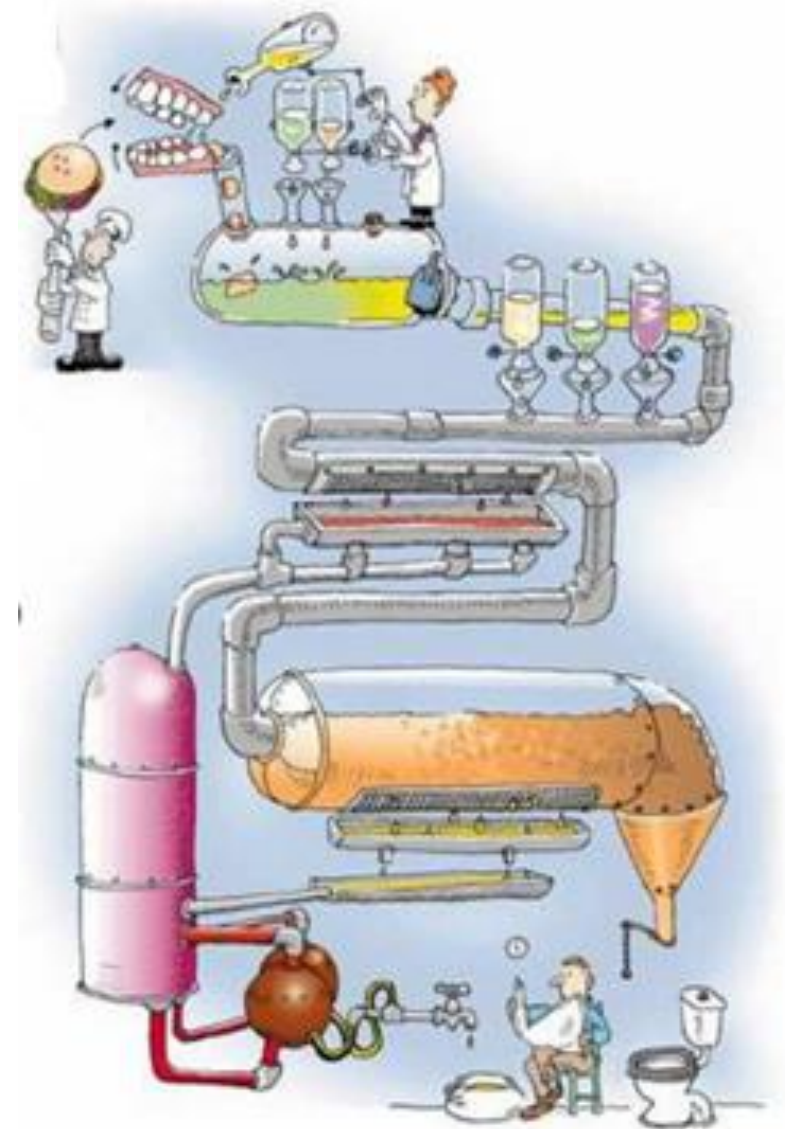


# MUNI

## DIGESTIVE SYSTEM

ANATOMY II – DENTISTRY  
RNDr. Michaela Račanská, Ph.D.



	LECTURES - WE:12-13,40 S4.5	SEMINARS – FRI:14-15,40 P2
1.	Digestive system (oral cavity - rectum)	Digestive system (oral cavity - rectum) Muscles of the head
2.	Digestive system (liver, spleen, pancreas, peritoneum)	Digestive system (liver, spleen, pancreas, peritoneum) Muscles of the neck and abdomen
3.	Respiratory system, thyroid gland, parathyroid glands, thymus	Respiratory system Muscles of the thorax and back
4.	Urinary system, suprarenal glands Male genital system	Urinary and male genital system
5.	Female genital system Pelvic floor	Female genital system Pelvic floor
6.	Heart	Heart
7.	Arteries	Arteries
8.	Veins and lymphs	Veins and lymphs
9.	Structure of the spinal nerve Plexus brachialis, lumbalis et sacralis,	Holiday 19.4.
10.	Topography of the upper limb	Plexus brachialis, lumbalis et sacralis,
11.	Holiday 1.5.	Topography of the upper limb
12.	Holiday 8.5.	Topography of the lower limb
13.	Topography of the lower limb	Oral examination: topography of the limbs
14 15		

## **Completion of the course**

**95% attendance to the practicals, basic knowledges at the tests during each seminar on splanchnology**

**Knowledges on the topography of the limbs in the end of the course!**

- **10 questions, 5 on upper, 5 on lower limb, for each 1 point**
- **to get credit is need to get minimum of 6 point out of 10**

# Where you can study from

## Book

HRADILOVÁ SVÍŽENSKÁ, Ivana, Michaela RAČANSKÁ a Petr DUBOVÝ. *Anatomy : handbook of splanchnology and angiology*. 1st ed. Brno: Masaryk University, 2014. 153 s. ISBN

Liebgoth, Bernard. *The anatomical basis of dentistry*. 3rd ed. Mosby, ISBN 0-323-06807

Frame

Grimm: Regional Anatomy

## Atlas

Sobotta, Netter .....

# IS – Studying materials

aZLAN0232p

**Schedule**

**Frame II**

**X-rays**

**<https://is.muni.cz/auth/el/1411/jaro2015/VSAN0232s/um/53713703/handouts/index.html>** - handouts and schemes

# **GASTROINTESTINAL TRACT – GIT (APPARATUS DIGESTORIUS)**

**Oral cavity (Cavitas oralis)**

**Pharynx**

**Oesophagus**

**Stomach (Ventriculus)**

**Small intestine (Intestinum tenue)**

duodenum

jejunum

ileum

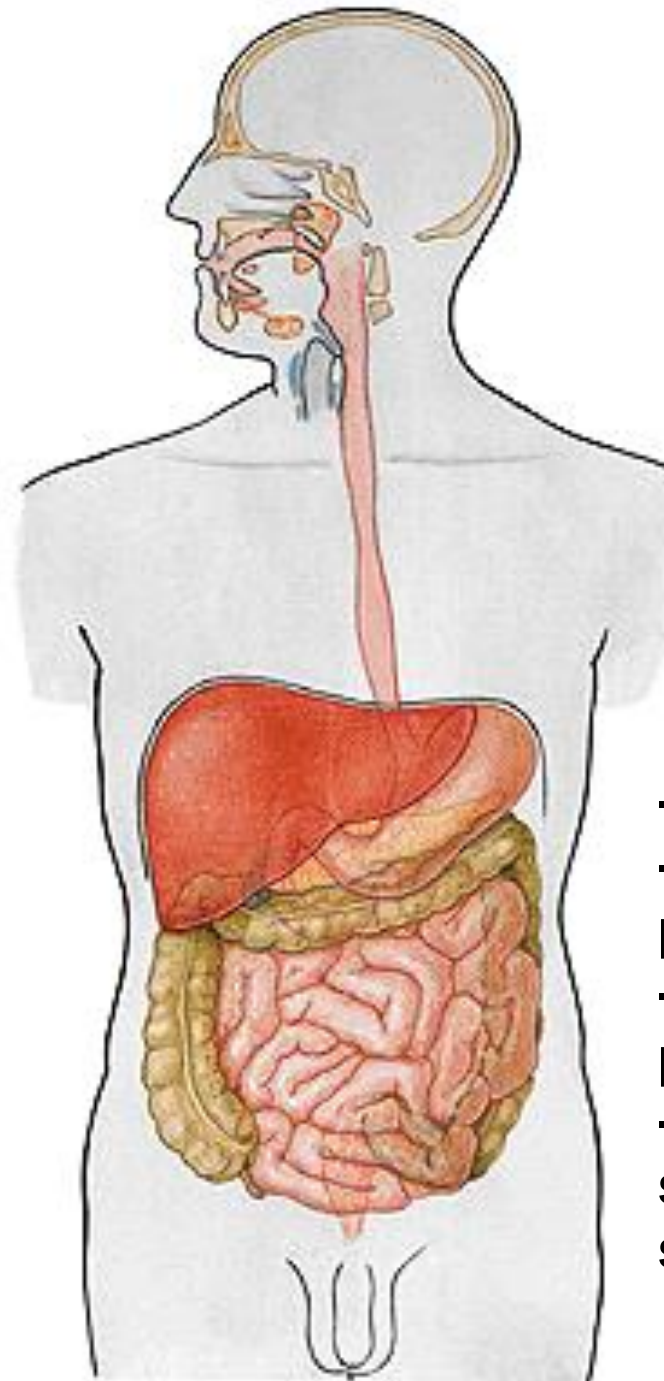
**Large intestine (Intestinum crassum)**

caecum

colon

rectum

**GLANDS**



- food intake
- mechanical and chemical processing
- absorption of fission products
- removal of unnecessary, superfluous, harmful substances

# GLANDS OF GIT:

**exocrine**

**endocrine**

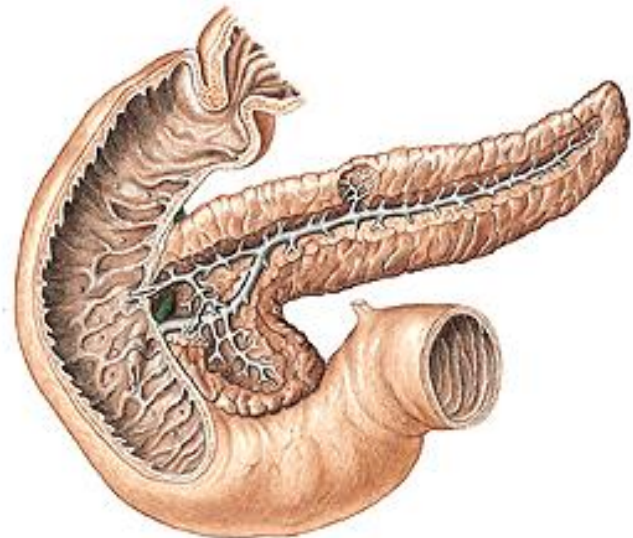
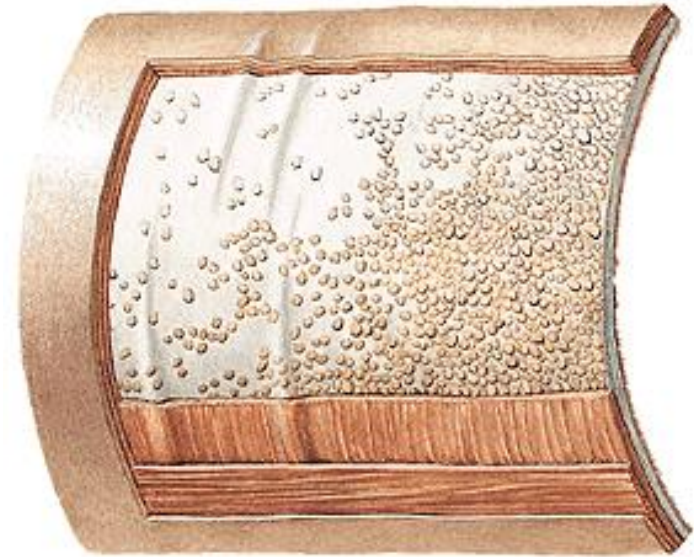
Just between epithelial cells

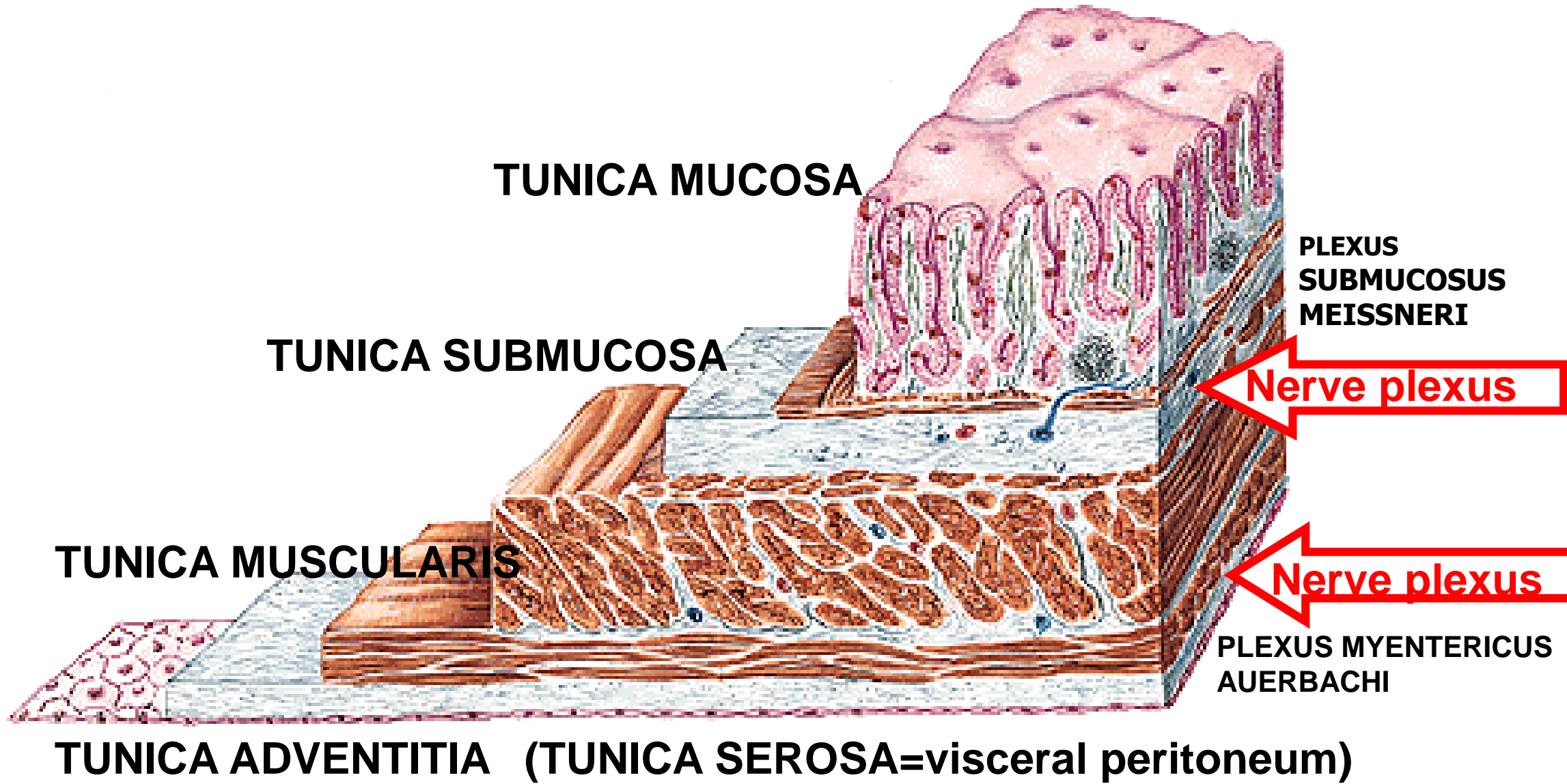
**Intramural** (in mucose or submucose tissue)

- ✓ goblet cells
- ✓ small salivary glands
- ✓ glandulae duodenales

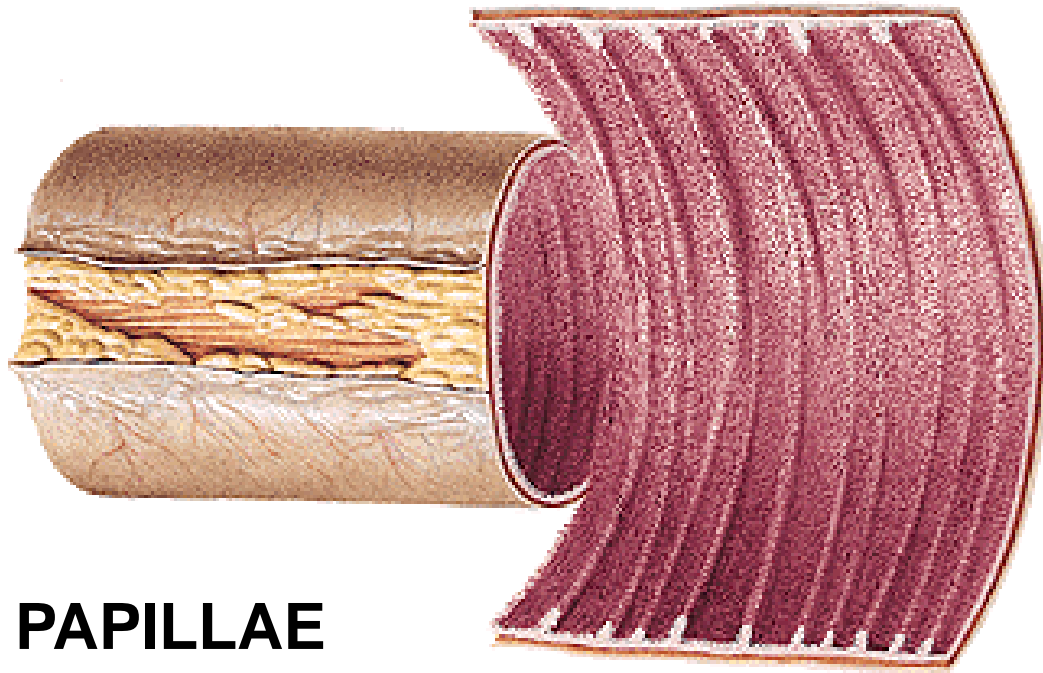
**Extramural** (outside of the DG-wall)

- ✓ great salivary glands
- ✓ liver
- ✓ pancreas



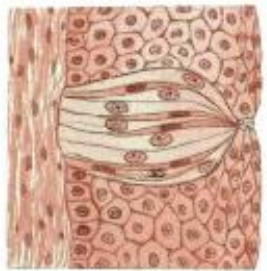
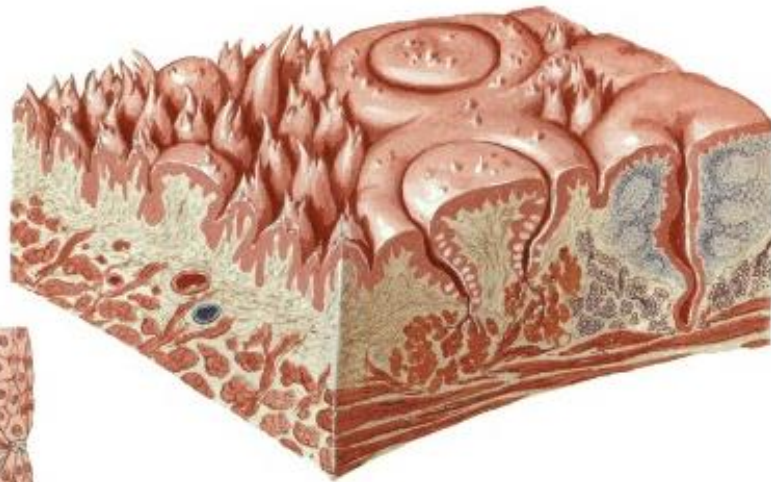




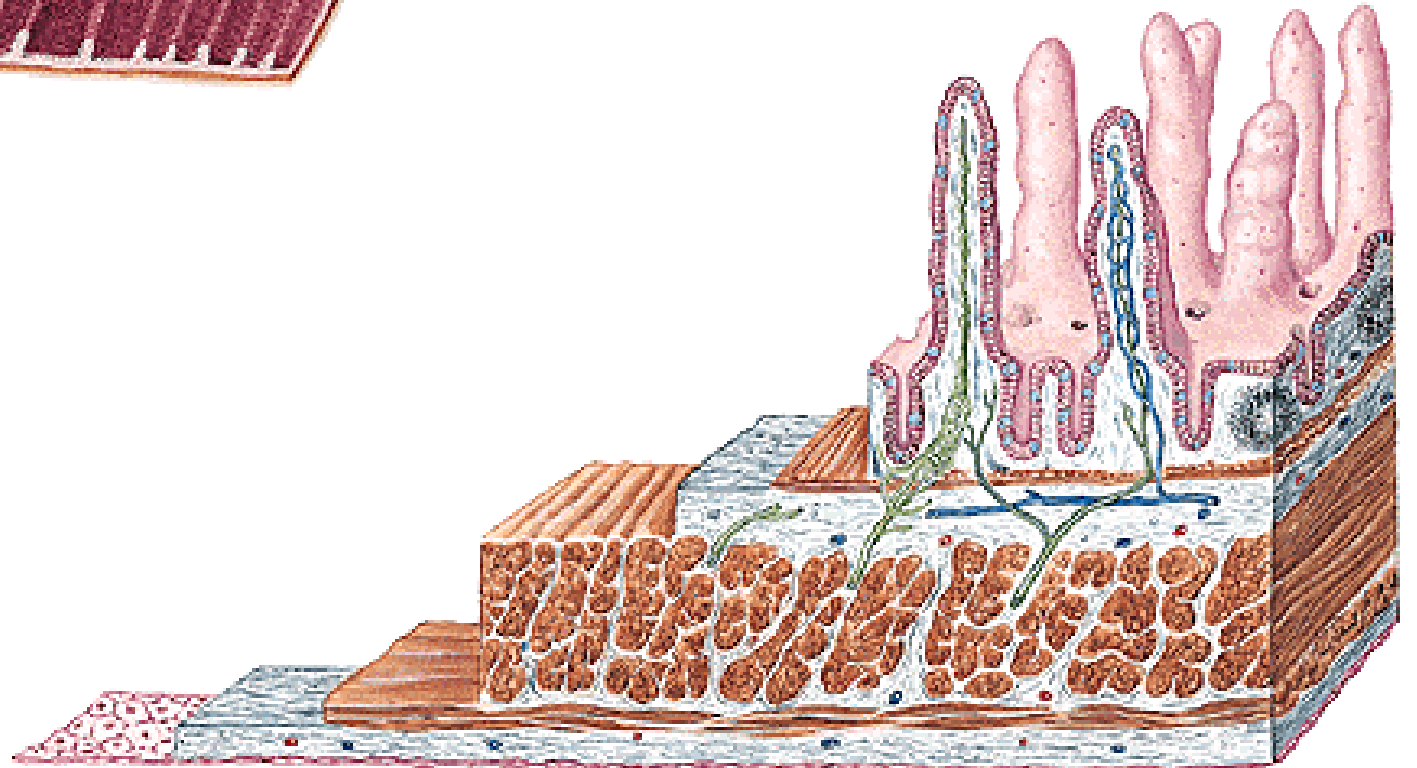


**PLICAE**

**PAPILLAE**



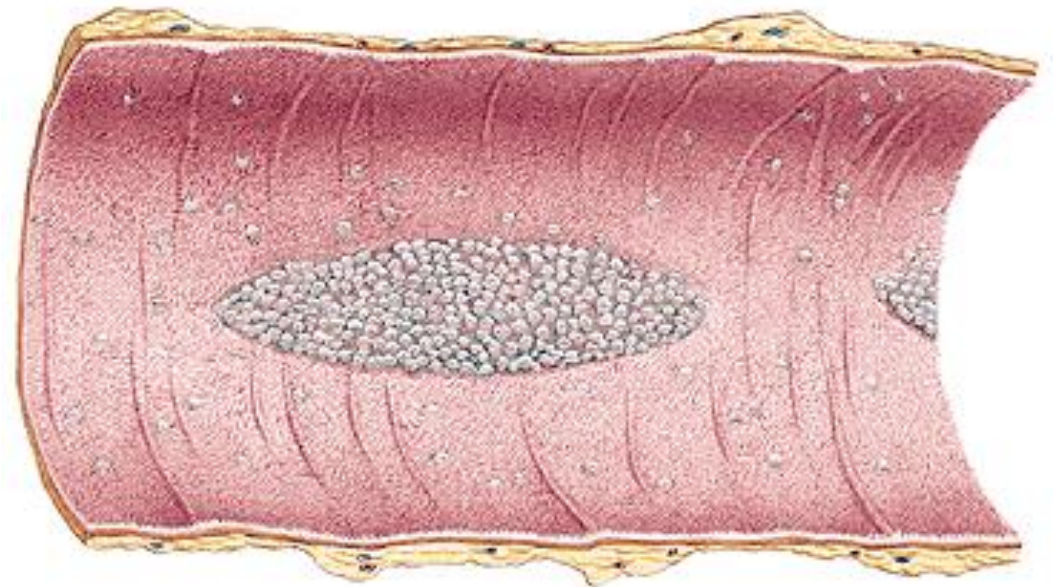
**VILLI INTESTINALES**



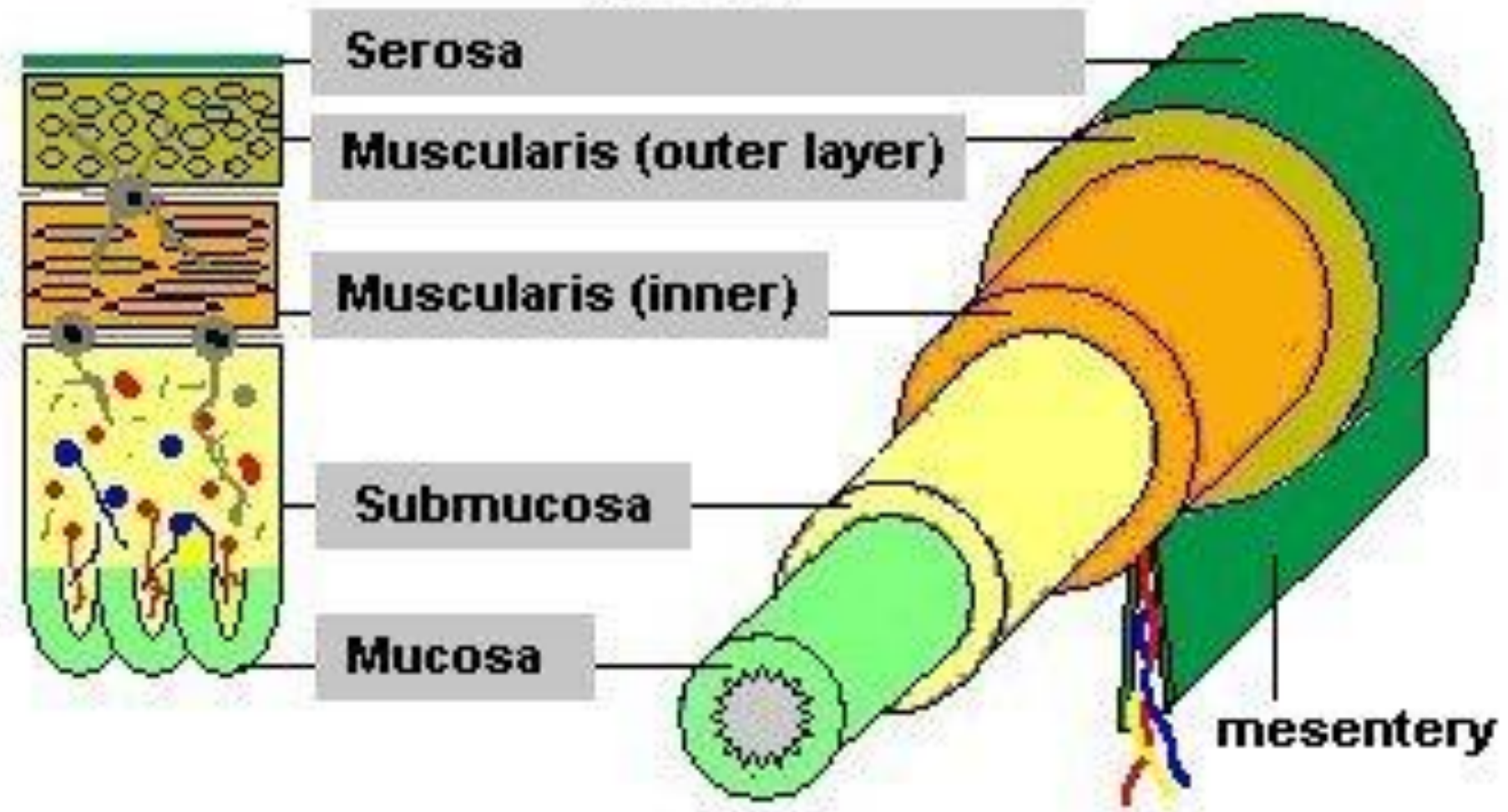


**FOLLICULI  
LYMPHATICI SOLITARII**

**FOLLICULI LYMPH. AGGREGATI  
– PEYER'S PATCHES**



# Tunics



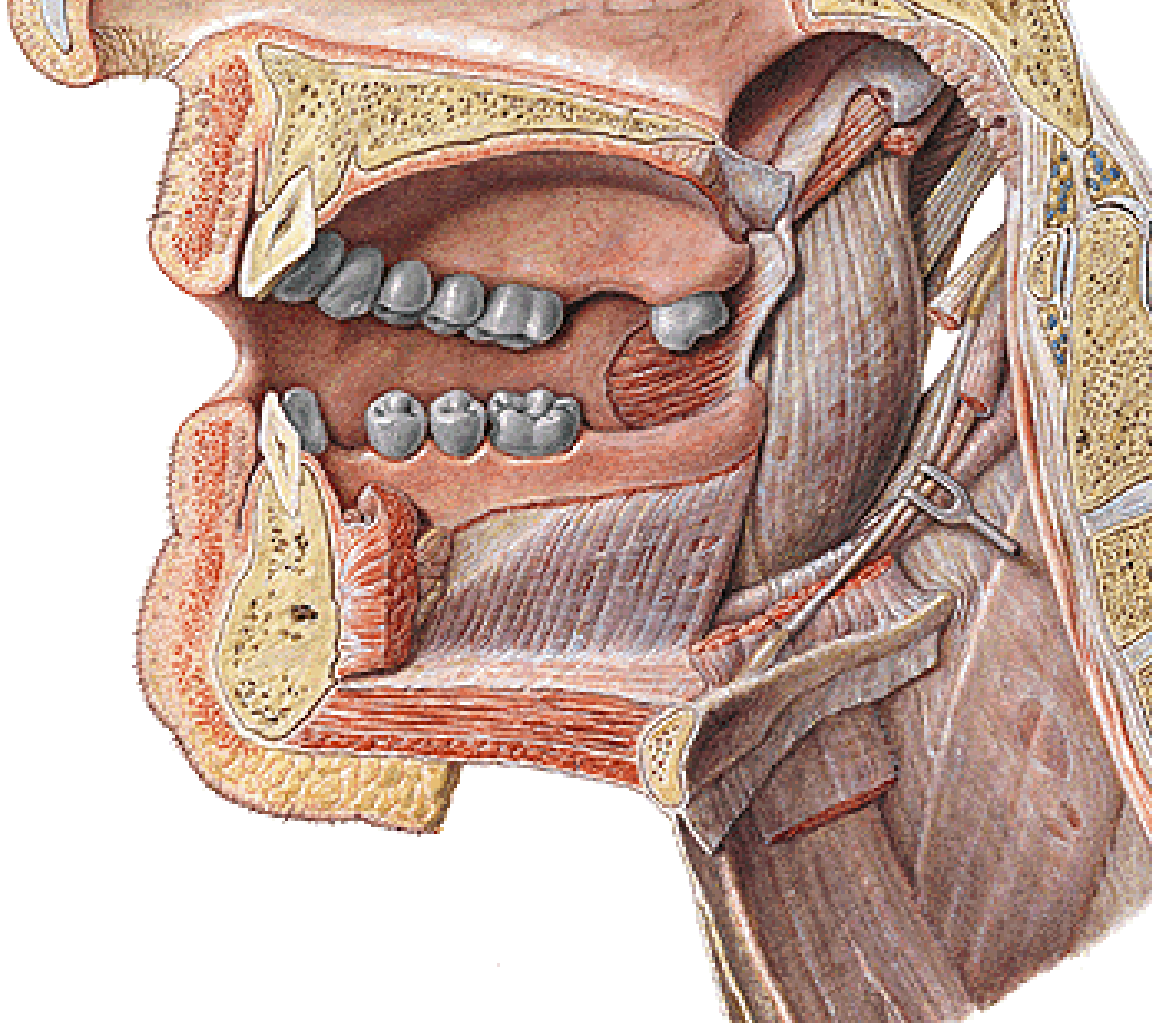
**CAVUM ORIS  
(CAVITAS ORIS)**

**Rima oris  
Isthmus faucium**

**Lips, bucca, palatum,  
Diaphragm**

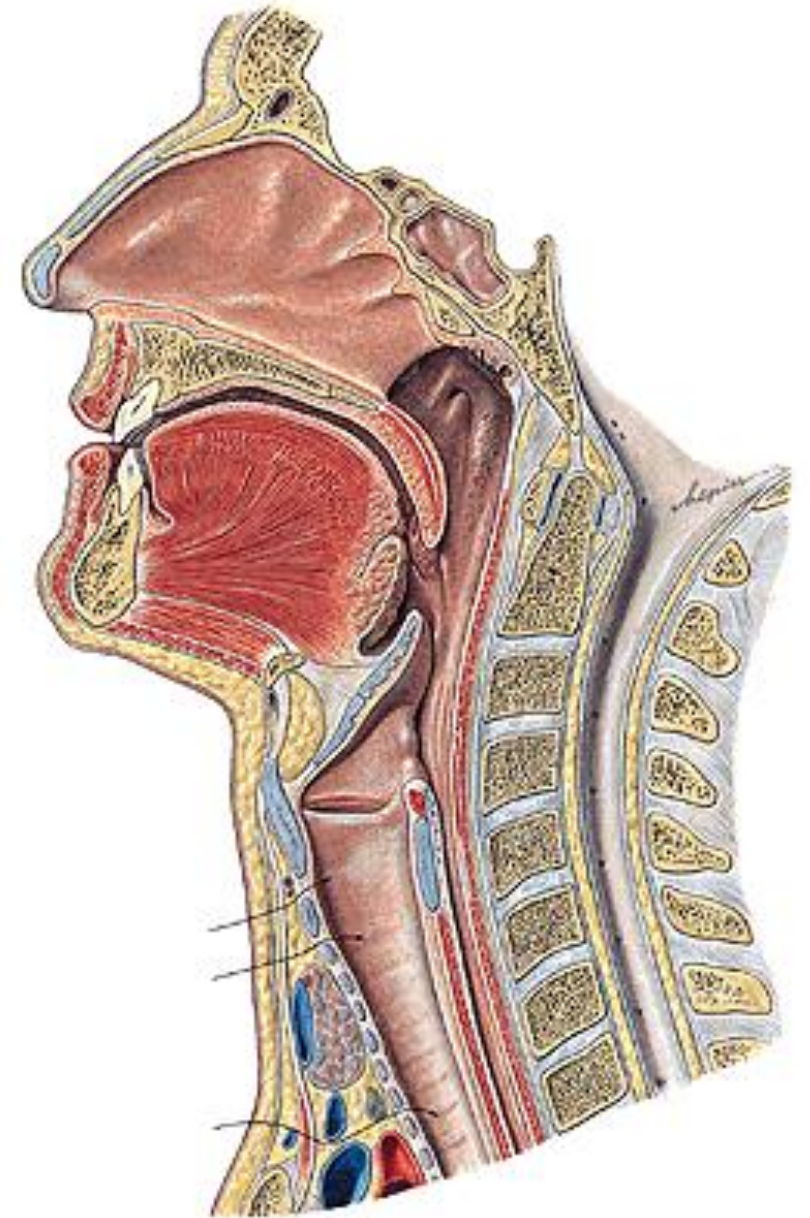
**Tongue, teeth, tonsils,  
Salivary glands**





## **CAVUM ORIS**

- vestibulum oris
- cavum oris proprium





**Labium superius**

Pars intermedia

philtrum

tuberculum labii sup.

**Labium inferius**

**Anguli oris**

**Sulcus nasolabialis**

**mentolabialis**

**Bucca**

- cheiloschisis
- gnathoschisis
- palatoschisis

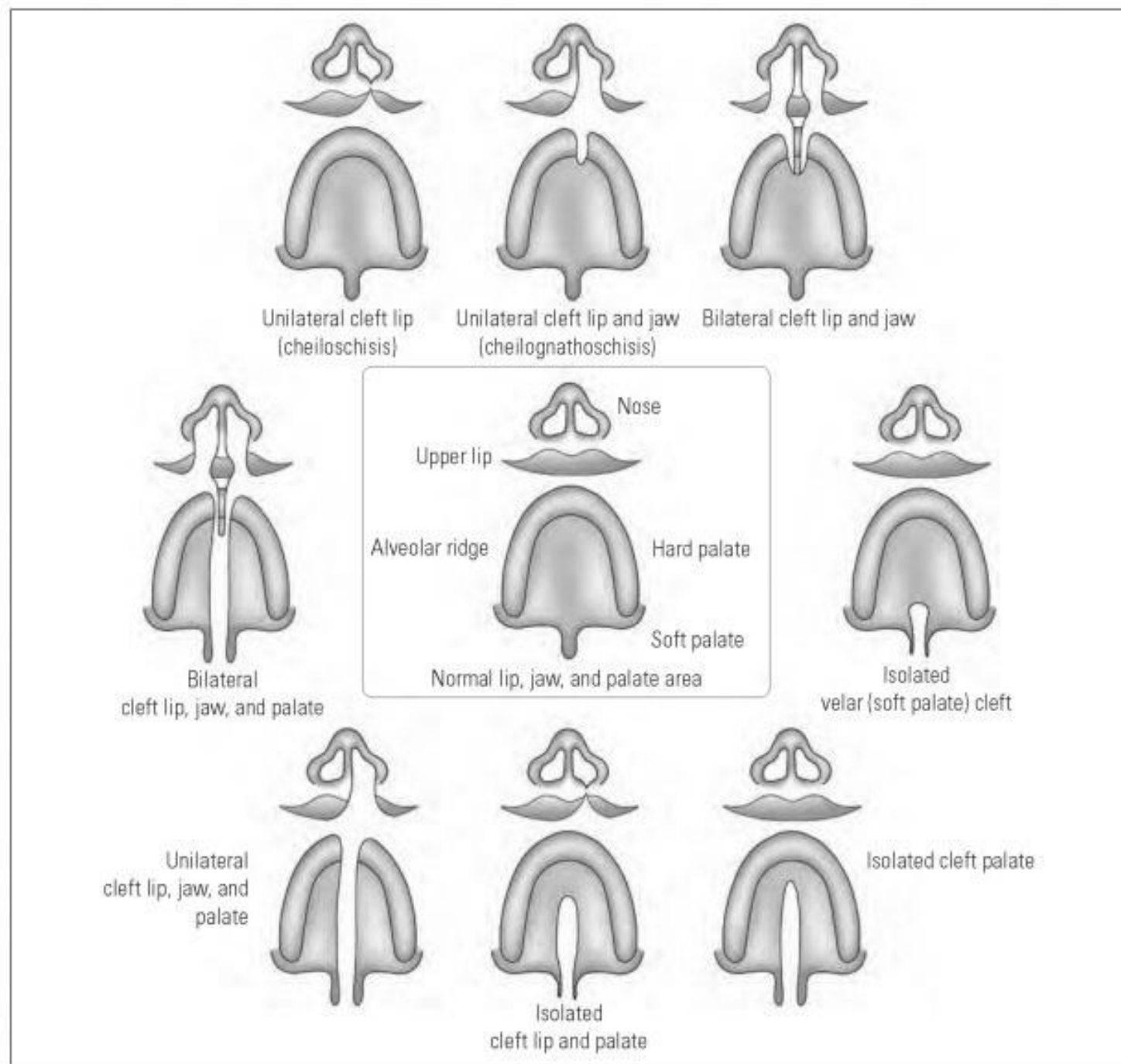
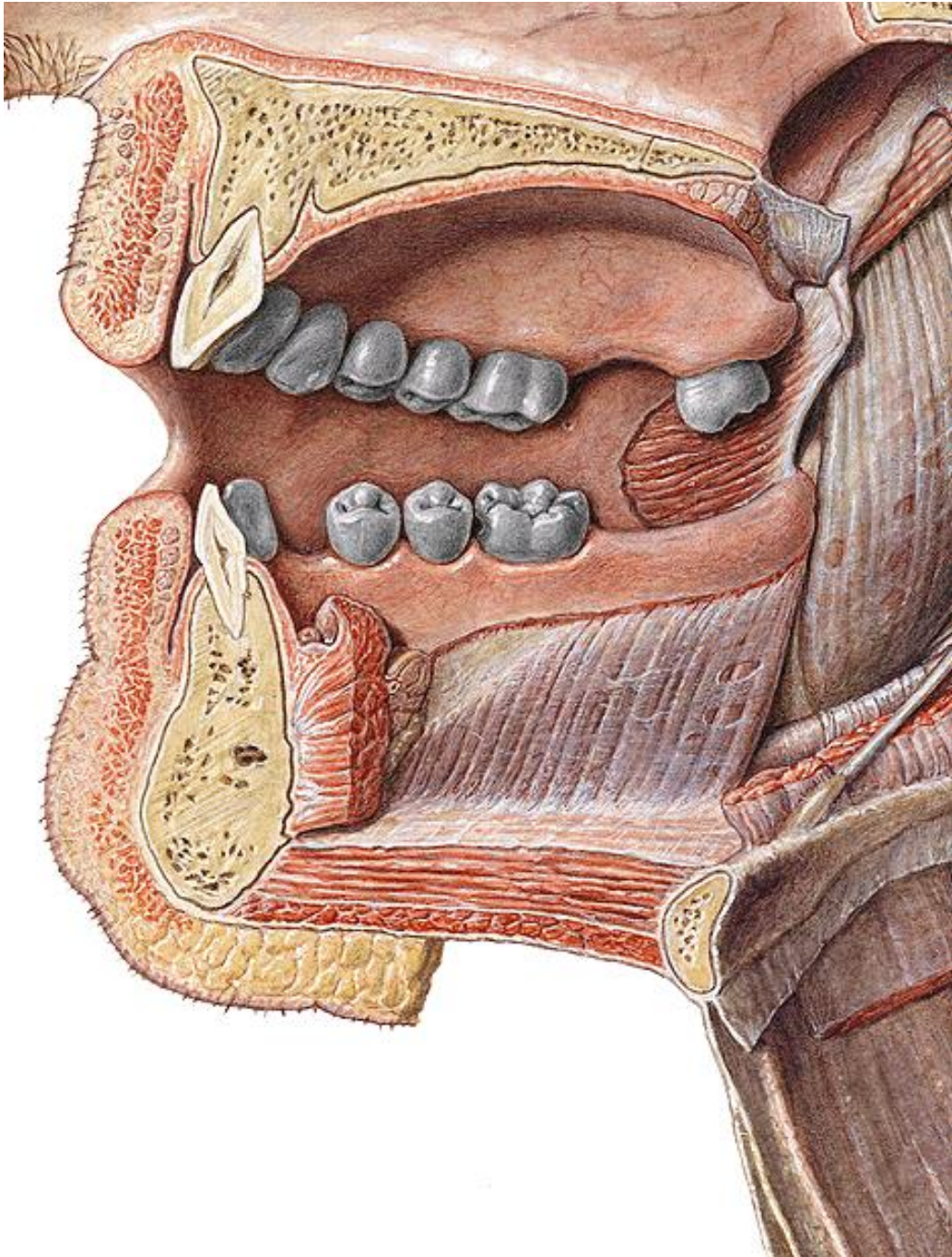


Fig 9-2 Classification of cleft lip, jaw, and palate.



## **Lips and bucca**

**skin**

**subcutaneous tissue**

**musculature**

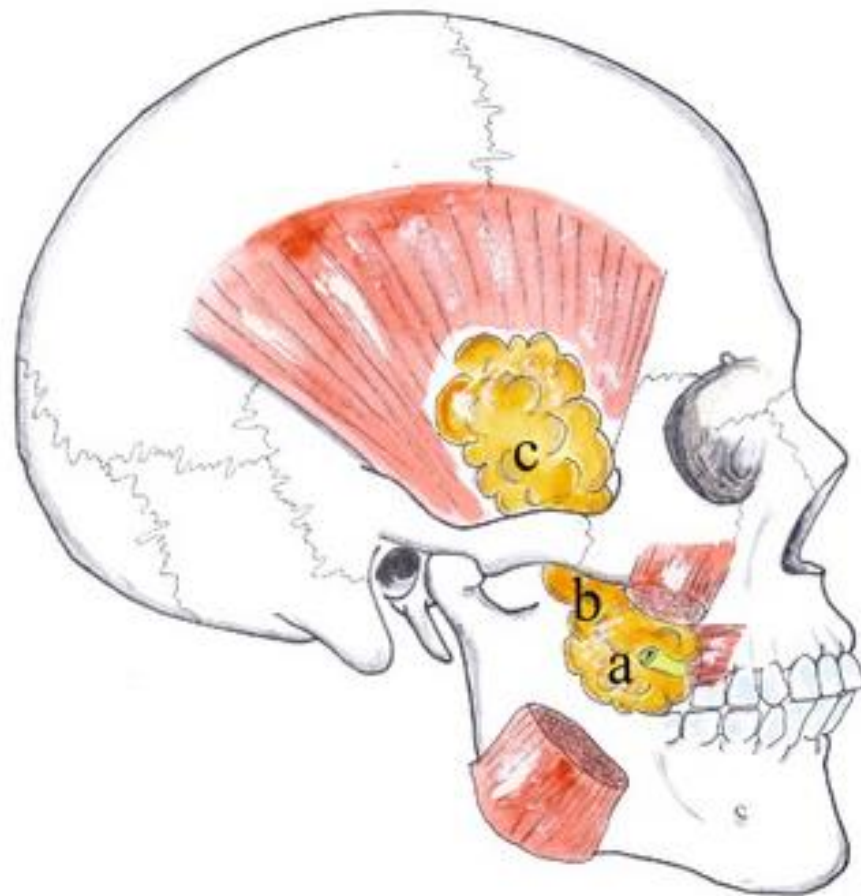
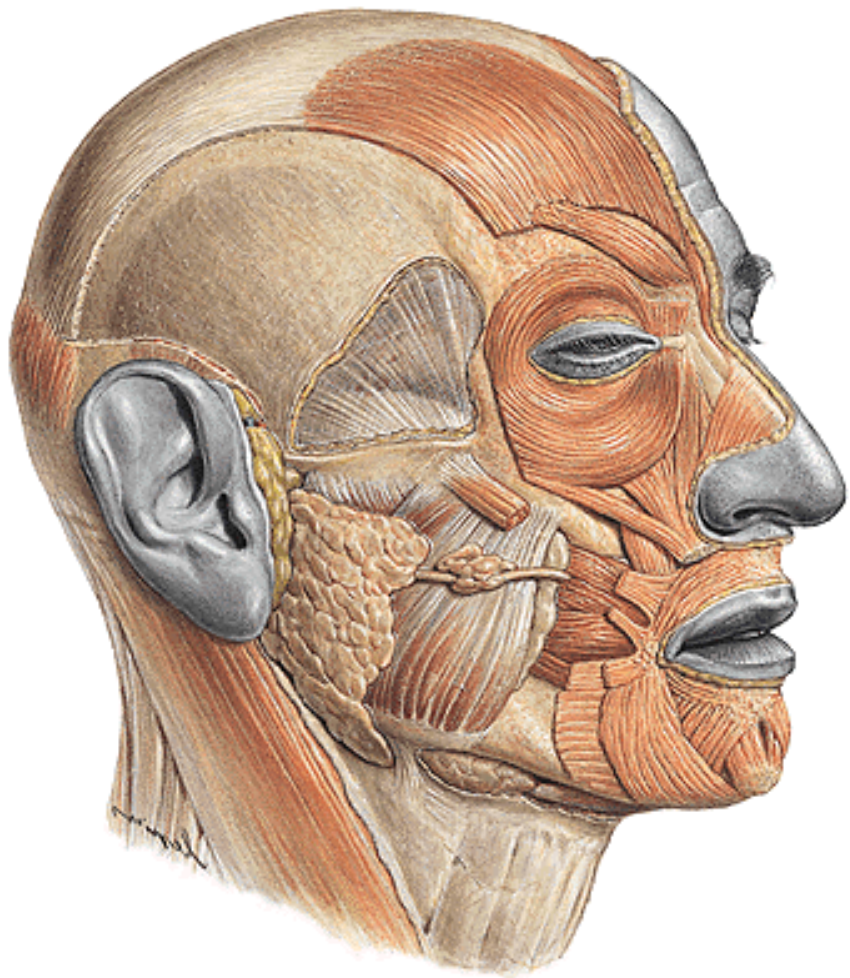
**Submucouse layer (glands)**

**Mucosa**

**Pars intermedia= red portion  
of the lips**



# Corpus adiposum buccae



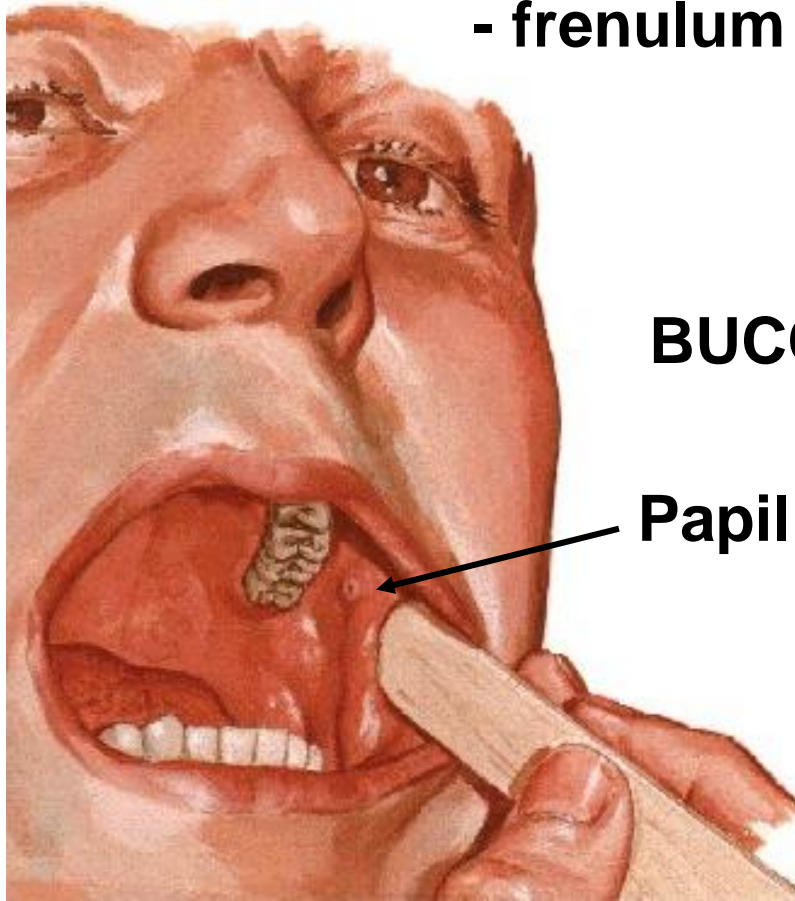
# VESTIBULUM ORIS

**Fornix vestibuli sup.**

**- frenulum labii superioris**

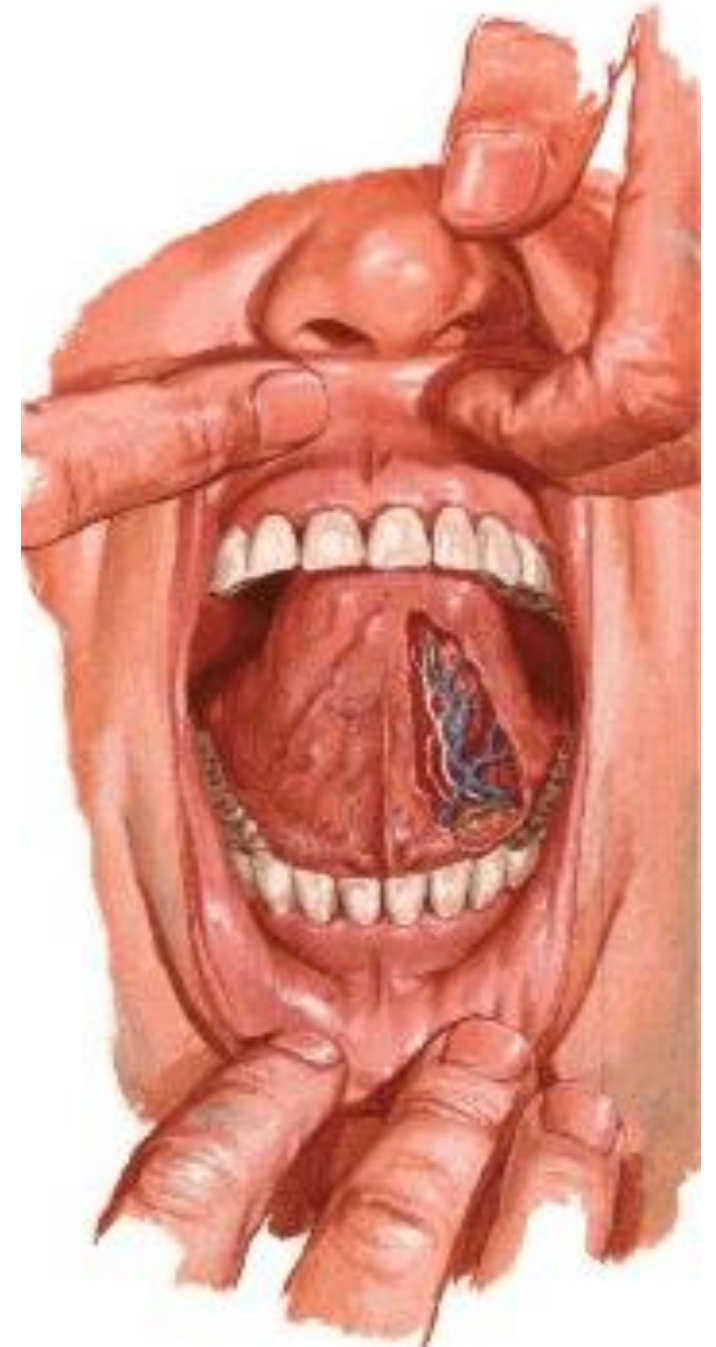
**Fornix vestibuli inf.**

**- frenulum labii inferioris**



**BUCCA**

**Papilla parotidea**





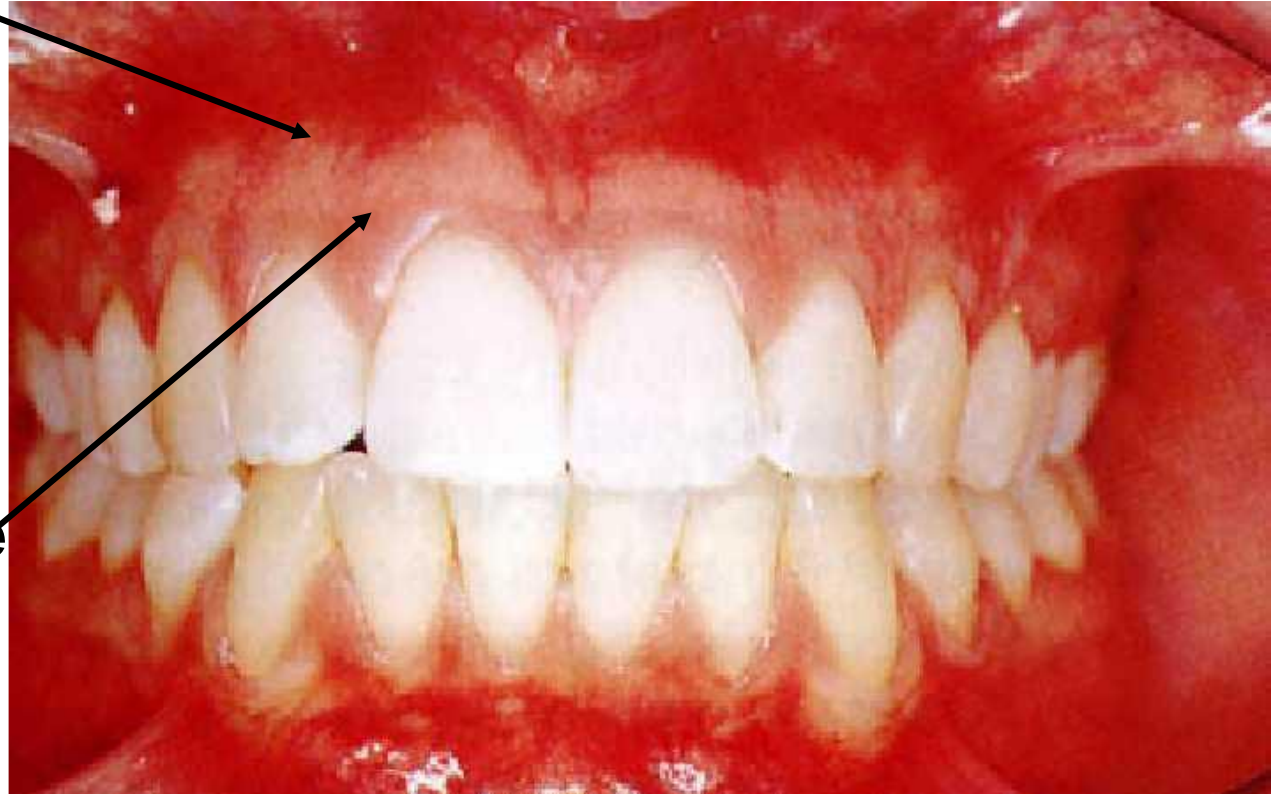
Fornix vestibuli sup. et inf.  
Frenulum labii sup. et inf.  
Tremata  
Trigonum retromolare

**Alveolar mucosa**

**Gingiva - gingiva fixa (attached g.)**

**- gingiva libera (marginal g.), gingival sulcus**

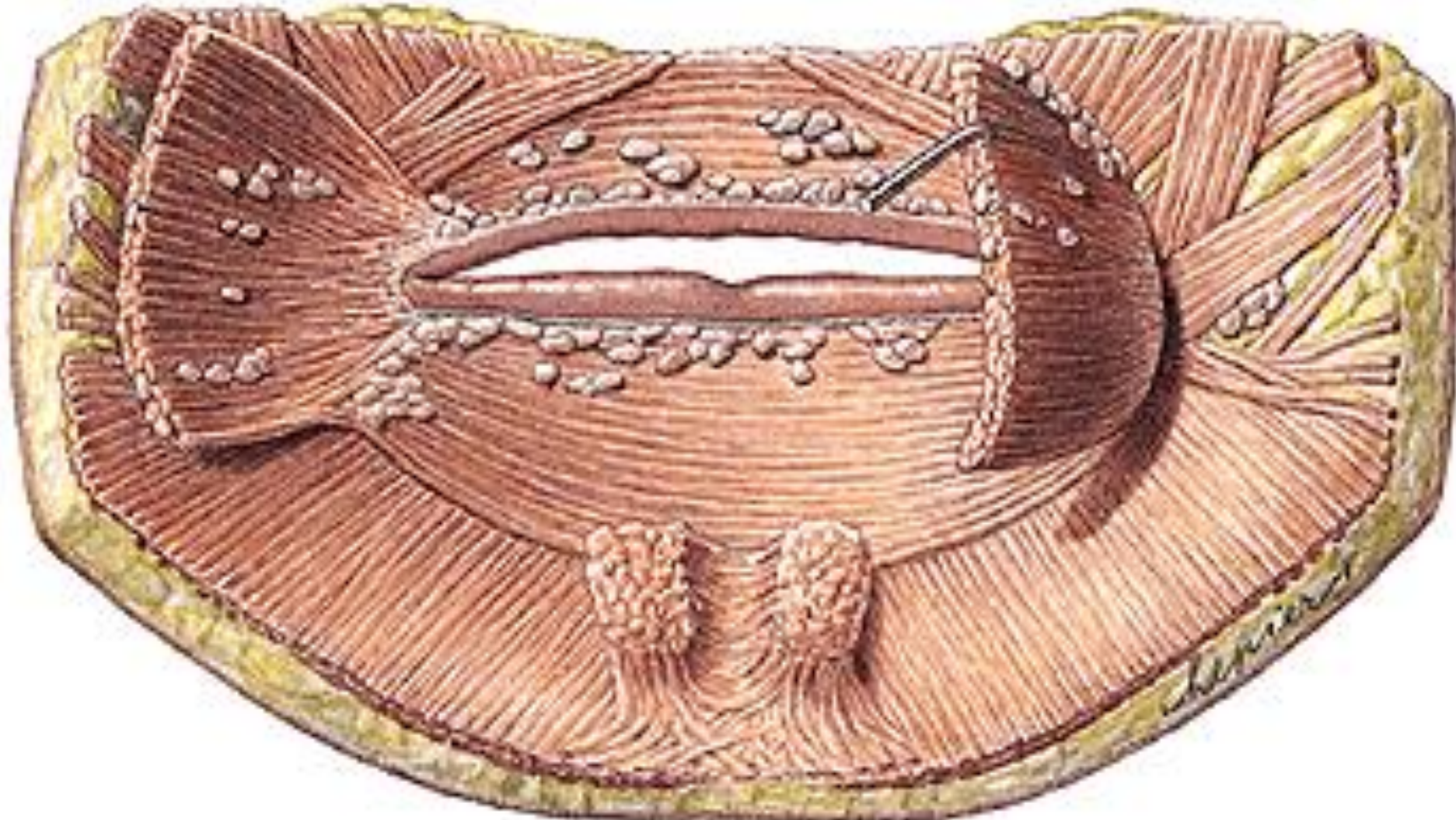
**Mucogingival border**

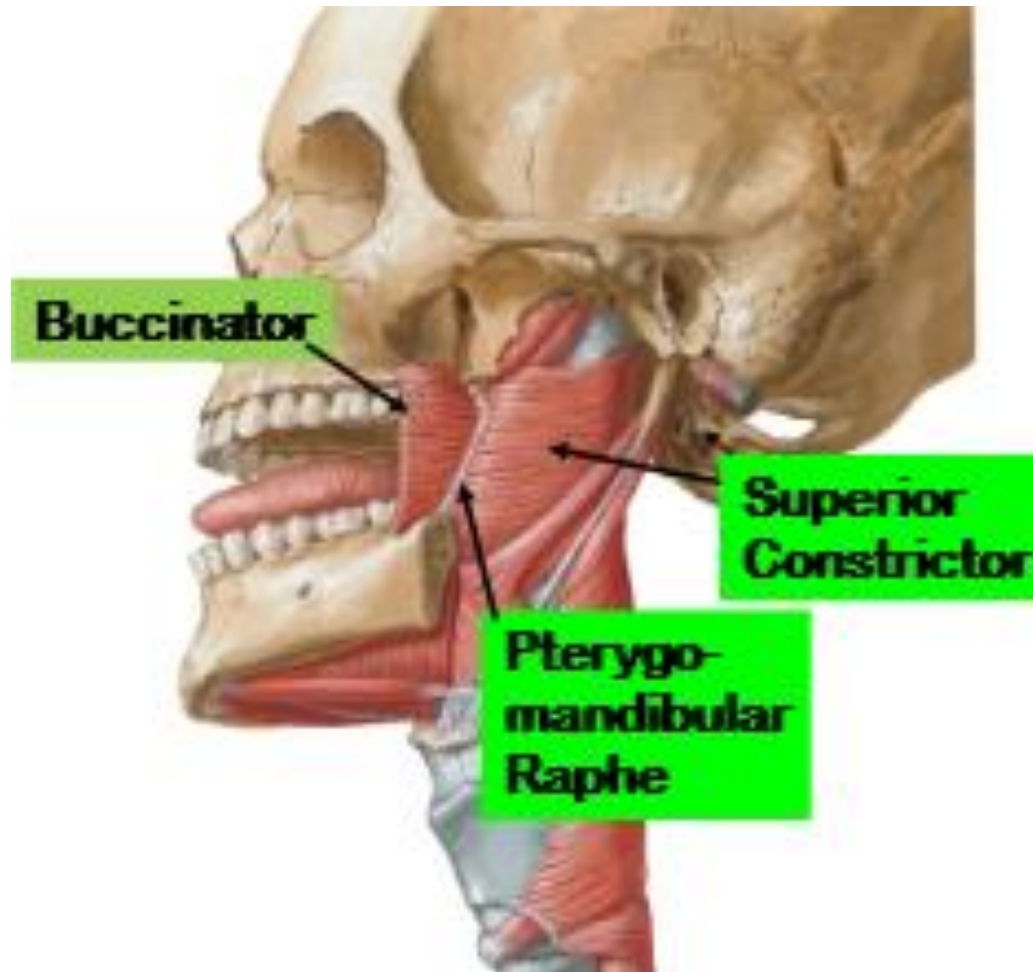


**Paramarginal groove**

**OCCLUSION (PROGNATHISM, PROGENISM)**

**Glandulae labiales, buccales**  
**M. orbicularis oris**  
**M. buccinator**  
**Corpus adiposum buccae**





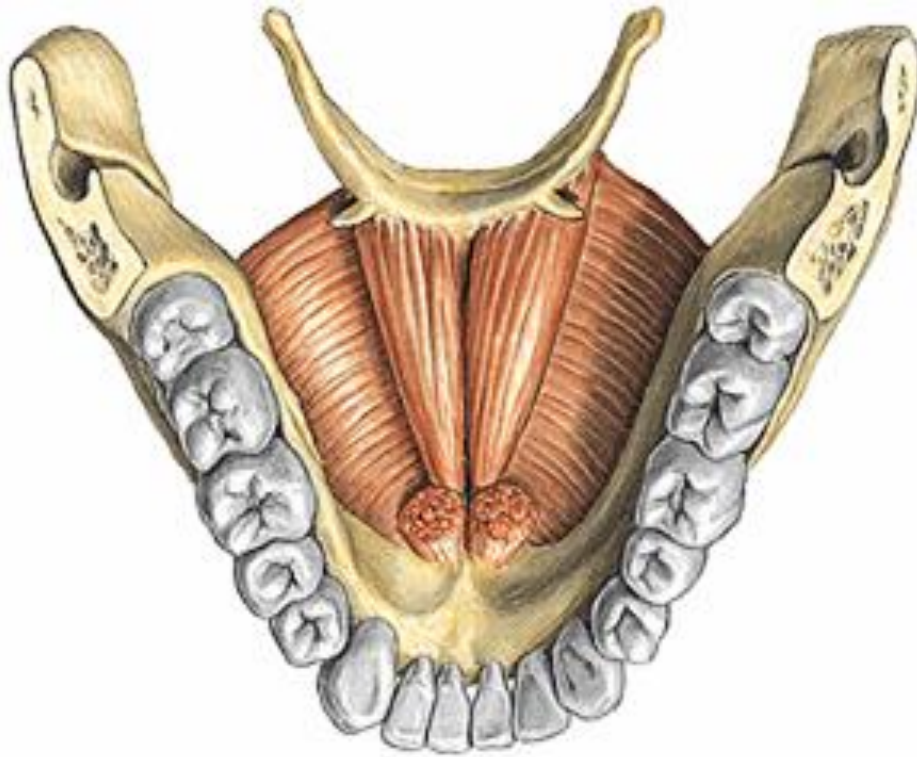
## **RAPHE PTERYGOMANDIBULARIS**

Membranous connection  
Between buccinator and  
upper sphincter of the pharynx  
(just between pterygoid proc. of the  
sphenoid and mandible)

# CAVUM ORIS PROPRIUM



# Diaphragma oris

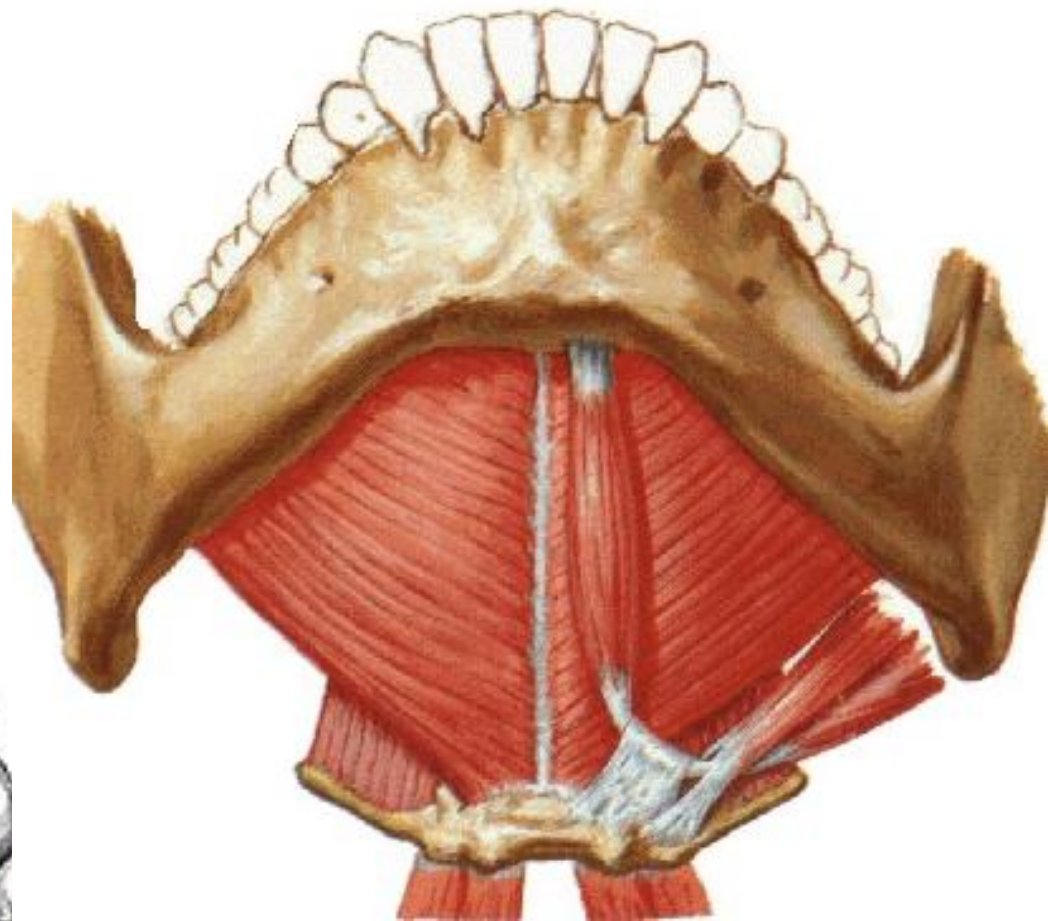
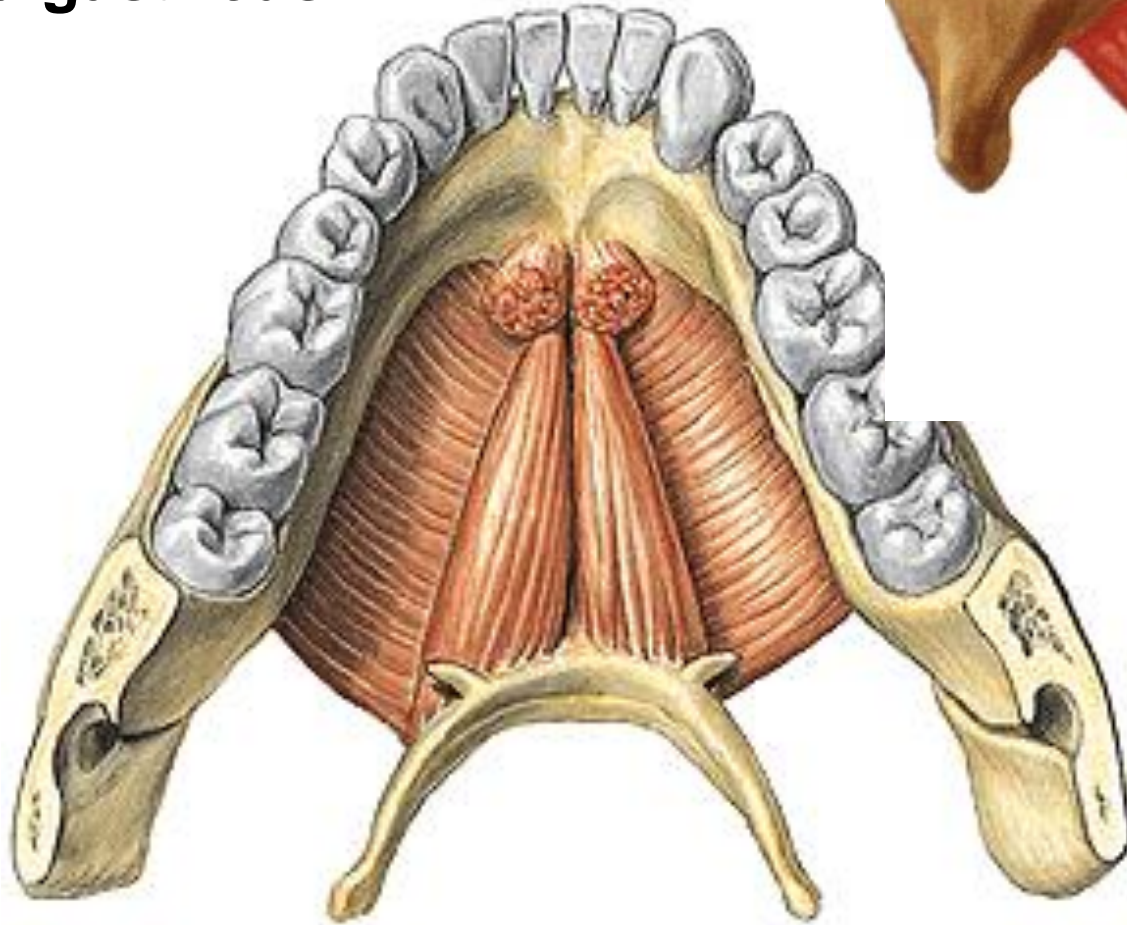


Frenulum linguae  
Plica sublingualis  
Caruncula sublingualis



## DIAPHRAGMA ORIS

- m. mylohyoideus  
(raphe mylohyoidea)
- m. geniohyoideus
- m. digastricus

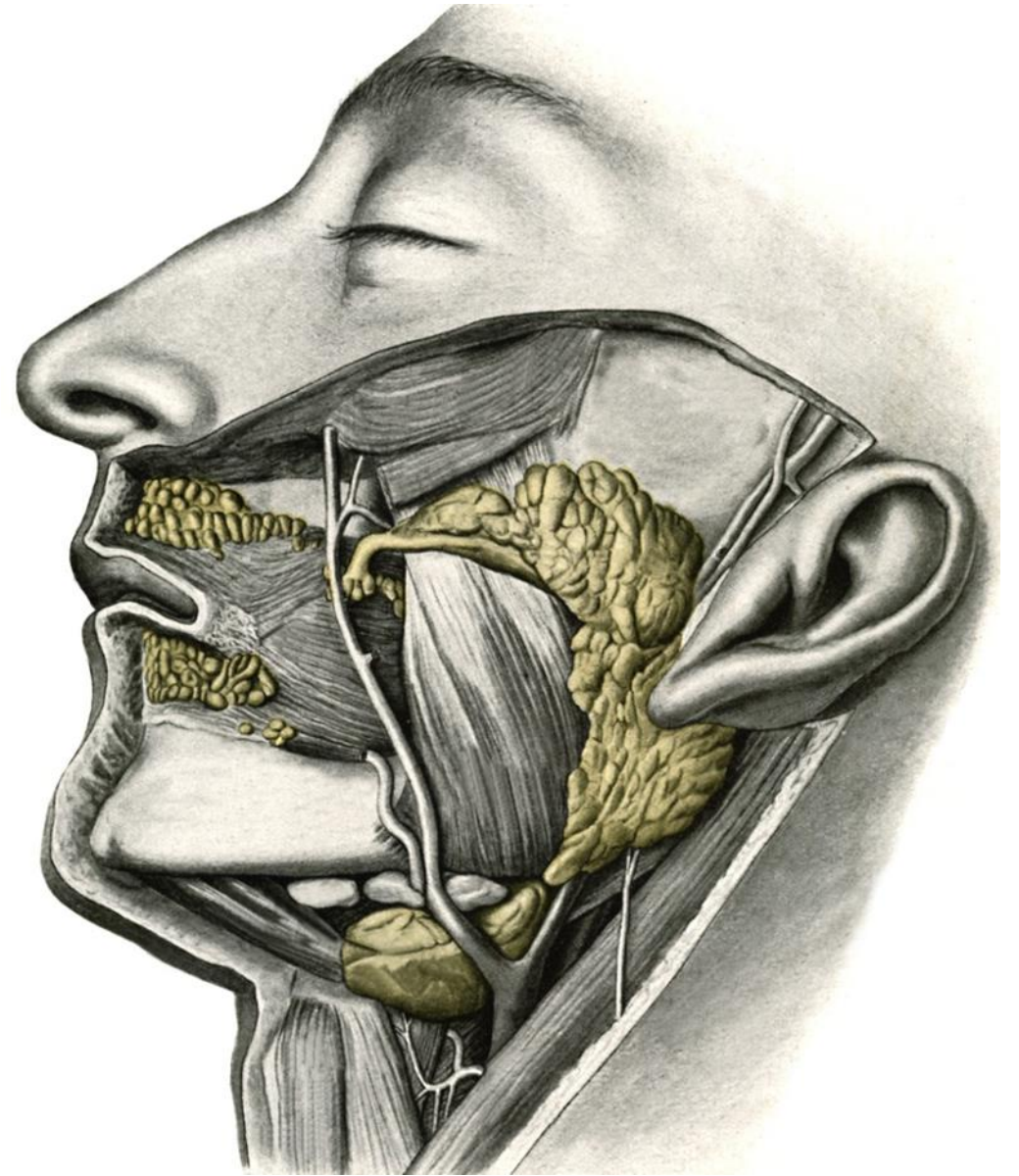


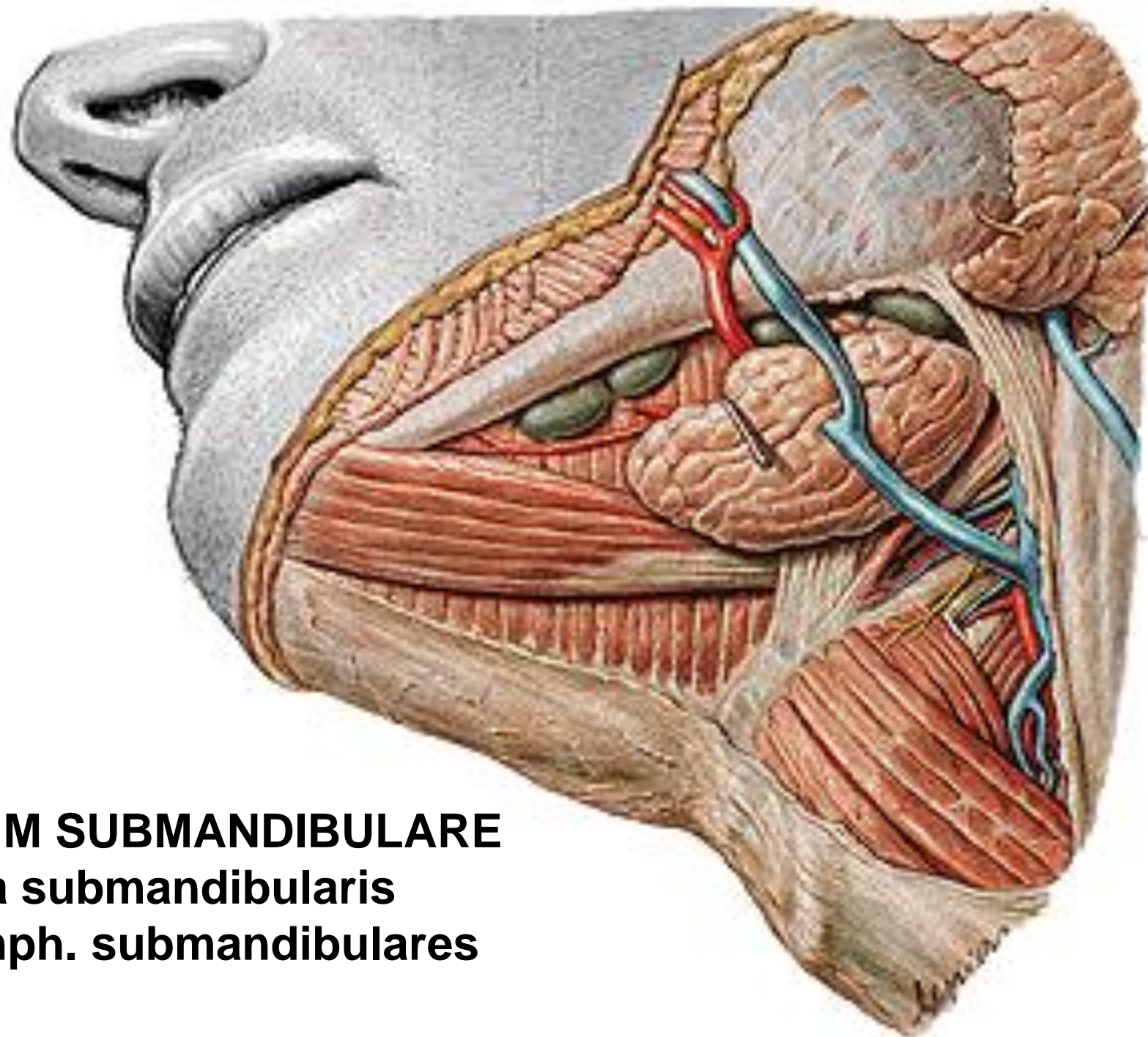
## **GLANDULAE SALIVARIAE MINORES**

- labiales, buccales, molares,  
palatinae, linguales

## **GLANDULAE SALIVARIAE MAJORES**

- submandibularis  
- sublingualis  
- parotis





## **TRIGONUM SUBMANDIBULARE**

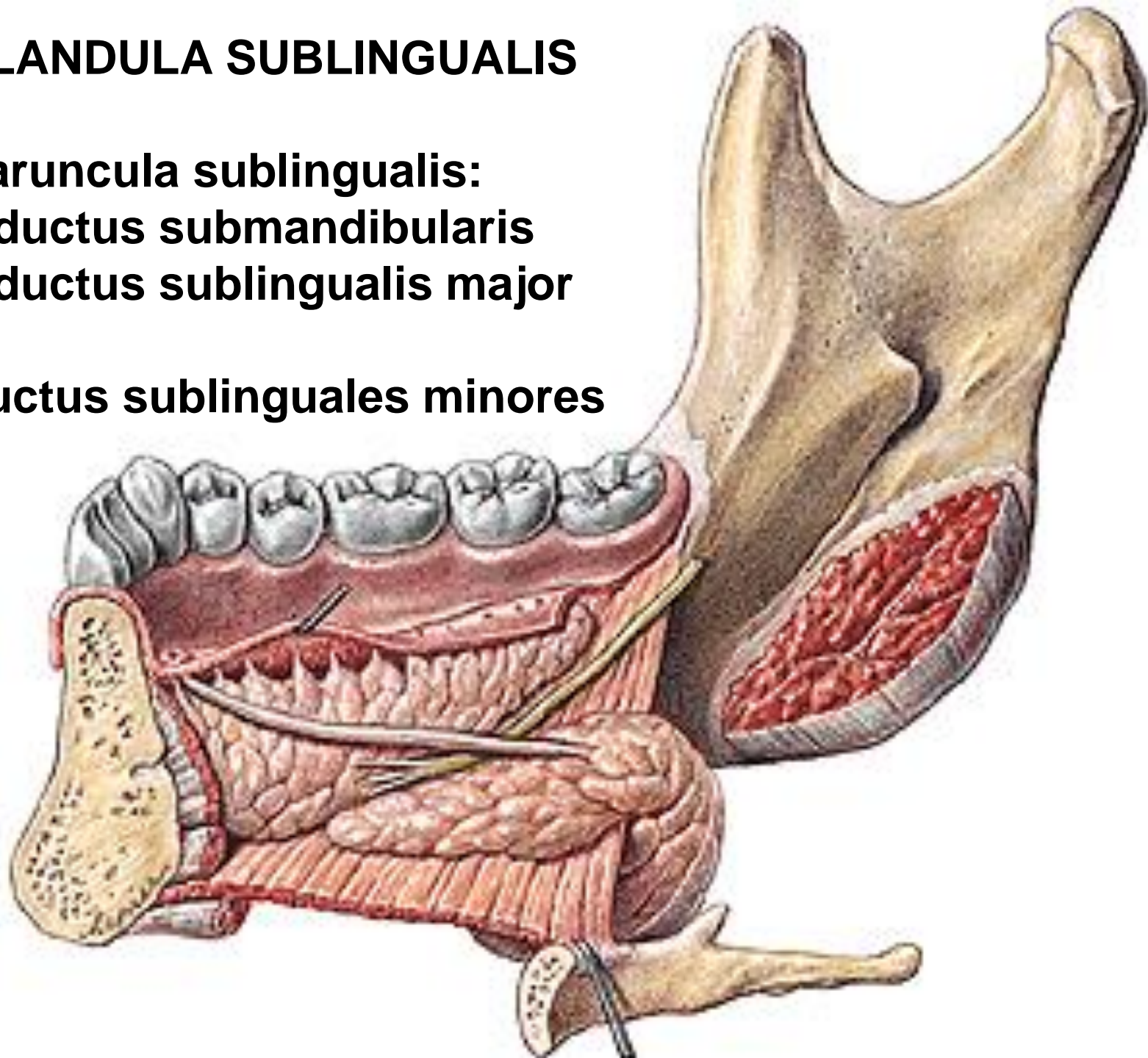
- glandula submandibularis
- nodi lymph. submandibulares

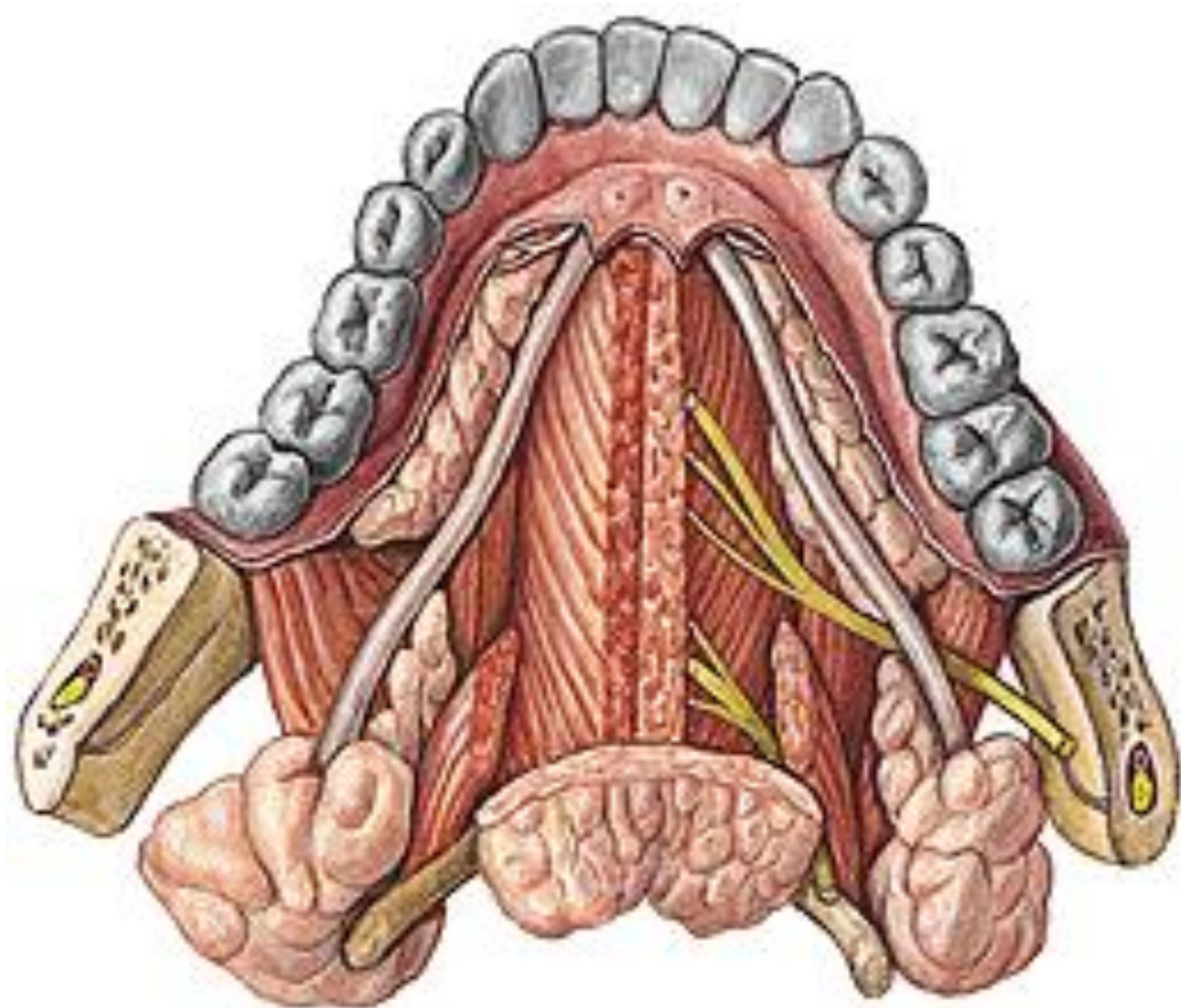
# GLANDULA SUBLINGUALIS

**Caruncula sublingualis:**

- ductus submandibularis
- ductus sublingualis major

**Ductus sublinguales minores**

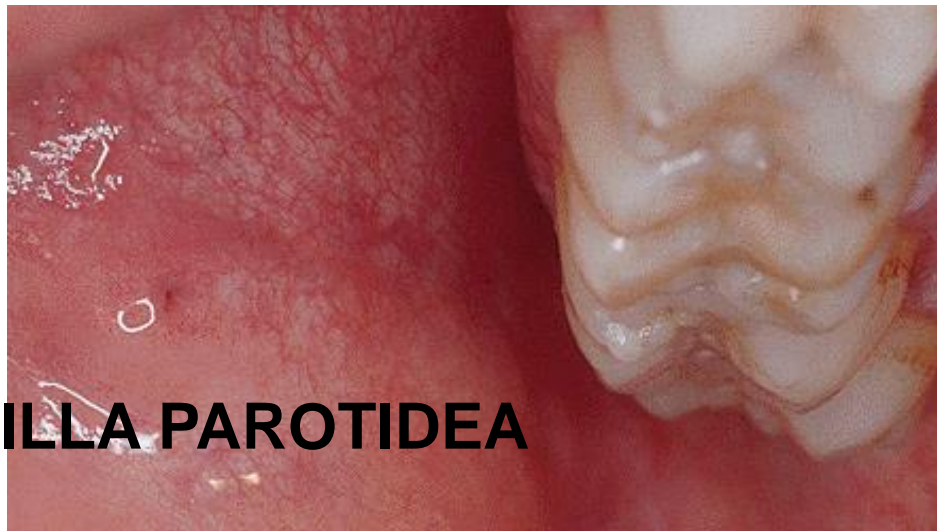
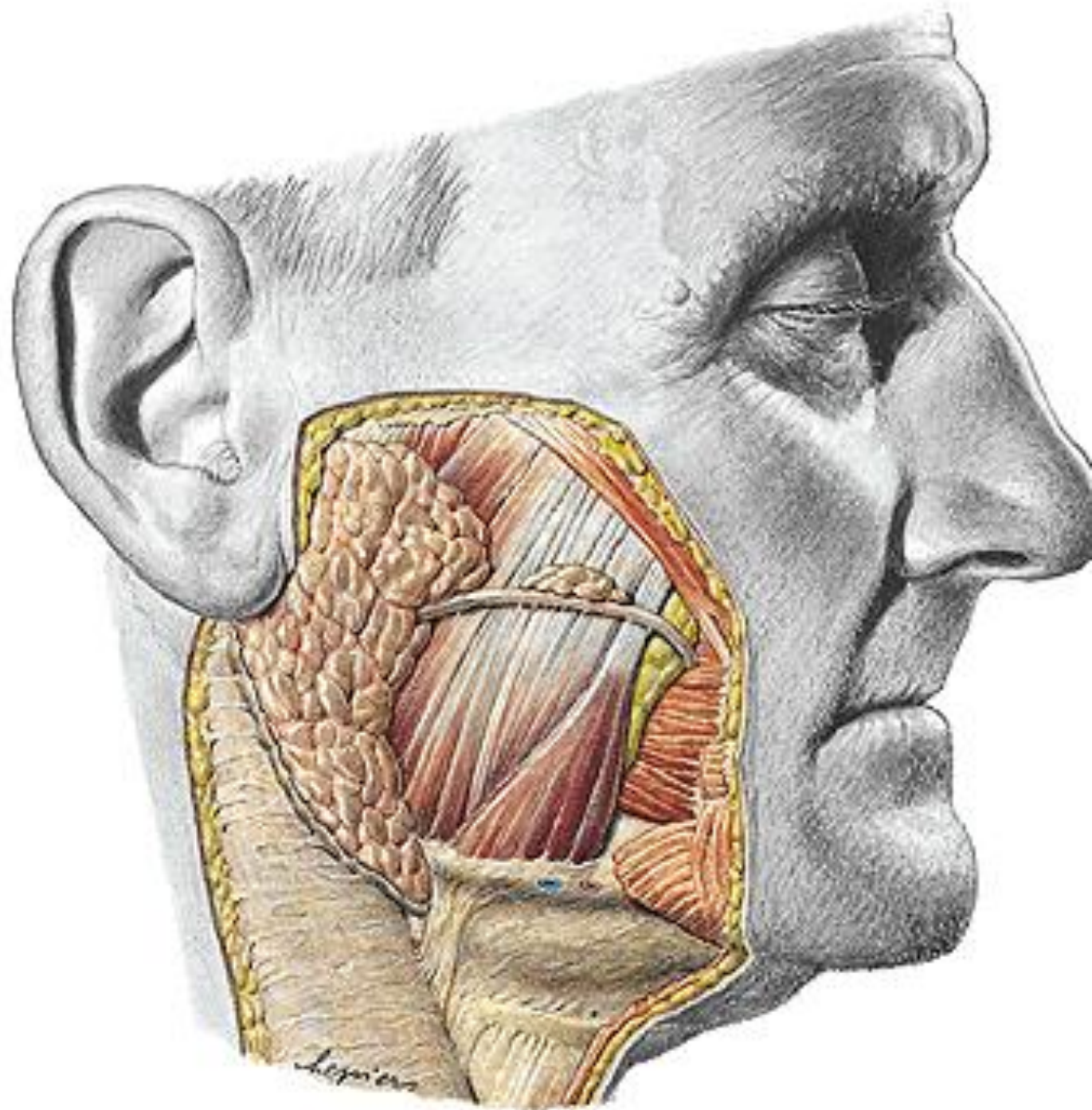




# GLANDULA PAROTIS

Fascia parotideomasseterica  
Tractus angularis

Ductus parotideus  
Glandula parotis  
accessoria



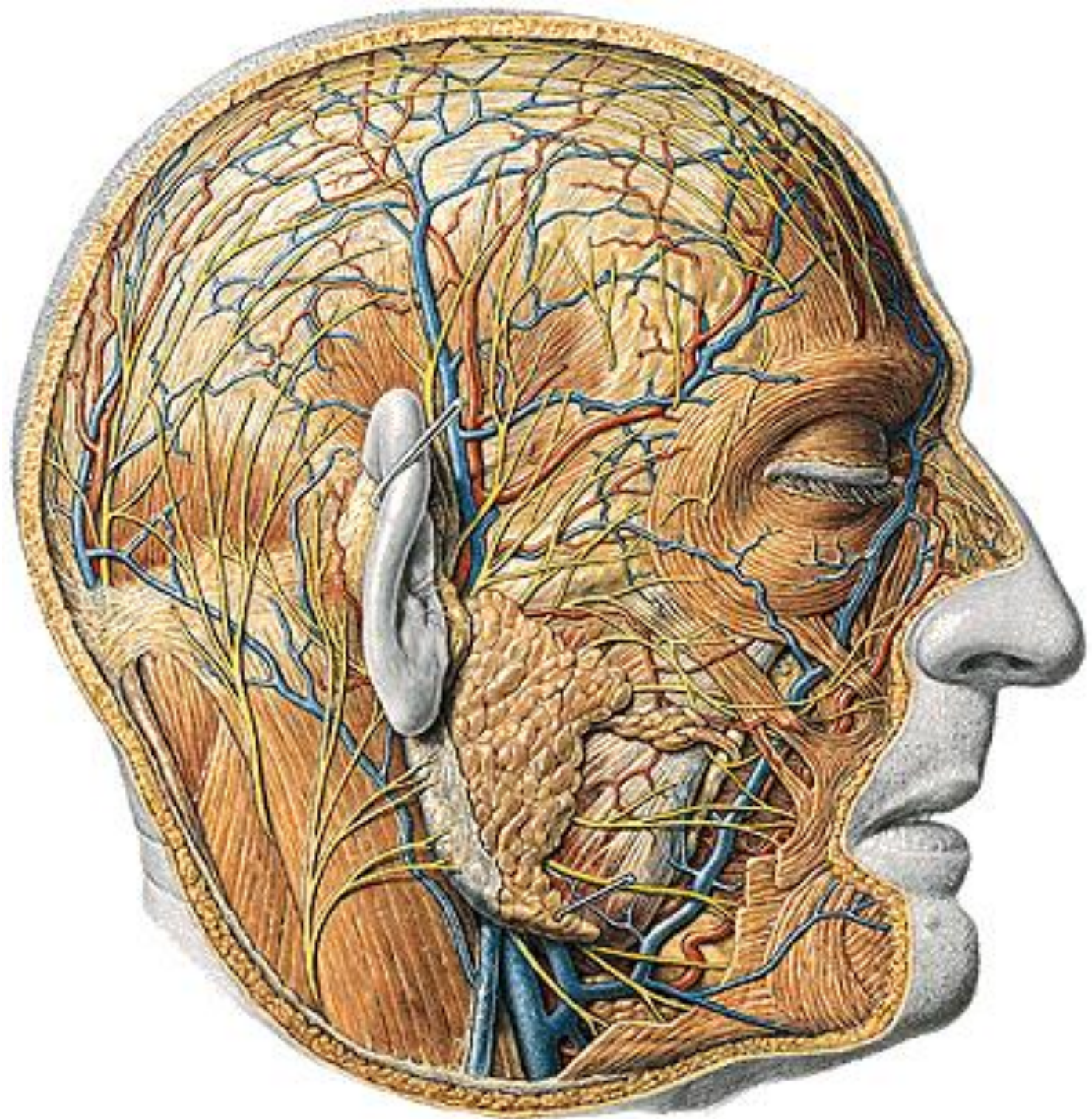
PAPILLA PAROTIDEA

**N. facialis (CN VII)**

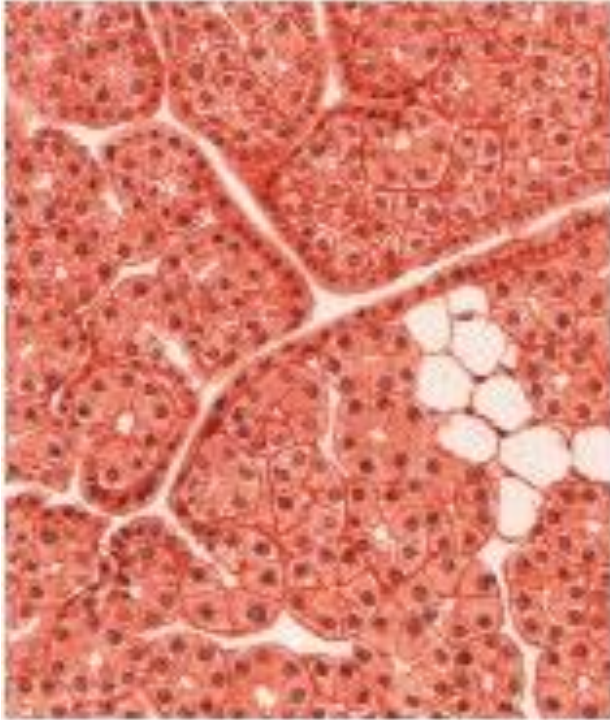
**- plexus parotideus**

**V. retromandibularis**

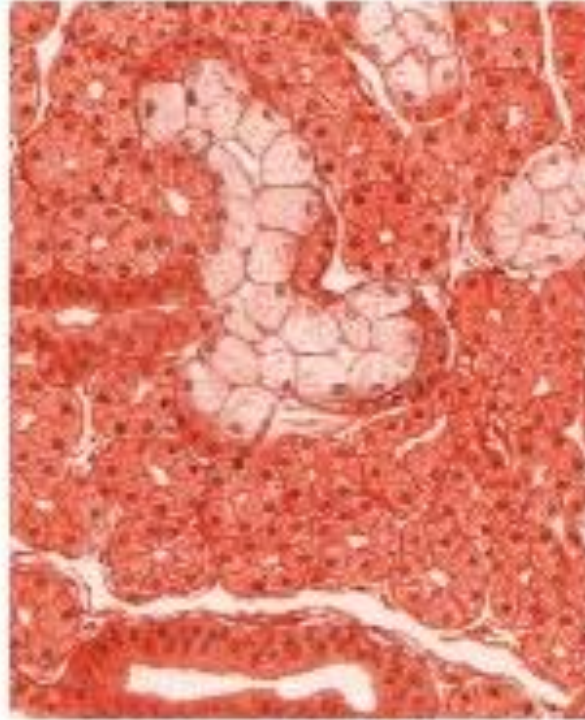
**A. carotis ext.**



# SALIVARY GLANDS



Parotid gland: totally serous



Submandibular gland:  
mostly serous, partially mucous



Sublingual gland:  
almost completely mucous



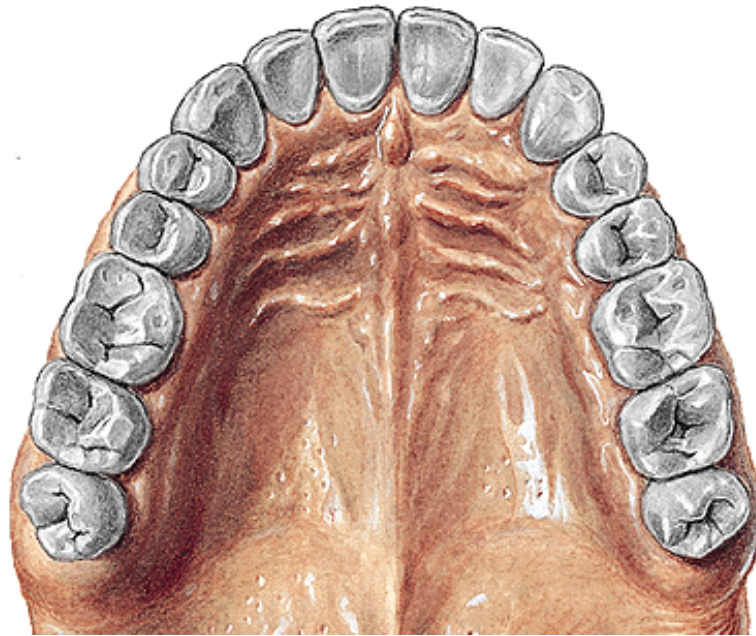
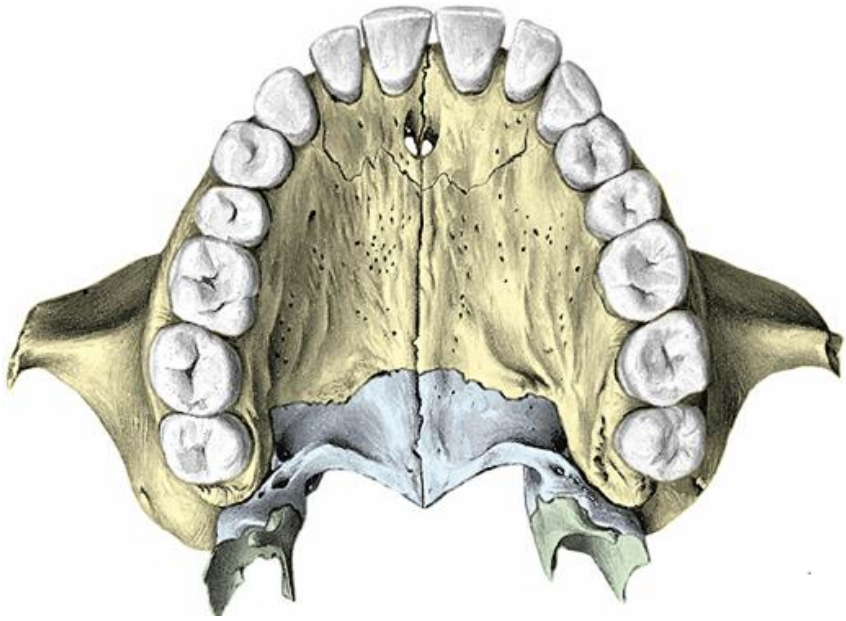
# Sialography



# Palatum

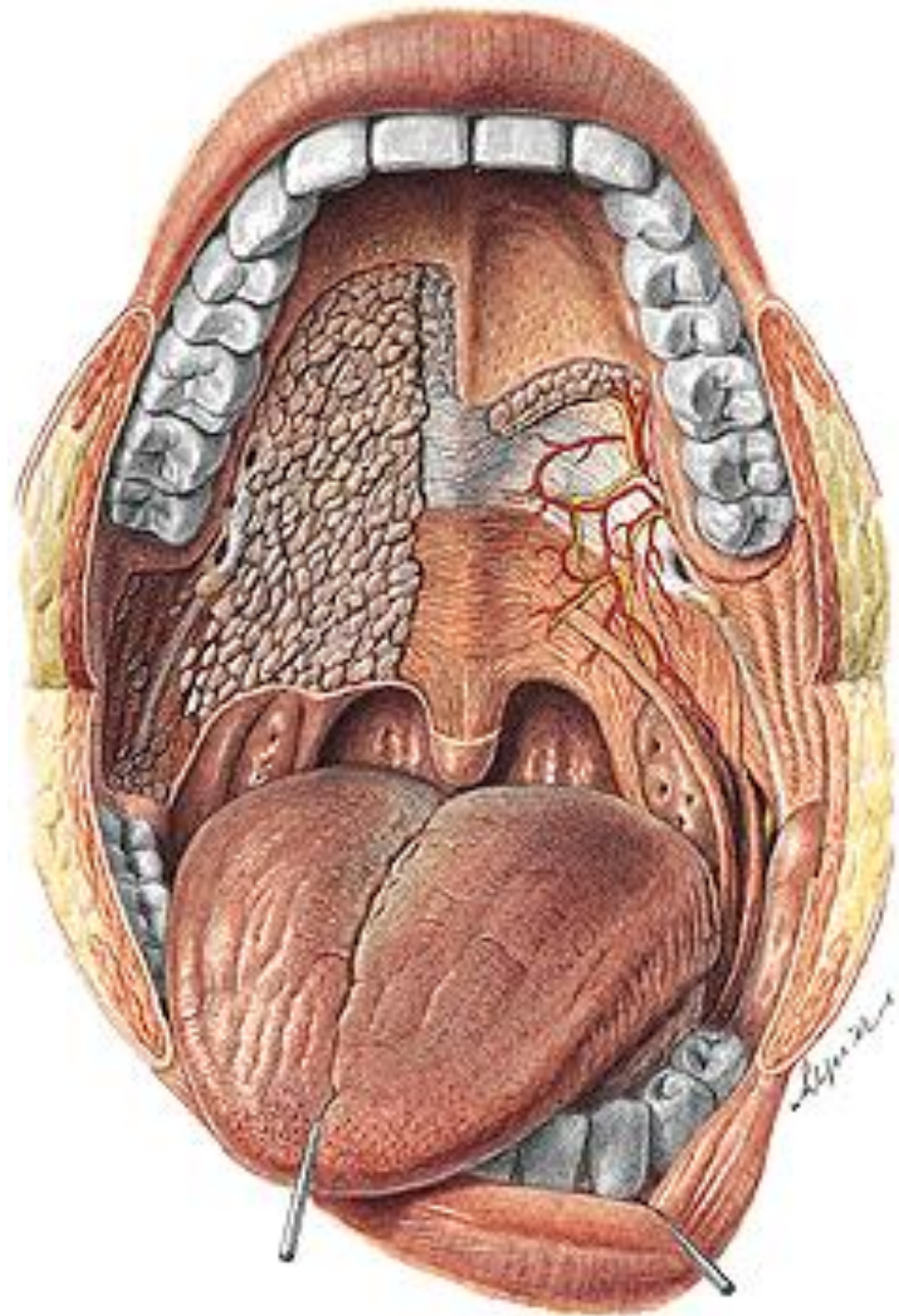
➤ durum

➤ molle



# PALATUM

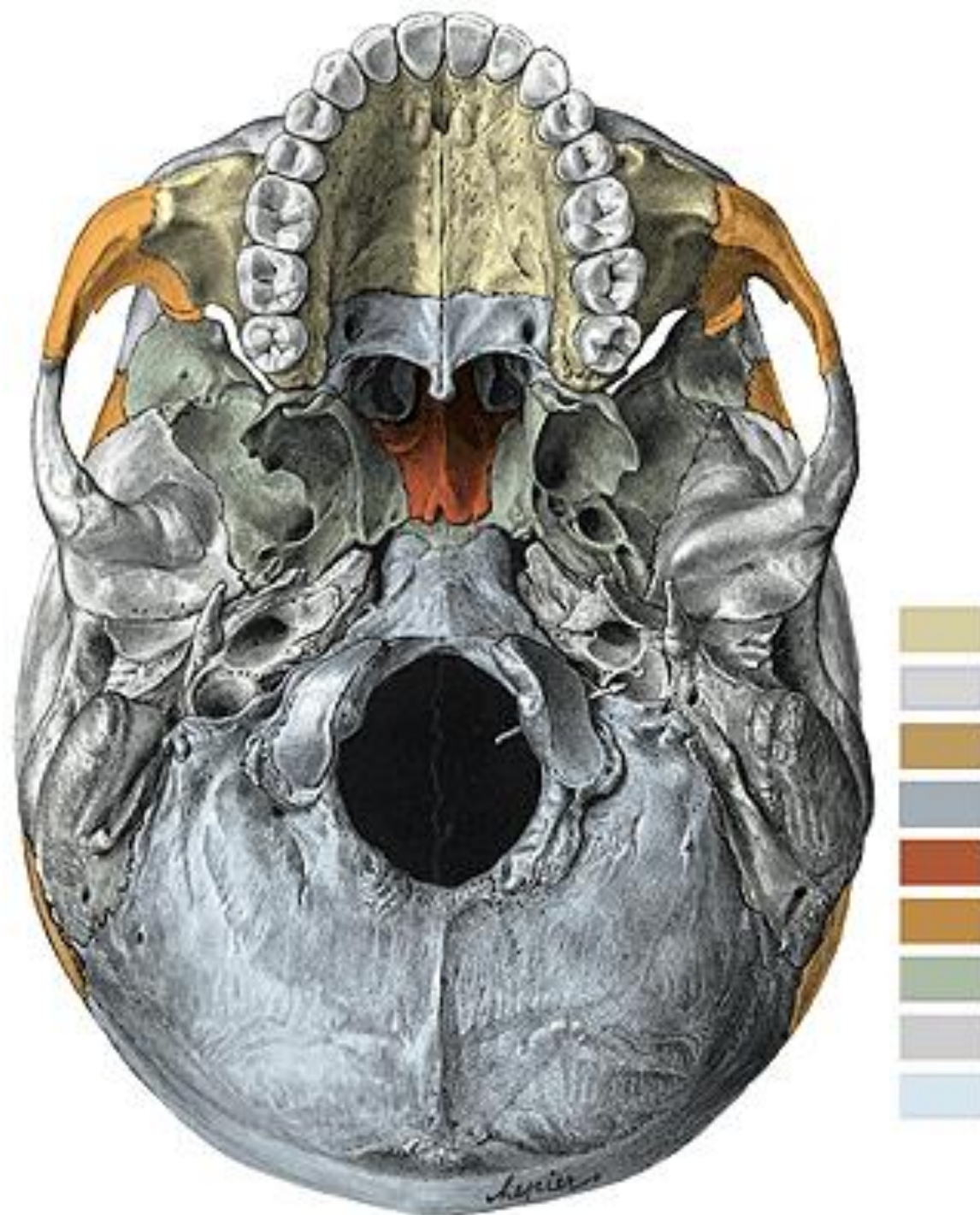
**Glandulae palatinae**  
**Aa. et vv. palatinae**  
**majores et minores**  
**Nn. palatini**  
**majores et minores**  
**N. napasopalatinus**

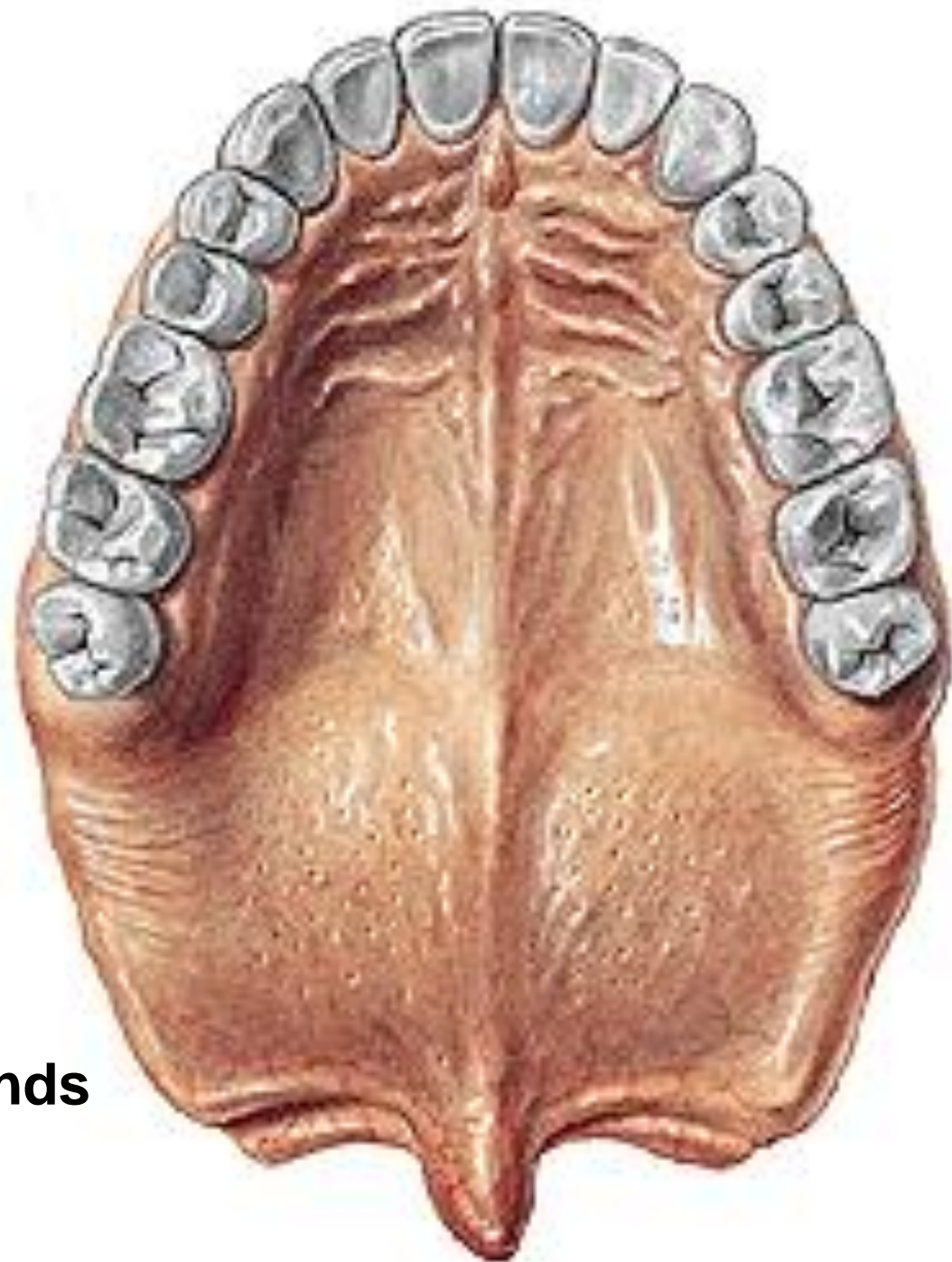


## PALATUM DURUM

### p. osseum

suturae palatinae  
sulci palatini  
foramen incisivum  
for. palatinum majus  
for. palatina minora  
spina nasalis post.





**Mucoperiost**  
**Raphe palati**  
**Papilla incisiva**  
**Plicae palatinae transversae**  
**Openings of small salivary glands**

**PALATUM MOLLE  
(VELUM PALATINUM)**

**Uvula**

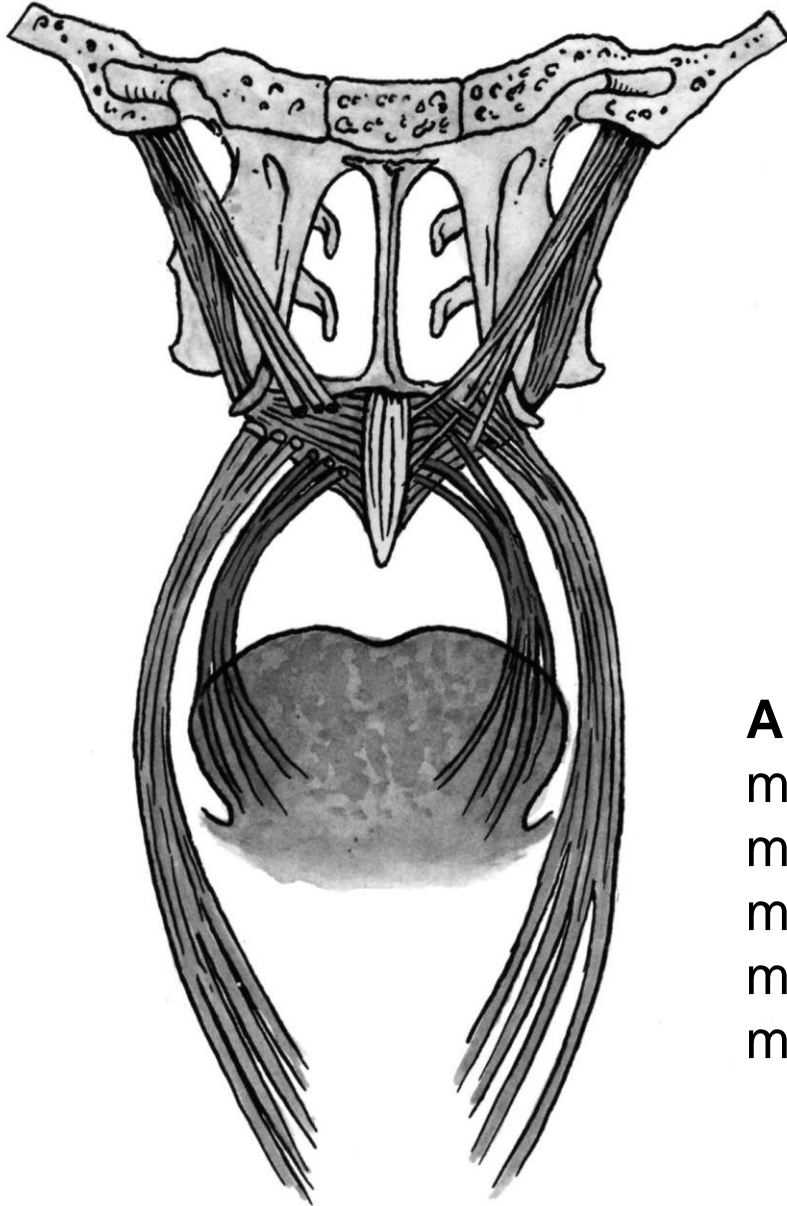
**Arcus palatoglossus**

**Arcus palatopharyngeus**

**Isthmus faucium**



# Palatum molle

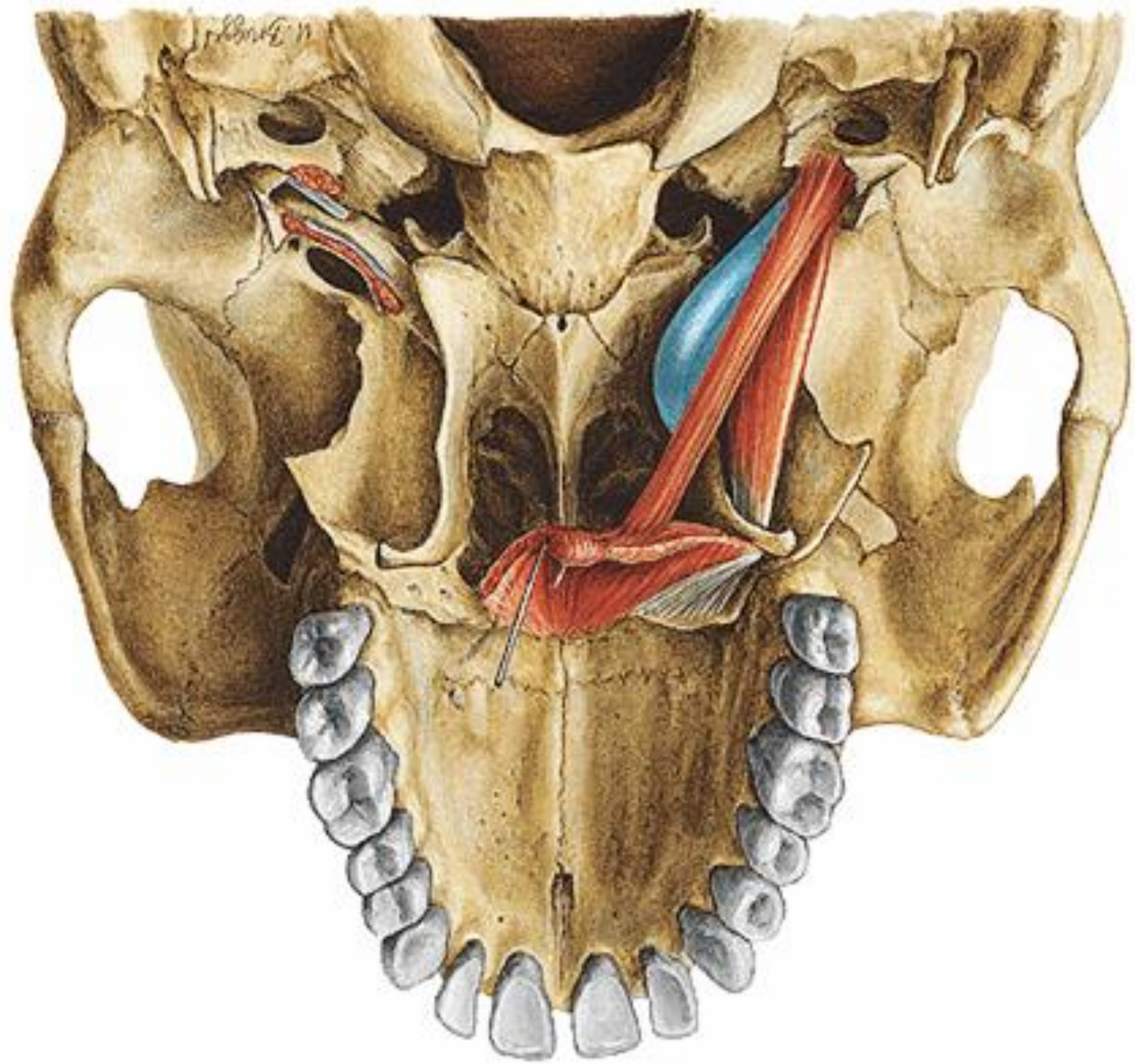


## **Aponeurosis palatina**

- m. levator veli palatini
- m. tensor veli palatini
- m. uvulae (uvula)
- m. palatoglossus (arcus)
- m. palatopharyngeus (arcus)

**Plexus pharyngeus**  
– **CN IX, X**

**Tensor – CN V**





# TONSILLA PALATINA

Fossa tonsillaris

Plica semilunaris

Fossa supratonsillaris

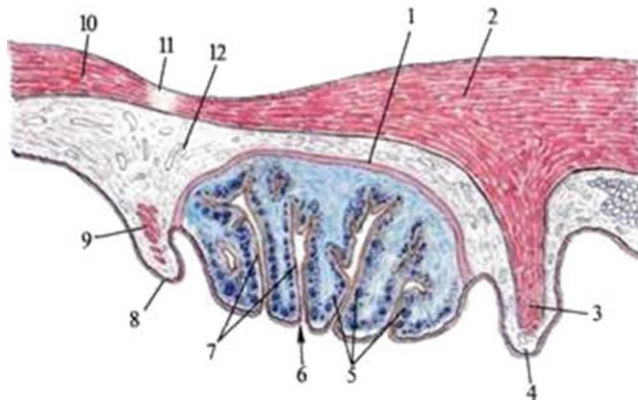
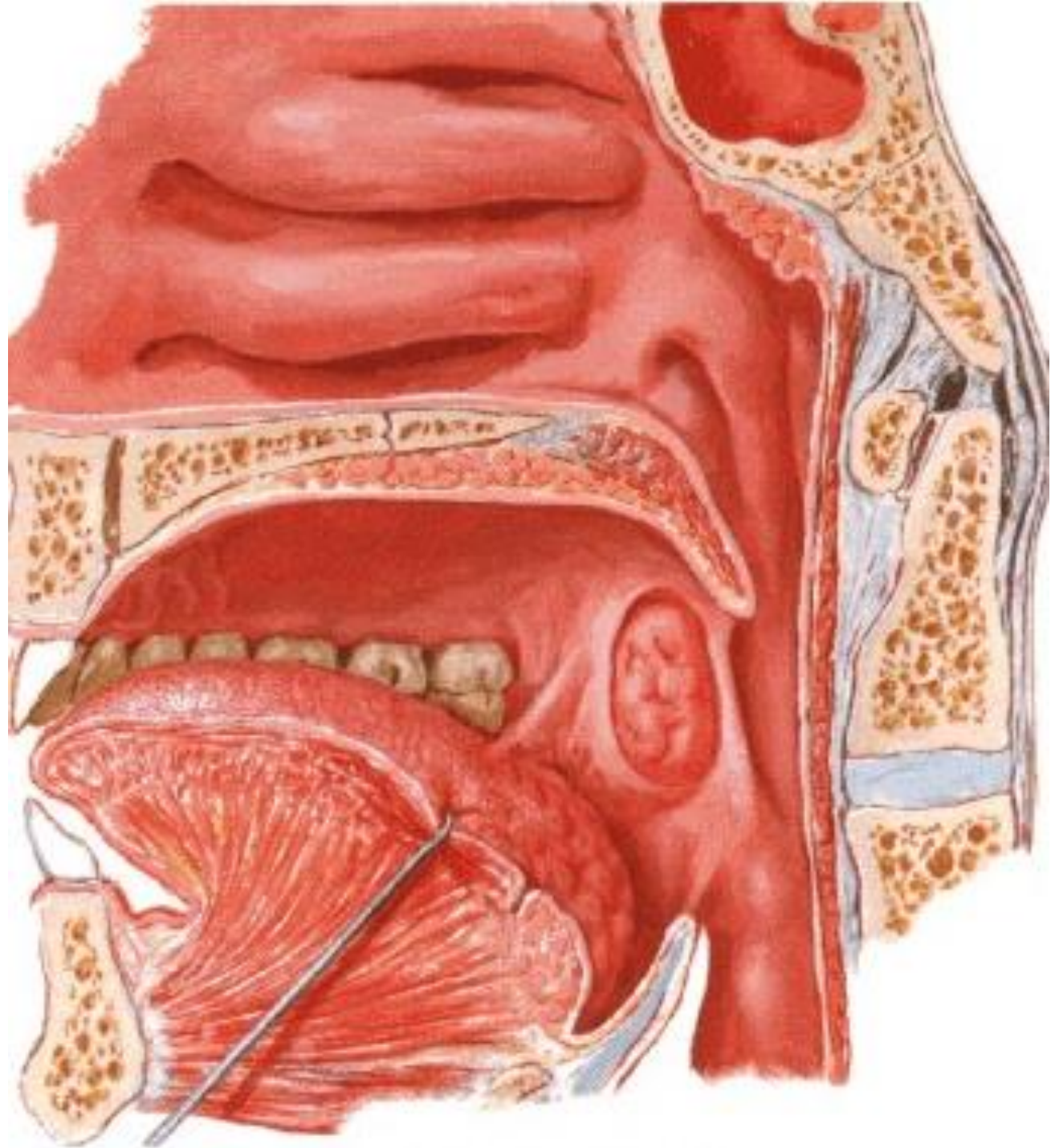
Plica triangularis

Capsula tonsillaris

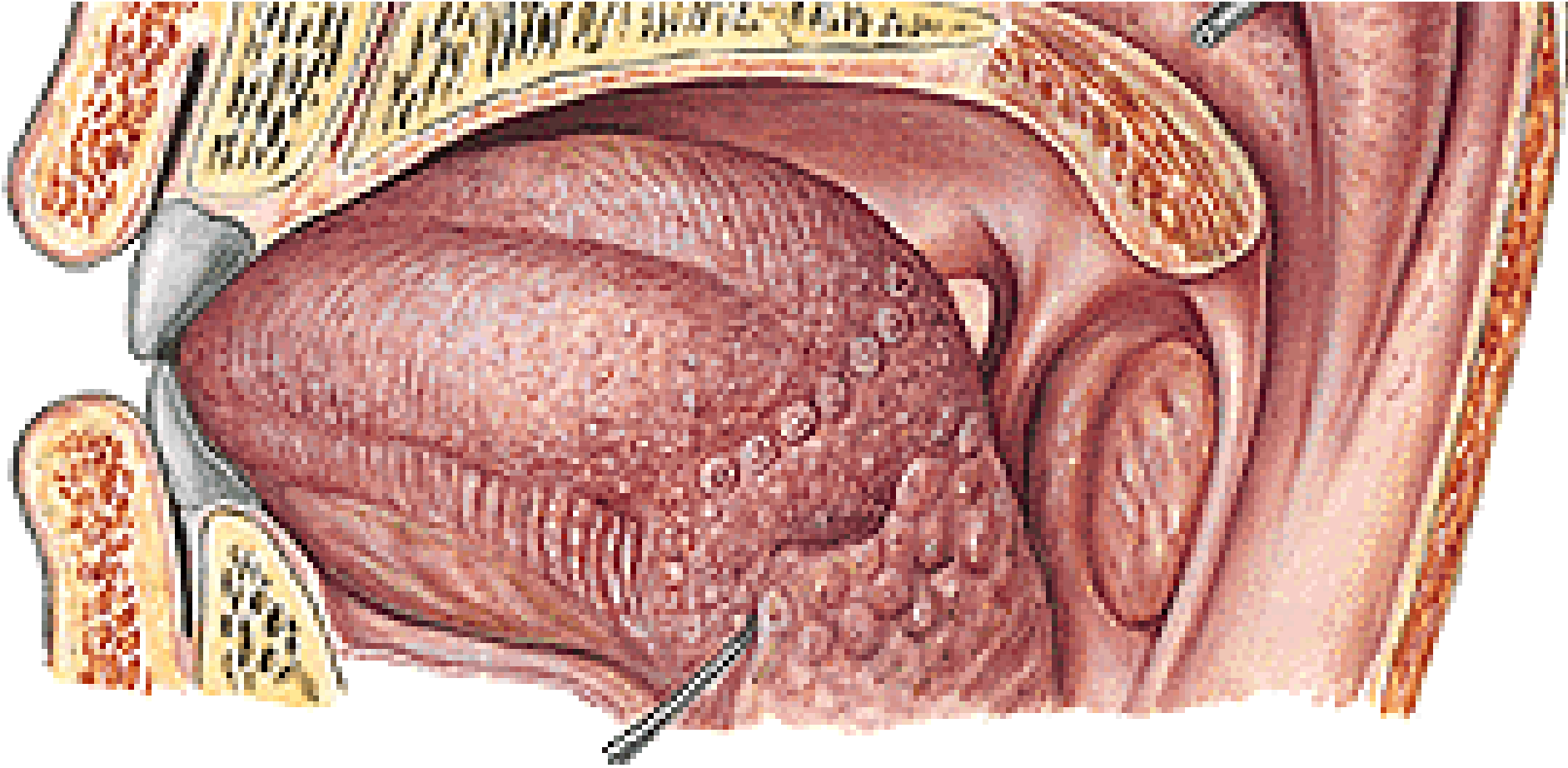
Paratonsillar vein

Cryptae tonsillares

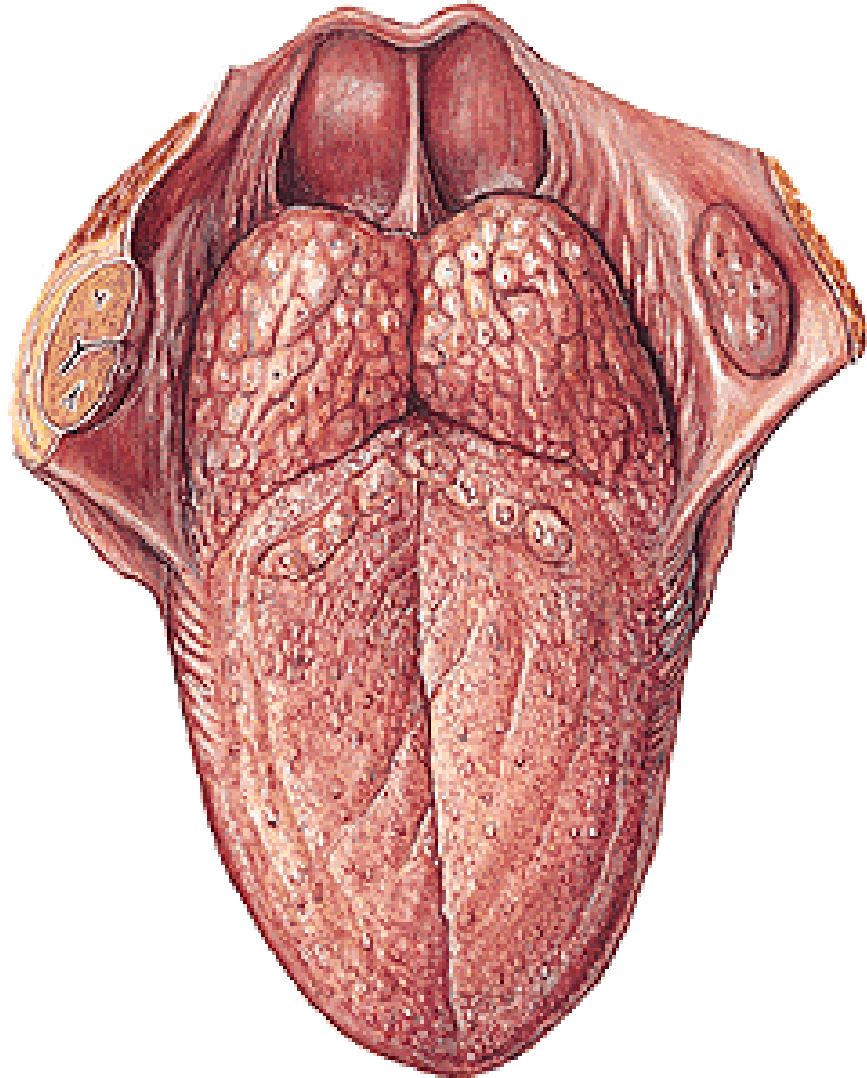
Tonsillar pegs



**LINGUA – APEX, CORPUS, RADIX**



Plicae glossoepiglotticae  
Valleculae epiglotticae



## Lingua (glossa)

**Radix: tonsilla lingualis**

**Corpus: dorsum x facies  
inf., margines linguae**

**Dorsum**

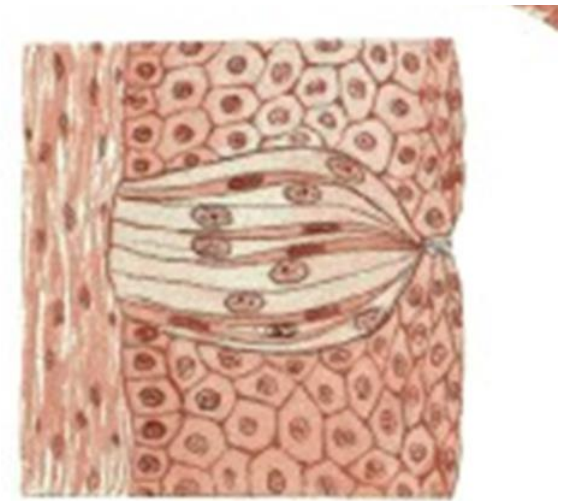
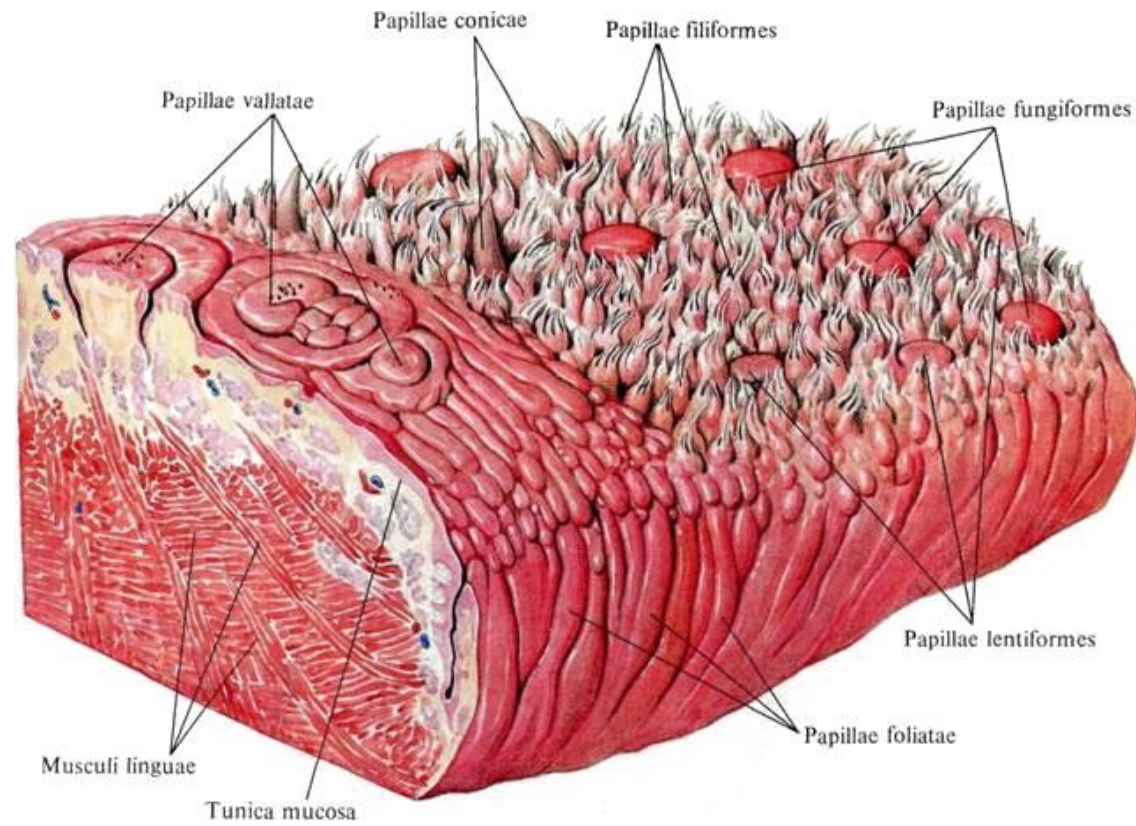
**sulcus medianus**

**sulcus terminalis**

**foramen caecum**

**(ductus thyroglossus)**

**papillae linguales**



**papillae:**  
 Filiformes  
 Fungiformes  
 Foliatae  
 Valatae

**calliculi gustatorii**

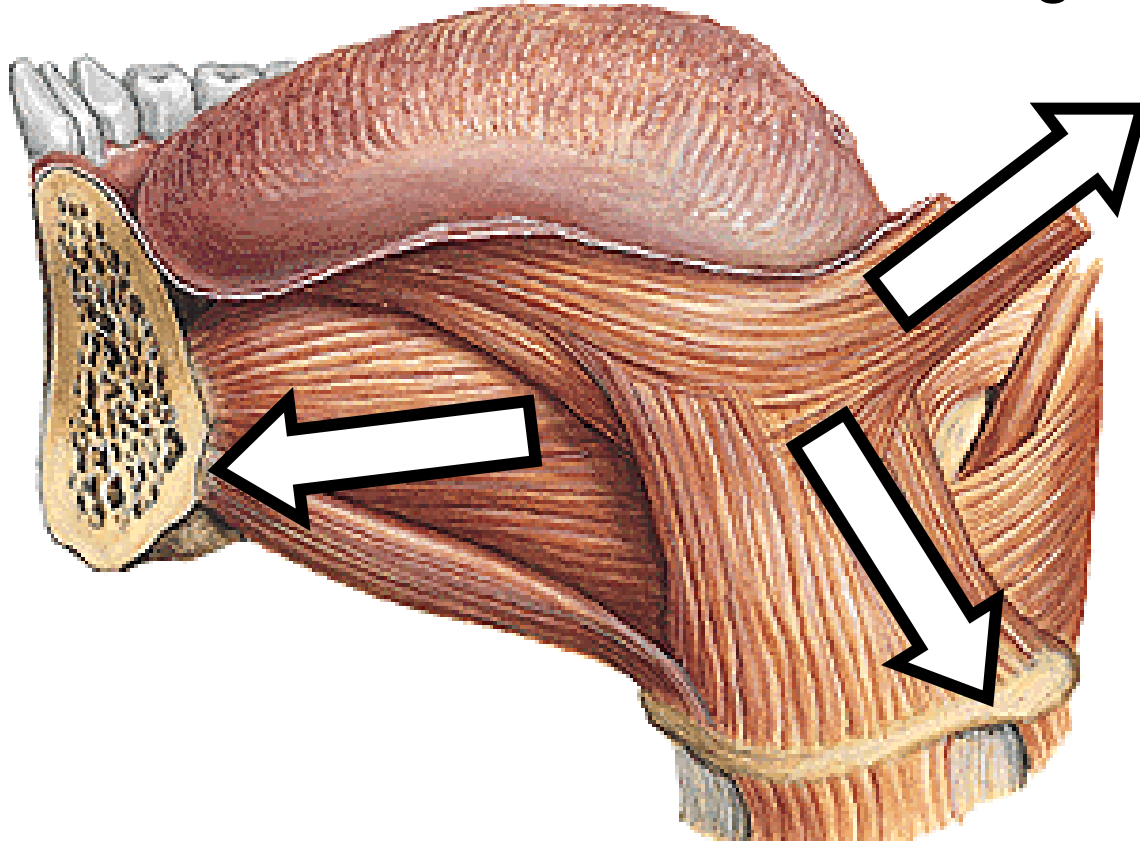
**Facies inferior linguae**  
**Plica fimbriata**

**Frenulum linguae**  
**Plica sublingualis**



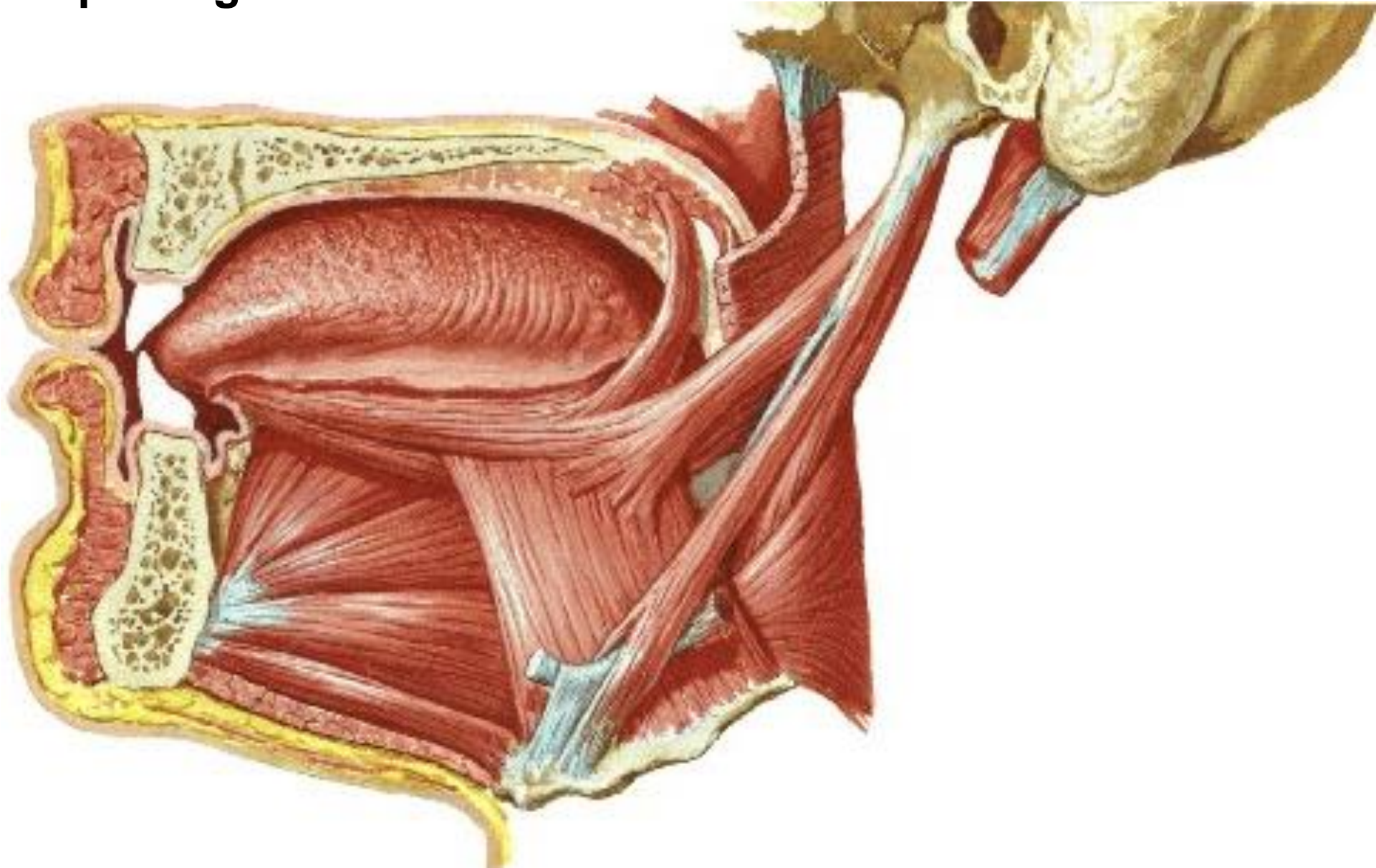
# Extraglossal muscles

(change the position of the tongue)

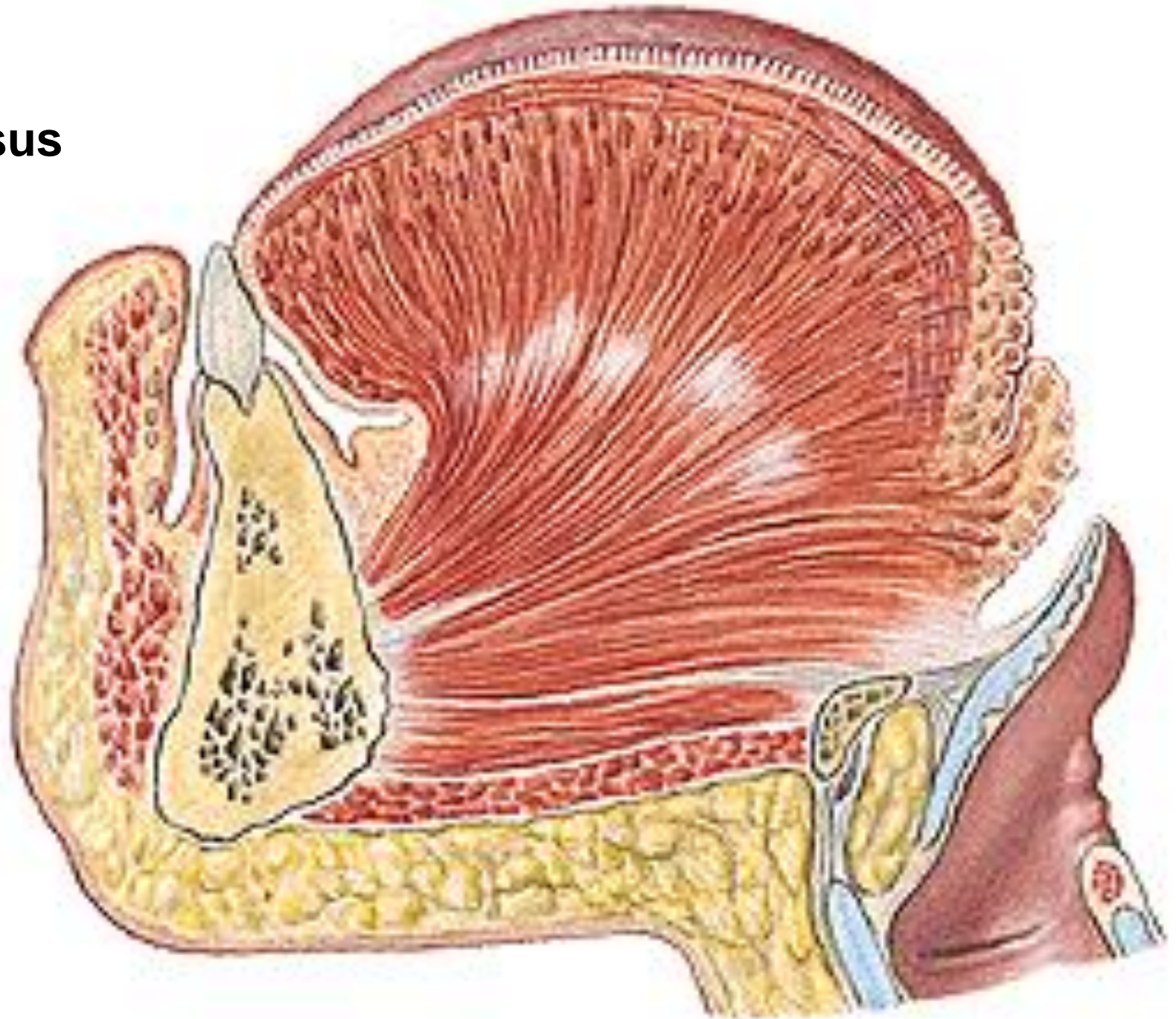


M. genioglossus  
M. hyoglossus  
M. styloglossus  
(M. palatoglossus)

**M. hyoglossus**  
**M. styloglossus**  
**M. palatoglossus**



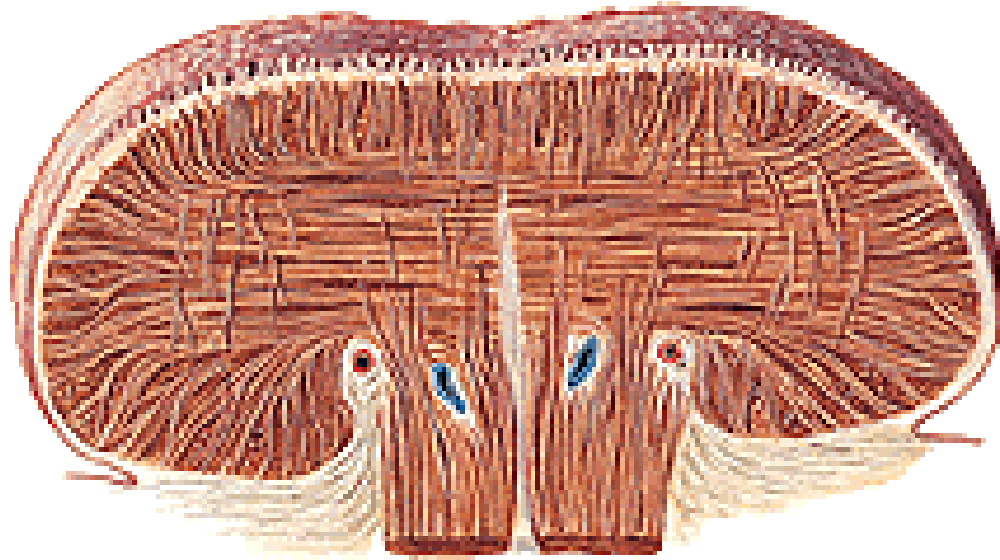
**M. genioglossus**





# Own muscles of the tongue

(change the shape of the tongue)



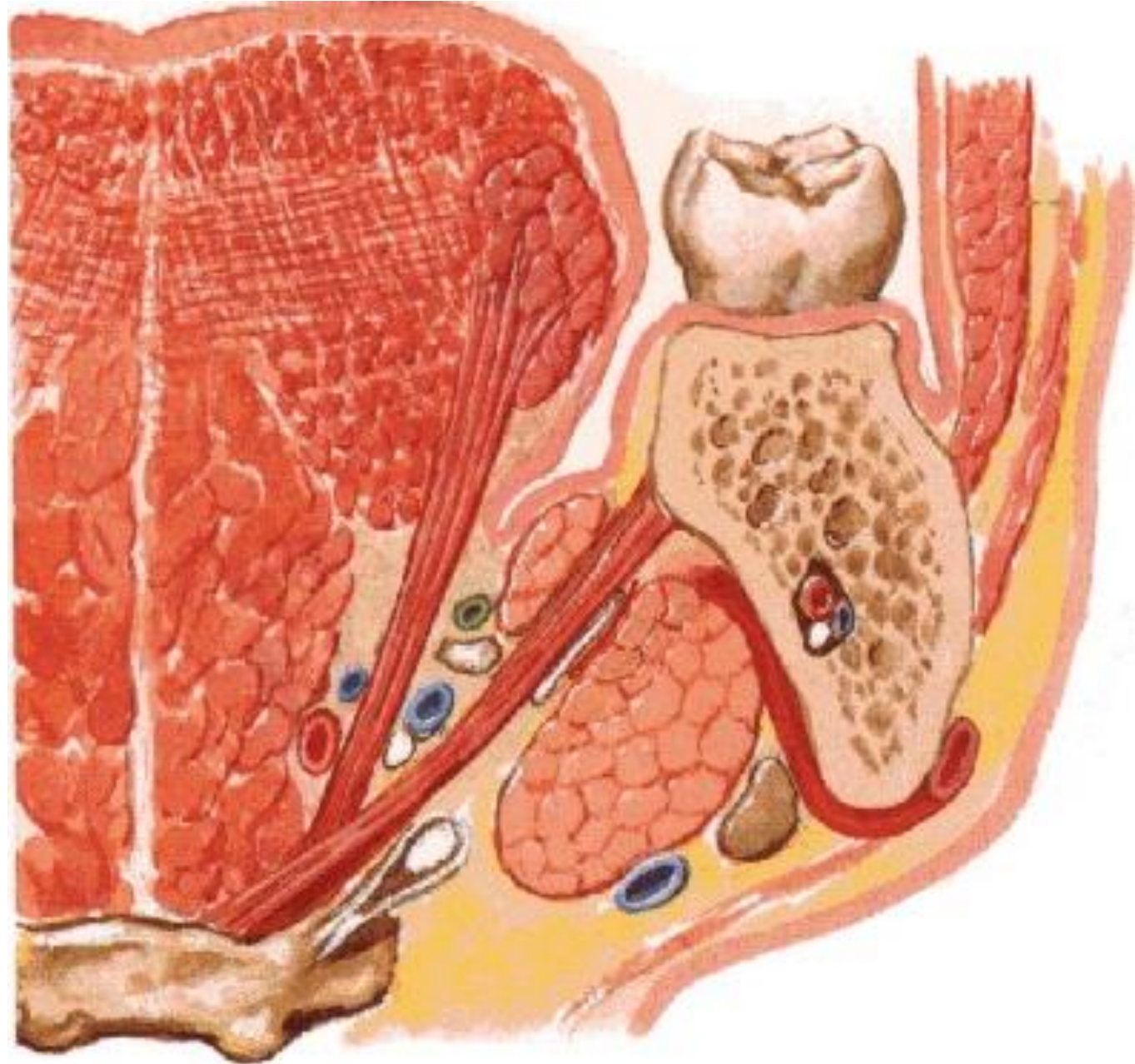
Mm. longitudinales  
(sup. et inf.)  
M. transversus  
M. verticalis

Aponeurosis linguae

Septum linguae

Canalis paralingualis

## Canalis paralingualis – a. et v. lingualis

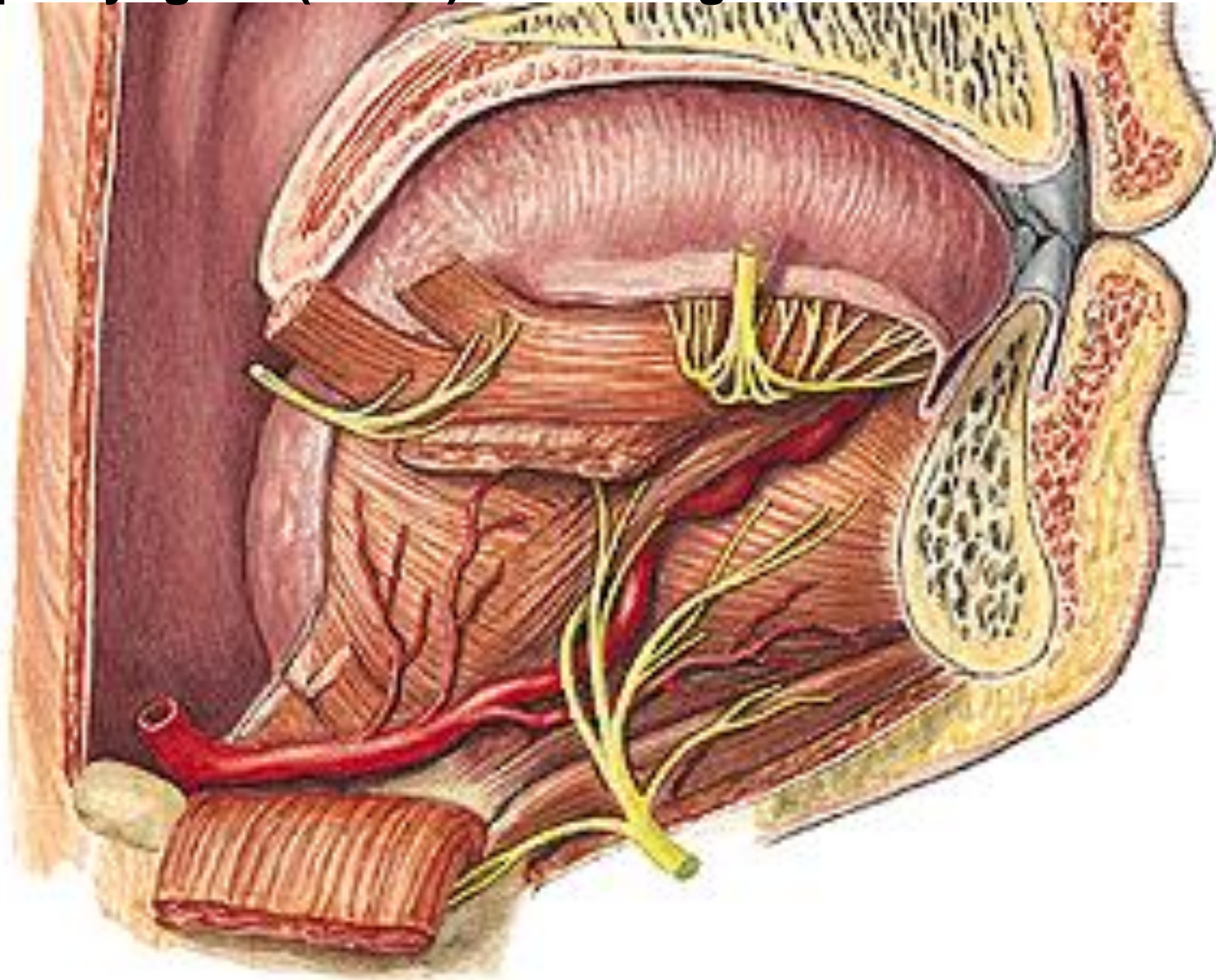


**N. lingualis**

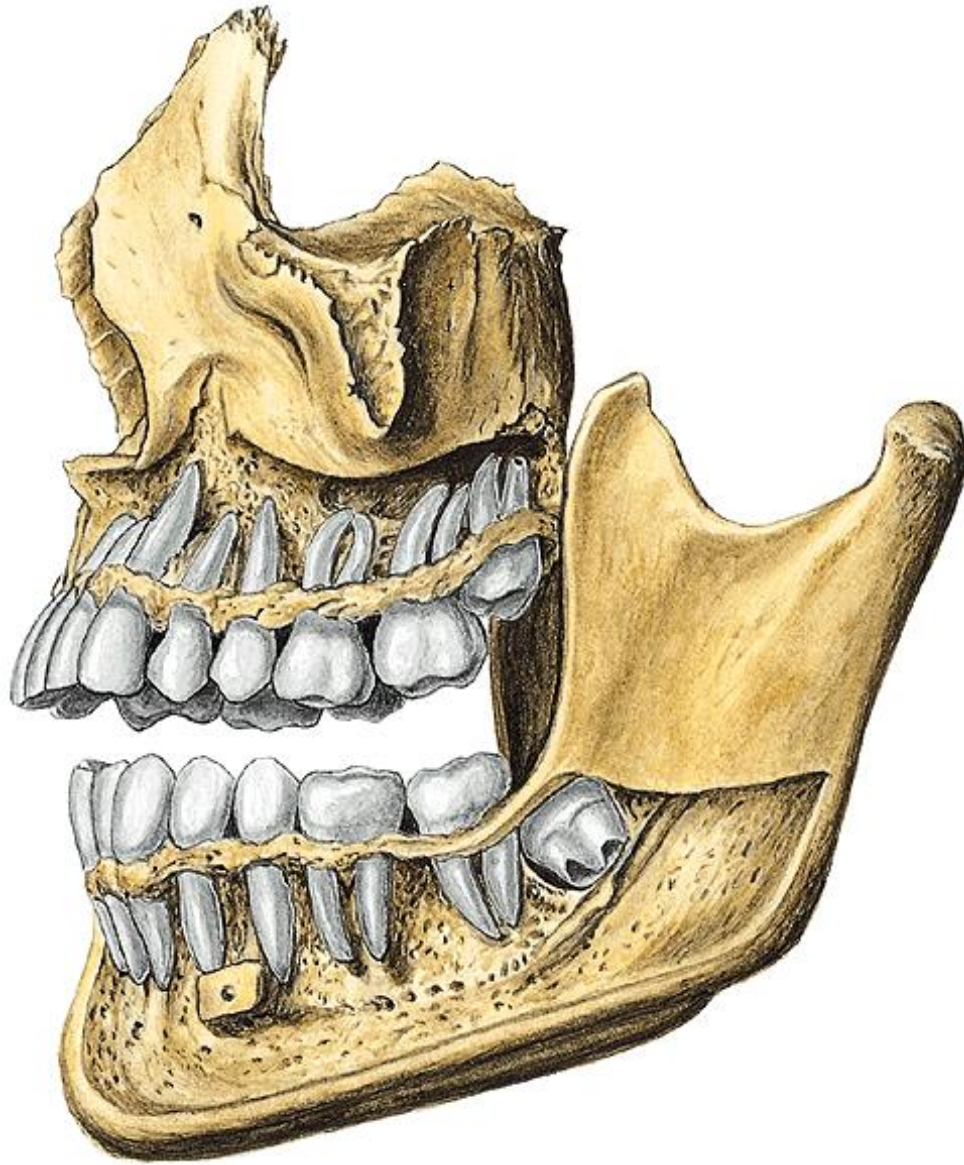
**N. glossopharyngeus (CN IX)**

**N. hypoglossus (CN XII)**

**A. lingualis**



# Dentes

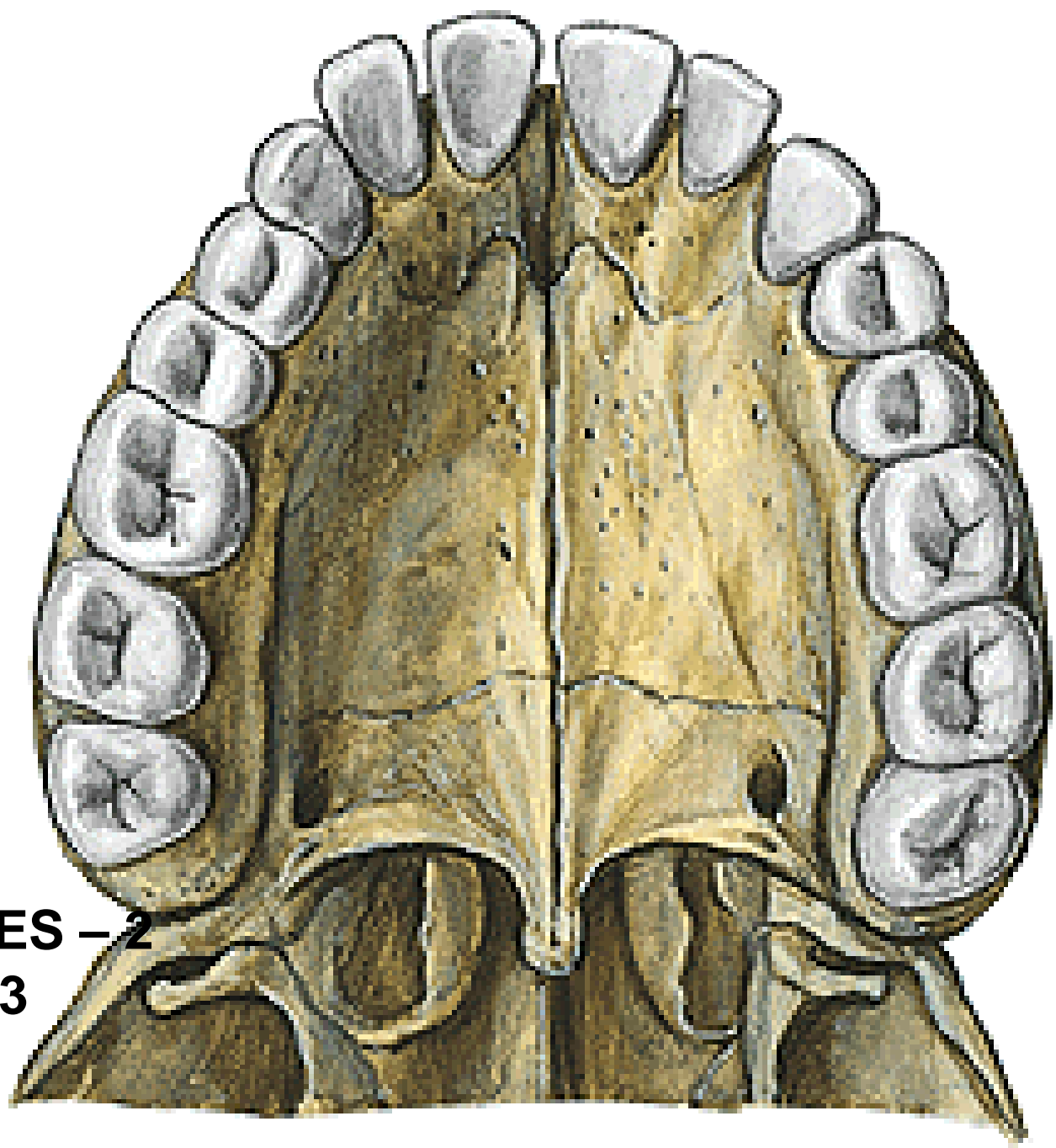


## Dentition

- first dentition (primary, milk)
- mixed
- permanent (second)

**DENTES  
PERMANENTES**

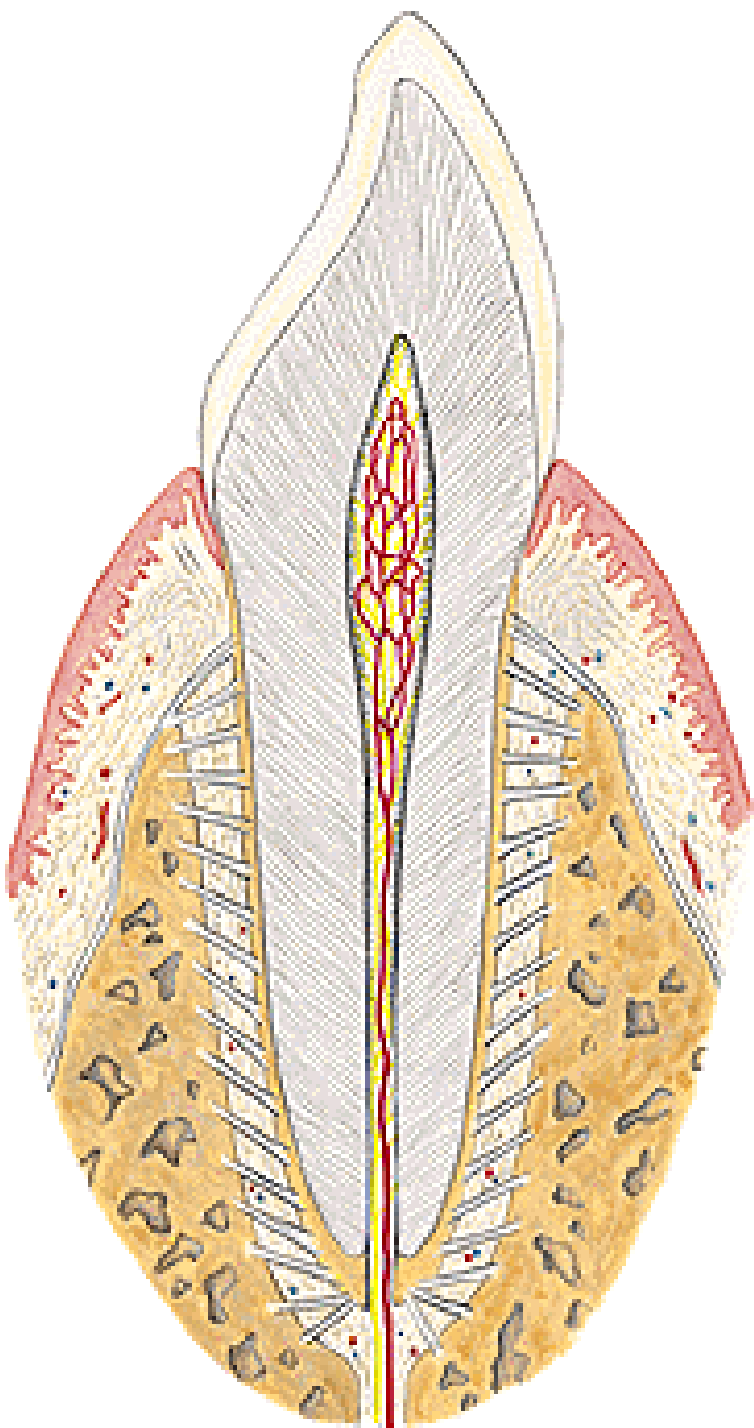
**DENTES INCISIVI - 2**  
**DENS CANINUS - 1**  
**DENTES PREMOLARES - 2**  
**DENTES MOLARES - 3**



**CORONA DENTIS**

**COLLUM DENTIS**

**RADIX DENTIS**



## **CORONA:**

### **Facies occlusalis**

- tubercula dentalia

### **Facies approximales**

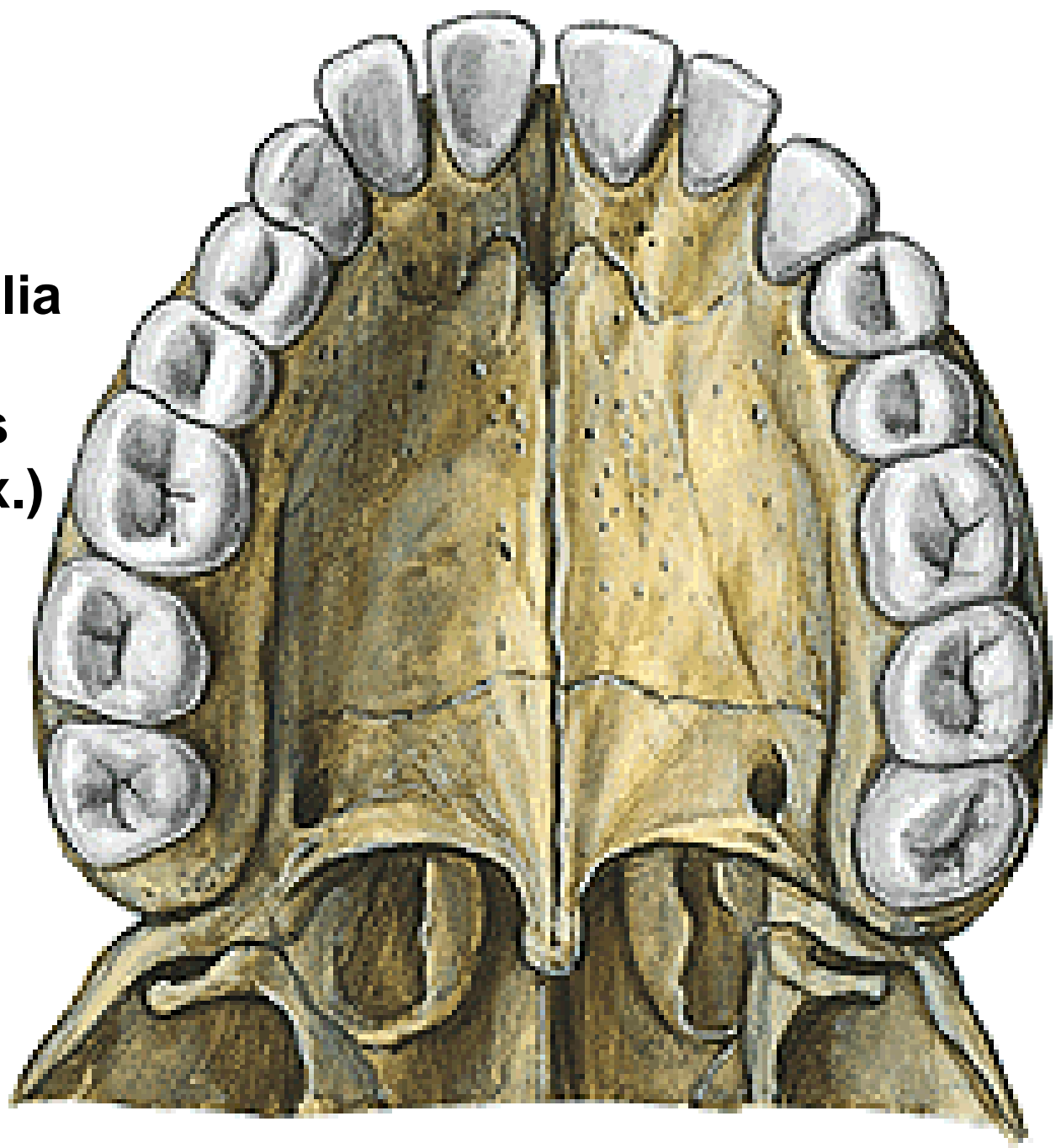
- f. mesialis (prox.)
- f. distalis

### **Facies vestibularis**

- f. labialis
- f. buccalis

### **Facies oralis**

- f. palatina
- f. lingualis



**CAVUM DENTIS**

**CANALIS RADICIS DENTIS**

**FORAMEN APICIS DENTIS**

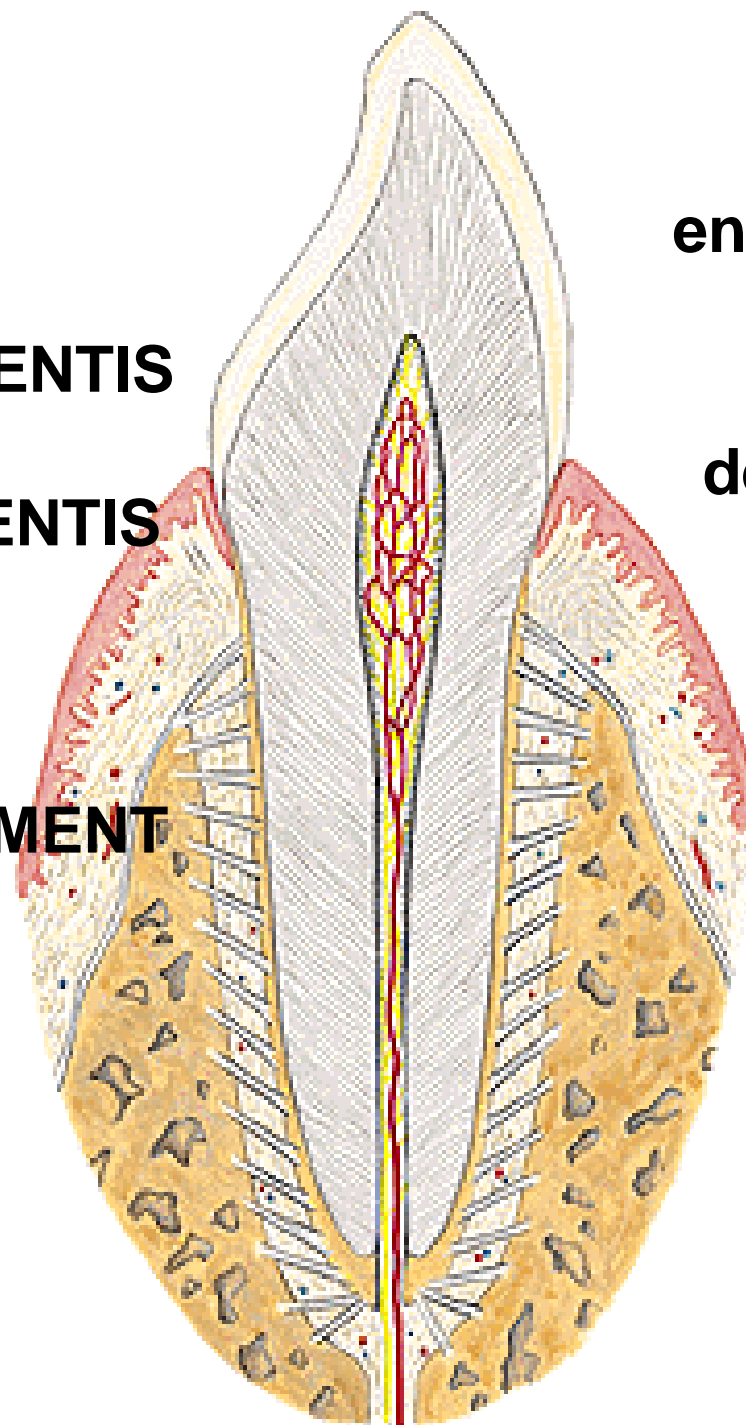
**GOMPHOSIS**

**PERIODONTAL LIGAMENT  
(P. MEMBRANE;  
PARODONTIUM)  
Sharpey's fibers**

**enamelum**

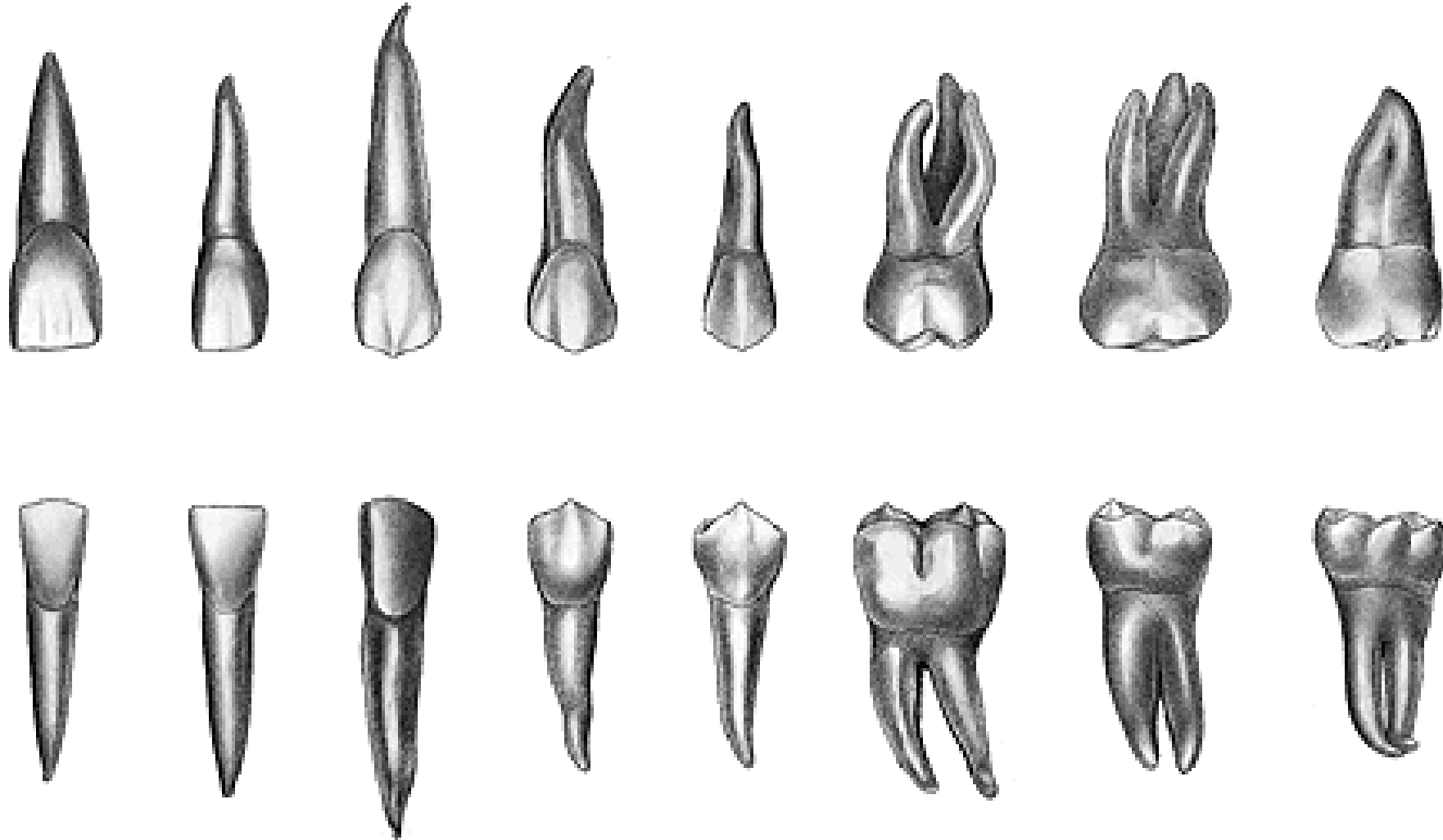
**dentinum**

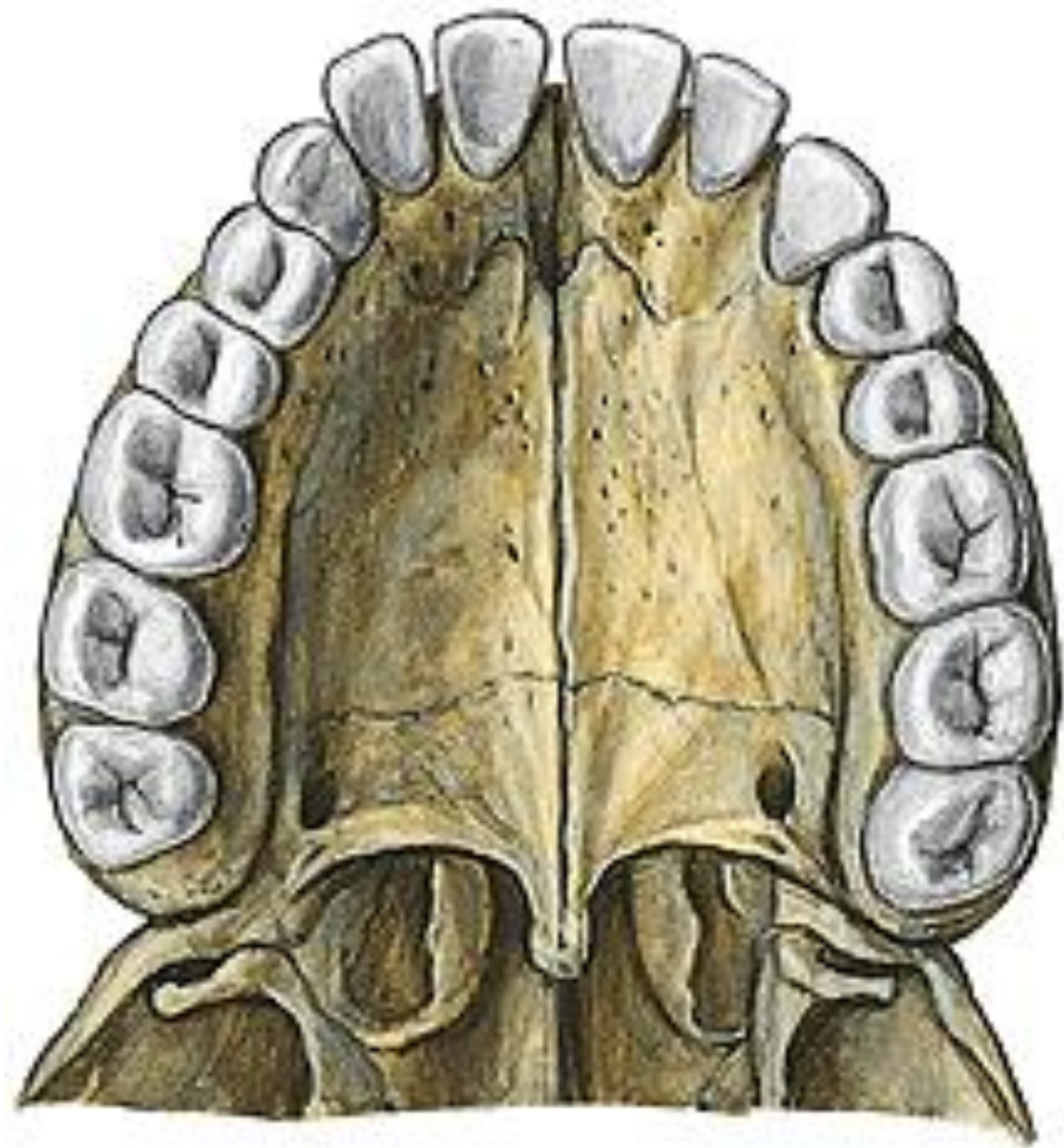
**cementum**



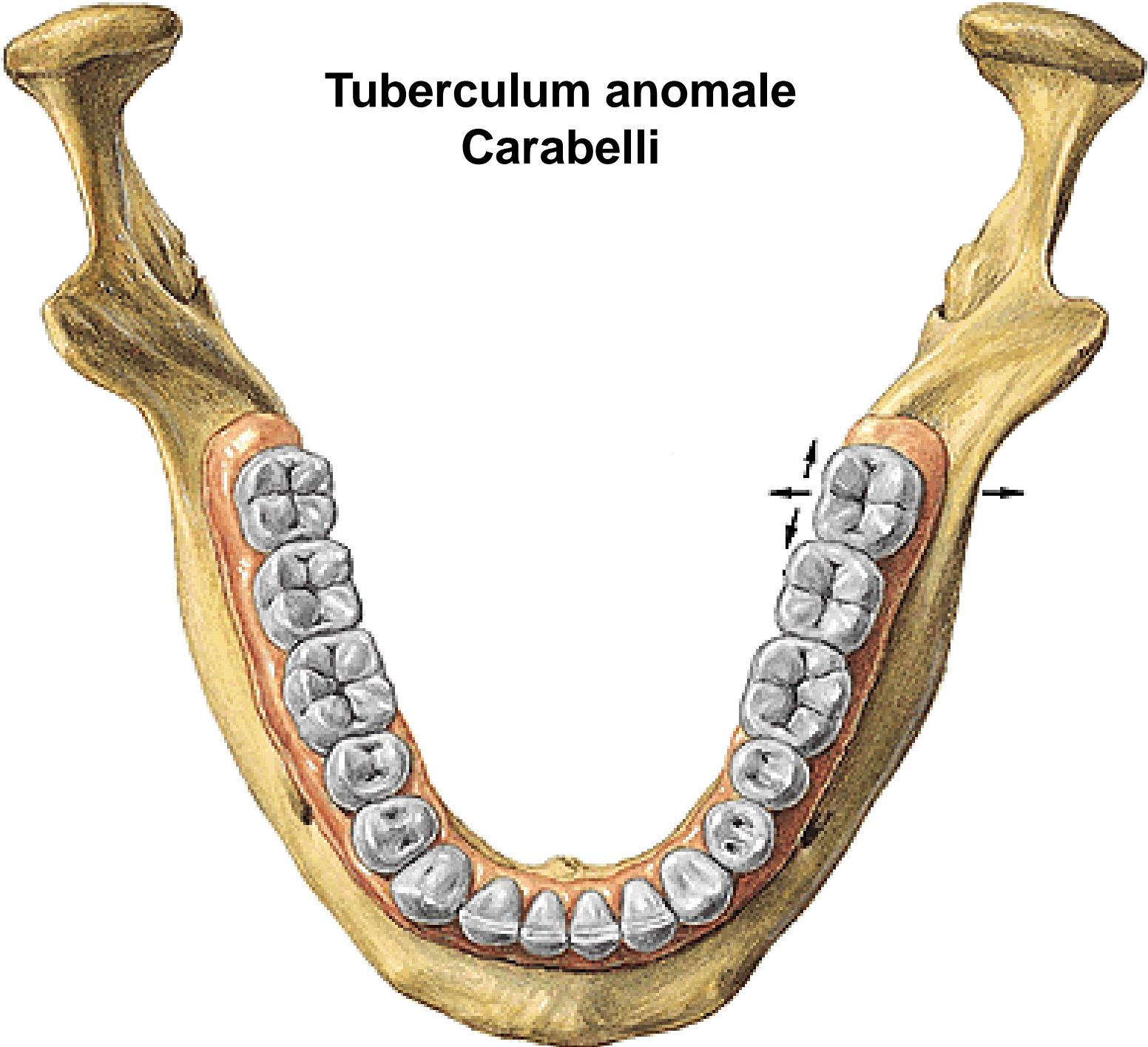


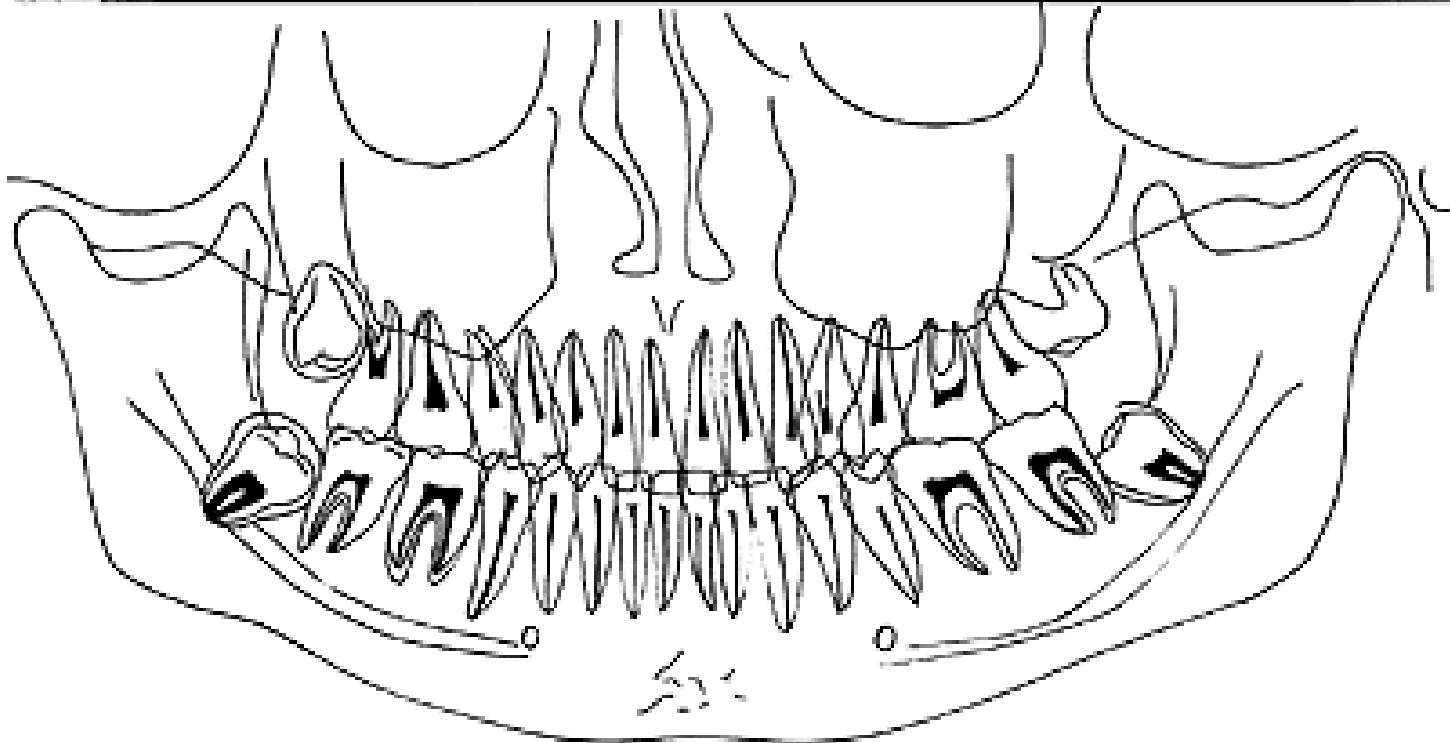
**DENTES INCISIVI - 2**  
**DENS CANINUS - 1**  
**DENTES PREMOLARES - 2**  
**DENTES MOLARES - 3**





**Tuberculum anomale  
Carabelli**

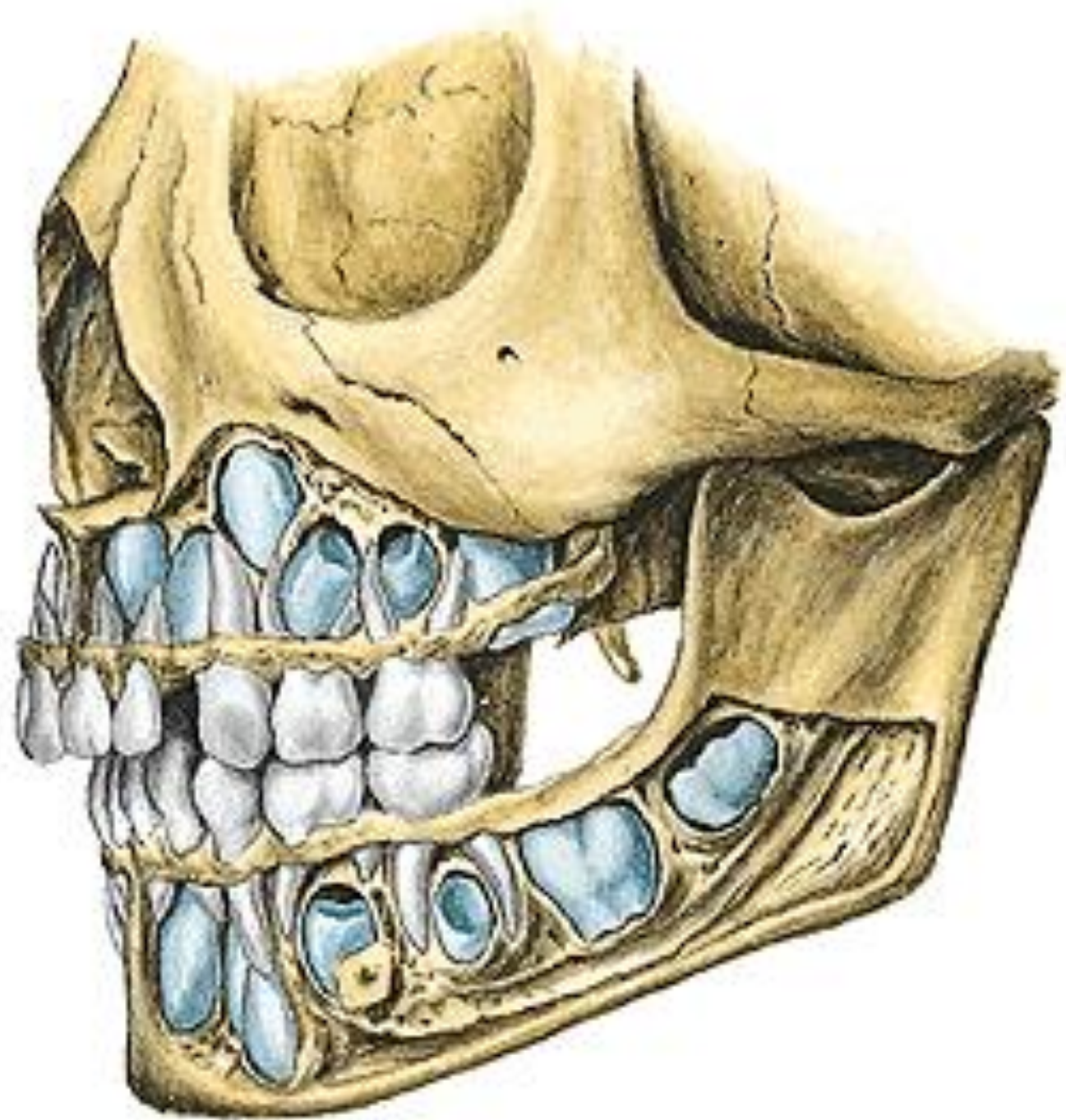




**DENTES INCISIVI - 2**  
**DENS CANINUS - 1**  
**DENTES MOLARES - 2**

**DENTES DECIDUI**





## **Eruption:**

**I 6<sup>th</sup>- 8<sup>th</sup> month**

**II 8<sup>th</sup>-12<sup>th</sup> month**

**III 16<sup>th</sup>-20<sup>th</sup> month**

**IV 12<sup>th</sup>-16<sup>th</sup> month**

**V 20<sup>th</sup>-36<sup>th</sup> month**

**I, II, IV, III, V**

## **Exchange of the teeth:**

**1 7<sup>th</sup>-8<sup>th</sup> year**

**2 8<sup>th</sup>-9<sup>th</sup> year**

**3 11<sup>th</sup>-13<sup>th</sup> year**

**4 9<sup>th</sup>-11<sup>th</sup> year**

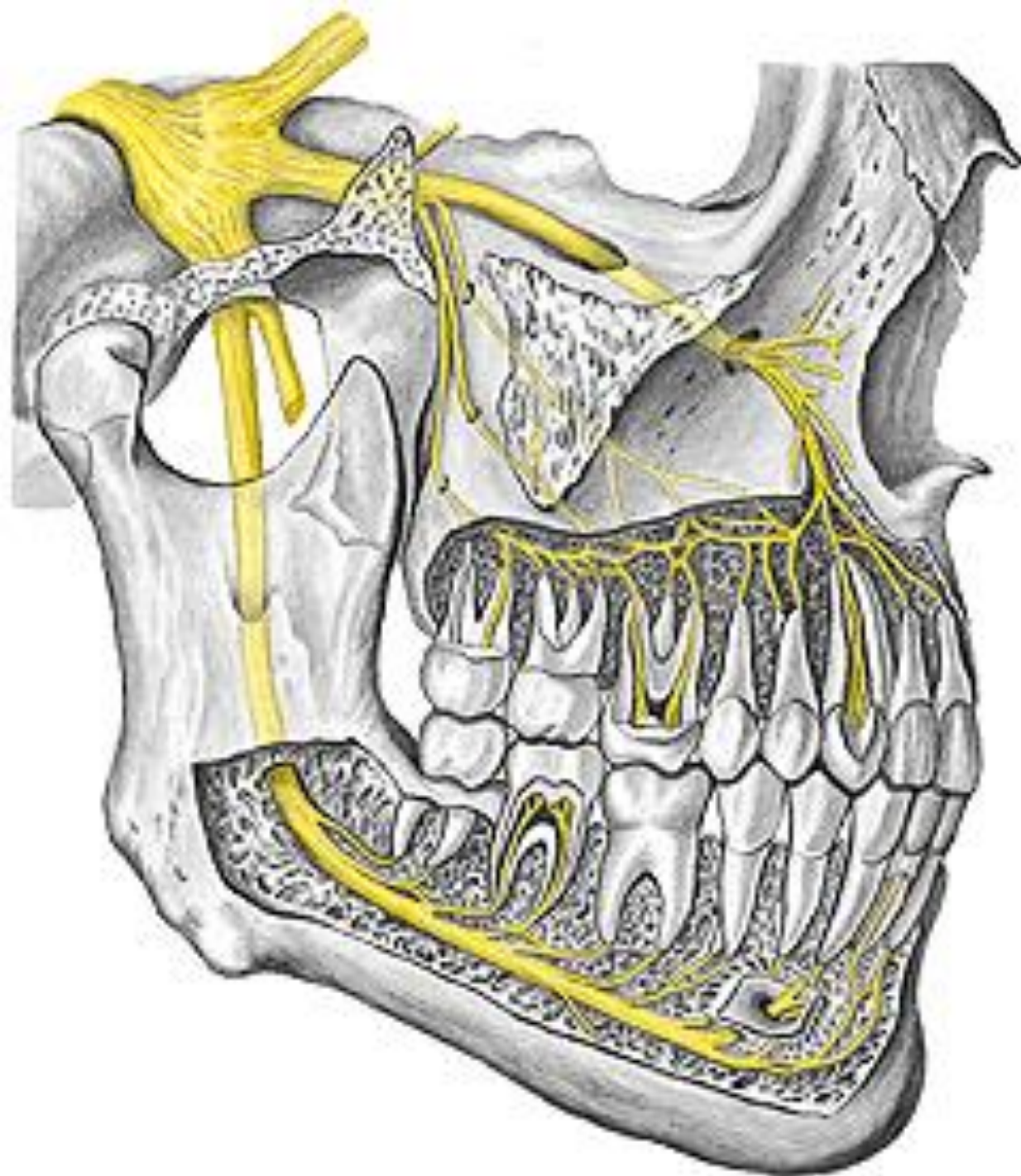
**5 11<sup>th</sup>-13<sup>th</sup> year**

**6 6<sup>th</sup>-7<sup>th</sup> year**

**7 12<sup>th</sup>-14<sup>th</sup> year**

**8 17<sup>th</sup>-40<sup>th</sup> year**

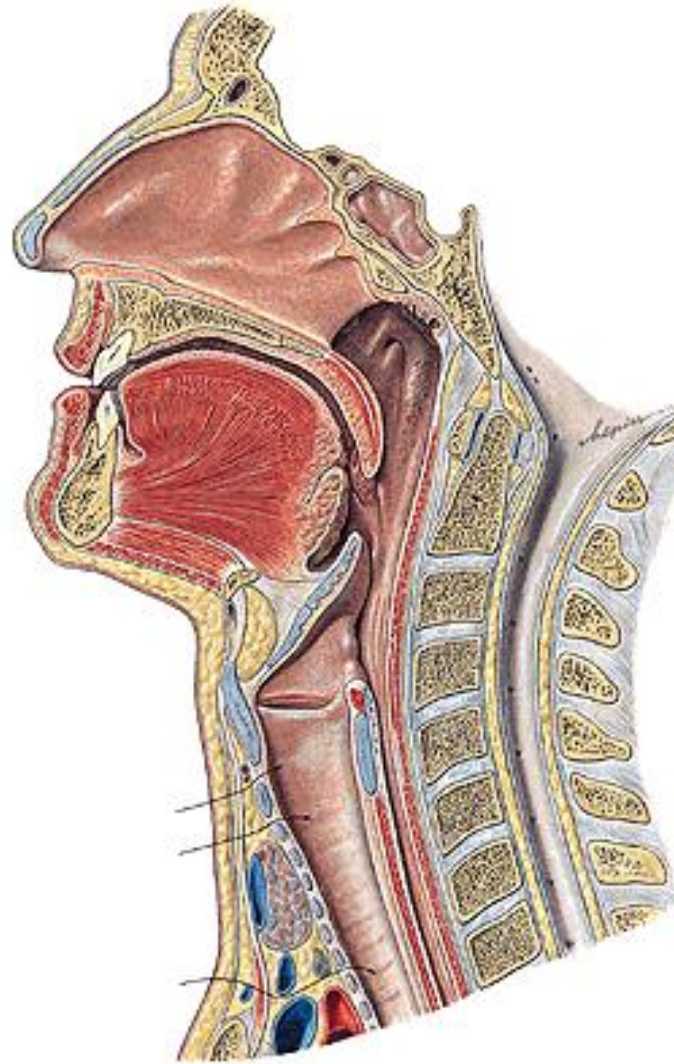
**6, 1, 2, 4, 3, 5, 7, 8**

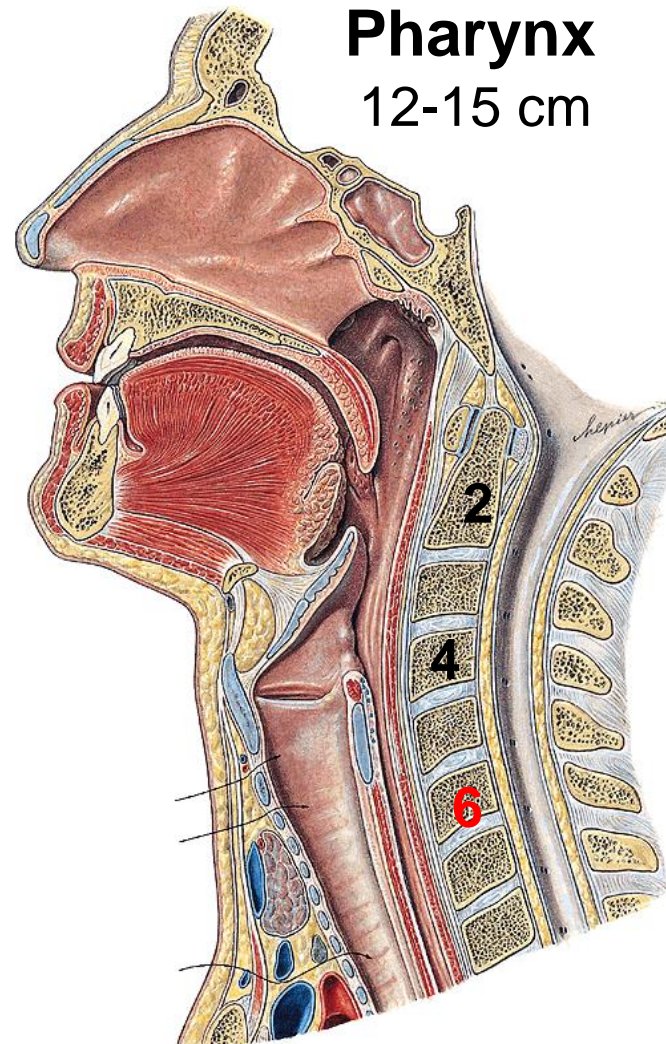




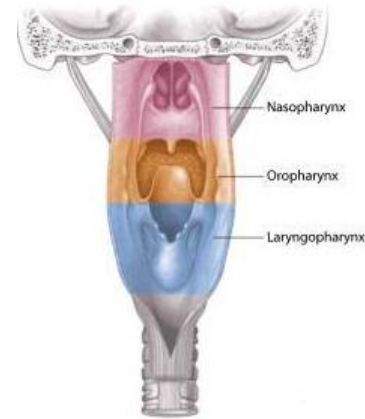
# PHARYNX

Fornix pharyngis  
Cavum pharyngis





**Pharynx**  
12-15 cm

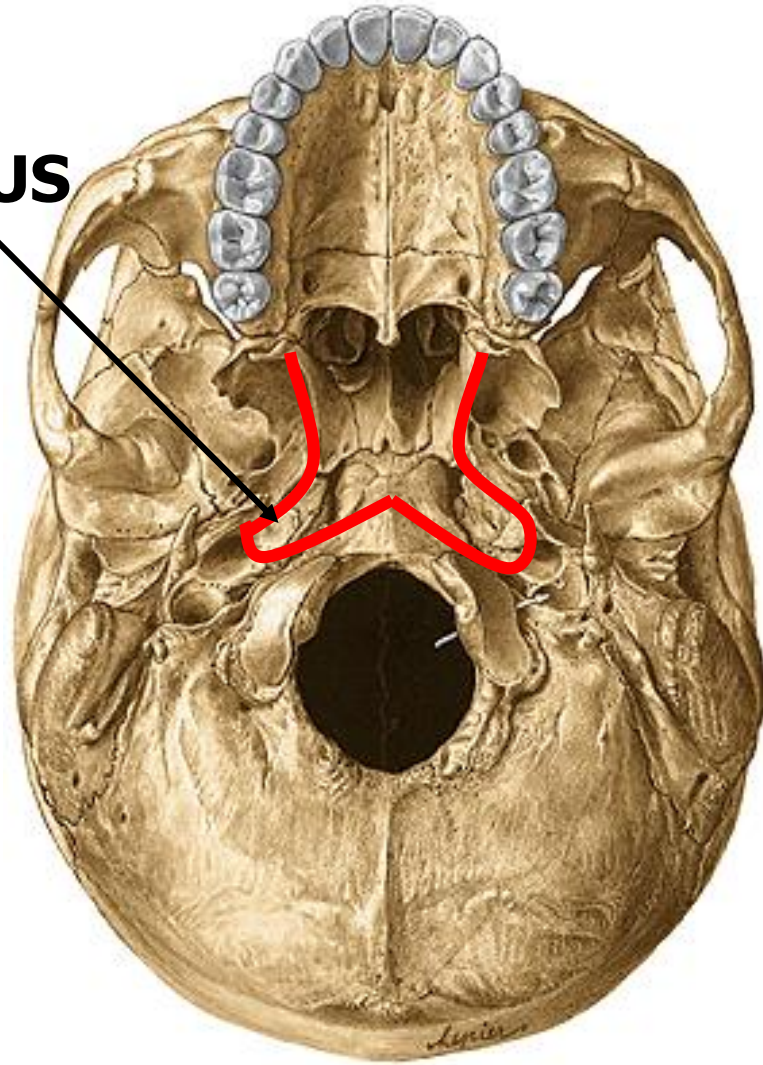


**Nasopharynx**  
Choanae

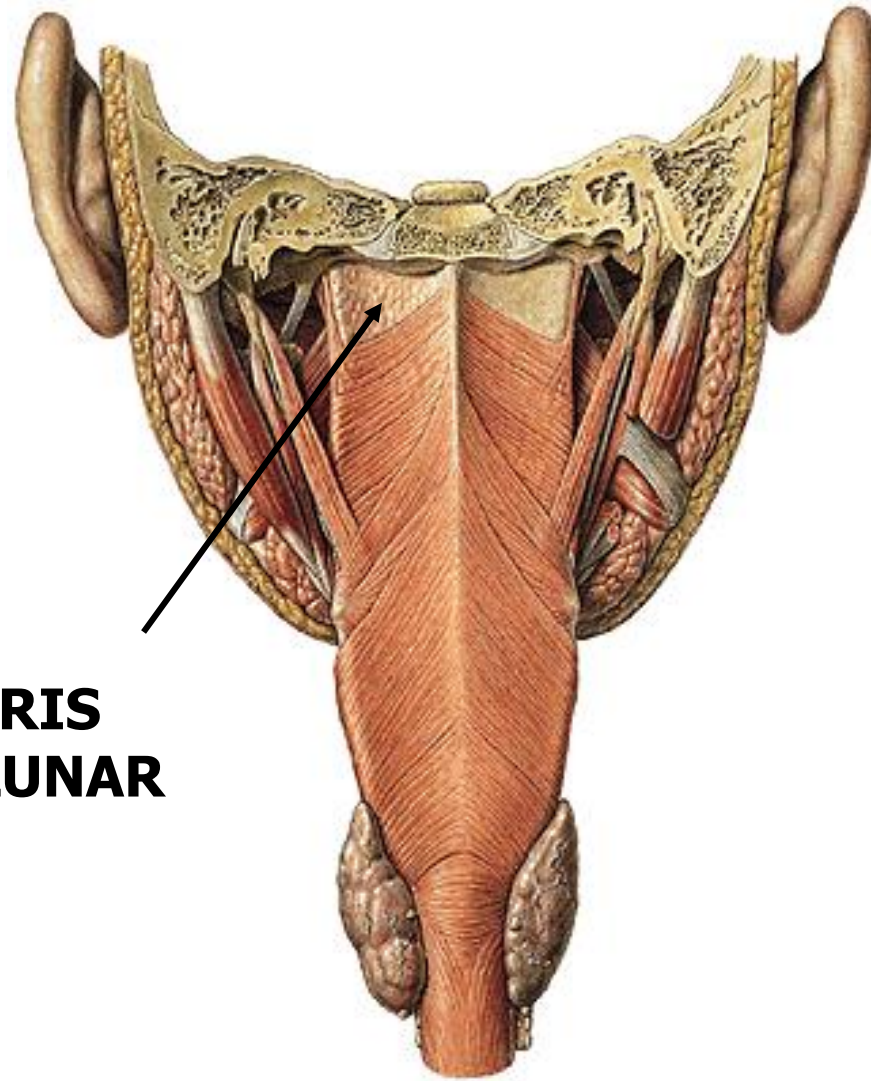
**Oropharynx**  
Isthmus faucium

**Laryngopharynx**  
Aditus laryngis

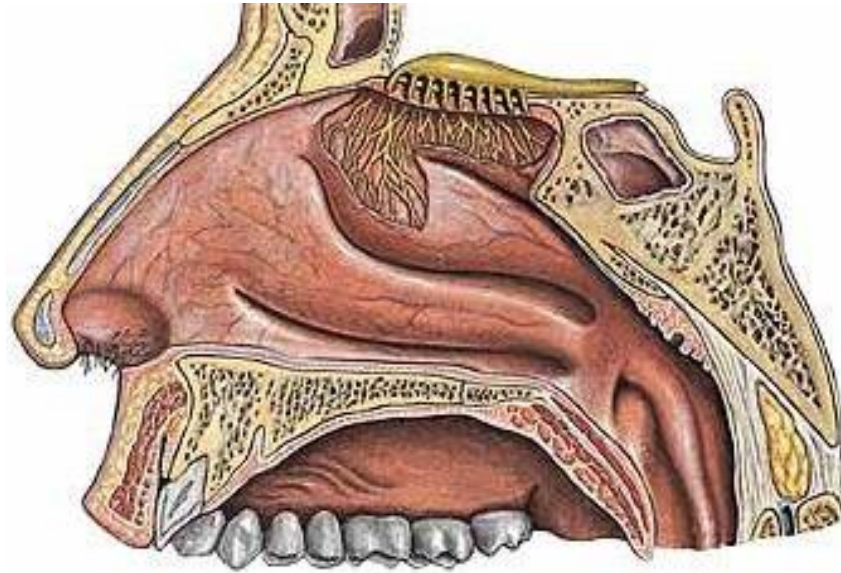
**RECESSUS  
PHARYNGEUS**



**FASCIA  
PHARYNGOBASILARIS  
(LUSCHKA'S SEMILUNAR  
SPACE)**



## Nasopharynx



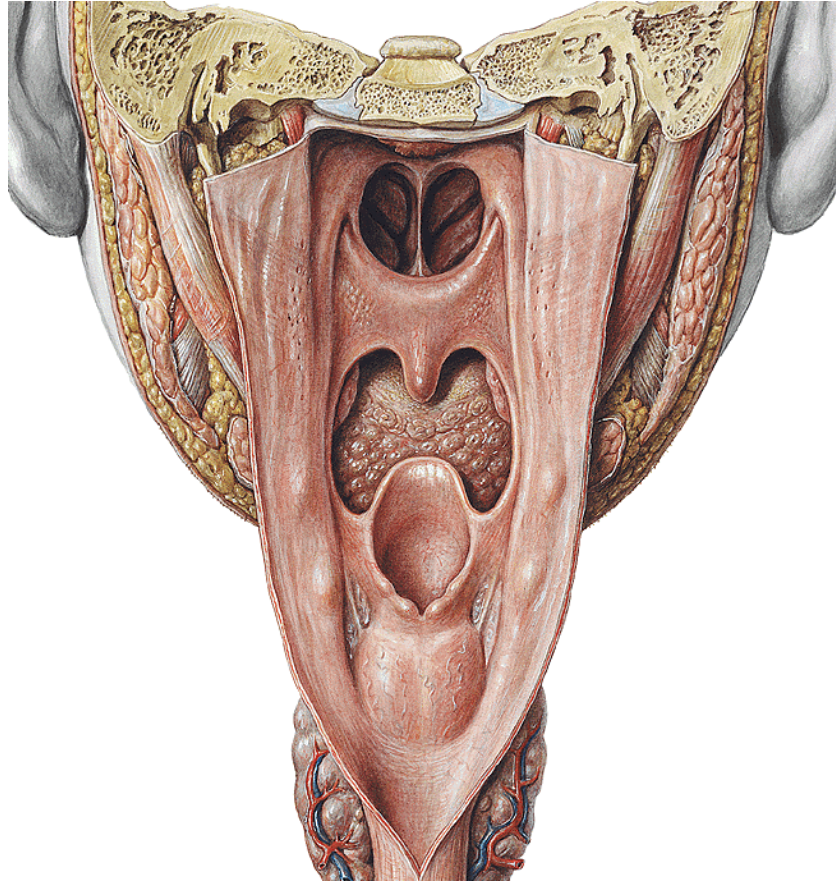
**Tonsilla pharyngea**

**Ostium phar. tubae auditivae, Tonsilla tubaria**

Torus tubarius (Plica salpingopharyngea )

Torus levatorius

Plica salpingopalatina



## **Nasopharynx**

Choanae

## **Oropharynx**

Isthmus faucium

Tonsilla palatina

## **Laryngopharynx**

Epiglottis

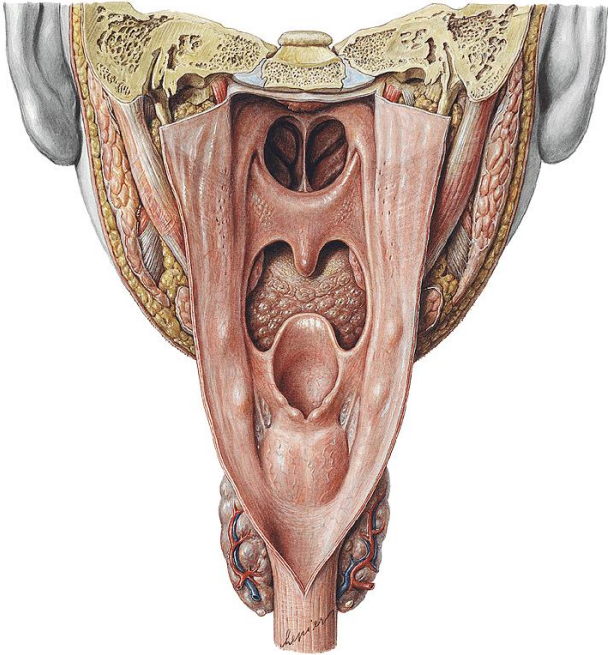
Plicae aryepiglotticae

Incisura interaryt.

Recessus piriformis

Plica n. laryngei

# Waldeyer's lymphoepithelial ring



T.pharyngea

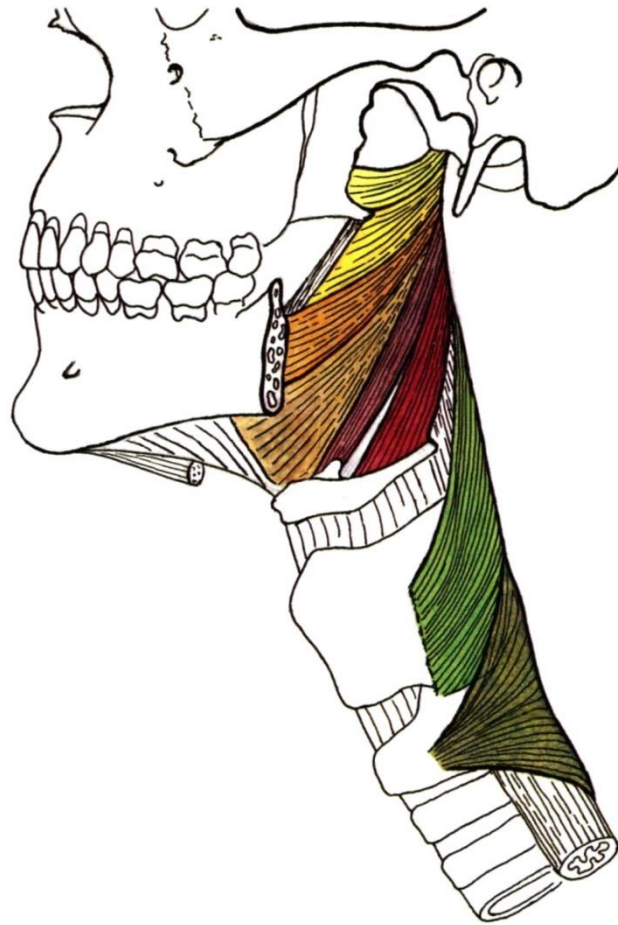
T.tubaria

T.tubaria

T.palatina

T.palatina

T.lingualis



raphe pharyngis



**Mm.  
constrictores**

Superius

- p. pterygo-
- p. bucco-
- p. mylo-
- p. glosso-

Medius

- p. chondro-
- p. cerato-

Inferius

- p. thyro-
- p. crico-

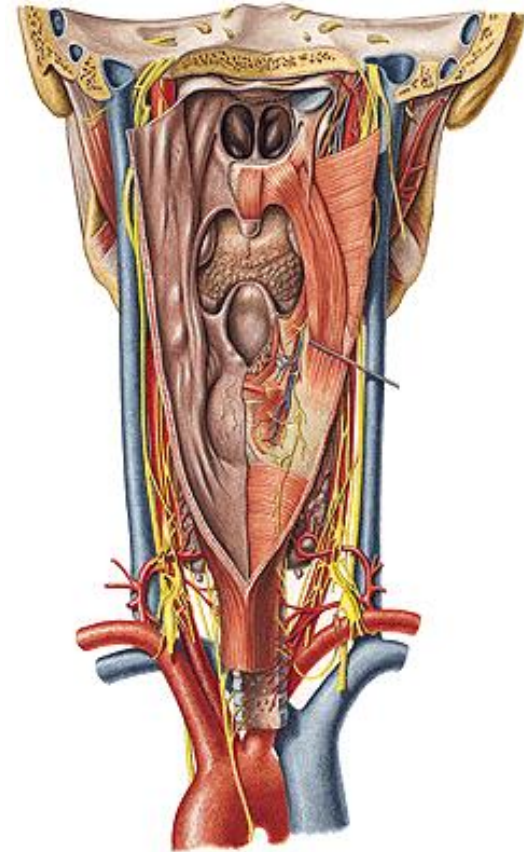
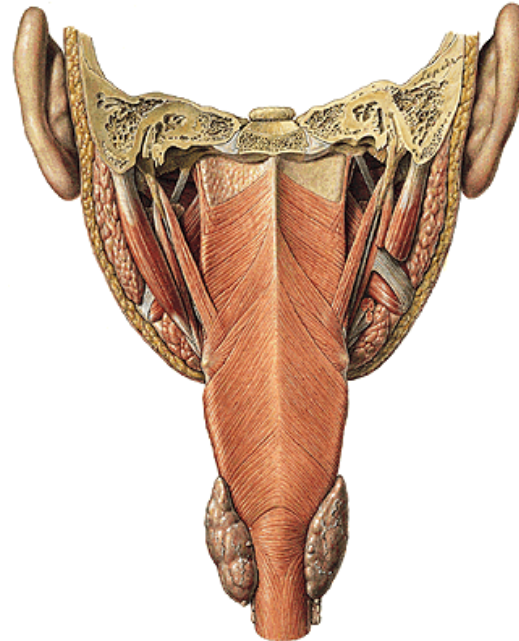
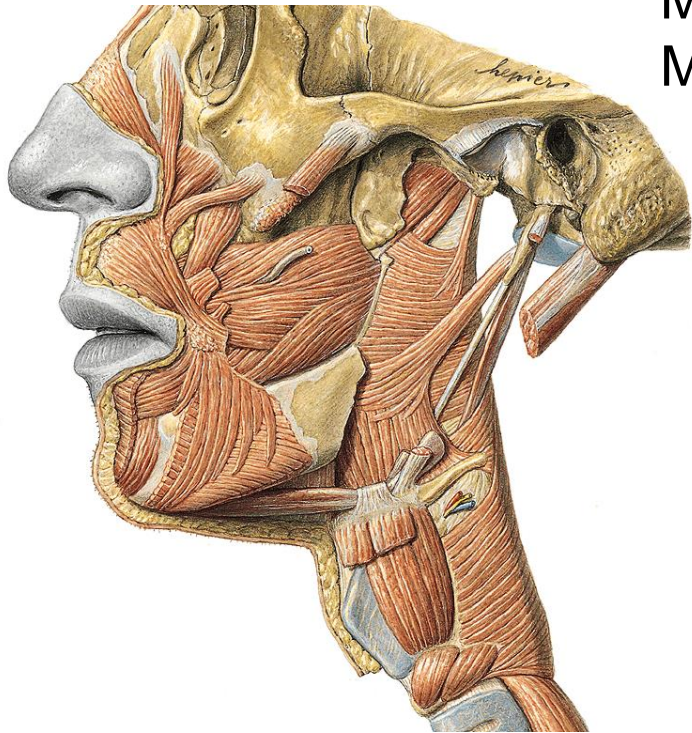


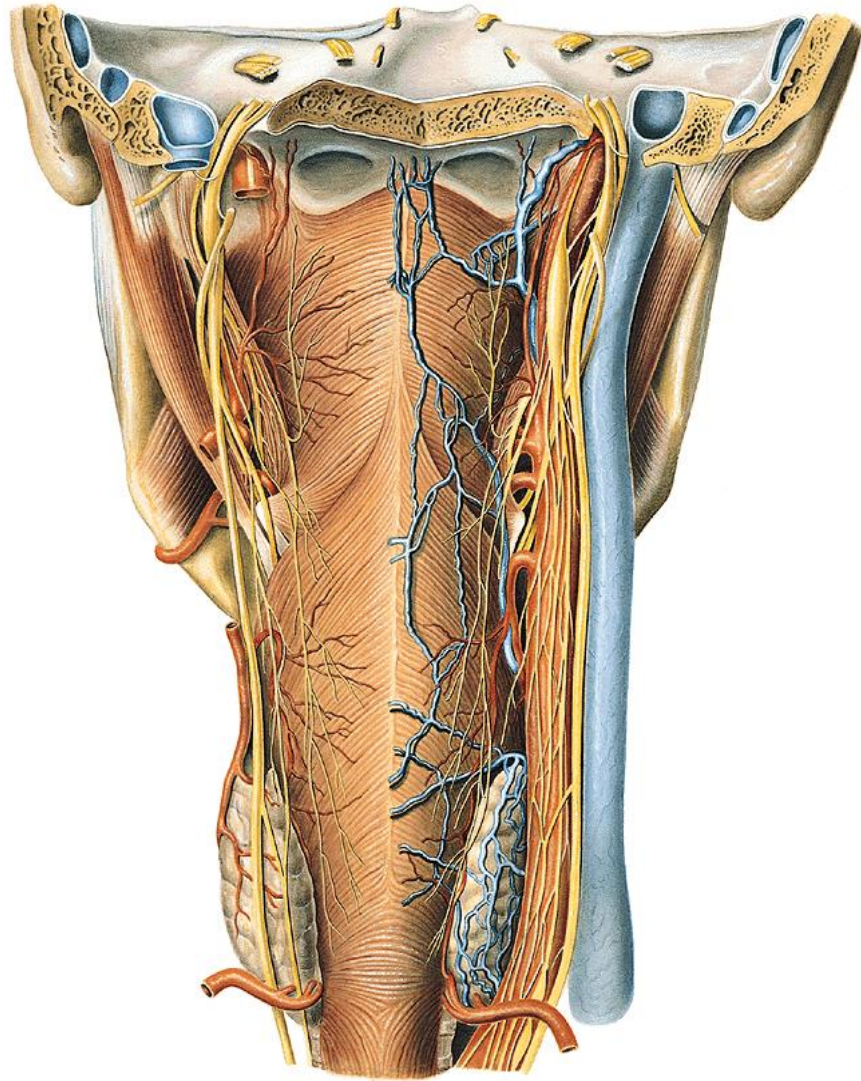
## LEVATORS

M. stylopharyngeus

M. palatopharyngeus

M. salpingopharyngeus

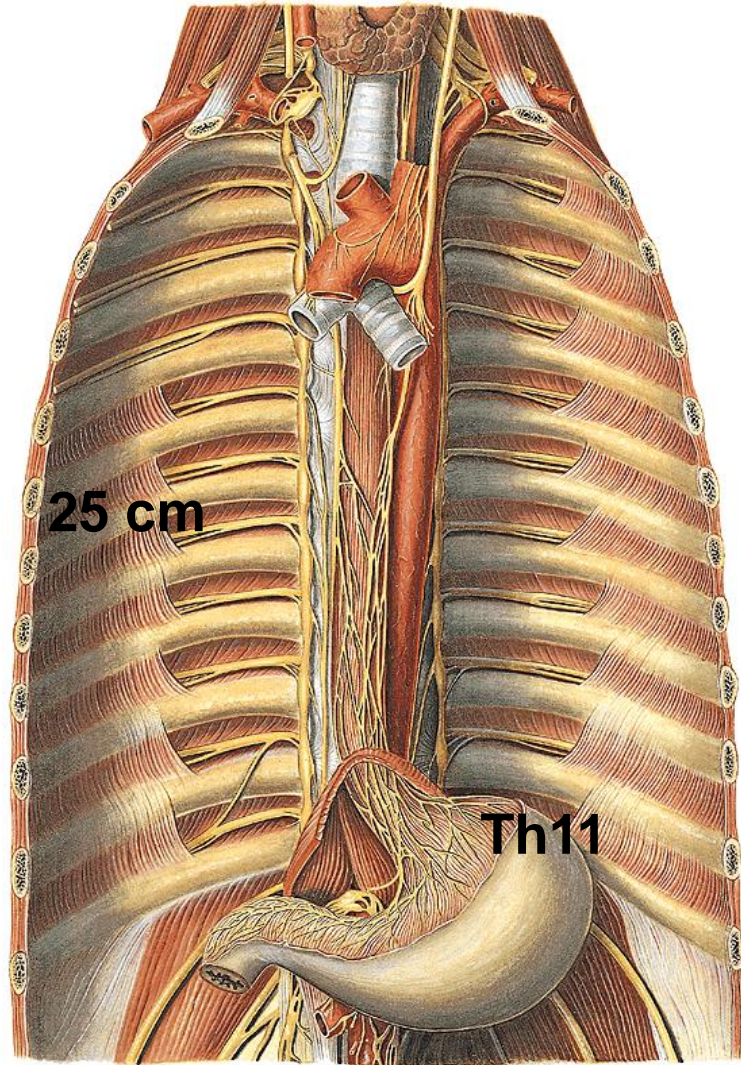




**Spatium  
parapharyngeum**

**Spatium  
retropharyngeum**

**LIG. RETROPHARYNGEUM  
MEDIANUM**



## Oesophagus

### Pars:

**cervicalis** (6cm)

- apertura thoracis sup.

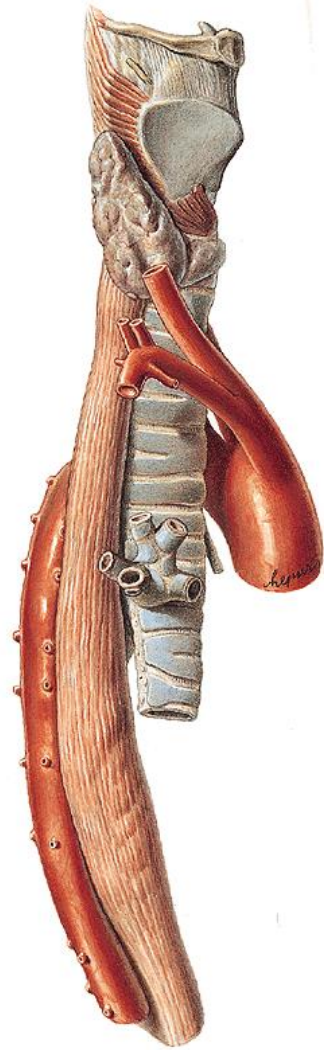
**thoracica** (15-20cm)

- PARS RETROTRACHEALIS

- PARS RETROPERICARDIACA

- diaphragm

**abdominalis** (1-2cm)

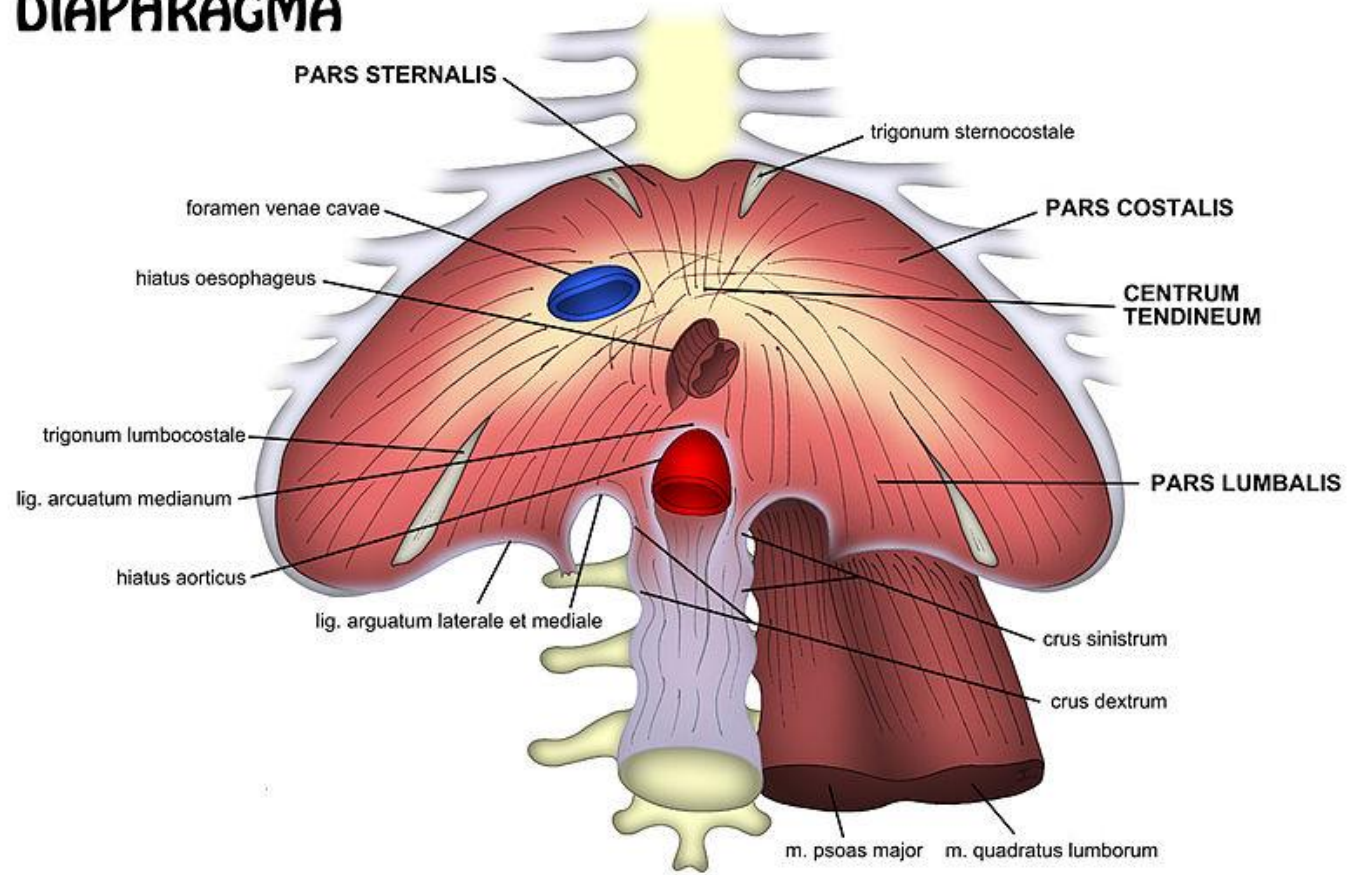


**Curvatures**  
in sagittal plane  
In frontal plane

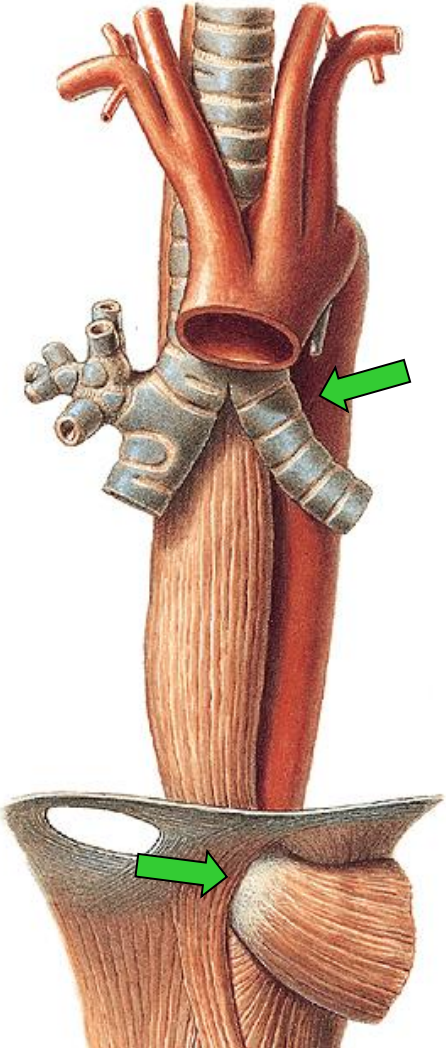
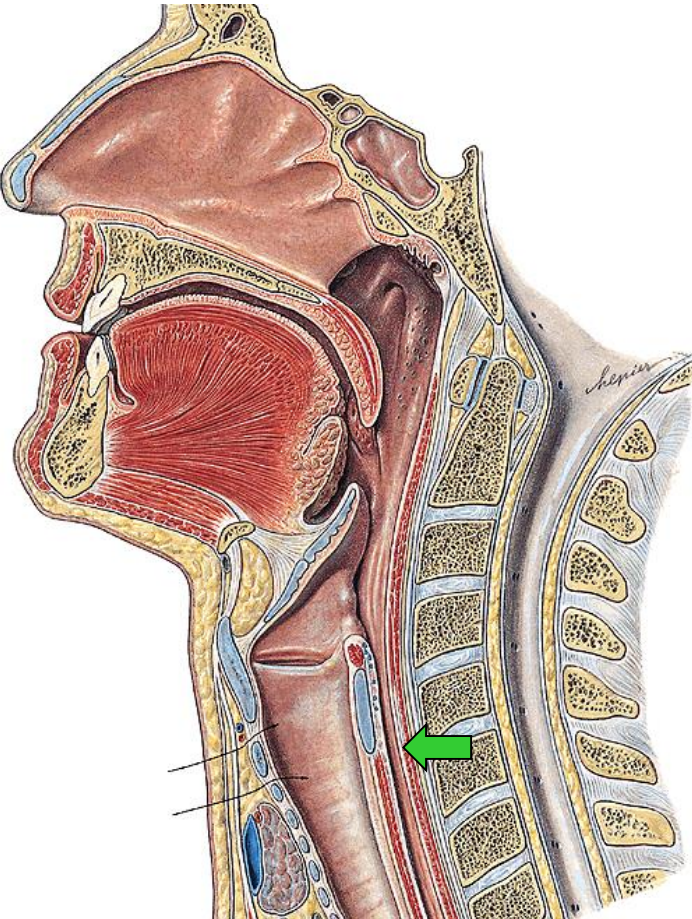
**Connection to aorta  
thoracica**



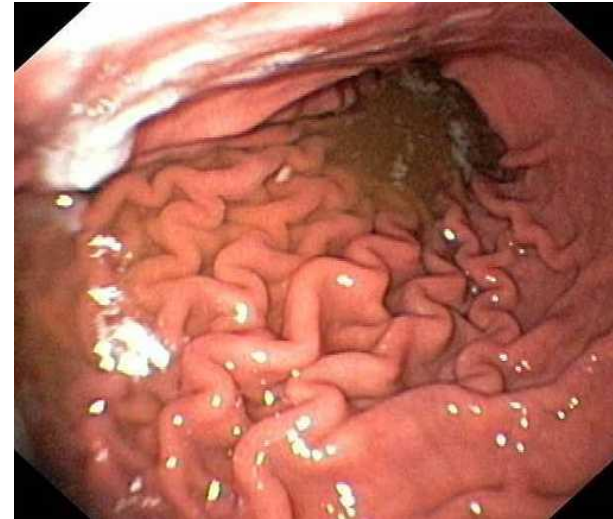
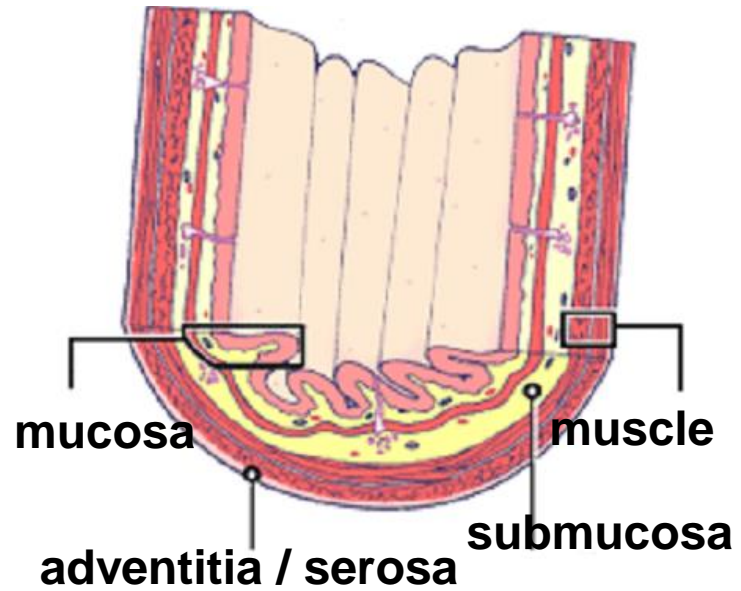
# DIAPHRAGMA



# ESOPHAGEAL CONSTRICTIONS



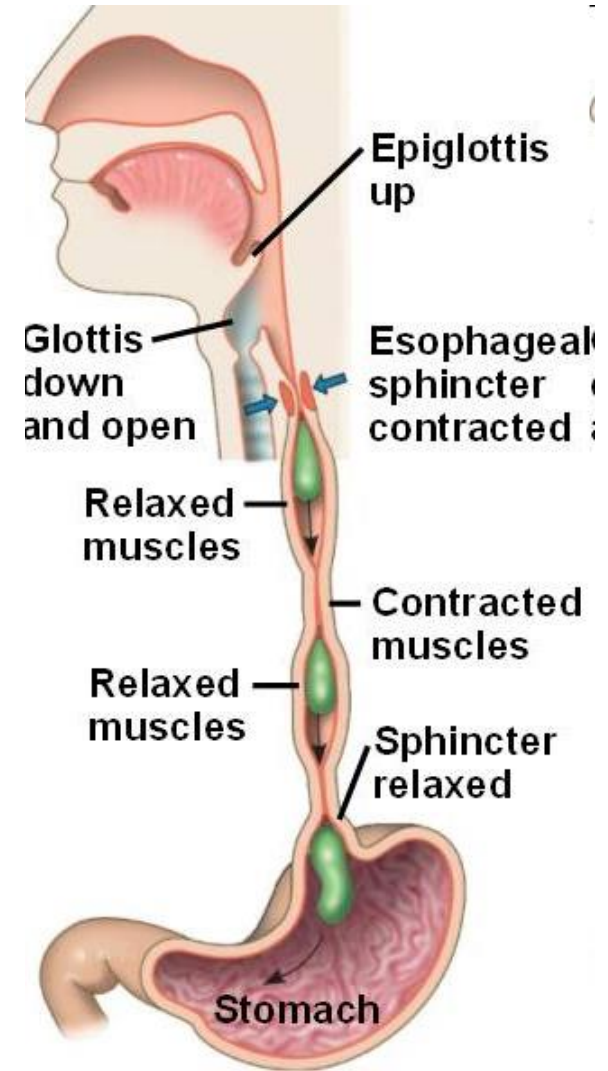
## Structure of the esophagus



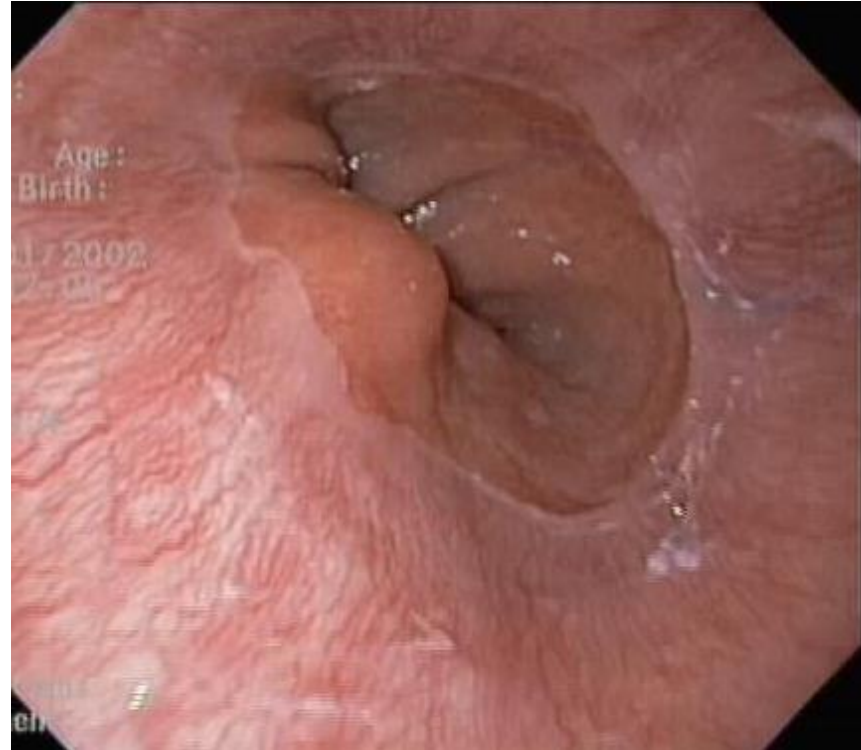
Reserve folds>  
Star shape section

## muscle

- striated
- mixed
- smooth (sphincter)



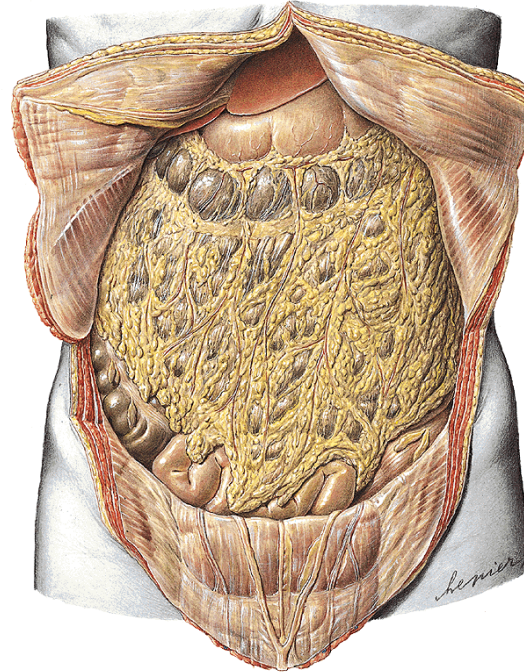
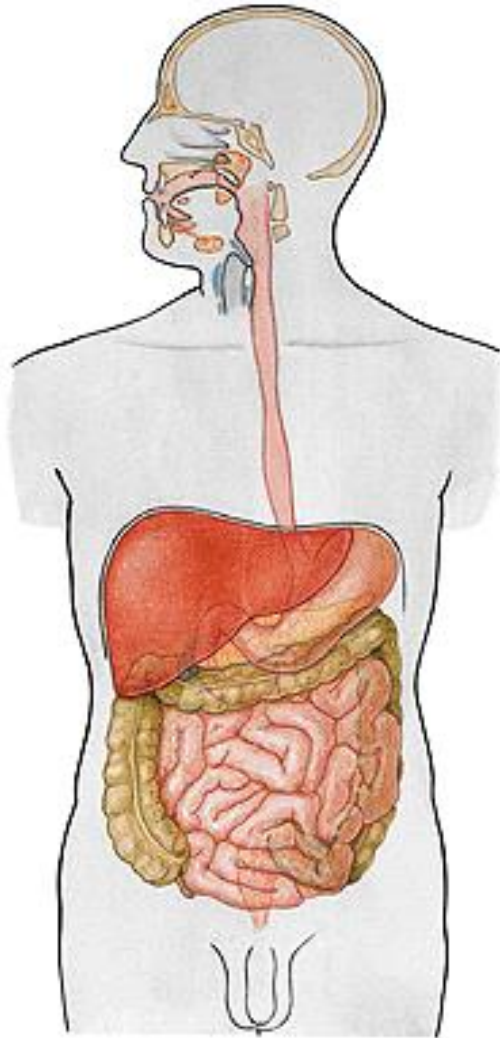




- **Transitional epithelium–oesophagus and stomach**
- GASTROOESOPHAGEAL JUNCTION

• OESOPHAGOGRAPHY





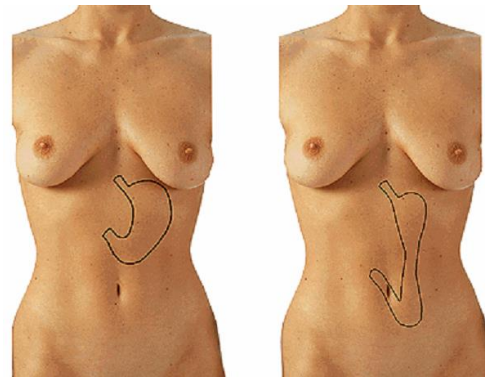
## Ventriculus (gaster)

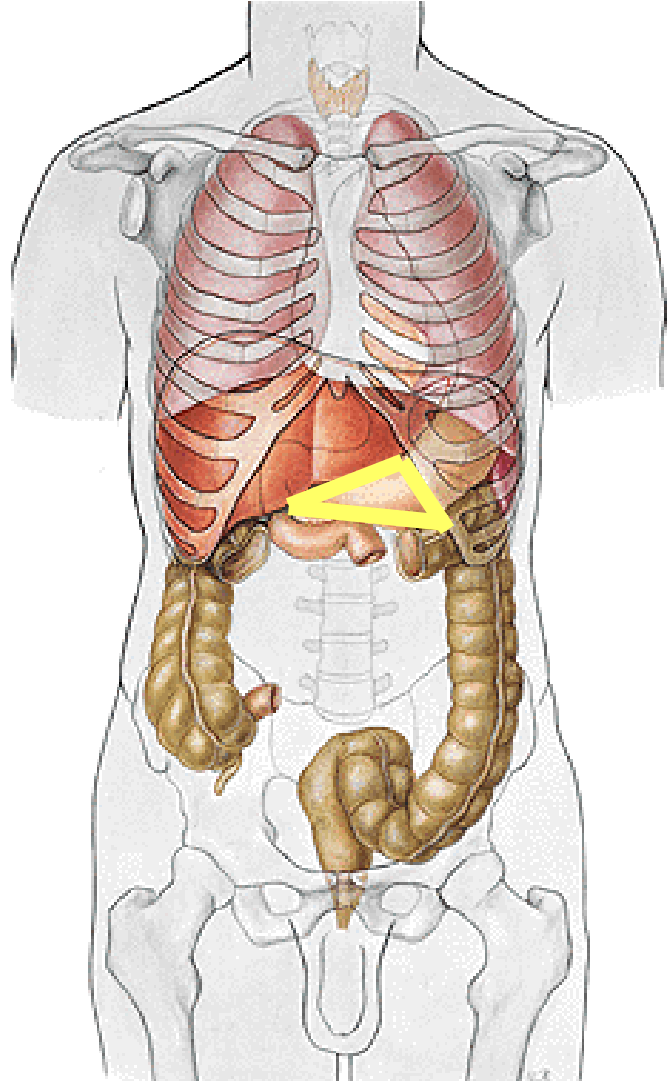
**Localization:**

**peritoneal cavity**

- reg. hypochondriaca  
sin.

**shape**

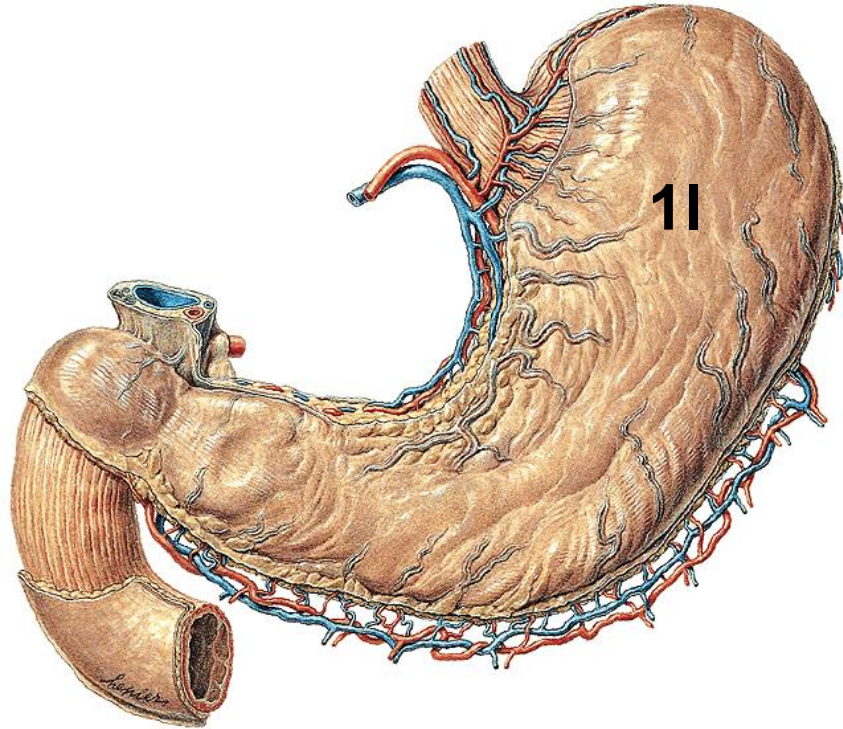




## Projection

### Triangle of Labbeé

- lower margin of the liver
- left arch of the rib
- transpyloric line



**Cardia (Th 11)**

**Pars cardiaca**

**Fundus**

**Corpus**

**Pars pylorica**

**Pylorus (L1-2)**

Paries anterior

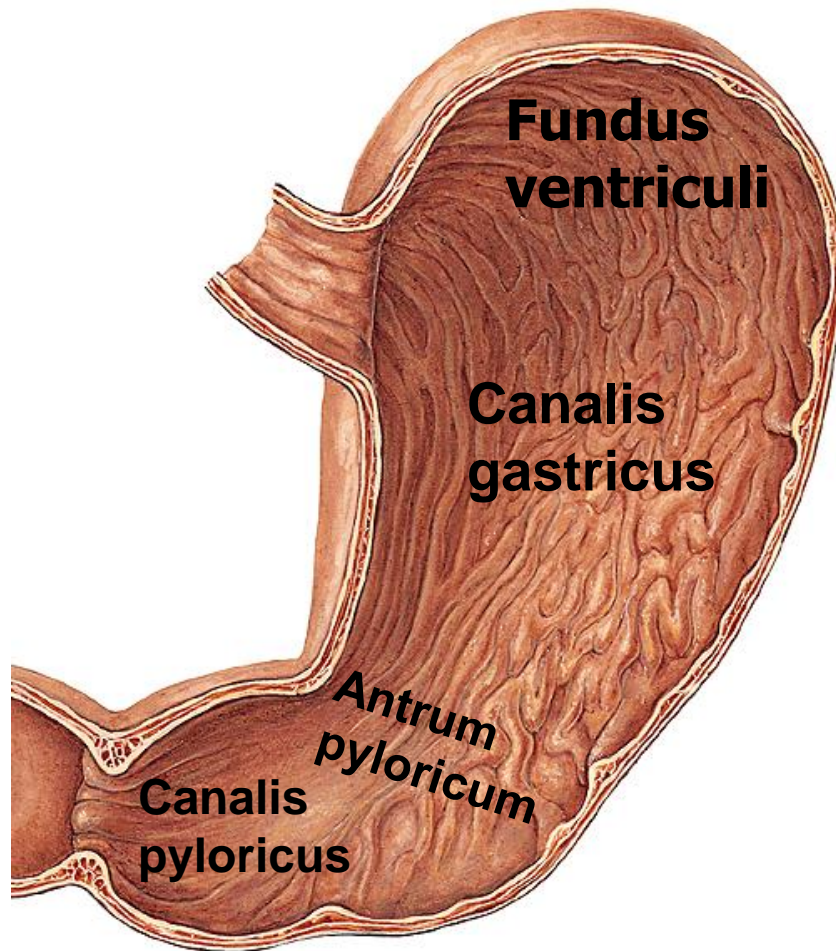
Paries posterior

Curvatura major

Curvatura minor

Incisura cardiaca

Incisura angularis



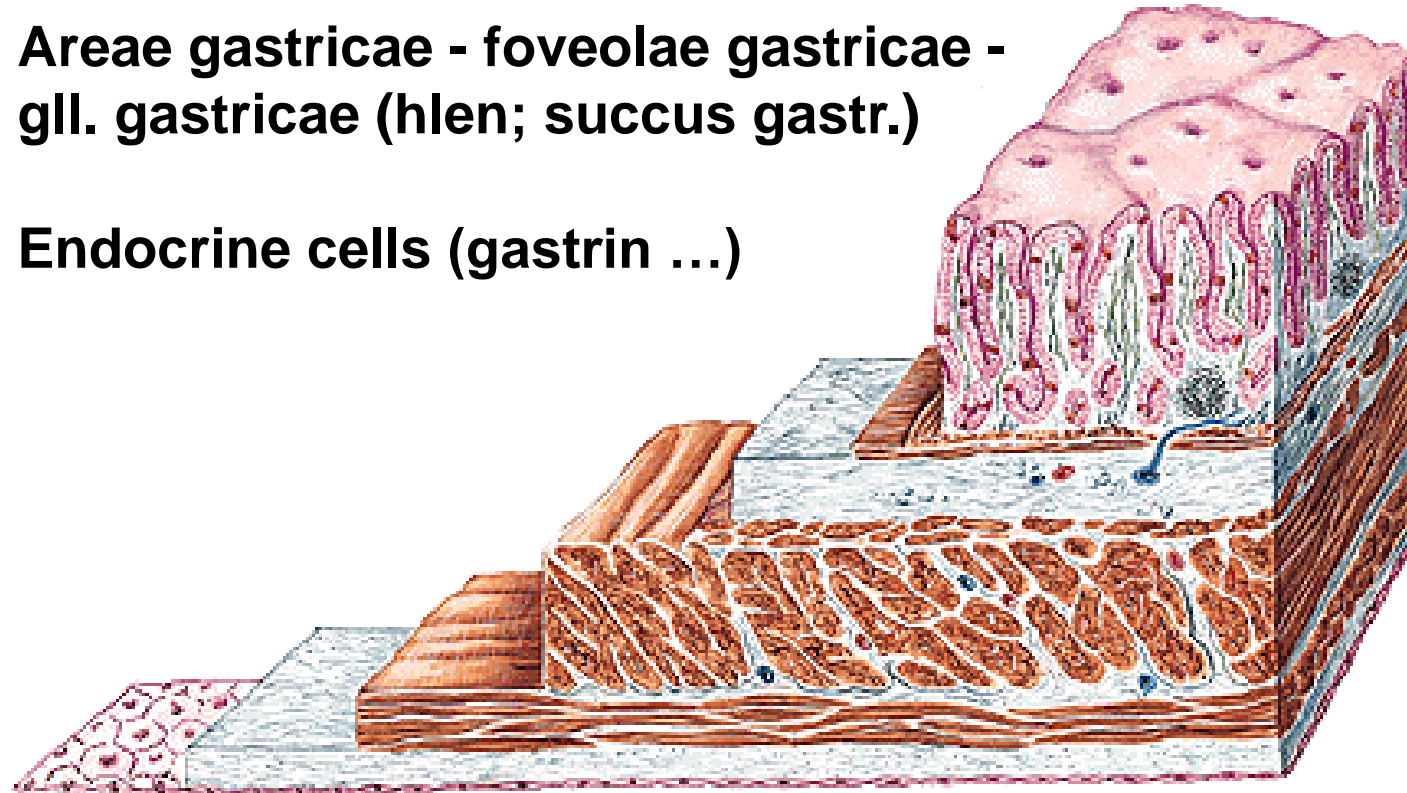
**Ostium cardiacum**

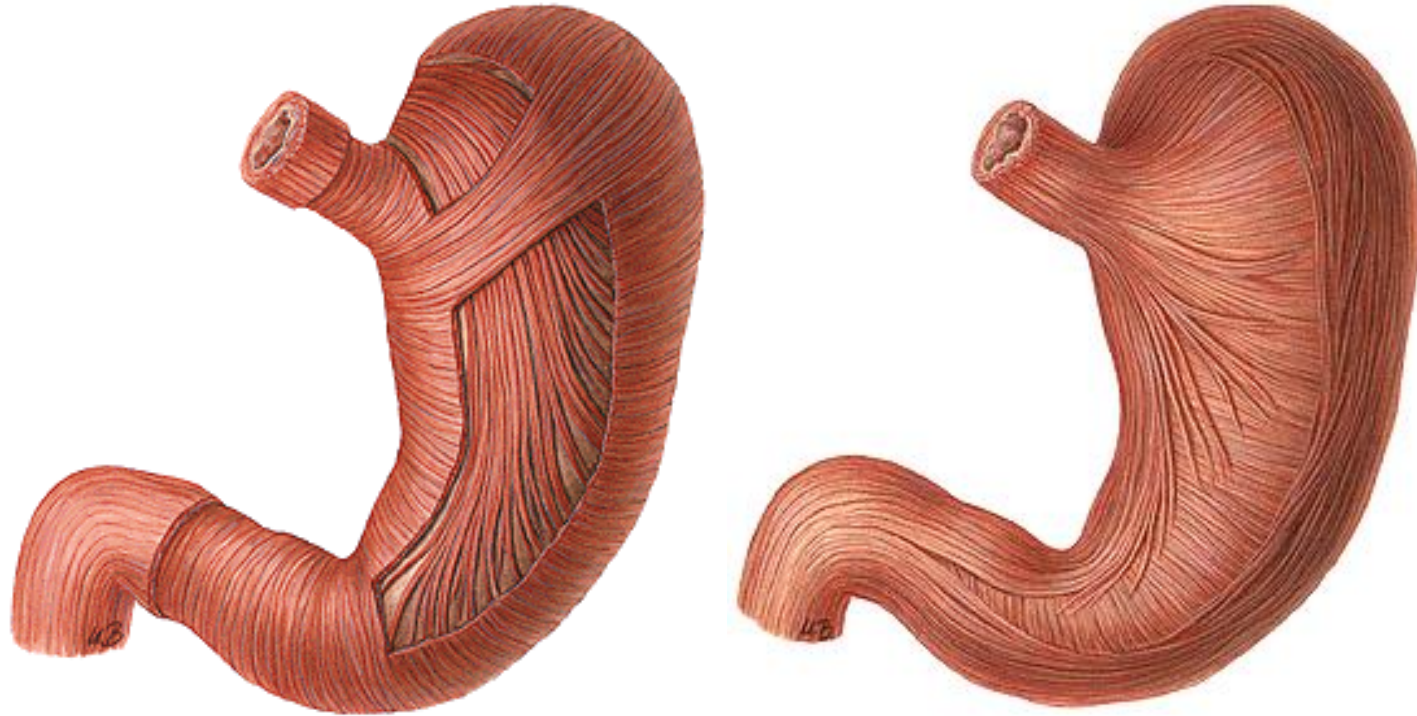
**Ostium pyloricum**  
(m. sphincter pylori)

**Plicae gastricae**  
Sulcus salivarius

**Areae gastricae - foveolae gastricae -  
gll. gastricae (hlen; succus gastr.)**

**Endocrine cells (gastrin ...)**





**3 muscular layers:**

fibrae obliquae

stratum circulare (m. sphincter pylori)

stratum longitudinale (taenie curvaturae)



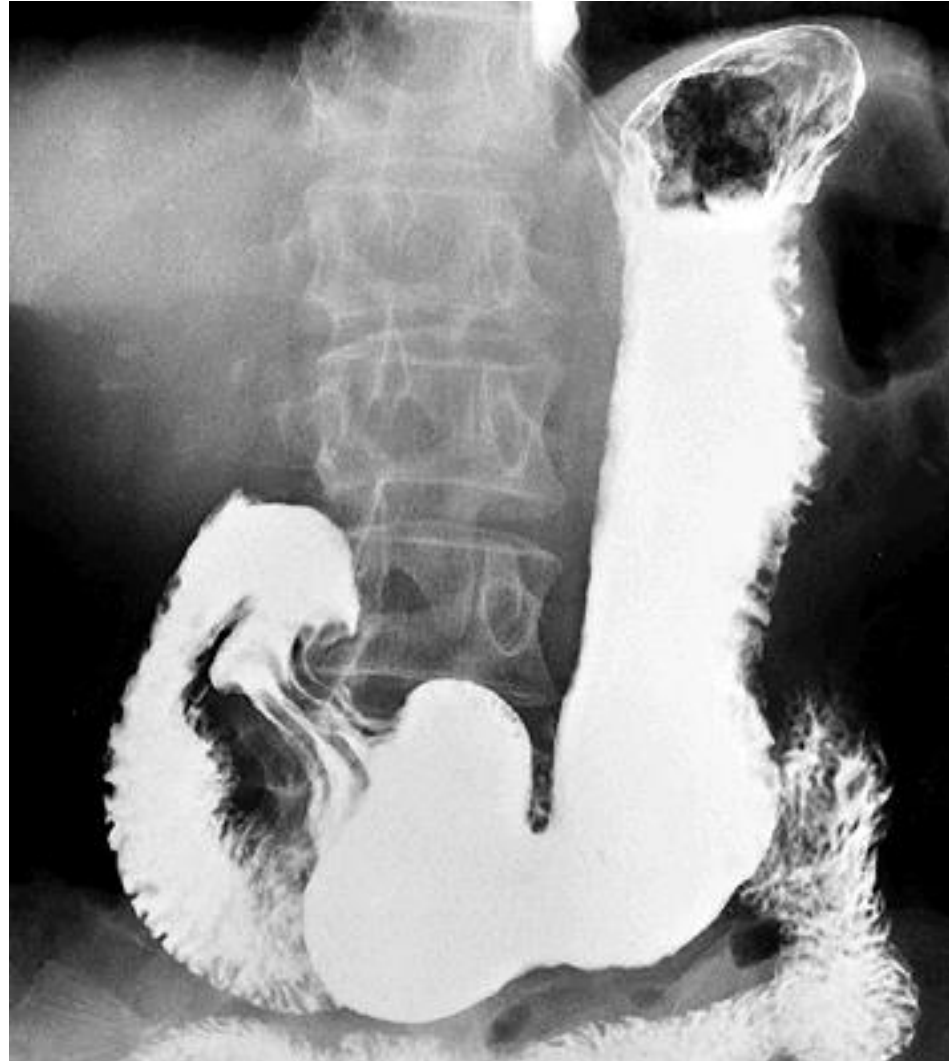
**serosa**



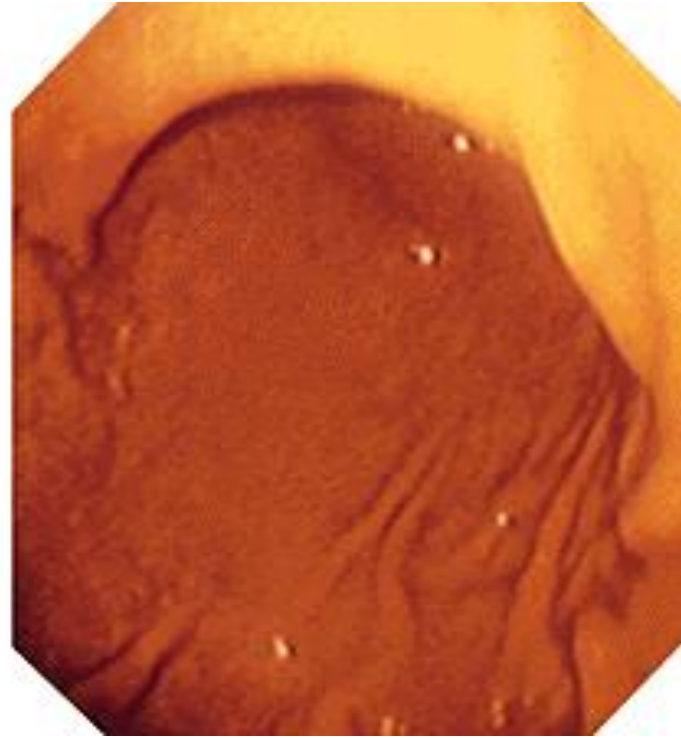
**Omentum minus:** Lig. hepatogastricum + hepatoduodenale

**Omentum majus:** Lig. gastrocolicum + gastrolienale

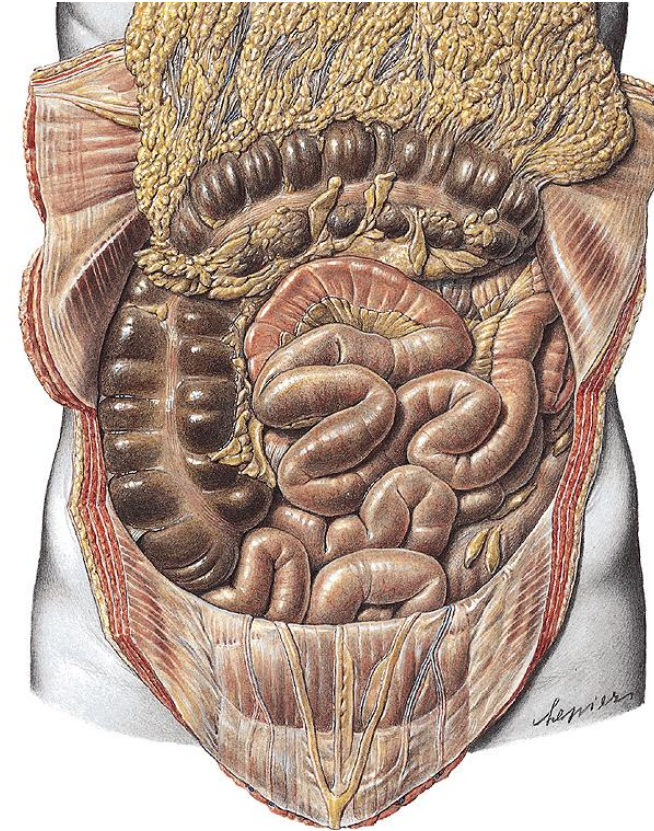
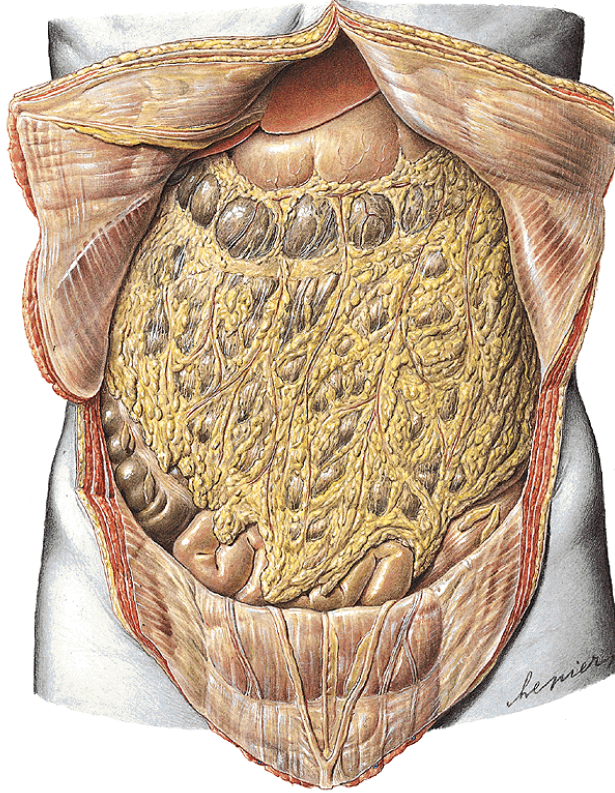
**Incisura angularis**  
**Pars digestoria**  
**Pars egestoria**



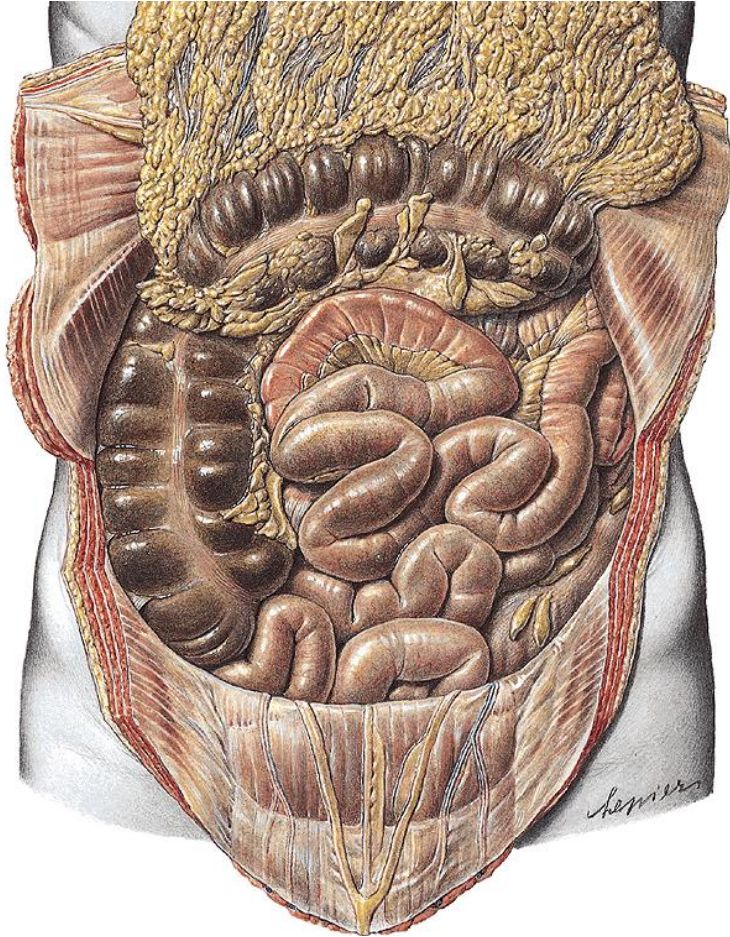
## Gastroscopy



# Intestinum



## Intestinum tenue 5-7m



### **Duodenum**

flexura duodeno-  
jejunalis

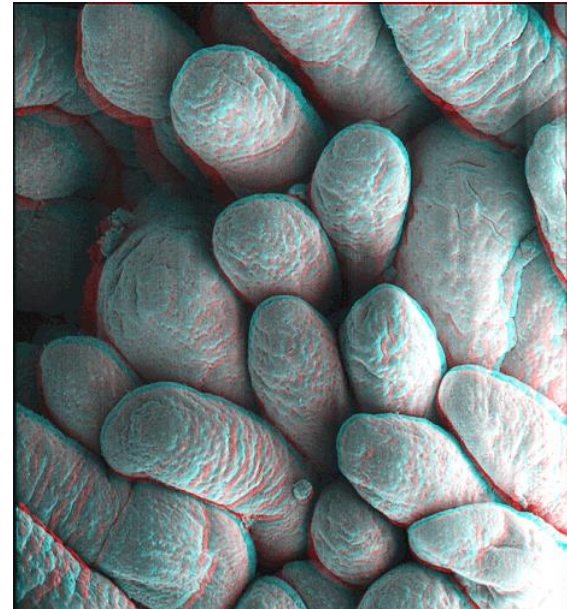
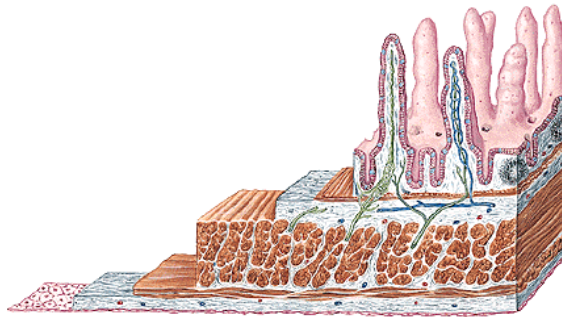
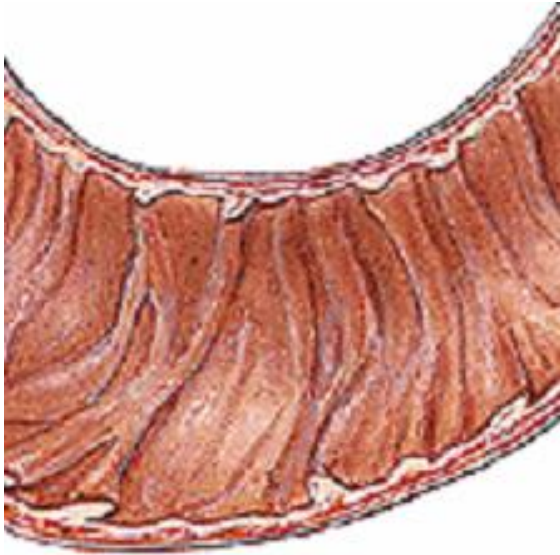
### **Jejunum**

### **Ileum**

ostium ileocaecale

Ansaes intestinales  
mesenterium





## **Plicae circulares Kerkringi**

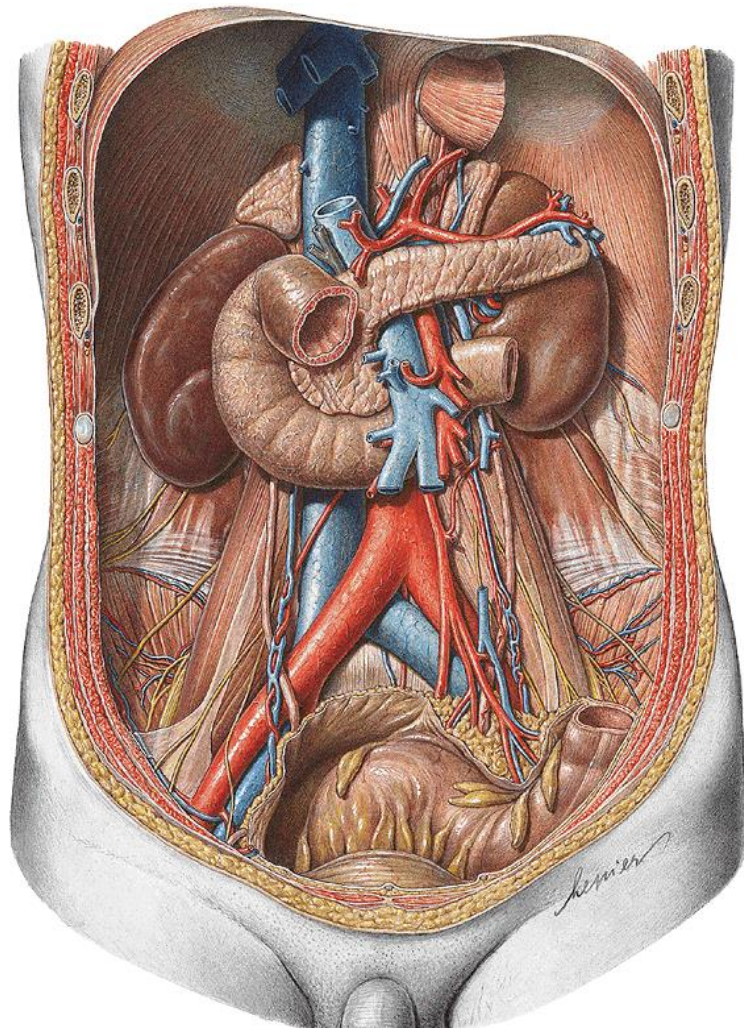
6-8 mm

**intestinales**

Glandulae intestinales – crypts of Lieberkuehn

## **Villi**

0,3 -1 mm



## Duodenum

25 – 28 cm

Flexura duodeni sup.  
5 L1

10 L2

5

8

Flexura duodeni inf.

Flexura  
duodenojejunalis  
M. suspensorius  
duodeni  
(ligament of Treitz)

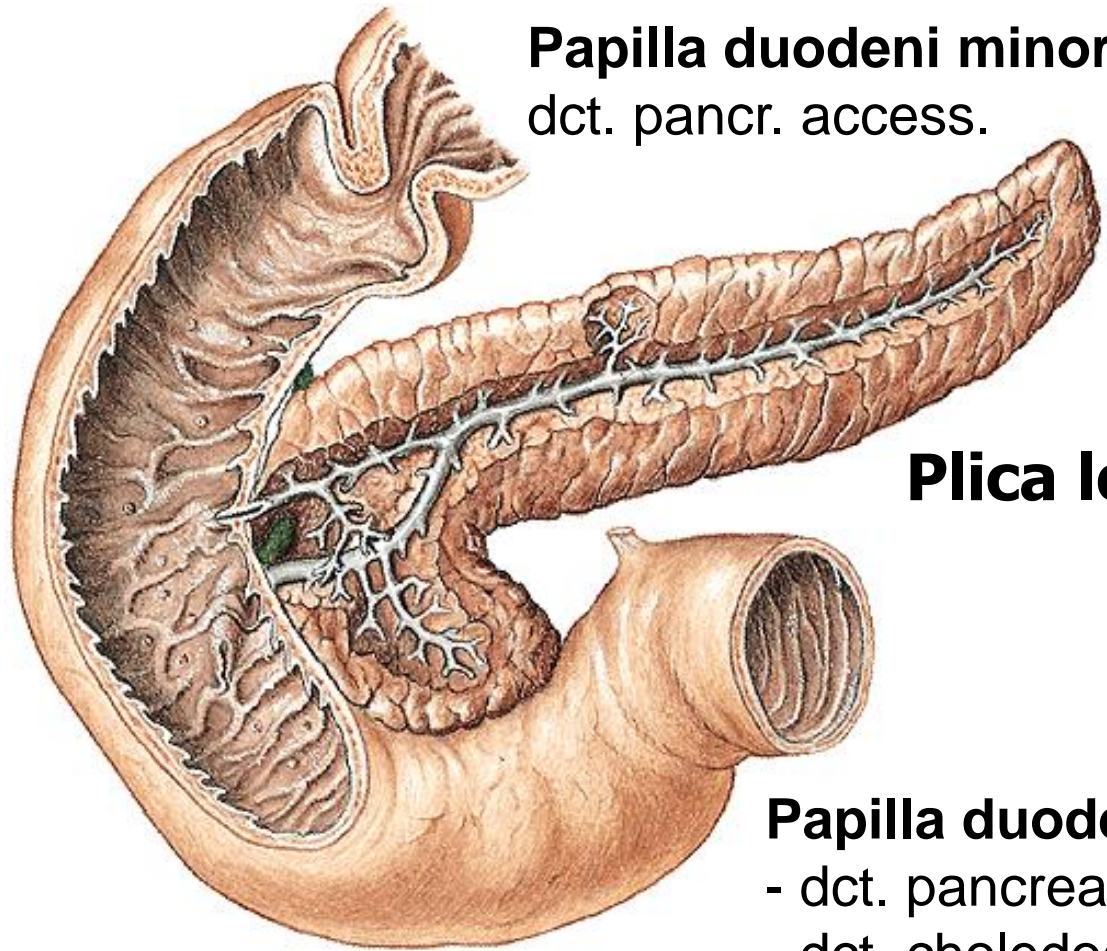
**Pars:** superior (bulbus)  
descendens  
horizontalis  
ascendens

## Differences in the duodenal mucosa



- ✓ rich plicae circulares, villi
- ✓ gll. duodenales Brunneri (alkalic secretion)
- ✓ plica longitudinalalis
- ✓ papilla duodeni major et minor

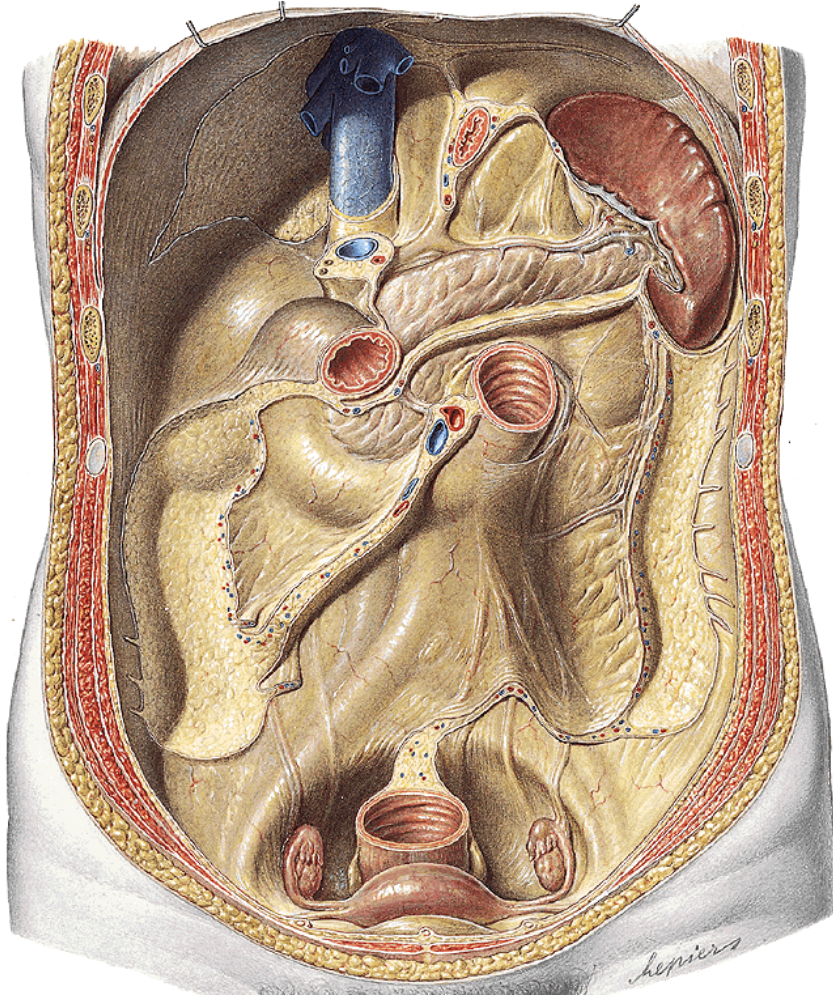




**Papilla duodeni minor**  
dct. pancr. access.

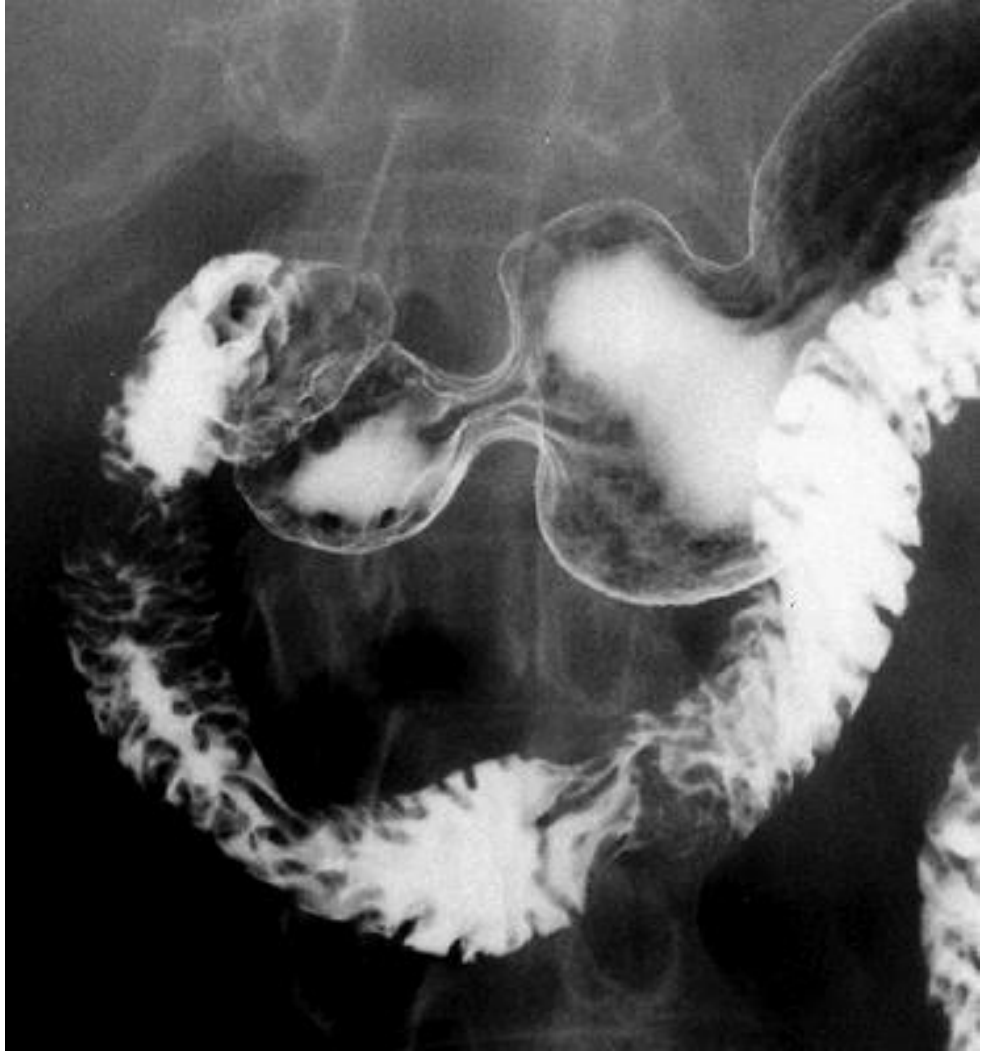
**Plica longitudinalis duodeni**

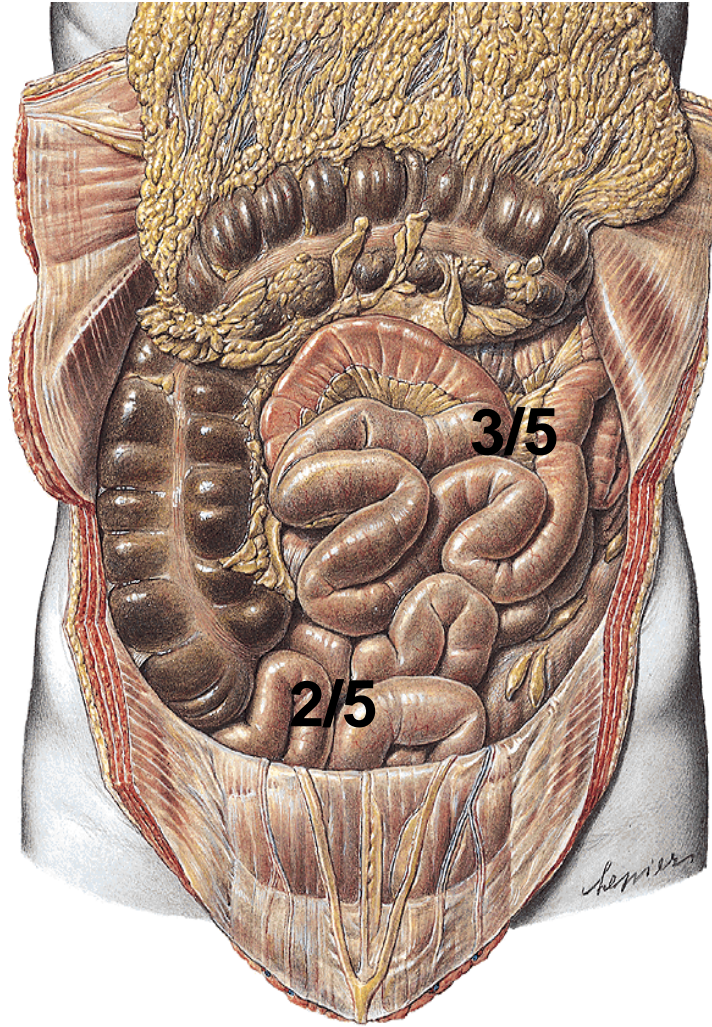
**Papilla duodeni major Vateri**  
- dct. pancreaticus  
- dct. choledochus



Connections to the 12  
and pancreas

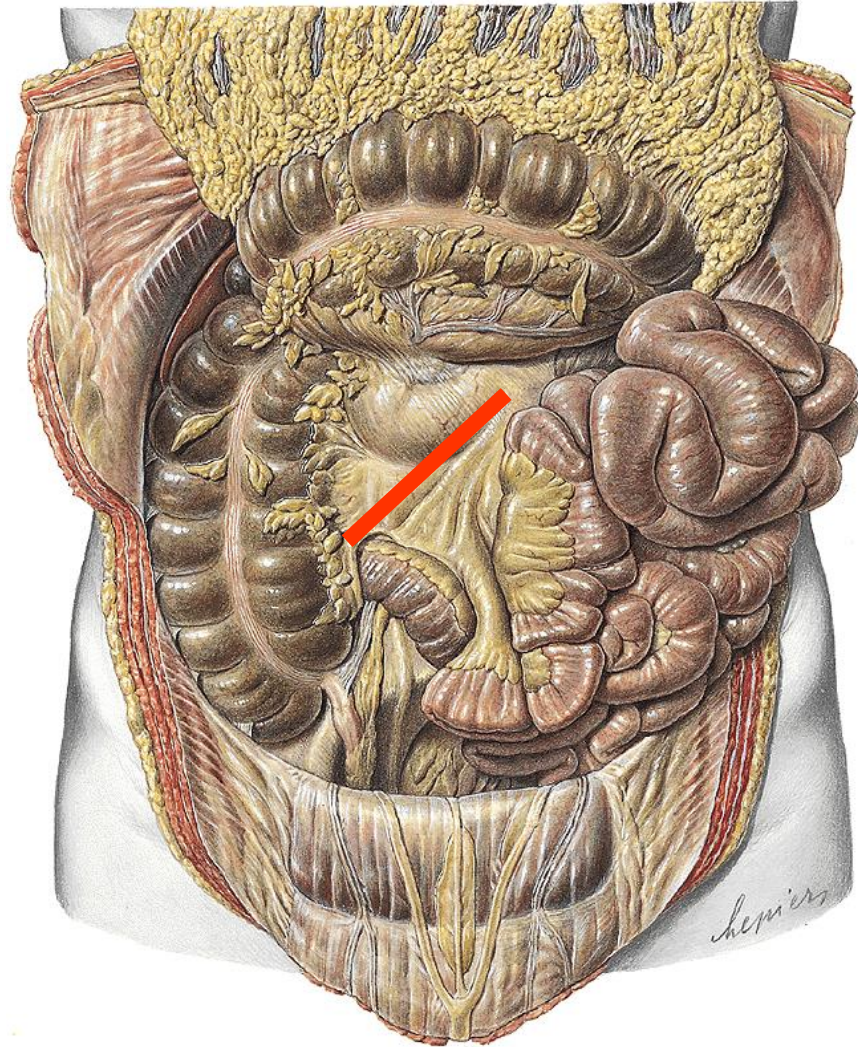
Localization against  
peritoneum:  
secondarily  
retro-peritoneal





**Jejunum**  
from flexura  
duodenojej. (upper  
left)

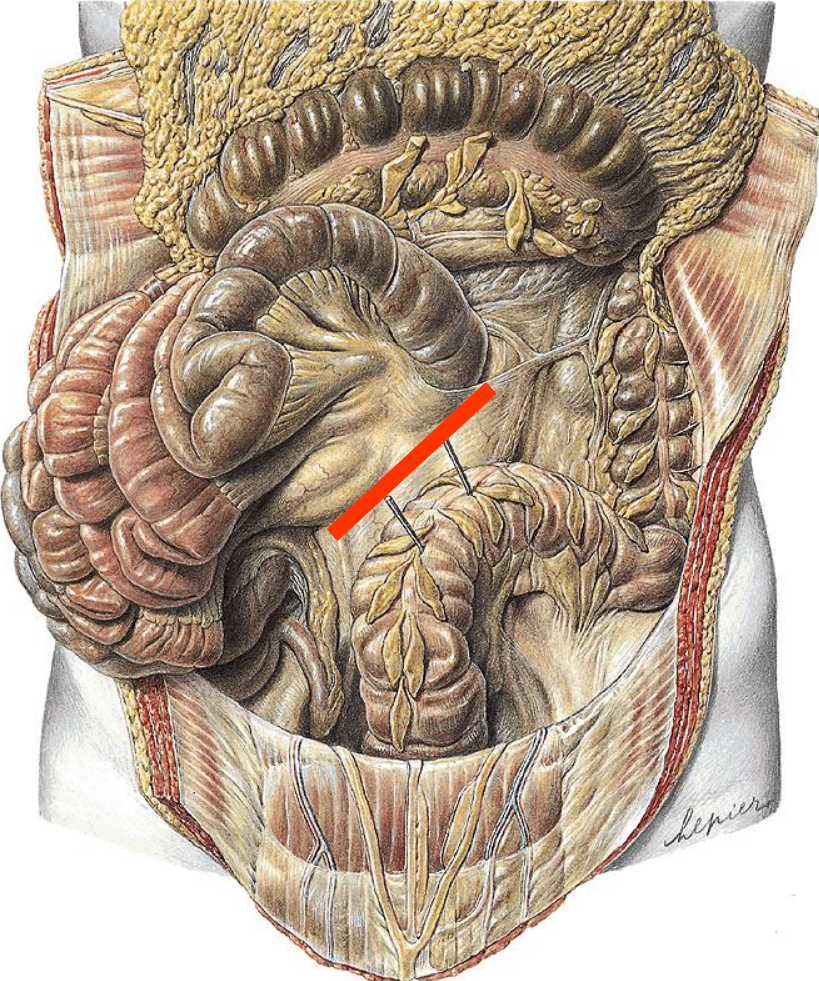
**Ileum**  
(lower right)



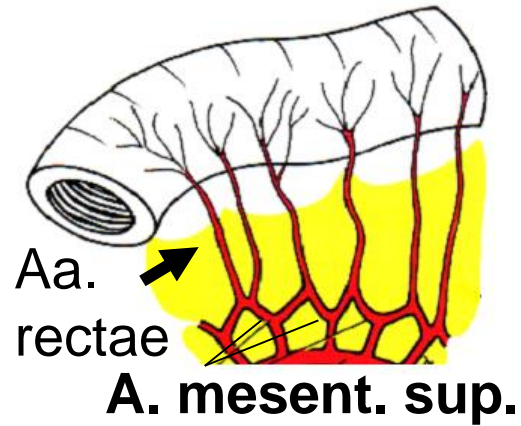
**Ansa  
intestinales**

**Mesenterium**

**Attachment line  
= radix mesenterii  
15 – 18 cm**



## Jejunum



ø 3cm



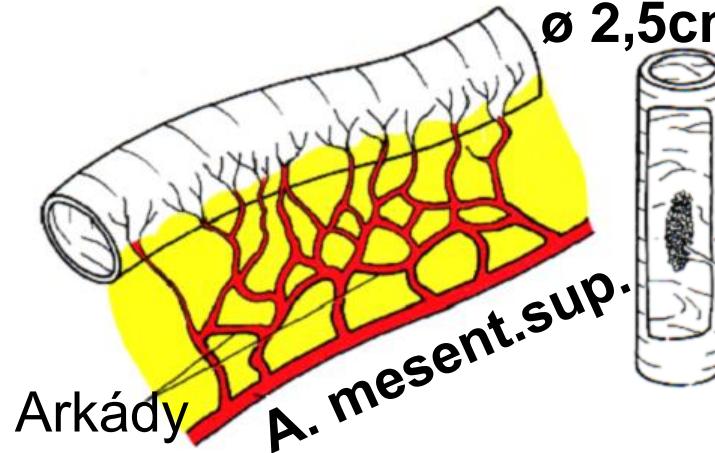
Plicae  
circulares

### Differences

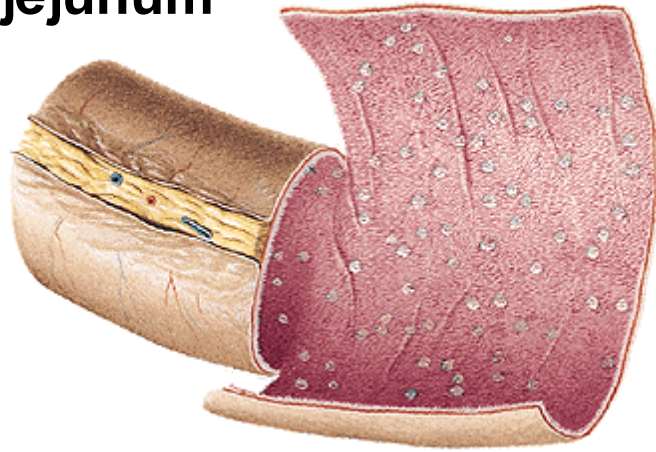
- lokalization
- thickness of the wall
- Number of folds
- Arteries
- Lymphoid tissue

## Ileum

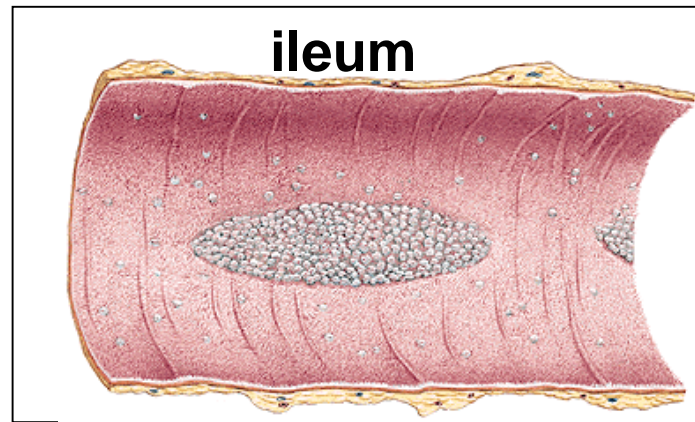
ø 2,5cm



**jejunum**

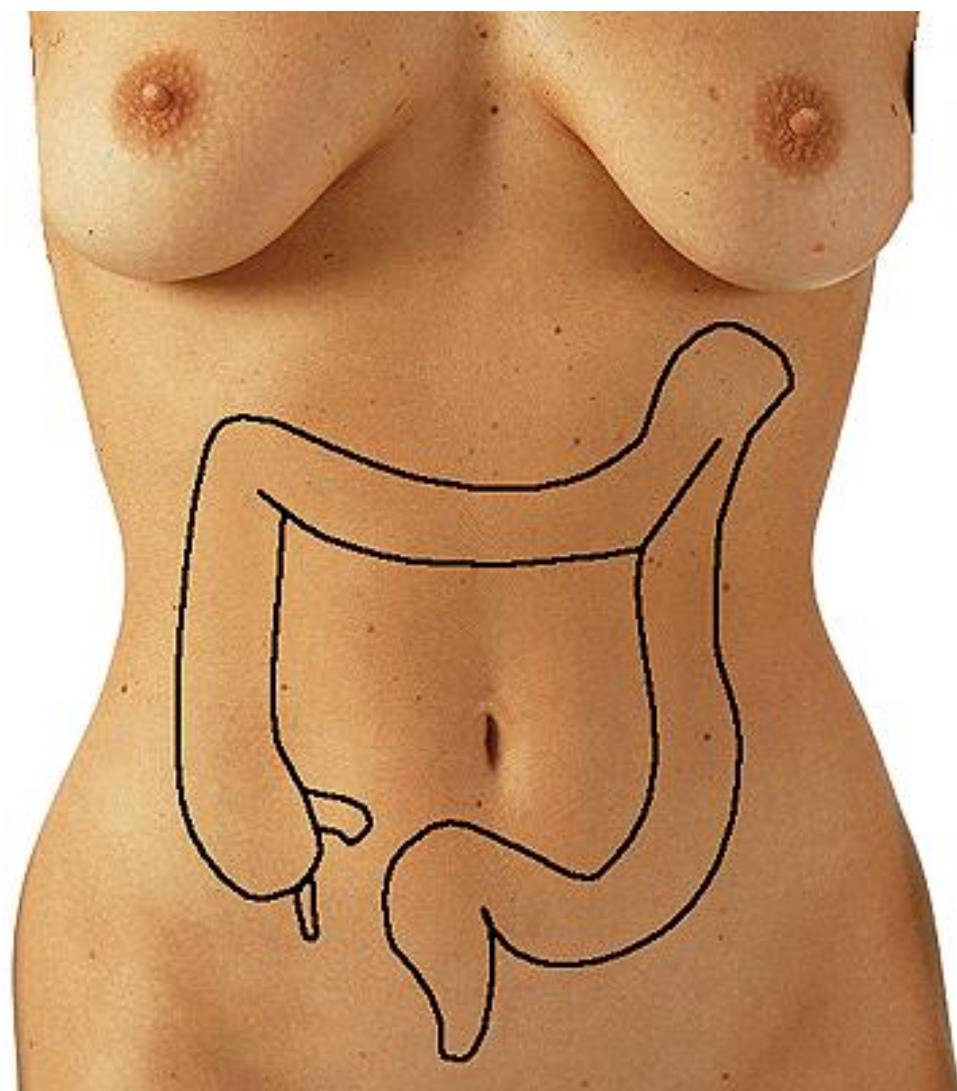


**Foll. lymph. solitarii**

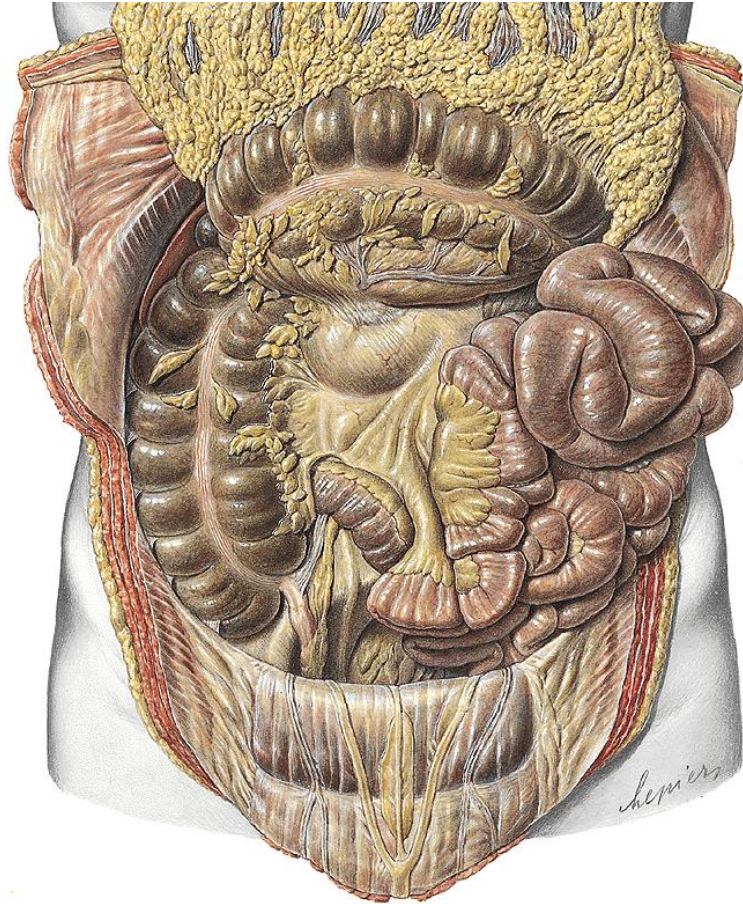


**Foll. lymph. agregatti**





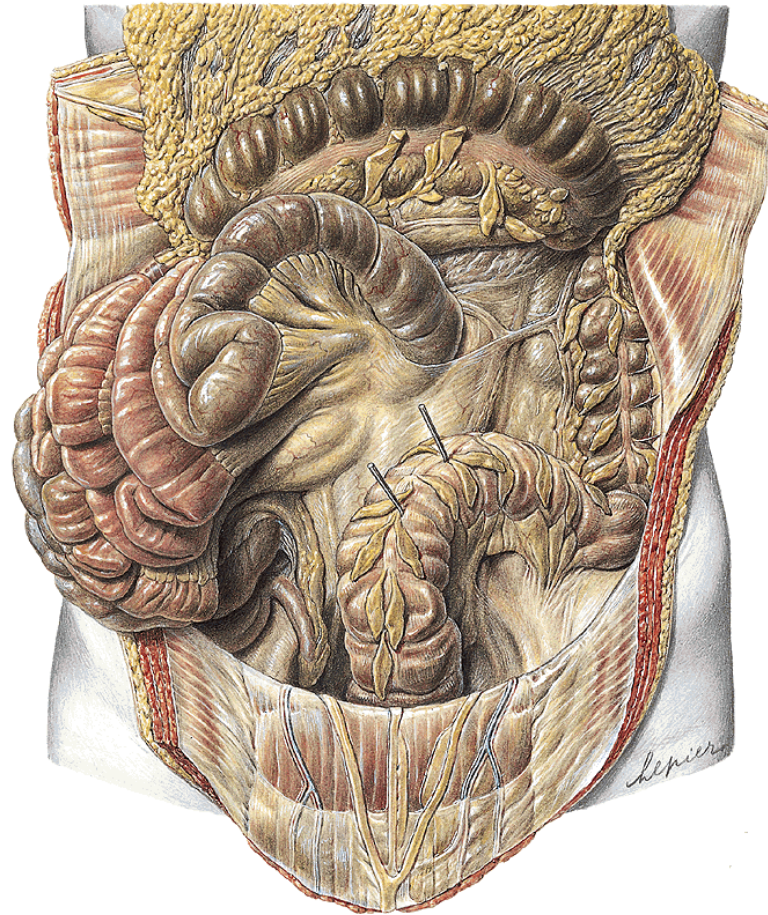
## Intestinum crassum 1,5-2m



**Caecum**  
(+ appendix vermiformis)

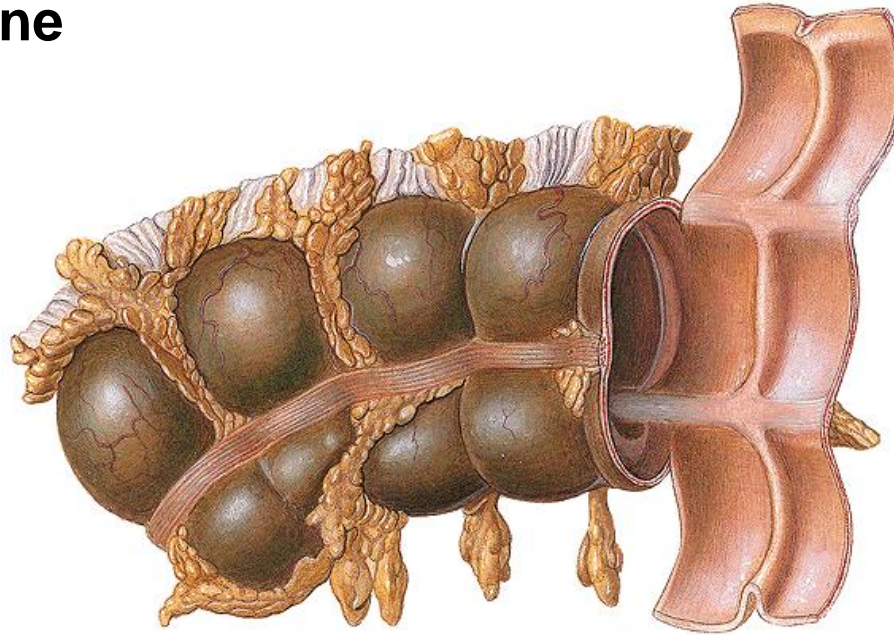
**Colon**  
ascendens  
transversum  
descendens  
sigmoideum

**Rectum**



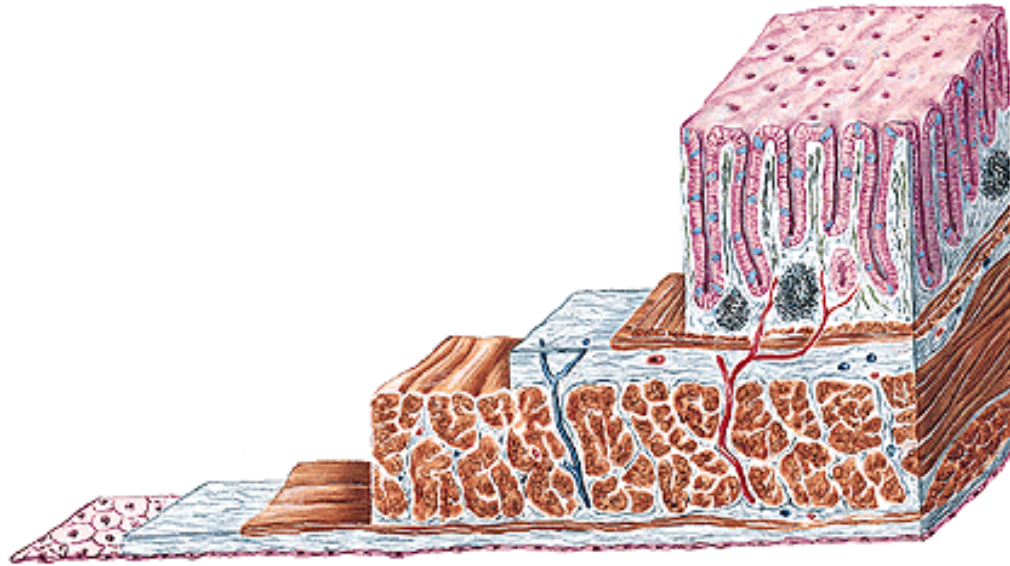
Colon  
descendens et  
sigmoideum

## Characteristic features of the wall of the large intestine



Taenia mesocolica  
Taenia omentalis  
Taenia libera

- ✓ Larger cross section
- ✓ Grey color
- ✓ taeniae coli, haustra, appendices epiploicae



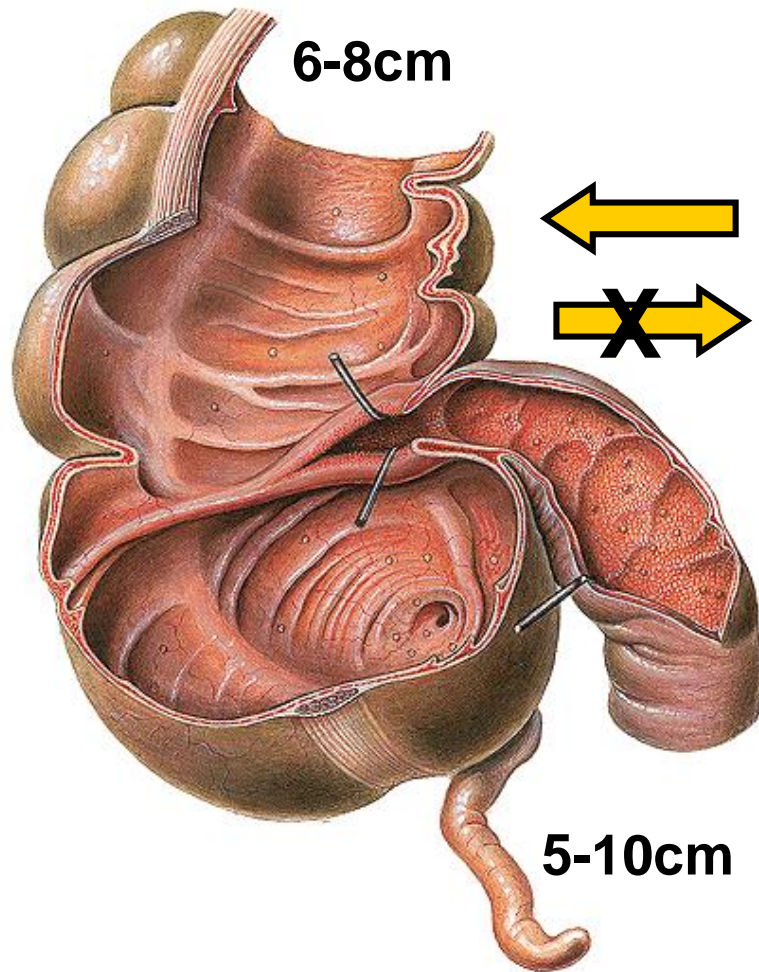
**Mucosa**

(no villi; plicae semilunares; lymphoid nodules)

**Submucose layer**

**Musculature** (longitudinal forms 3 taenias)

**Serosa**



6-8cm

## Caecum

Right iliac fossa

### Ostium ileocaecale

- valva ileocaecalis

-labium superius

-labium inferius

### Appendix vermiformis

Ostium app. vermif. , valva ap.v.

Lymph. tissue

Mesoappendix

5-10cm

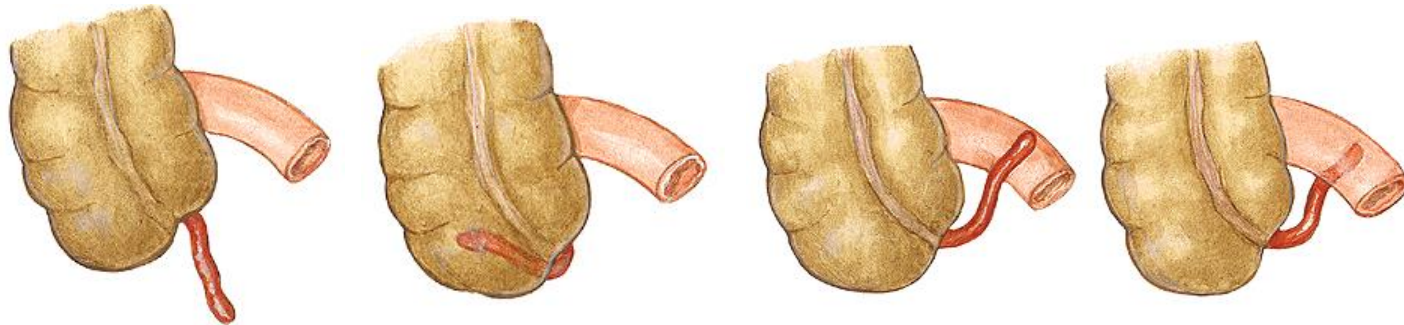


## Positions

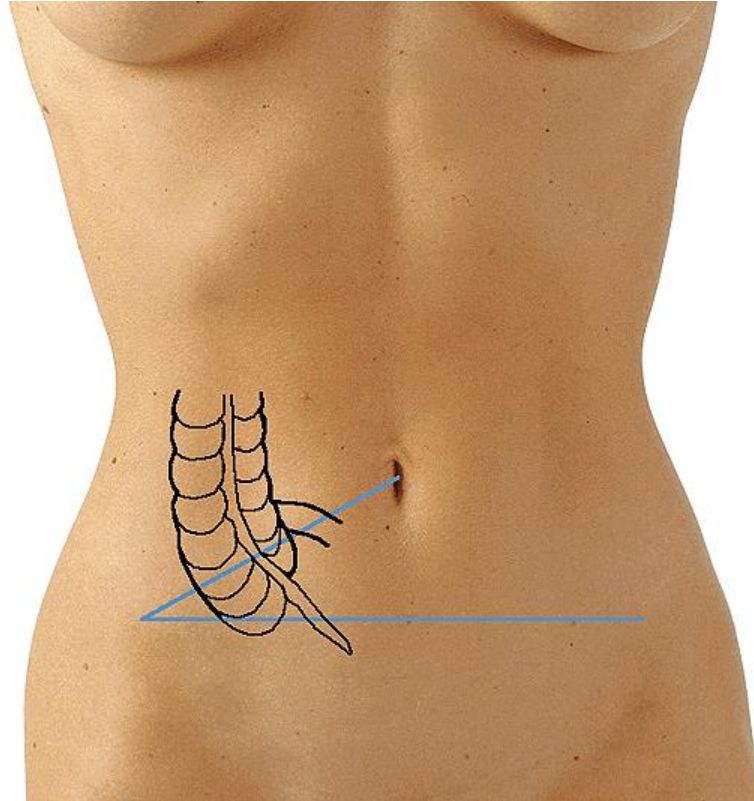
### Positio:

pelvina lig. appendiculoovaricum  
retrocaecalis

ileocaecalis  
laterocaecalis  
praecaecalis



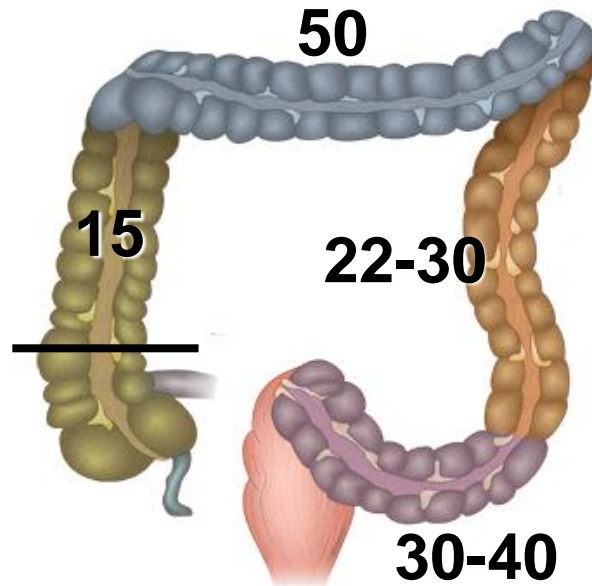
## Projection of appendix



**Linea spinoumbilicalis dx.  
(line of Monro)  
Mc Burney's point**

**Linea bispinalis  
Lanz's point**





### **Colon ascendens**

fused with post. abd. wall  
flexura coli dextra (hepatica)

### **Colon transversum**

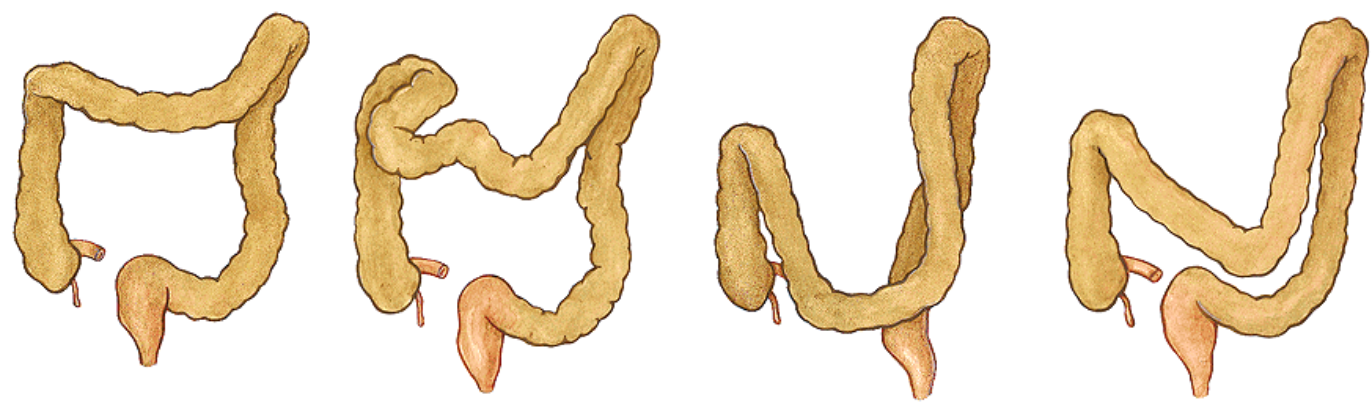
To the left and up  
Hanging on mesocolon transversum  
flexura coli sinistra (lienalis)  
omentum majus,  
lig.gastrocolicum

### **Colon descendens**

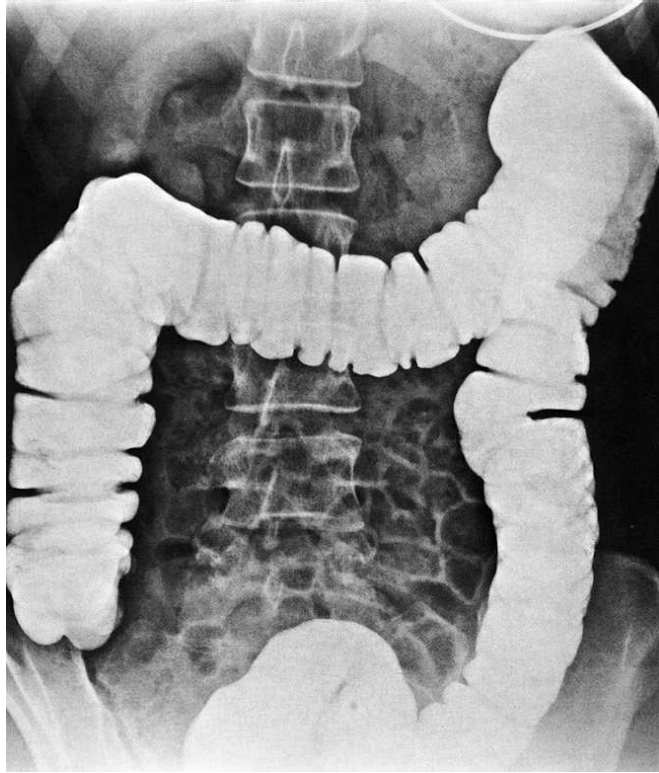
Became narrower  
fused with abd.wall

### **Colon sigmoideum**

(crista iliaca → S2-3)  
mesosigmoideum.

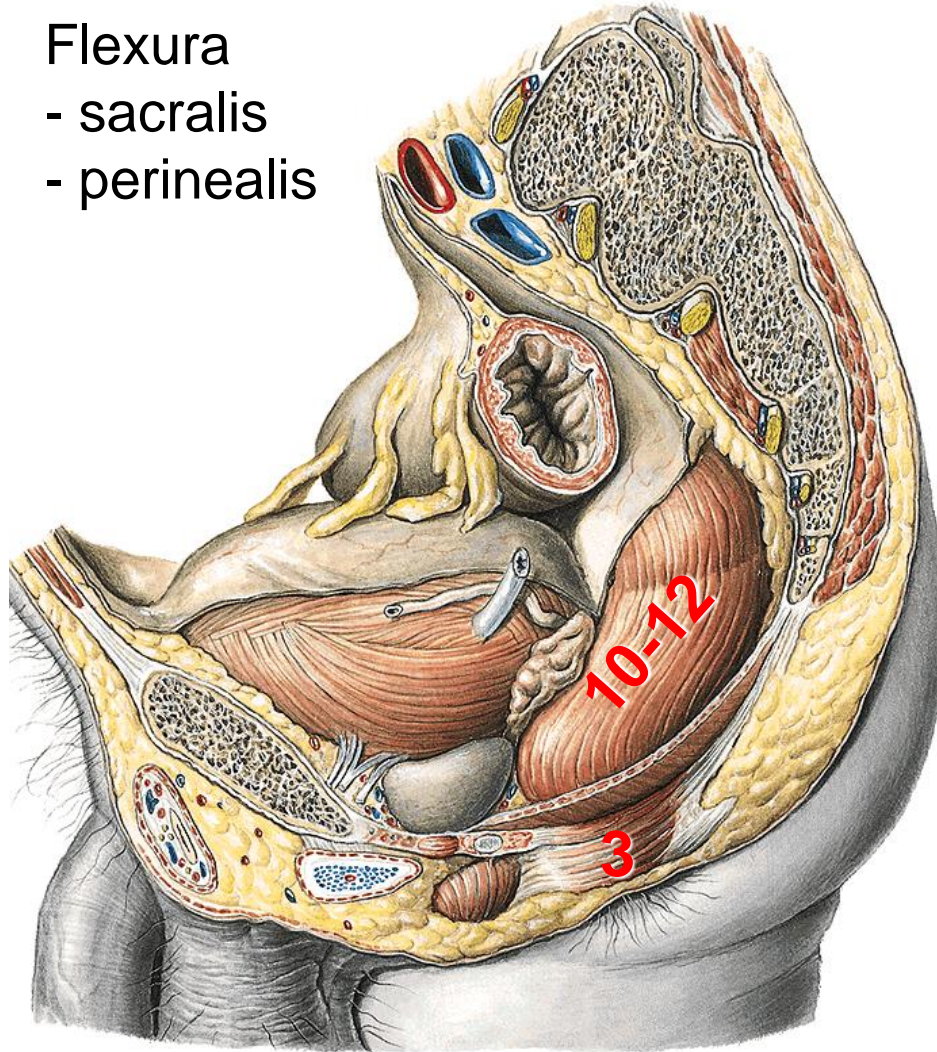


# Irigography



DCBE

Flexura  
- sacralis  
- perinealis



**Rectum**  
S2-3 → anus  
small pelvis

**Ampula recti**  
3/4

**Canalis analis**  
1/4



## Mucosa

### ampula recti:

**3 plicae transversae recti**

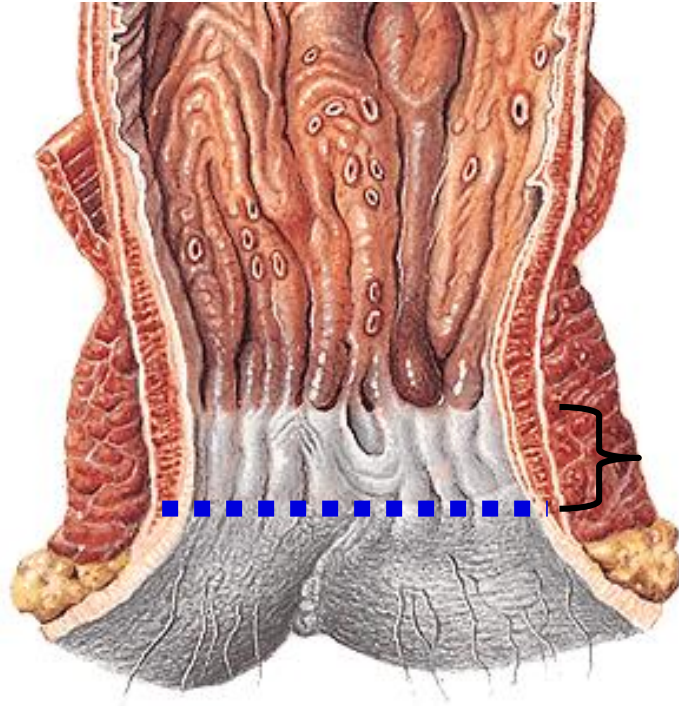
Plica t.r. media Kohlrausch

### canalis analis:

**6-12 columnae anales**

valvulae anales

sinus anales



**Zona haemorrhoidalis**

epithel: cylindrical

plexus venosus rectalis int.

**Zona intermedia (pecten analis)**

Epithel: squamous not ceratinising

Linea anocutanea

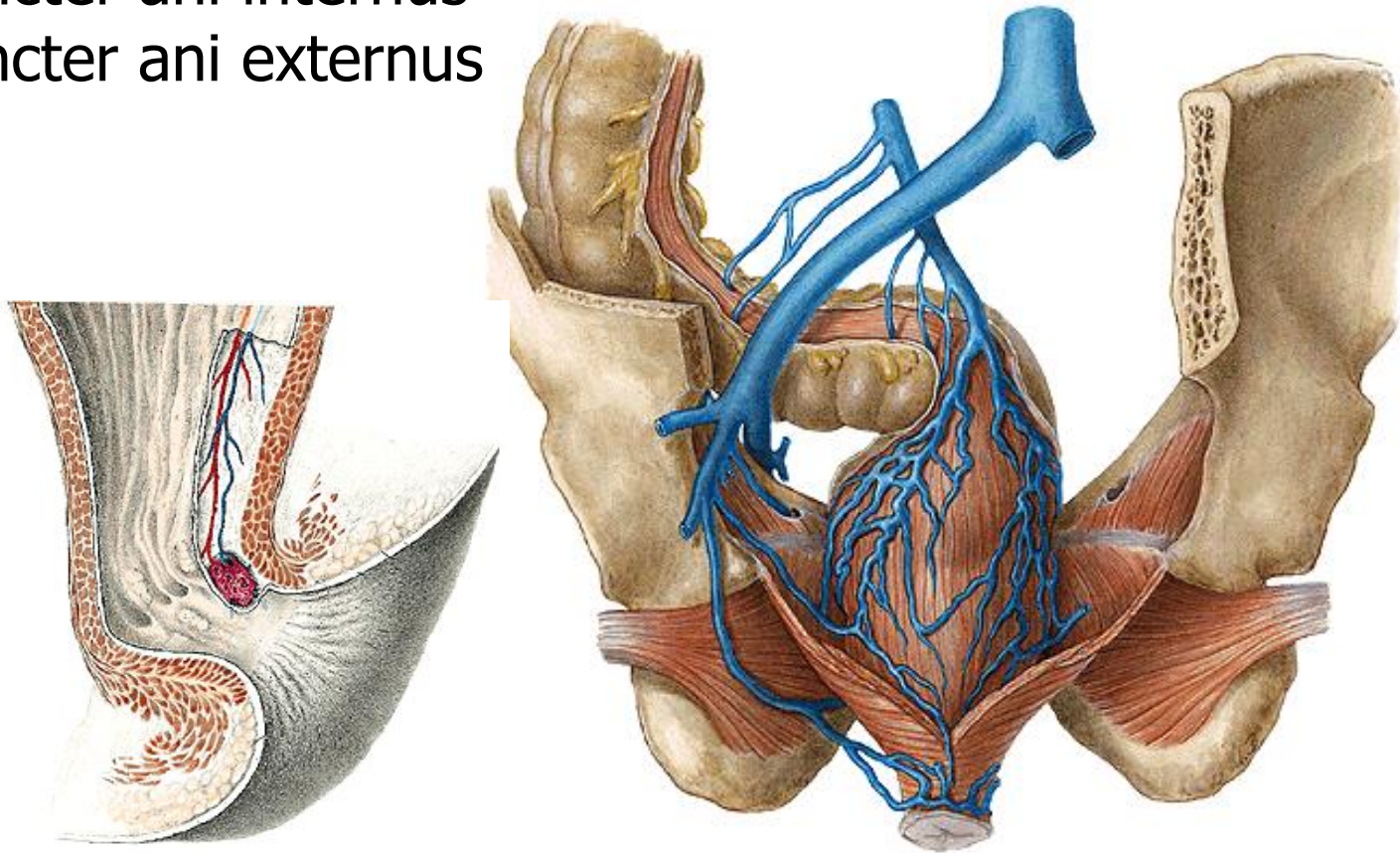
**Zona cutanea (anus) epithel**

squamous stritified ceratinising

Plexus venosus rectalis

M. sphincter ani internus

M. sphincter ani externus





### **submucosa**

Dense connective tissue - PROLAPS !

### **Muscle layer**

internal circul. - m. sphincter ani int.

External longitudinal

Below diaphragma pelvis

Striated m.

- m. sphincter ani ext.

### **Serosa / adventitia**

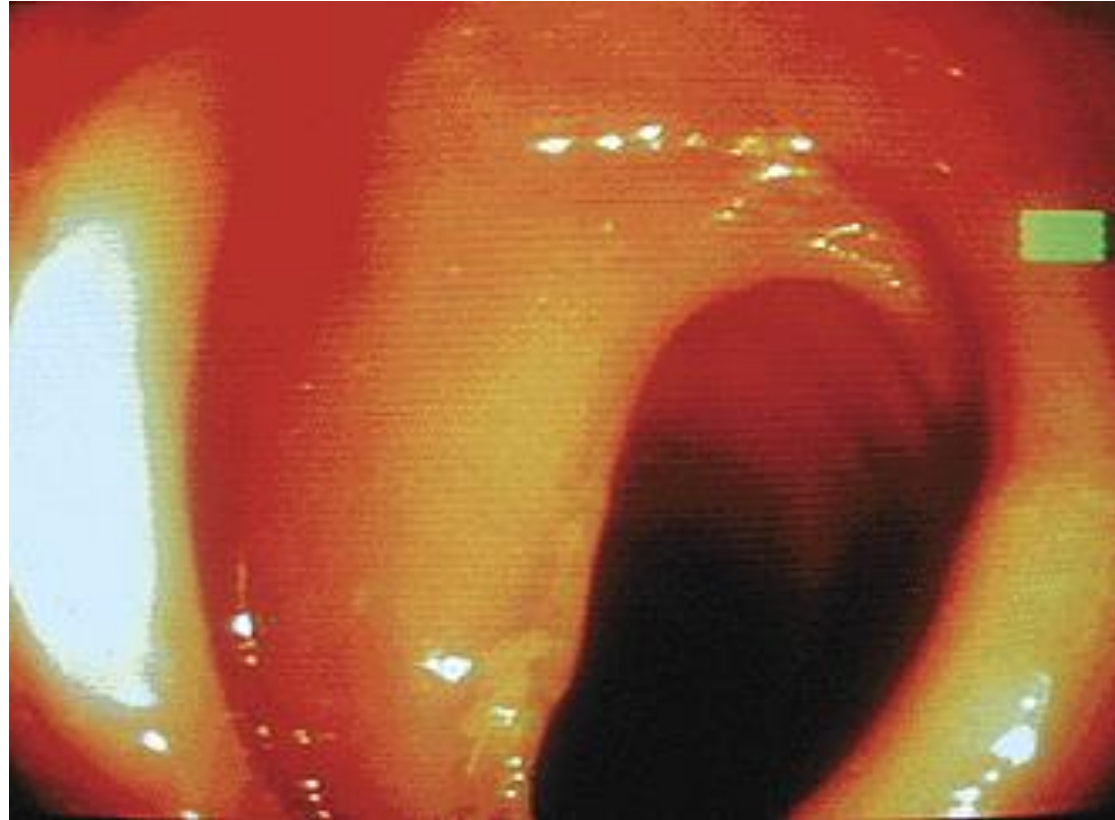


# Anus



- ✓ Opens in crena ani
- ✓ pigmented skin
- ✓ Thanks to sphincters closed
- ✓ glandulae circumanales
- ✓ Thicker hair

# Rectoscopy



Illustrations, photographs, and radiographs were copied from:  
Atlas der Anatomie des Menschen/Sobotta.  
Putz,R., und Pabst,R. 20. Auflage. München:  
Urban & Schwarzenberg, 1993)