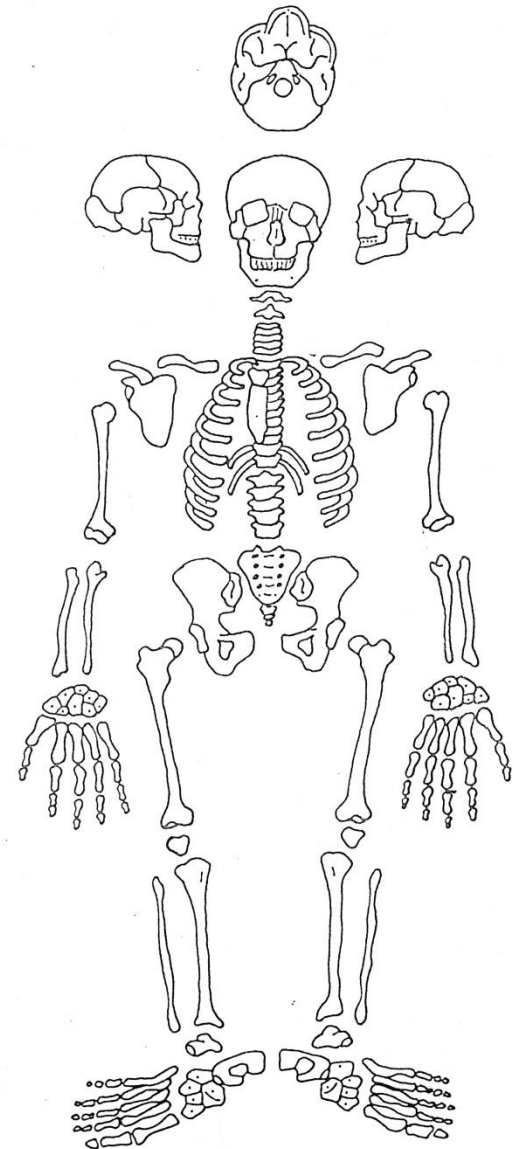


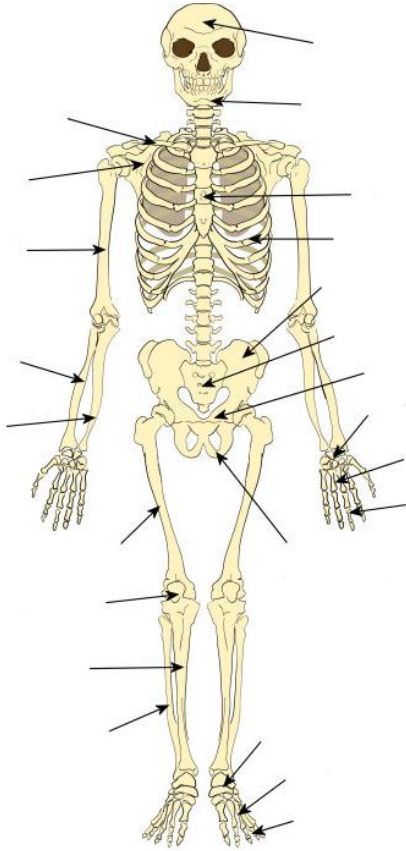
# Ukázky typů zachovalosti

Úkol: Složit lidskou kostru v základním anatomickém postavení.

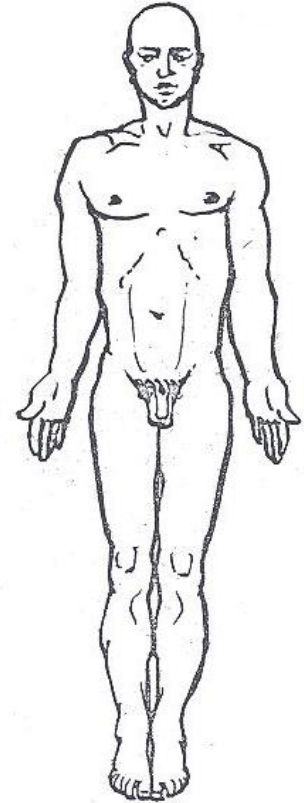
Zakreslení a zapsání zchovalé kosti do protokolu (česky i latinsky)



# Základní anatomické postavení



Vzpřímený postoj, hlava hledí přímo dopředu, horní končetiny jsou připaženy a visí volně podél trupu. Dlaně jsou obráceny dopředu, palec směřuje zevně. Dolní končetiny jsou nataženy a stojí těsně vedle sebe ve stoji spojném, vnitřní okraje nohou se lehce dotýkají.



# Typy kostí lidského skeletu, typy kostní tkáně

## 1. Kostí dlouhé (*ossa longa*)

- délka kostí převládá nad ostatními rozměry
- rozlišujeme proximální epifysu, diafysu a distální epifysu
- např. dlouhé kosti končetin (humerus, femur)

## 2. Kostí krátké (*ossa brevia*)

- všechny tři rozměry jsou přibližně stejně velké
- často mají tvar nízkých válců, krychlí, hranolů apod.
- např. kosti karpální, kosti tarzální

## 3. Kostí ploché (*ossa plana*)

- mají jeden rozměr menší (tloušťku) a dva zbývající větší, připomínají desky či ploténky
- např. kosti klenby lebeční, lopatka, pánevní kost

## 4. Kostí nepravidelného tvaru (*ossa irregularia*)

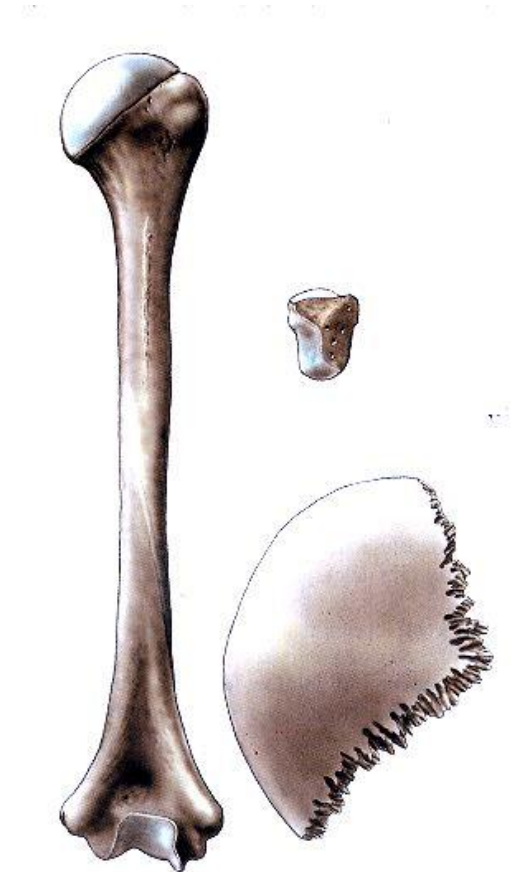
- např. kosti obličejového oddílu lebky, obratle

## 5. Kostí vzdušné (*ossa pneumatica*)

- obsahují dutinky vystlané sliznicí a vyplněné vzduchem
- např. lebeční kosti obsahující tzv. sinusy (kost čelní, čichová, horní čelist)

## 6. Sezamské kosti (*ossa sesamoidea*)

- šlacha – např. česka (*patella*)



Obr. 73. ZÁKLADNÍ TVARY KOSTÍ; dlouhá kost (pažní kost člověka), krátká kost (jedna ze zápěstních kostí), plochá kost (temenní kost člověka)

# Lebka (*cranium*)

- Lebku rozdělujeme na dva oddíly:
- Kostí mozkového oddílu lebky (*neurocranium*)
- Kostí obličejového oddílu lebky (*splanchnocranium*)
- **Neurocranium**
- - ohraničuje dutinu lebeční (*cavum cranii*)
- - horní část se nazývá klenba lebeční – *calvaria*, dolní částí tvoří spodinu lebeční – *basis cranii*

# Neurocranium

Mozková část lebky tvoří zejména **lebeční klenbu** (osifikují endesmálně) a **kosti báze lebny** (osifikují enchondrálně).

**7 kostí:**

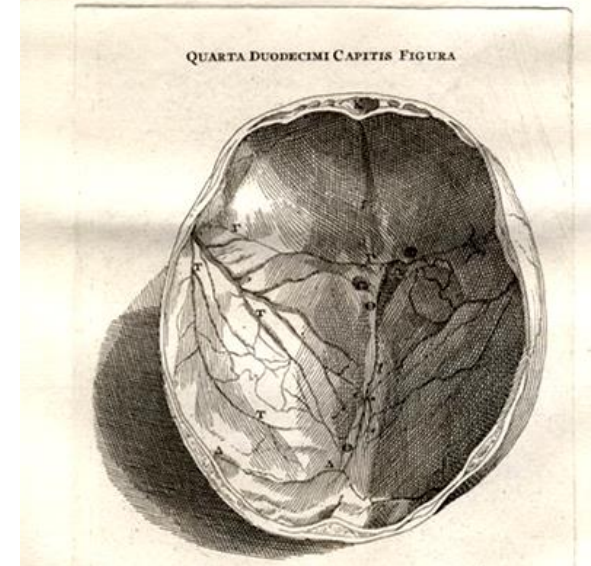
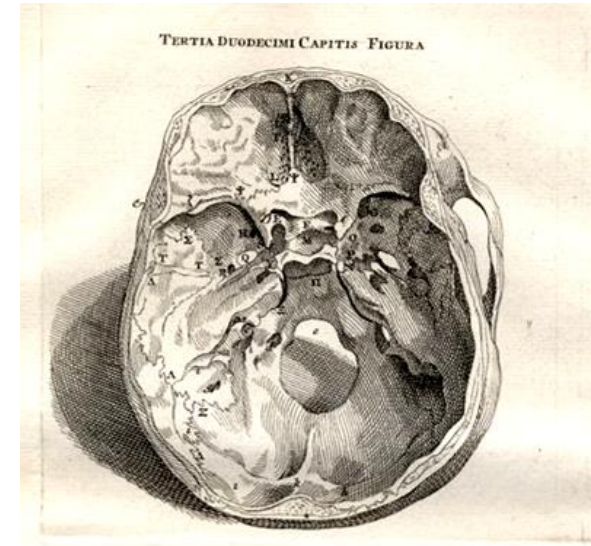
**Týlní kost** (*os occipitale*)

**Klínová kost** (*os sphenoidale*)

**Čelní kost** (*os frontale*)

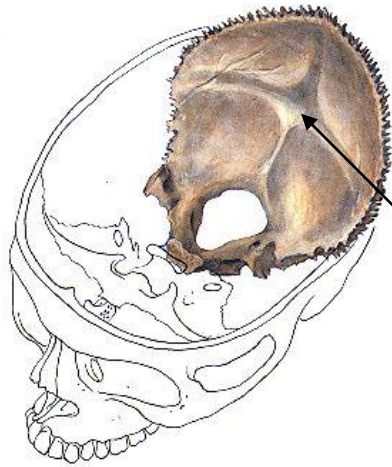
**Kosti temenní** (*ossa parietalia*) – párové  
(1 temenní = *os parietale*)

**Kosti spánkové** (*ossa temporalia*) – párové  
(1 spánková = *os temporale*)



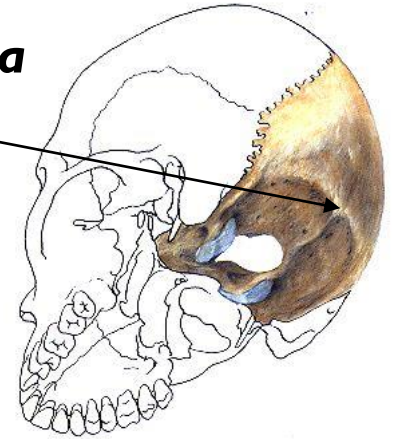
# Os occipitale – kost týlní

*protuberantia occipitalis externa*



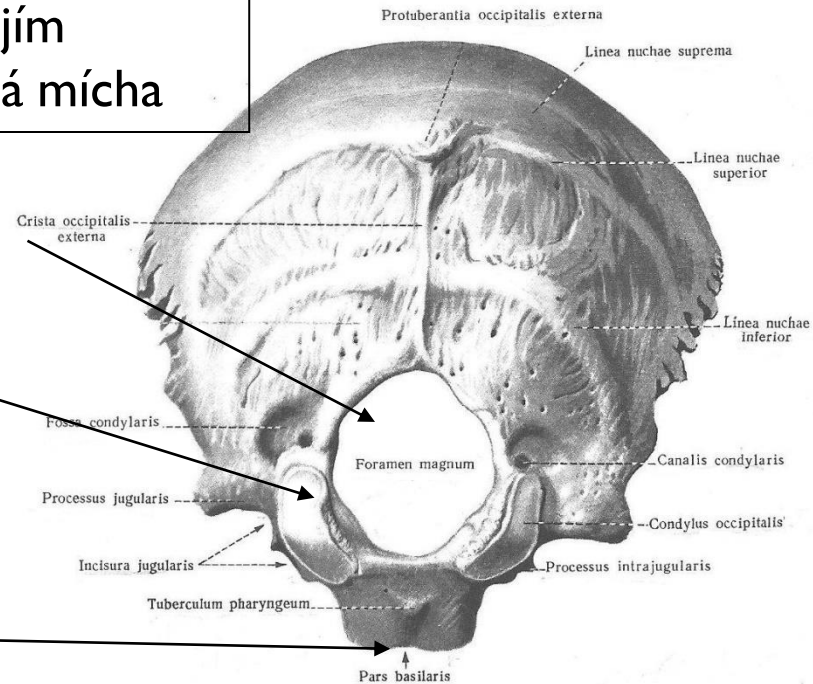
*eminentia cruciata*

**foramen magnum** –  
spojuje dutinu lebeční  
s páteřním kanálem,  
prostupuje jím  
prodloužená mícha

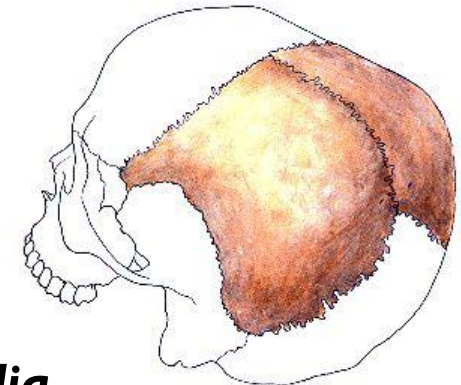
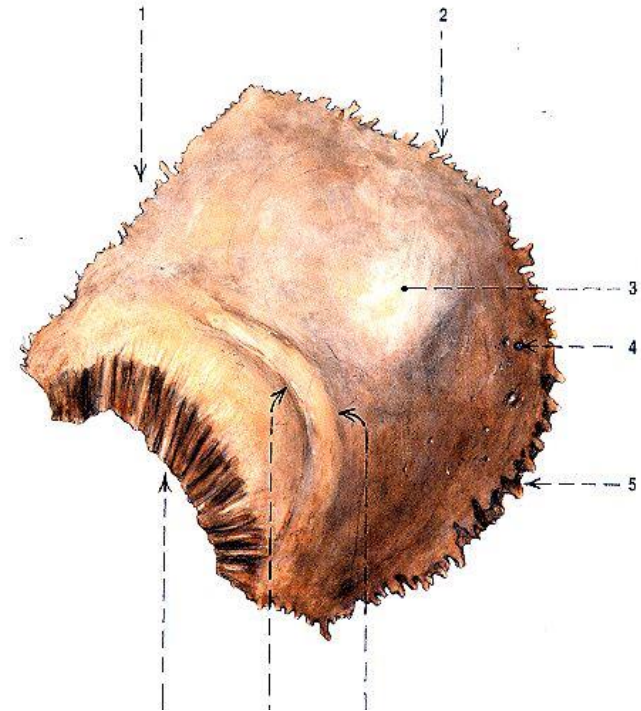
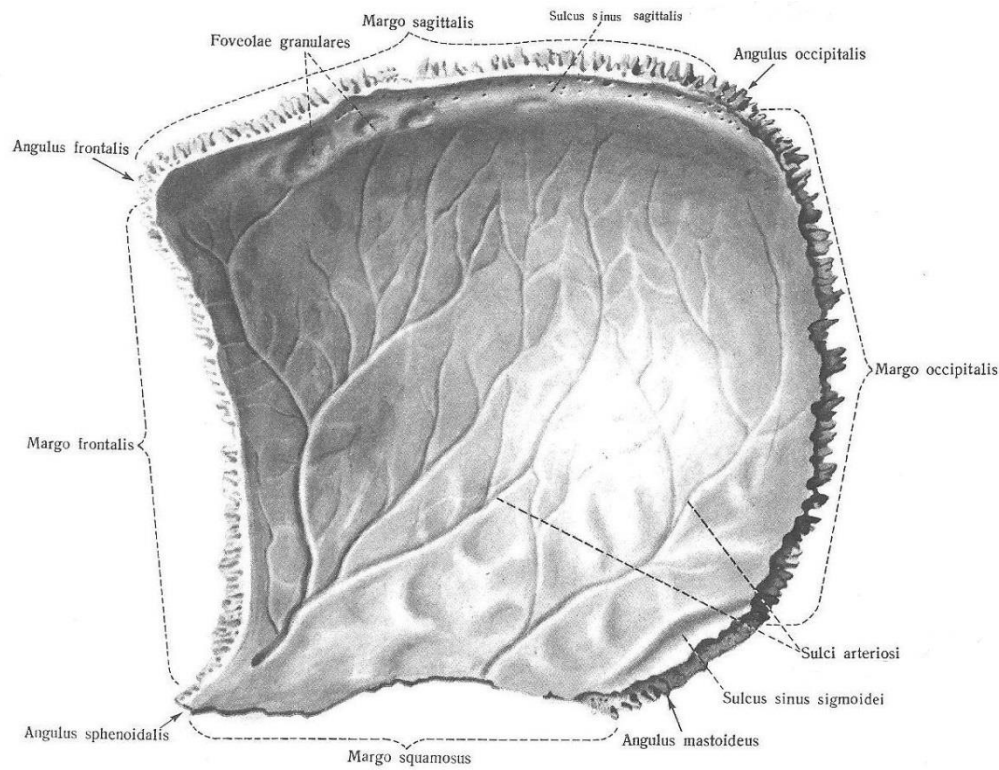


**condyli occipitales** – kloubní  
spojení s atlasem

spojení s tělem kosti klínové  
pomocí chrupavky  
**symphondrosis**  
**sphenooccipitalis**  
(do cca 18-20 let)



# Os parietale – kost temenní



58. OS PARIETALE, KOST TEMENNÍ; pravá strana, pohled na vnitřní plochu (4/5).

**tubera parietalia**

# Os frontale – kost čelní

## Squama frontalis – facies externa

**tubera frontalia**

**margo supraorbitalis**

**arcus superciliares**

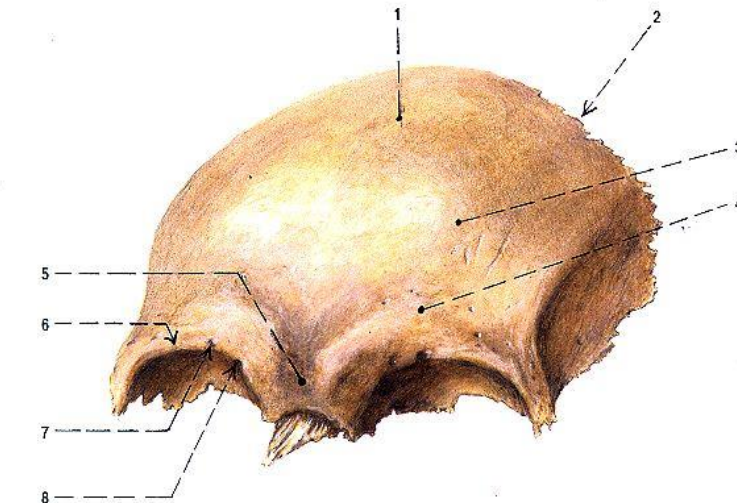
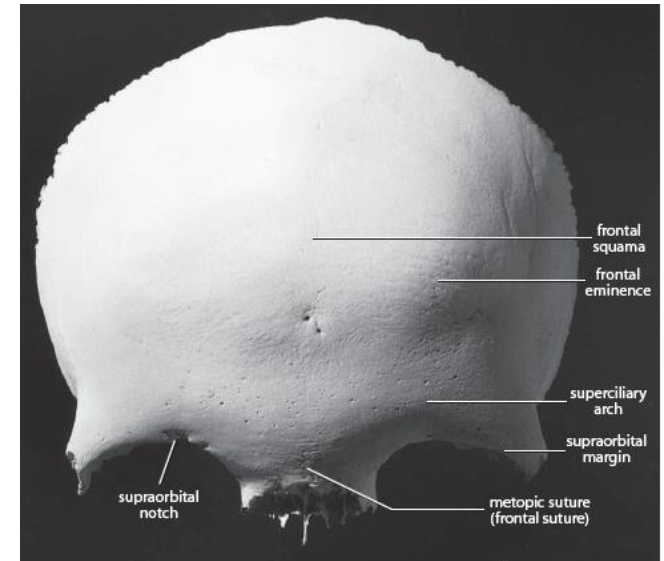
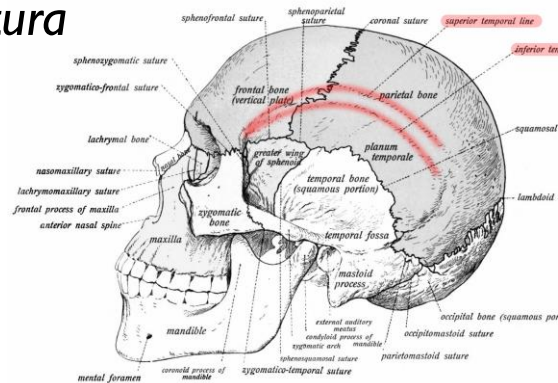
**glabella** – významný antropometrický bod

**linea temporalis inferior**

– po překřížení sutura

coronalis pokračuje

na kost temenní



Obr. 185. OS FRONTALE; pohled zleva zředu

- 1 squama frontalis, facies externa
- 2 margo parietalis (spojení s kostmi temenními v sutura coronalis)
- 3 tuber frontale
- 4 arcus superciliaris

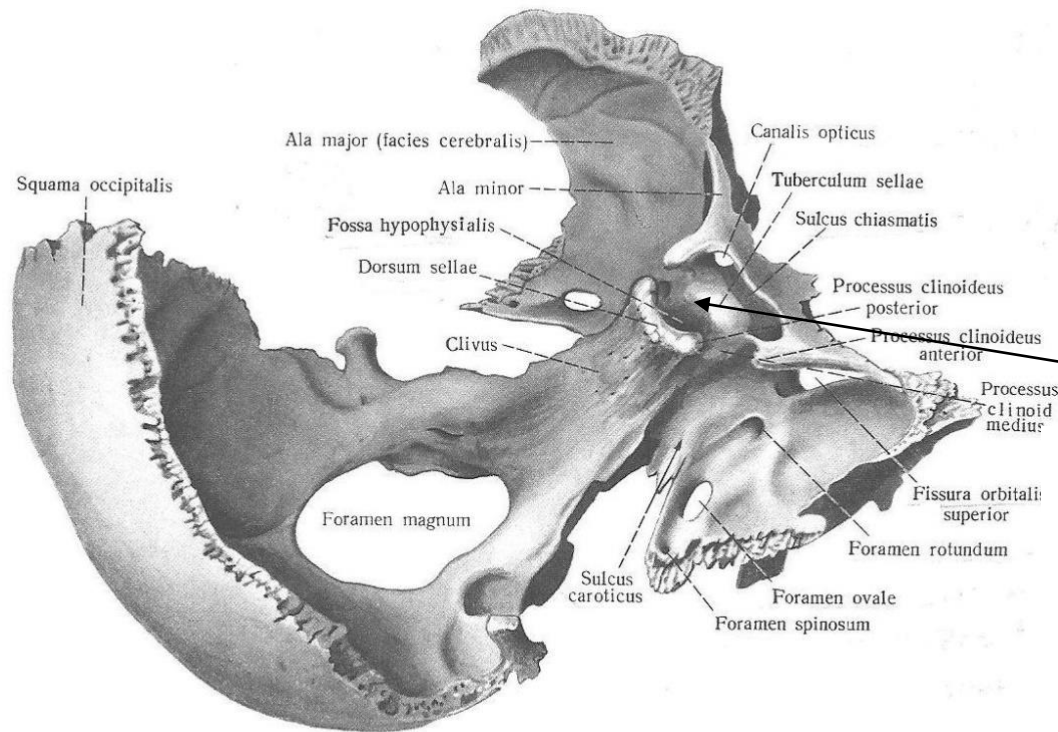
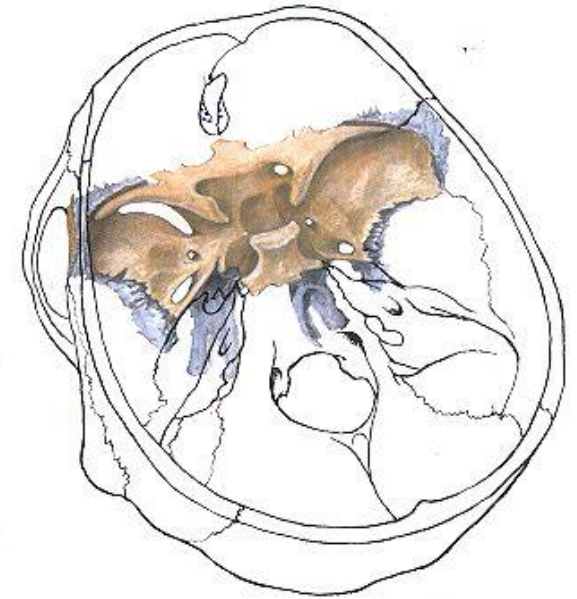
- 5 glabella
- 6 margo supraorbitalis
- 7 incisura supraorbitalis
- 8 incisura frontalis (na levé straně foramen frontale)

původně párová kost – **sutura frontalis**,  
v dospělosti perzistuje někdy jako sutura  
**metopica**

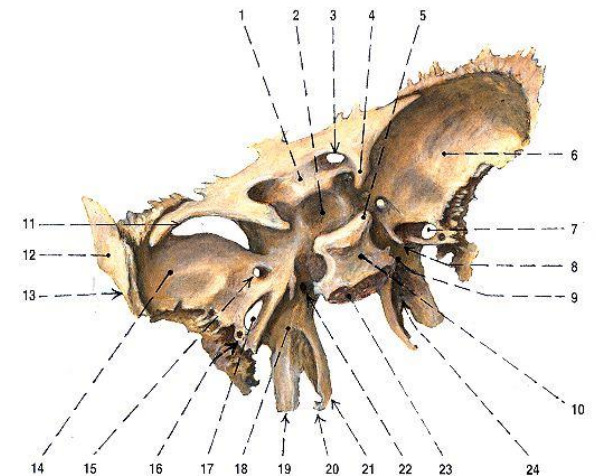


# Os sphenoidale – kost klínová

- osifikace na chondrogenním základě
- **corpus ossis sphenoidalis**
- **alae majores, alae minores, processus pterygoidei**



**sella turcica**

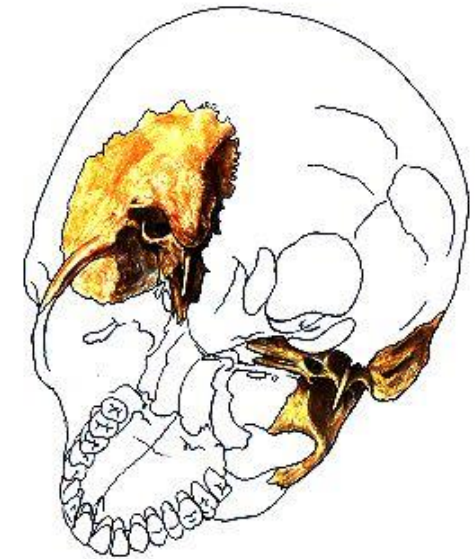
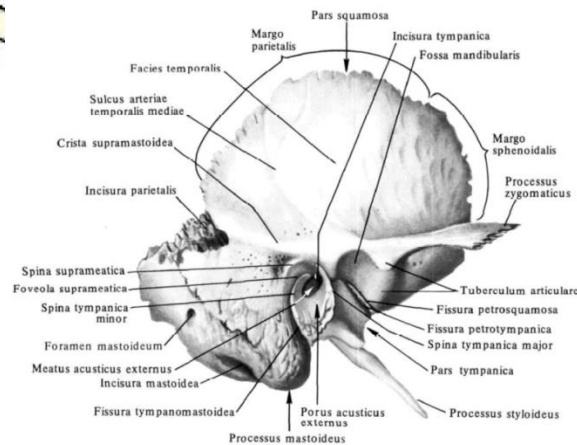
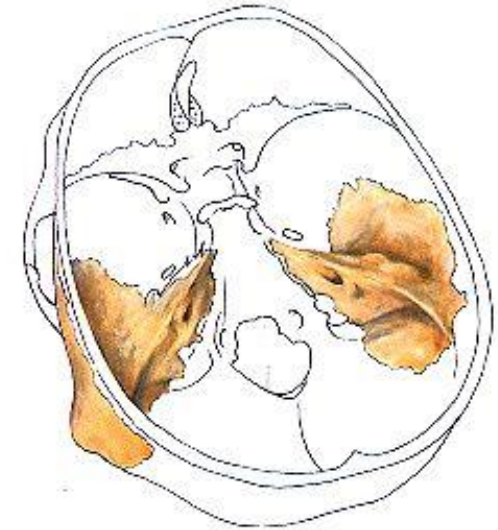
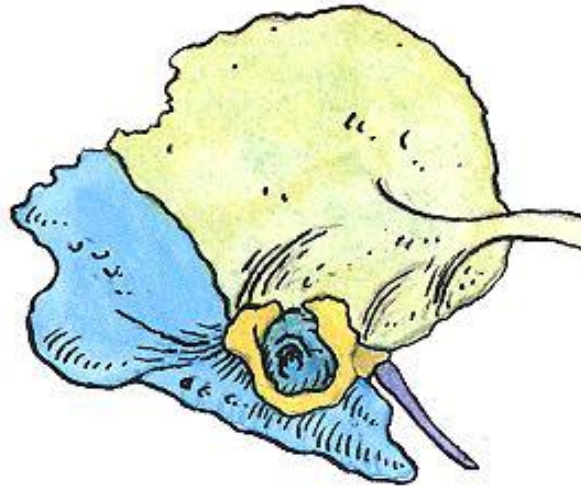


62. OS SPHENOIDALE ET OS OCCIPITALE, KOST KLÍNOVÁ A KOST TÝLNÍ; pohled shora (3/4).

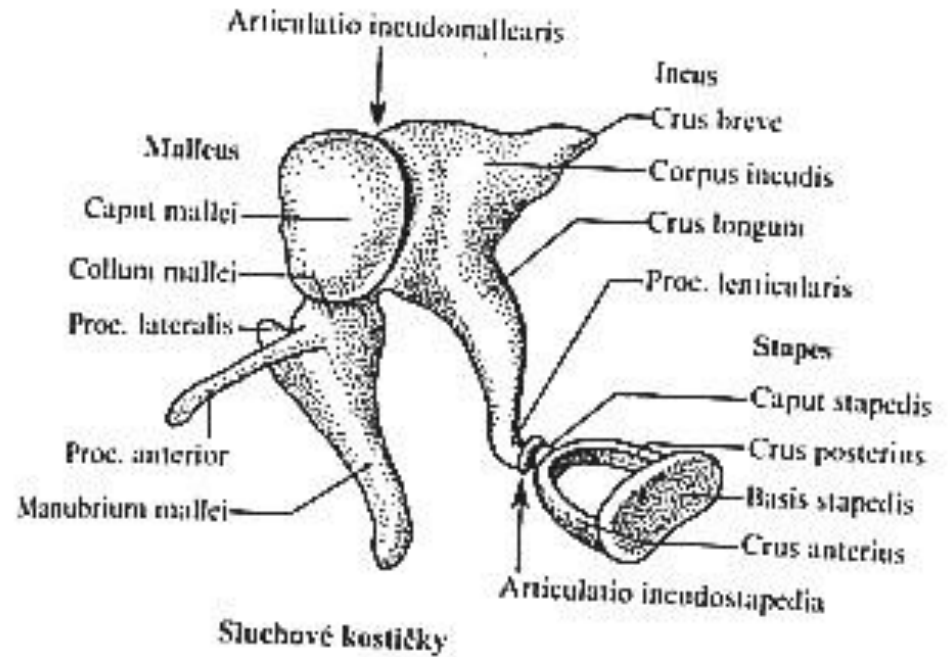
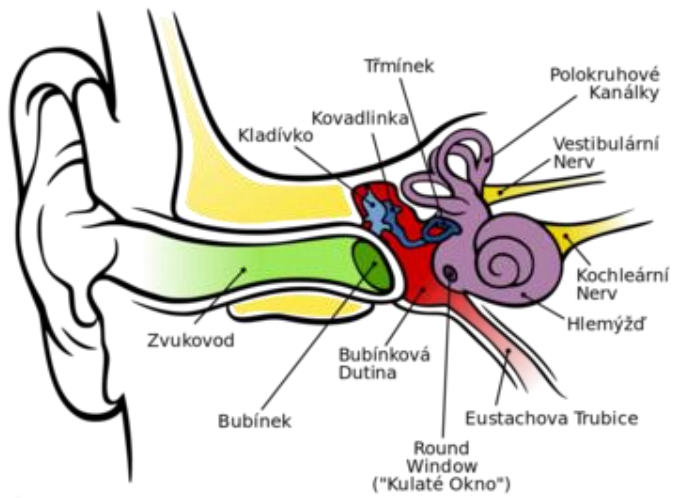
# Os temporale – kost spánková

5 základních částí:

- *pars petrosa (os petrosum, pyramis)*
- *pars squamosa*
- *pars mastoidea*
- *pars tympanica*
- *processus styloideus*



# Sluchové kůstky



## Splanchnocranium

Obličejová část lebky vznikla z žaberních oblouků, které ztratily svou původní funkci a tvoří základ především čelistí.

### 16 kostí:

**Horní čelist** (*maxilla*) – párová

**Nosní kost** (*os nasale*) – párová

**Slzná kost** (*os lacrimale*) – párová

**Lícní kost** (*os zygomaticum*) – párová

**Patrová kost** (*os palatinum*) – párová

**Dolní nosní skořepa** (*concha nasalis inferior*) – párová

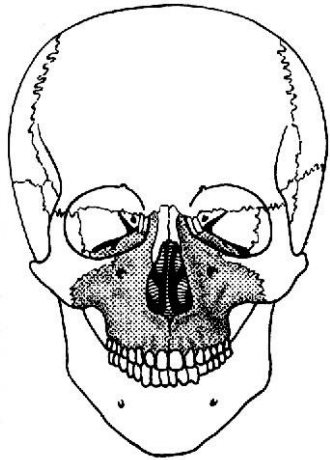
**Radličná kost** (*vomer*)

**Kost čichová** (*os ethmoidale*)

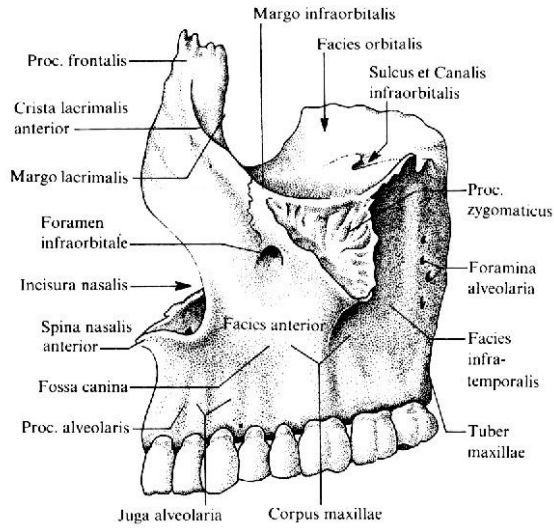
**Dolní čelist** (*mandibula*)

**Jazylka** (*os hyoideum*)

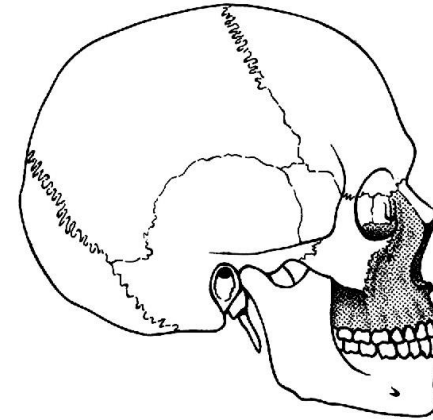
# Horní čelist (maxilla)



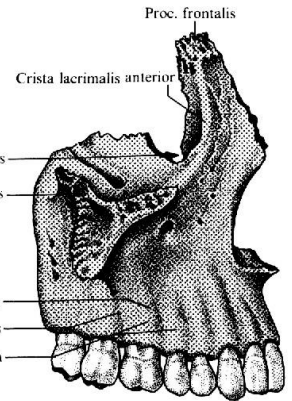
Topografia čeluste spredu



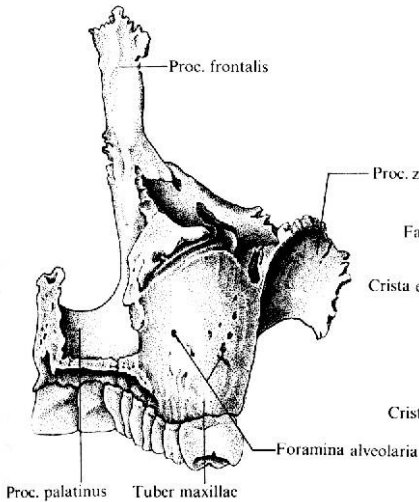
Ľavá čelist' z boku



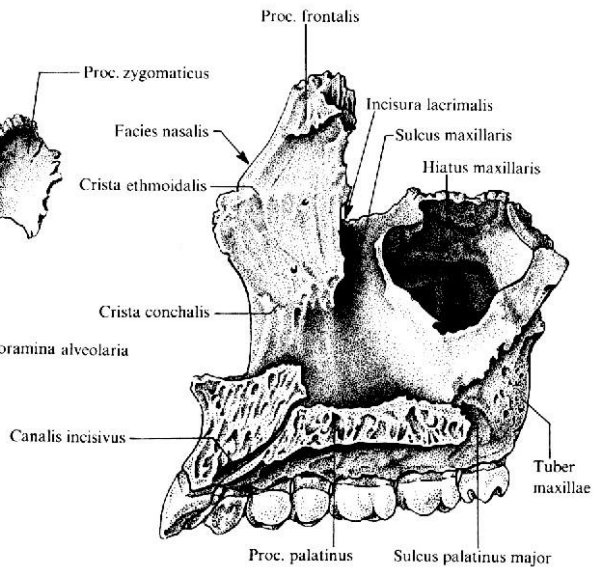
Topografia čeluste z boku



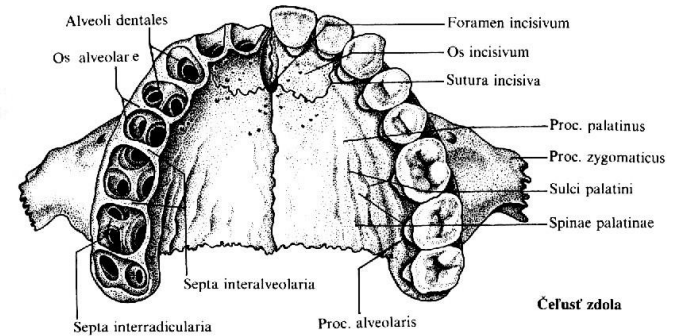
Pravá čelist' z boku



Pravá čelist' zozadu

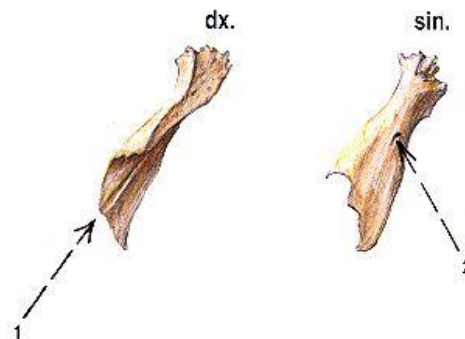


Mediálna plocha pravej čeluste

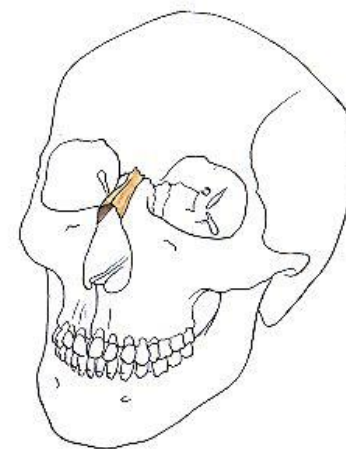


Čelist' zdola

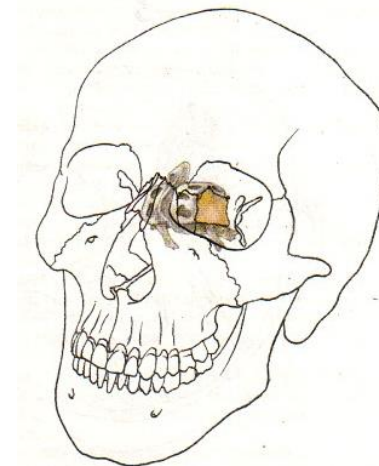
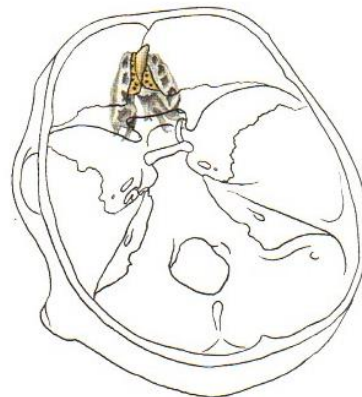
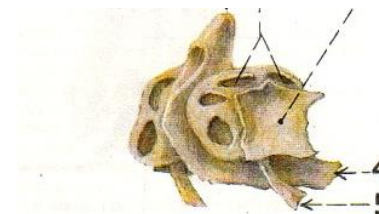
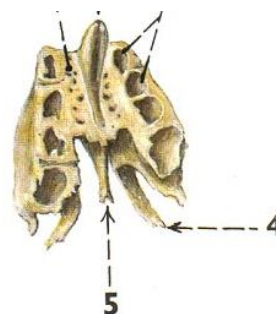
## Kost nosní (*os nasale*)



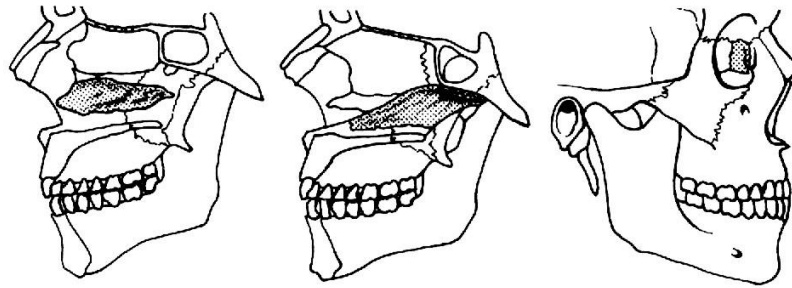
Obr. 192. OSSA NASALIA; pohled zleva zpredu  
1 sulcus ethmoidalis  
2 foramen nasale



## Kost čichová (*os ethmoidale*)



# Kost slzná (*os lacrimale*), kost radličná (*vomer*), dolní skořepa nosní (*concha nasalis inferior*)



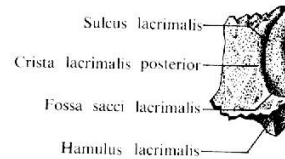
Topografia dolnej nosovej mušle

Topografia čeriesla

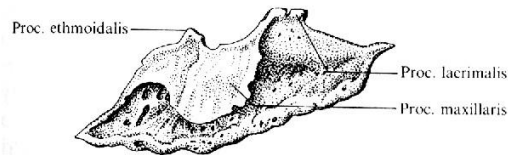
Topografia slznej kosti



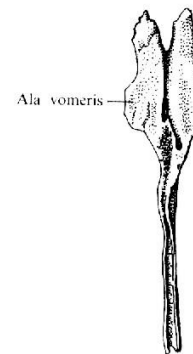
Mediálna plocha pravej dolnej nosovej mušle



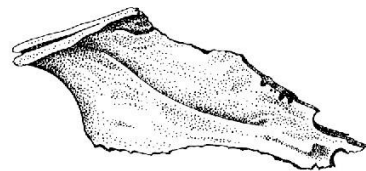
Laterálna plocha pravej slznej kosti



Laterálna plocha pravej dolnej nosovej mušle

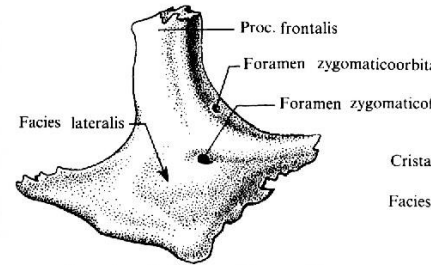
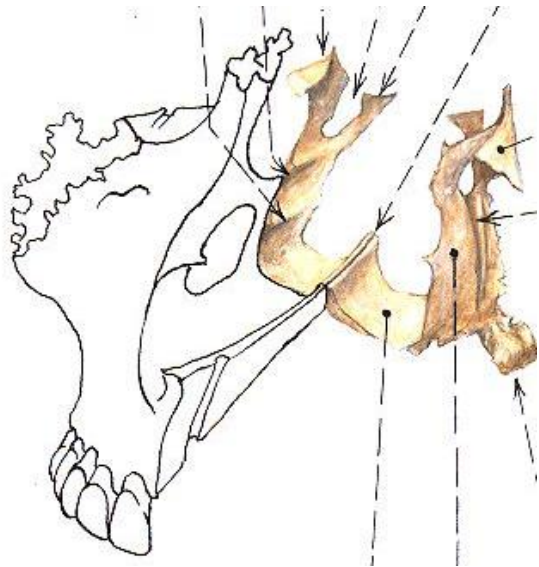


Čerieslo zhora

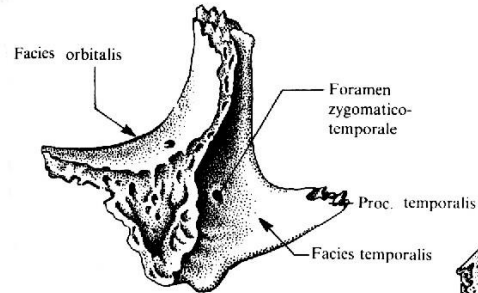


Laterálna plocha čeriesla

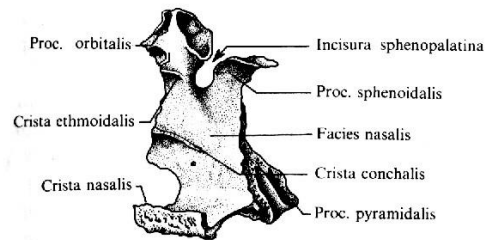
# Kost lícní, jařmová (*os zygomaticum*) a kost patrová (*os palatinum*)



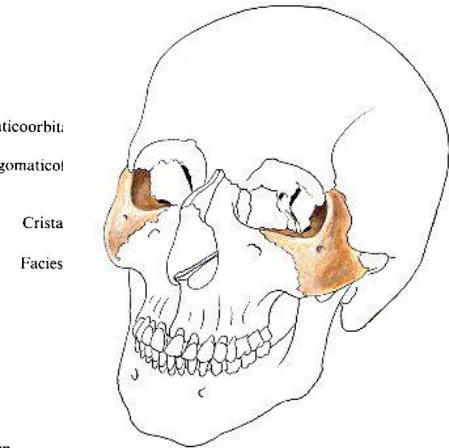
Laterálna plocha pravej jařmovej kosti



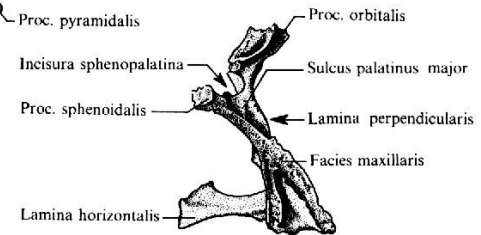
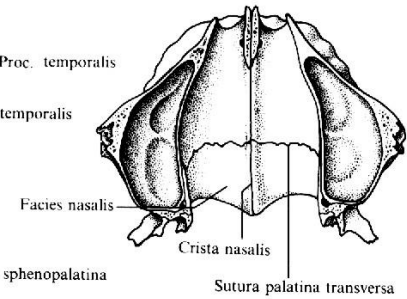
Mediálna plocha pravej jařmovej kosti



Mediálna plocha pravej podnebnjej kosti



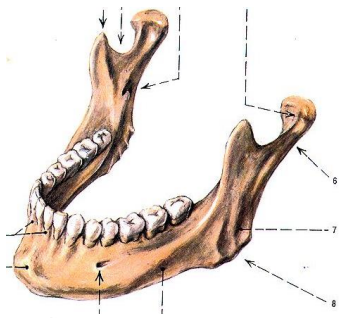
Nazálna plocha kostného podnebia



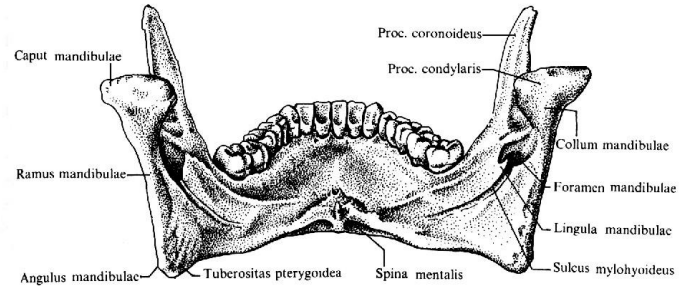
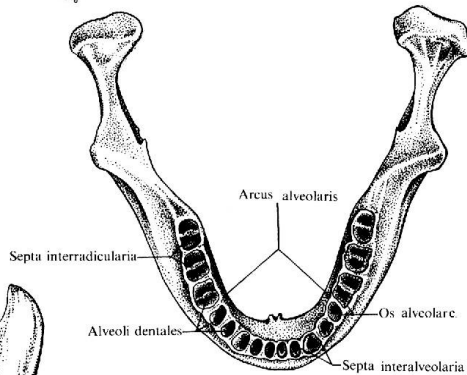
Pravá podnebná kosť zozadu



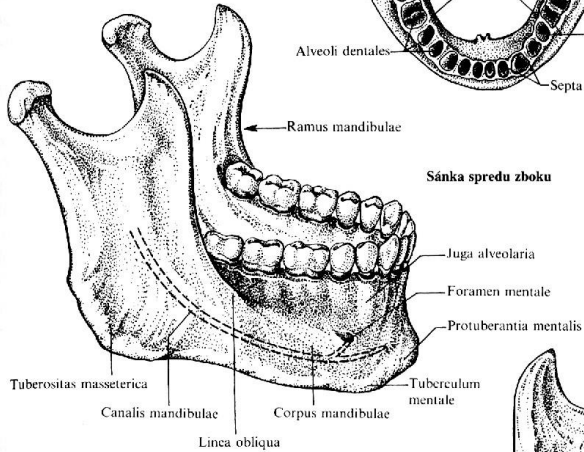
# Dolní čelist (mandibula) a jazyk (os hyoideum)



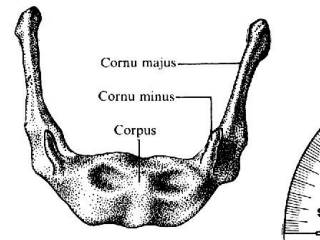
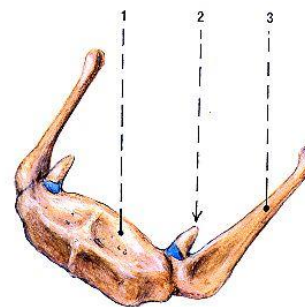
Sánka zhora



Sánka zozadu

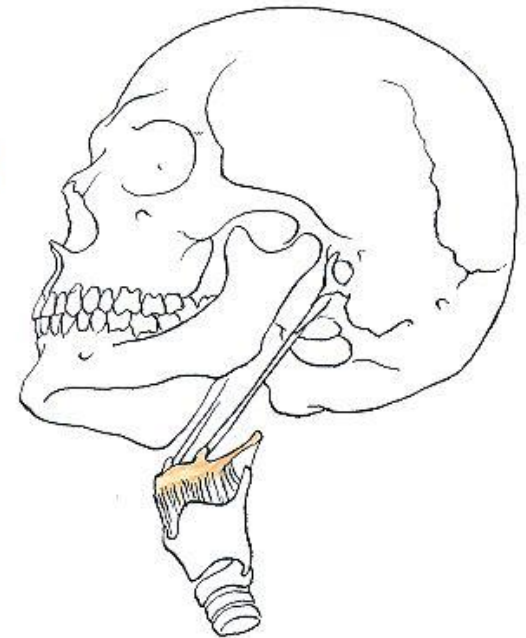
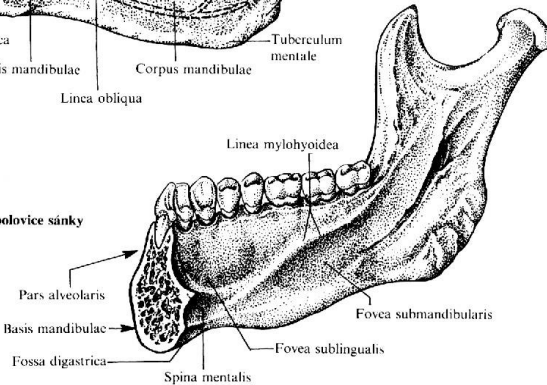


Sánka spredu z boku



Jazyk spredu zhora

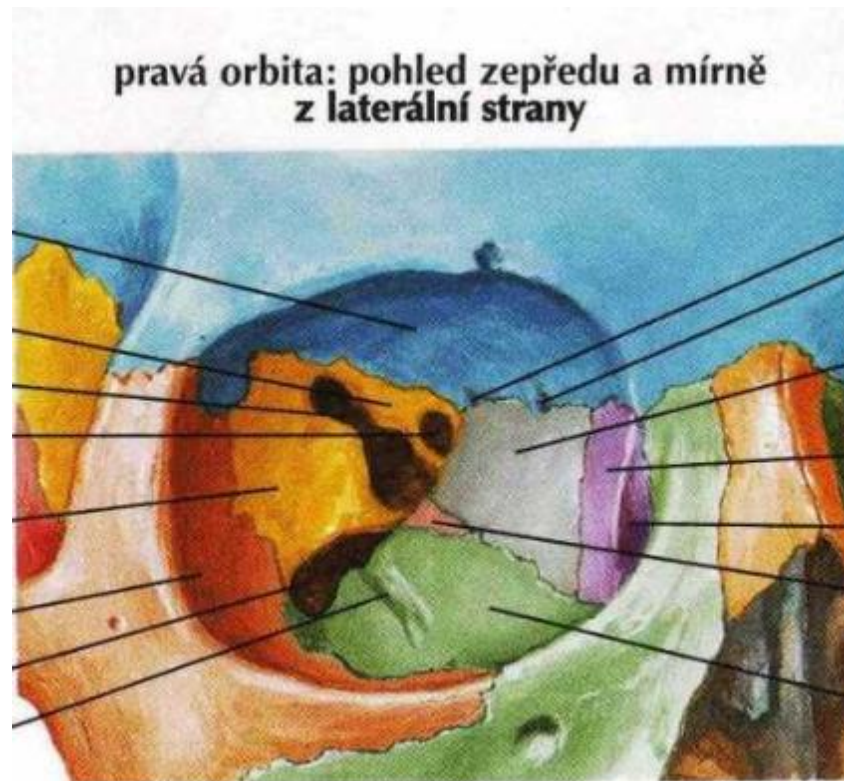
Vnitřní plocha polovice sánky



# Orbita (očnice)

Na tvorbě očnice se podílí:

*os frontale*; *os lacrimale*; *os ethmoidale*; *os sphenoidale*;  
*os zygomaticum* ; *maxilla*; *os palatinum*



F. Netter (2005) Anatomický atlas člověka

# Dutina nosní

Na tvorbě dutiny nosní se podílí:  
*maxilla*

*os palatinum*

*os vomer*

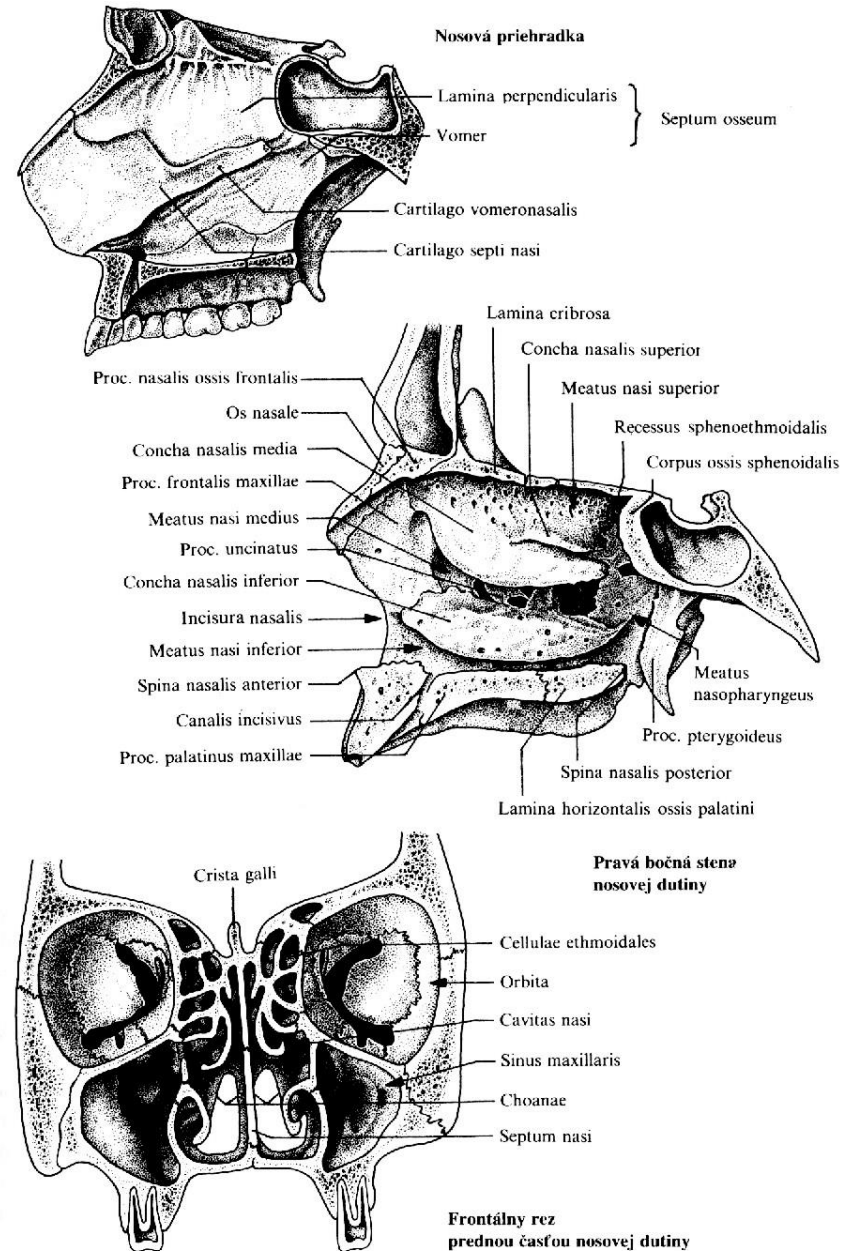
*ossa nasalia,*

*os sphenoidale*

*os lacrimale*

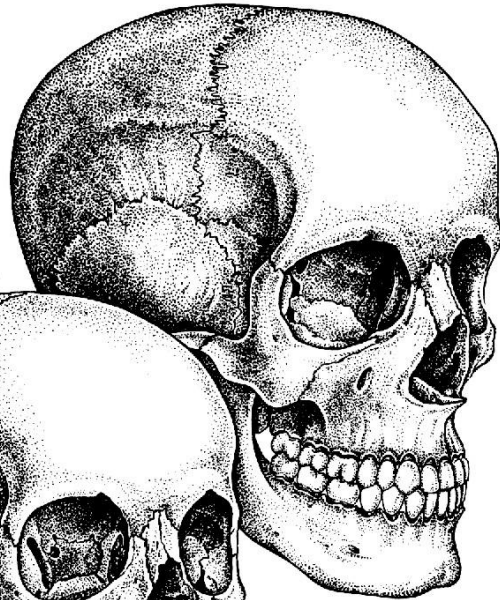
*os ethmoidale*

3 párové nosní skořepy (*conchae nasales superior, media a inferior*)

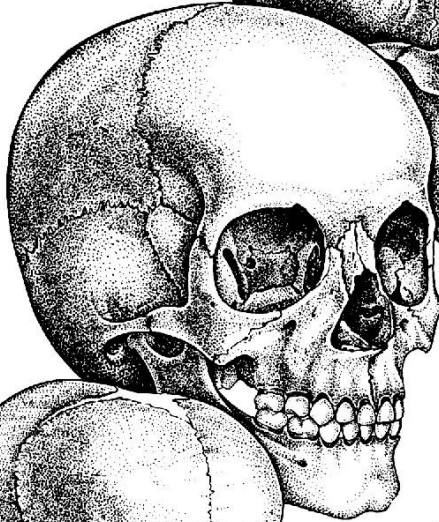


# Lebka v průběhu času

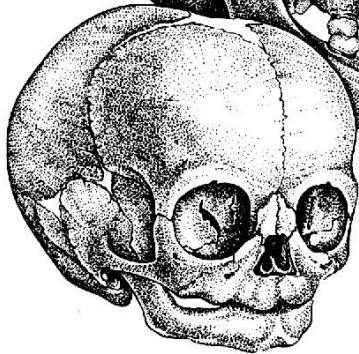
Lebka  
dospělého člověka



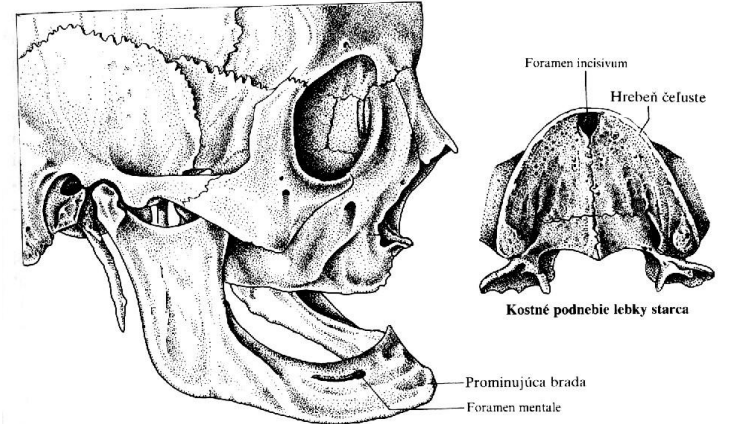
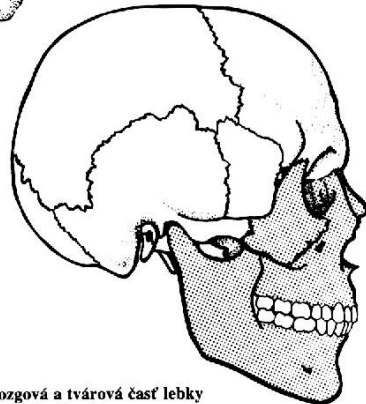
Lebka  
mladistvého



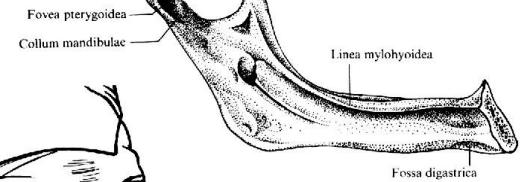
Lebka  
novorozence



Mozgová a tvárová část lebky  
dospělého člověka



Lebka starca

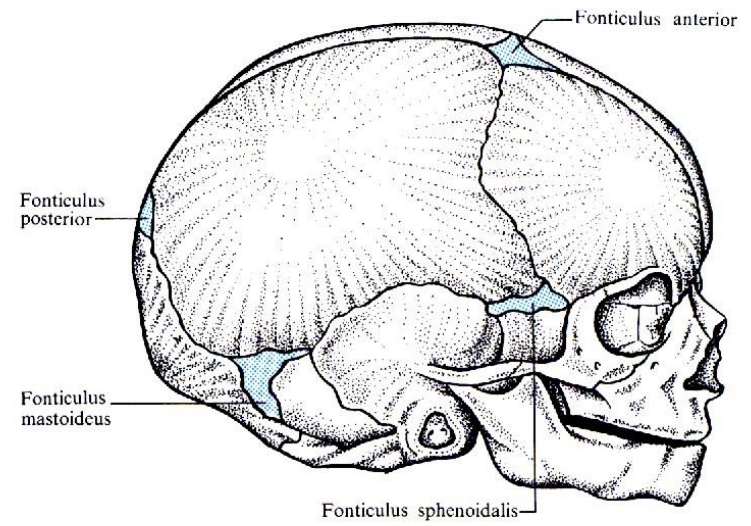
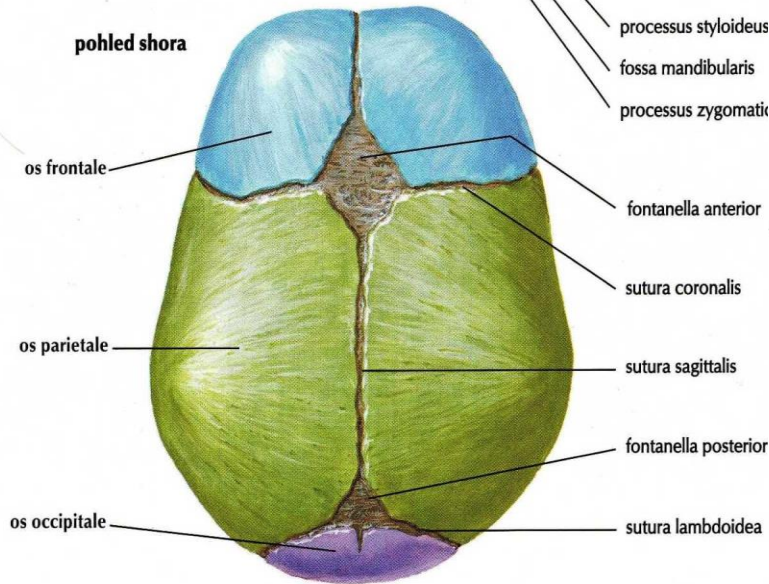
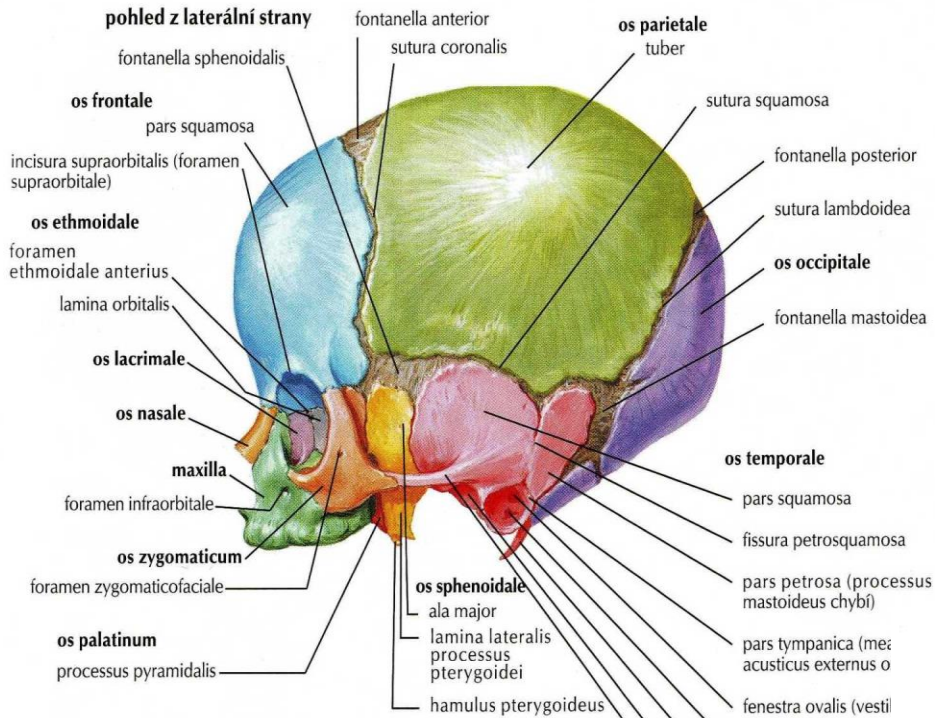


Mediální plocha sánky starca



„Il vecchio“ (štúdie starnutia  
Leonarda da Vinciho; z E. Belta,  
1952)

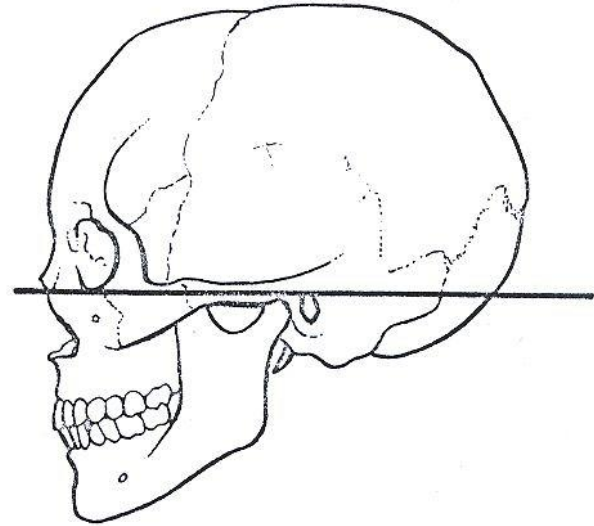
# Lebka novorozence



Lebka novorođenca

*F. N. 1880*

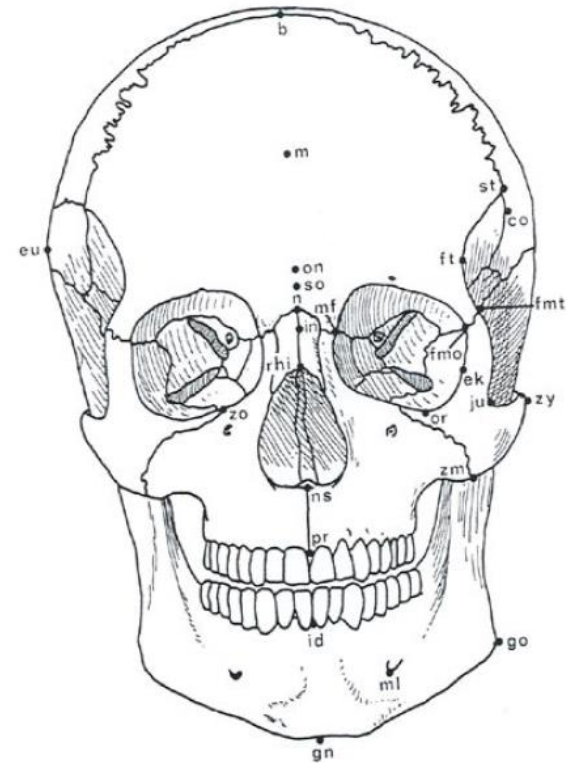
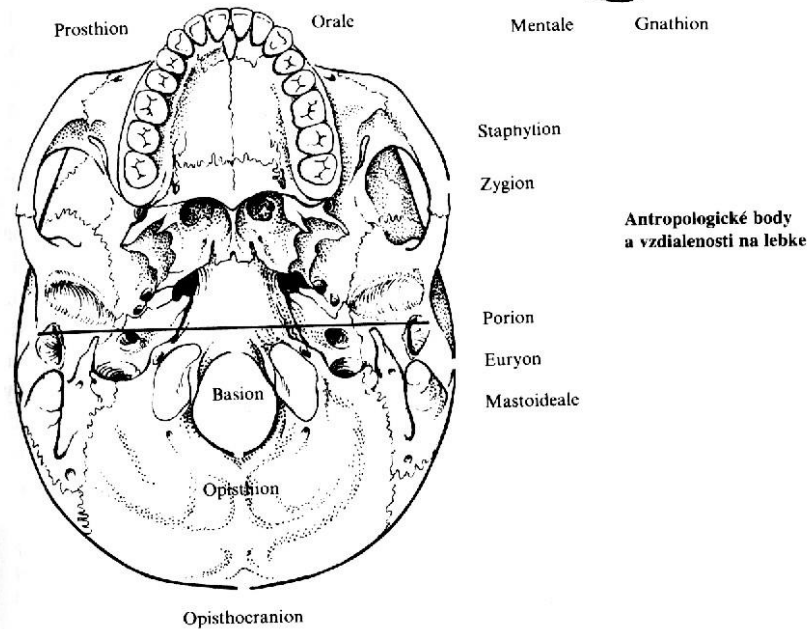
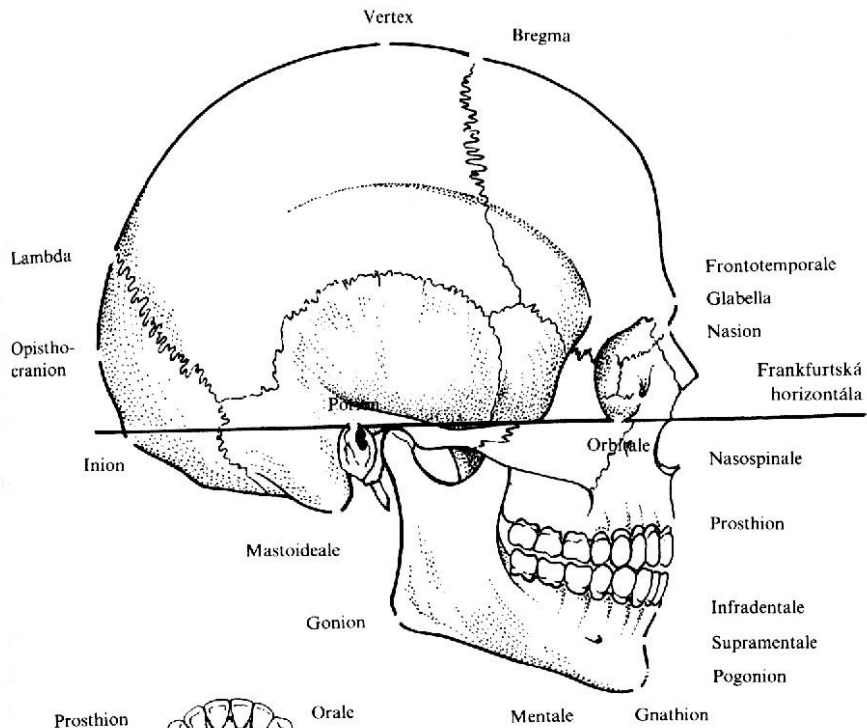
# Normovaná poloha lebky



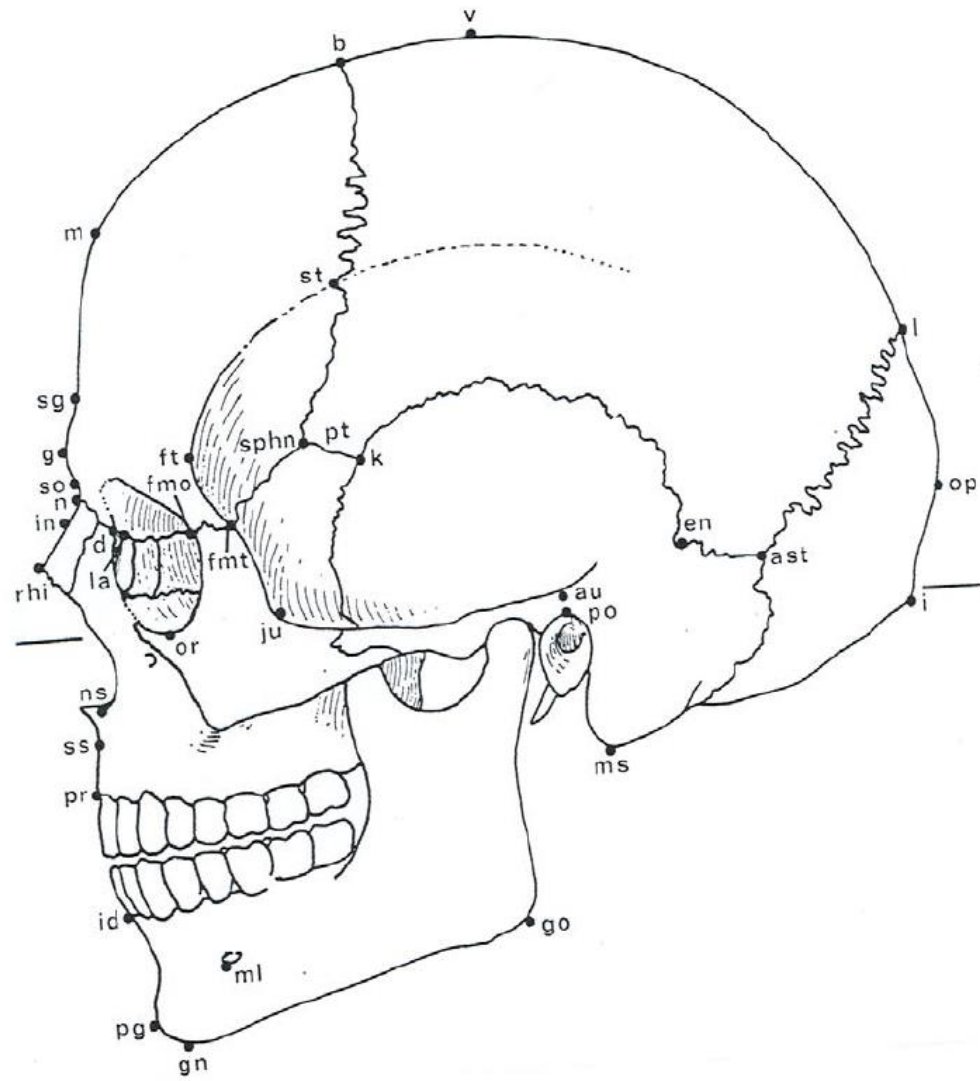
## Frankfurtská horizontála

- **přibližně odpovídá postavení hlavy živého člověka!!!**
- spojuje dolní okraj očnice s horním okrajem porus acusticus externus, probíhá vodorovně, rovnoběžně s rovinou horizontální
- dohoda o rovině z Frankfurtu nad Mohanem z roku 1884
- lebka postavená v kranioforu

# Kosti lebky (antropometrické body)

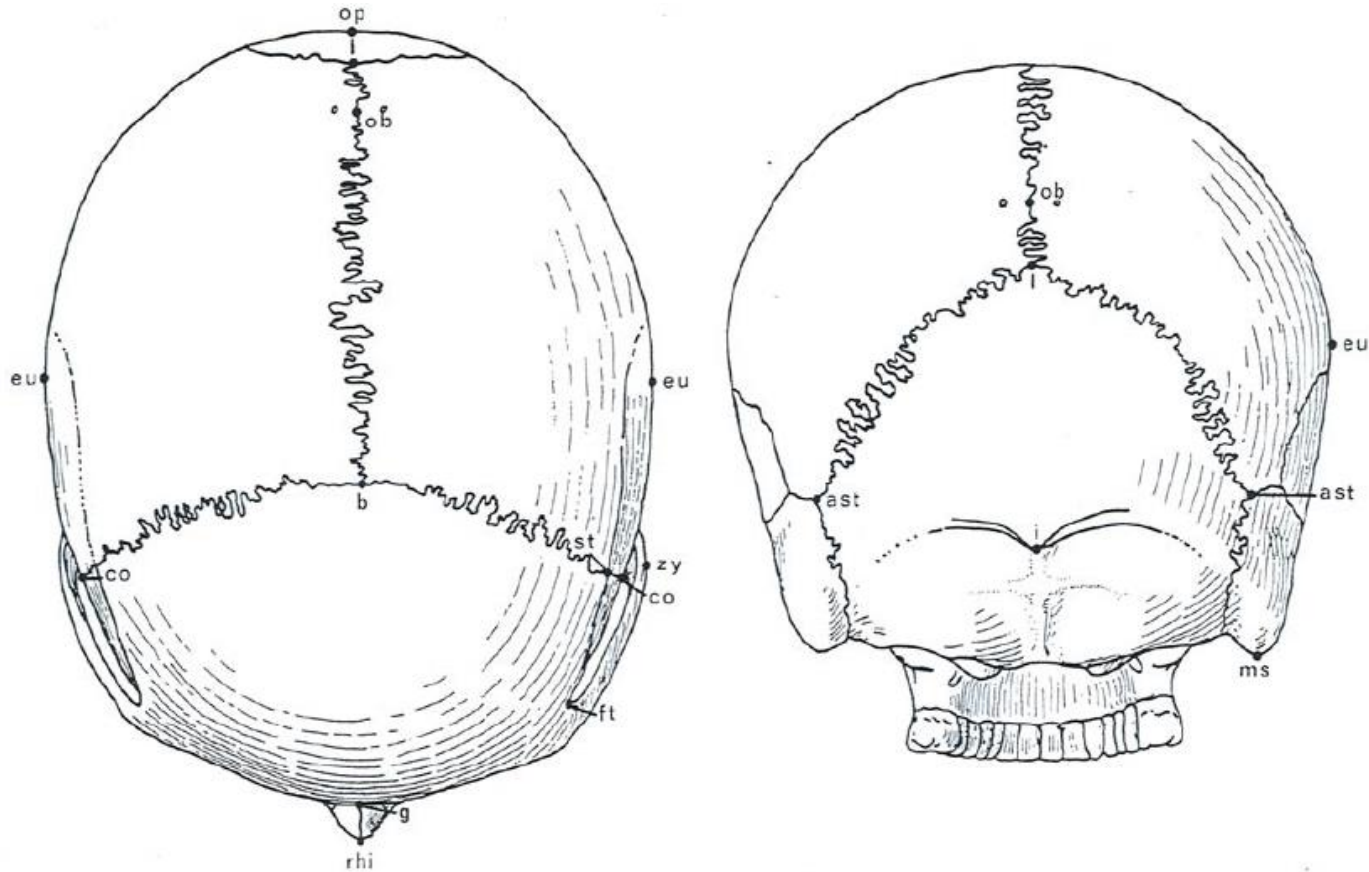


# Kraniometrické body v *norma lateralis*

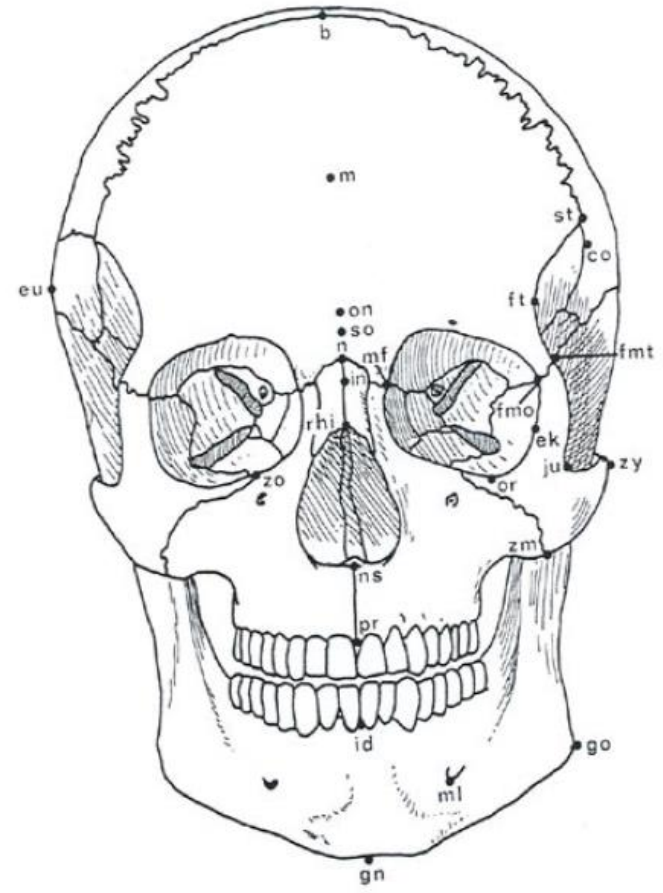
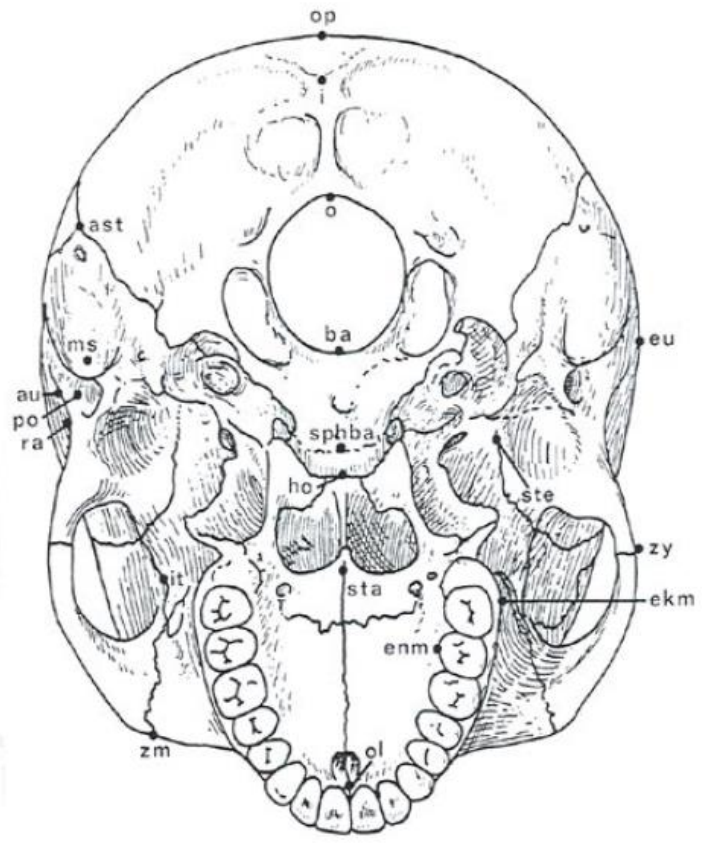




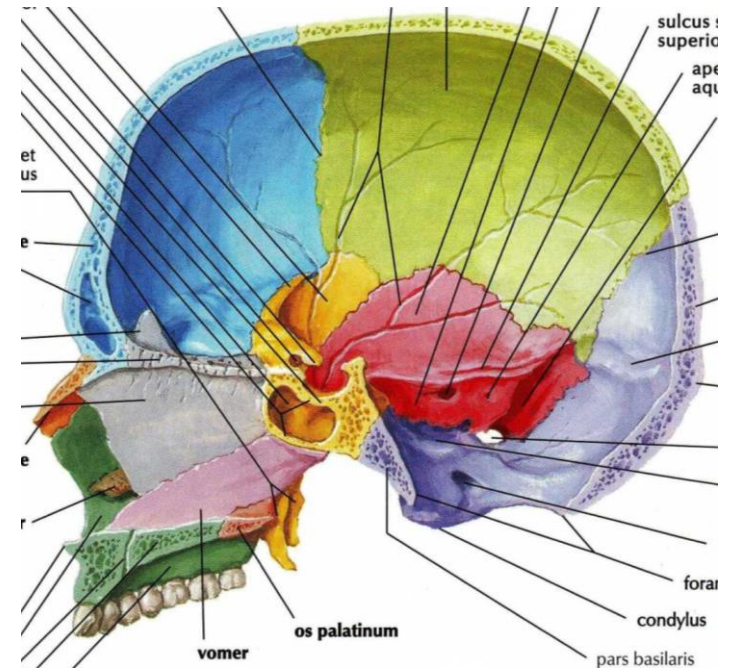
# Kraniometrické body v *norma verticalis* a *occipitalis*



# Kraniometrické body v *norma basilaris* a *frontalis*

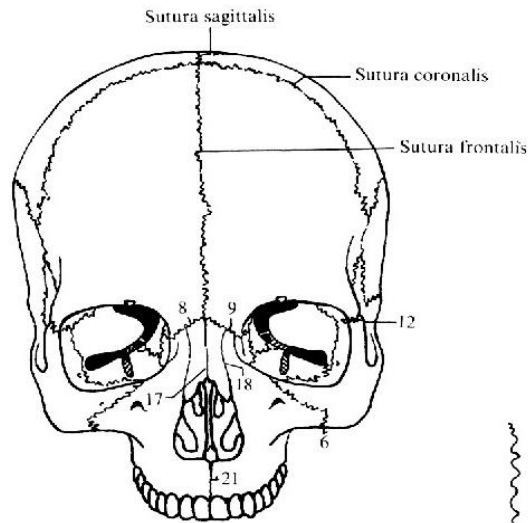


6. **norma sagitalis** (nebo též *interna*) pohled na lebku v mediansagitálním řezu →

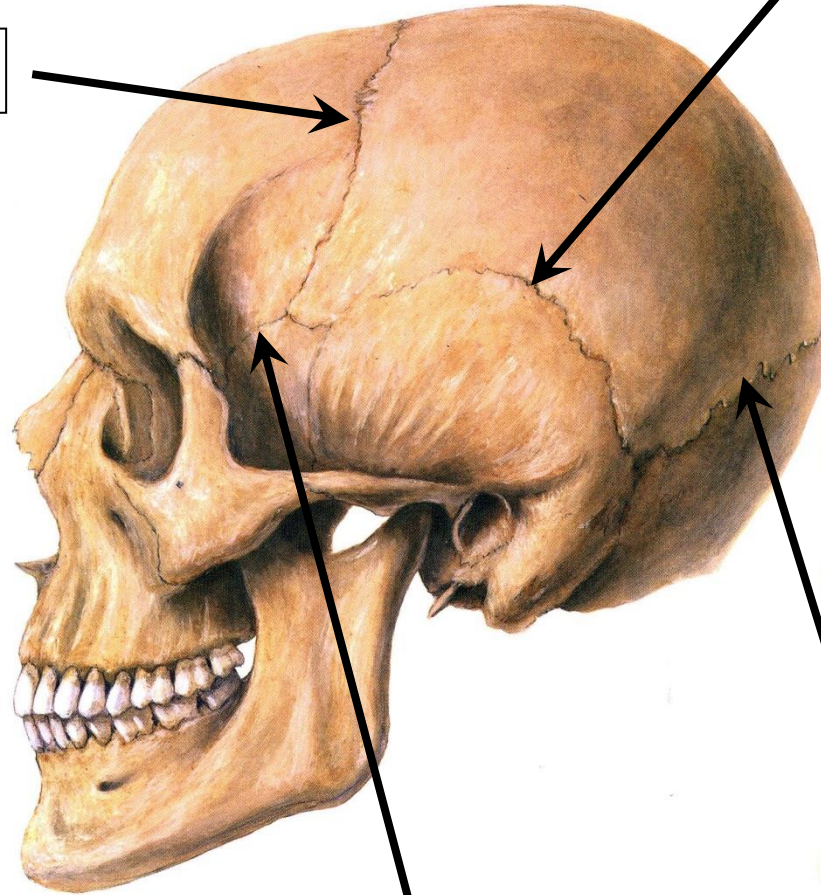


← 7. **norma basilaris interna** pohled na lební bázi zevnitř lebky (dosáhneme ho pouze horizontálním rozříznutím lebky)

# Lebeční švy



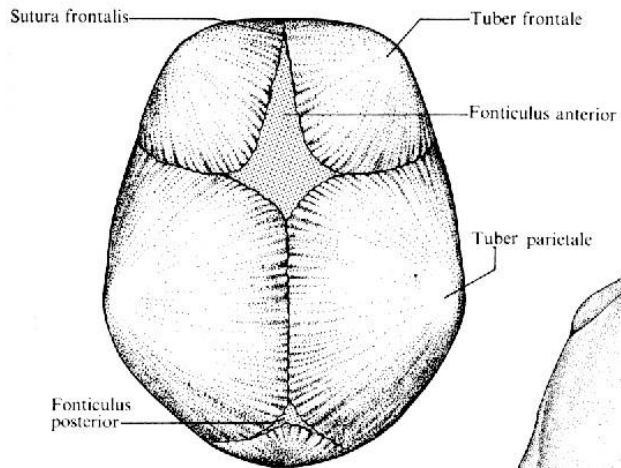
***sutura coronalis***



***sutura squamosa***

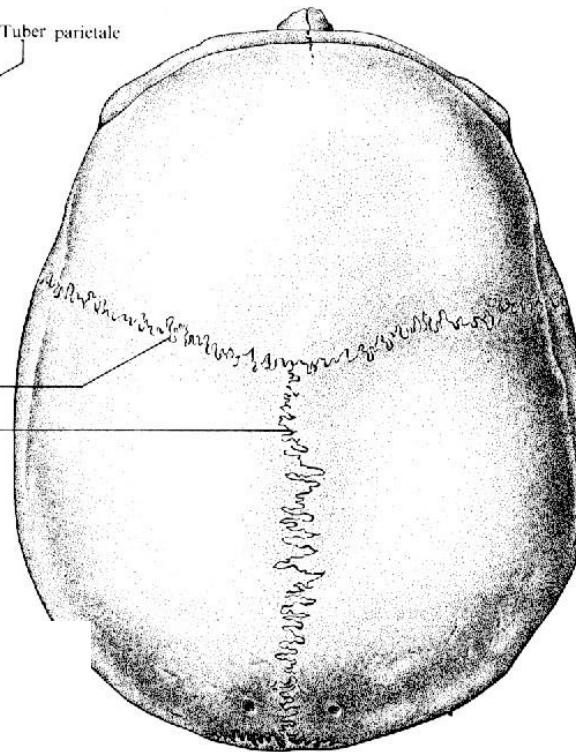
***sutura sphenofrontalis***

***sutura lambdoidea***



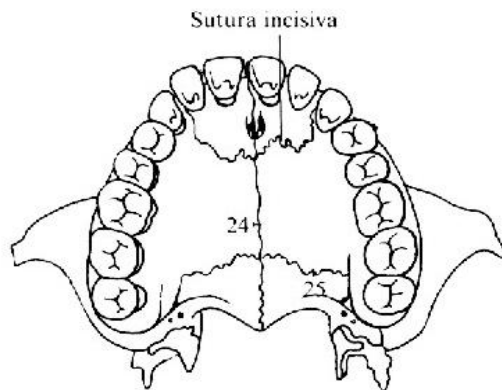
Lebečná klenba novorodenca

Lebečná klenba dospelého človeka



***sutura sagittalis***

5



Sutúry tvrdého podnebia

***sutura intermaxilaris***

# Postkraniální skelet

## Kostra osy tělní - obratle (*vertebrae*)

- kost křížová (*os sacrum*)
- kost kostrční (*os coccygis*)
- žebra (*costae*)
- kost hrudní (*sternum*)

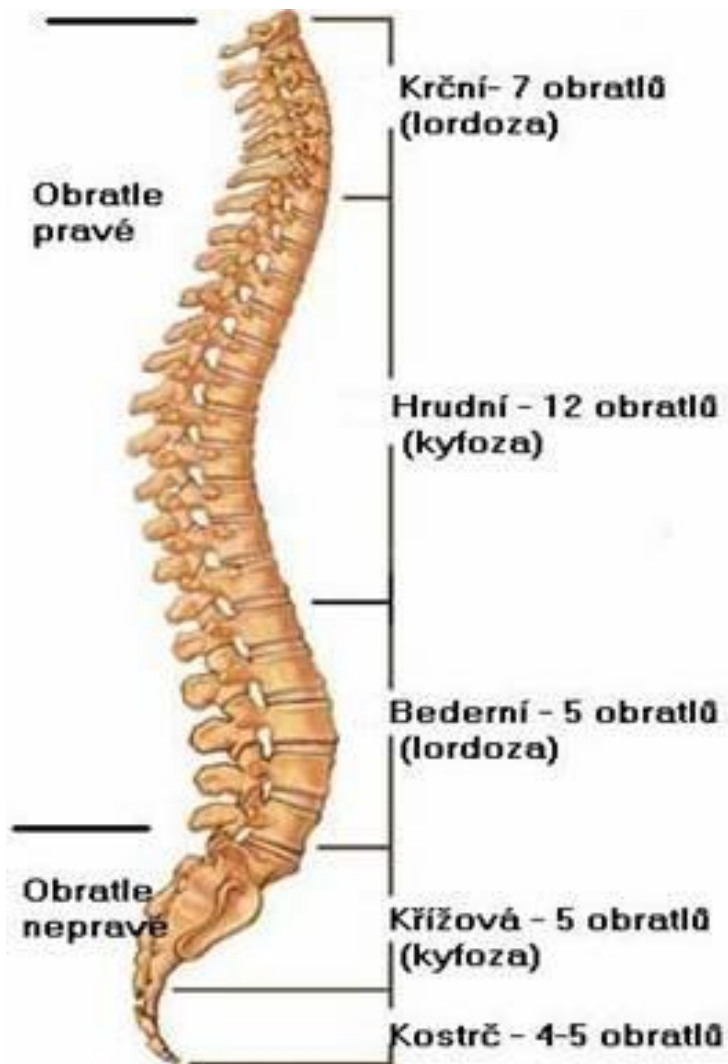
## Kostra horní končetiny - kosti pletence (*clavicula, scapula*)

- kosti volné končetiny (*humerus, radius, ulna, ossa carpi, ossa metacarpi, ossa digitorum manus*)

## Kostra dolní končetiny - kosti pletence (*os coxae – os ilium, os ischii, os pubis*)

- kosti volné končetiny (*femur, patella, tibia, fibula, ossa tarsi, ossa metatarsi, ossa digitorum pedis*)

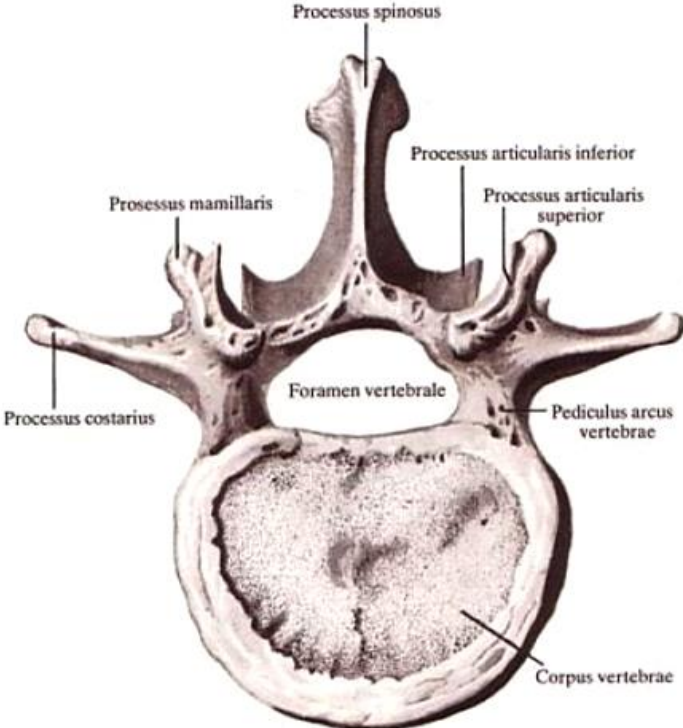
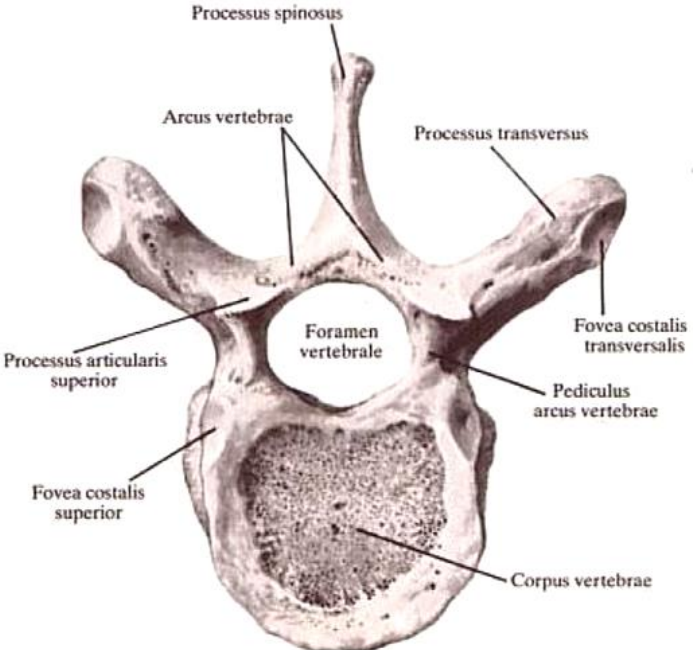
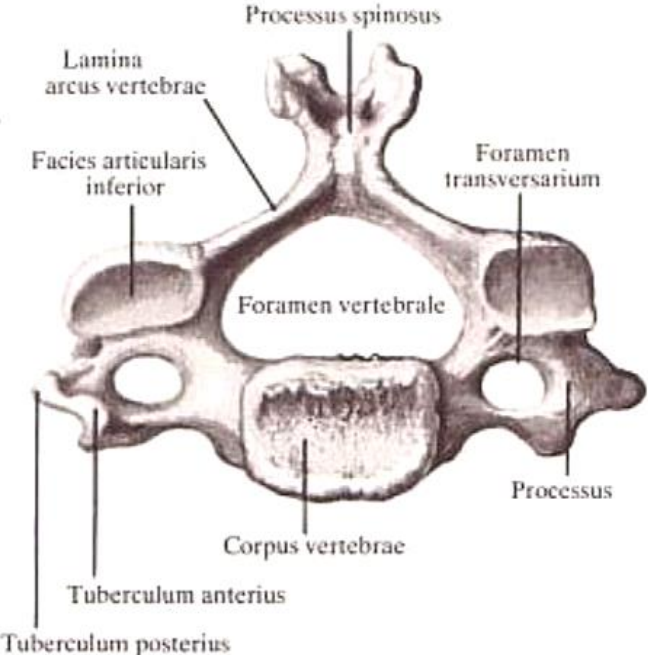
# Columna vertebralis, páteř



- 7 obratlů krčních – ***vertebrae cervicales***
- 12 obratlů hrudních – ***vertebrae thoracicae***
- 5 obratlů bederních - ***vertebrae lumbales***
- 5 obratlů křížových – ***vertebrae sacrales***
- 4-5 obratlů kostrčních – ***vertebrae coccygeae***



# Obratle





# Atlas (nosič) a axis (čepovec)



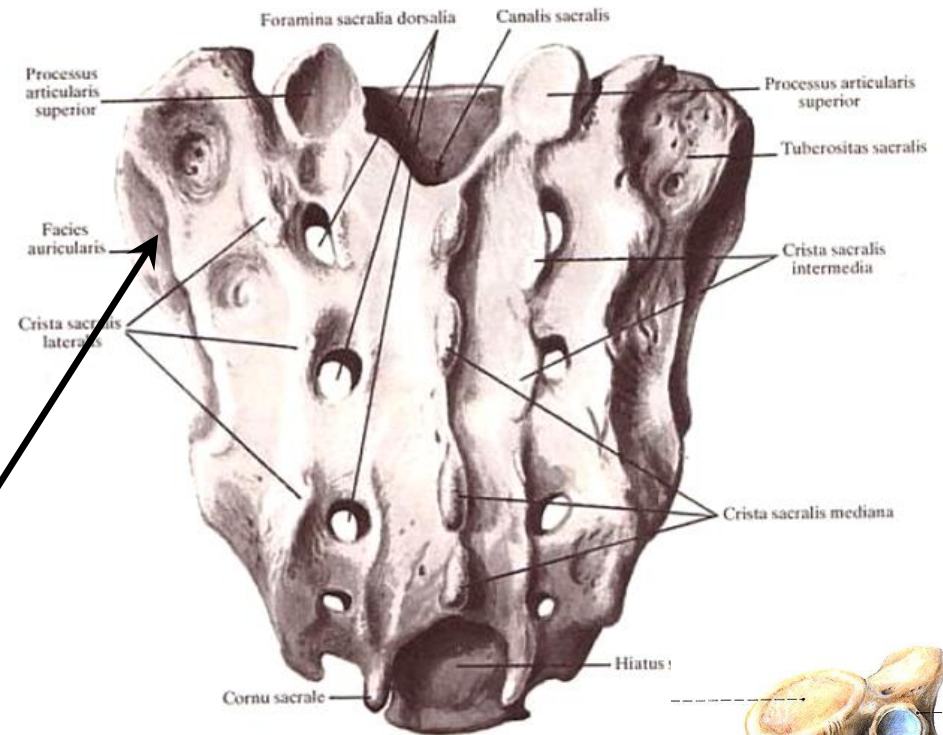
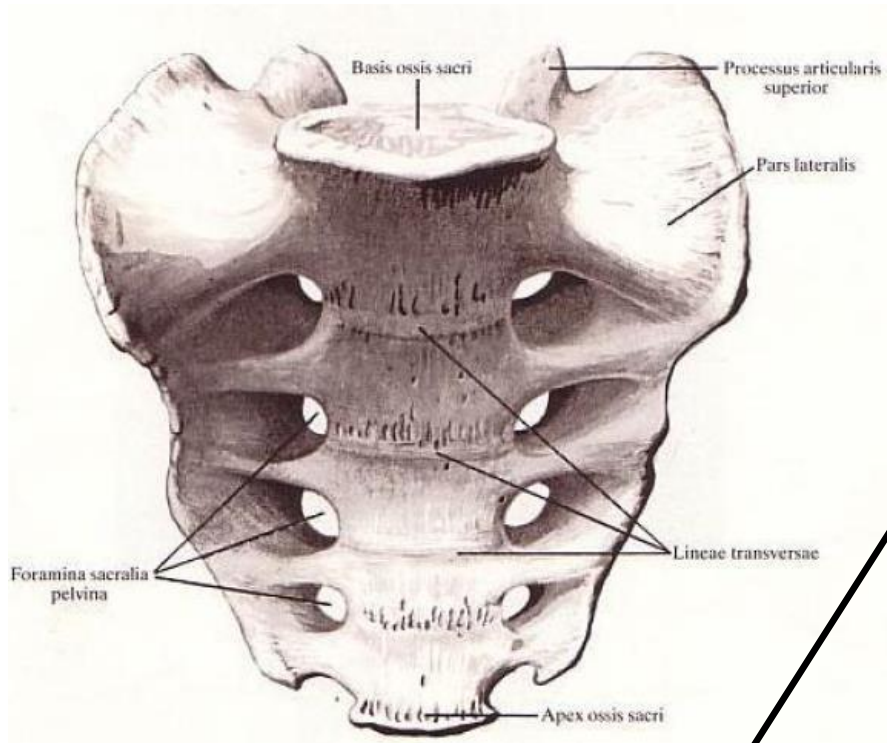
## Atlas

- nemá tělo
- *arcus anterior, arcus posterior*
- ***fovea dentis***
- *foveae articulares superiores* – vejčité jamky se styčnými ploškami pro spojení s hrboly týlní kosti
- *foveae articulares inferiores* – ploché, stýkají se s čepovcem

## Axis

- ***dens axis*** – zub čepovce

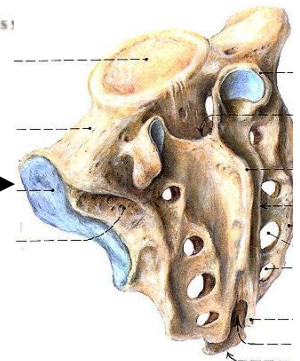
# Os sacrum – kost křížová



**facies auricularis**

**canalis sacralis**

**spina bifida** – nesplynutí obou polovin  
obratlových oblouků, sakrální kanál otevřený

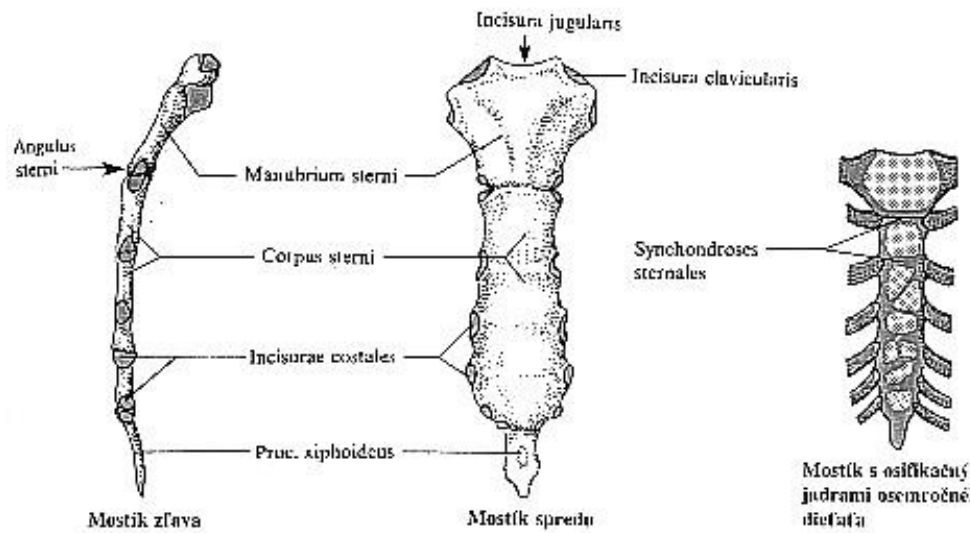
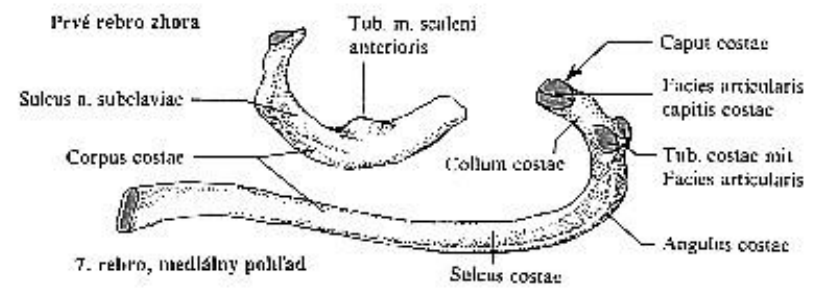
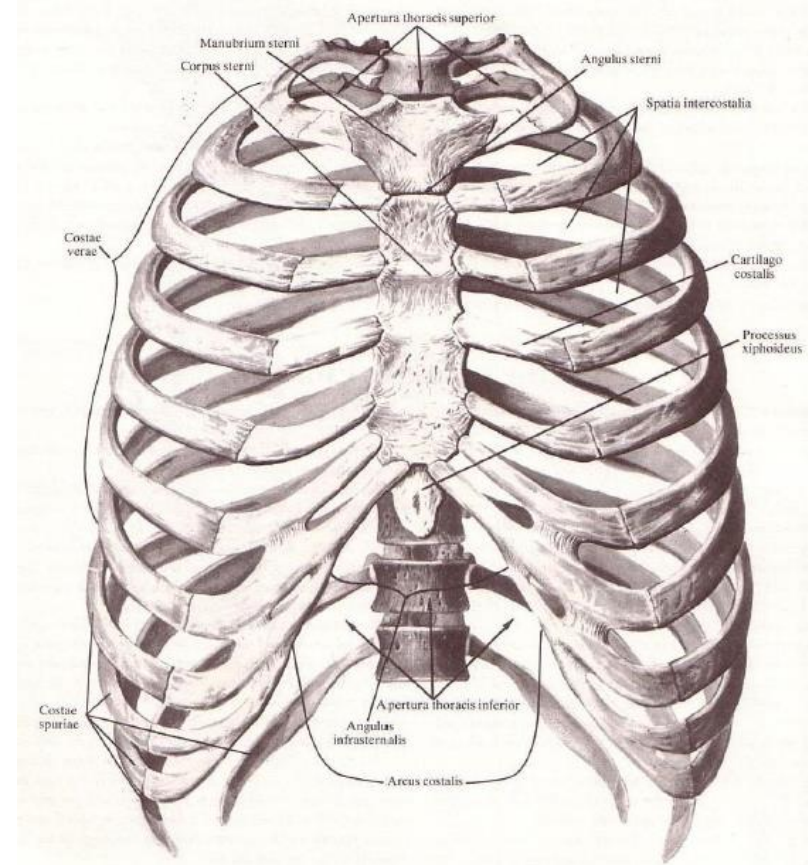
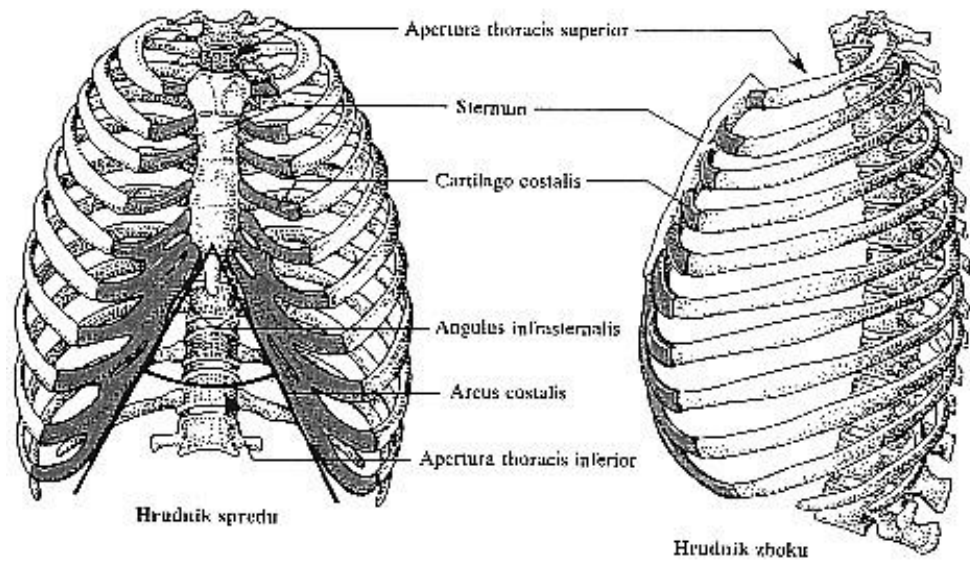


# Os coccygis – kost kostrční

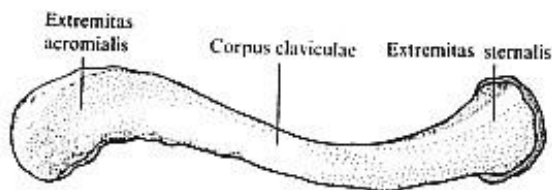
- konečná část páteře
- vznikla spojením 4 – 5 kostrčních obratlů



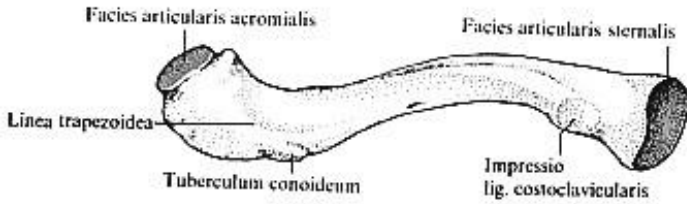
# Hrudník



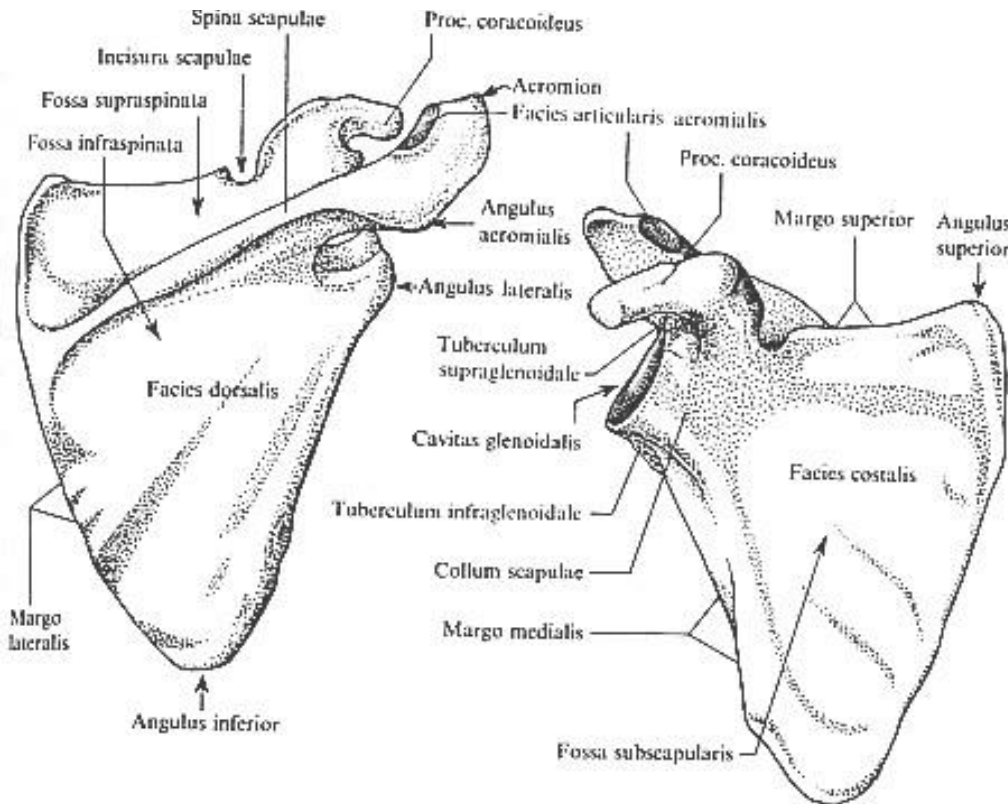
# Kostra horní končetiny - pletenec



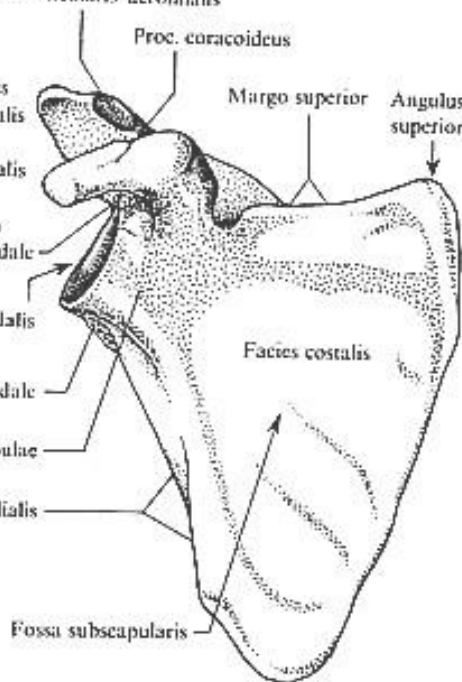
Pravá ključna kosť zhora



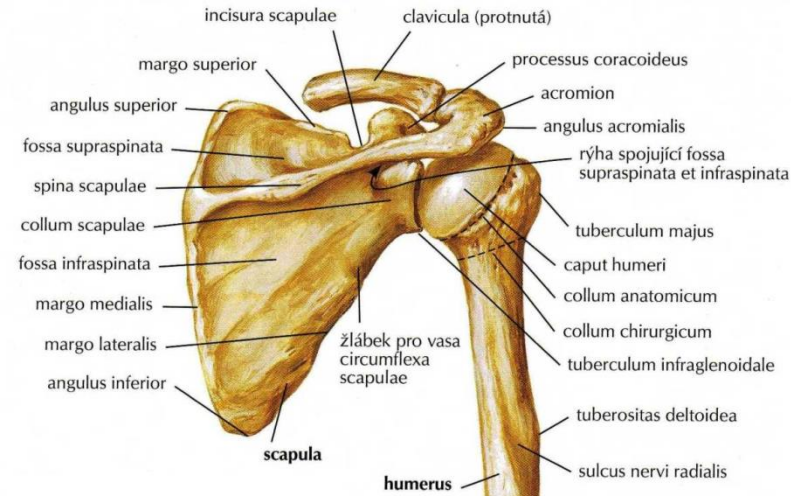
Pravá ključna kosť zdola



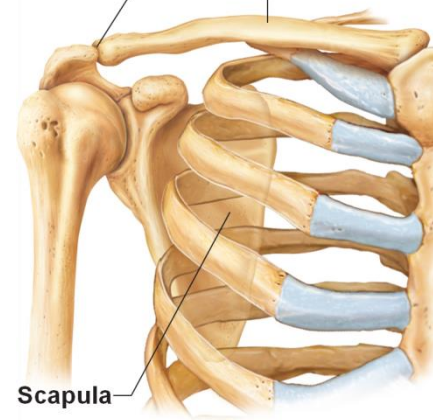
Pravá lopatka zozadu



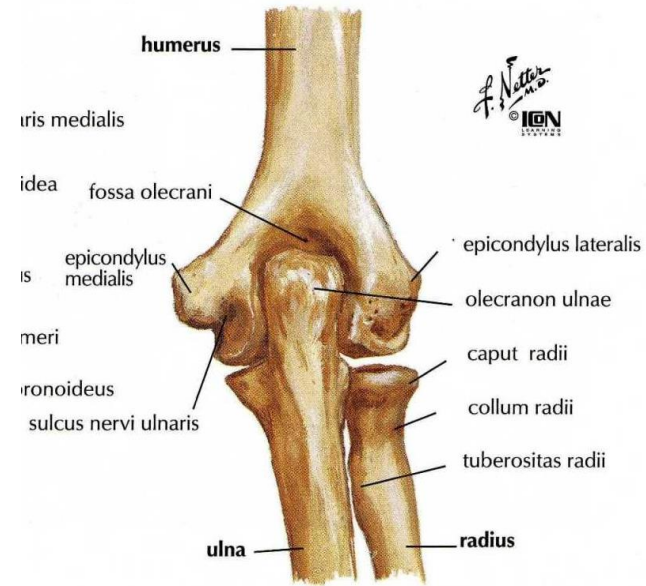
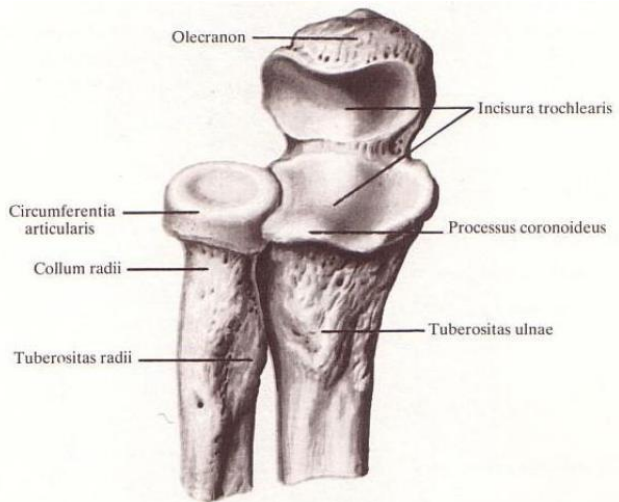
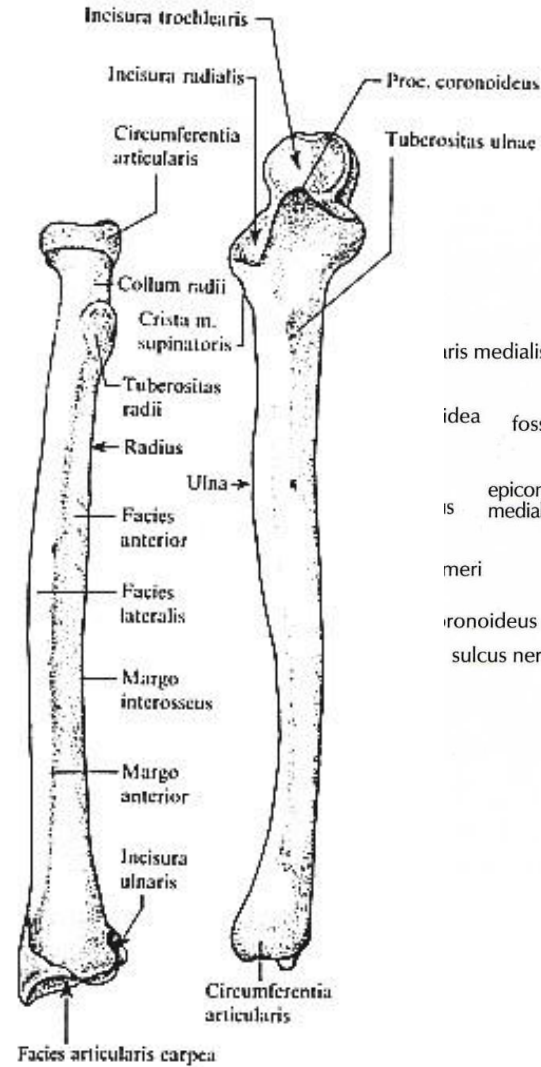
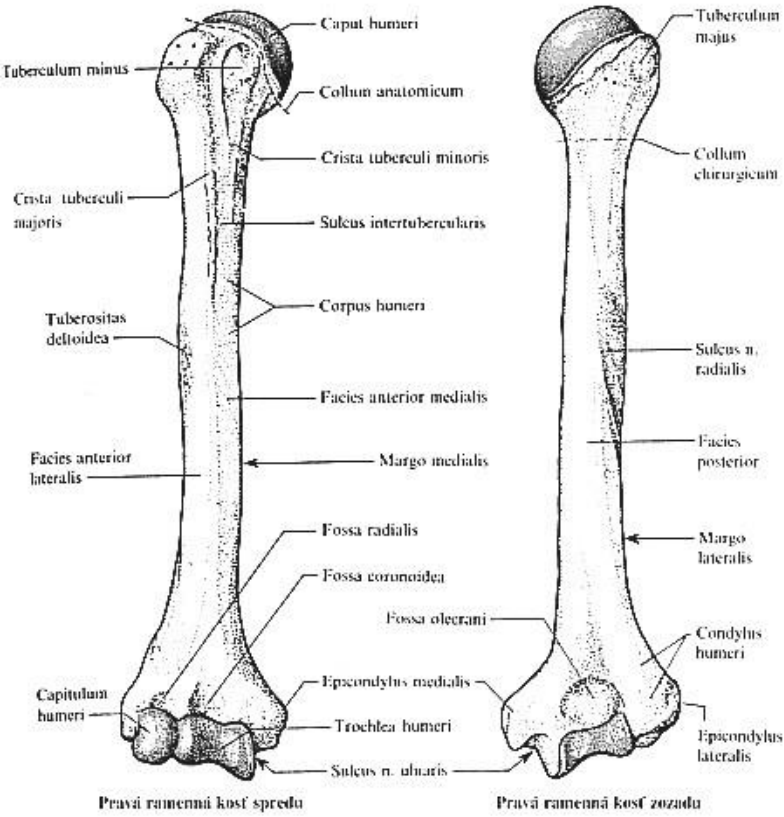
Pravá lopatka spredu



Acromio-clavicular joint  
Clavicle



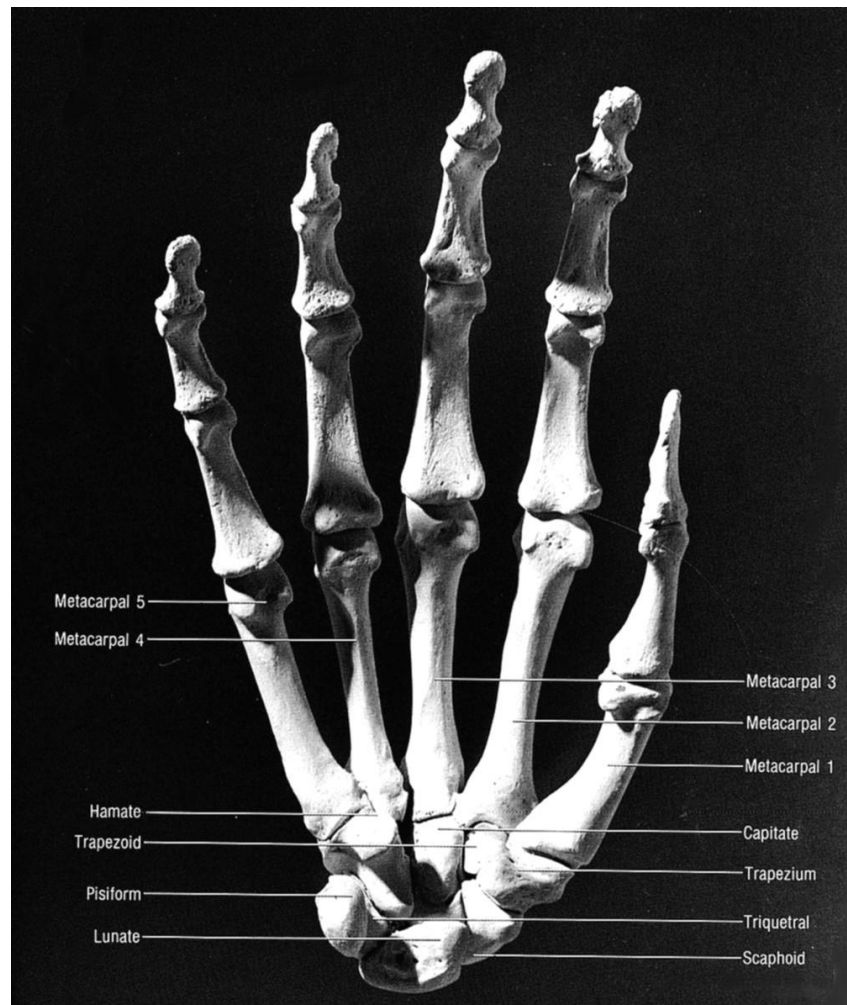
# Kosti volné končetiny



poloha při extenzi: pohled zezadu

F. Netter M.D. IGM

# Kosti ruky



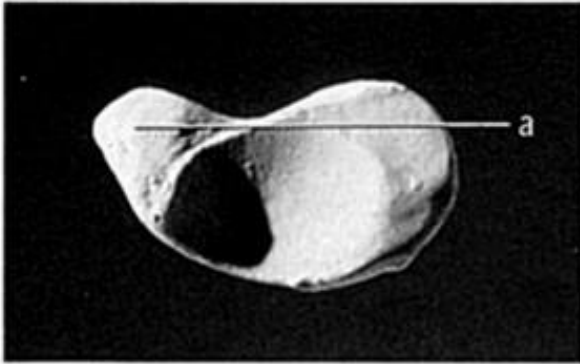
# Kosti ruky

- **Karpální kůstky (zápěstní)**
- Proximální řada: kost loďkovitá, kost poloměsíčitá, kost trojhranná, kost hráškovitá
- Distální řada: kost mnohohranná větší, kost mnohohranná menší, kost hlavatá, kost hákovitá





# Kost lod'kovitá (os scaphoideum)



View from the capitate

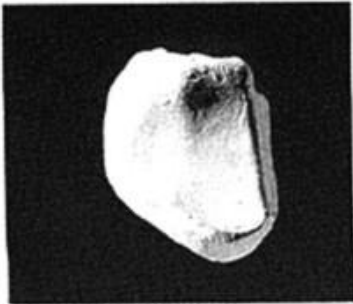


View from the radius

Figure 10.4 Right scaphoid. Palmar is up. Natural size.

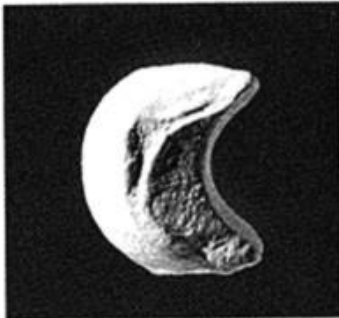


# Kost poloměsíčitá (*os lunatum*)



View from the capitate

Figure 10.5 Right lunate. Dorsal is up. Natural size.



View from the scaphoid



View from the triquetrum

Figure 10.6 Right lunate. Palmar is up. Natural size.



Facies articularis  
with os capitatum



## Kost trojhranná (*os triquetrum*)



Palmar view

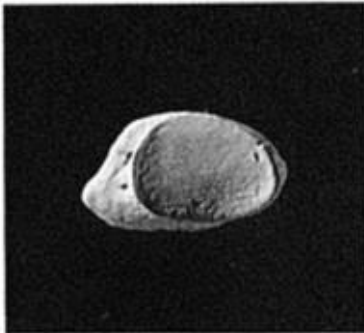
Figure 10.7 Right triquetrum.  
Lateral is up. Natural size.



View from the hamate

Figure 10.8 Right triquetrum.  
Palmar is up. Natural size.

## Kost hráškovitá (*os pisiforme*)



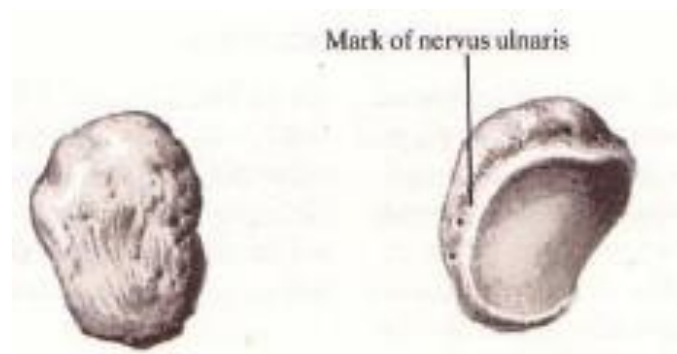
View from the triquetral

Figure 10.9 **Right pisiform.**  
Distal is toward the left.  
Natural size.



View from the proximal,  
palmar hamate end (lateral)

Figure 10.10 **Right pisiform.** The  
triquetral facet is up and faces the  
left (dorsal). Natural size.



## Kost mnohohranná větší (*os trapezium*)



View from the MC-2  
base



View from the lateral  
scaphoid end

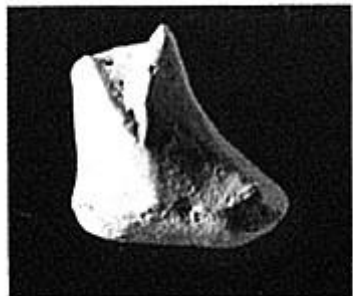


View from the  
scaphoid–trapezoid  
boundary (from medial)

Figure 10.11 **Right trapezium.** Palmar is up. Natural size.



## Kost mnohohranná menší (*os trapezoideum*)



View from the  
distalmost trapezium



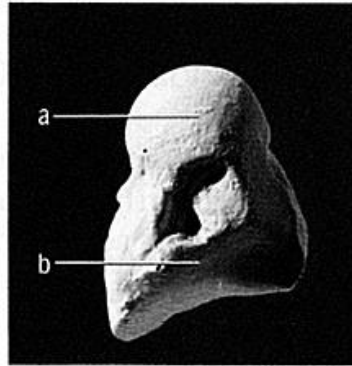
View from the capitate-  
scaphoid boundary  
(from proximal)

Figure 10.12 Right trapezoid. Palmar is up. Natural size.

## Kost hlavatá (*os capitatum*)



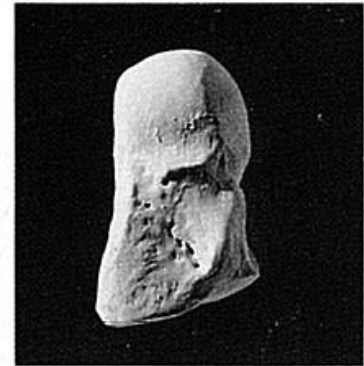
View from the hamate



View from the scaphoid and trapezoid (from lateral)



Palmar view



Dorsal view

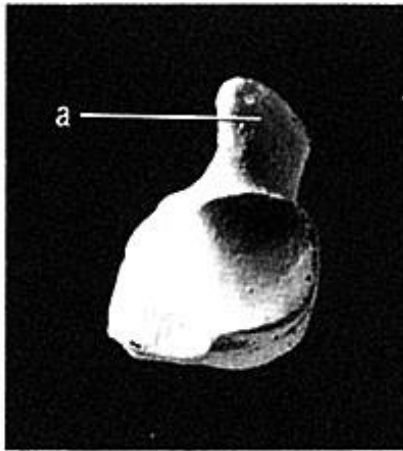
Figure 10.13 Right capitulum. Proximal is up. Natural size.



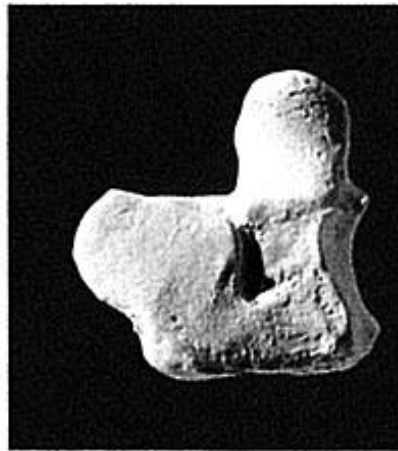
View from the MC-3 base

Figure 10.14 Right capitulum. Palmar is up. Natural size.

## Kost hákovitá (*os hamatum*)



View from the MC-4 and  
MC-5 bases



View from the capitate



View from the triquetral



View from the lunate

Figure 10.15 Right hamate. Palmar is up. Natural size.



# Záprstní kosti (*ossa metacarpi*) a kosti prstů ruky (*phalanges*)

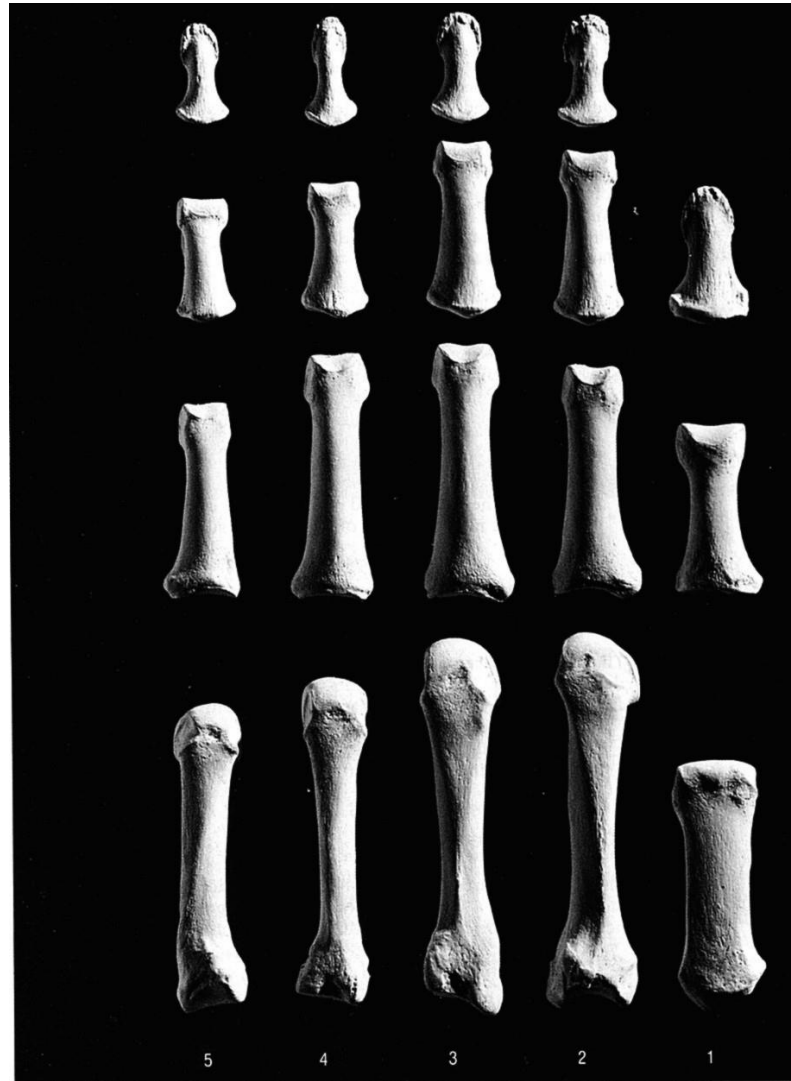


Figure 10.16 Right hand, palmar (anterior), rays 1–5, showing the metacarpals and the proximal, intermediate, and distal hand phalanges. Distal is up, lateral is toward the right. Natural size.

# Záprstní kosti a kosti prstů ruky

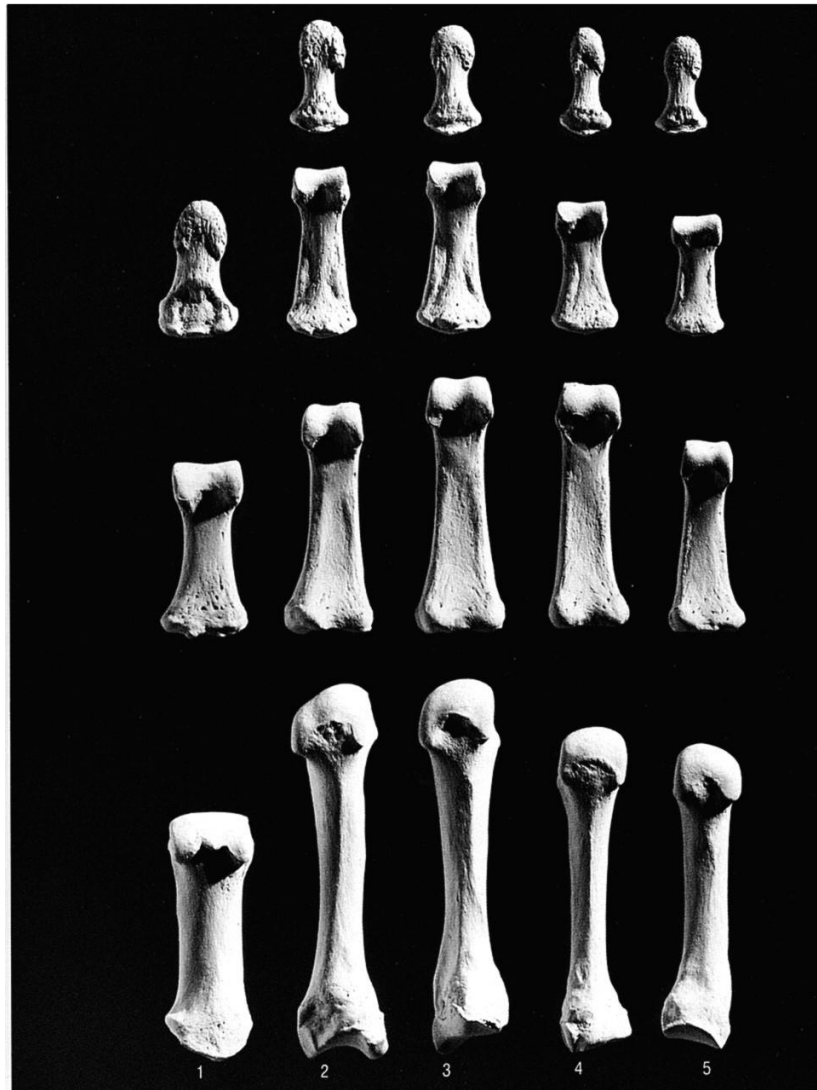
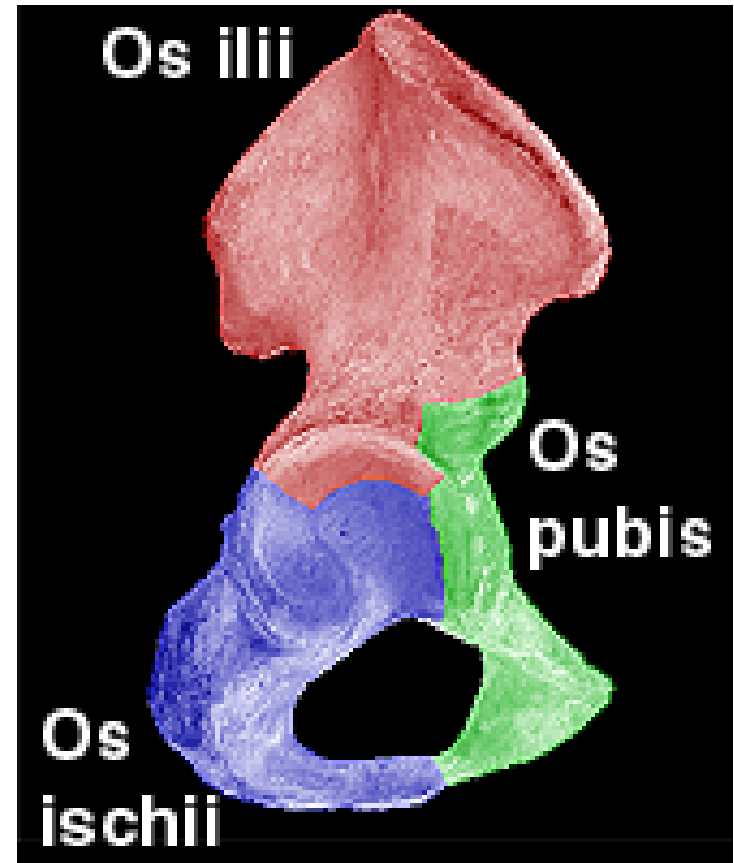
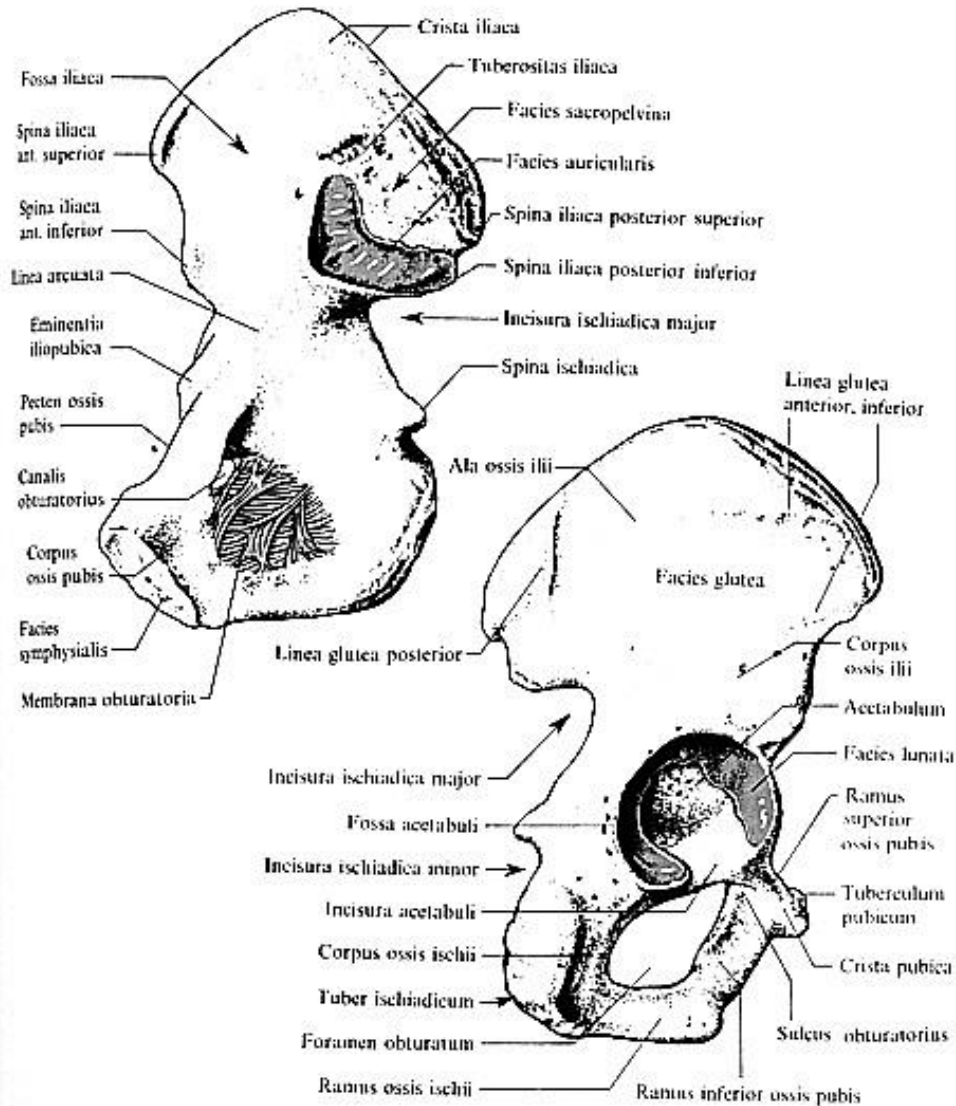
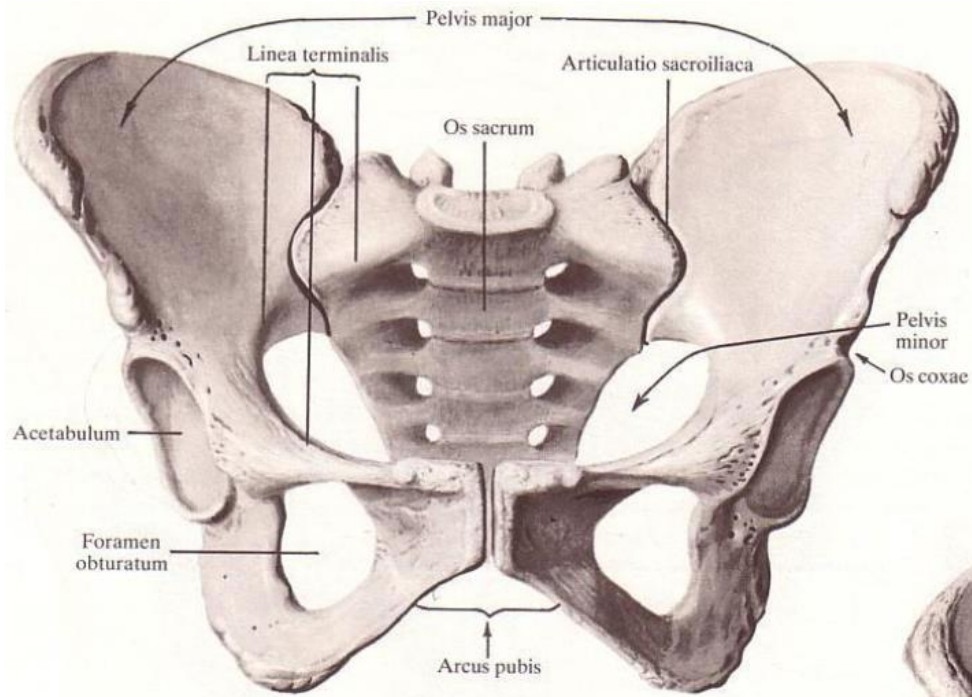


Figure 10.17 Right hand, dorsal (posterior), rays 1-5, showing the metacarpals and the proximal, intermediate, and distal hand phalanges. Distal is up, lateral is toward the left. Natural size.

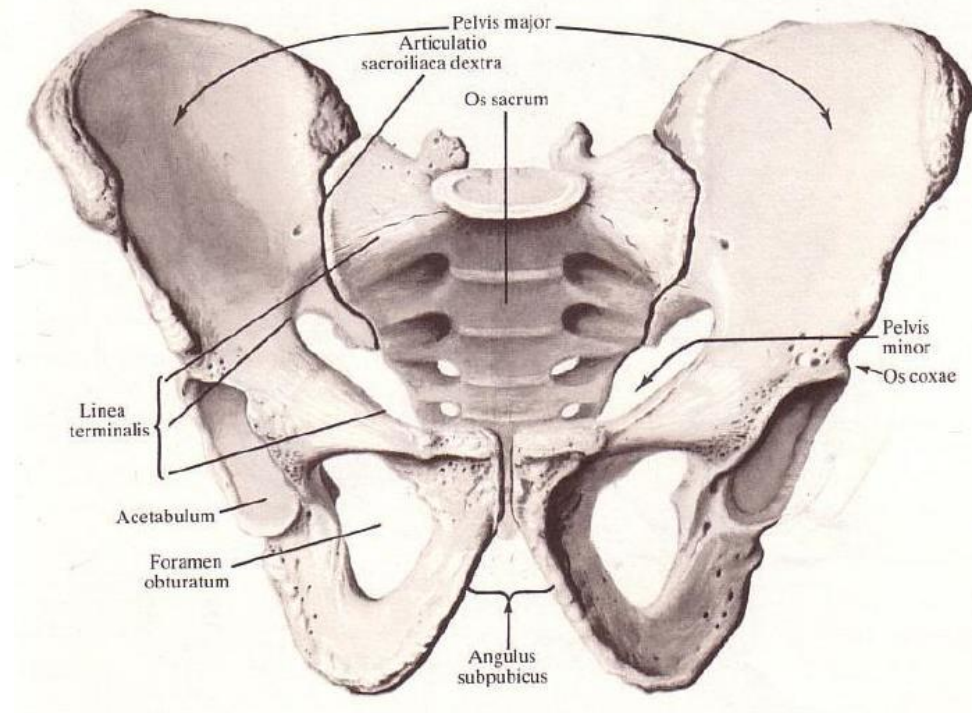
# Kosti dolní končetiny - pletenec



# Kosti pánve

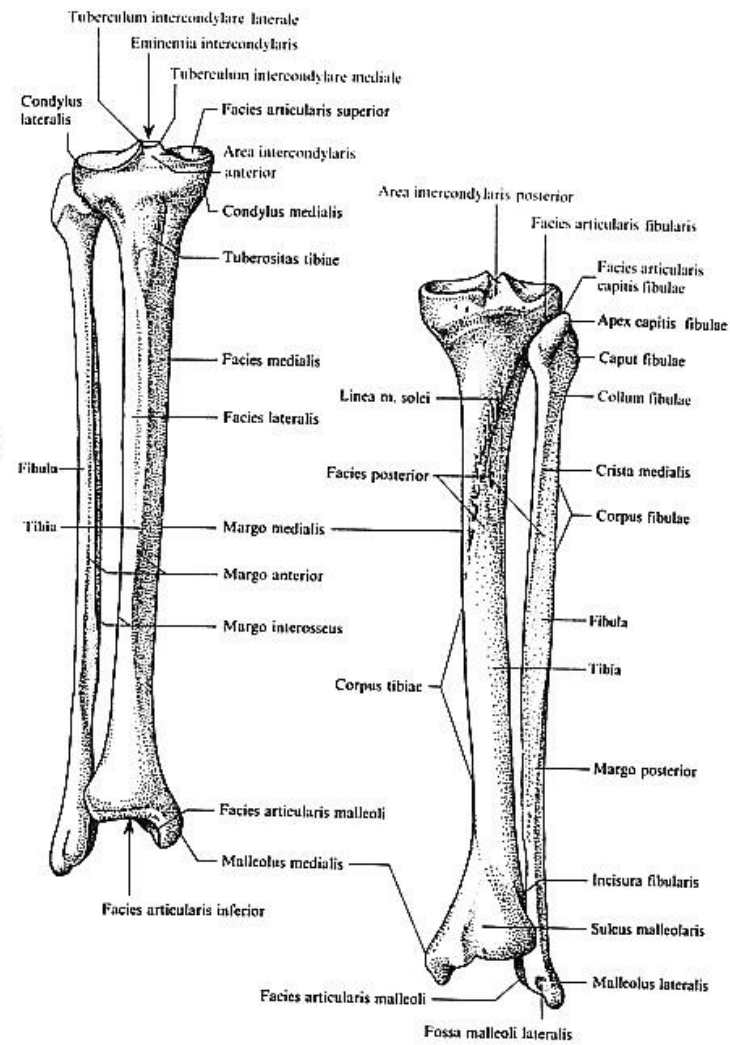
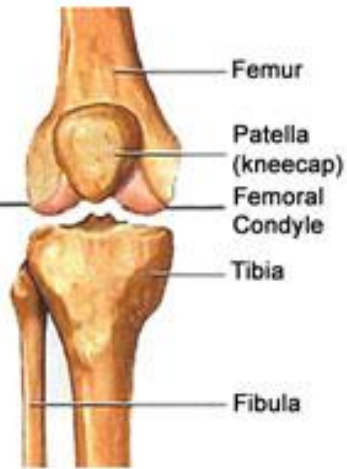
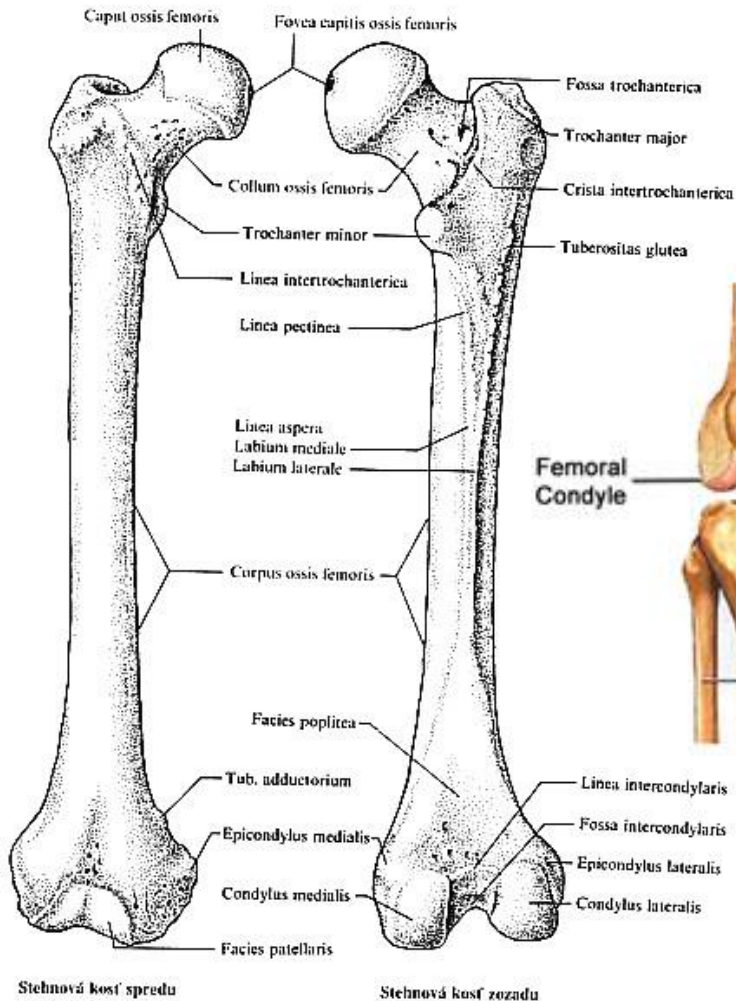


ženská



mužská

# Kosti volné končety



# Kosti nohy

- Tarsální kosti (zánártní)
- Kost hlezení, kost patní, kost loďkovitá, kost krychlová, 3 kosti klínové

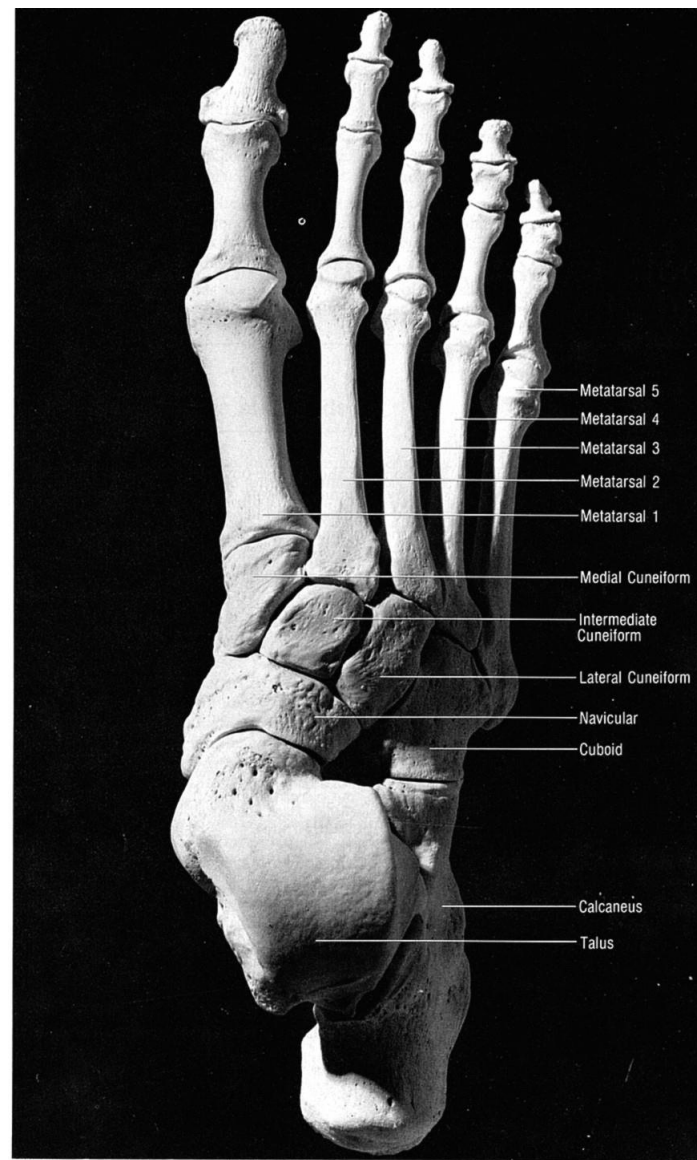
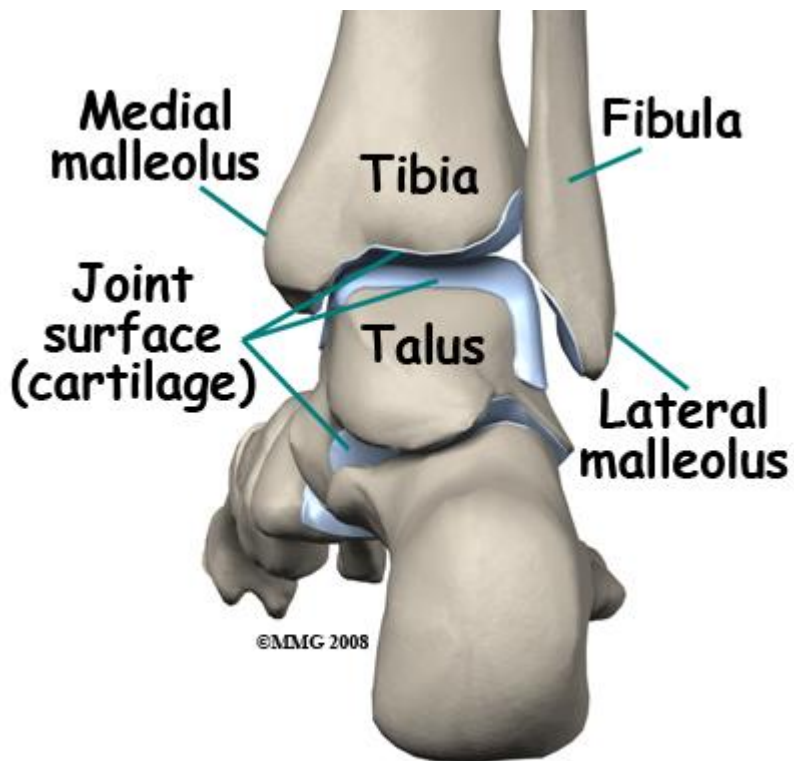


Figure 13.2 Right foot, dorsal [superior]. Sesamoid bones not included. Natural size.

# Kosti nohy

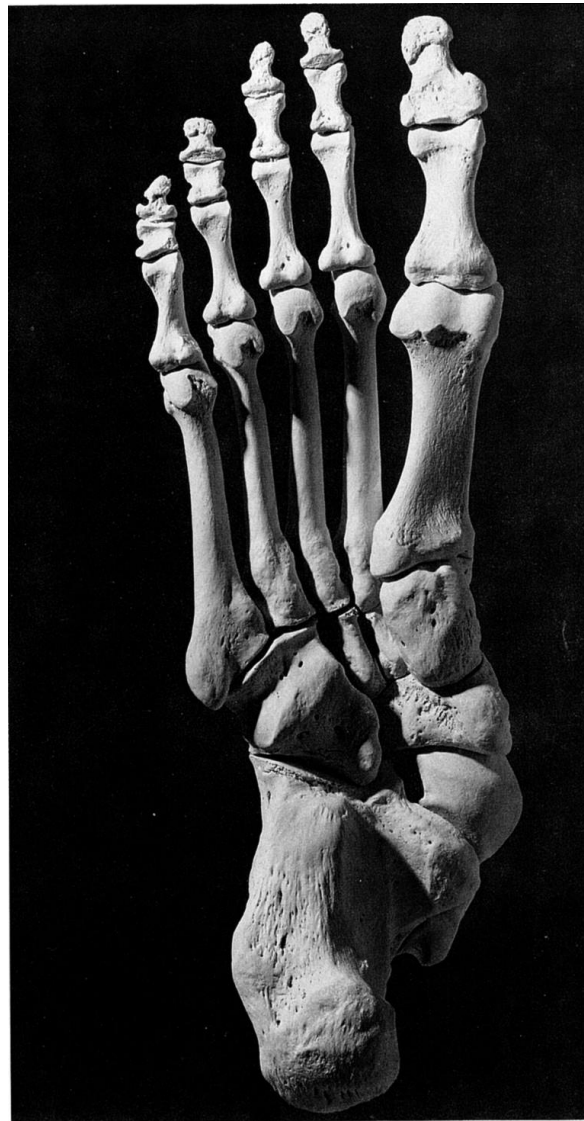


Figure 13.3 Right foot, plantar (inferior). Sesamoid bones not included. Natural size.

# Kosti nohy

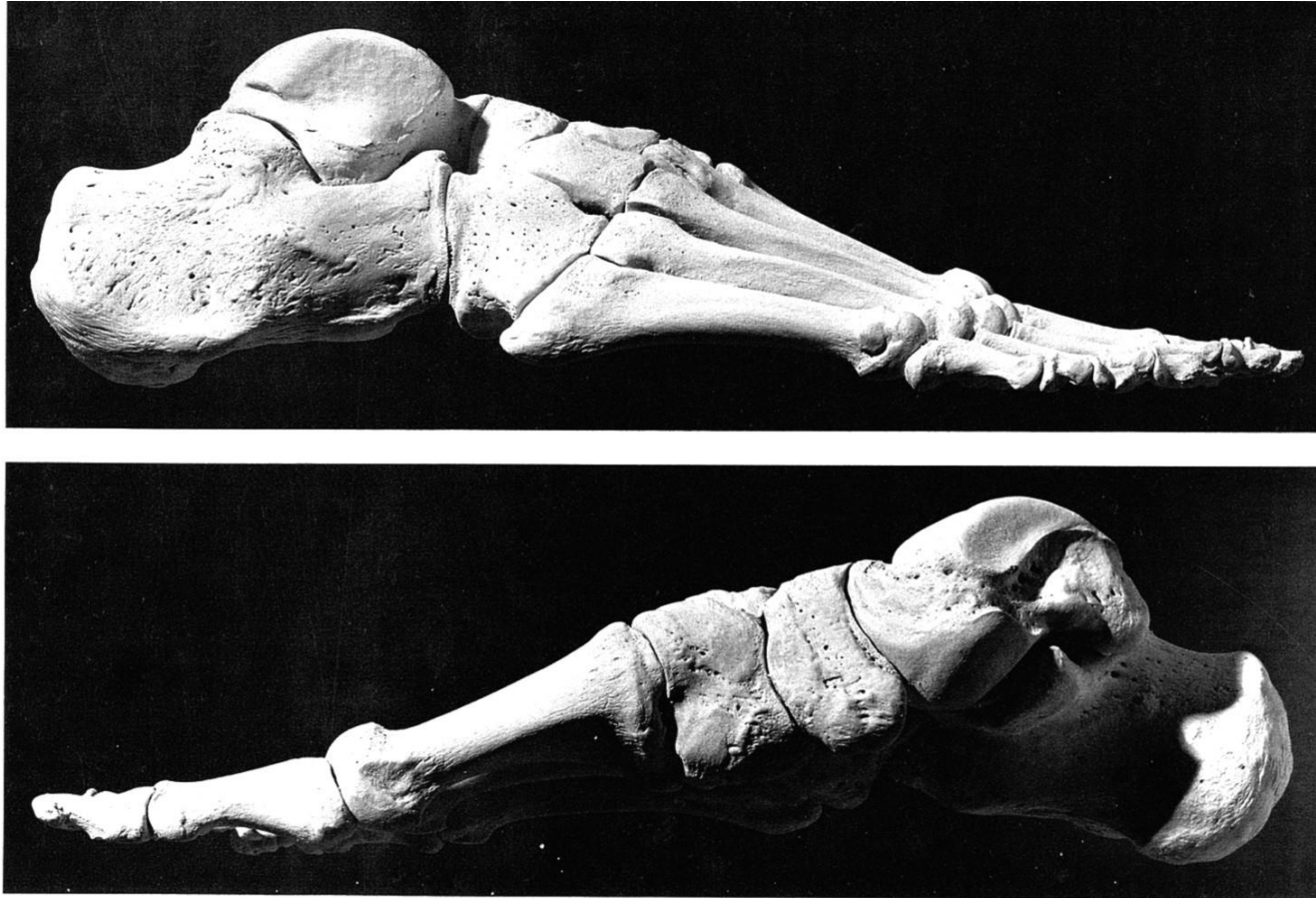
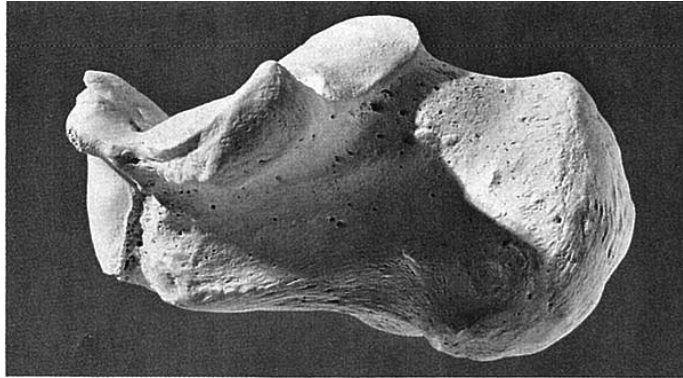


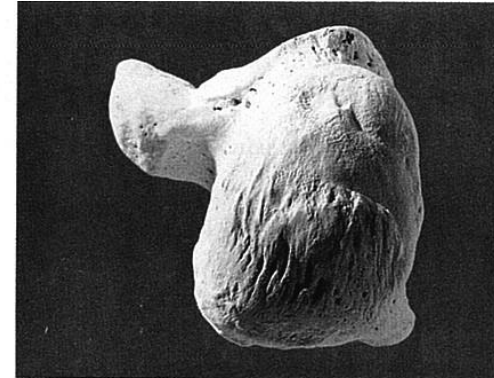
Figure 13.4 Right foot: *top, lateral; bottom, medial*. Sesamoid bones not included. Natural size.



# Kost patní (*calcaneus*)

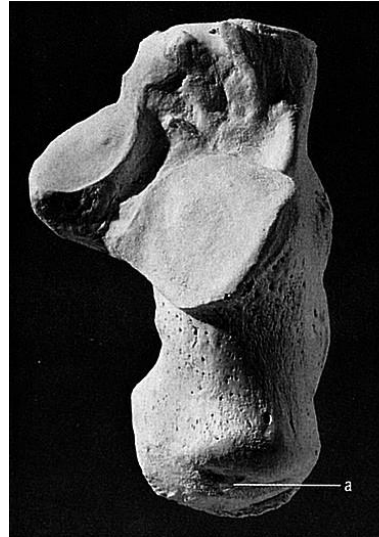


Medial view

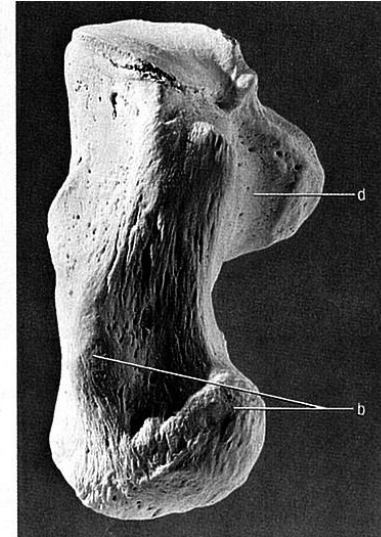


Posterior view

Figure 13.8 Right calcaneus. Dorsal is up. Natural size.

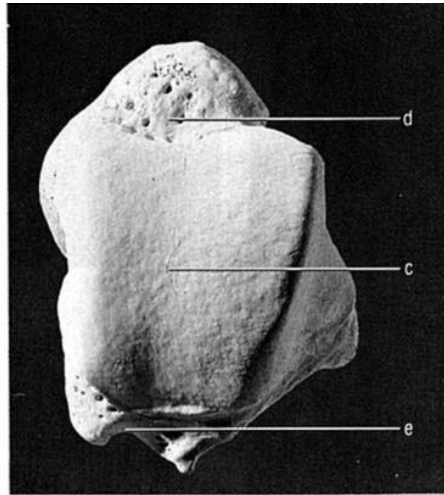


Dorsal (superior) view

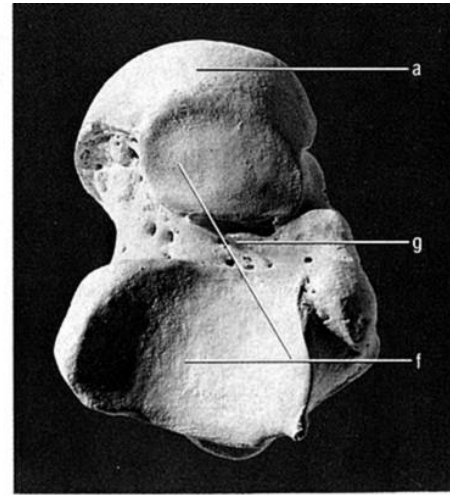


Plantar (inferior) view

# Kost hlezenní (*talus*)

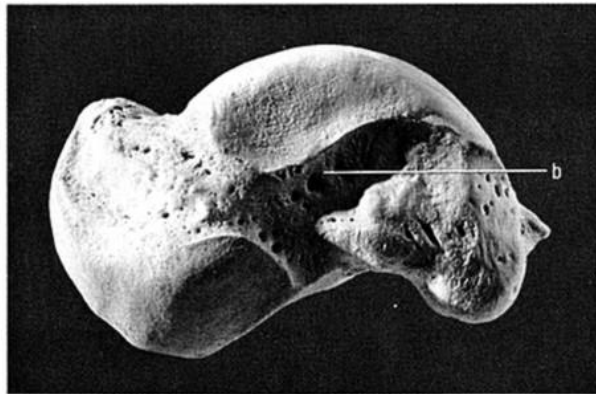


Dorsal (superior) view



Plantar (inferior) view

Figure 13.5 **Right talus**. Distal is up. Natural size.



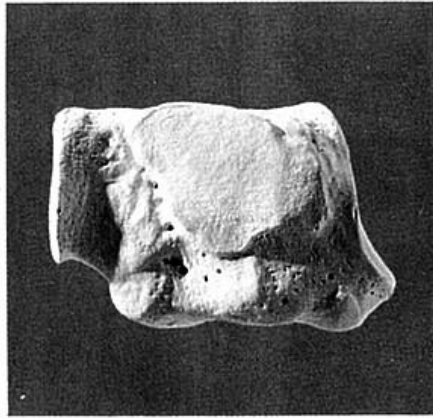
Medial view



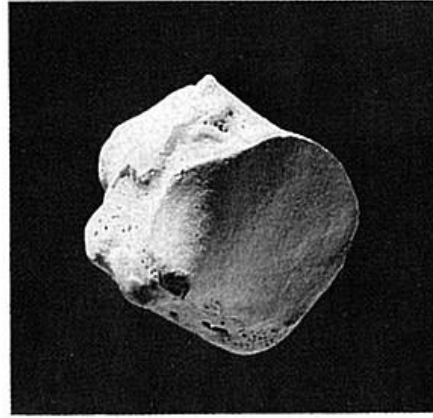
Lateral view

Figure 13.6 **Right talus**. Dorsal is up. Natural size.

# Kost krychlová (os cuboideum)



View from the lateral cuneiform

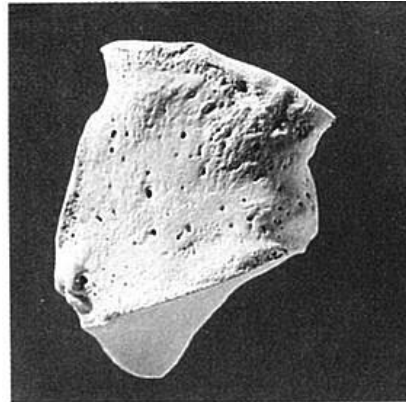


View from the calcaneus

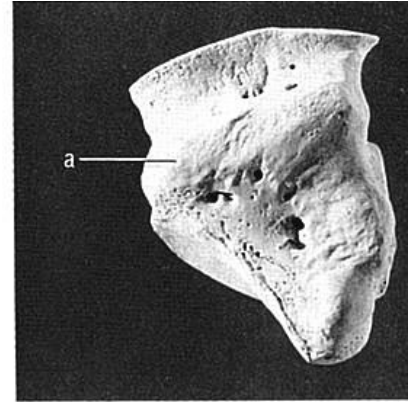


View from the MT-4 and MT-5 bases

Figure 13.11 **Right cuboid.** Dorsal is up. Natural size.



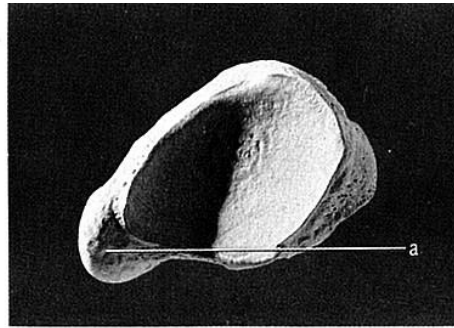
Supero(dorso)lateral view



Infero(plantar)medial view

Figure 13.10 **Right cuboid.** Distal is up. Natural size.

# Kost lod'kovitá (*os naviculare*)

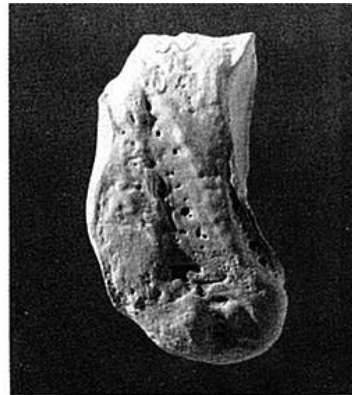


View from the talus (proximal view)



View from the cuneiforms (distal view)

Figure 13.12 Right foot navicular. Dorsal is up. Natural size.



Superomedial view

Figure 13.13 Right foot navicular. Distal is toward the left. Natural size.

# Kosti klínové (*ossa cuneiformia*)



Medial view

View from the intermediate cuneiform

View from the foot navicular

Figure 13.14 Right medial (first) cuneiform. Dorsal is up. Natural size.

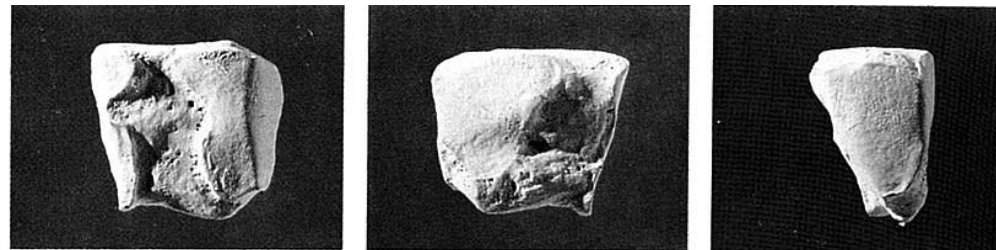


View from the medial cuneiform

View from the lateral cuneiform

View from the foot navicular

Figure 13.15 Right intermediate (second) cuneiform. Dorsal is up. Natural size.



View from the intermediate cuneiform

View from the cuboid

View from the foot navicular

Figure 13.16 Right lateral (third) cuneiform. Dorsal is up. Natural size.

# Kosti nártní (*ossa metatarsi*) a kosti prstů nohy (*phalanges*)

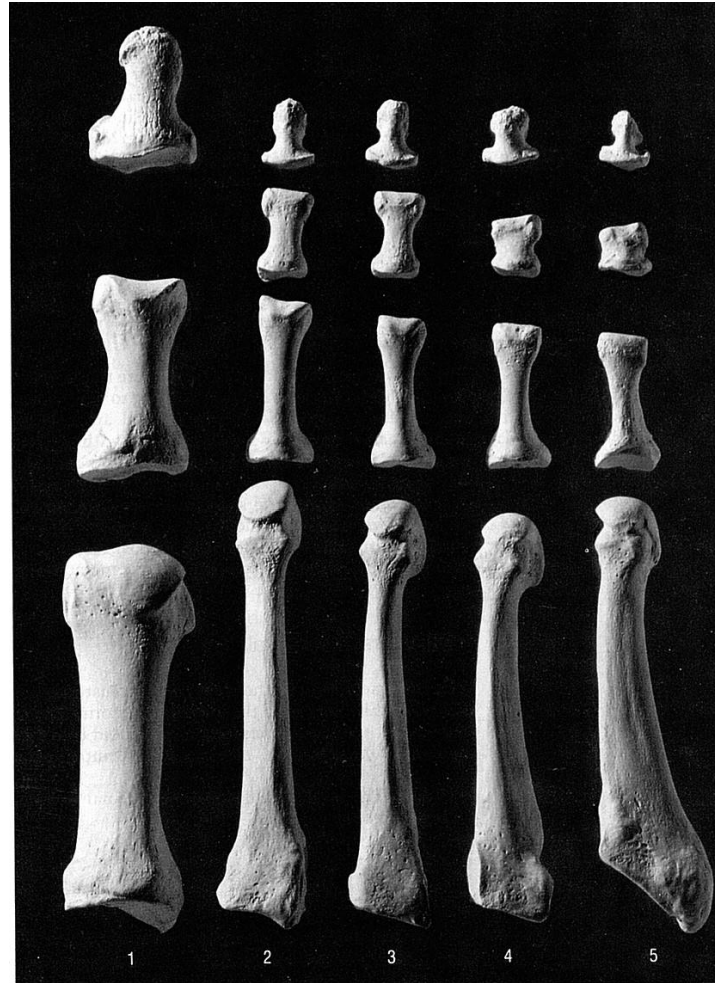


Figure 13.17 Right foot, dorsal (superior), rays 1–5, showing the metatarsals and the proximal, intermediate, and distal foot phalanges. Distal is up, lateral is toward the right. Natural size.

# Kosti nártní a kosti prstů nohy

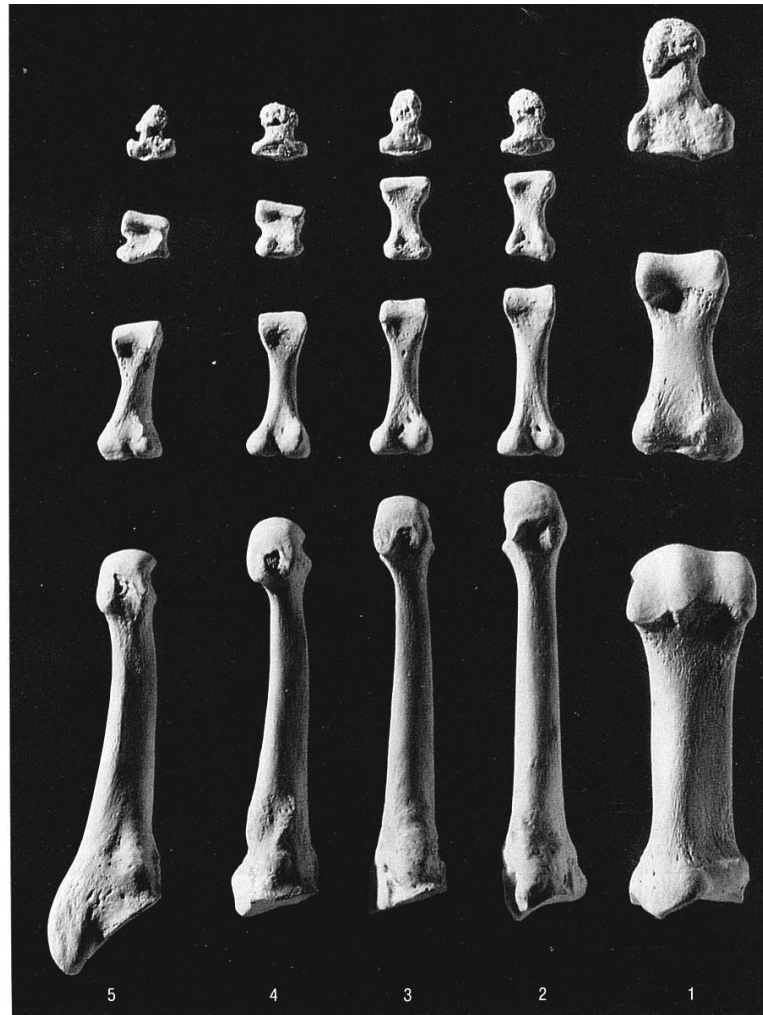


Figure 13.18 Right foot, plantar (inferior), rays 1-5, showing the metatarsals and the proximal, intermediate, and distal foot phalanges. Distal is up, lateral is toward the left. Natural size.