochlearis	Kladkový nerv
V	N. trigeminus	Trojklaný nerv
V1	N. ophthalmicus	Oční nerv
V2	N. maxillaris	Čelistní nerv
V3	N. mandibularis	Sáňový nerv
VI	N. abducens	Odtahovací nerv
VII	N. facialis	Lícní nerv
VIII	N. vestibulocochlearis	Sluchorovnovážný nerv
IX	N. glossopharyngeus	Jazykohltanový nerv
X	N. vagus	Bloudivý nerv
XI	N. accessorius	Přídavný nerv
XII	N. hypoglossus	Podjazykový nerv

# Výstupy z lebky



## CRANIAL NERVES IN CRANIAL CAVITY

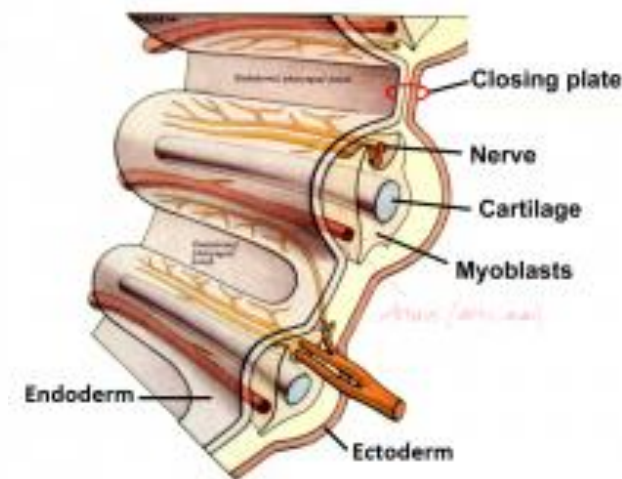
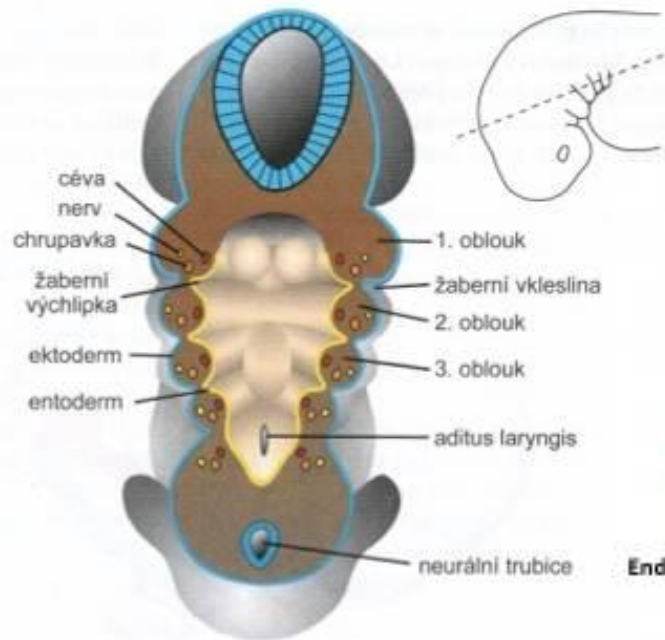
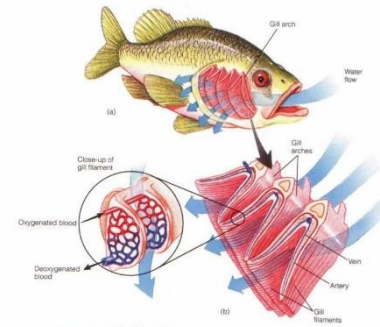


- I - Olfactory Tract
- IV - Trochlear Nerve (broken)
- VA - Vertebral Artery
- CG - Crista Galli
- VII - Facial Nerve
- VIII - Vestibulocochlear Nerve
- IX - Glossopharyngeal Nerve
- X - Vagus
- XI - Accessory Nerve
- XII - Hypoglossal Nerve

- ICA - Internal Carotid Artery
- II - Optic Nerve
- III - Oculomotor Nerve
- V - Trigeminal nerve
- VI - Abducens Nerve

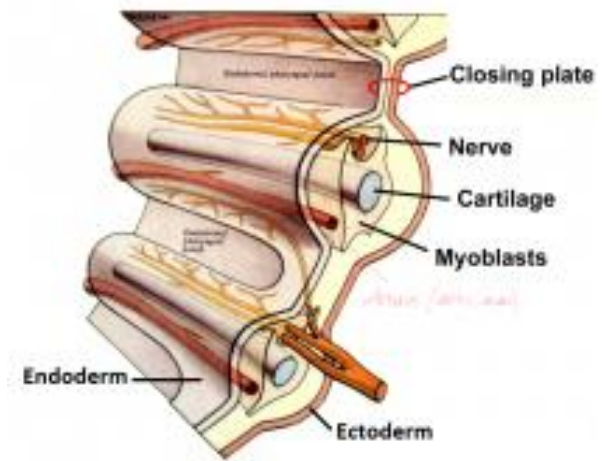
# Žaberní (faryngové) ústrojí

- žaberní (faryngové) **oblouky** (*arcus pharyngei*)
- žaberní (faryngové) **výchlipky** (*sacci pharyngei*)
- žaberní (faryngové) **vklesliny** (*sulci pharyngei*)
- žaberní (faryngové) **membrány** (*membranae pharyngeae*)



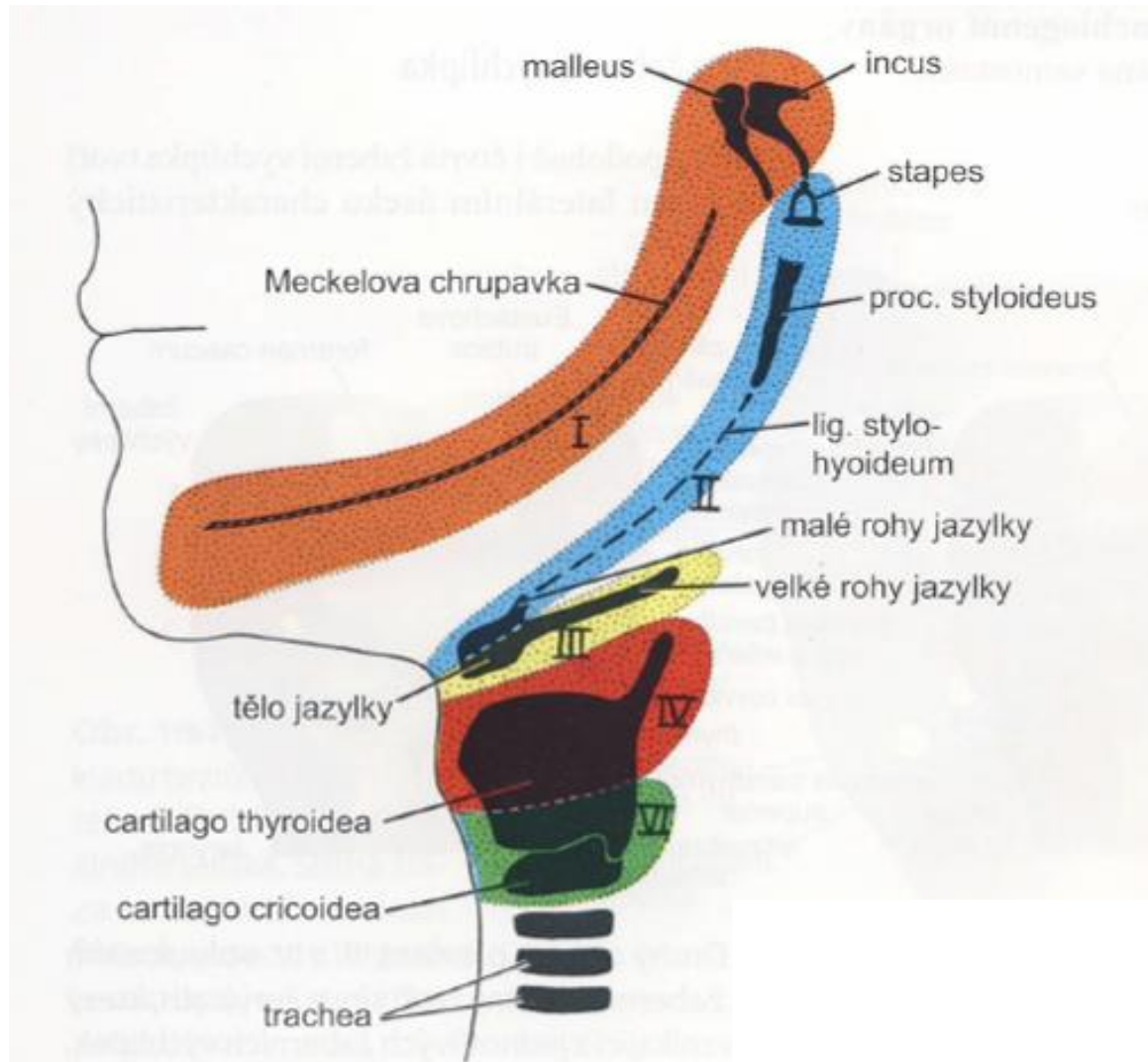


# Splanchnocranium



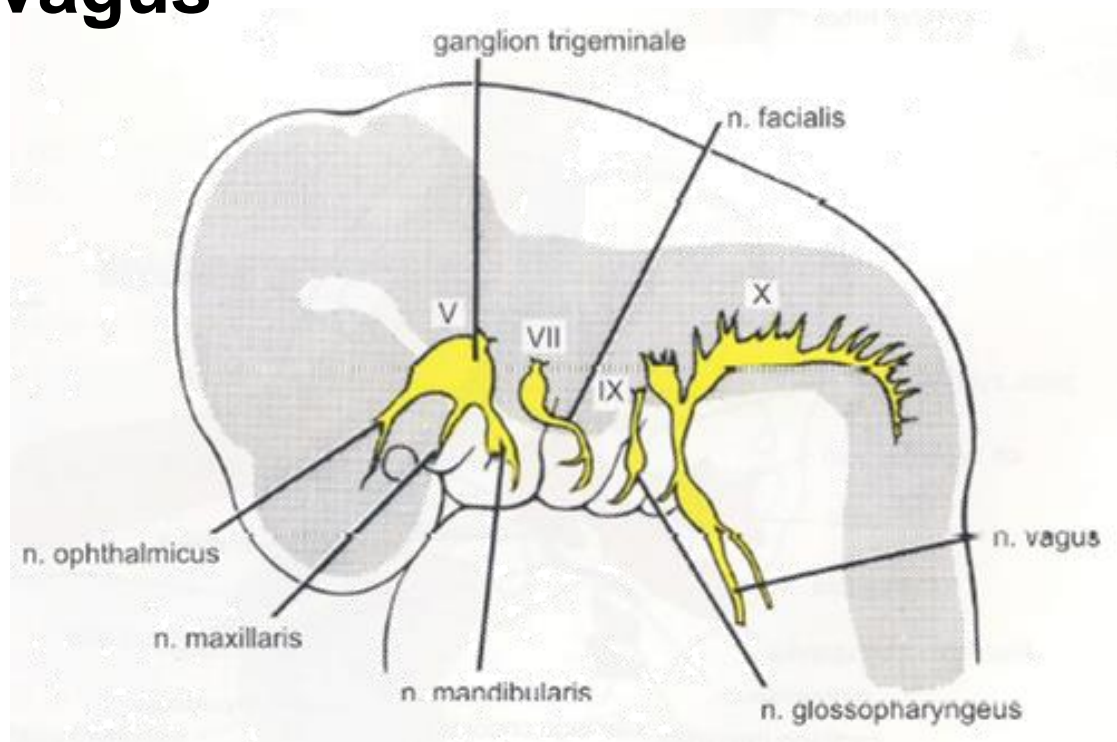
- **1. žaberní oblouk**
  - horní val (= **maxilární**)
    - os incisivum, maxilla, os zygomaticum, os palatinum, incus
  - dolní val (= **mandibulární**) – Meckelova chrupavka
    - dezmogenní osifikací mandibula, malleus
- **2. žaberní oblouk (= jazykový)**
  - stapes, processus styloideus, os hyoideum (část těla a malé rohy), lig. stylohyoideum
- **3. žaberní oblouk**
  - os hyoideum (část těla a velké rohy)

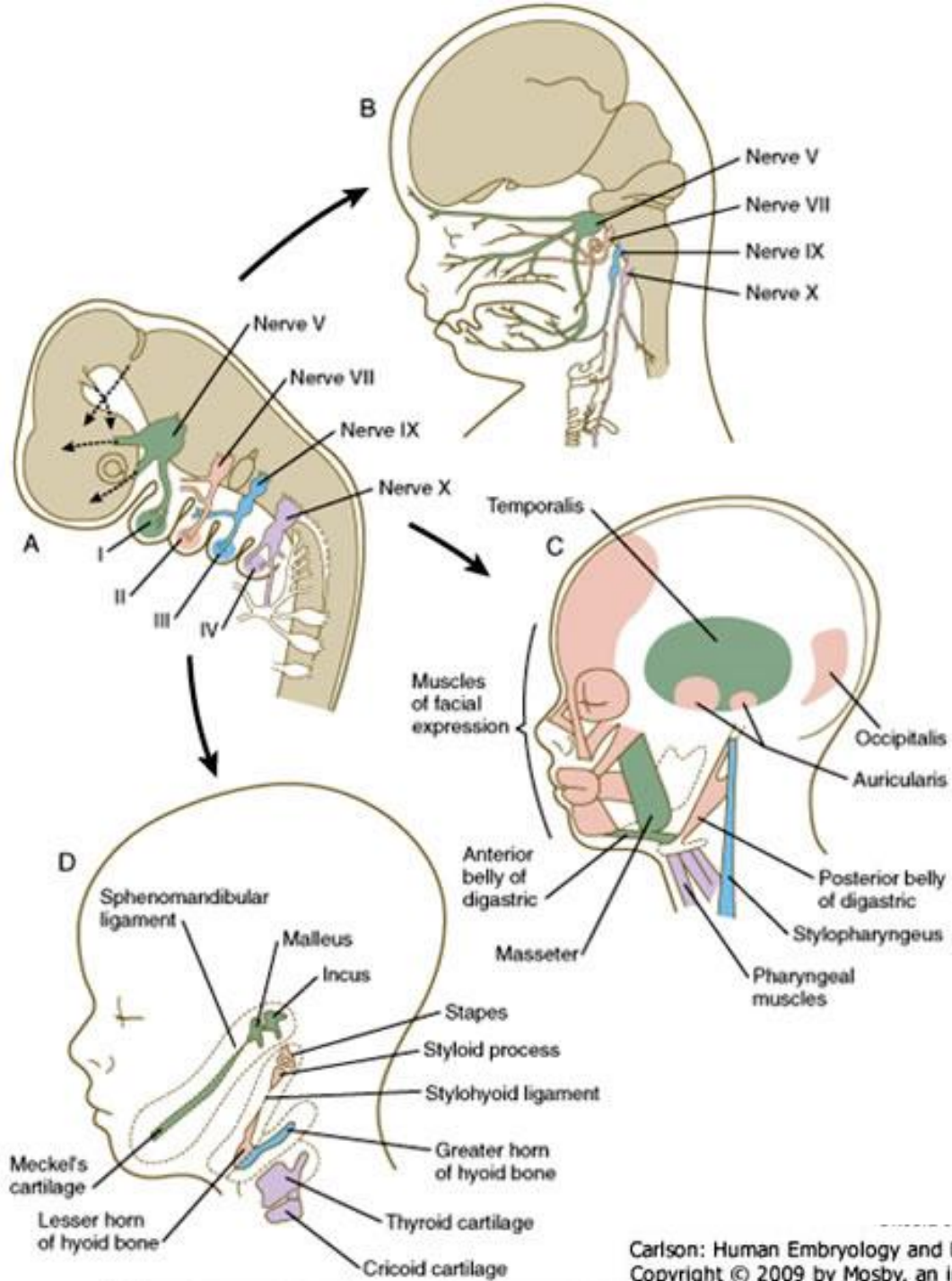
# Konečné struktury z chrupavek žaberních oblouků



# Žaberní oblouky – inervace

1. oblouk – **n. trigeminus**
2. oblouk – **n. facialis**
3. oblouk – **n. glossopharyngeus**
4. a 6. oblouk – **n. vagus**

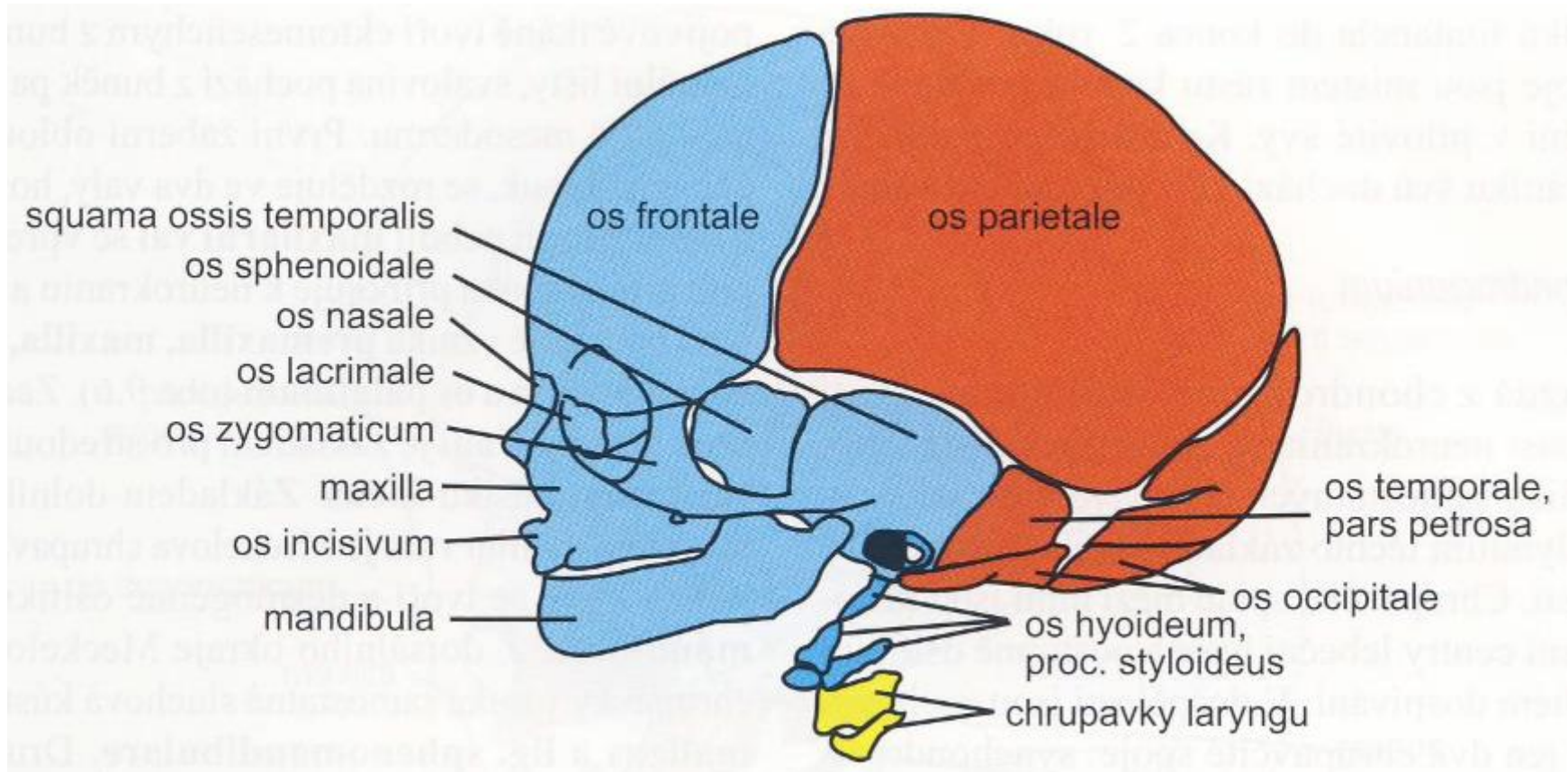




# Kosti lebky – vývojový původ

- paraaxiální mezoderm – nesegmentovaný
- neurální lišta (ventrokaudální část, ektomezenchym)
- ektodermové plakody
  - čichová (*capsula ethmoidalis*)
  - sluchová (*capsula otica*)
  - zraková (*capsula optica*) → čočka
- žaberní oblouky (1.–3.)
  - sluchové kůstky, čelisti, proc. styloideus
- týlní segmenty
  - pars basilaris + pars lateralis ossis occipitalis

# Kosti lebky podle původu



**červeně** – nesegmentovaný paraaxiální mezoderm

**modře** – ektomezenchym (buňky neurální lišty)

**tmavá modrá a žlutá** – deriváty žaberních oblouků (rovněž ektomezenchym (buňky neurální lišty))

# Kosti lebky podle osifikace

chrupavčité

neurocranium  
(chondrocranium)

vazivové

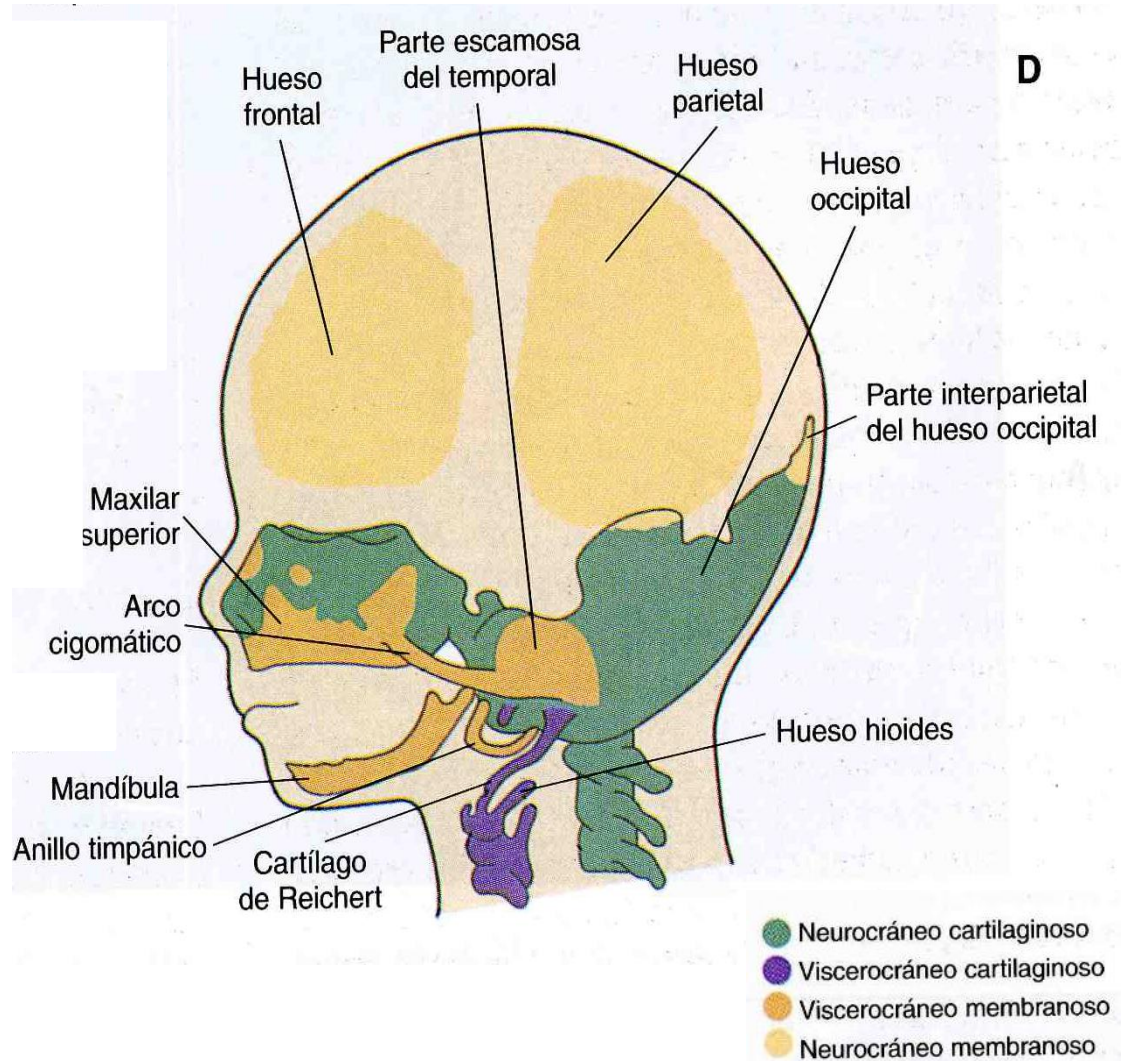
neurocranium  
(desmocranium)

vazivové

viscerocranium

chrupavčité

viscerocranium



# Vývojový růst lebky



14

20

30

32

34

38

týdnů



# Poruchy vývoje lebky

- **cranioschisis** – neuzavření neuroporus anterior, nevytvoření kostí lebeční klenby → anencefalie
- **meningocoele (meningokéla) / meningoencefalokéla** – malé defekty lebky, výhřez mozkových plen / mozku
- **craniosynostosis** – předčasný uzávěr švů
  - sutura sagittalis – scaphocephalia (lodčkovitá lebka)
  - sutura coronalis – acrocephalia (věžovitá lebka)
  - sutura coronalis + sutura lambdoidea – brachycephalia (krátká lebka)
- **trpaslictví (nanismus) – 1:26 000**
  - achondroplasia – porucha růstu dlouhých kostí, hypoplázie obličeje, krátké prsty, výrazné zakřivení páteře
  - hypochondroplasia – mírnější forma
- **microcephalia** – mozek i lebka přestanou růst → mentální retardace

# Anencephalia



# Meningocele



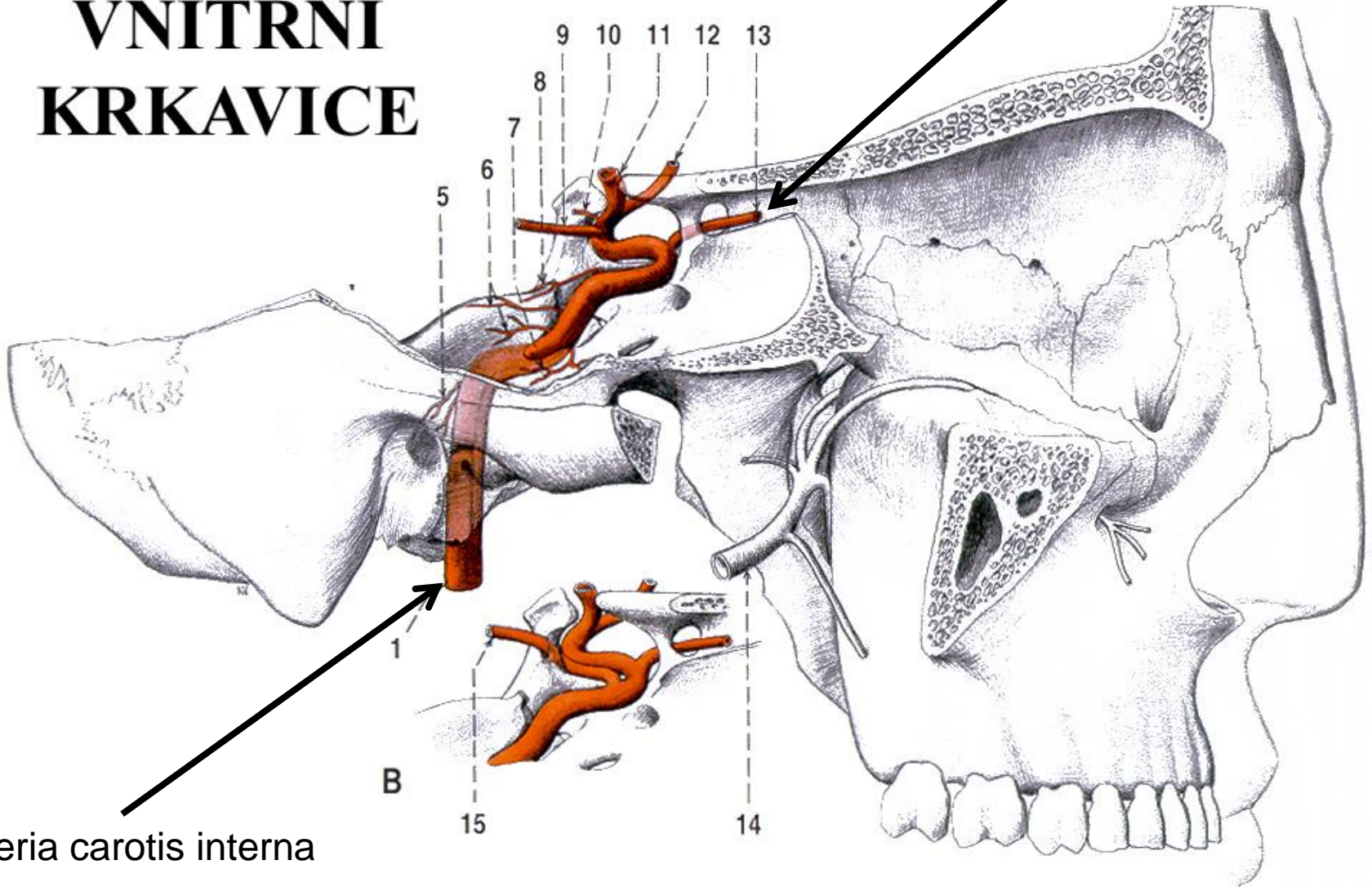
# Meningoencephalocele

# Tepny hlavy

## arteria carotis interna

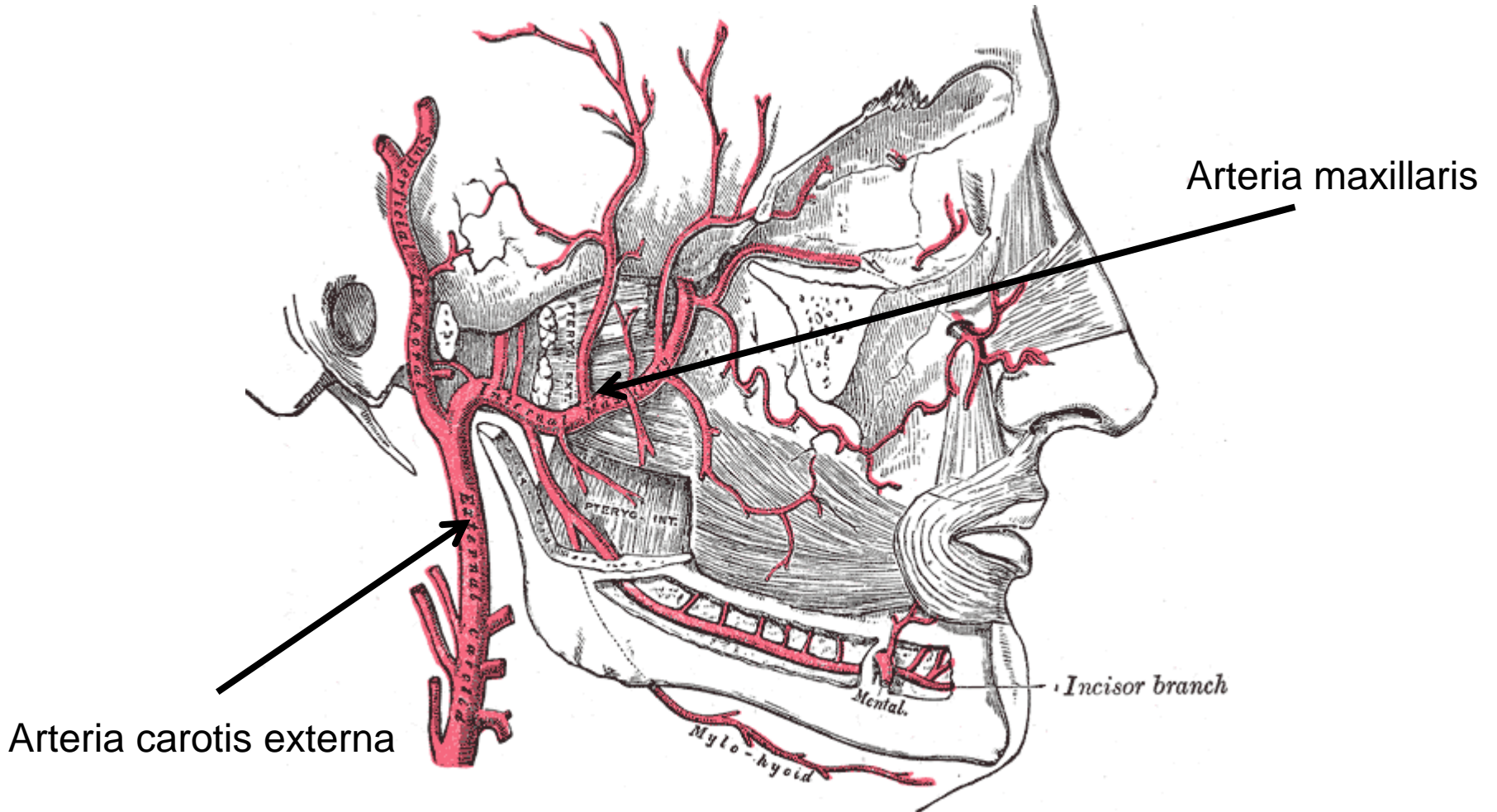
**VNITŘNÍ  
KRKAVICE**

Arteria ophthalmica

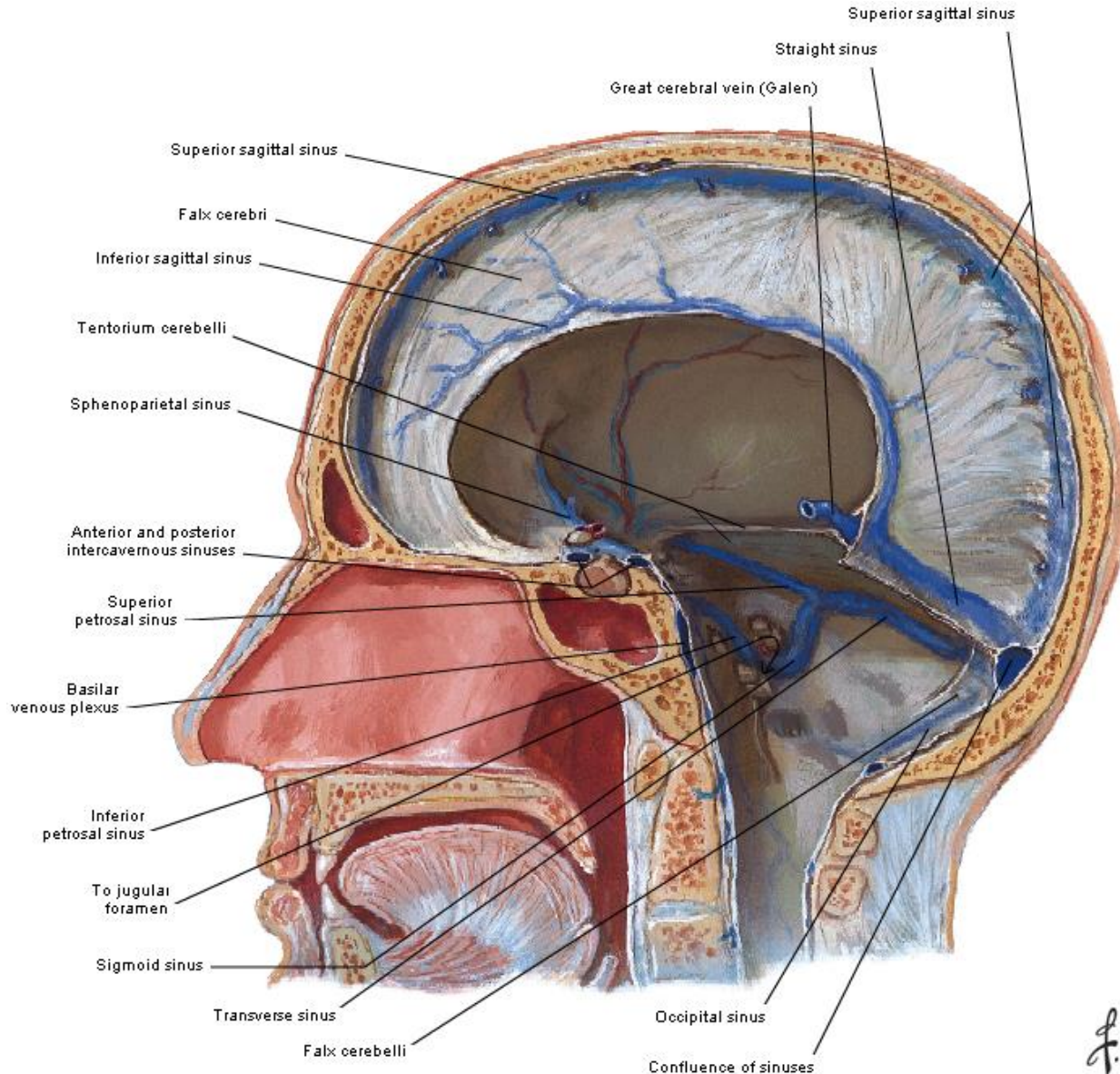


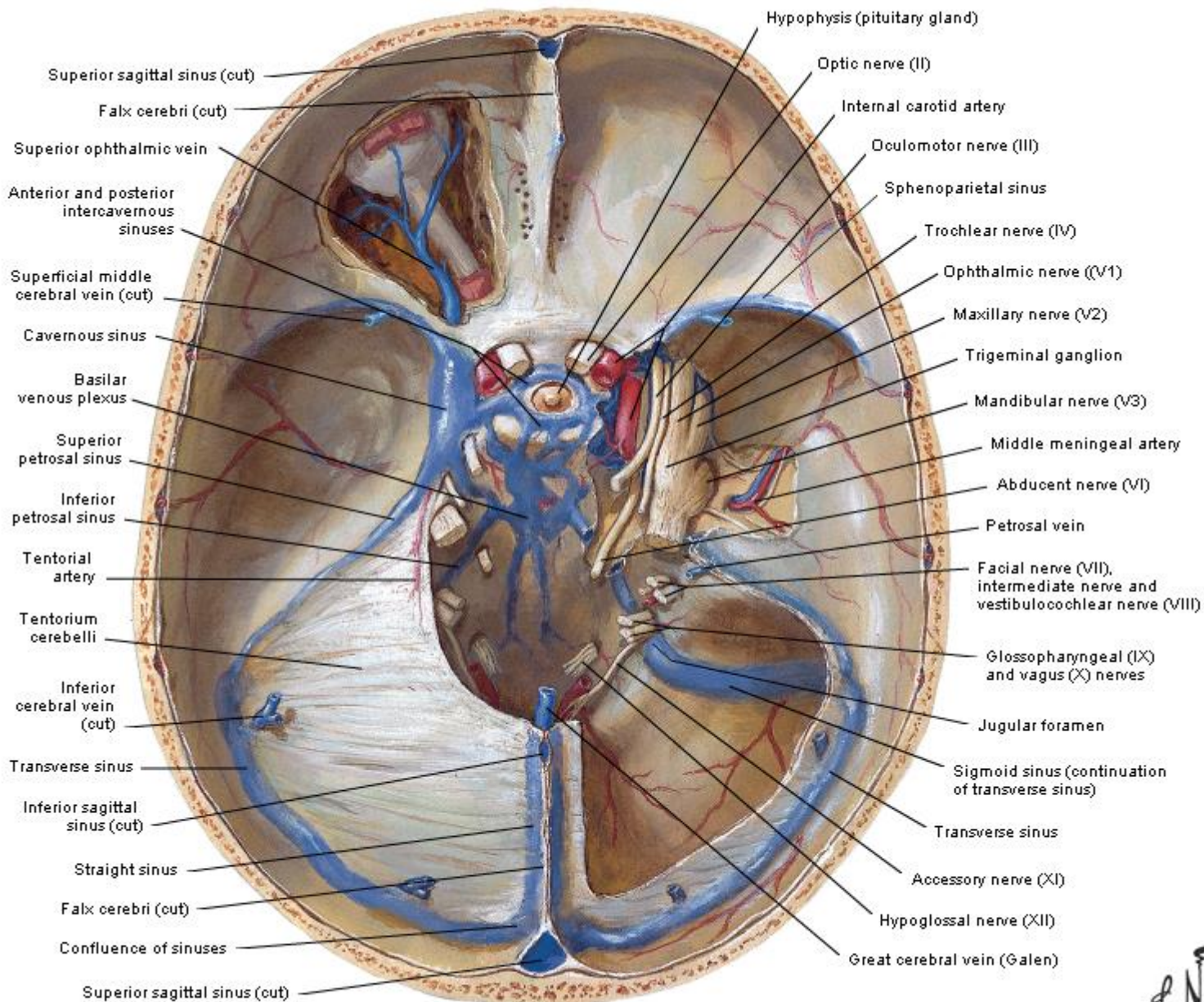
Arteria carotis interna

# Tepny hlavy arteria maxillaris

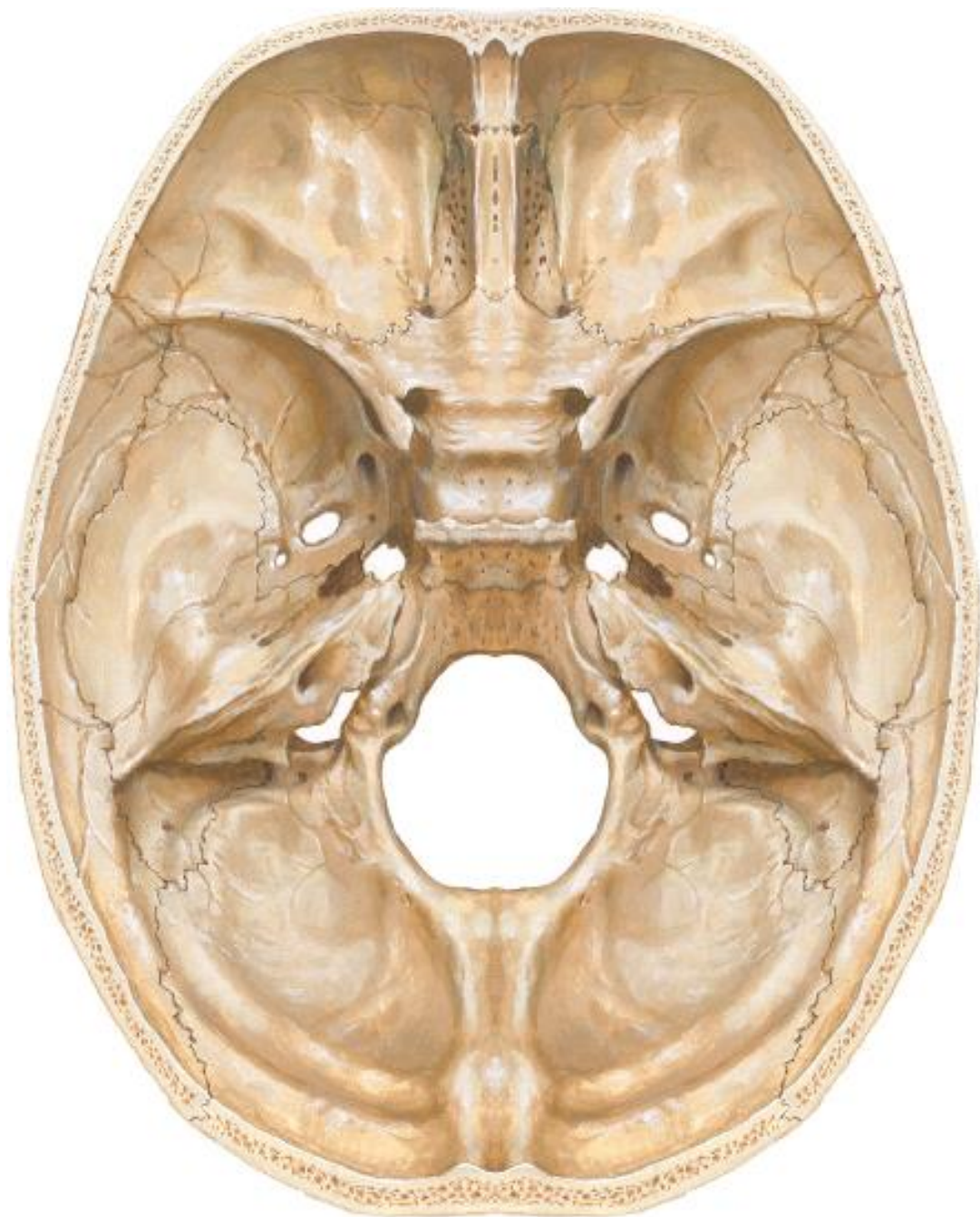


# Žilní splavy (sinus durae matris)

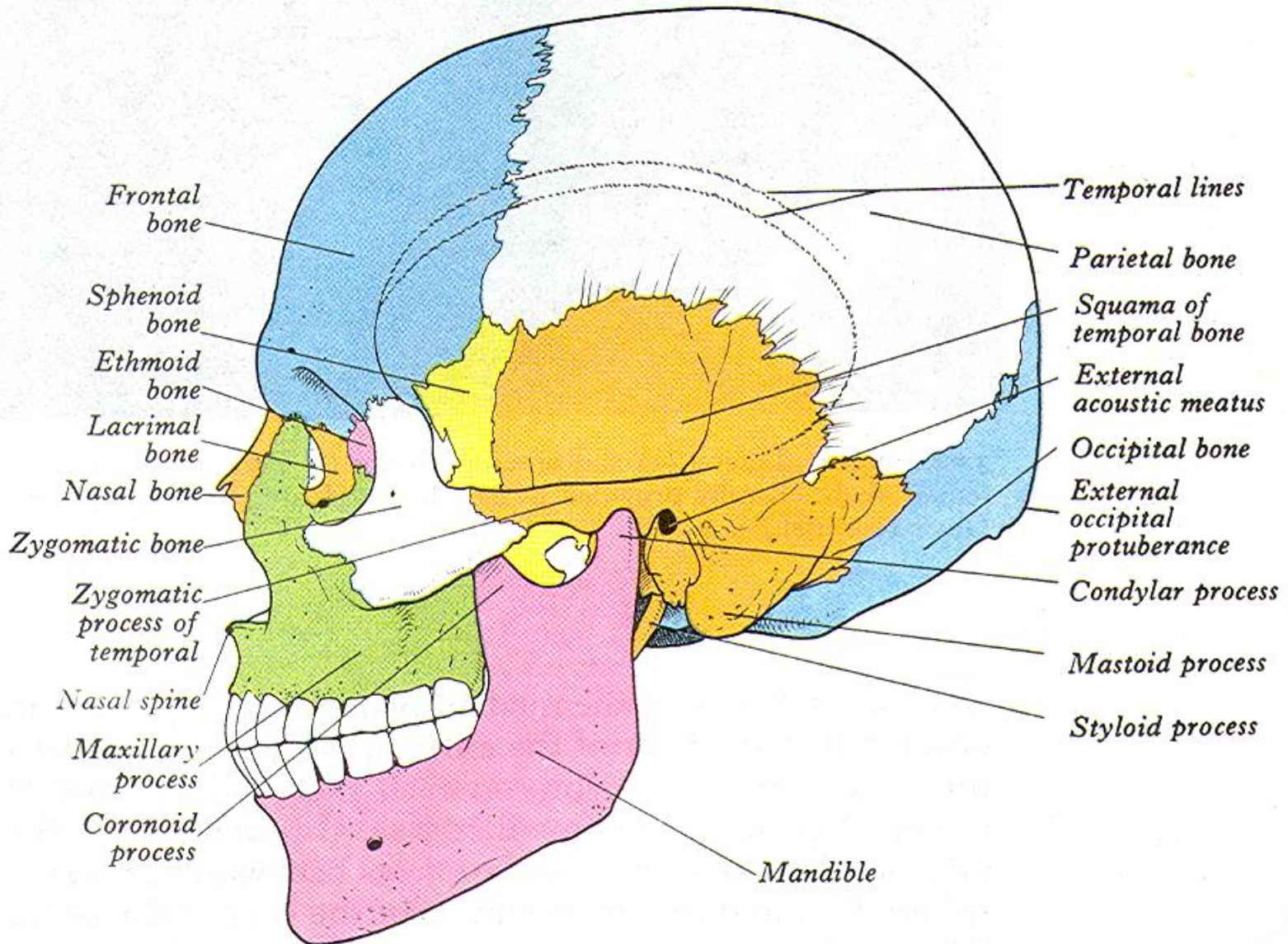




*F. Netter M.D.*  
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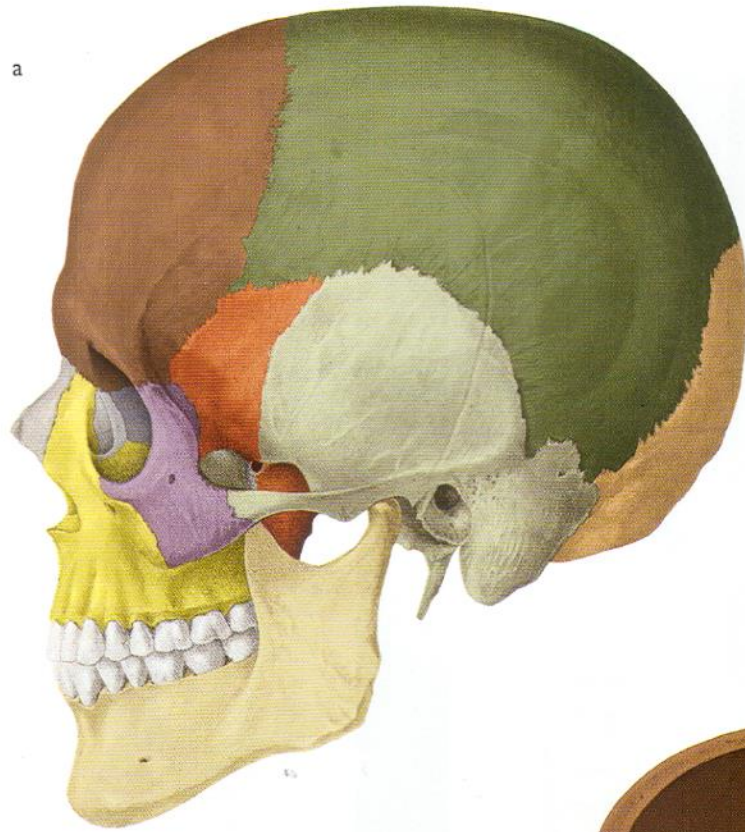
# Norma lateralis





a

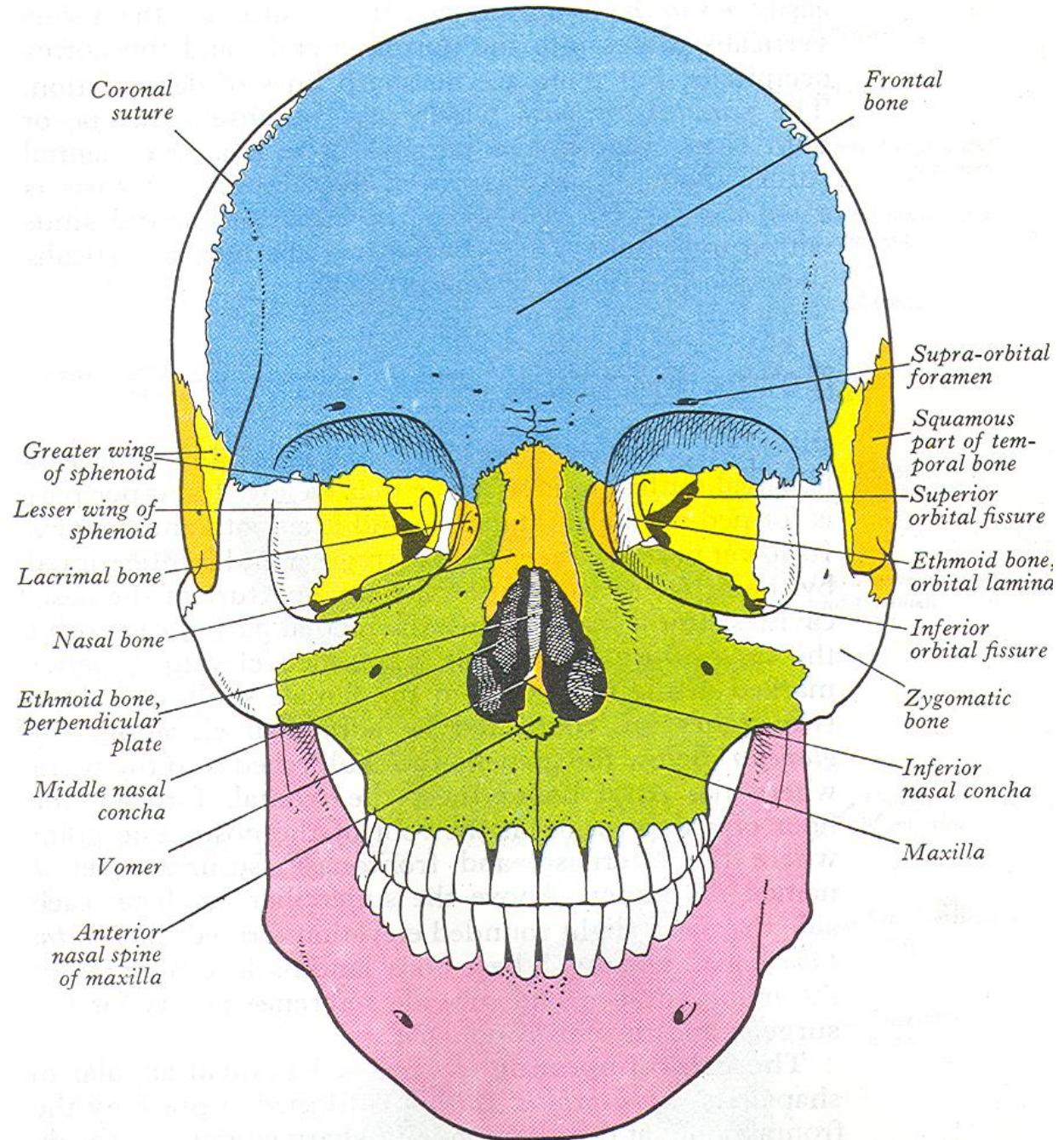
# Norma lateralis



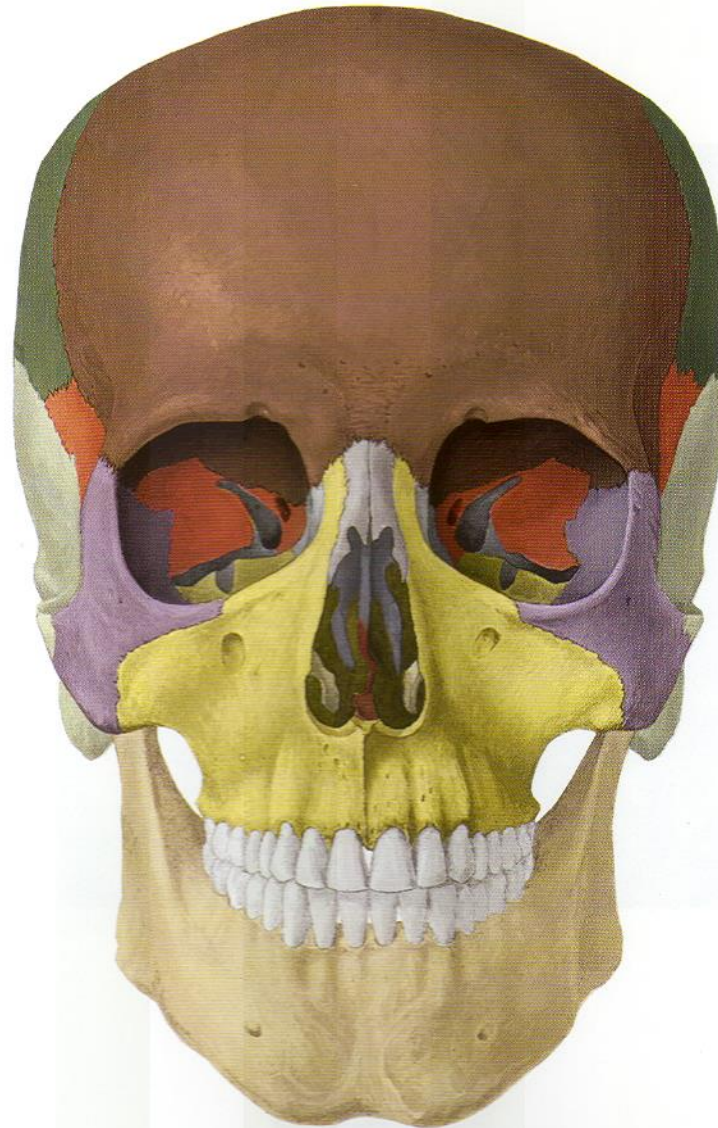
- Os frontale
- Os parietale
- Os sphenoidale
- Os occipitale
- Os temporale
- Os nasale
- Os lacrimale
- Os ethmoidale
- Os zygomaticum
- Maxilla
- Mandibula
- Os palatinum
- Vomer



# Norma facialis



# Norma facialis

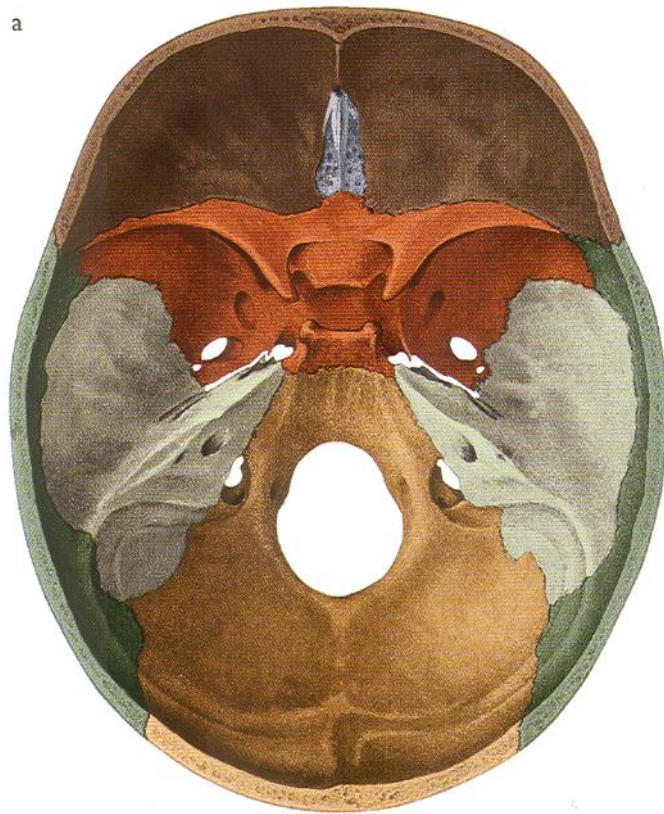


Os frontale  
Os parietale  
Os sphenoidale  
Os temporale

Os nasale  
Os lacrimale  
Os ethmoidale  
Os zygomaticum

Maxilla  
Concha nasalis inferior  
Mandibula  
Vomer

a

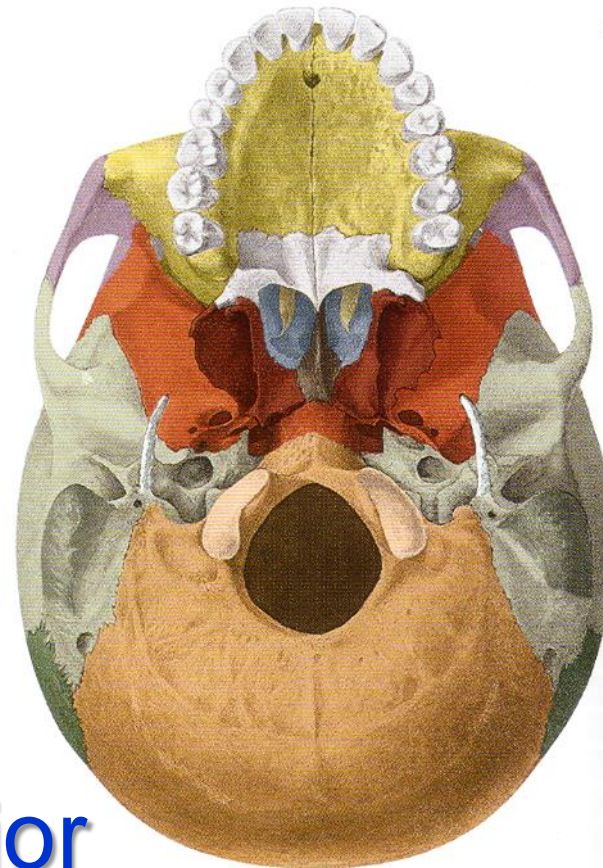


# Vnitřní lebeční spodina Basis cranii interna

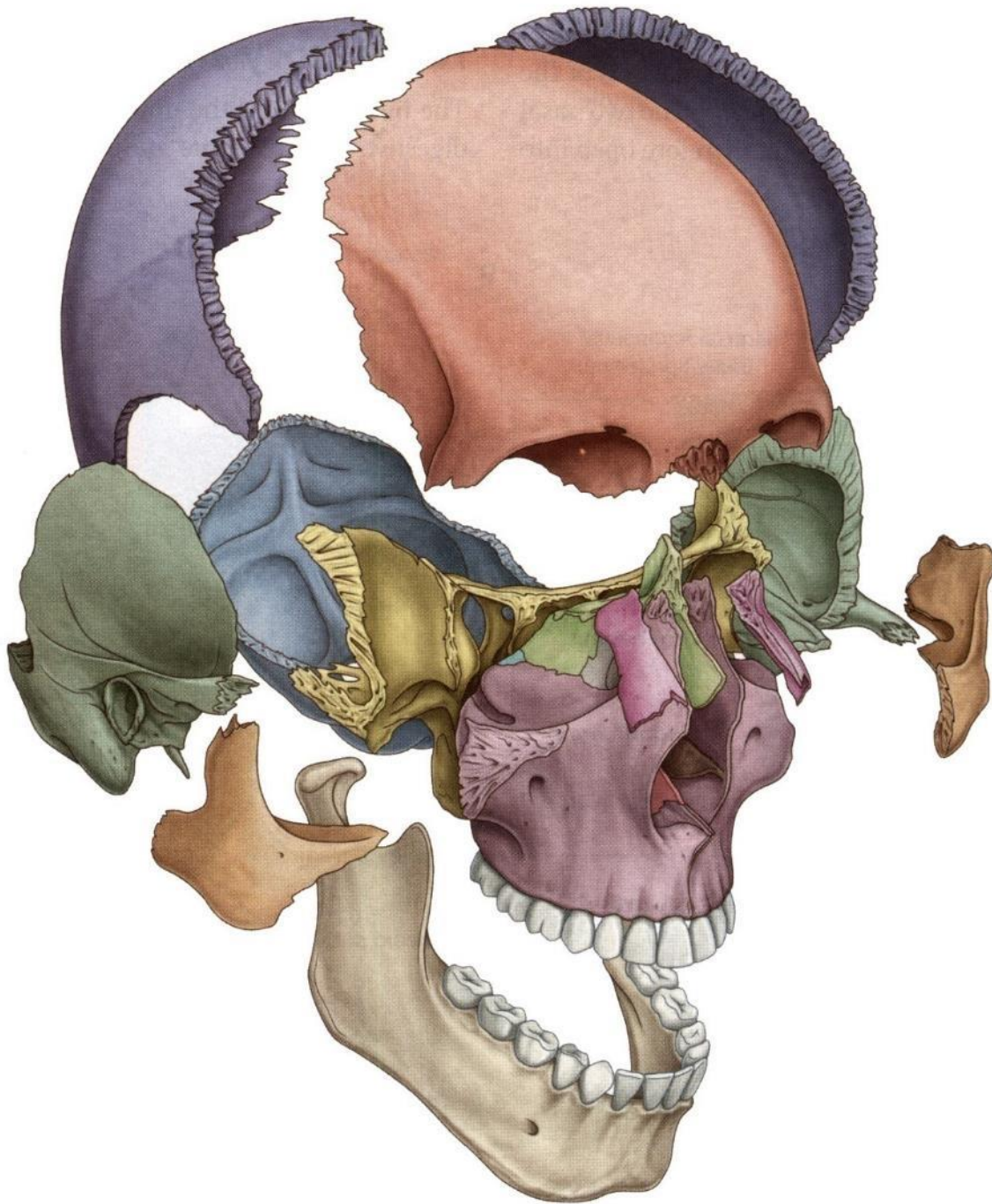
- Os frontale
- Os parietale
- Os sphenoidale
- Os occipitale
- Os temporale
- Os ethmoidale
- Os zygomaticum
- Maxilla
- Os palatinum
- Vomer

**Basis  
cranii  
externa =  
norma inferior**

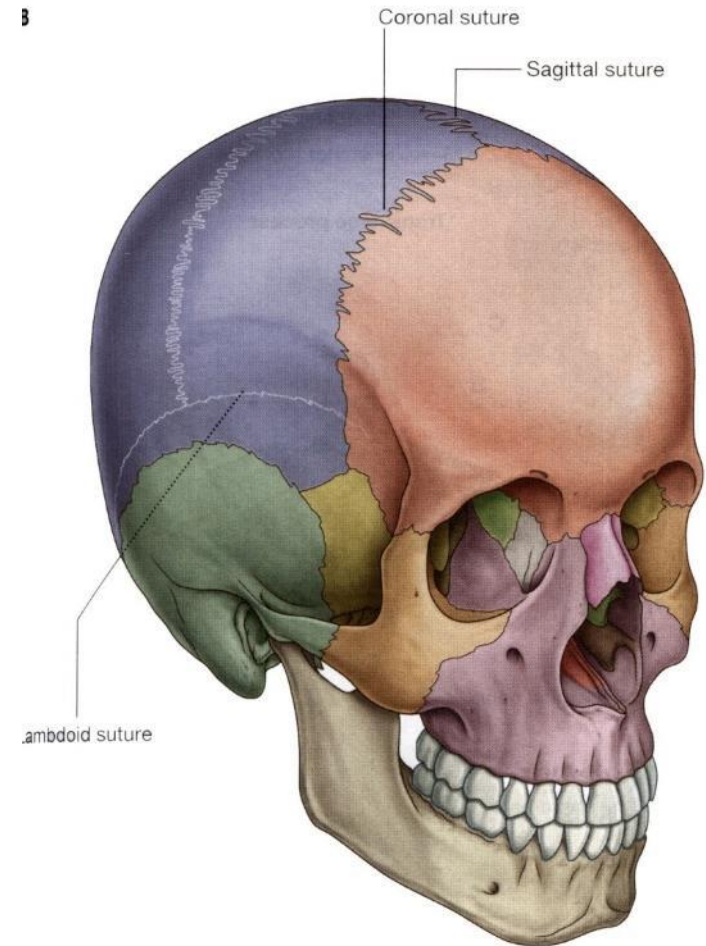
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# Jednotlivé kosti lebky



3



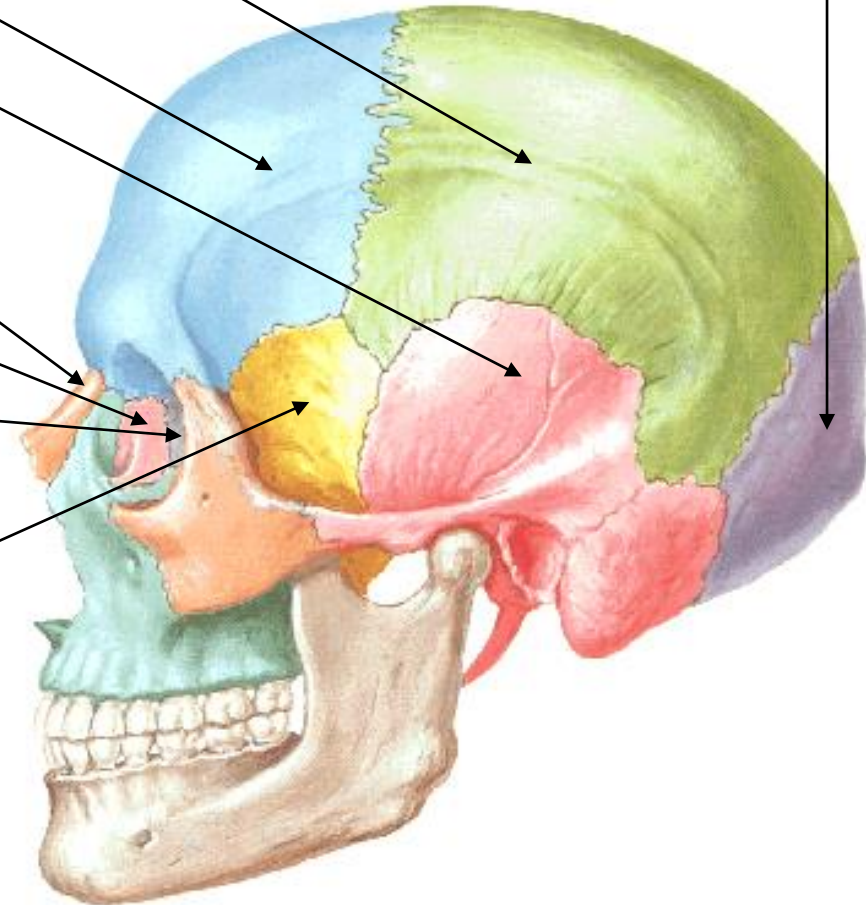
# Jednotlivé kosti lebky

## CRANIUM

neurocranium		viscerocranium
<i>desmocranium</i> (z vaziva) <i>kosti lebeční klenby</i>	<i>chondrocranium</i> (z chrupavky) <i>kosti lebeční spodiny</i>	(z žaberních oblouků)
squama ossis occipitalis	pars basilaris et lateralis ossis occipitalis	mandibula
os parietale	os sphenoidale	maxilla
squama ossis temporalis	os temporale (ne šupina a bodcovitý výběžek)	proc. styloideus ossis temporalis
os frontale	os ethmoidale	os zygomaticum
os nasale	concha nasalis inferior	os palatinum
os lacrimale	vomer	os hyoideum
os tympanicum		ossicula auditus

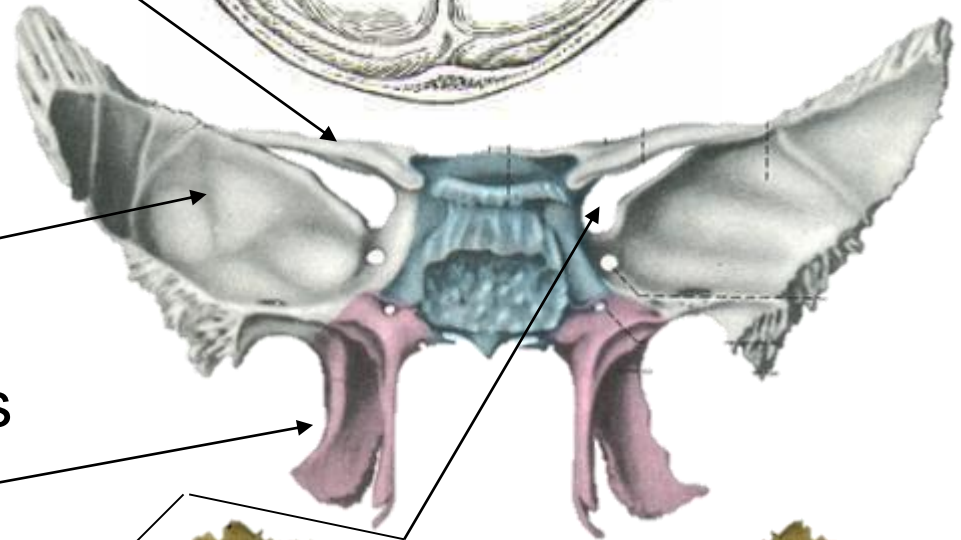
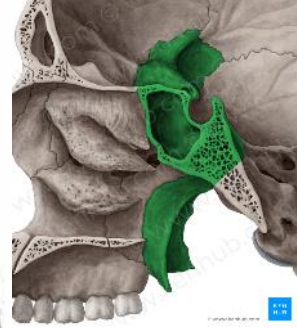
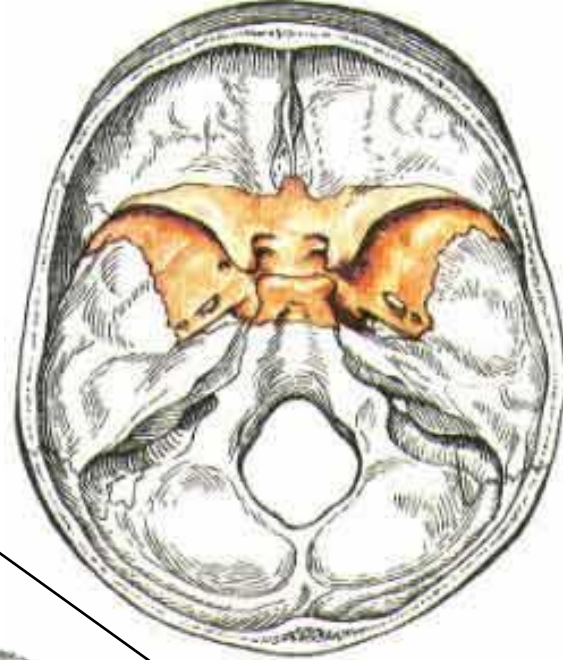
# Neurocranium

- os occipitale (týlní kost)
- os parietale (temenní kost)
- os frontale (čelní kost)
- os temporale (spánková kost)
- os nasale (nosní kost)
- os lacrimale (slzní kost)
- os ethmoidale (čichová kost)
- os sphenoidale (klínová kost)
- vomer (radličná kost)
- concha nasalis inferior (dolní nosní skořepa)



# Os sphenoidale (Klínová kost)

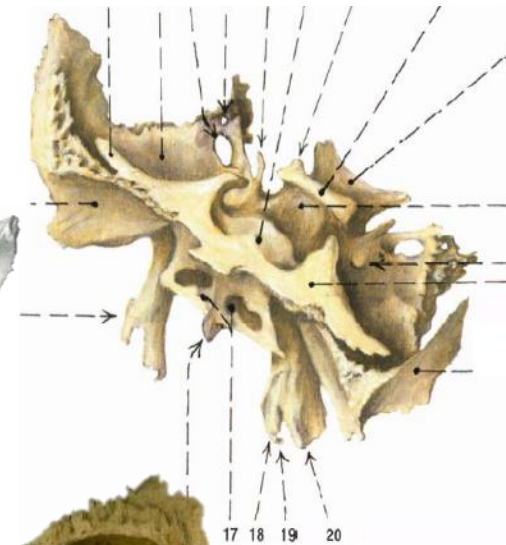
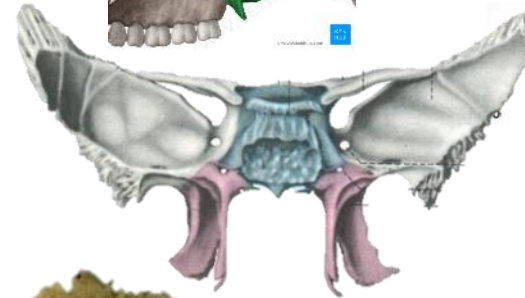
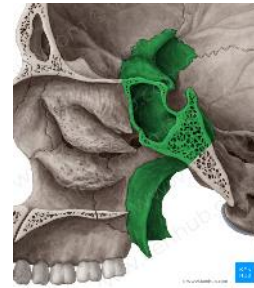
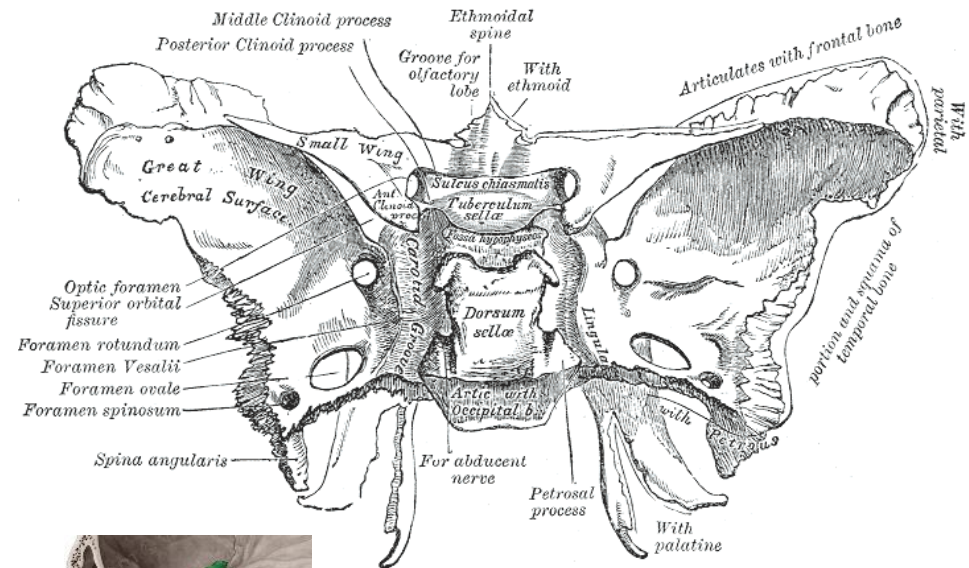
- corpus
  - sinus sphenoidalis (párový)
  - sella turcica
- ala minor
- ala major
  - facies cerebralis, orbitalis, temporalis, infratemporalis, maxillaris
- processus pterygoideus
  - lamina medialis et lateralis
- fissura orbitalis superior

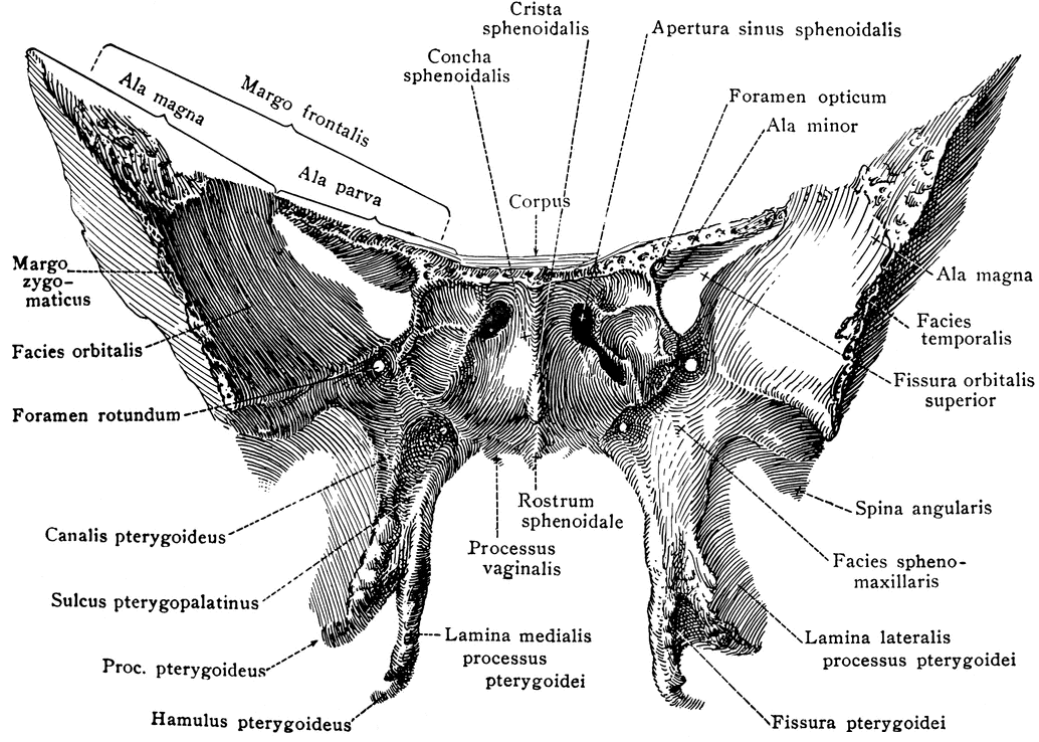




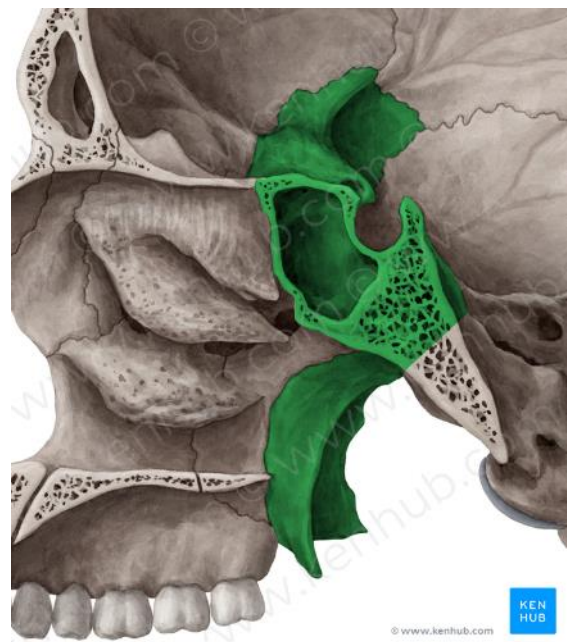
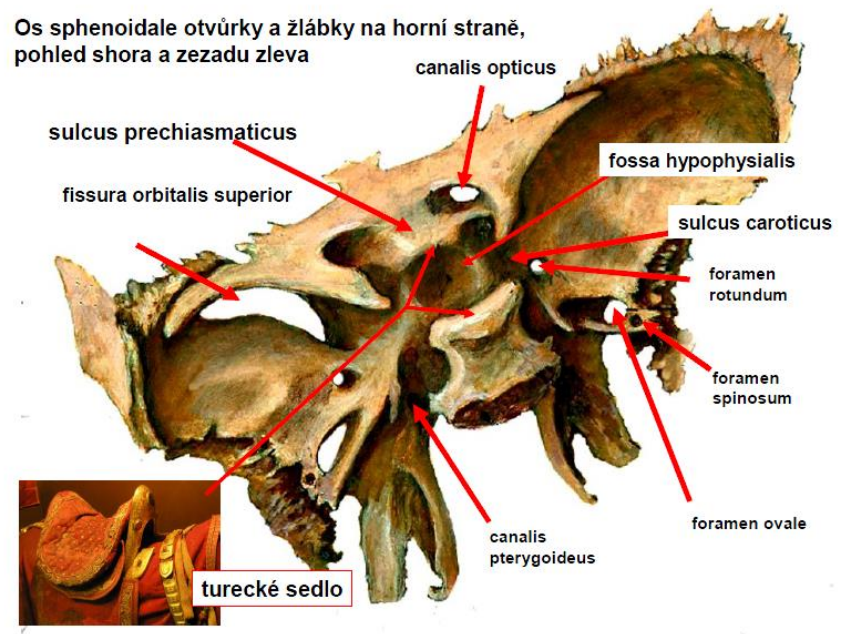
# Os sphenoidale Corpus

<b>Corpus</b>
(Jugum sphenoidale / Jho klínové kosti)
(Limbus sphenoidalis)
(Sulcus chiasmaticus / Zkřížeňová rýha)
<b>Sella turcica / Turecké sedlo</b>
(Tuberculum sellae)
<b>Fossa hypophysialis / Podvěšková jma</b>
<b>Dorsum sellae</b>
<b>Processus clinoides posterior (et medius)</b>
<b>Sulcus caroticus / Krkavcová rýha</b>
Lingula sphenoidalis / Jazyček klínové kosti
(Crista sphenoidalis)
Rostrum sphenoidale / Zobák klínové kosti
<b>Sinus sphenoidalis / Dutina klínové kosti</b>
<b>Septum sinuum sphenoidalum</b>
<b>Apertura sinus sphenoidalis</b>
Concha sphenoidalis / Skořepa klínové kosti





Os sphenoidale otvůrky a žláby na horní straně, pohled shora a zezadu zleva



# Os sphenoidale

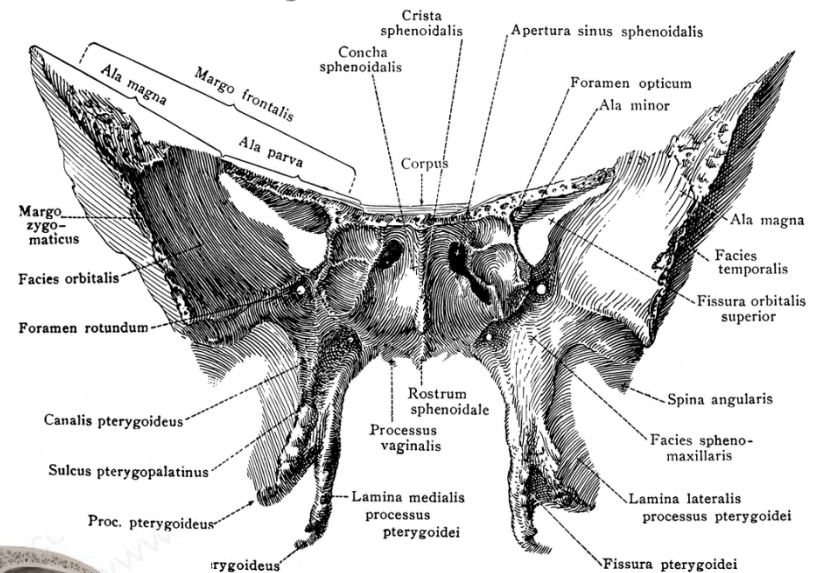
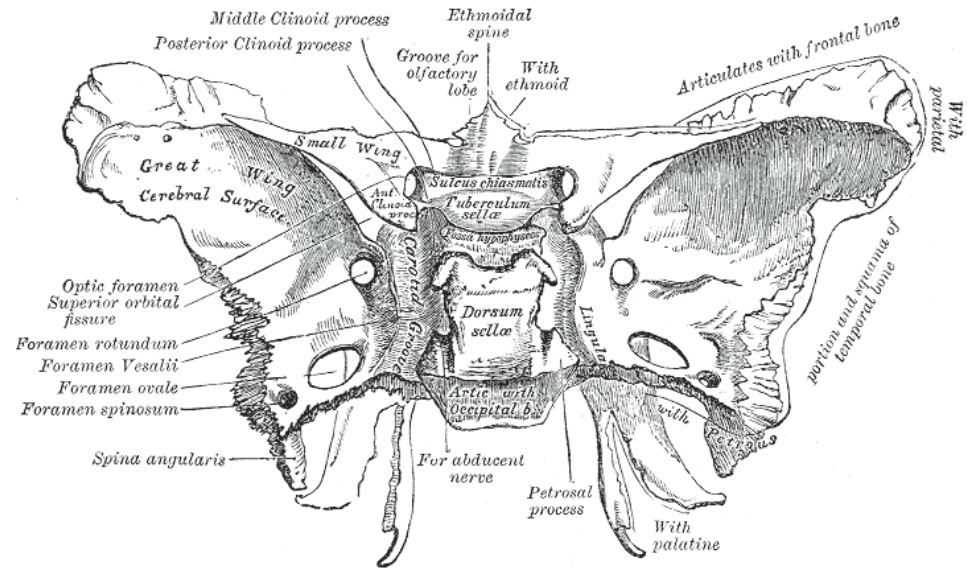
## Ala minor

**Ala minor / Malé křídlo**

**Canalis opticus / Zrakový kanál**

**Processus clinoides anterior**

**Fissura orbitalis superior / Horní očnívá štěrbina**



# Os sphenoidale

## Ala major

### *Plochy*

**Facies cerebralis** / Mozková plocha

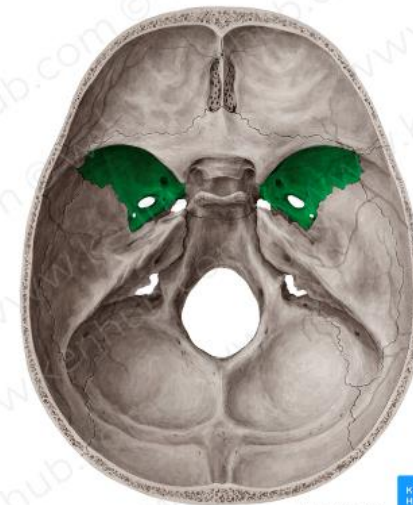
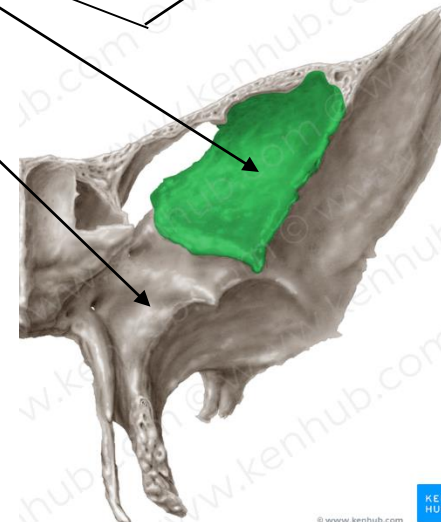
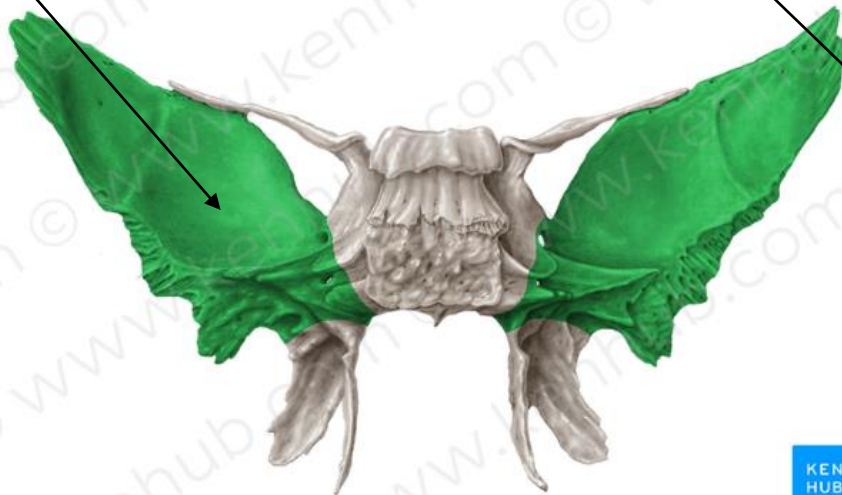
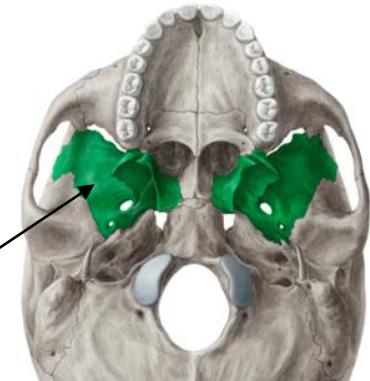
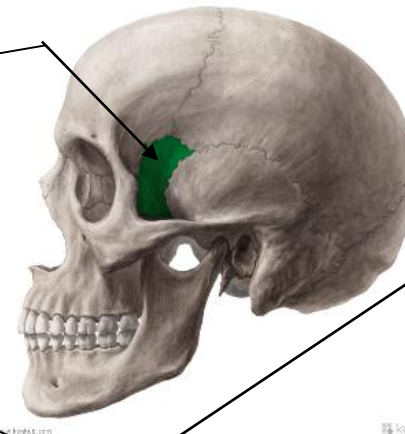
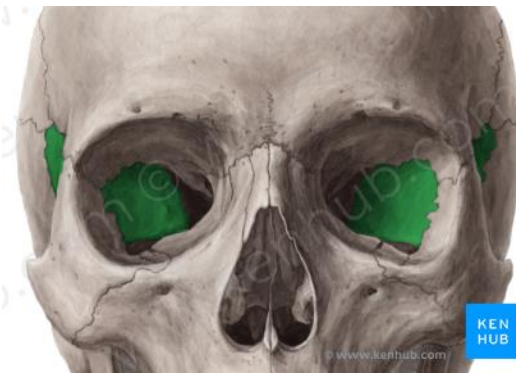
**Facies temporalis** / Spánková plocha

**Crista infratemporalis** / Podspánková hrana

**Facies infratemporalis** / Podspánková plocha

**Facies orbitalis** / Očnicová plocha

**Facies maxillaris** / Čelistní plocha



# Os sphenoidale

## Ala major

**Ala major / Velké křídlo**

**Facies cerebrialis, temporalis, infratemporalis, /** Mozková, spánková, podspánková plocha

**Crista infratemporalis**

**Facies maxillaris, orbitalis /** Čelistní, oční plocha

(Margo zygomaticus, frontalis, parietalis, squamosus)

**Foramen rotundum /** Kruhový otvor

**Foramen ovale /** Oválný otvor

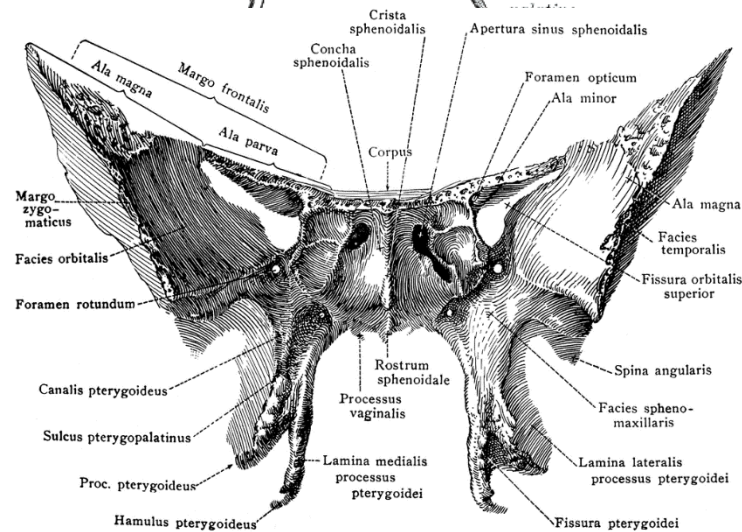
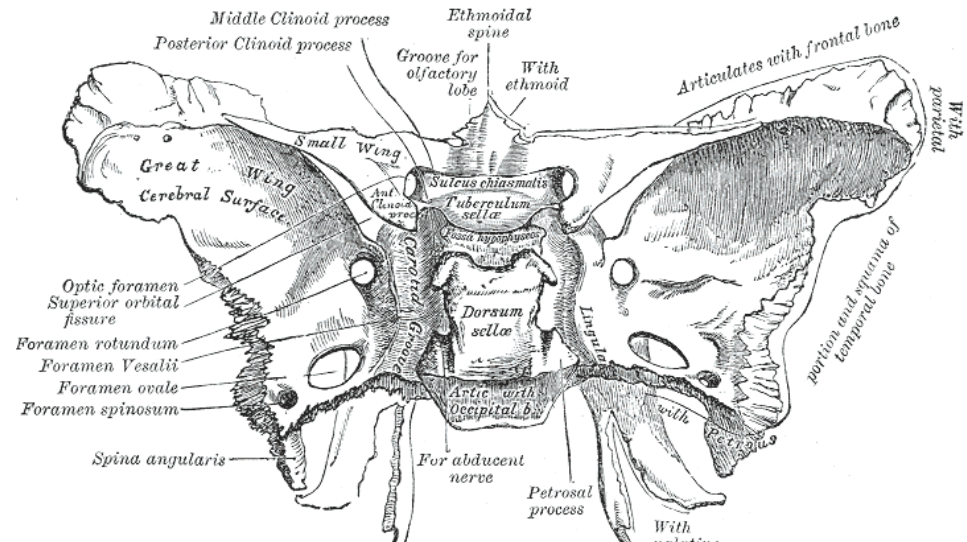
**Foramen spinosum /** Trnový otvor

**Spina ossis sphenoidalis /** Trn klínové kosti

**Foramen venosum Vesalii -** varabilní

**Foramen petrosus Arnoldi (dříve Canaliculus innominatus Arnoldi) -** variabilní

(Sulcus tubae auditivae / Rýha sluchové trubice)





**FORAMEN ROTUNDUM**

**FORAMEN OVALE**

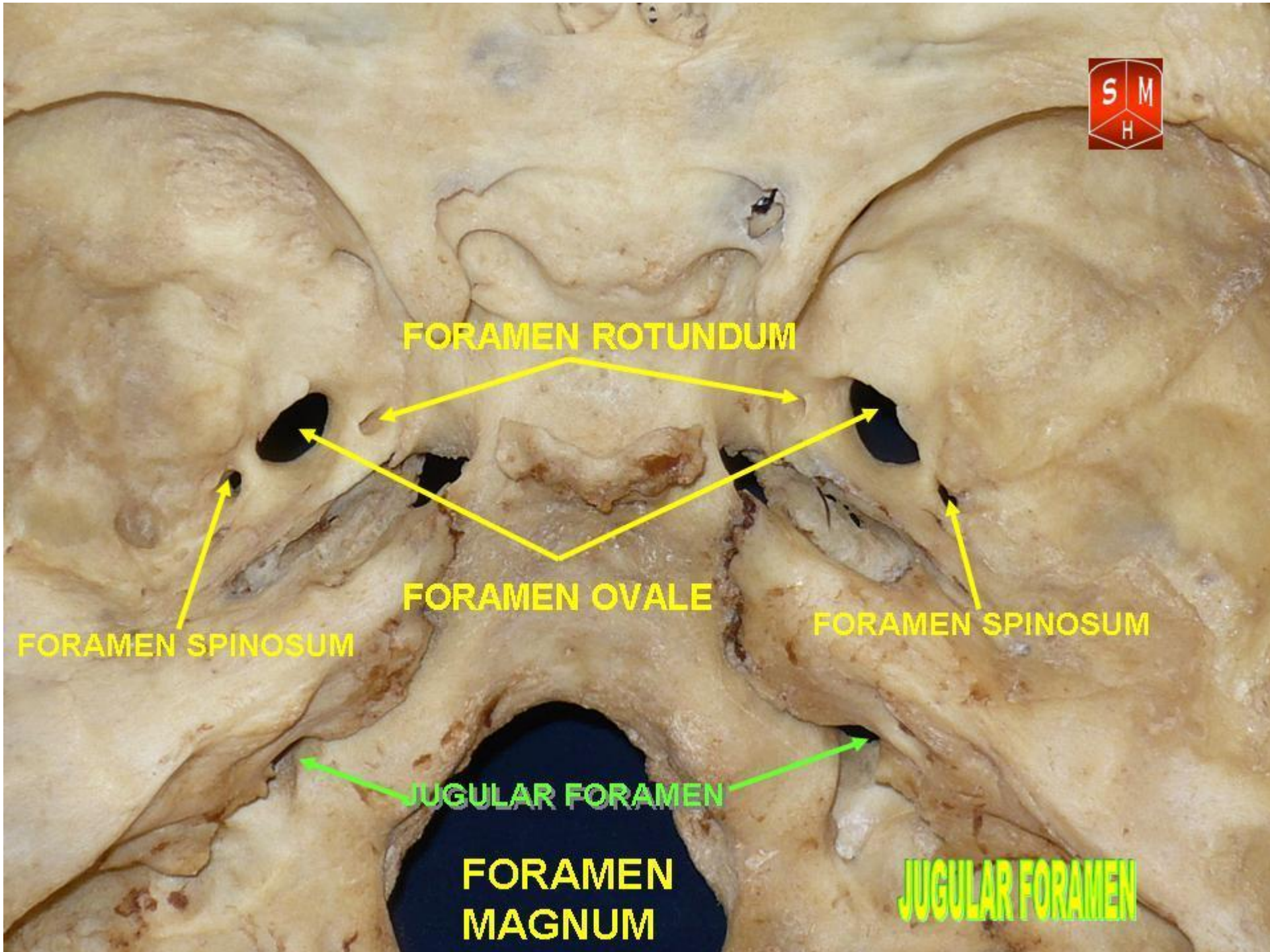
**JUGULAR FORAMEN**

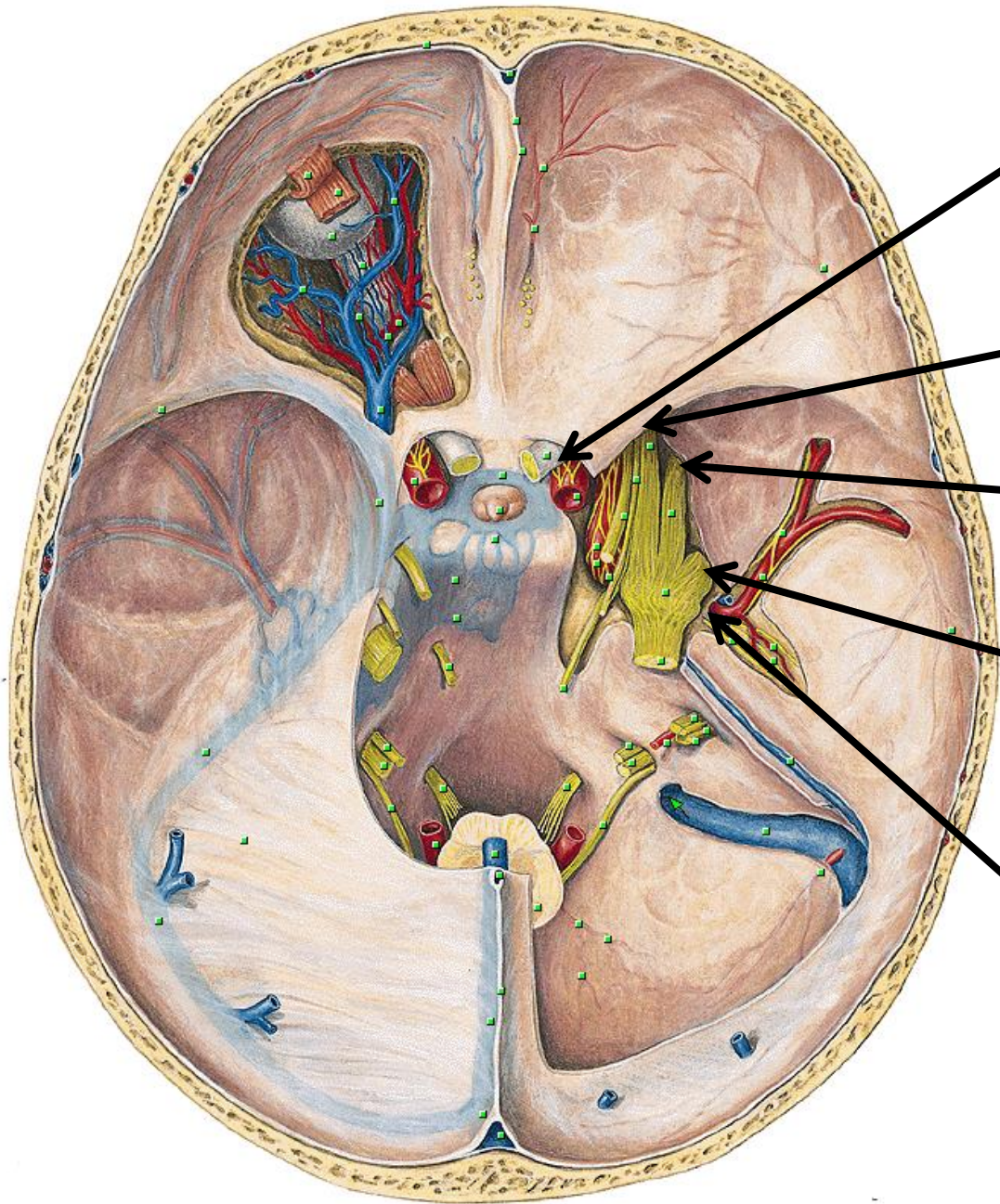
**FORAMEN  
MAGNUM**

**FORAMEN SPINOSUM**

**JUGULAR FORAMEN**

**FORAMEN SPINOSUM**





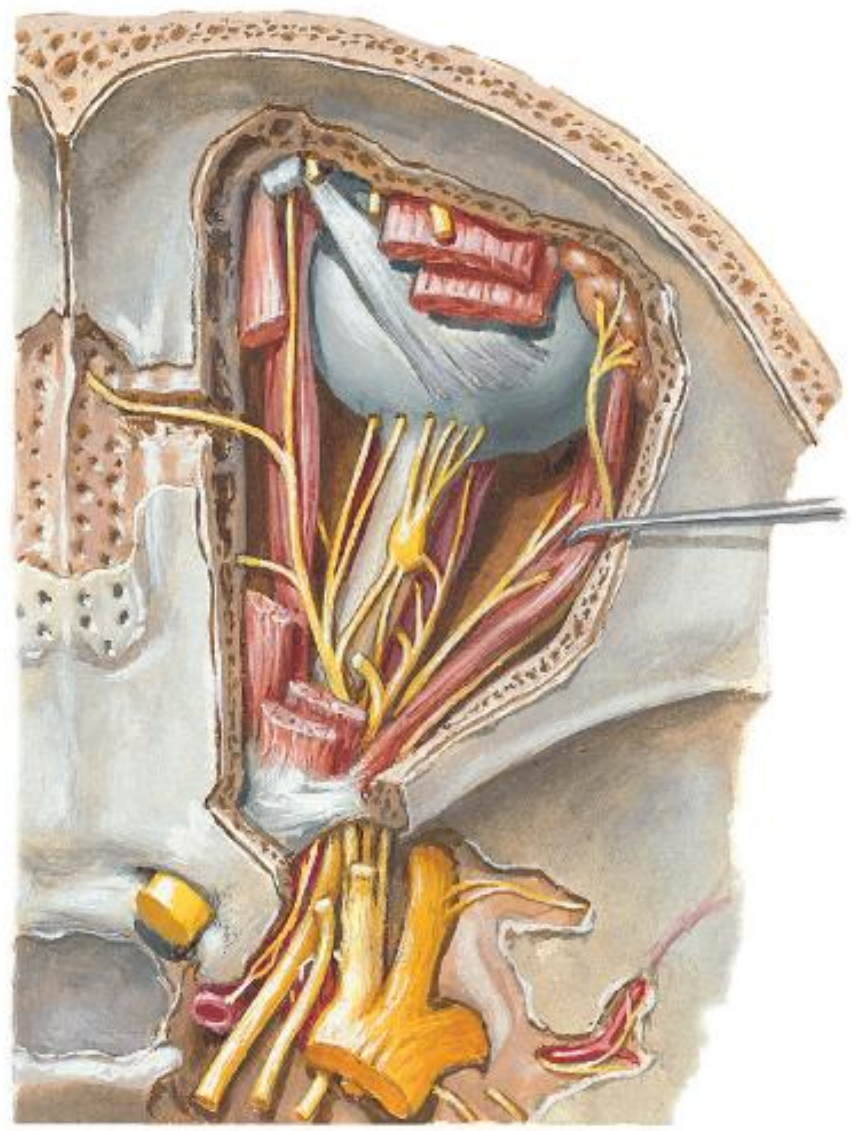
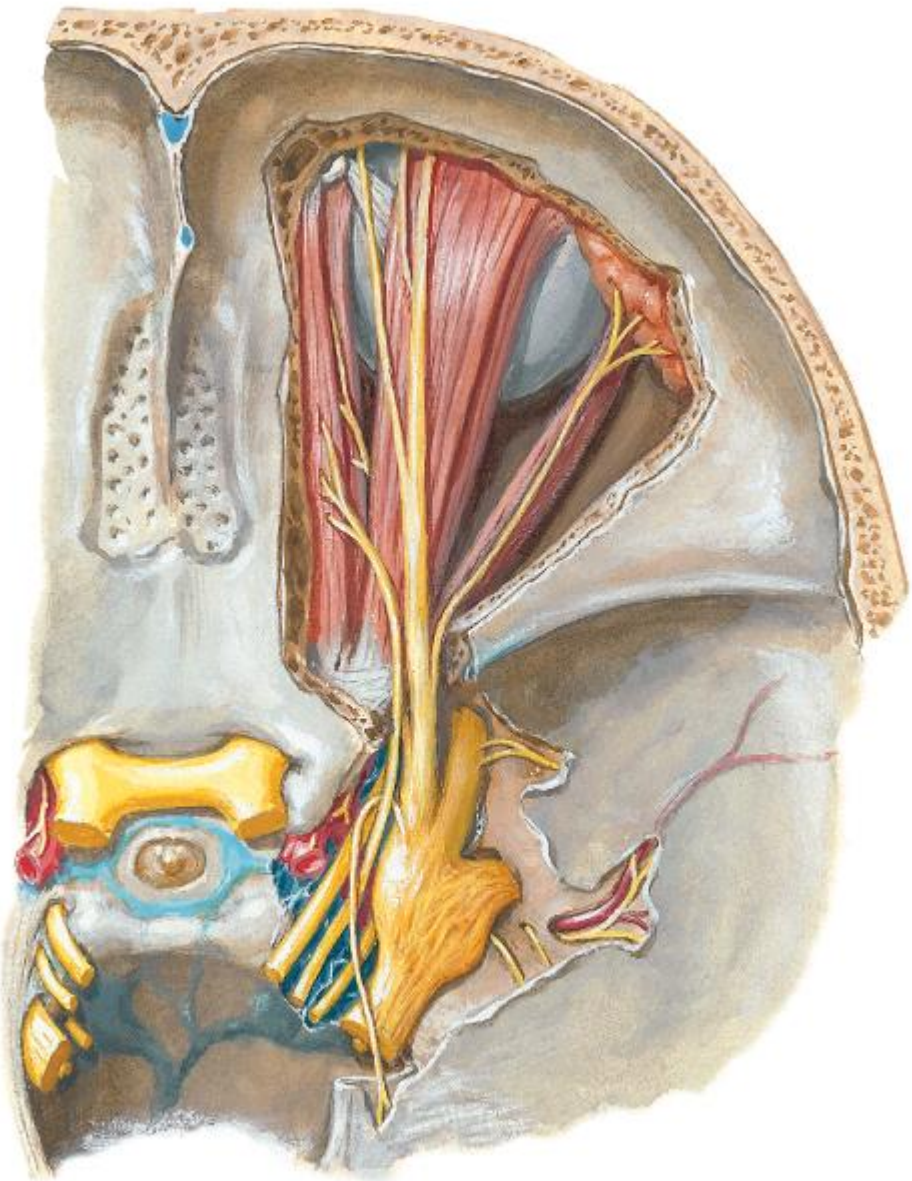
canalis opticus

fissura orbitalis superior

foramen rotundum

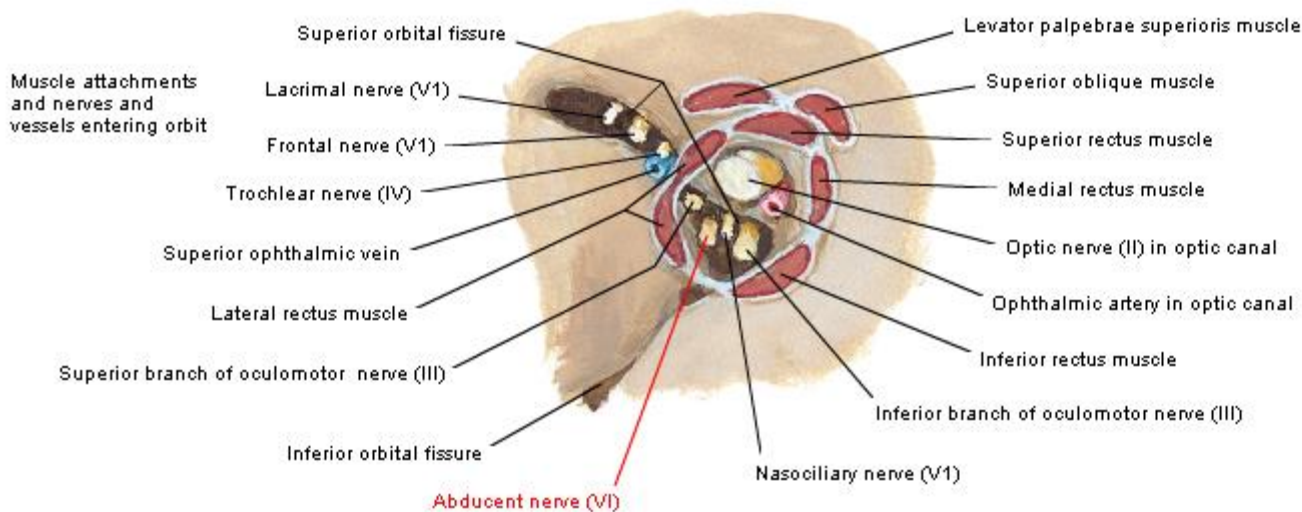
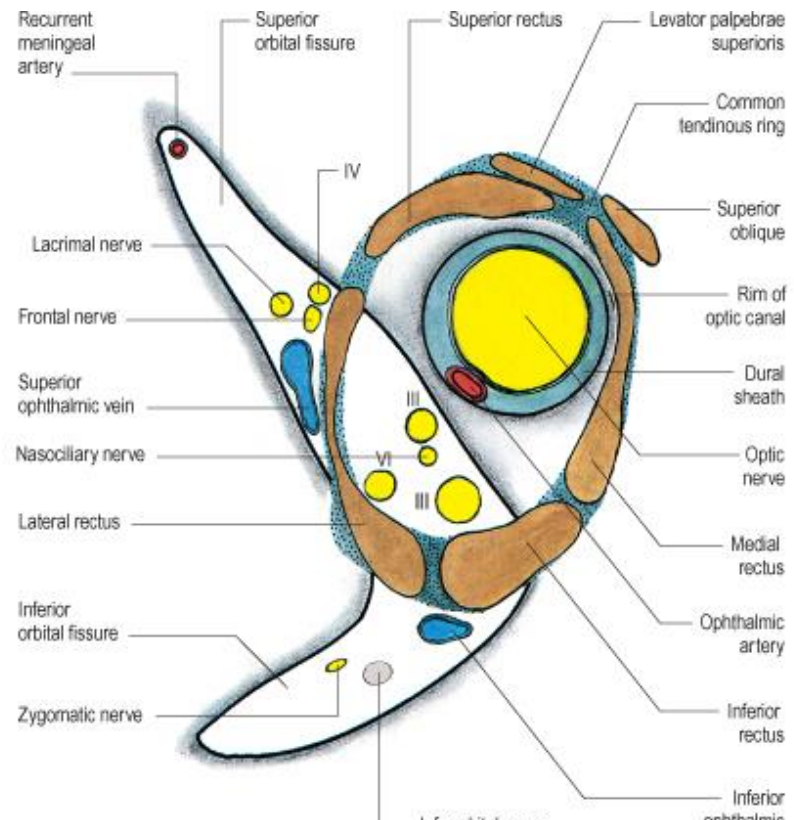
foramen ovale

foramen spinosum





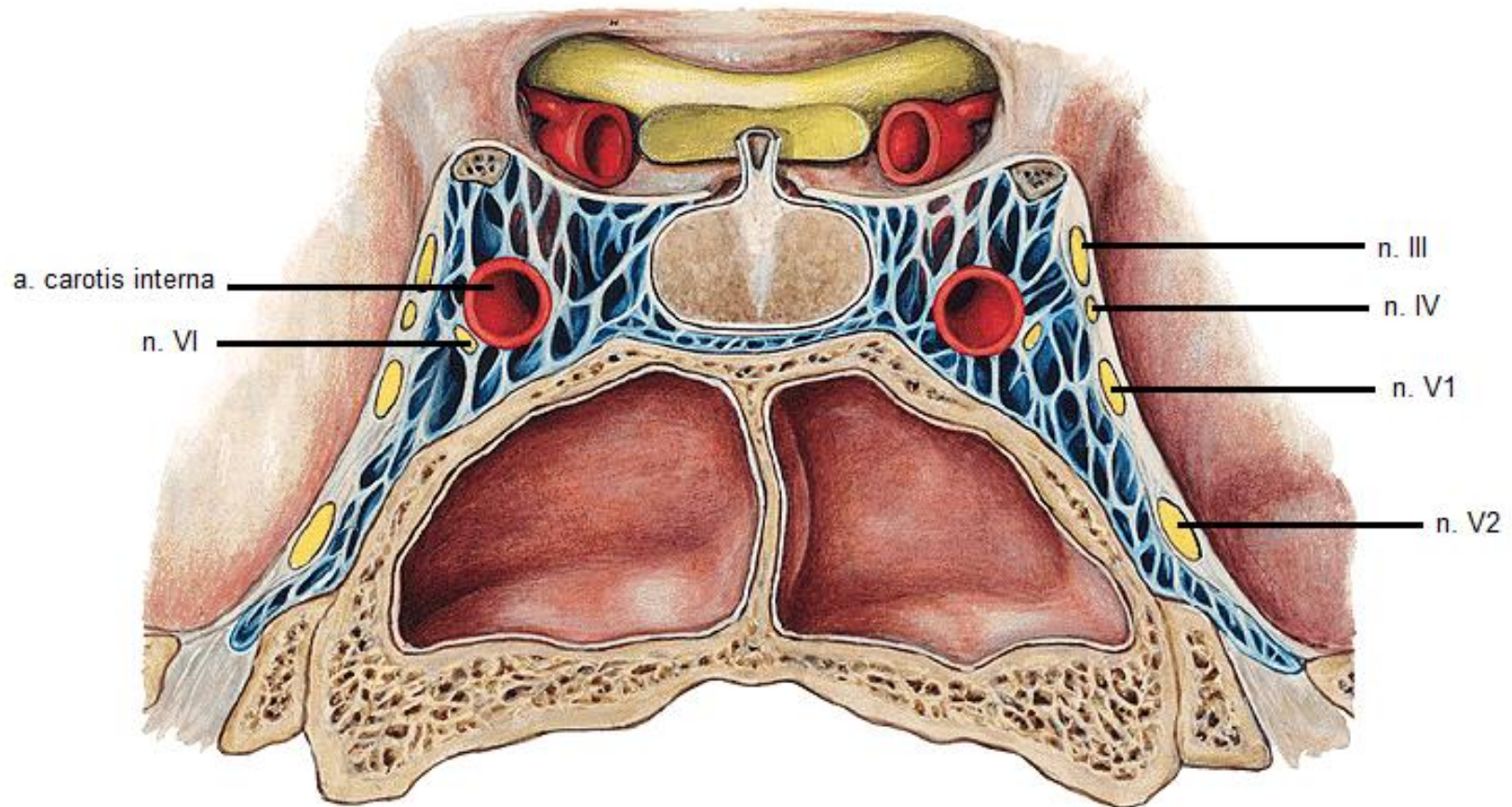
# Anulus tendineus communis Zinni



netter.com

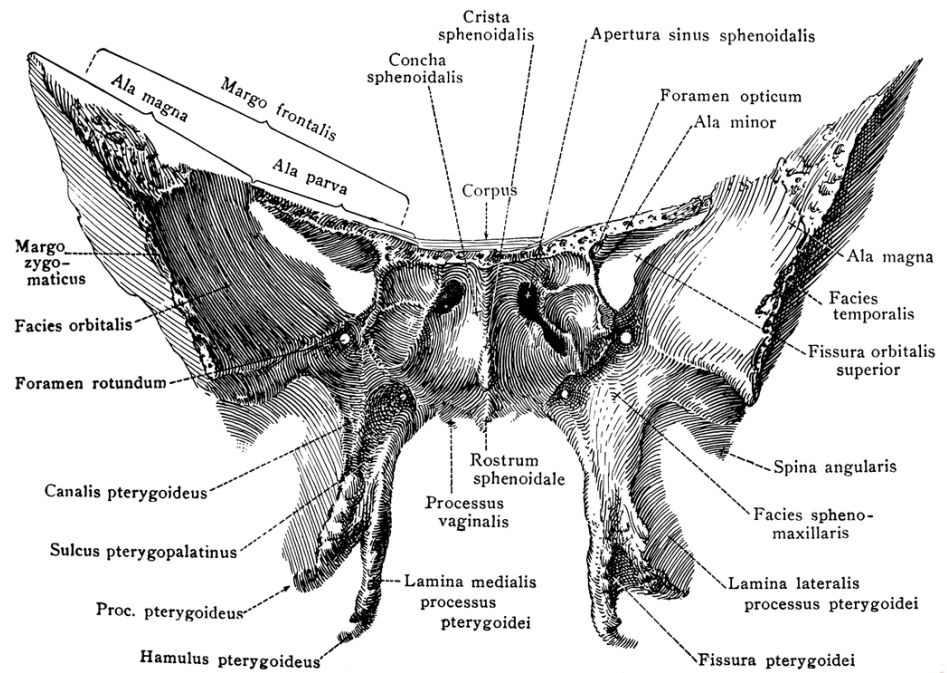


# Sinus cavernosus

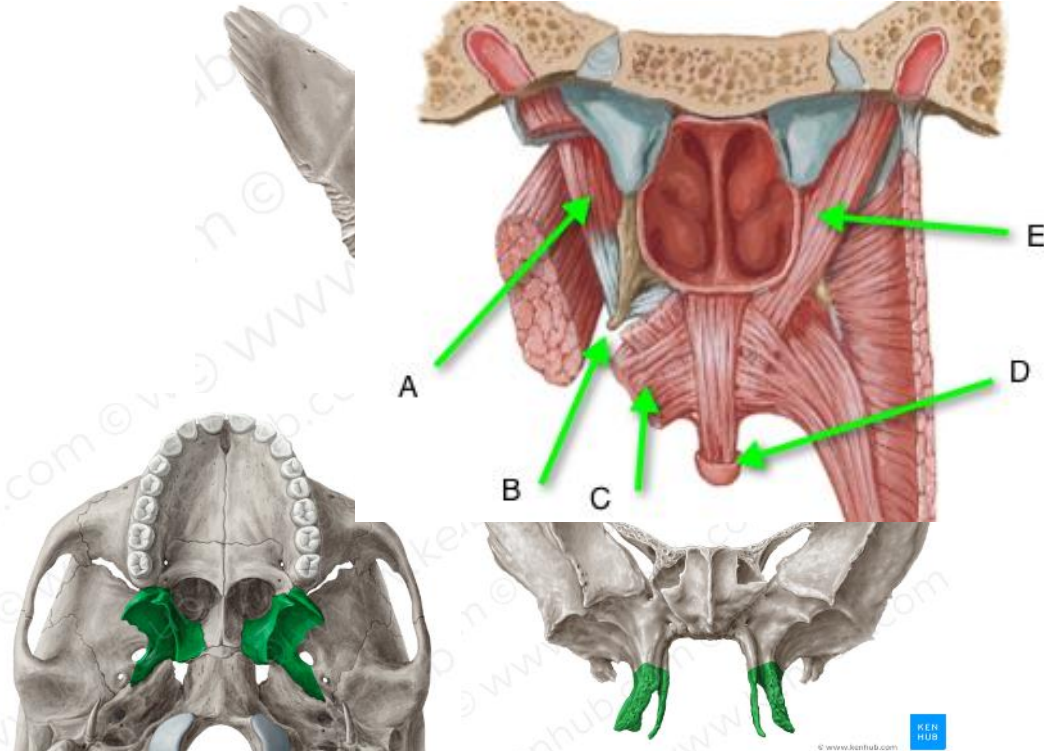


# Os sphenoidale

## Processus pterygoideus

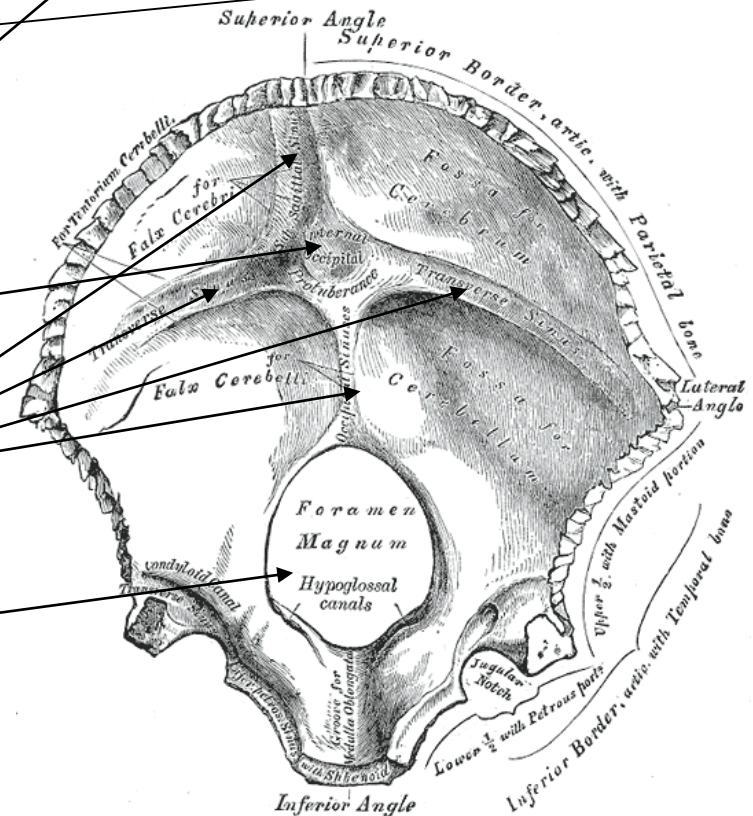
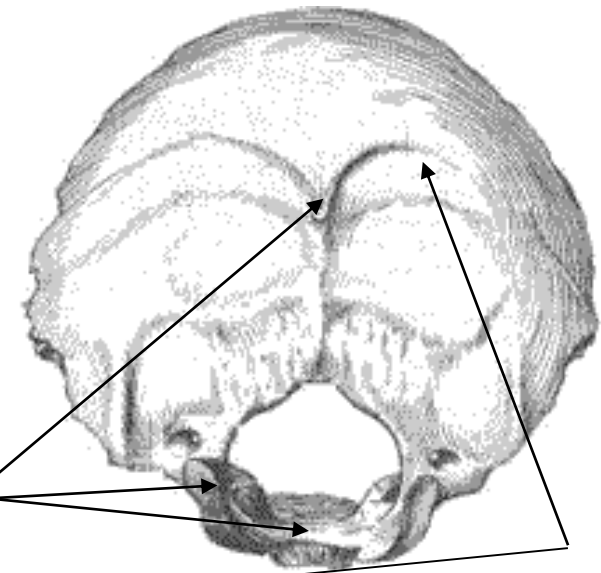


<b>Processus pterygoideus</b> / Křídlovitý výběžek
<b>Lamina medialis et lateralis</b>
(Incisura pterygoidea)
<b>Fossa pterygoidea</b>
(Fossa scaphoidea / Lodičkovitá jáma)
(Processus vaginalis / Poševní výběžek)
(Sulcus palatovaginalis / Patropoševní rýha)
→ <i>Canalis palatovaginalis</i>
(Sulcus vomerovaginalis / Radlicopoševní rýha)
Canalis vomerorostralis - variabilní
<b>Hamulus pterygoideus</b> / Křídlovitý háček
<b>Sulcus hamuli pterygoidei</b>
<b>Canalis pterygoideus</b> Vidii
Processus pterygospinosus Civinini / Křídlotnový výběžek - variabilní



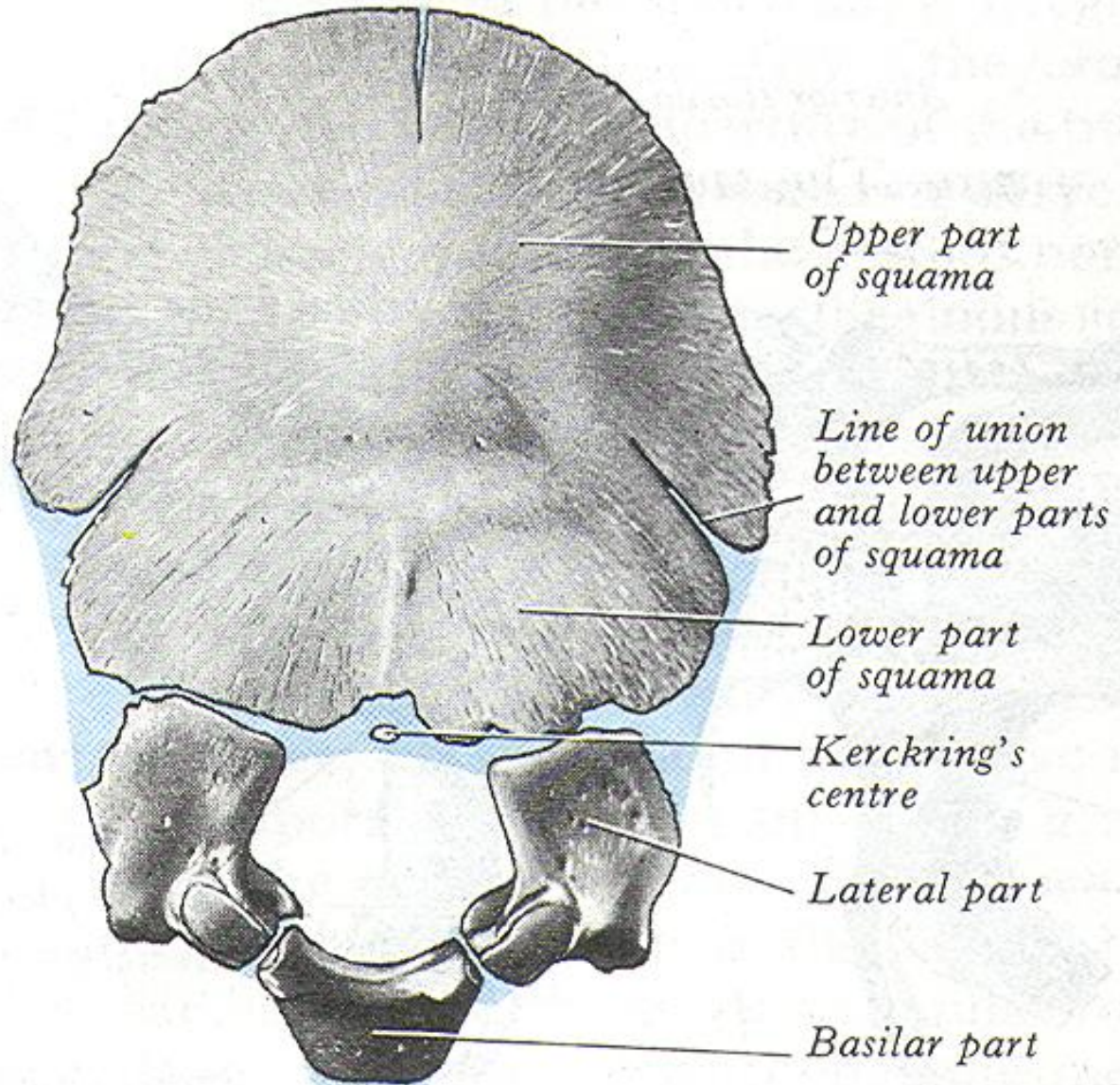
# Os occipitale (Týlní kost)

- pars basilaris
- pars lateralis
- squama occipitalis
  - facies externa, interna
  - protuberantia occipitalis externa, interna
  - eminentia cruciformis
  - sulci sinuum
- foramen magnum



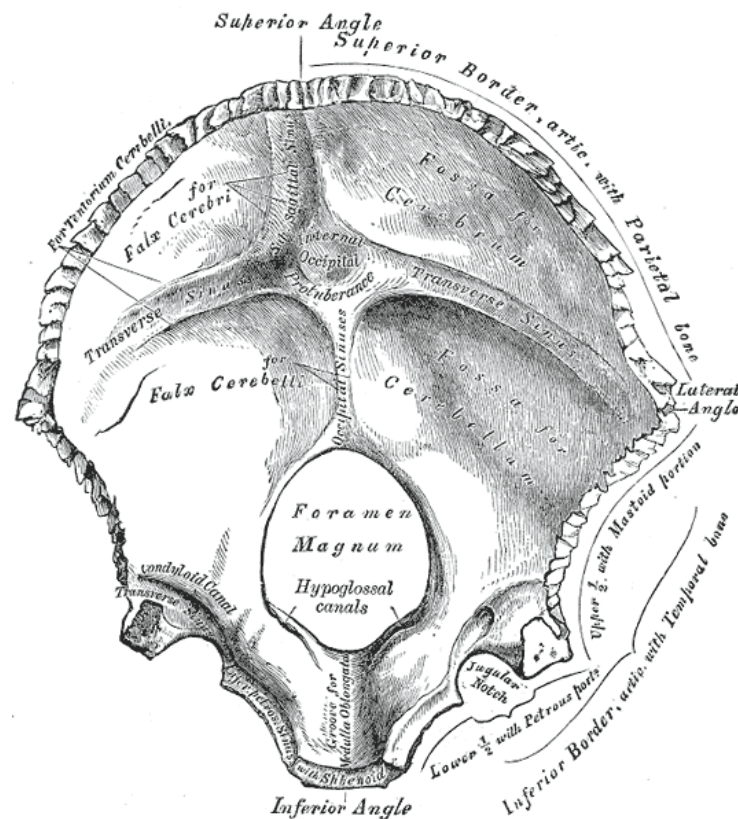
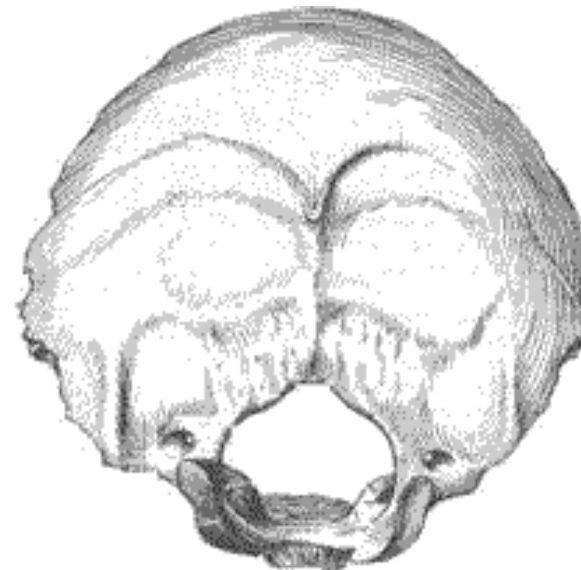
# Os occipitale – novorozenec

- pars basilaris
- pars lateralis
- squama occipitalis



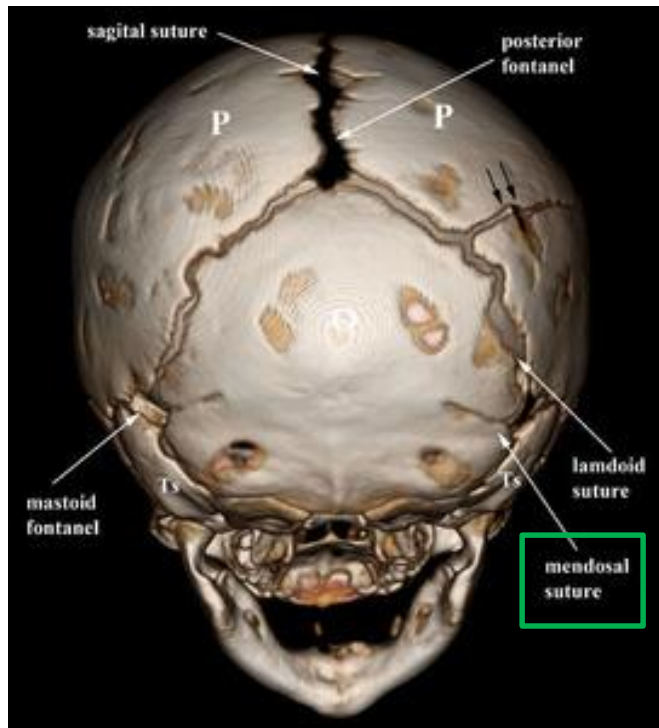
# Os occipitale

<b>Foramen magnum / Velký týlní otvor</b>
Basion, opisthion – kranio-metrické body
<b>Pars basilaris / Spodinová část</b>
<b>Clivus Blumenbachi / Svah</b>
<b>Tuberculum pharyngeum / Hltanový hrbolek</b>
<b>Sulcus sinus petrosi inferioris / Brázda dolního skalního splavu</b>
<b>Pars lateralis</b>
<b>Squama occipitalis</b>
(Margo mastoideus, lambdoideus)
<b>Os interparietale Incae s. Goethicum - variabilní</b>
<b>Sutura mendosa – variabilní (jen v dětství)</b>
<b>Sutura occipitalis transversa – variabilní (jen v dětství)</b>
<b>Condylus occipitalis / Týlní kloubní hrbol</b>
<b>Canalis nervi hypoglossi / Kanál podjazykového nervu</b>
Fossa condylaris
<b>Canalis condylaris / Hrbolový kanál</b>
(Tuberculum jugulare / Hrdelní hrbolek)
<b>Incisura jugularis</b>
Processus intrajugularis / Nitrohrdelní výběžek
<b>Processus jugularis</b>



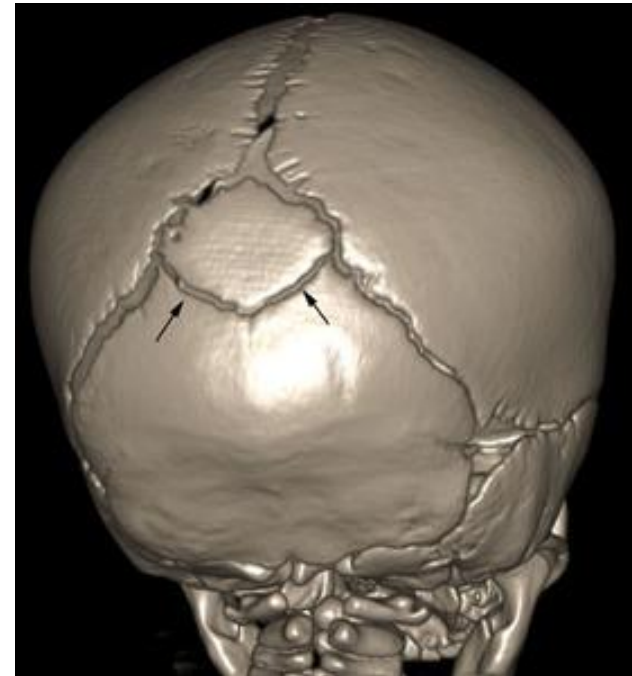
# Sutura mendosa

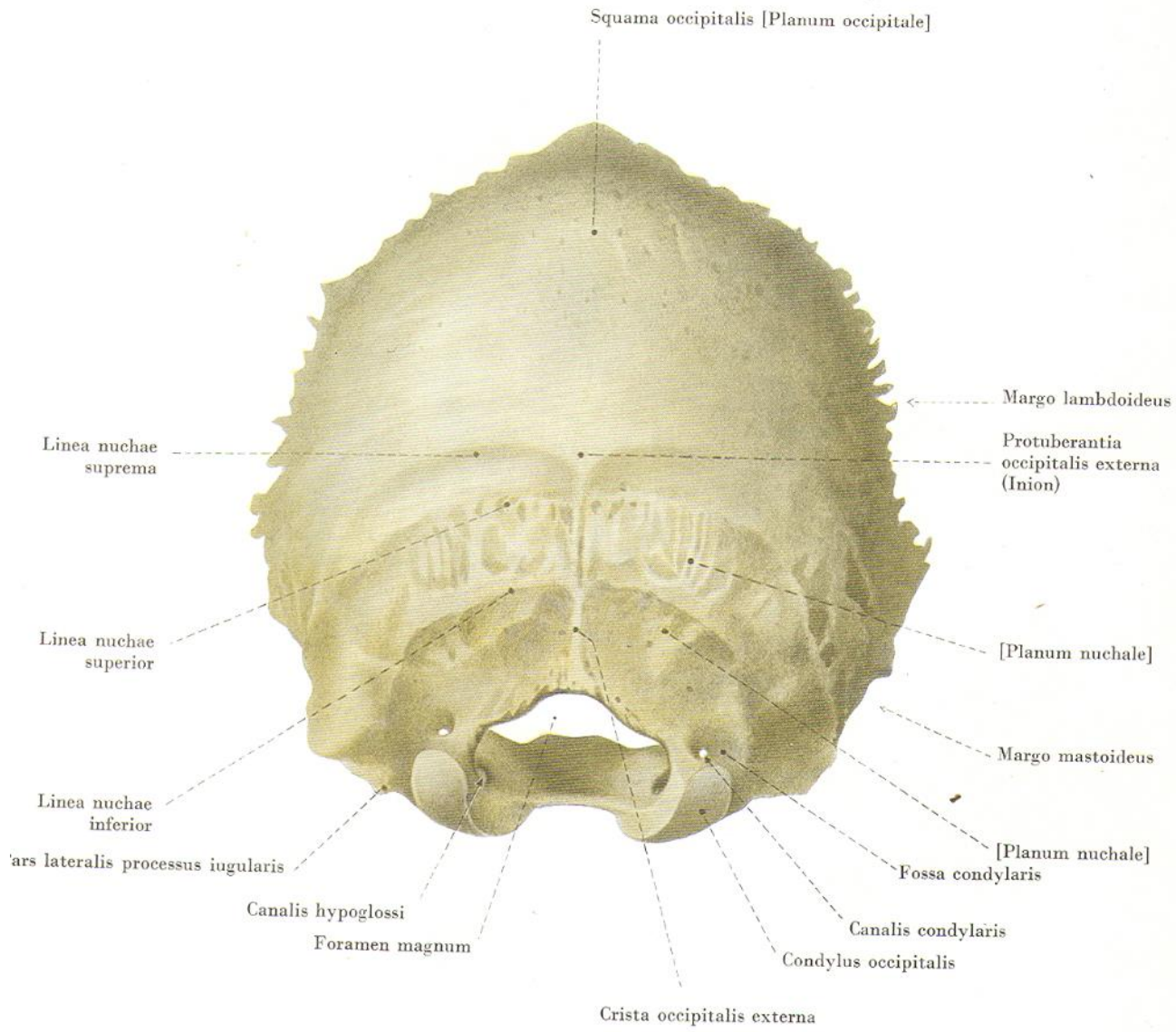
- mezi částmi squama occipitalis



# Sutura occipitalis transversa

- do 4. roku
- přetrvává v 5 %
  - 30% v Americe

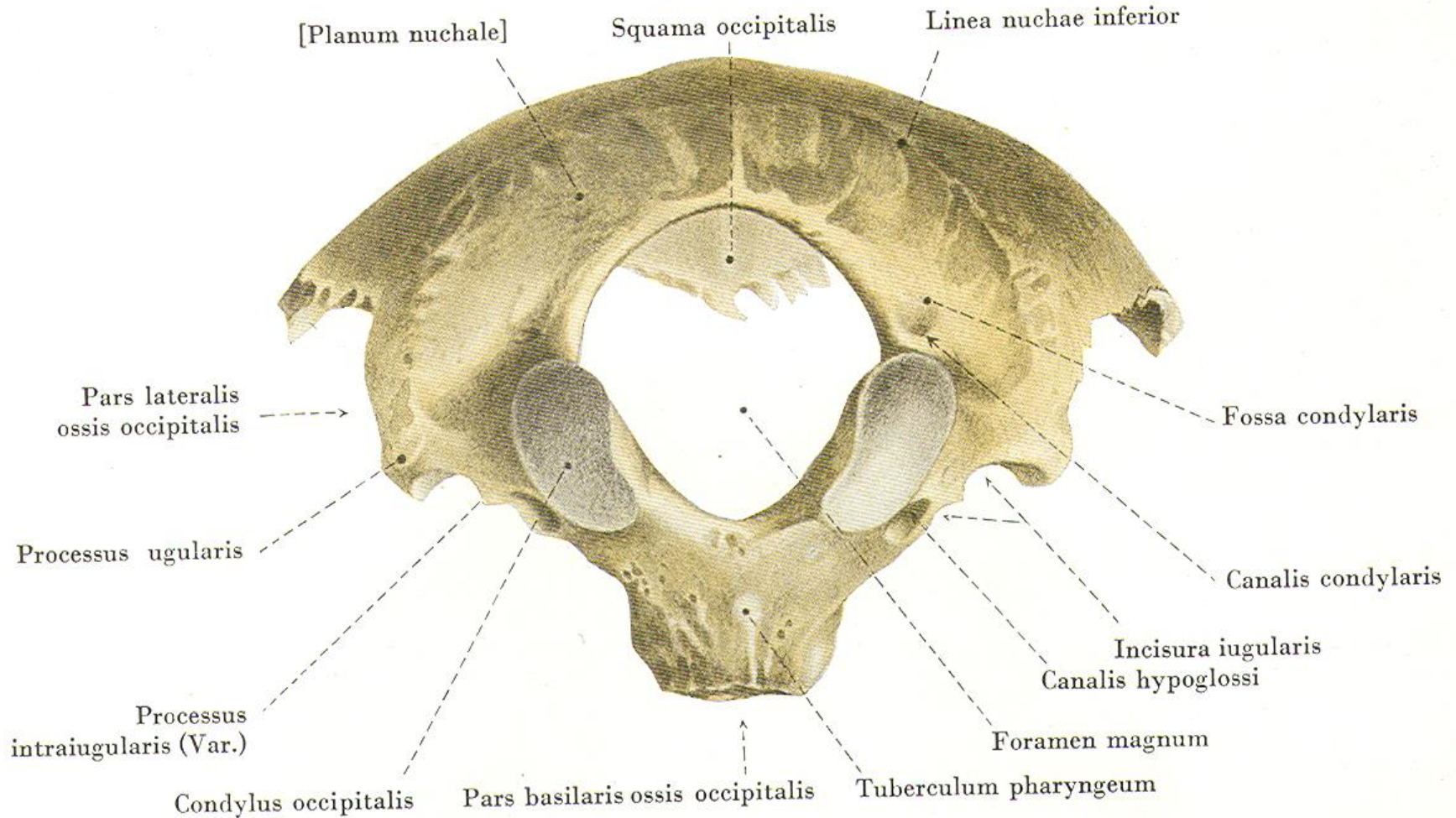






# Os occipitale

## pars basilaris, partes laterales



# Os occipitale – squama

## Facies externa

**Protuberantia occipitalis externa** / Vnější týlní hrbol

**Crista occipitalis externa** – variabilní

**Linea nuchalis superior, inferior** / Hořejší, horní, dolní šíjová čára

Ionion - kranio-metrický bod

**Planum occipitale** / Týlní rovina

(**Processus paramastoideus** / Přisoscový výběžek) – variabilní

## Facies interna

**Eminentia cruciformis** / Křížová vyvýšenina

**Protuberantia occipitalis interna** / Vnitřní týlní hrbol

**Sulcus sinus sagittalis superioris** / Brázda horního šíjového splavu

**Sulcus sinus transversi**

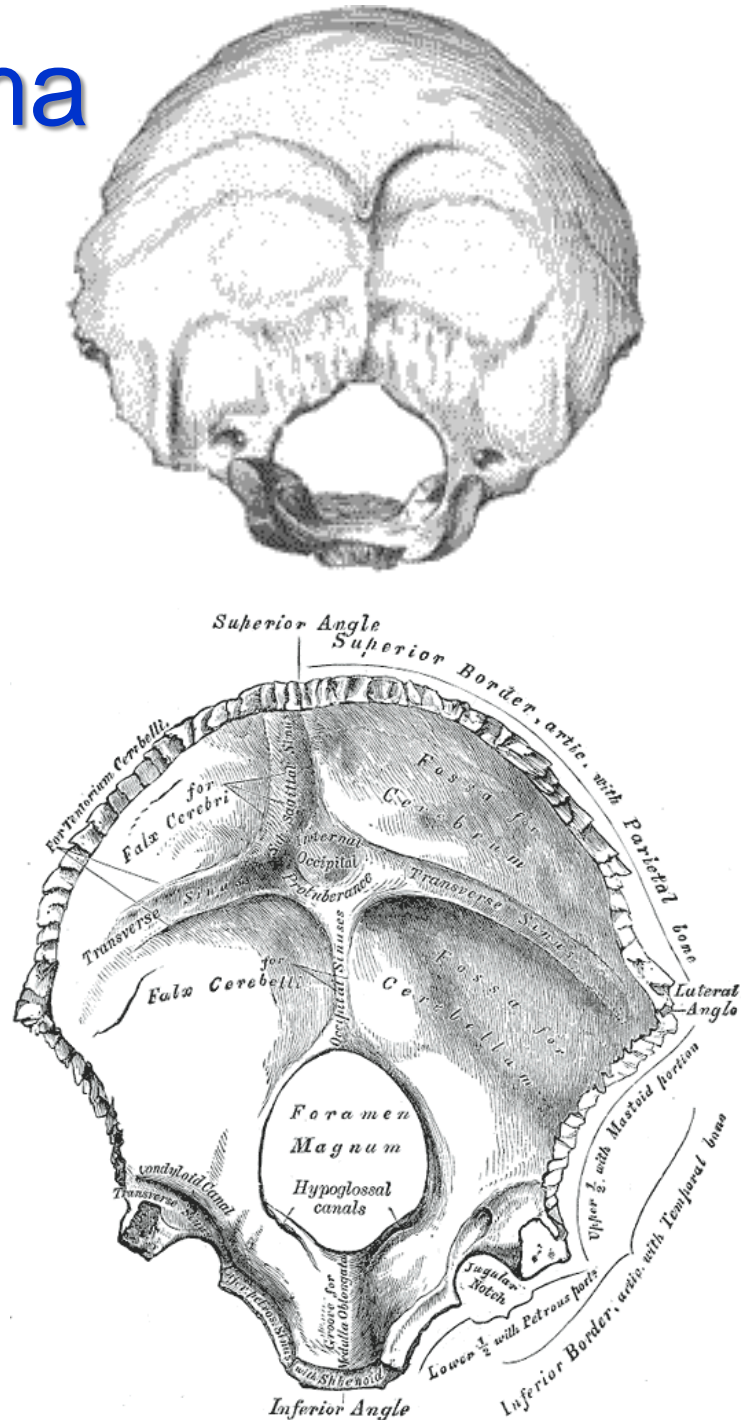
**Sulcus sinus sigmoidei**

**Sulcus sinus occipitalis - Crista occipitalis interna**

**Sulcus sinus marginalis** / Brázda okrajového splavu

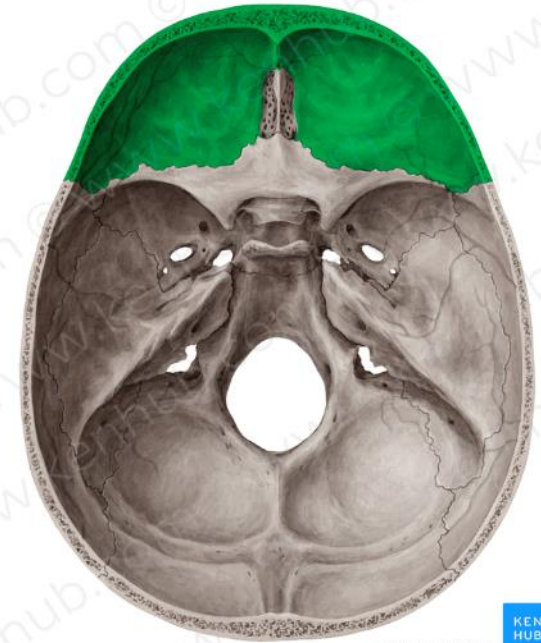
**Fossa cerebri** / Mozková jáma

**Fossa cerebellaris** / Mozečková jáma



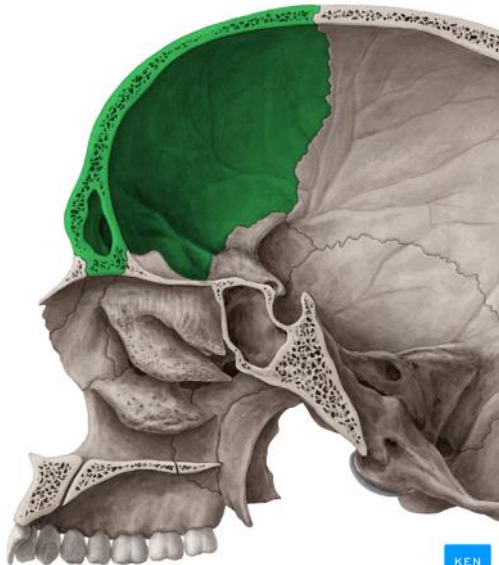
# Os frontale (Čelní kost)

- squama frontalis – nepárová
- pars nasalis – nepárová
- pars orbitalis – párová



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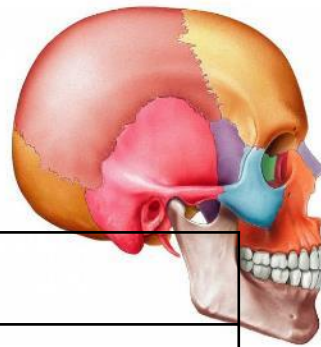
© www.kenhub.com



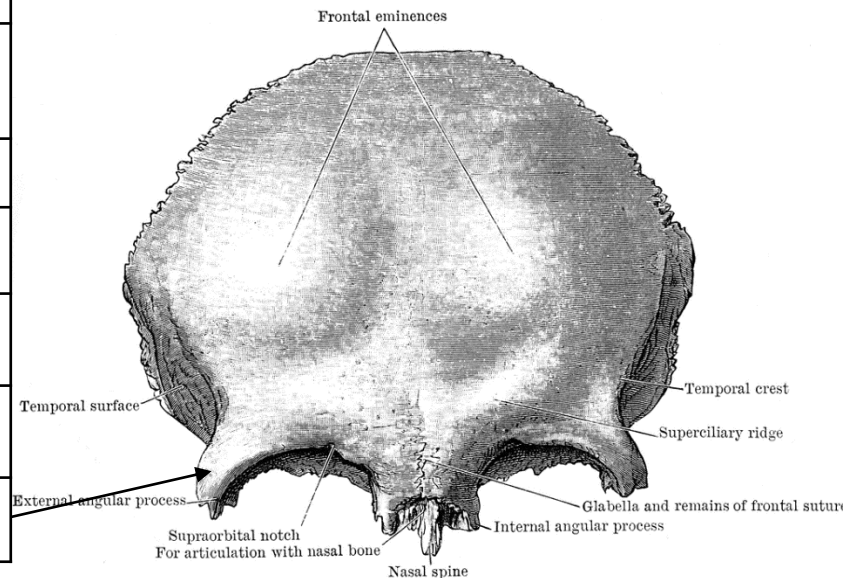
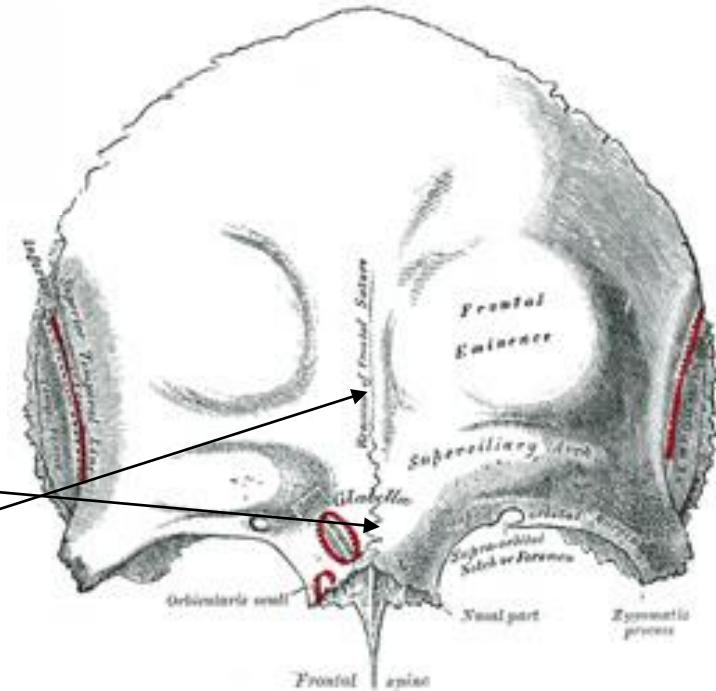
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# Os frontale



<b>Squama frontalis / Čelní šupina</b>
<b>Facies externa</b>
<b>Tuber frontale</b>
<b>Arcus superciliaris / Nadočnicový oblouk</b>
<b>Glabella / Čelní úžlabí – kranimetrický bod</b>
<b>Sutura frontalis persistens s. methopica / Čelní šev</b>
<b>Margo supraorbitalis / Nadočnicový okraj</b>
<b>Incisura supraorbitalis s. Foramen supraorbitale</b>
<b>Incisura frontalis s. Foramen frontale</b>
<b>Facies temporalis</b>
(Margo parietalis)
<b>Linea temporalis</b>
<b>Processus zygomaticus / Jařmový výběžek</b>



# Os frontale (Čelní kost)

**Facies interna**

**Crista frontalis**

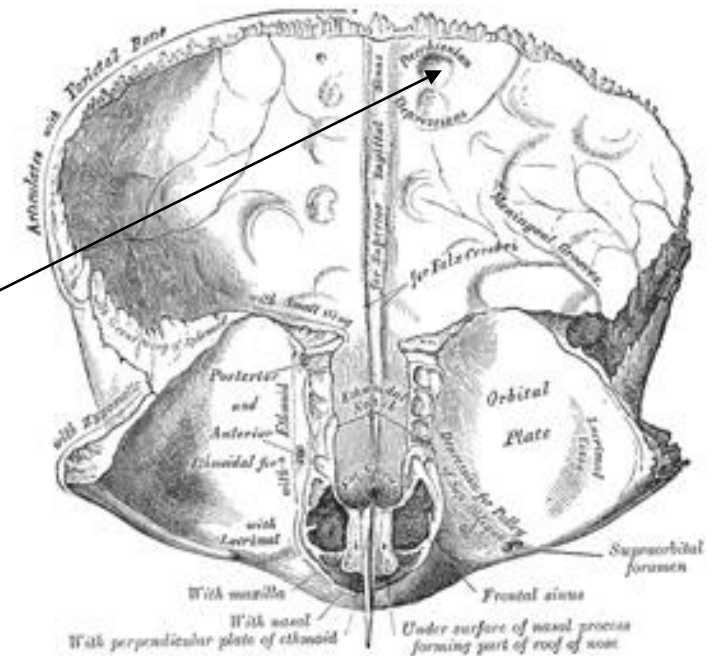
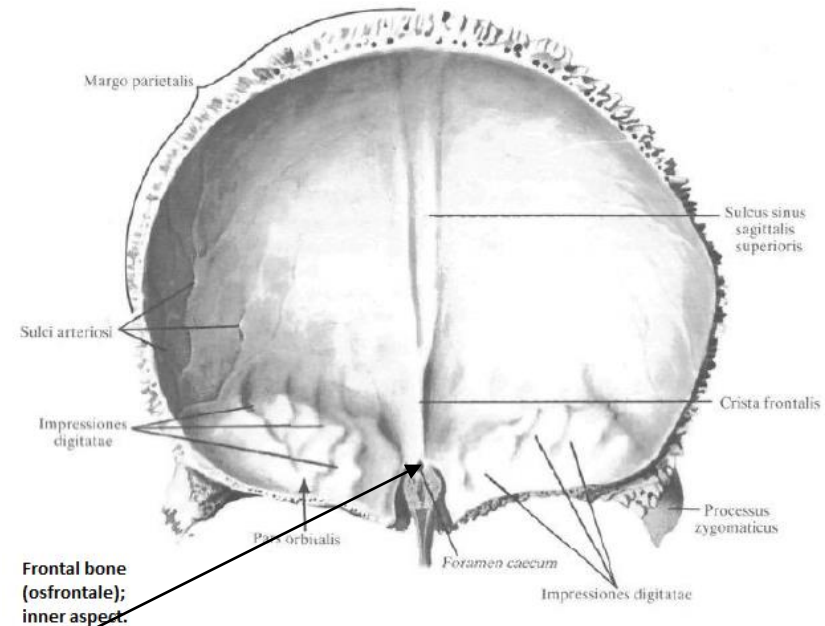
**Sulcus sinus sagittalis superioris**

**Foramen caecum / Slepý otvor**

**Impressiones gyrorum / Otisky závitů**

**Juga cerebralia**

**Foveolae granulares Pacchioni**

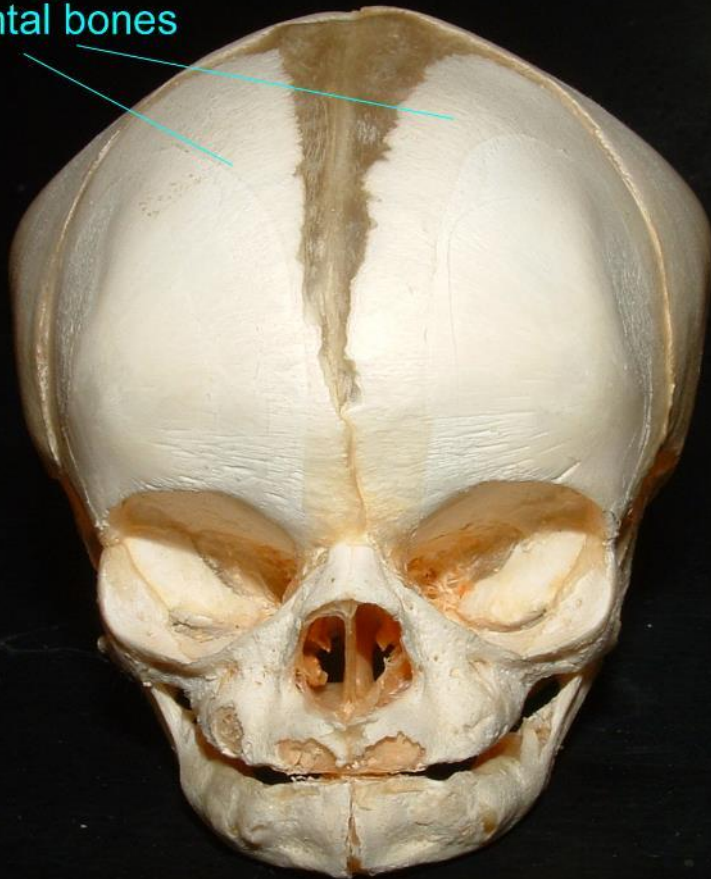


# Sutura frontalis persistens

## Sutura methopica

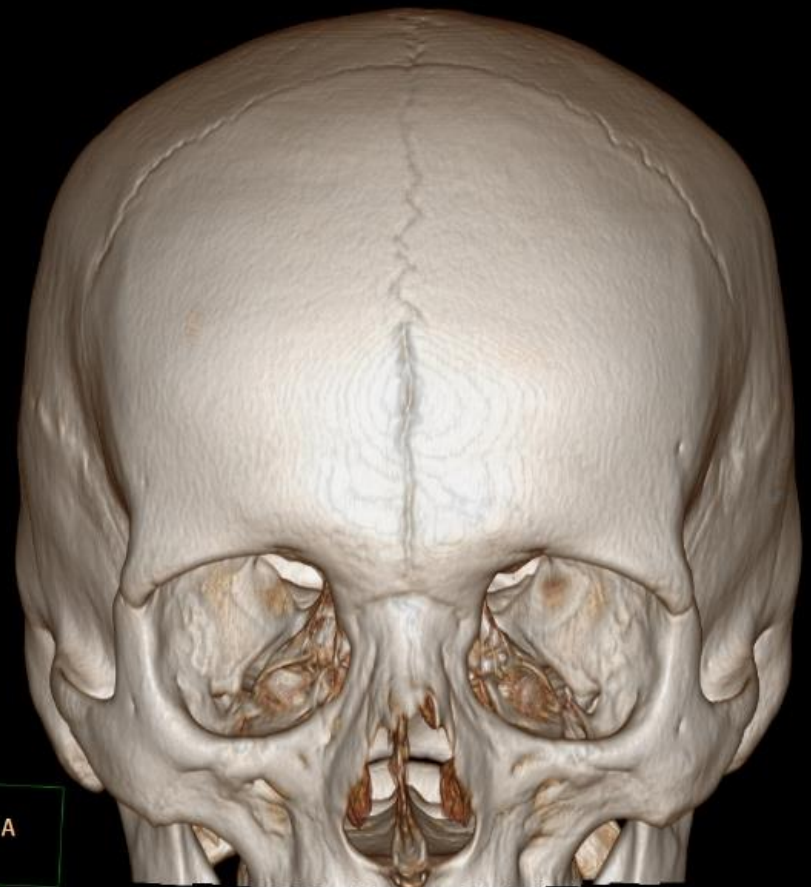
- do 2 let věku se uzavírá – přetrvává u 5-8 %

frontal bones



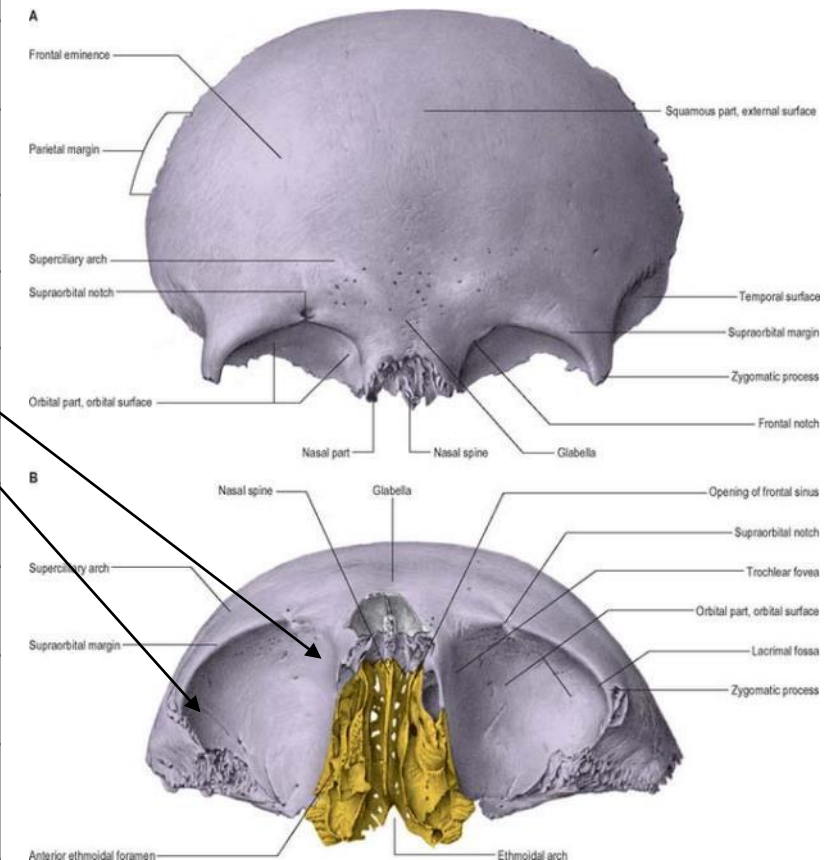
R

R A



F

# Os frontale (Čelní kost)



**Pars nasalis** / Nosní část čelní kosti

(Spina nasalis)

(Margo nasalis)

**Pars orbitalis** / Očnicová část čelní kosti

**Facies orbitalis**

**Fovea trochlearis** / Kladková jamka

(Spina trochlearis)

**Fossa glandulae lacrimalis** / Slzná jamka

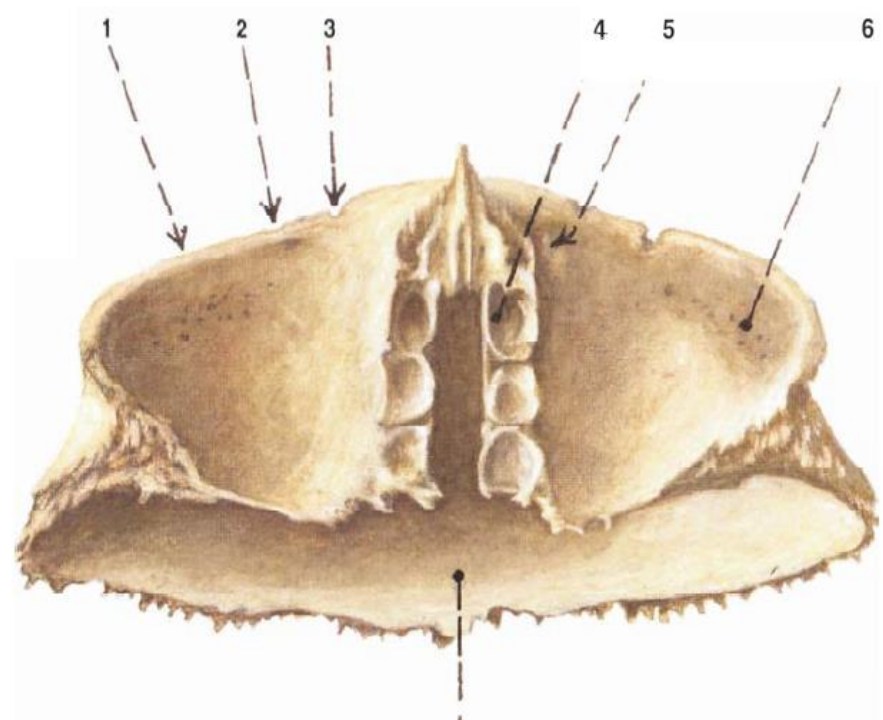
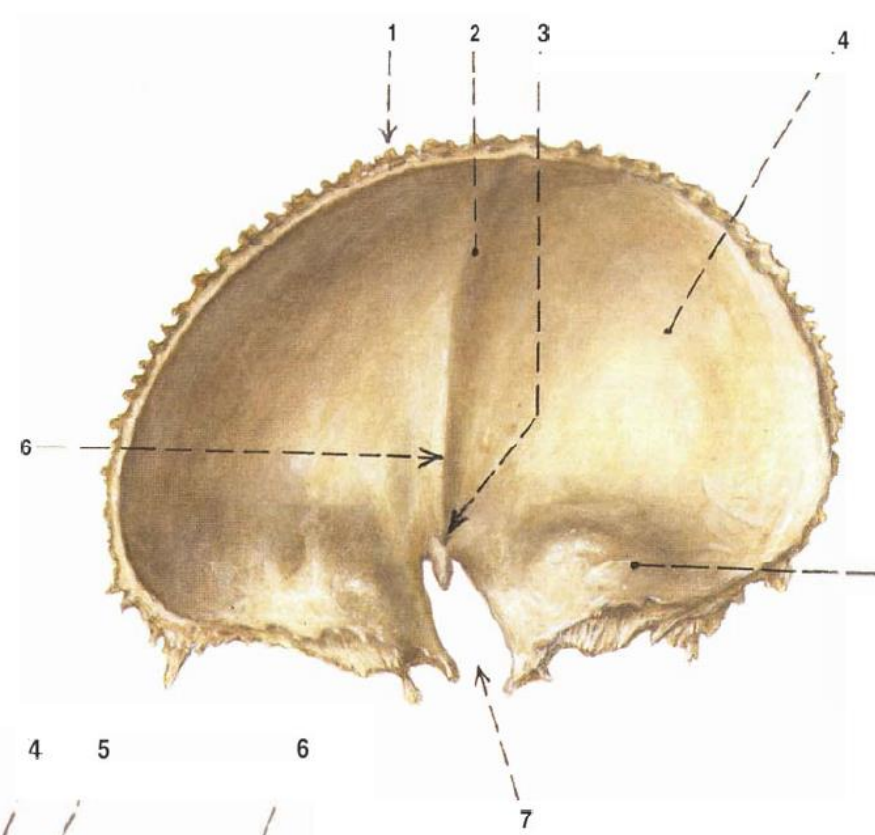
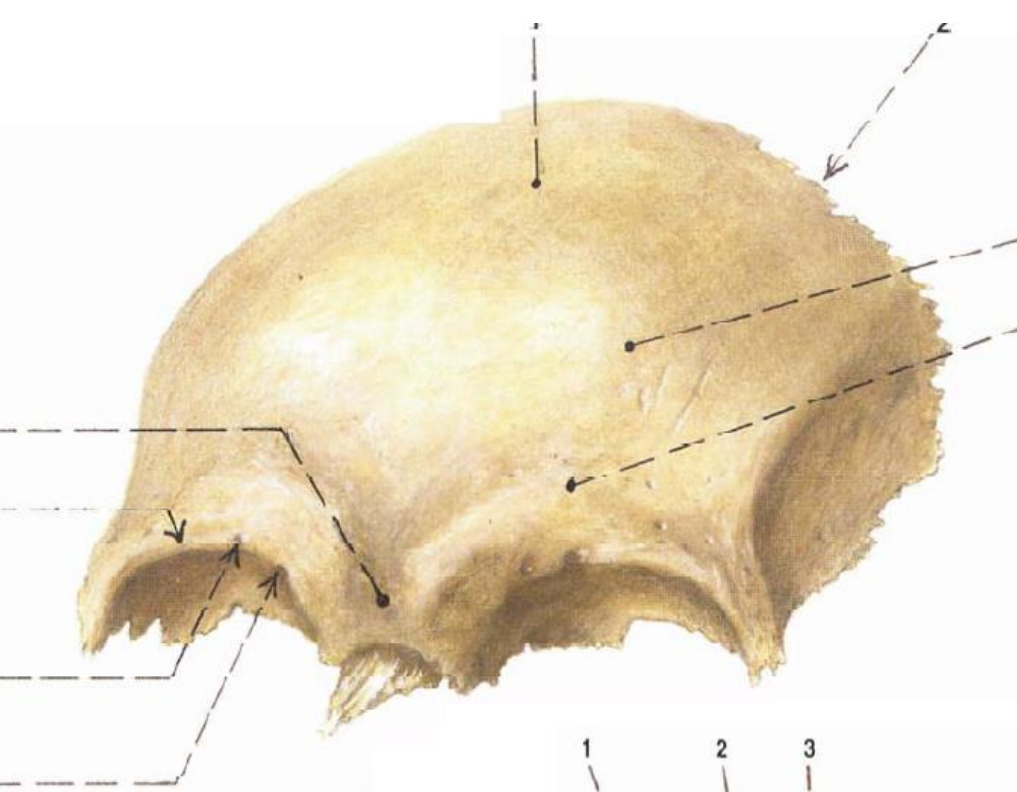
(Margo sphenoidalis / Klínový okraj)

**Incisura ethmoidalis** / Čichový zářez

**Sinus frontalis** / Čelní dutina

**Apertura sinus frontalis** / Ústí čelní dutiny

**Septum sinuum frontalem** / Přepážka čelních dutin



**Os  
frontale**



# Os parietale (temenní kost)

## Facies externa

**Linea temporalis superior** / Horní spánková čára

**Linea temporalis inferior**

**Tuber parietale**

Margo occipitalis, squamosus, sagittalis, frontalis / Týlní, šupinový, šípový, čelní okraj

Angulus frontalis, occipitalis, sphenoidalis, mastoideus / Čelní, týlní, klínový, soscový úhel

**Foramen parietale**

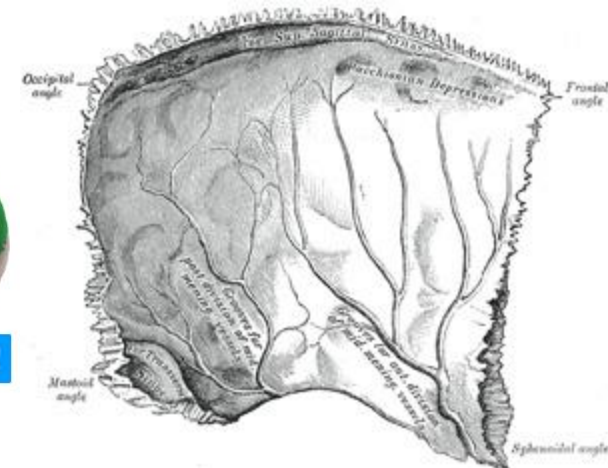
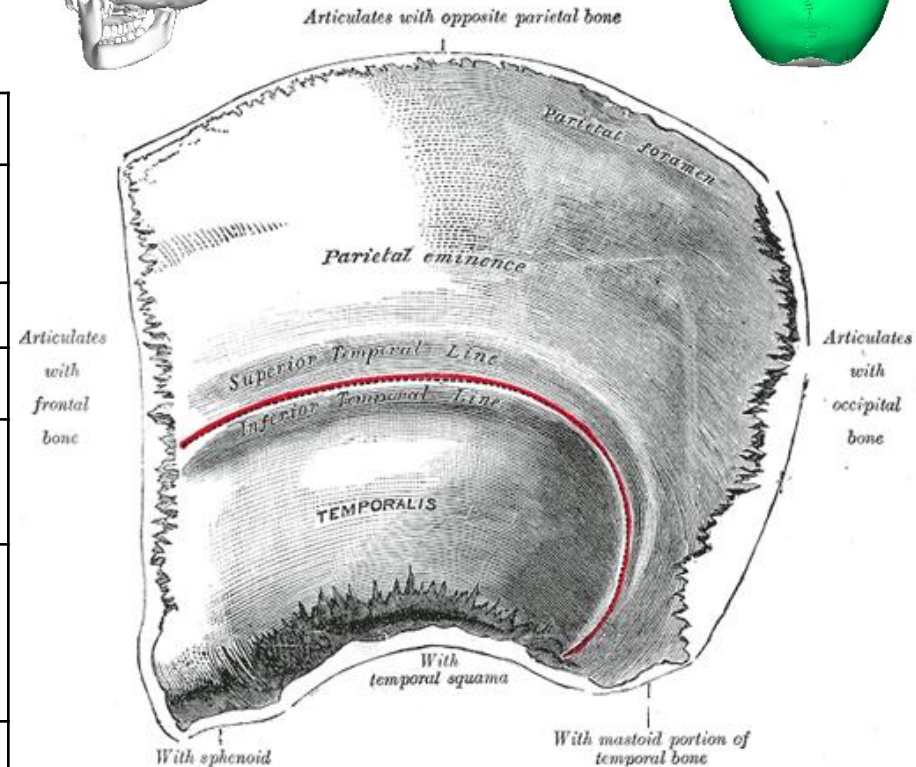
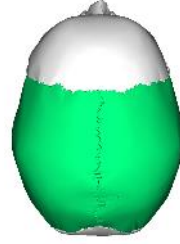
**Facies interna**

**Sulcus sinus sagittalis superioris** / Brázda šípového splavu

Sulcus sinus sigmoidei / Brázda esovitého splavu

**Sulcus arteriae meningae mediae** / Žlábek střední plenové tepny

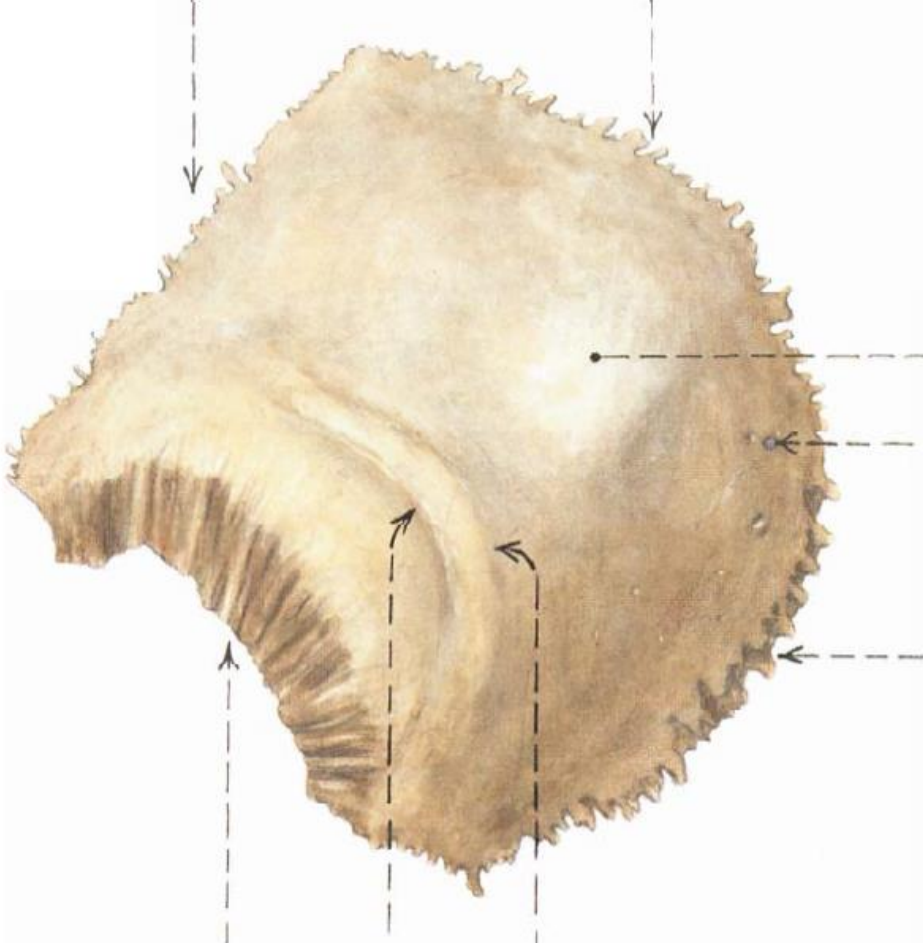
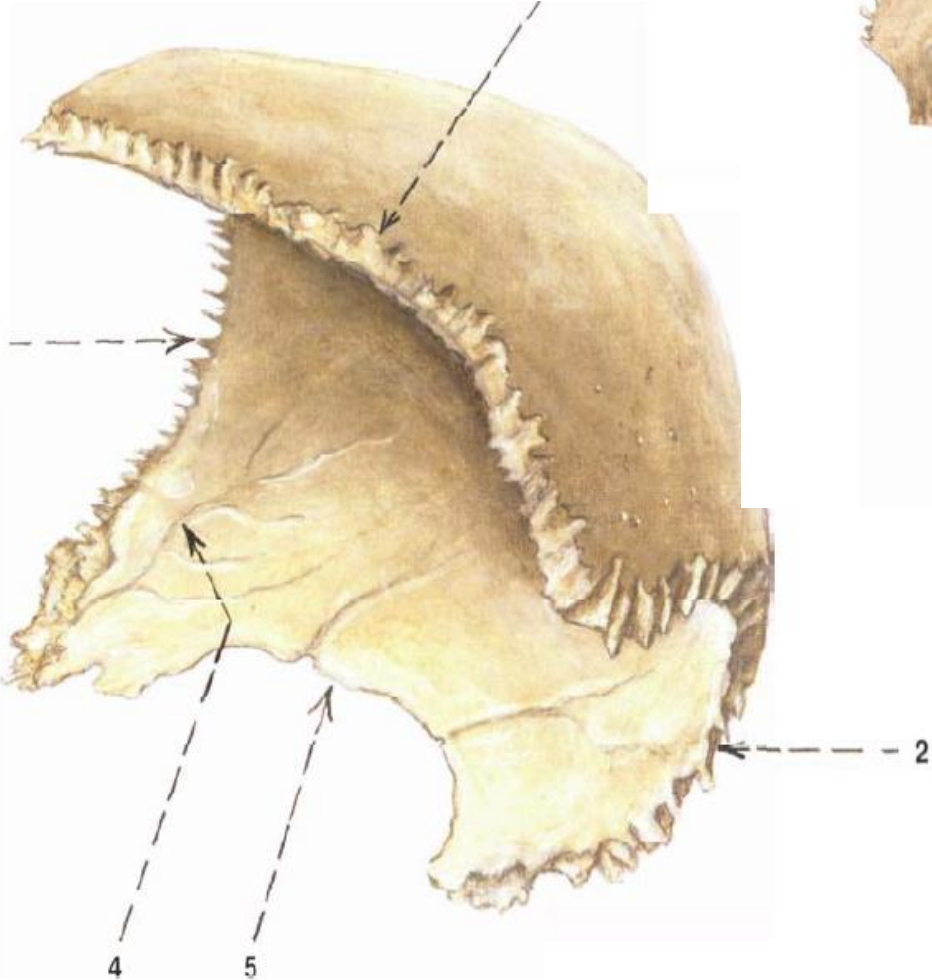
**Sulci arteriosi**



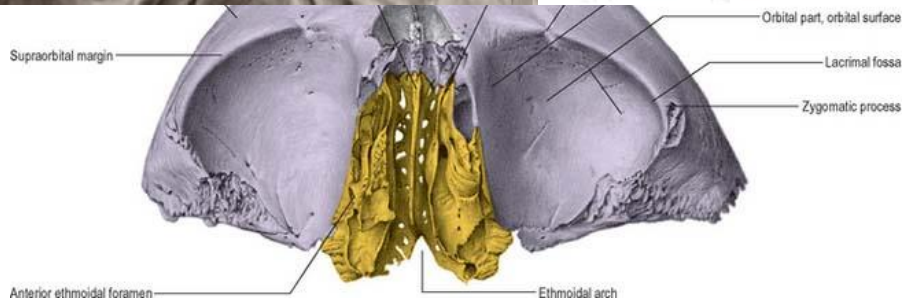
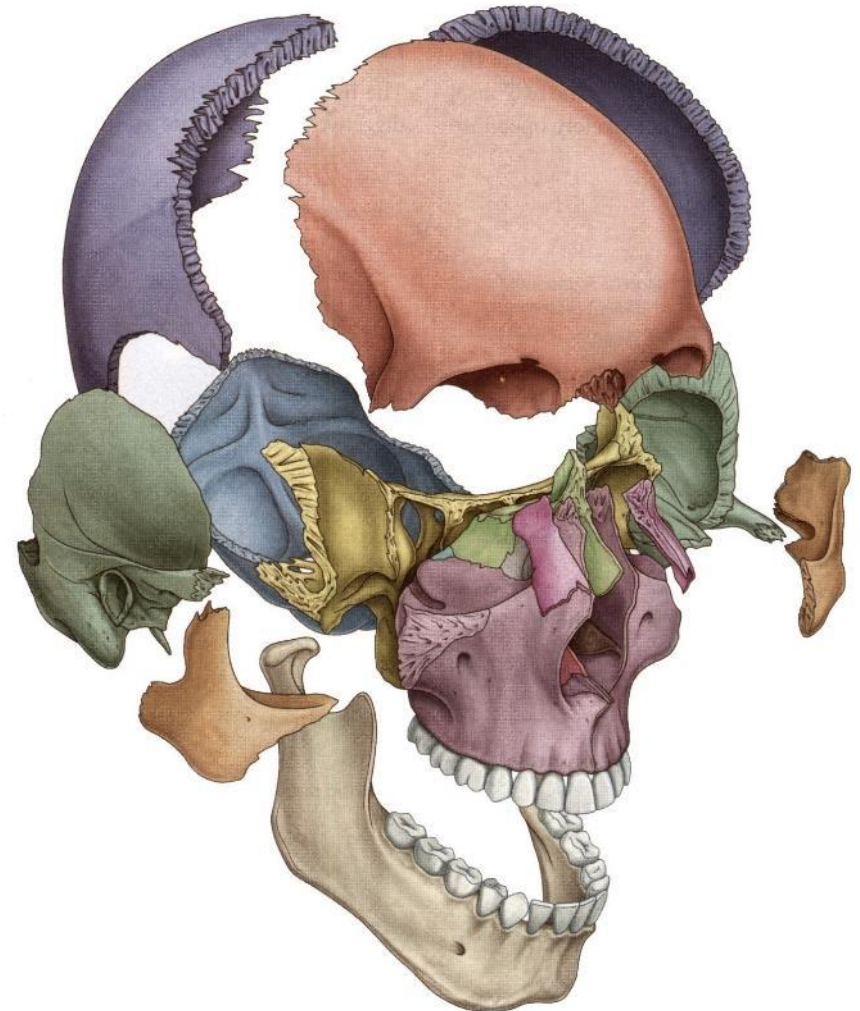
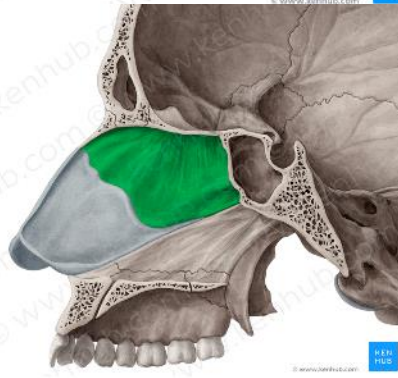
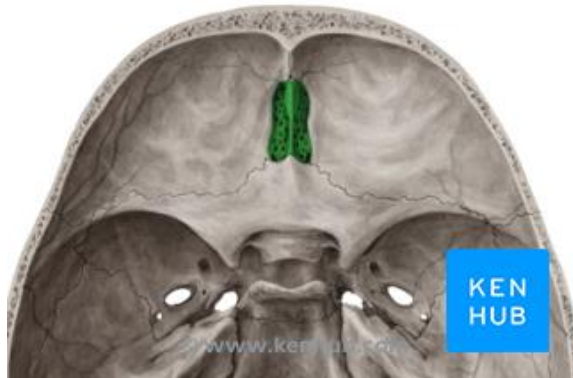
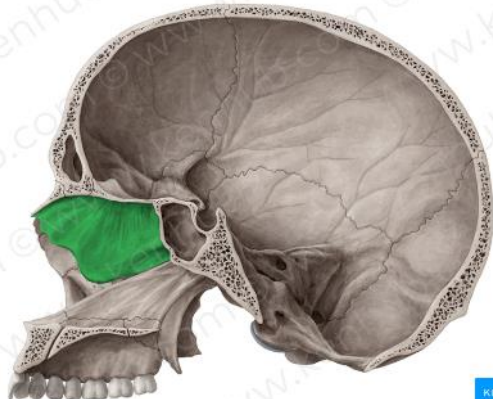
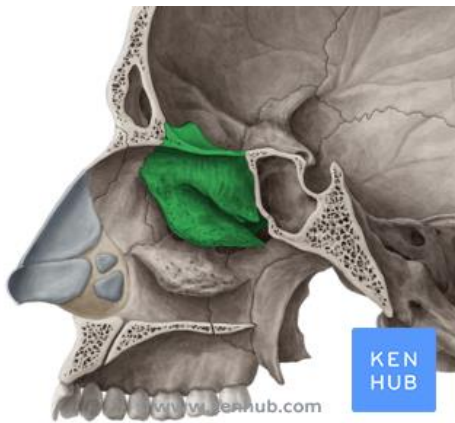
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# Os parietale



# Os ethmoidale (Čichová kost)



# Os ethmoidale (Čichová kost)

**Lamina cribrosa** / Dírkováná ploténka

**Foramina cribrosa**

**Crista galli** / Kohoutí hřeben

(Alae cristae galli)

**Lamina perpendicularis** / Svislá ploténka

**Labyrinthus ethmoidalis** / Čichové bludiště

**Cellulae ethmoidales anteriores, medii, posteriores** / Přední, střední, zadní čichové sklípky

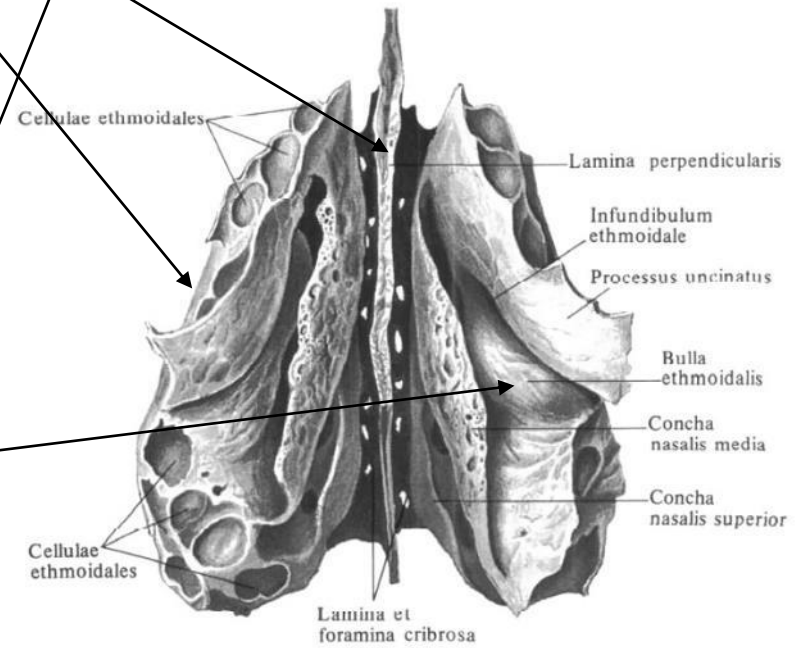
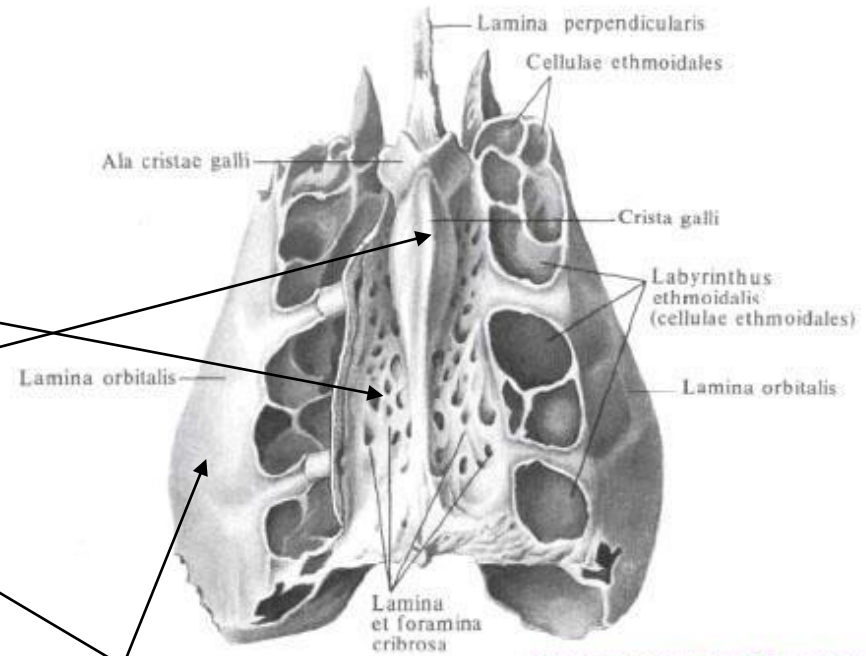
**Lamina orbitalis** (dříve papyracea)

**Concha nasalis media, superior, (suprema)** / Střední, horní, (hořejší) nosní skořepa

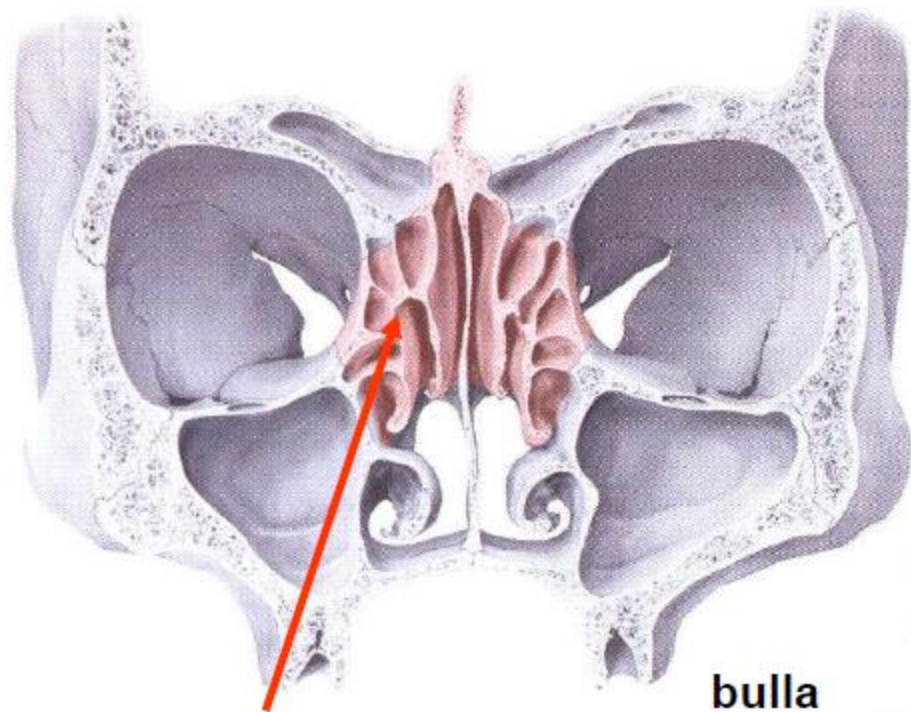
**Bulla ethmoidalis** / Čichová vypuklina

**Processus uncinatus** / Háčkovitý výběžek

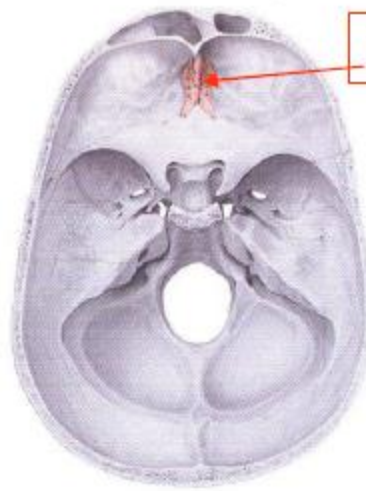
(Infundibulum ethmoidale / Čichová nálevka)



# Os ethmoidale (Čichová kost)

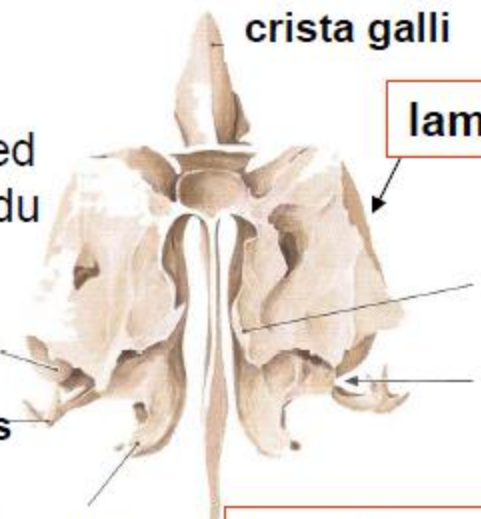


cellulae ethmoidales)



lamina cribrosa

Pohled  
zezadu



crista galli

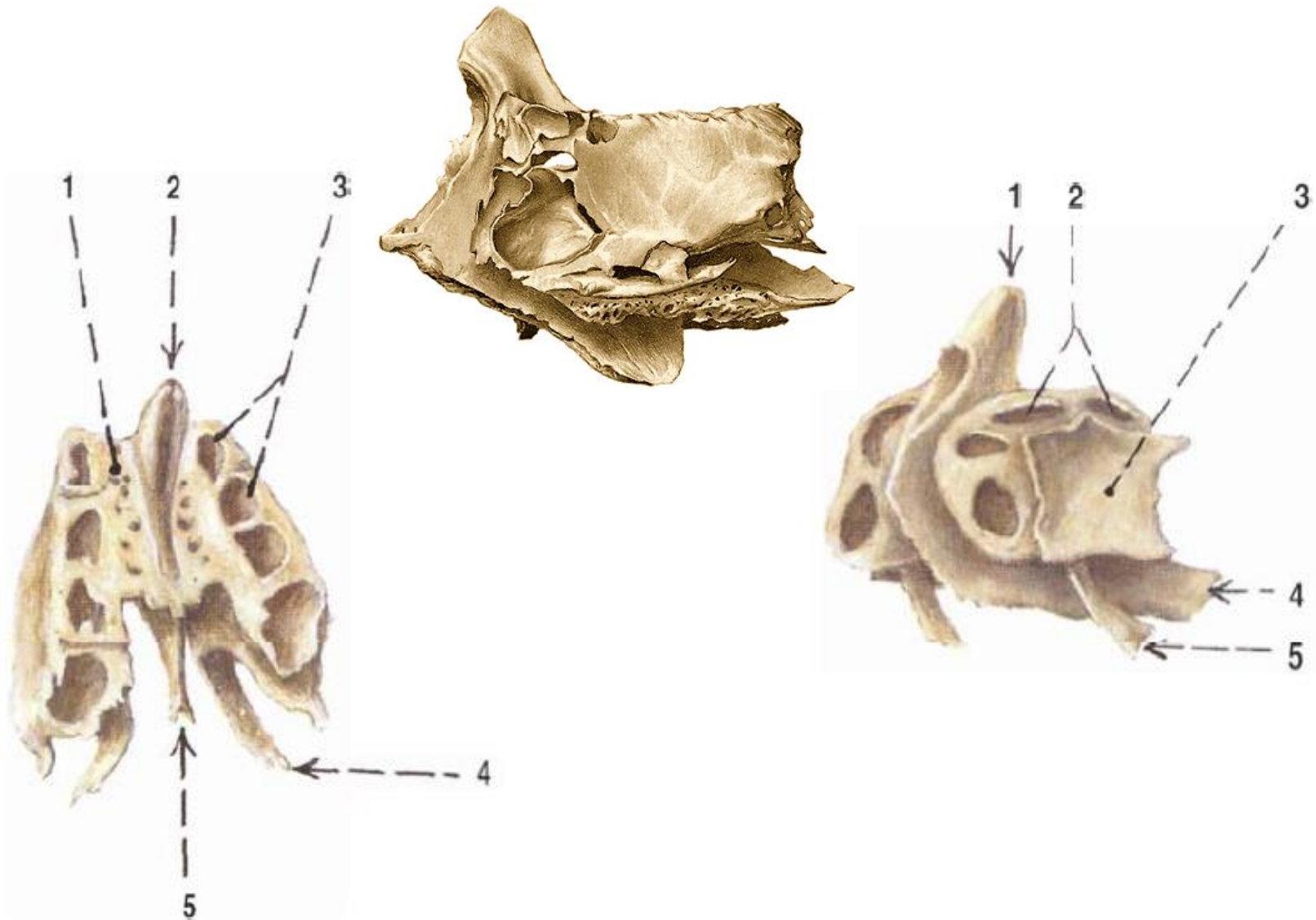
lamina orbitalis

bulla  
ethmoidalis  
processus uncinatus

concha nasalis media

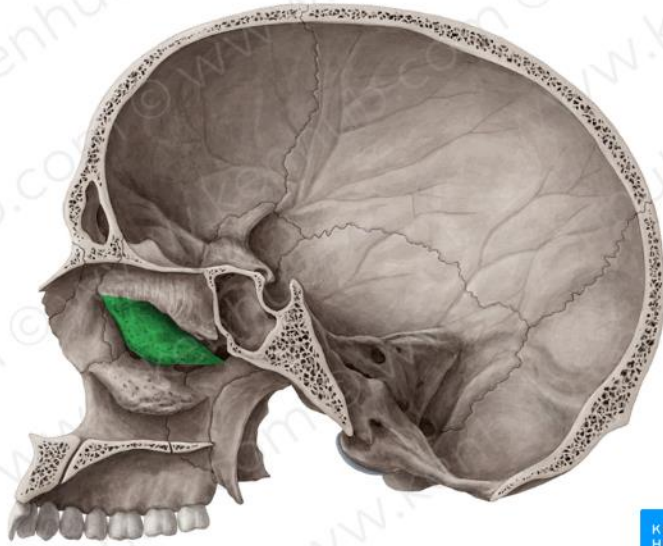
lamina perpendicularis

# Os ethmoidale (Čichová kost)



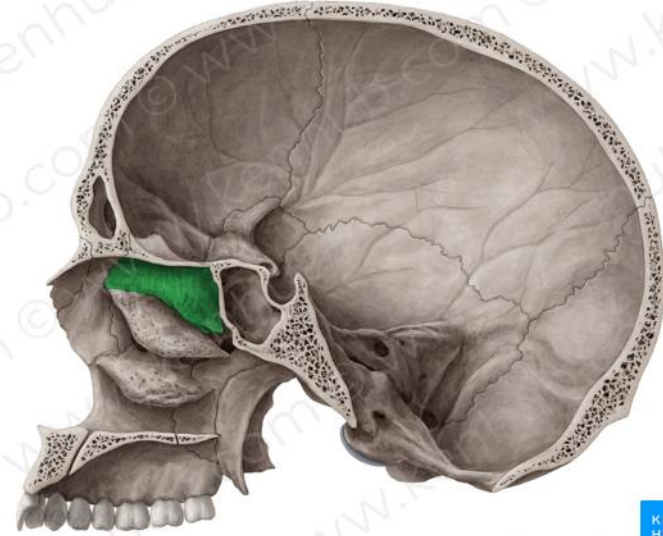
# Os ethmoidale (Čichová kost)

## Concha nasalis media

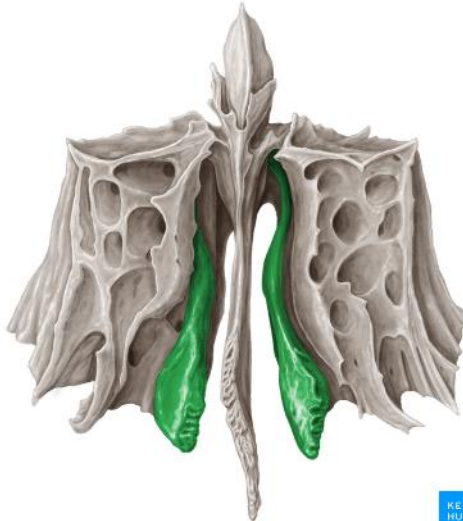


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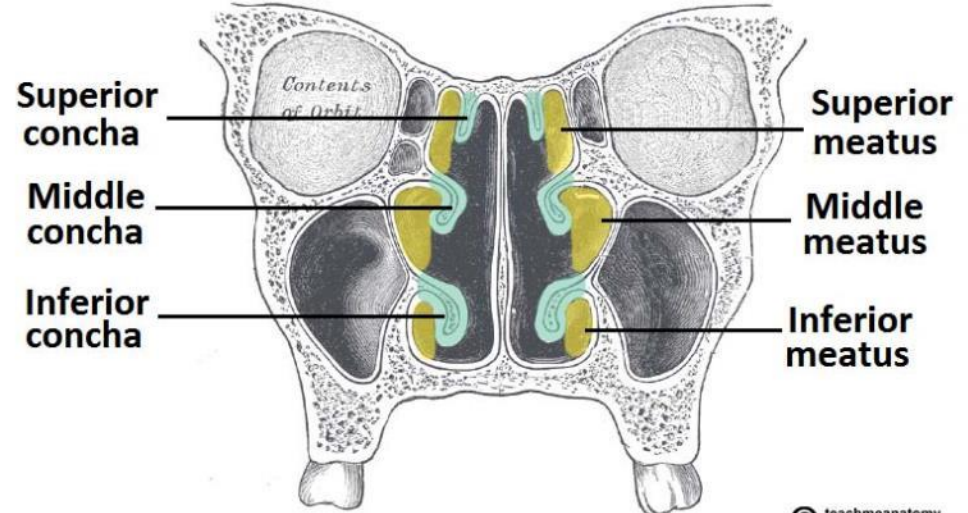
## Concha nasalis superior



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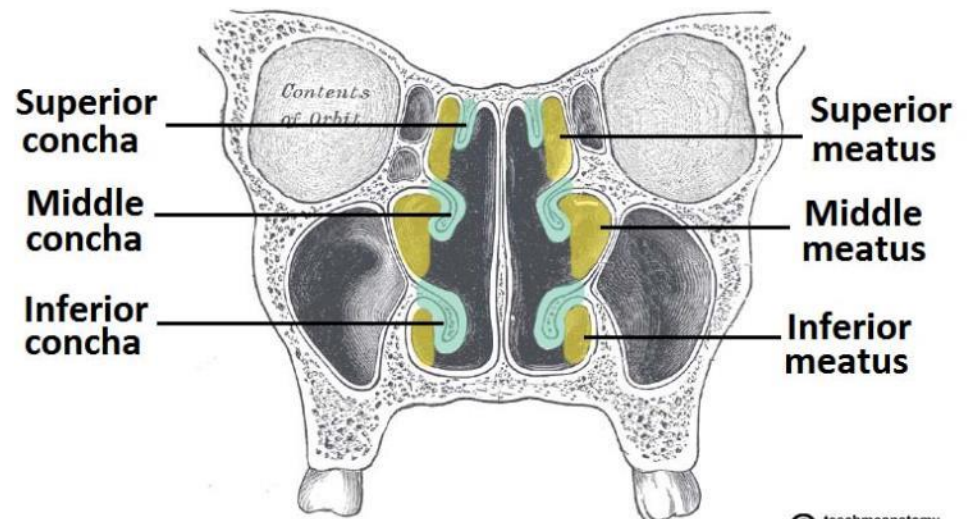
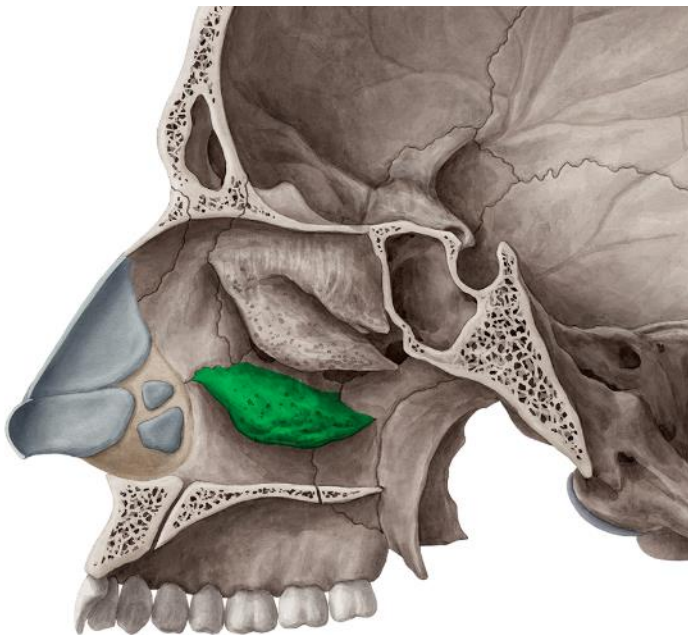
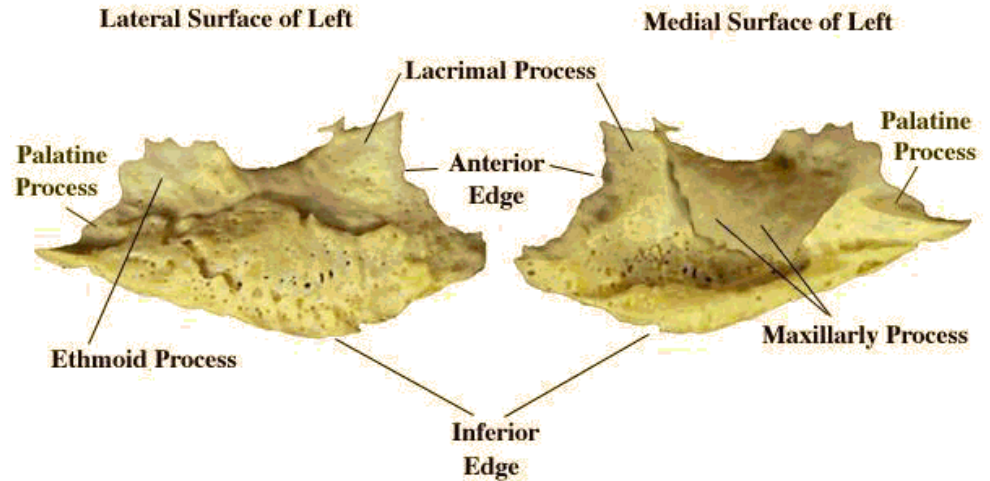
teachmeanatomy  
The #1 Rated Human Anatomy Site on the Web.

# Concha nasalis inferior (Dolní nosní skořepa)

Processus lacrimalis /  
Slzný výběžek

Processus maxillaris /  
Čelistní výběžek

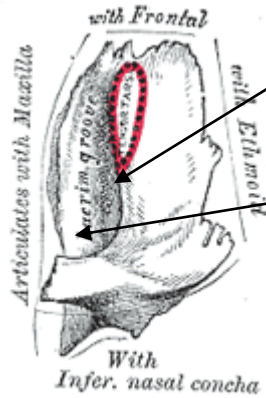
**Processus ethmoidalis**





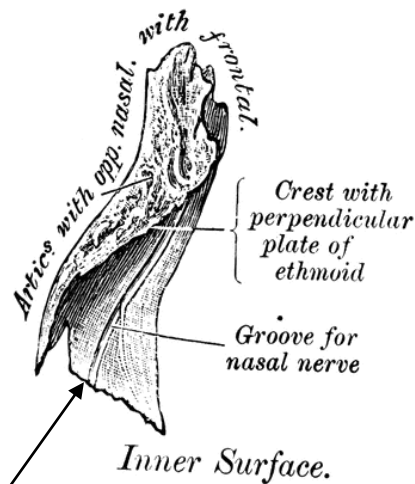
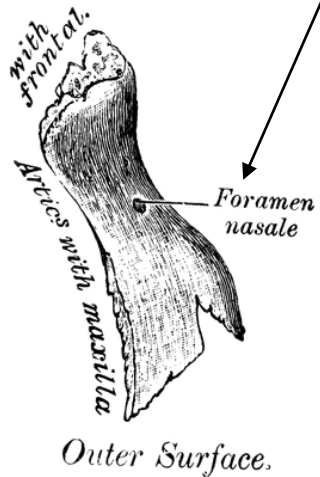
# Os nasale (nosní kost)

# Os lacrimale (slzní kost)

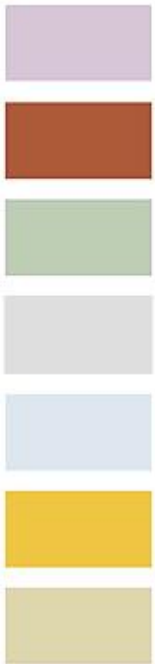
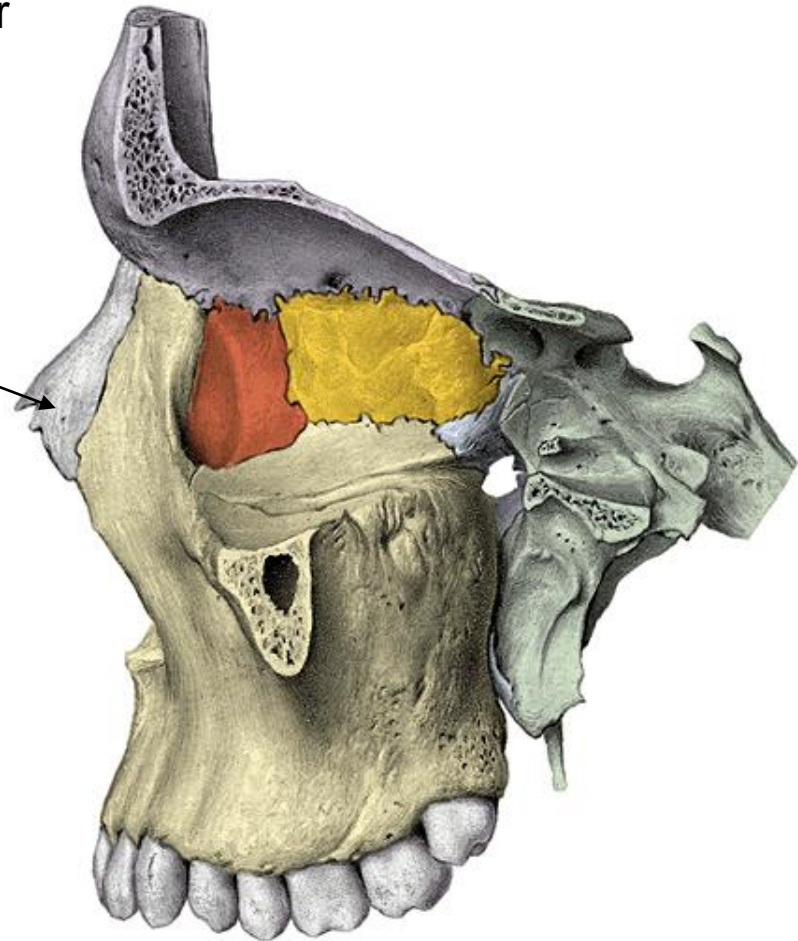


crista lacrimalis posterior

sulcus lacrimalis

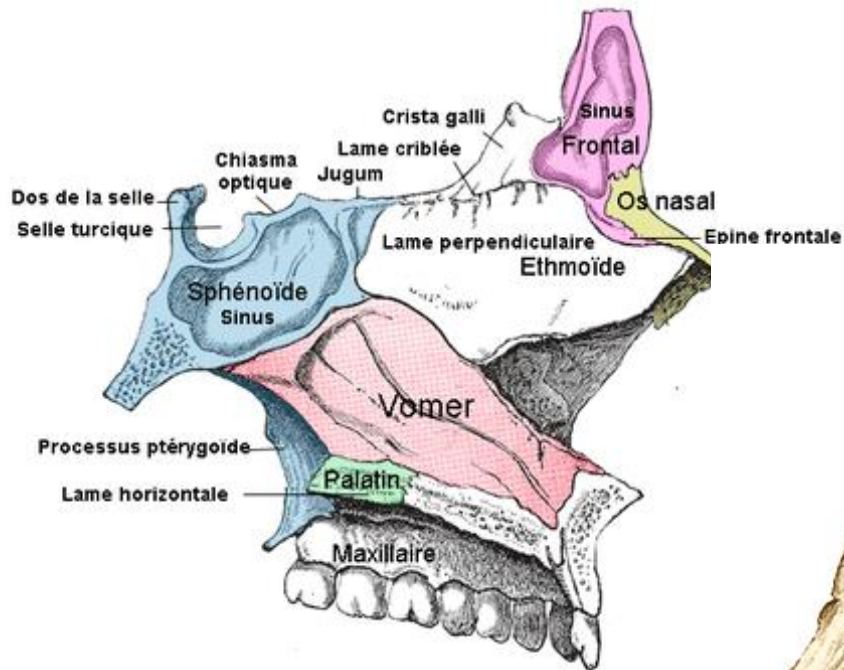
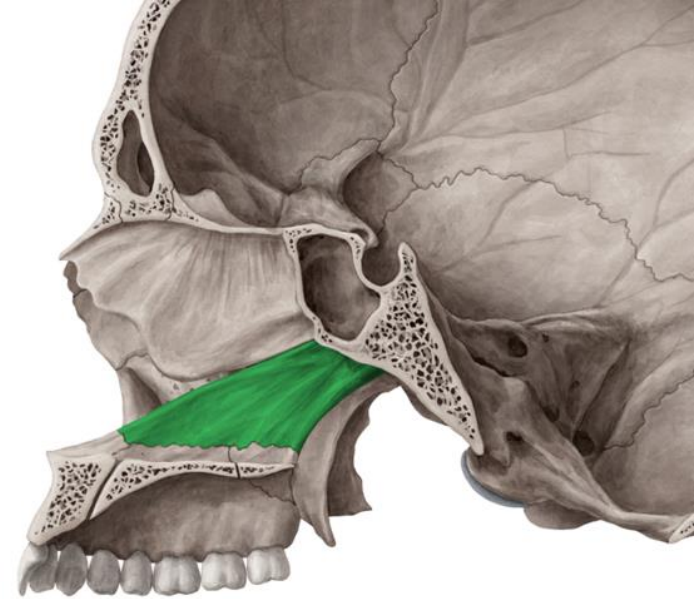


sulcus ethmoidalis



# Vomer (Radličná kost)

- ala vomeris

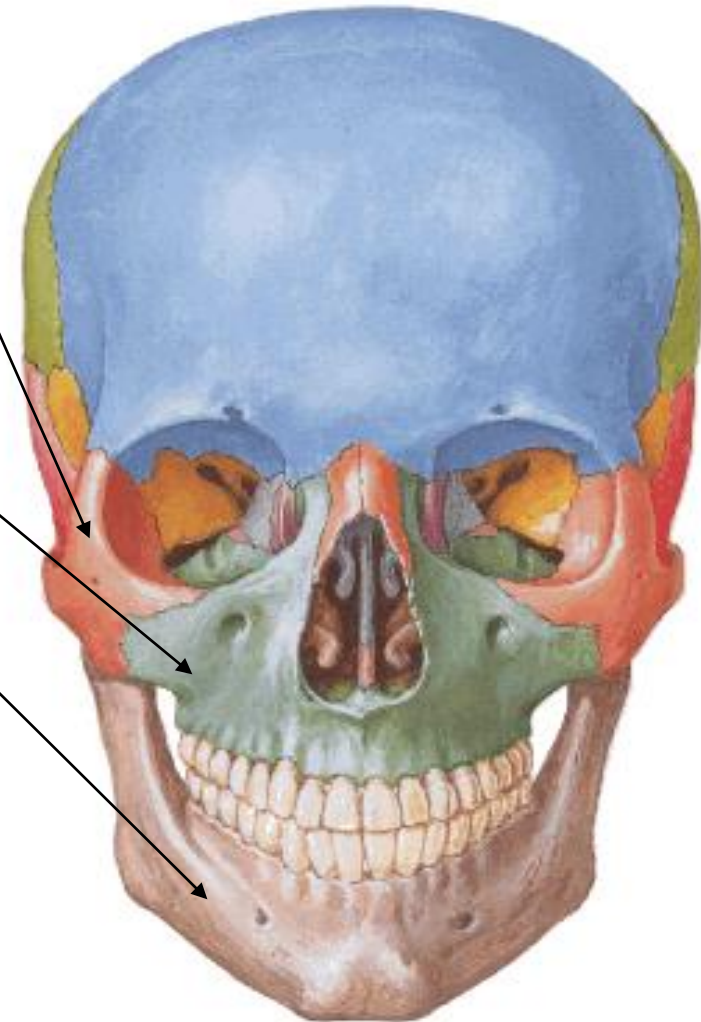


Vomer  
(vue latérale droite)



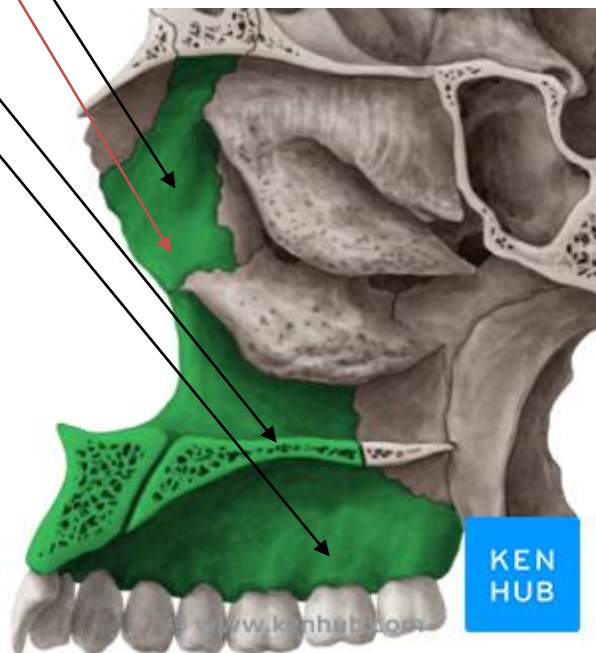
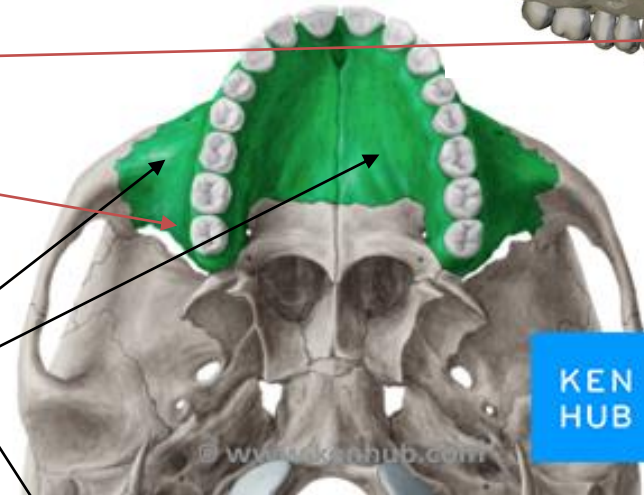
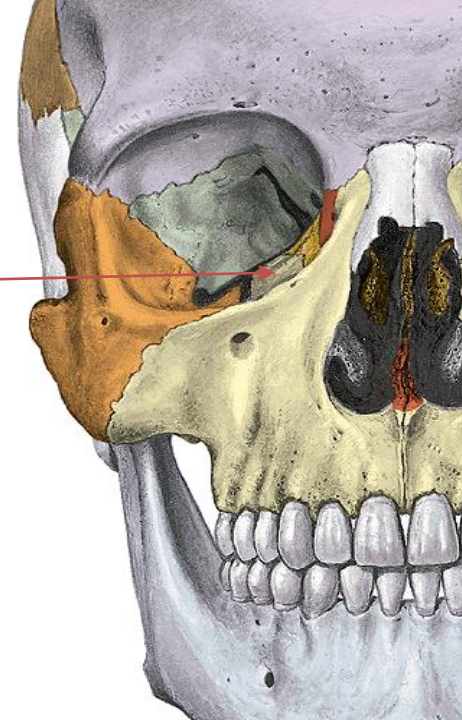
# Viscerocranium

- os zygomaticum (lícní kost)
- maxilla (horní čelist)
- mandibula (dolní čelist)
- os palatinum (patrová kost)
- os hyoideum (jazyk)
- ossicula auditus (ušní kůstky)



# Maxilla (horní čelist)

<b>Corpus maxillae</b>
<b>Facies orbitalis</b>
<b>Facies anterior</b>
<b>Facies infratemporalis</b>
<b>Facies nasalis</b>
<b>Processus frontalis</b>
<b>Processus zygomaticus</b>
<b>Processus palatinus</b>
<b>Processus alveolaris</b>
<b>Sinus maxillaris / Antrum Highmori / Čelistní dutina</b>



# Maxilla (horní čelist)

**Corpus maxillae**

**Facies orbitalis**

**Canalis infraorbitalis**

**Sulcus infraorbitalis**

**Margo infraorbitalis**

**Facies anterior**

**Foramen infraorbitale**

**Fossa canina / Špičáková jáma**

(Incisura nasalis)

**Spina nasalis anterior**

**Facies infratemporalis**

**Foramina alveolaria / Lůžkové otvory**

**Canales alveolares / Lůžkové kanálky**

**Tuber maxillae**

**Facies nasalis**

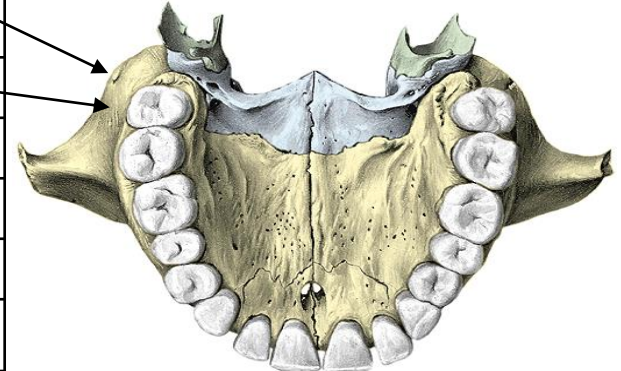
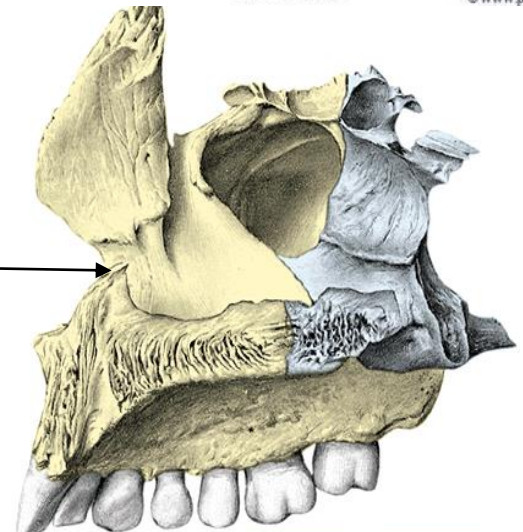
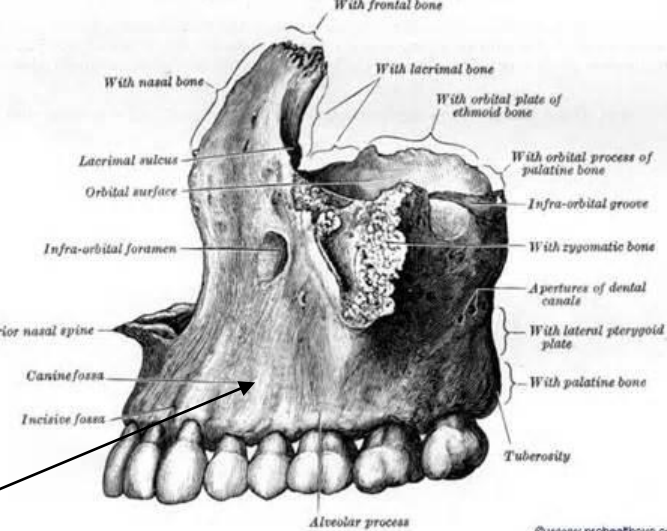
(Sulcus lacrimalis)

**Crista conchalis**

**Hiatus maxillaris**

(Sulcus palatinus major)

**Sinus maxillaris / Antrum Highmori / Čelistní dutina**



# Maxilla (horní čelist)

**Processus frontalis**

**Crista lacrimalis anterior**

(Incisura lacrimalis)

**Crista ethmoidalis**

**Processus zygomaticus**

**Processus palatinus**

**Crista nasalis**

**Os incisivum seu Premaxilla / Mezičelist**

variabilní (samostatná jen v dětství)

**Sutura incisiva / Mezičelistní šev** – variabilní (jen v dětství)

**Canales incisivi et foramina incisiva**

(Spinae palatine)

(Sulci palatini)

**Processus alveolaris / Lůžkový výběžek**

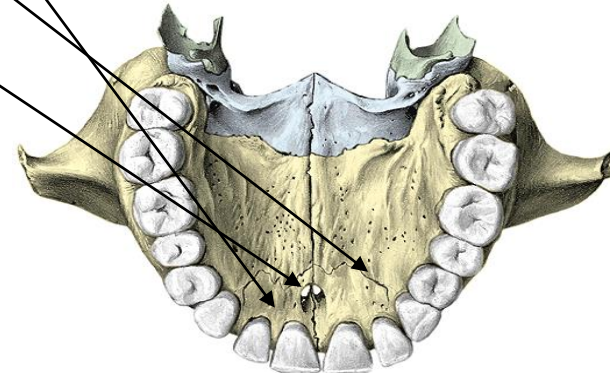
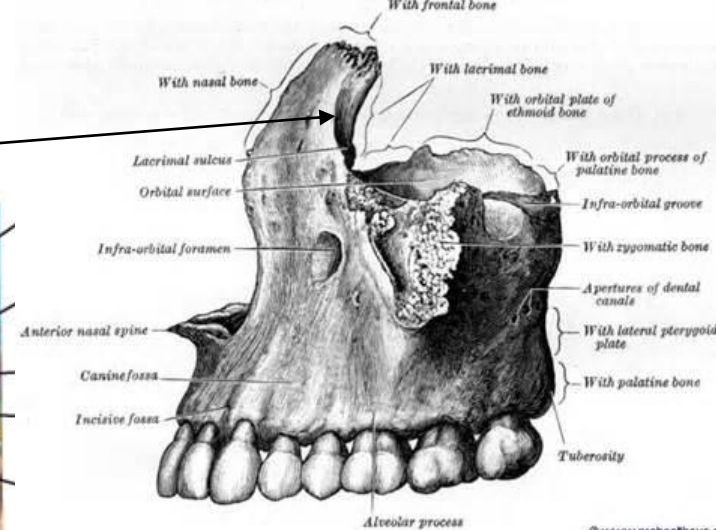
**Arcus alveolaris**

**Alveoli dentales / Zubní lůžka**

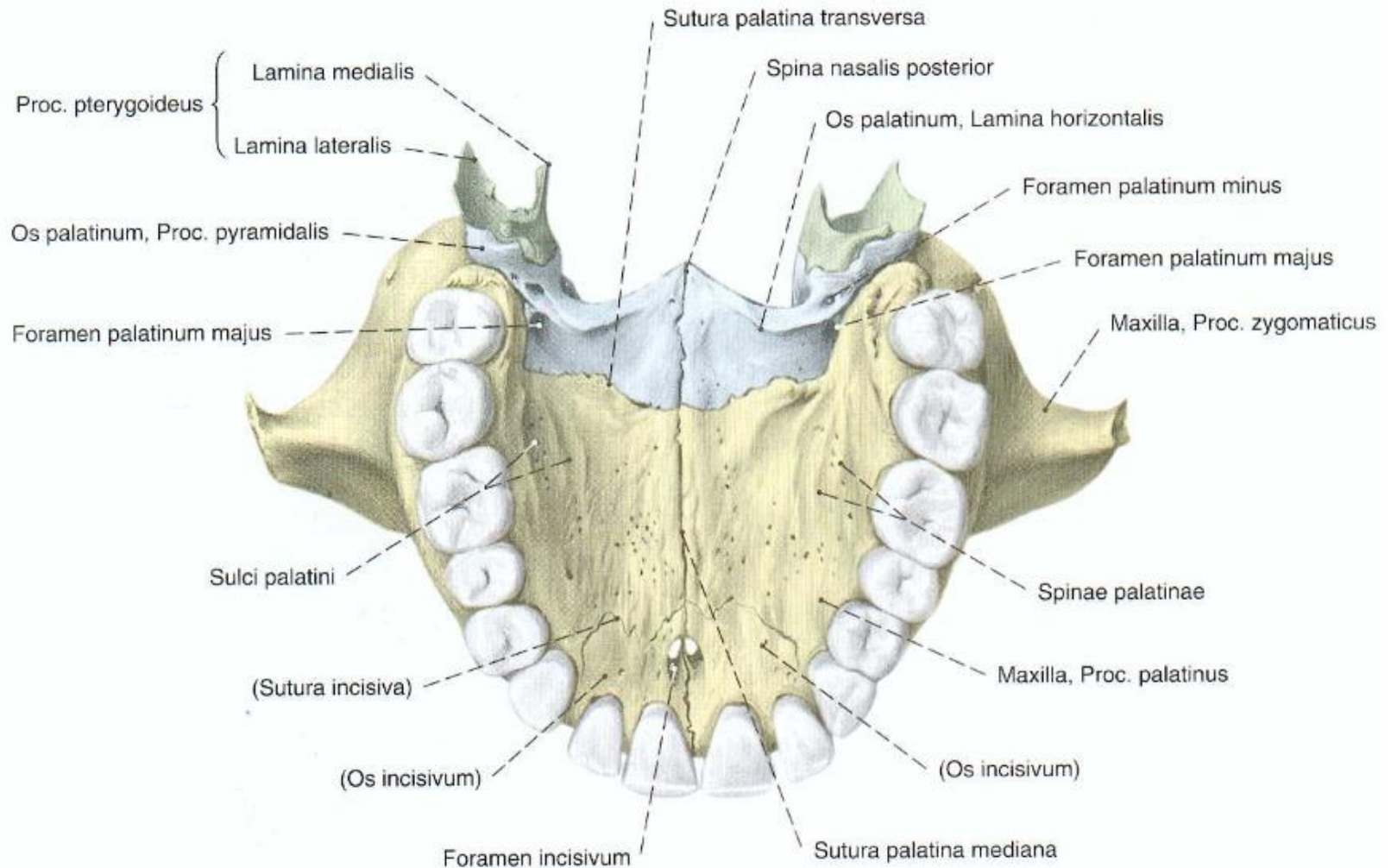
**Septa interalveolaria / Mezilůžkové přepážky**

**Septa interradicularia / Mezikořenové přepážky**

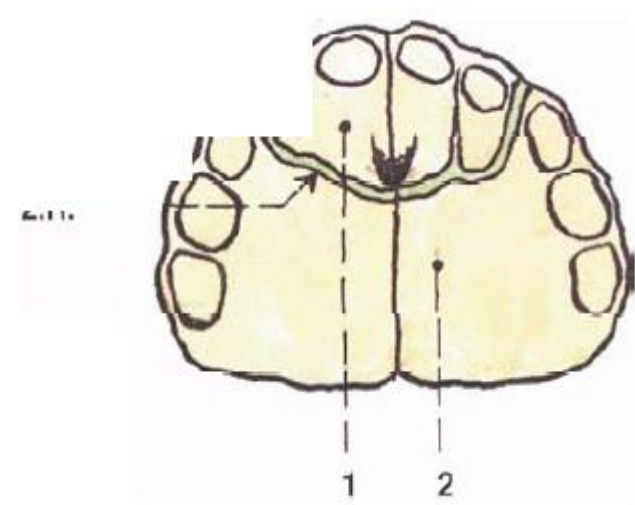
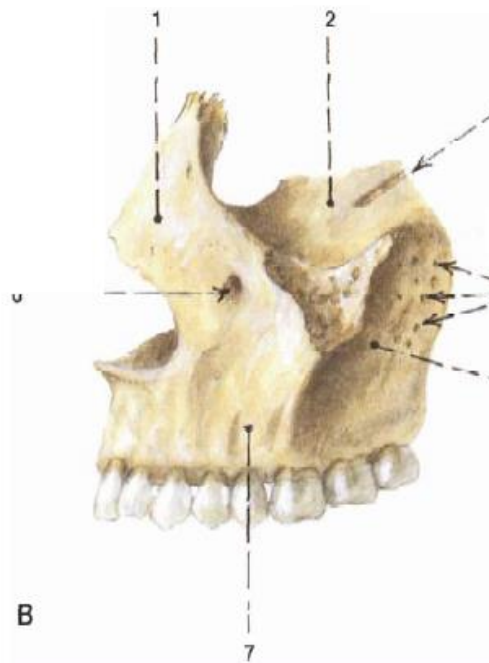
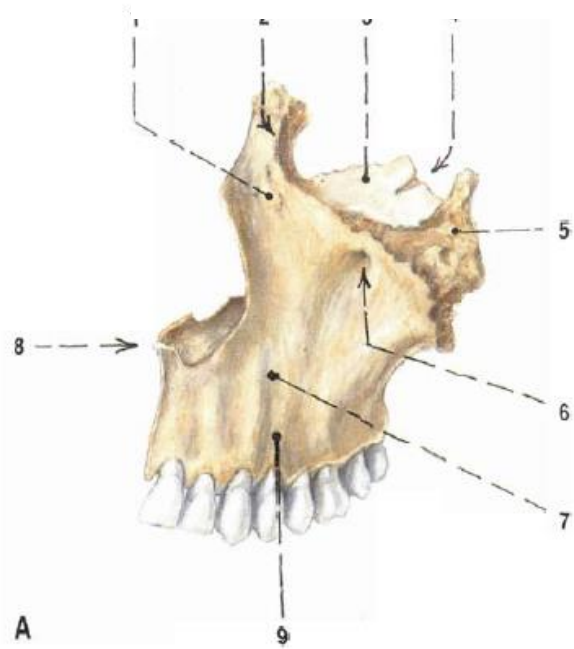
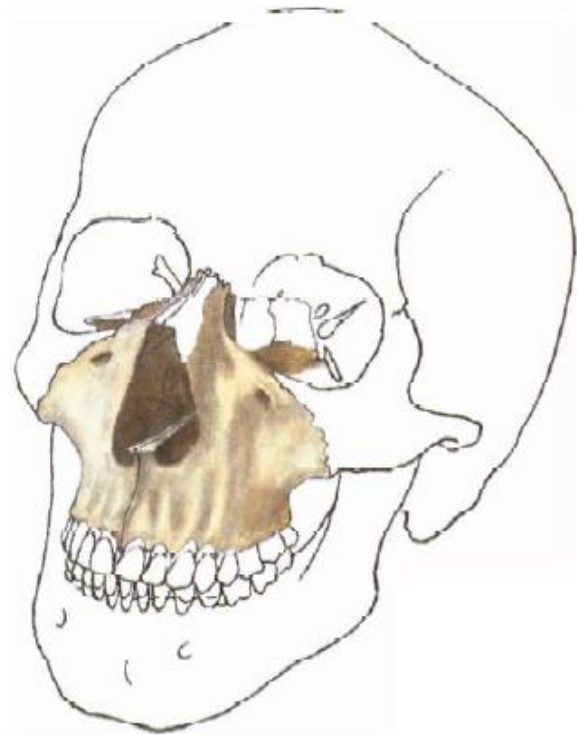
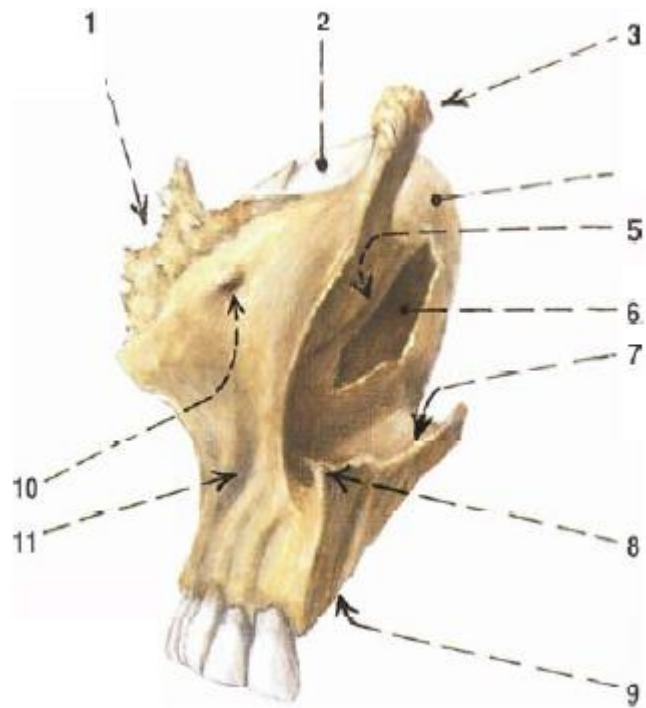
**Juga alveolaria / Lůžková jařma**



# Processus palatinus maxillae



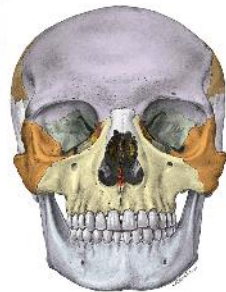
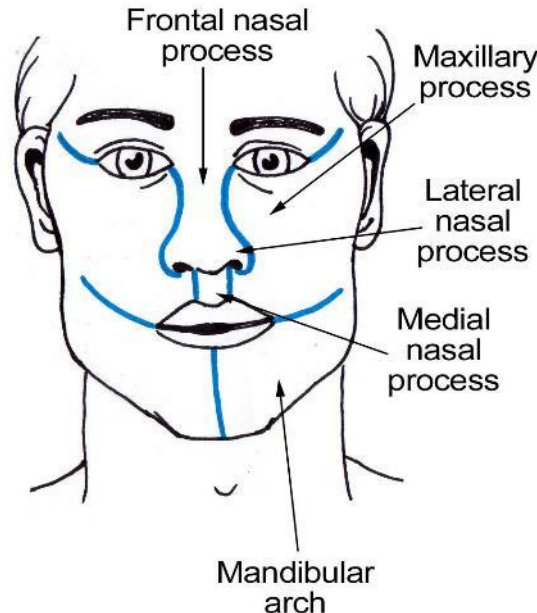
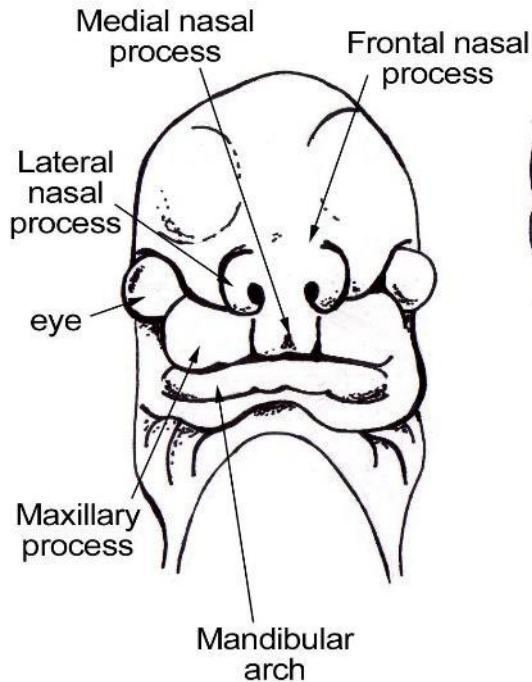
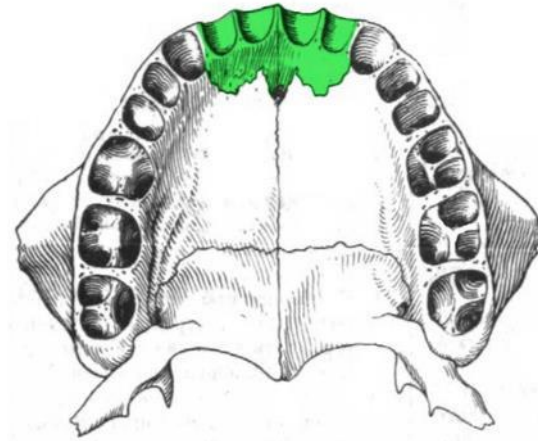
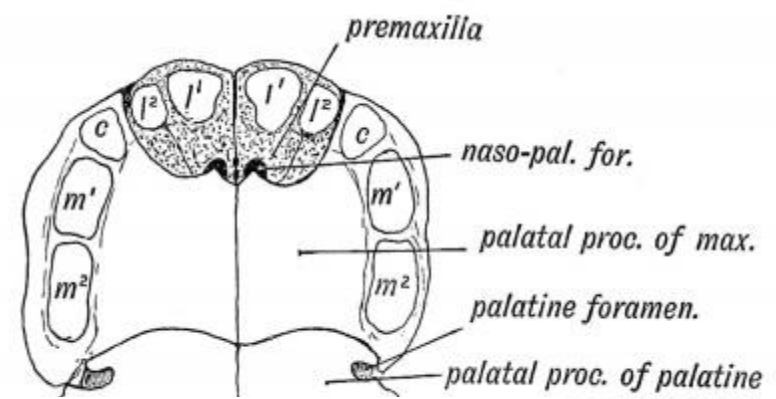
**Abb. 86** Harter Gaumen, Palatum durum; von unten .





# Os incisivum (premaxilla, mezičelist)

- vývoj: frontonazální výběžek obličeje
- sutura incisiva



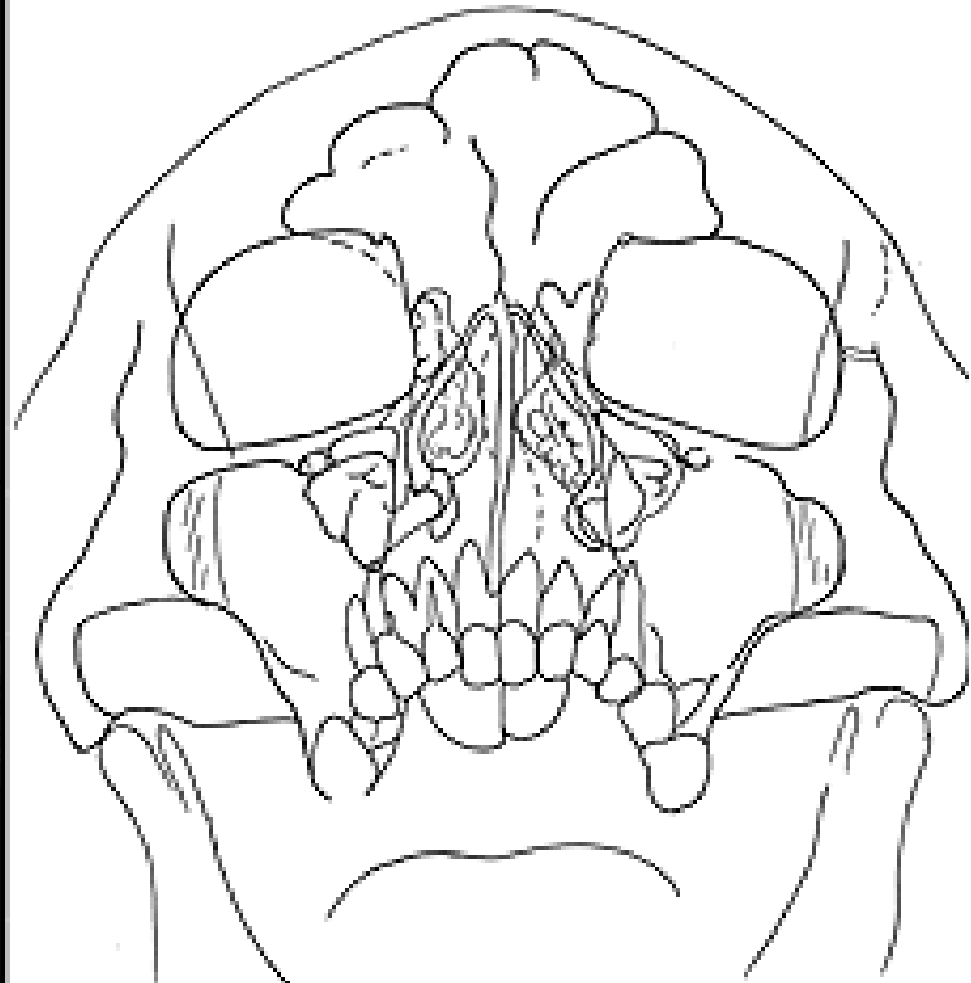
# Rozštěpové vady

cheilo/gnatho/palatoschisis – asi 1 ‰ porodů



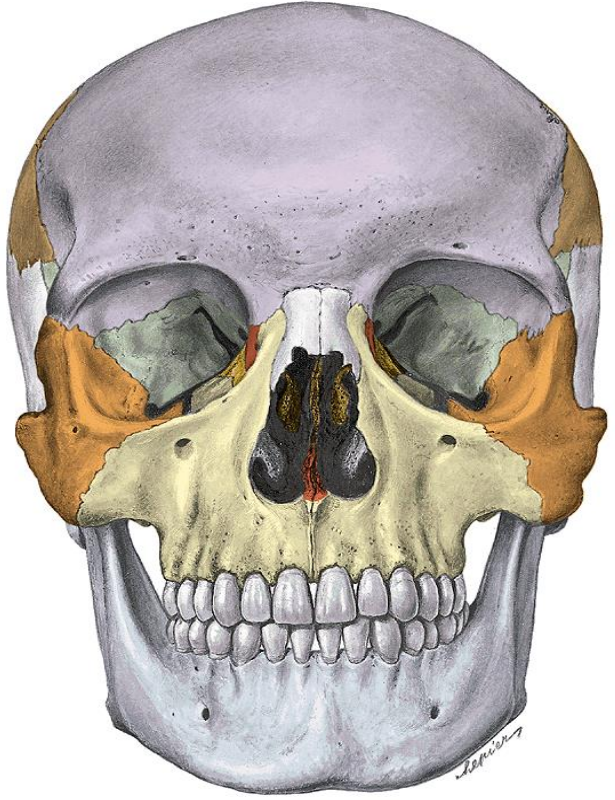
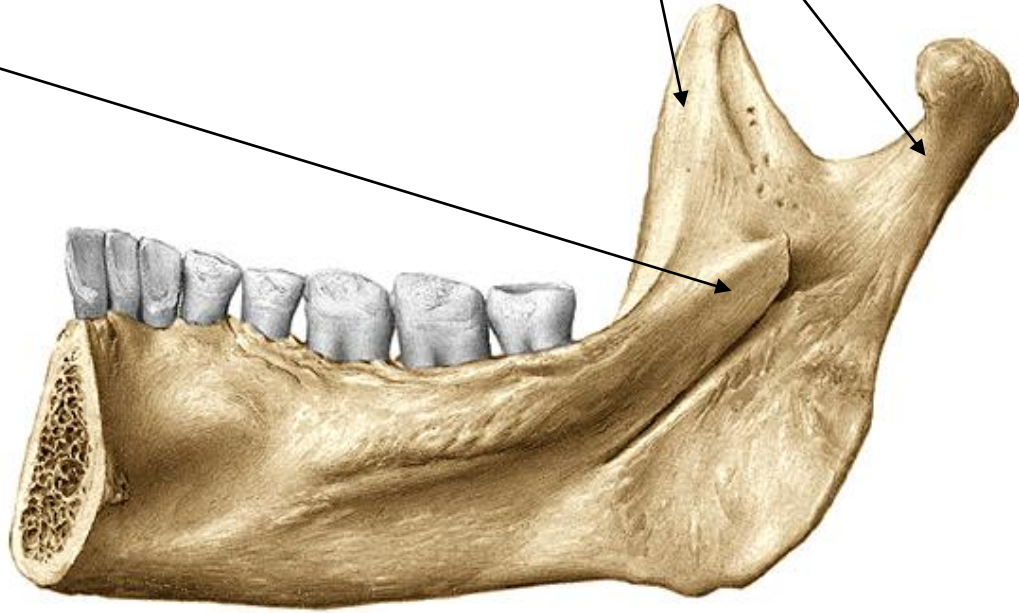
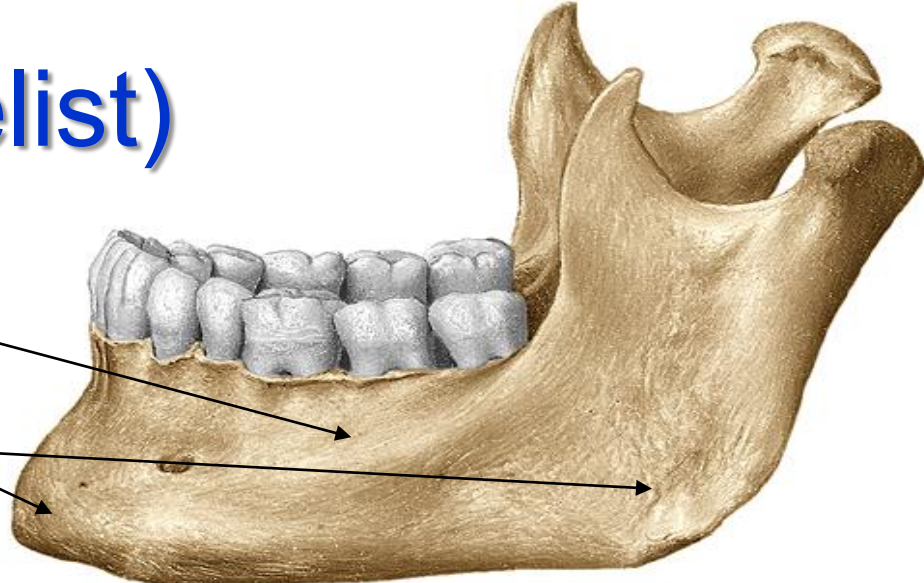
# Vedlejší nosní dutiny

## *Sinus paranasales*



# Mandibula (dolní čelist)

- Corpus mandibulae
- Basis mandibulae
- Ramus mandibulae
- Angulus mandibulae
- Processus condylaris
- Processus coronoideus



# Mandibula (dolní čelist)

**Corpus mandibulae**

**Basis mandibulae**

**Syndesmosis mandibulae** – variabilní (jen v dětství do 1. roku)

**Protuberantia mentalis** / Bradová vyvýšenina (Tuberculum mentale)

**Foramen mentale**

**Linea obliqua** / Šikmá čára

**Fossa digastrica** / Jamka dvojbřiškového svalu

**Spina mentalis superior et inferior**

**Linea mylohyoidea** / Jazykočelistní čára (Torus mandibularis – variabilní)

**Fovea sublingualis** / Podjazyková jamka

**Fovea submandibularis** / Podčelistní jamka

**Arcus alveolaris**

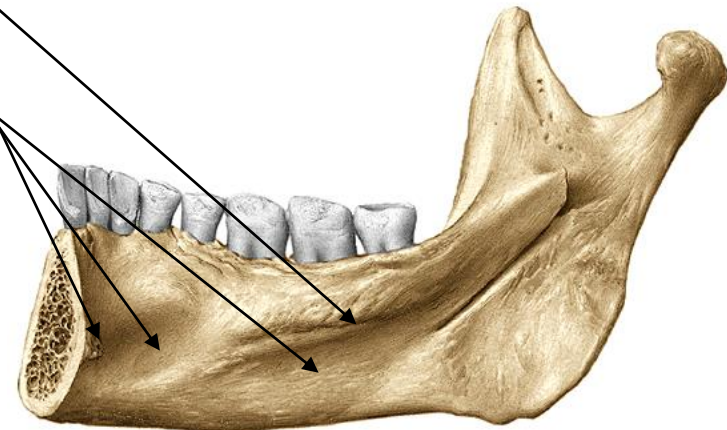
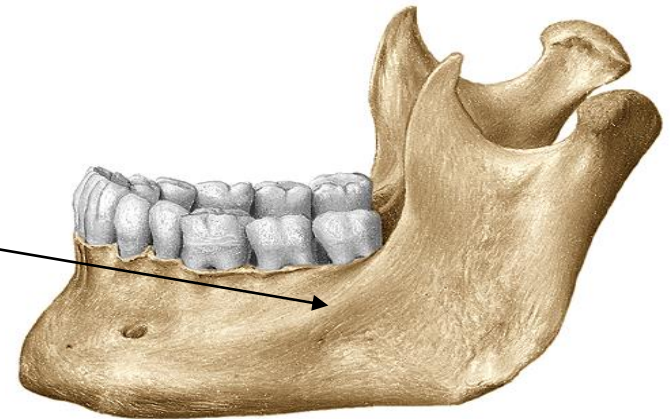
**Alveoli dentales**

**Septa interalveolaria**

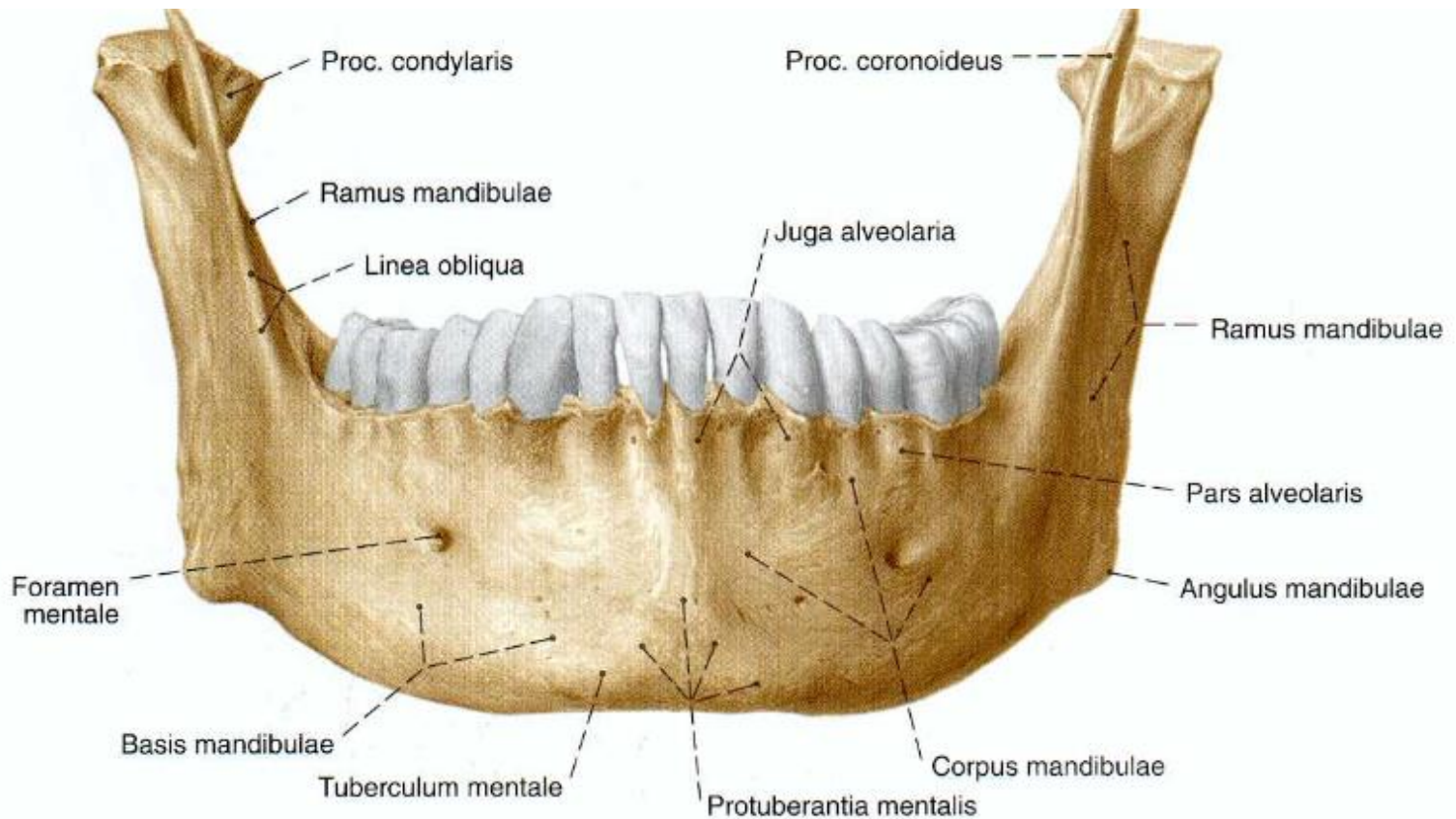
**Septa interradicularia**

**Juga alveolaria**

**Trigonum retromolare** / Zastoličkový trojúhelník (Fossa retromolaris)



# Mandibula (dolní čelist)



**Abb. 119** Unterkiefer, Mandibula;  
von vorne.

# Mandibula (dolní čelist)

**Ramus mandibulae /**  
Rameno dolní čelisti

**Angulus mandibulae**

**Tuberositas masseterica /**  
Žvýkačová drsnatina

**Tuberositas pterygoidea**

**Foramen mandibulae**

**Lingula mandibulae**

**Canalis mandibulae**

**Sulcus mylohyoideus**

**Processus coronoideus /**  
Hákovitý nebo Svalový  
výběžek

**Crista temporalis**

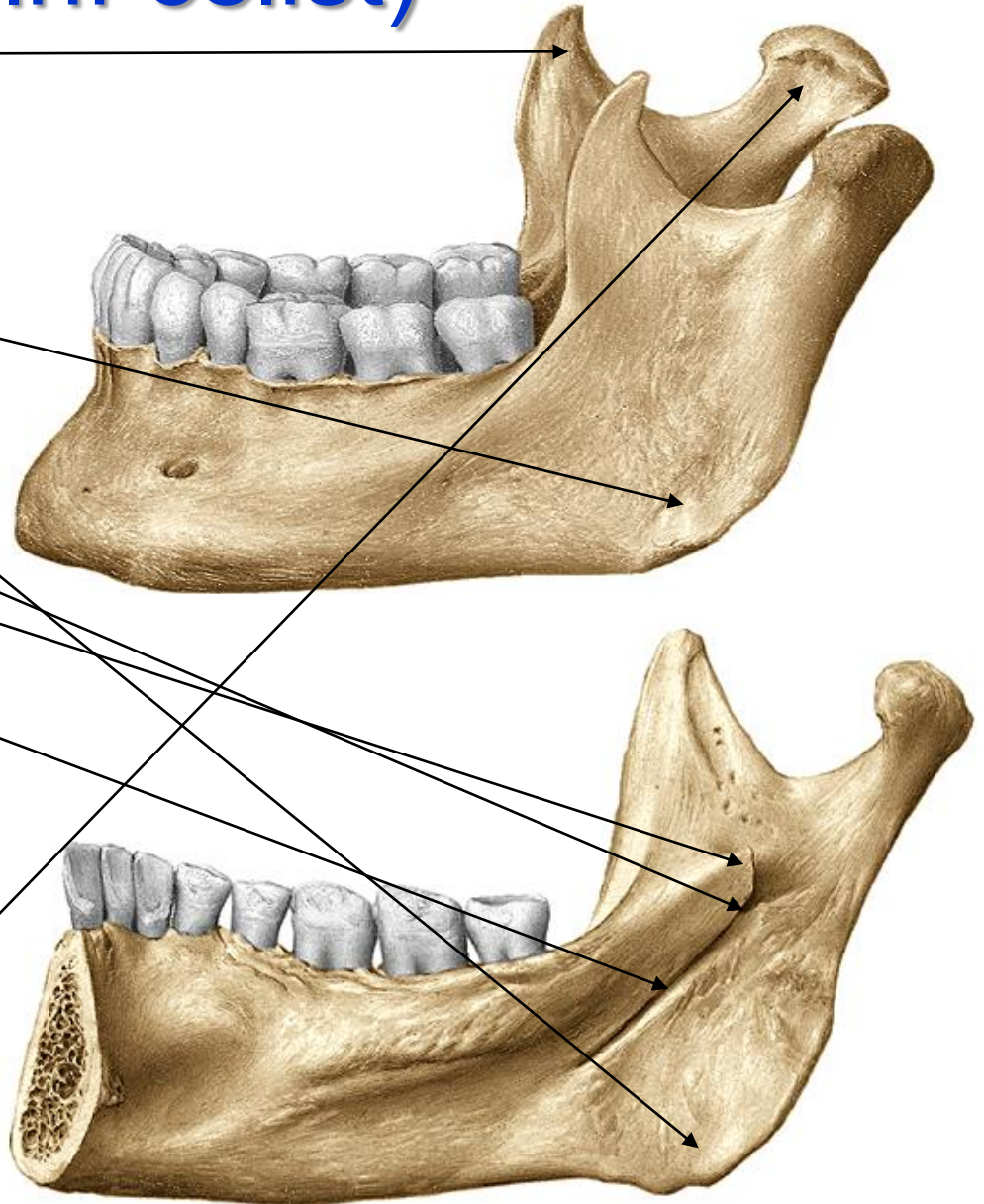
**Incisura mandibulae**

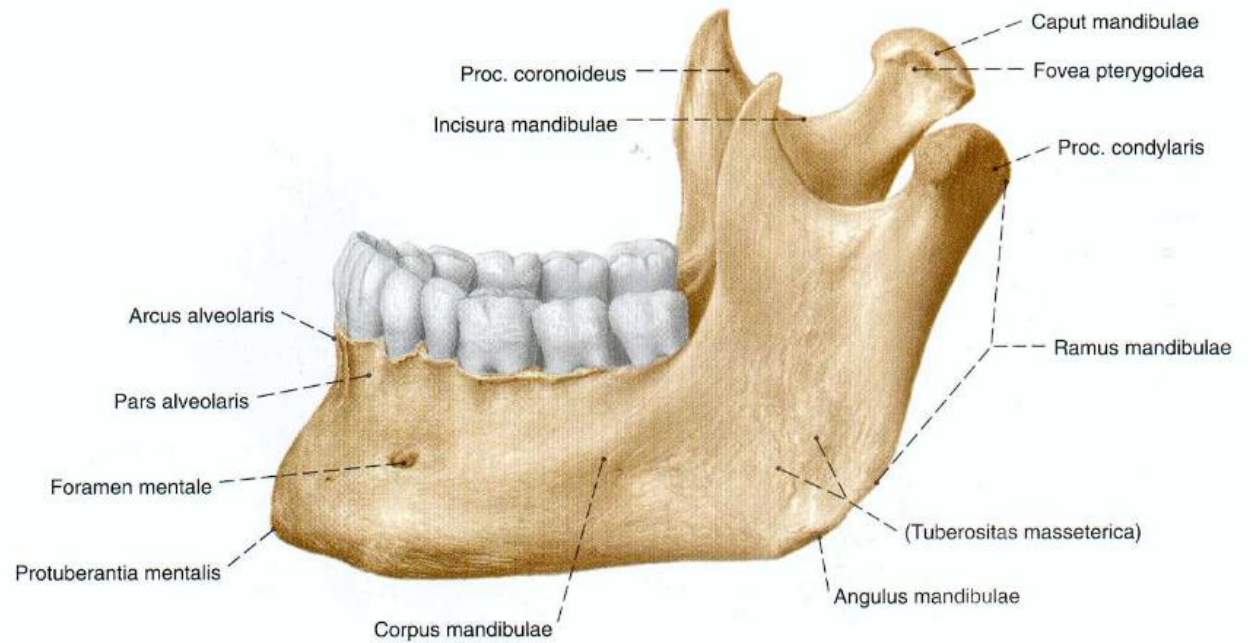
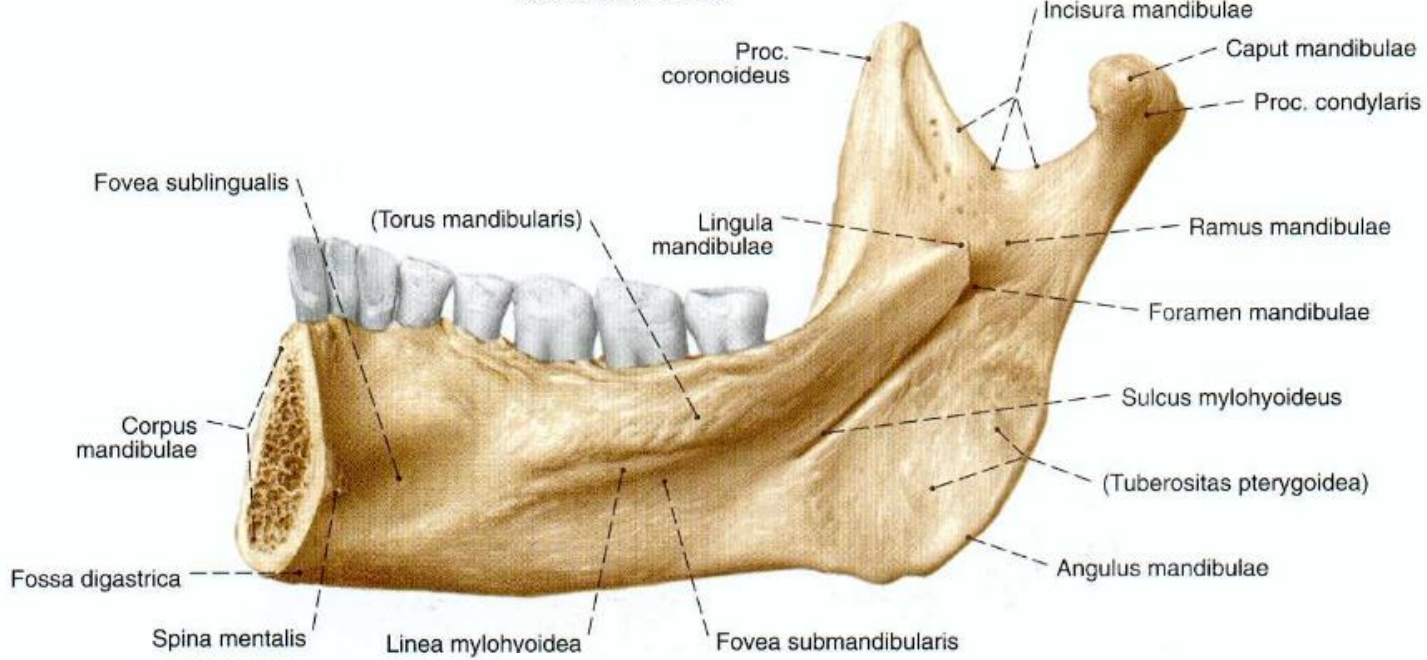
**Processus condylaris /**  
Kloubní výběžek

**Caput mandibulae**

**Collum mandibulae**

**Fovea pterygoidea**

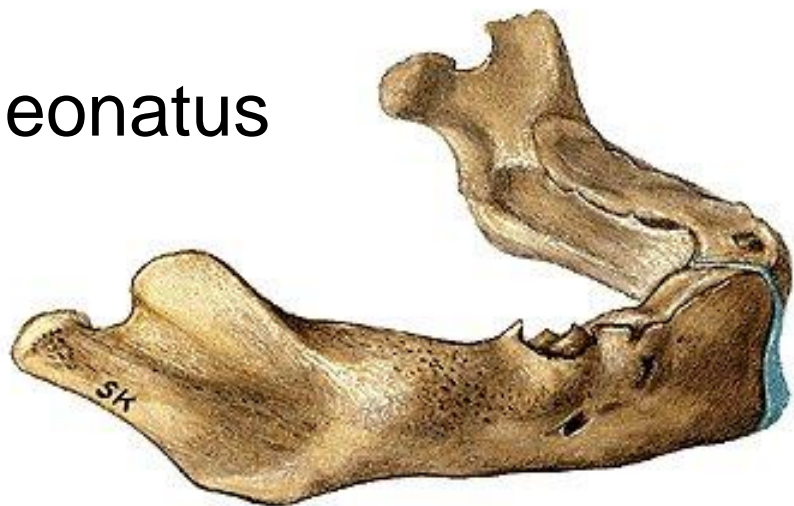




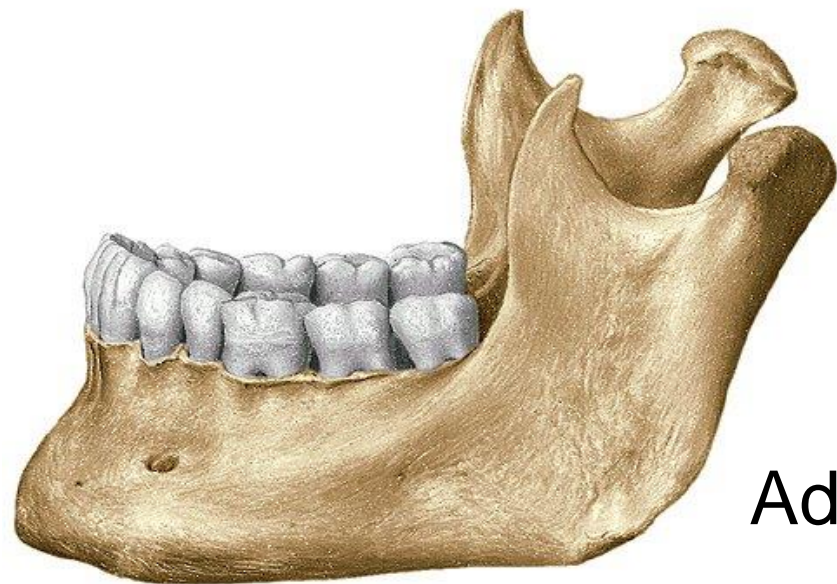
**Abb. 117** Unterkiefer, Mandibula; von lateral oben.



Neonatus



Senex



Adultus

# Os zygomaticum (lícní kost)

Facies lateralis, temporalis, orbitalis
Processus temporalis
Processus frontalis (Tuberculum orbitale)
(Tuberculum marginale – variabilní)
<b>Foramen zygomaticoorbitale</b>
<b>Foramen zygomaticofaciale</b>
<b>Foramen zygomaticotemporale</b>

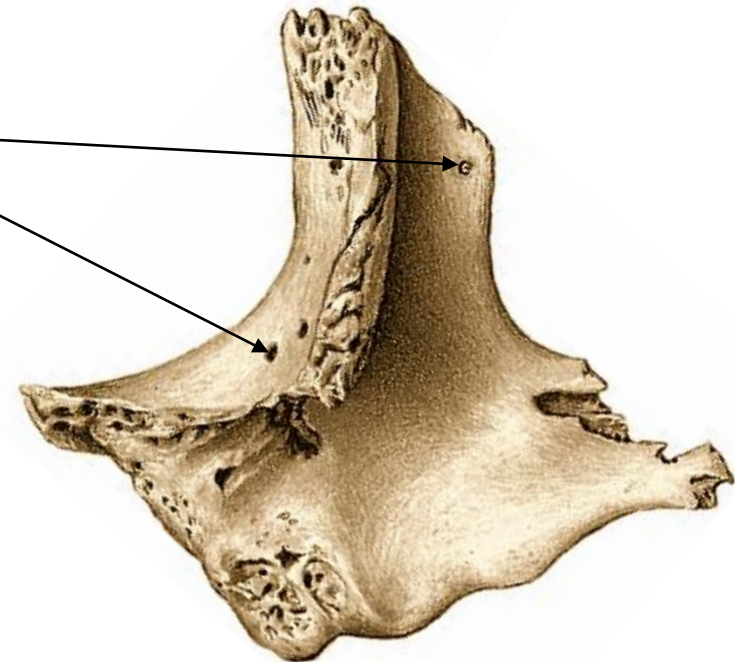
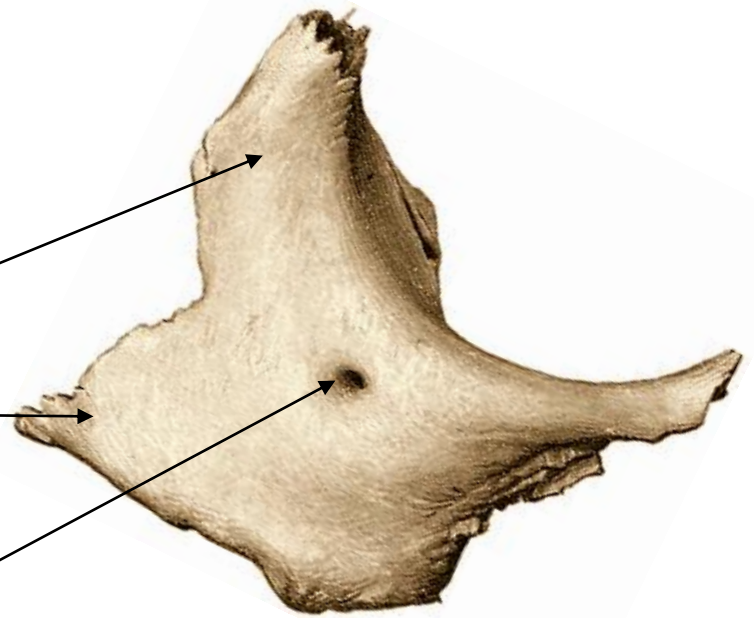
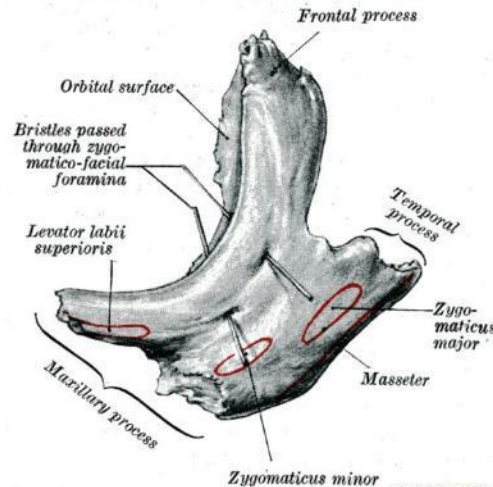
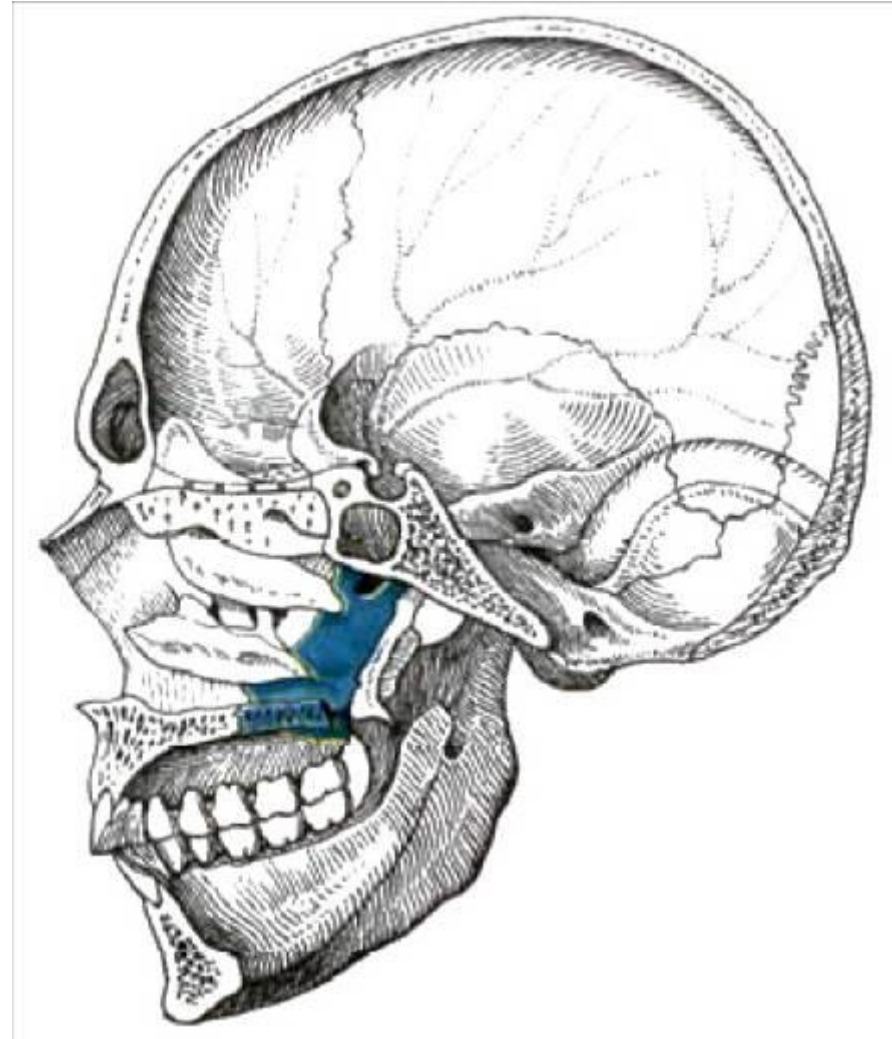


FIG. 395.—The left zygomatic bone.  
Lateral aspect.

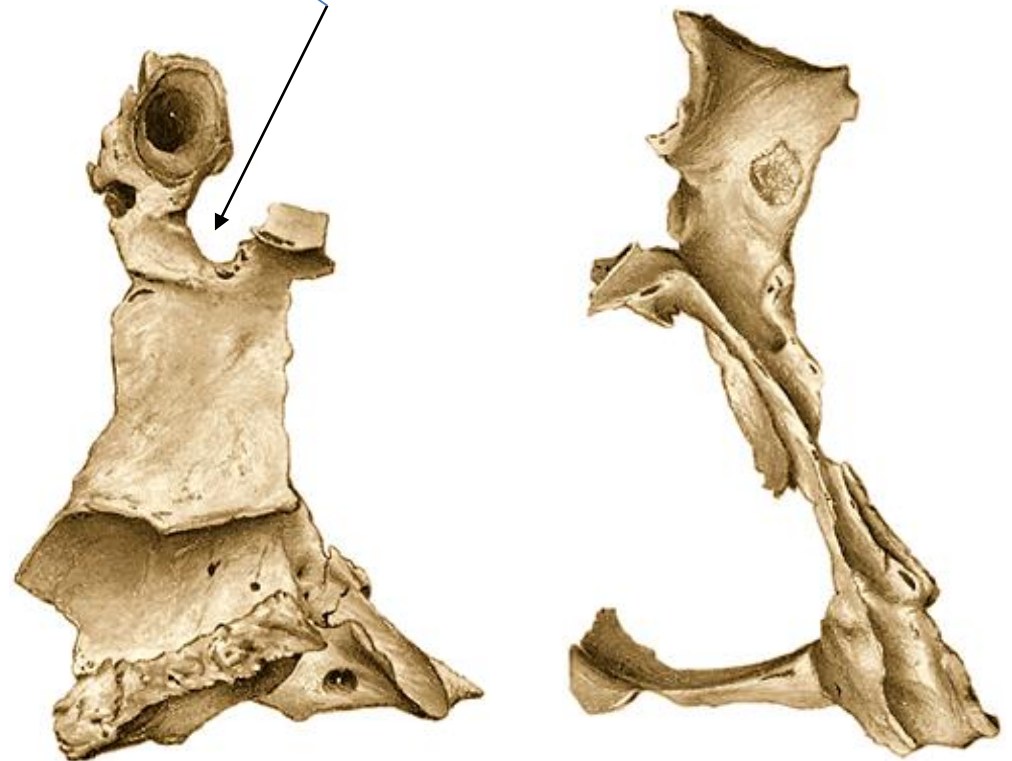
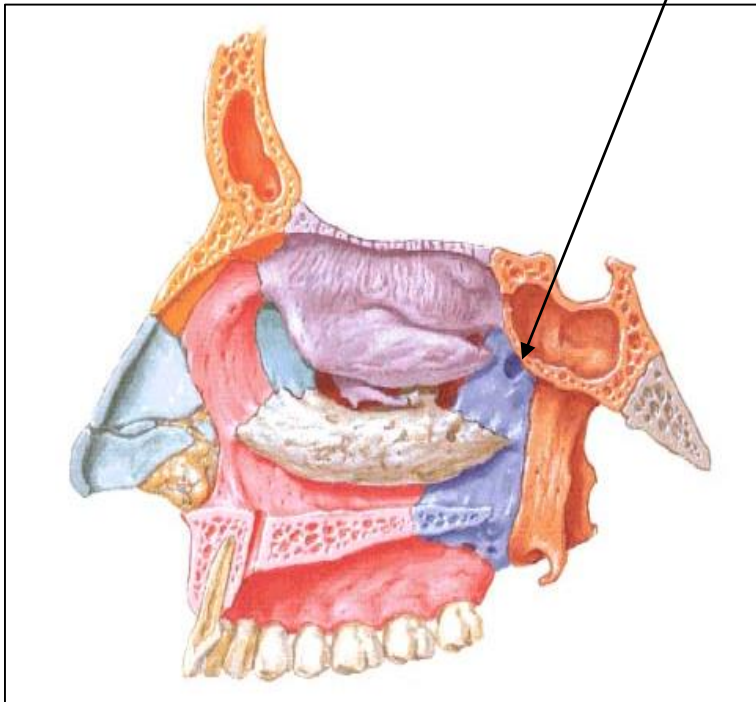


# Os palatinum (Patrová kost)



# Os palatinum (Patrová kost)

- lamina horizontalis
- lamina perpendicularis
- incisura sphenopalatina → foramen sphenopalatinum



# Os palatinum

**Lamina perpendicularis**

**Facies nasalis, maxillaris**

**Incisura sphenopalatina**

(Sulcus palatinus major) → *Canalis palatinus major*

(Processus pyramidalis)

**Canales palatini minores**

**Crista ethmoidalis**

**Crista conchalis**

**Processus orbitalis**

**Processus sphenoidalis**

**Lamina horizontalis / Vodorovná ploténka**

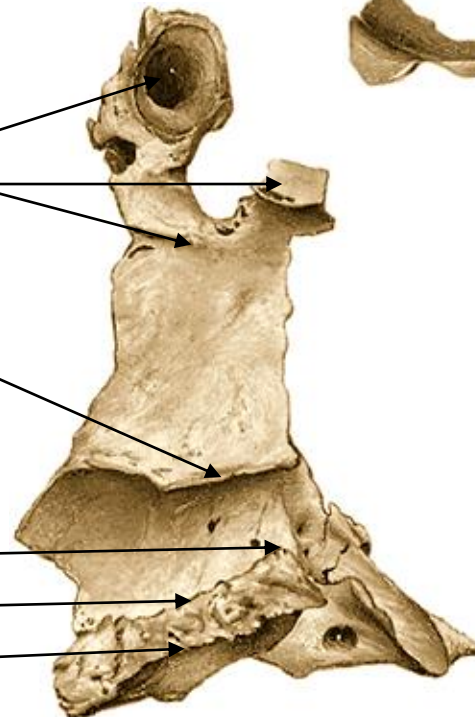
**Facies nasalis et palatina**

**Foramina palatina minora**

**Spina nasalis posterior**

**Crista nasalis**

**Crista palatina**



# Jazylka (os hyoideum)

- corpus
- cornu majus / velký roh
- cornu minus / malý roh

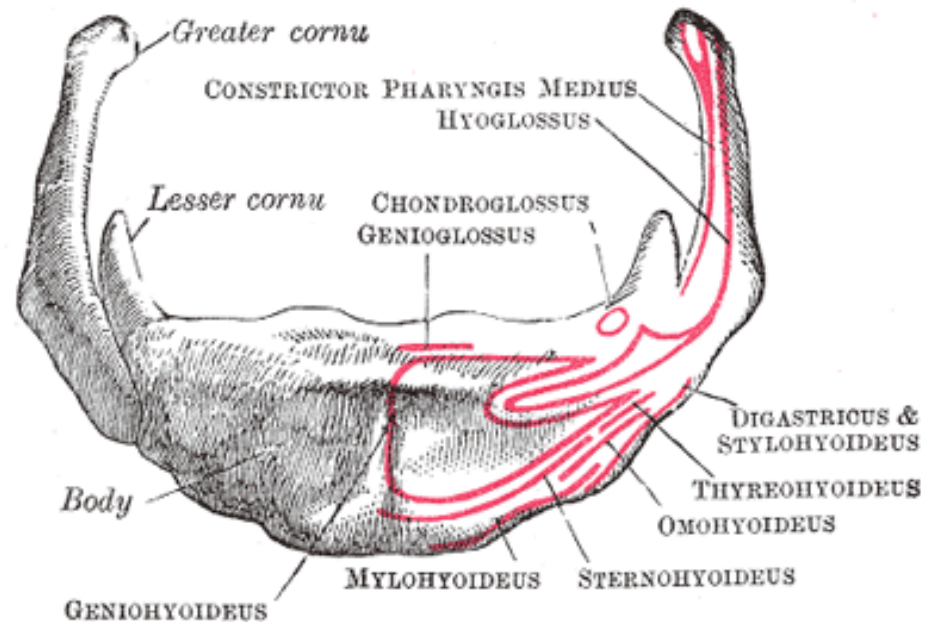
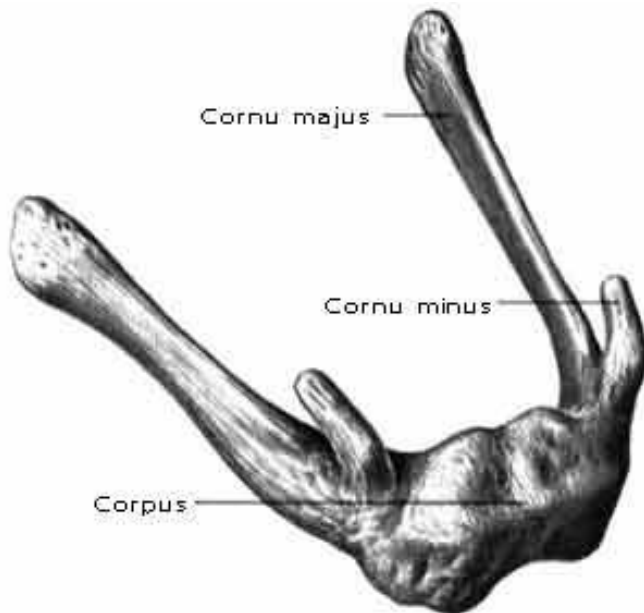
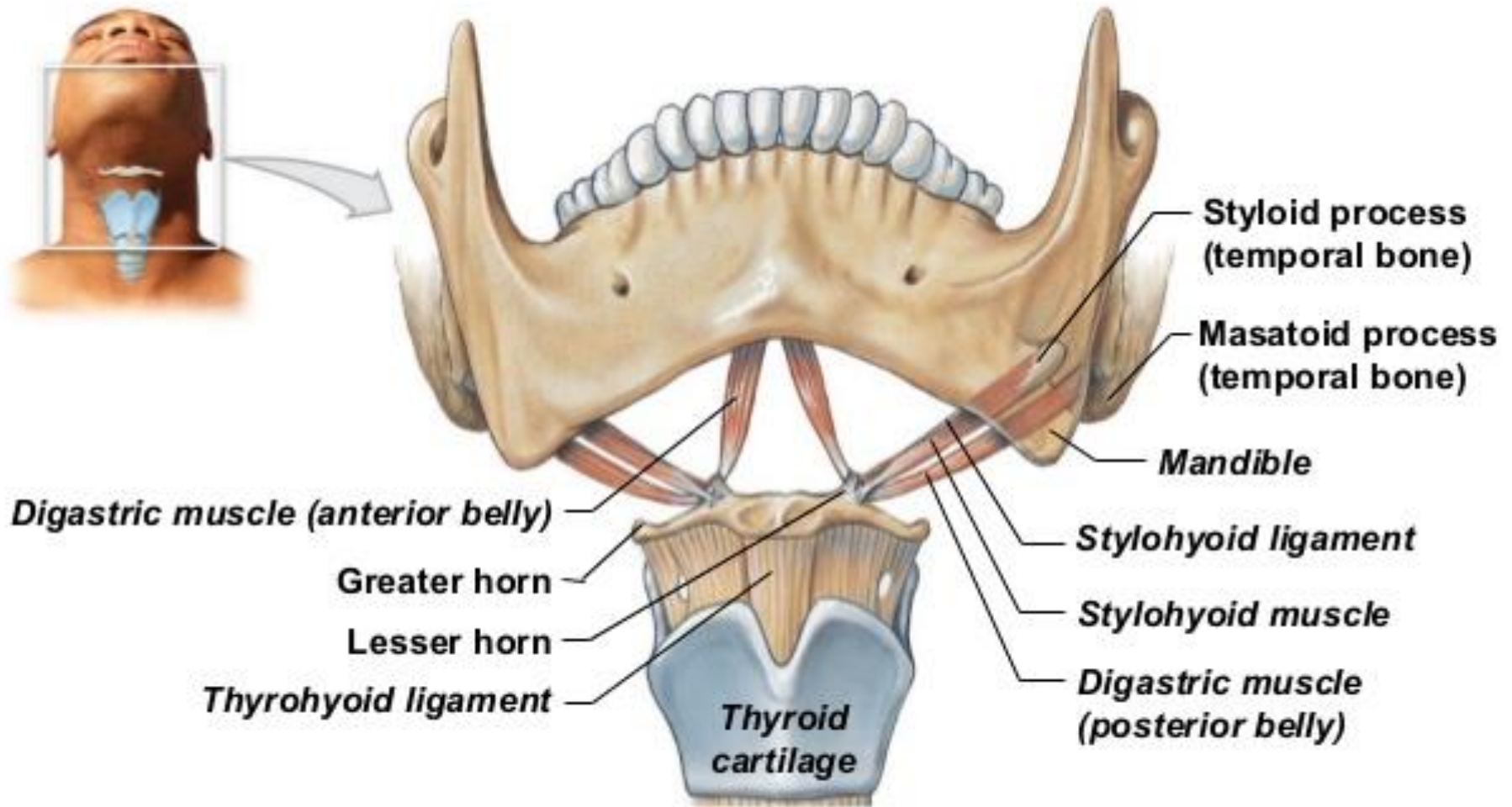


Figure 6.18a The Hyoid Bone



**a** Anterior view showing the relationship of the hyoid bone to the skull, the larynx, and selected skeletal muscles

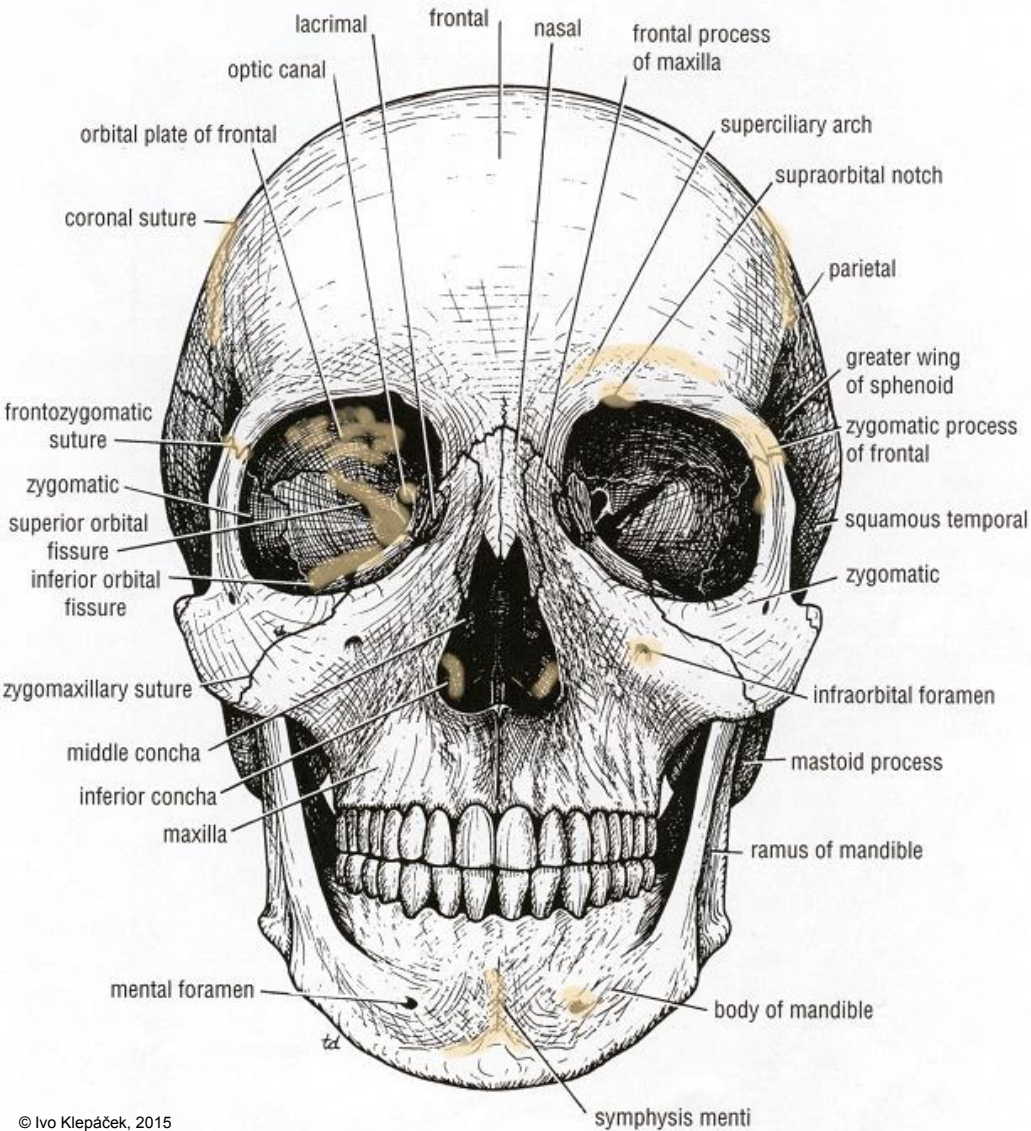
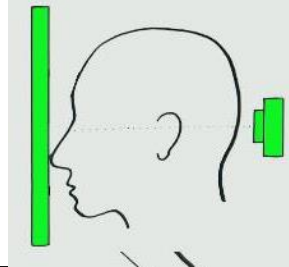
# Ossicula auditus (Ušní kůstky)

- malleus (kladívko)
- incus (kovadlinka)
- stapes (třmínek)





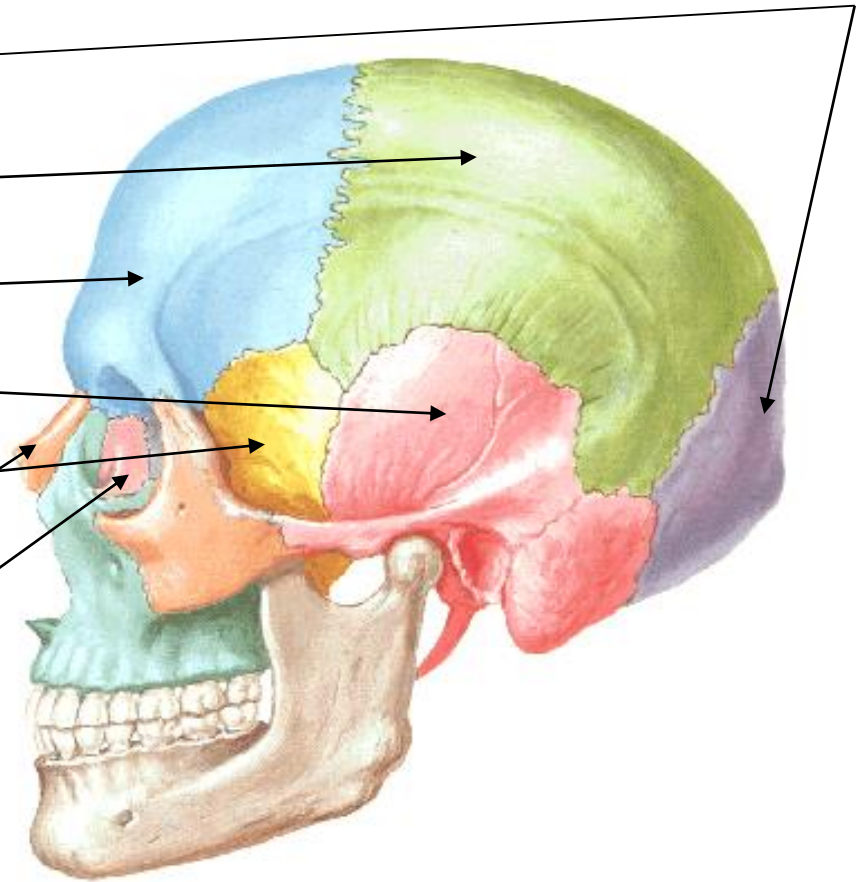
# Zadopřední projekce





# Neurocranium

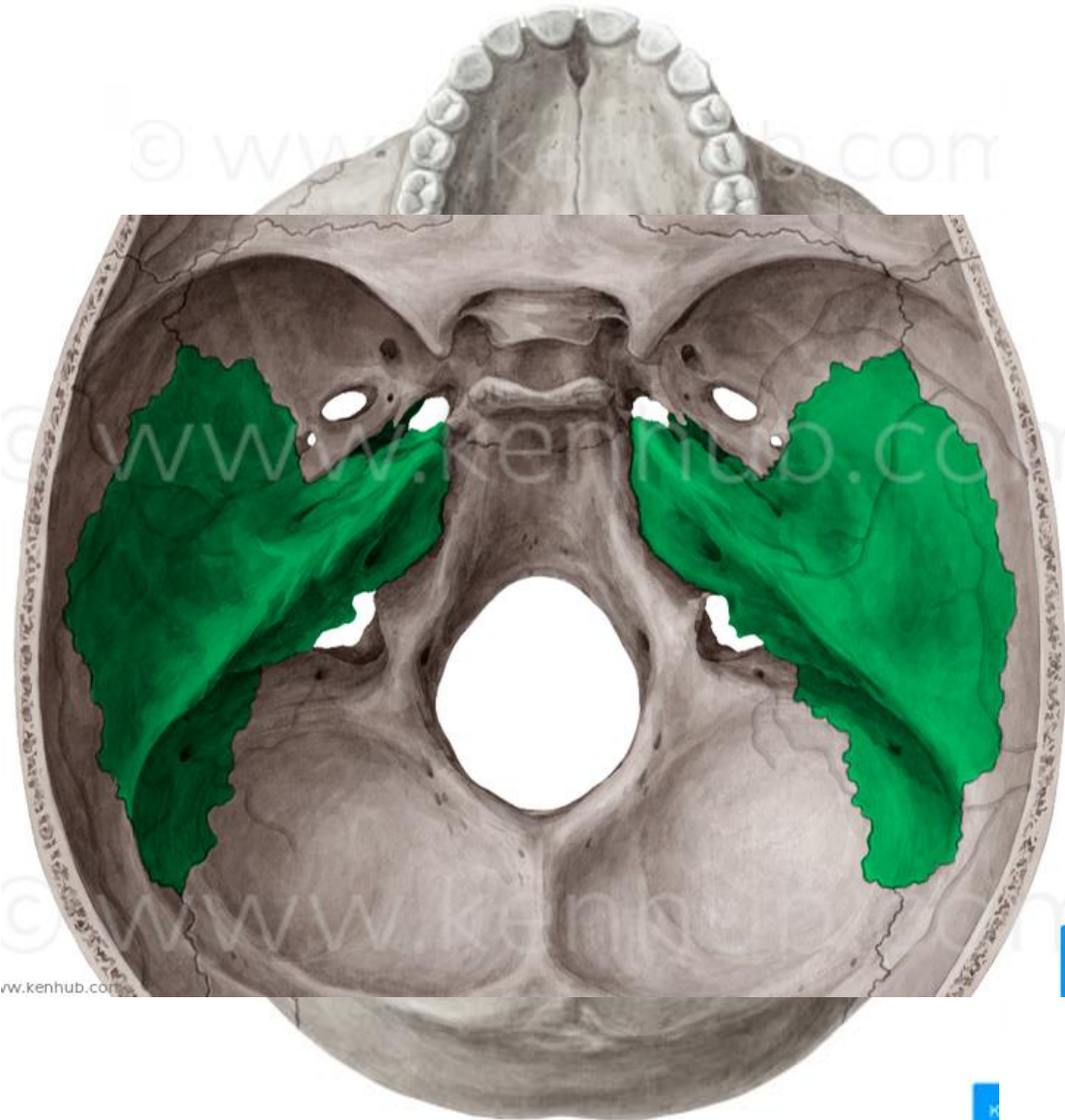
- os occipitale
- os parietale
- os frontale
- os temporale
- os sphenoidale
- os ethmoidale
- os nasale
- os lacrimale
- vomer
- concha nasalis inf.





# Os temporale

- squama
- pyramis
- proc. mastoideus
- proc. styloideus
- os tympanicum
- porus et meatus acusticus ext./int.

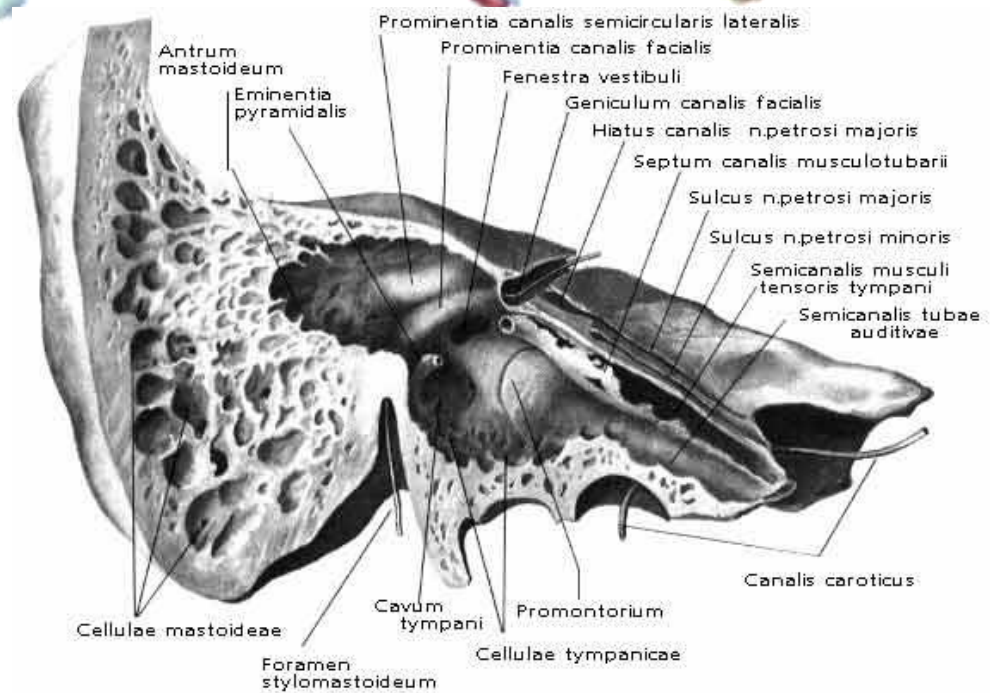
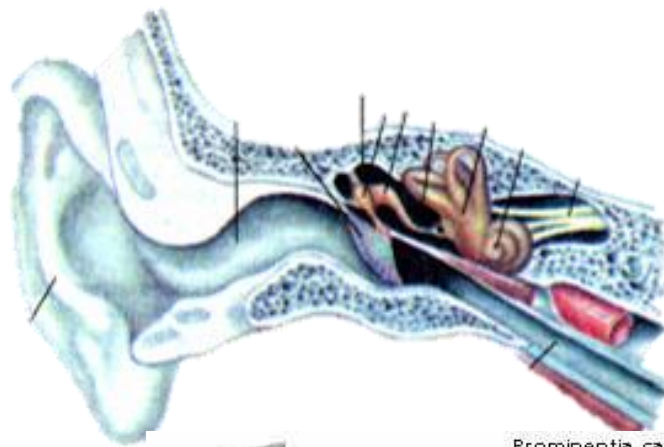




# Os temporale



- středoušní dutina
  - sluchové kůstky
- vnitřní ucho
  - rovnovážné ústrojí
  - sluchové ústrojí
- lícní nerv





# Spojení na lebce

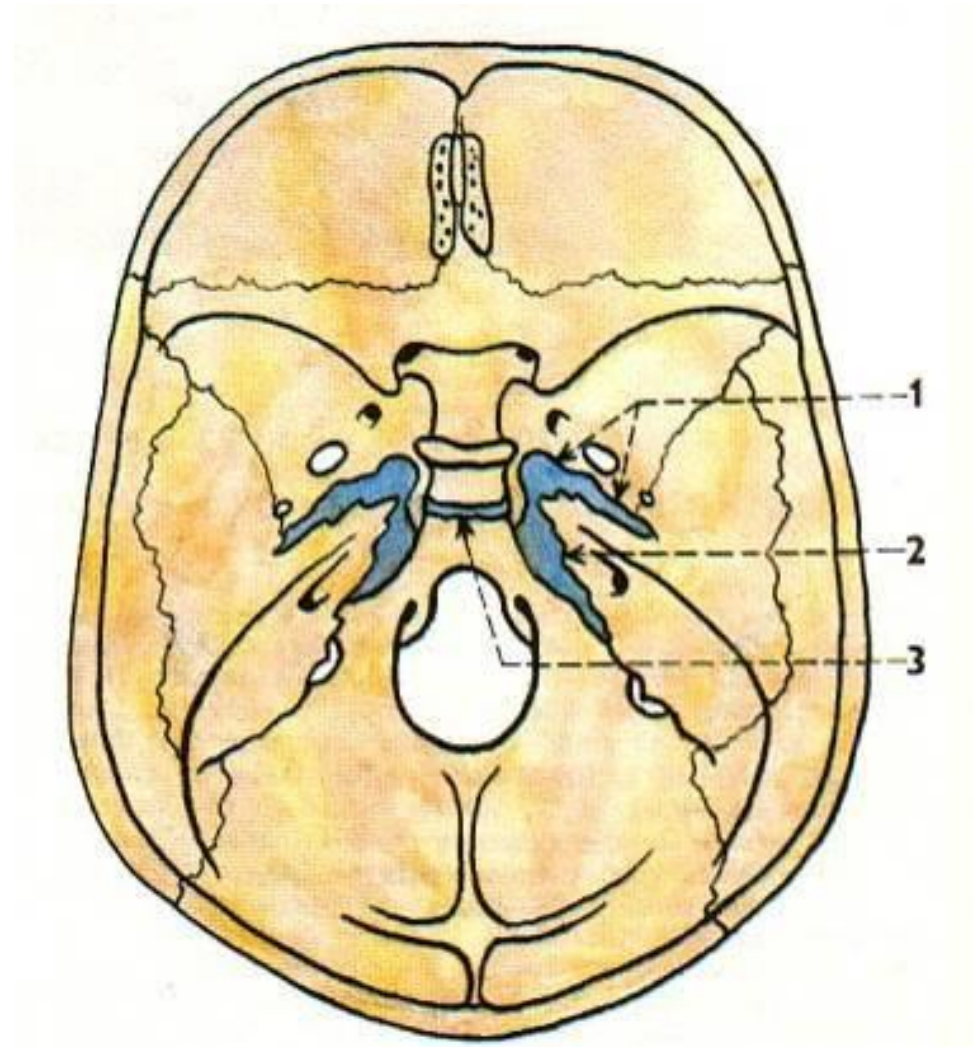
Synchondróza  
= spojení chrupavkou

synchondrosis

sphenooccipitalis (3)

sphenopetrosa (1)

petrooccipitalis (2)





# Spojení na lebce

## Syndesmózy

= srůst vazivem

zánik → do  
synostóz

lebeční švy

- pilovité
- šupinový

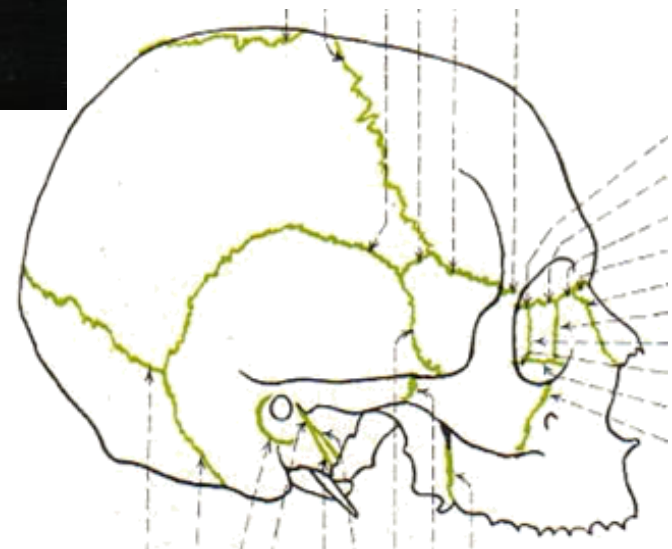
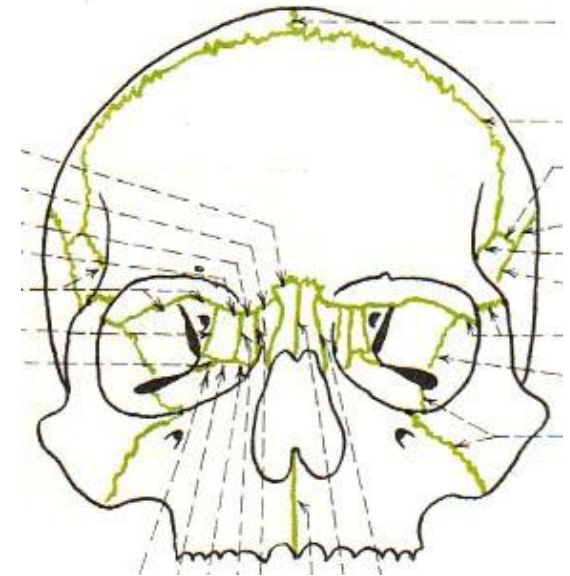
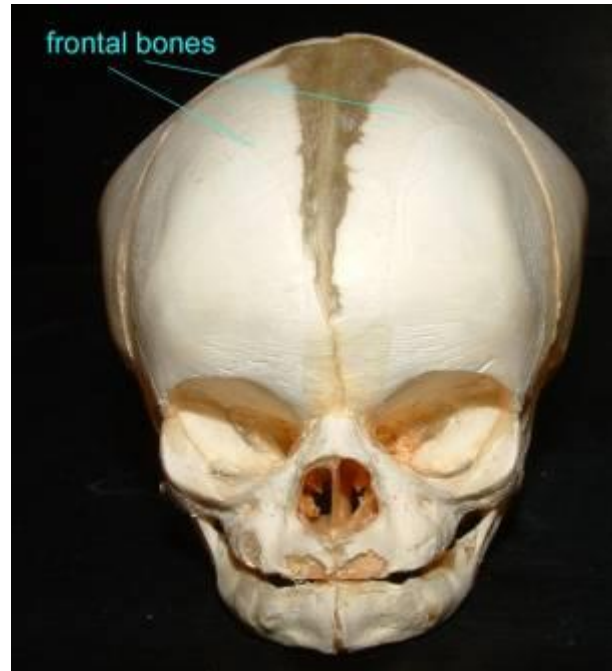
sutura

coronalis

sagitalis

lambdoidea

squamosa



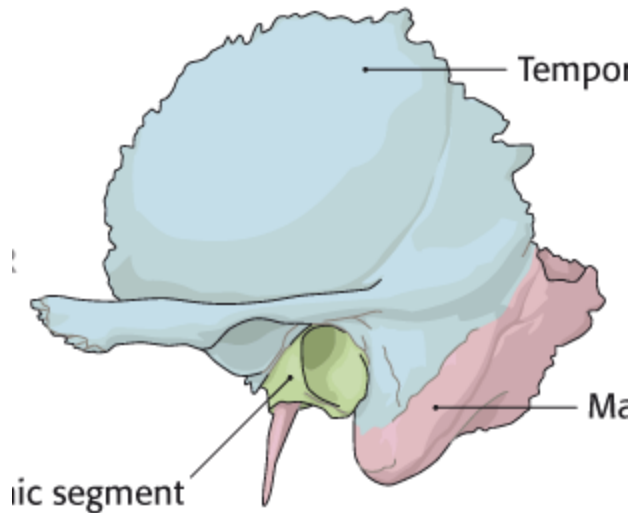
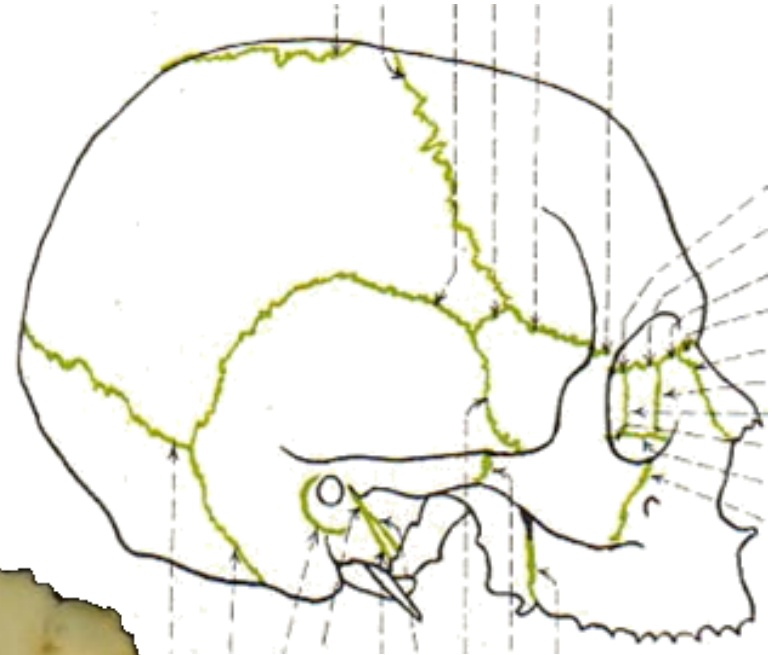


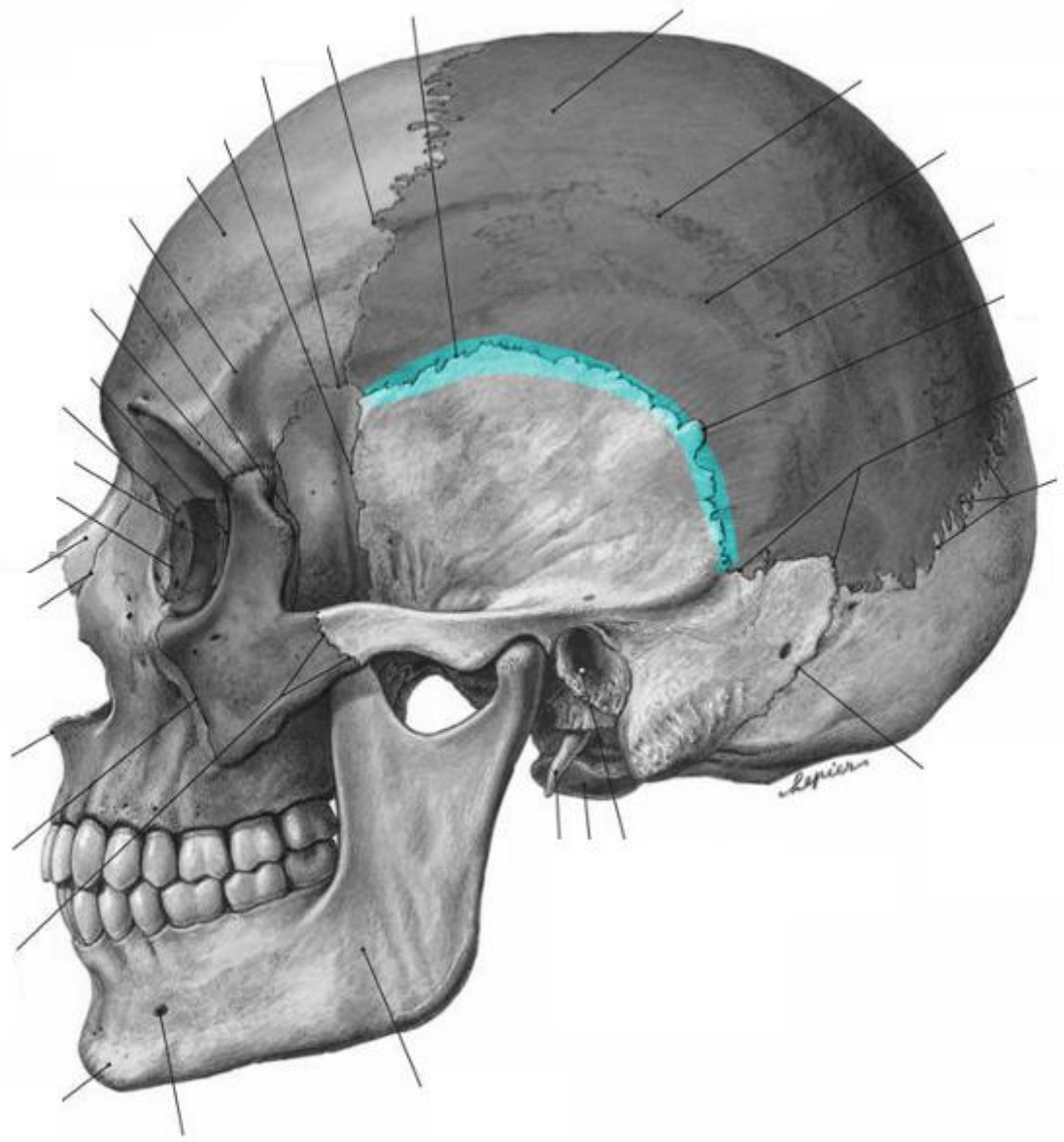
# Spojení na lebce

## Synostóza

= srůst kostí

- os temporale
- lebeční švy







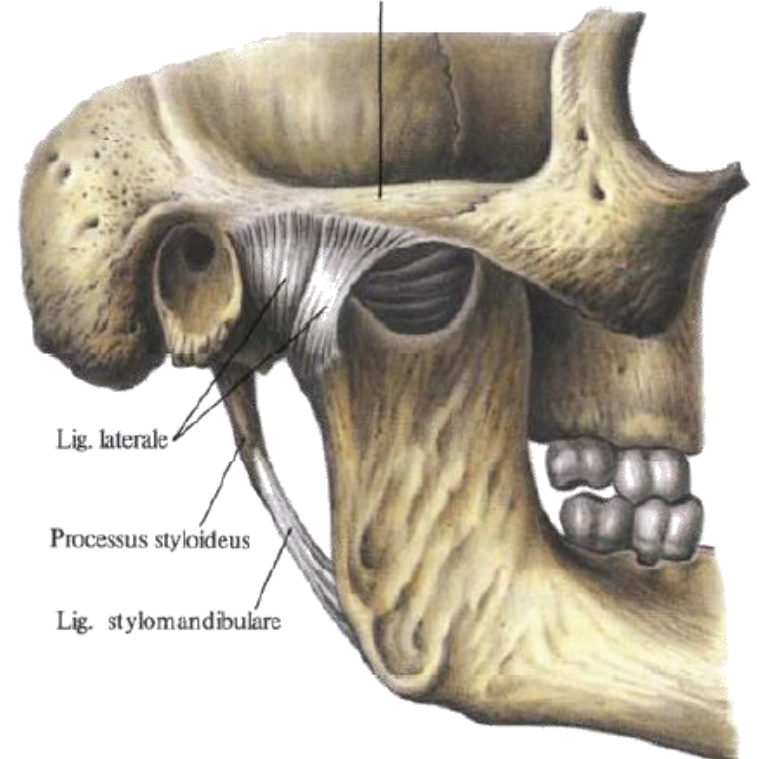


# Čelistní kloub

*(articulatio*

*temporomandibularis)*

- kloub složený
- hlavice – caput mandibulae, osy pod úhlem  $150^{\circ}$ - $160^{\circ}$
- jamka – fossa mandibularis včetně tuberculum articulare
- discus articularis (vazivová chrupavka, ev. centrální perforace ve stáří)
- Zenkerův polštář – za hlavicí, tukové vazivo s množstvím žil

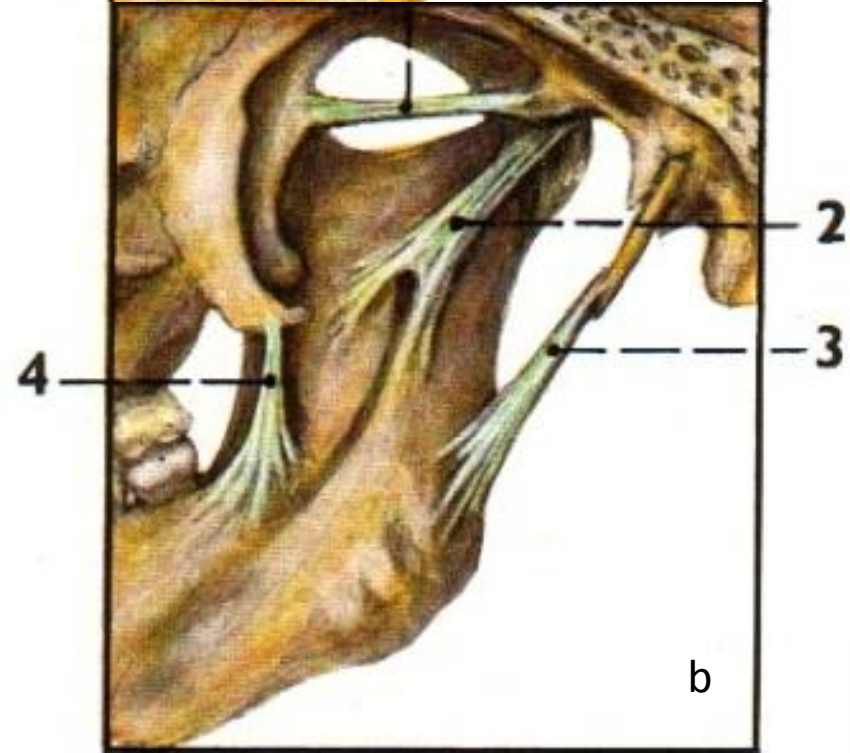
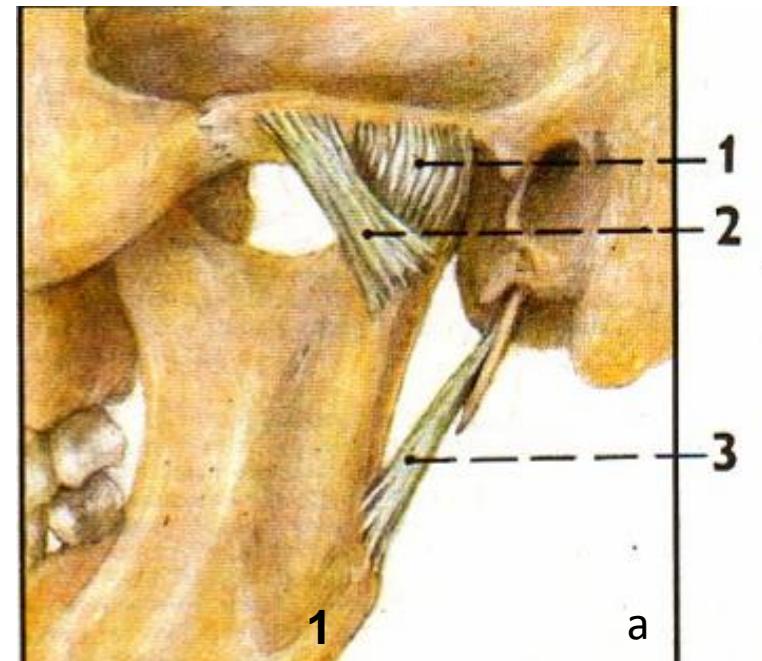




# Zesílení kloubního pouzdra

Některé vazy jdou sice mimo kloub, mají však význam pro zajištění pohybů v kloubu.

- **ligamentum laterale (temporomandibulare) (2a)**
- **ligamentum mediale**
- **ligamentum pterygospinale (1b)** - od spina ossis sphenoidalis k lamina medialis processus pterygoidei
- **ligamentum sphenomandibulare (2b)**
- **ligamentum stylomandibulare (3a,b)**
- **raphe pterygomandibularis (4b)** – od hamulus pterygoideus za poslední stoličku mandibuly





# Čelistní kloub - pohyby

- **deprese** mandibuly – otvírání úst
- **elevace** mandibuly – zavírání úst
- **protrakce** mandibuly – posun dopředu
- **retrakce** mandibuly – posun dozadu
- **lateropulse** – pohyb ke stranám = protrakce strany jedné a rotace strany druhé

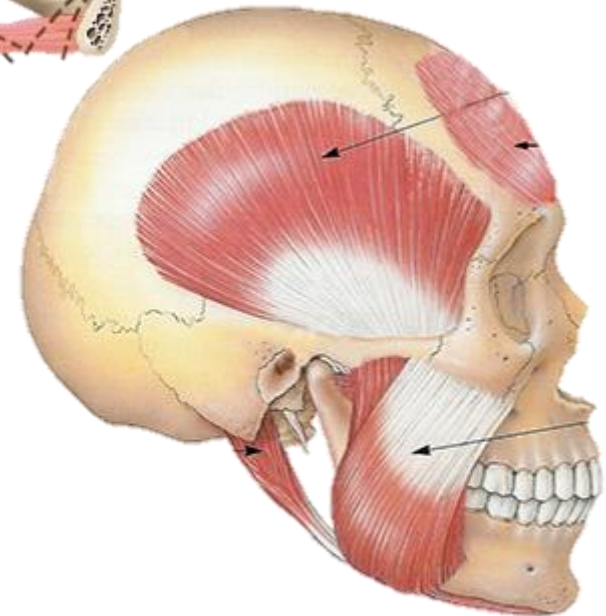
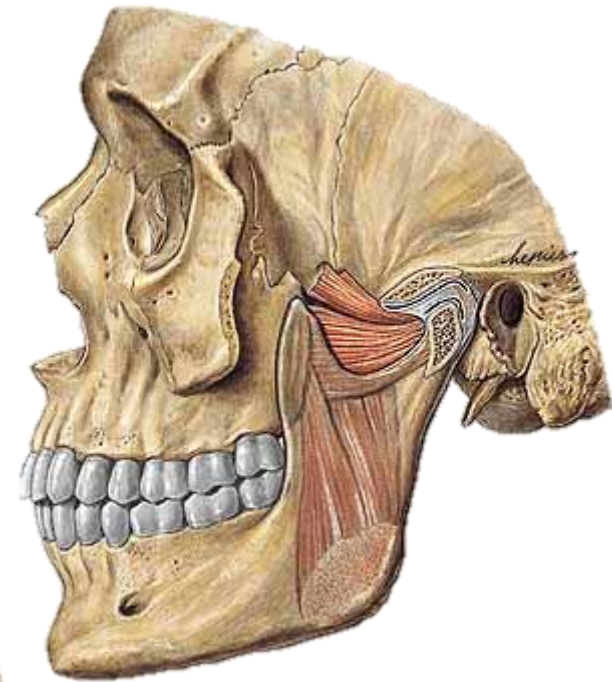
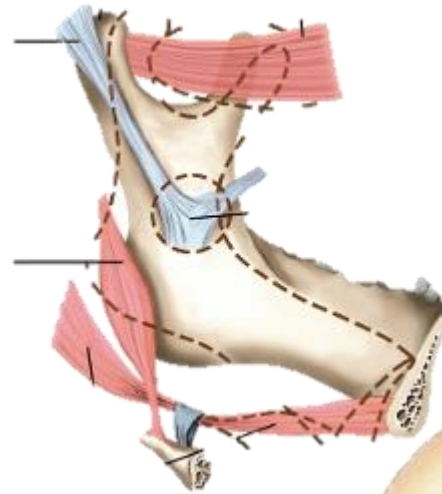


*Obr. 6.7 Čelistní kloub – posun dolní čelisti při depresi (abdukci)*



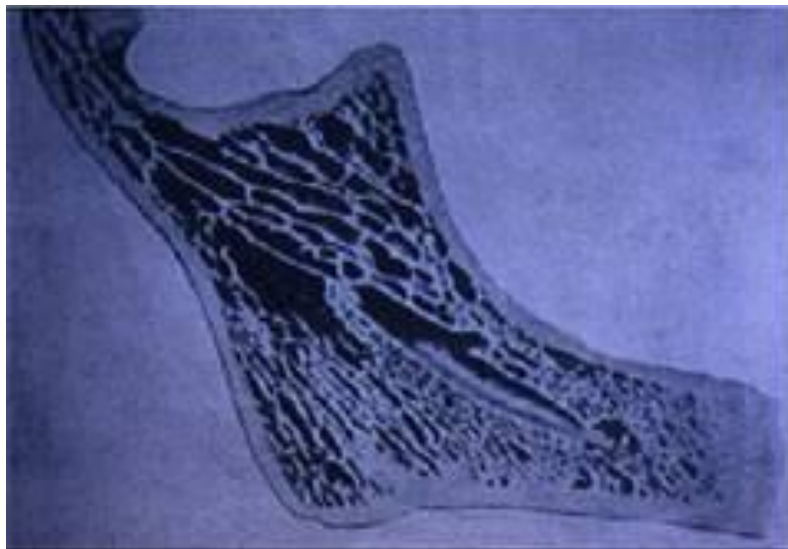
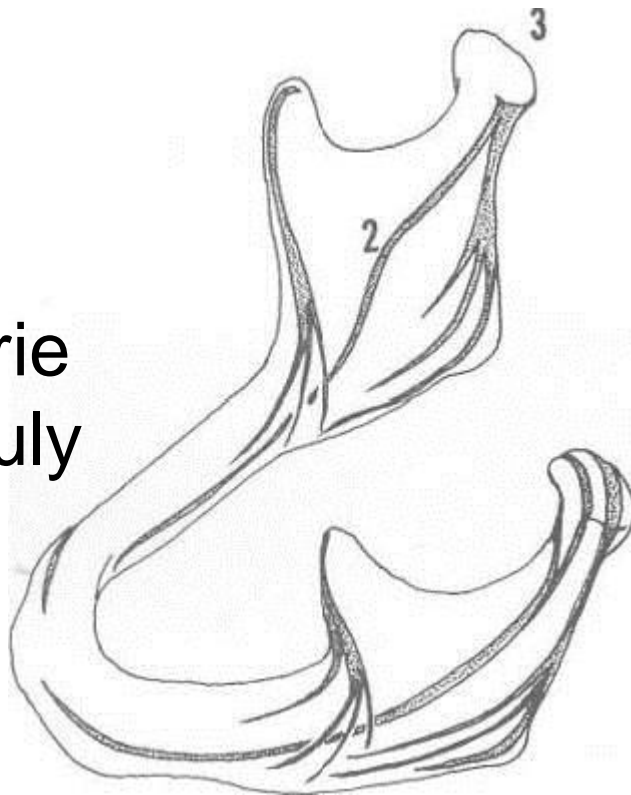
# Čelistní kloub - svaly

- **deprese:** *m. mylohyoideus*, *m. digastricus* (venter anterior), *m. geniohyoideus*
- **elevace:** *m. masseter*, *m. temporalis*, *m. pterygoideus medialis*
- **protrakce:** *m. pterygoideus lateralis*, *m. masseter*
- **retrakce:** *m. temporalis*, *m. masseter*
- **lateropulse:** *mm. pterygoidei*





trajektorie  
mandibuly

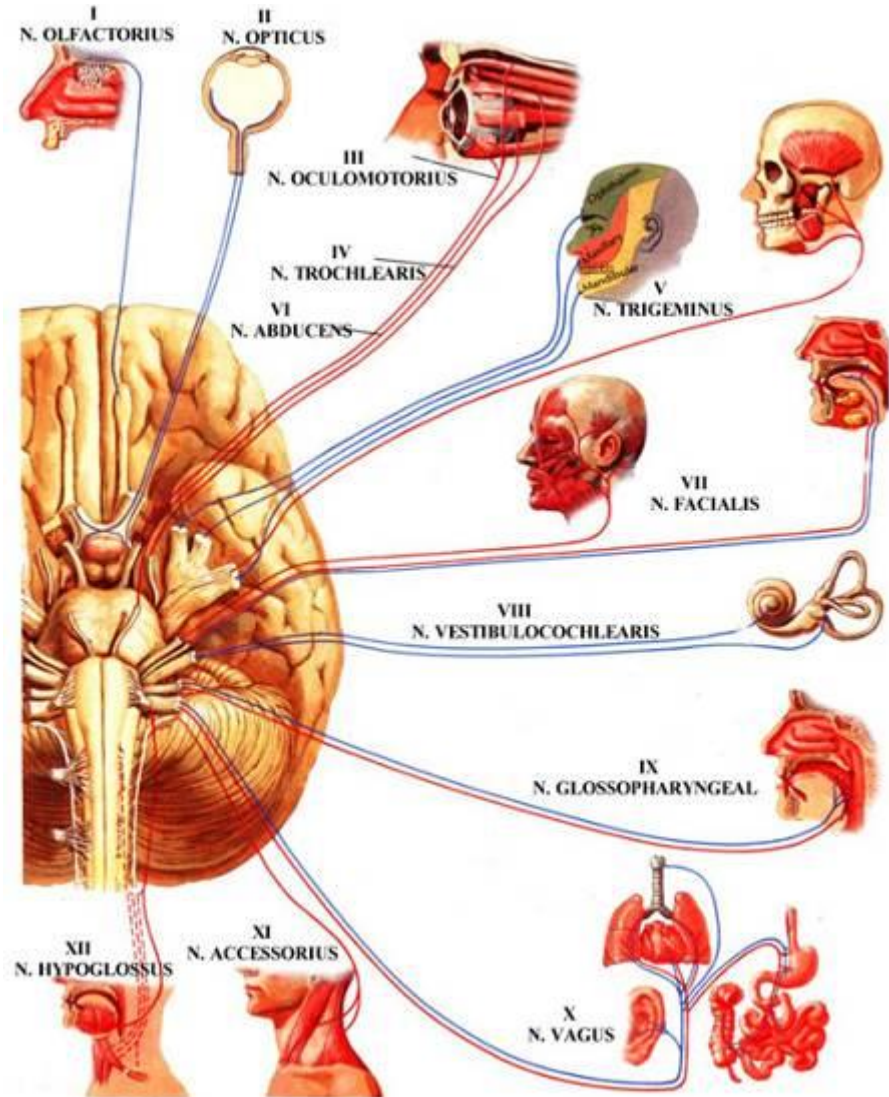


zesilující pásy  
lebečních kostí

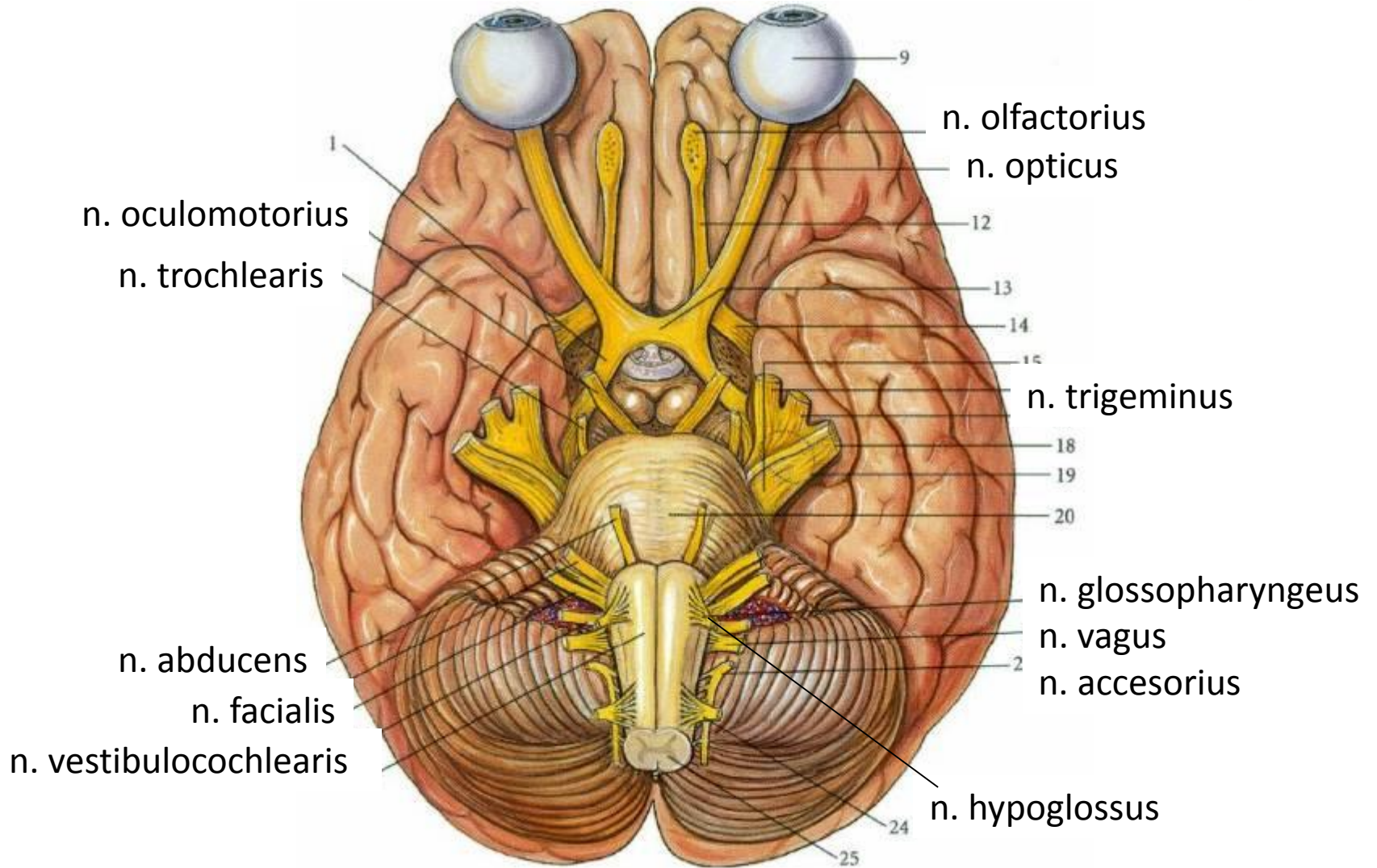


# Nervi craniales

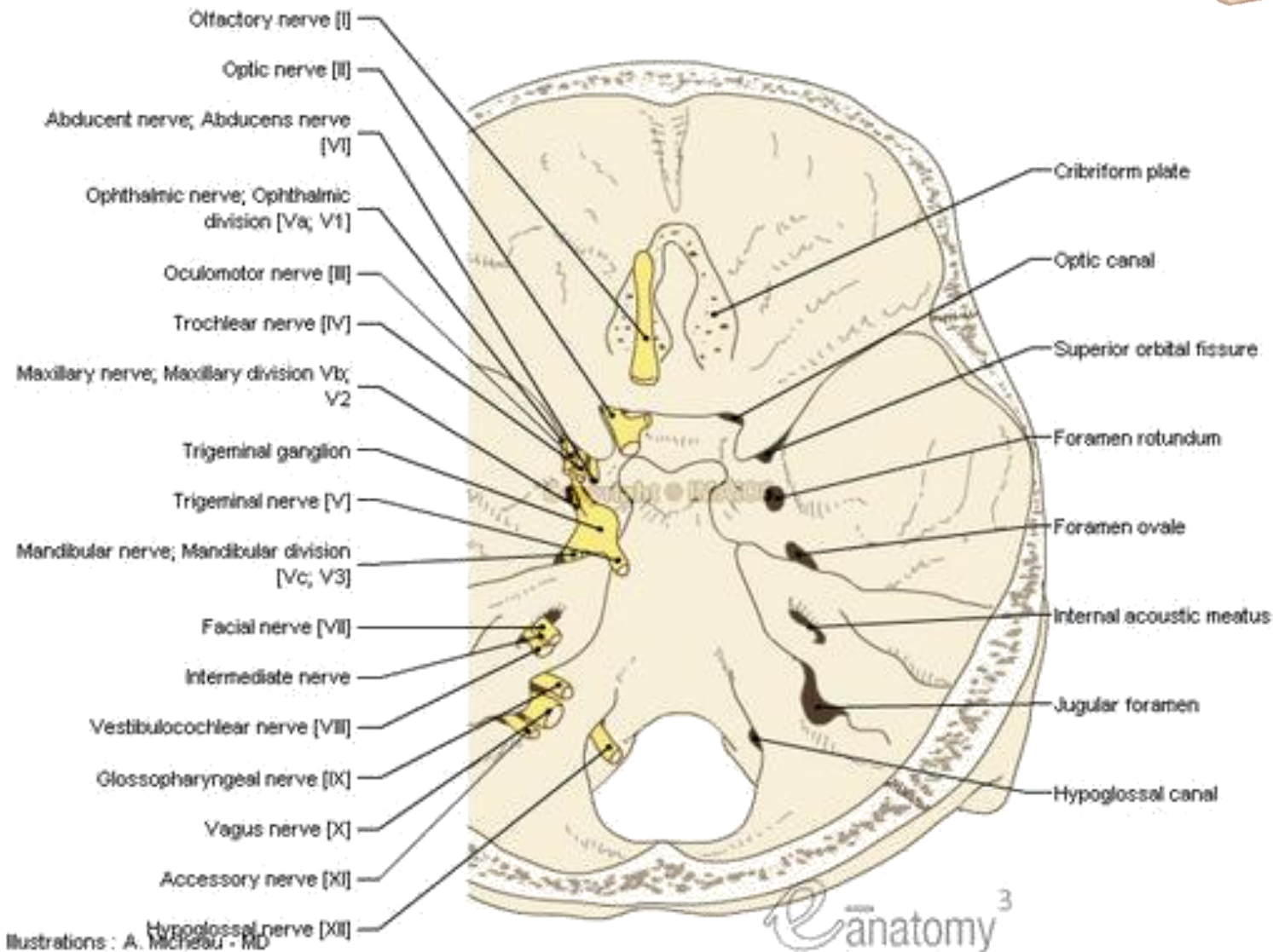
- I. n. olfactorius
- II. n. opticus
- III. n. oculomotorius
- IV. n. trochlearis
- V. n. trigeminus
- VI. n. abducens
- VII. n. facialis
- VIII. n. vestibulocochlearis
- IX. n. glossopharyngeus
- X. n. vagus
- XI. n. accesorius
- XII. n. hypoglossus



# Spodina mozku



# Basis crani interna





# Zobrazovací metody



- RTG (rentgen)
- CT (počítačová tomografie)
- MR (magnetická rezonance)

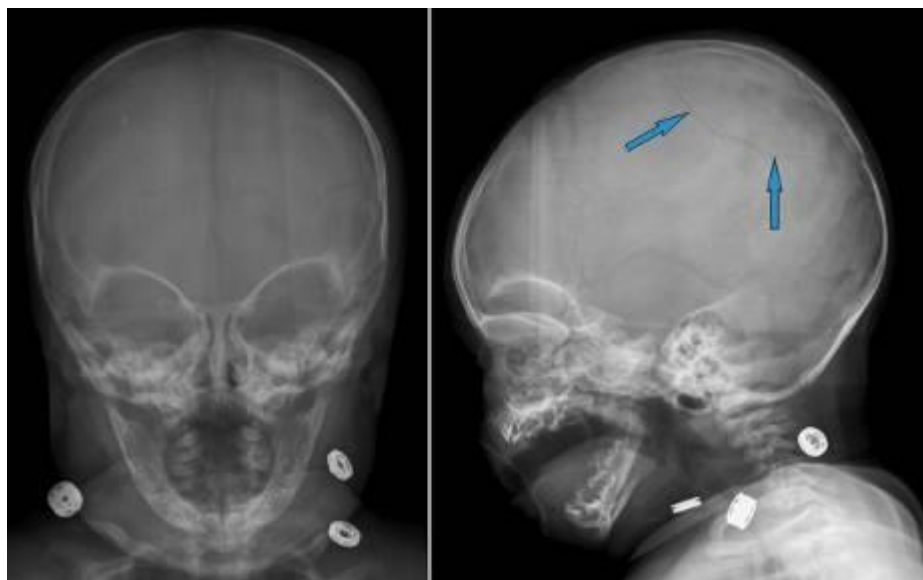


# RTG



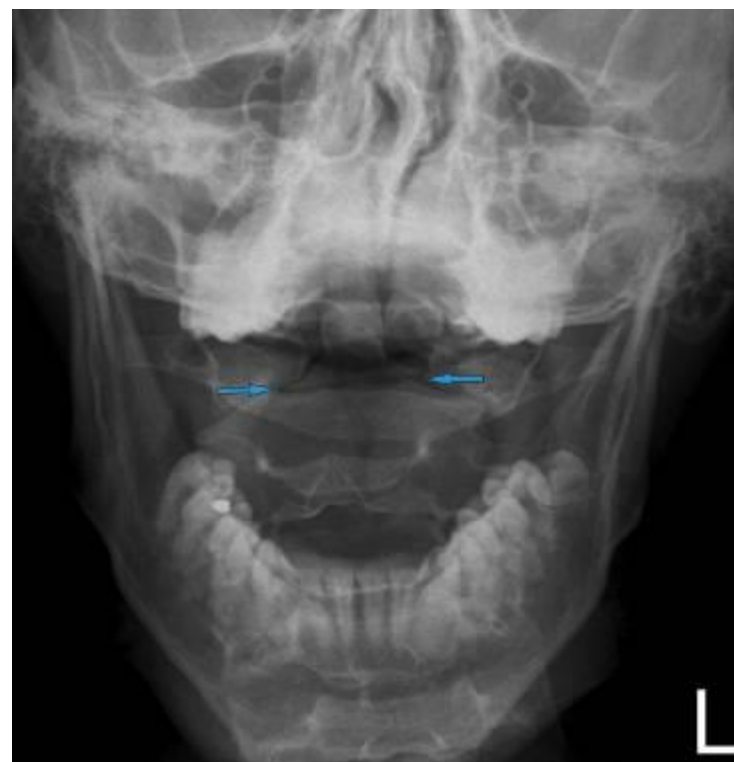


rtg hlavy dítěte



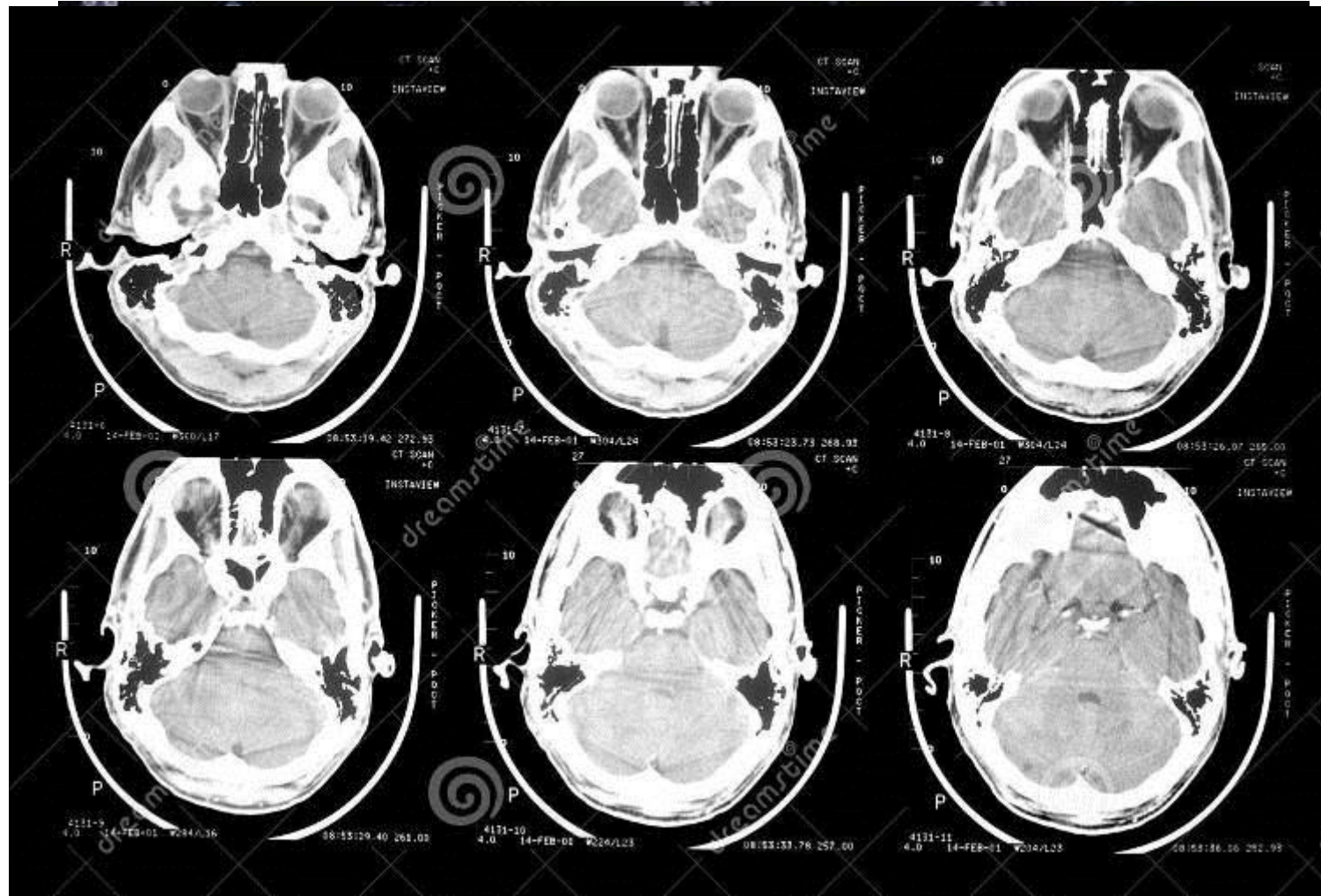
<http://public.fnol.cz/www/rtg/program%20na%20vyuku%20radiol%20popisu/Vysledne/CD4/SIPKY/lebka.jpg>

transorální rtg na dens axis

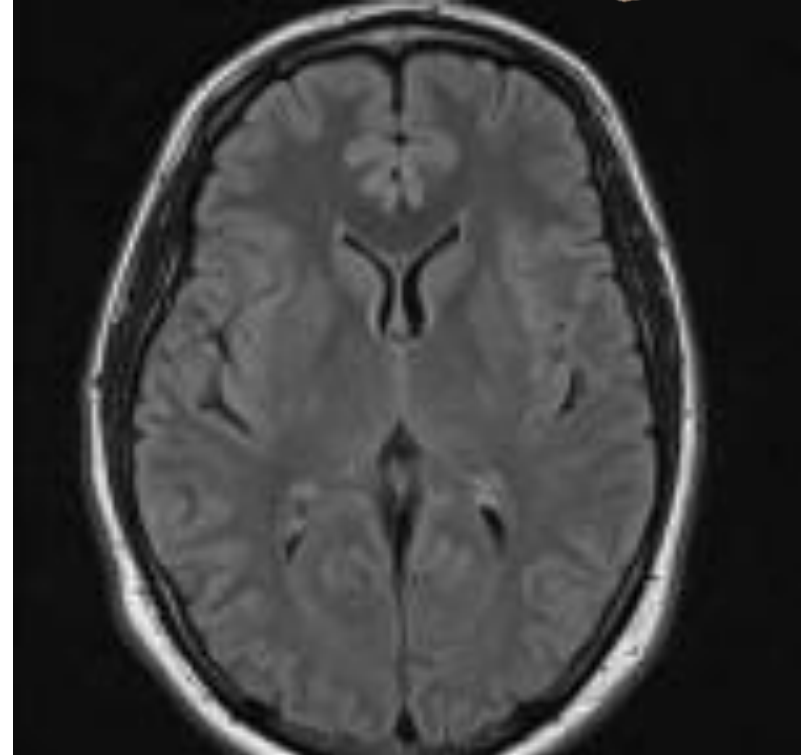


<http://public.fnol.cz/www/rtg/program%20na%20vyuku%20radiol%20popisu/Vysledne/CD4/SIPKY/dens1b.jpg>

# Počítačová tomografie – CT



# MRI



MRI mozku muž



Děkuji Vám za pozornost.

