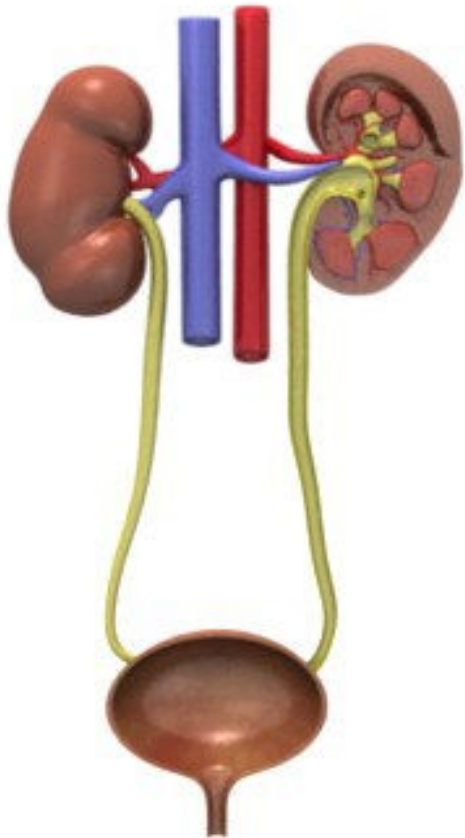


# MOČOVÝ SYSTÉM



- **Ledvina**
- **Vývodní cesty**
  - kalichy
  - pánvička
  - močovod
  - močový měchýř
  - močová trubice

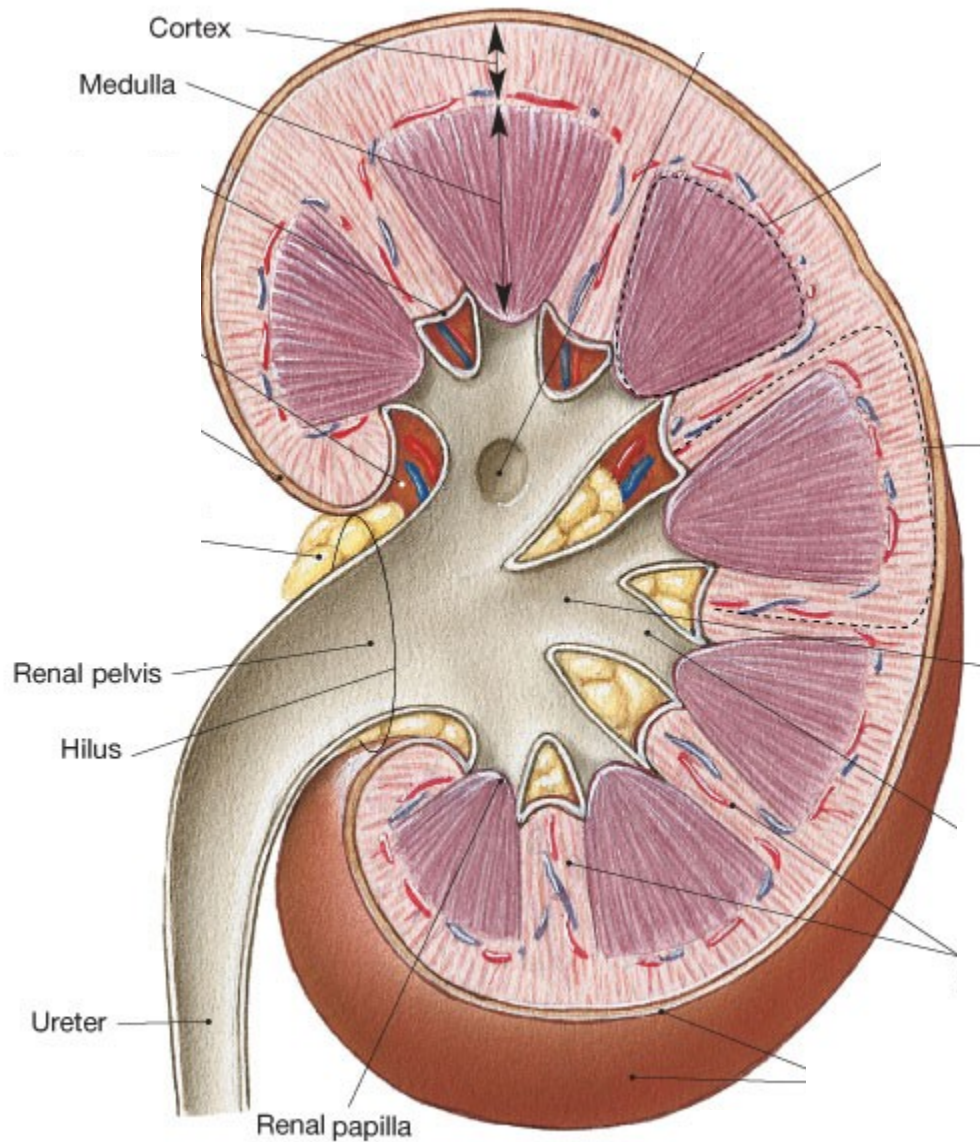
# Ledvina (ren, nephros)

## Kůra:

- „čistá“ kůra
- žíhaná kůra
- sloupce korové

## Dřeň:

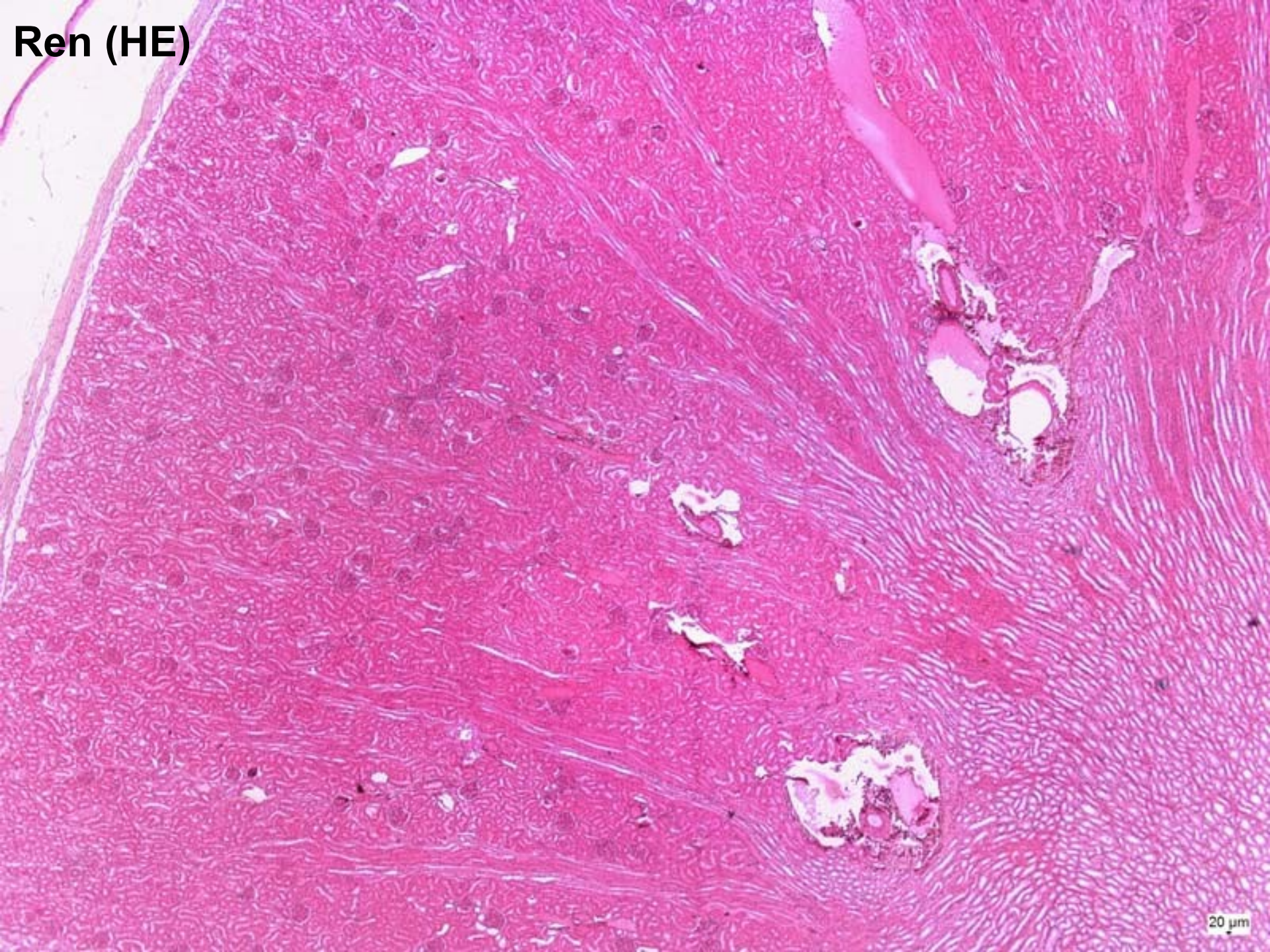
- pyramidy (10 – 18)
- papily s otvory



vazivové pouzdro  
tukové pouzdro

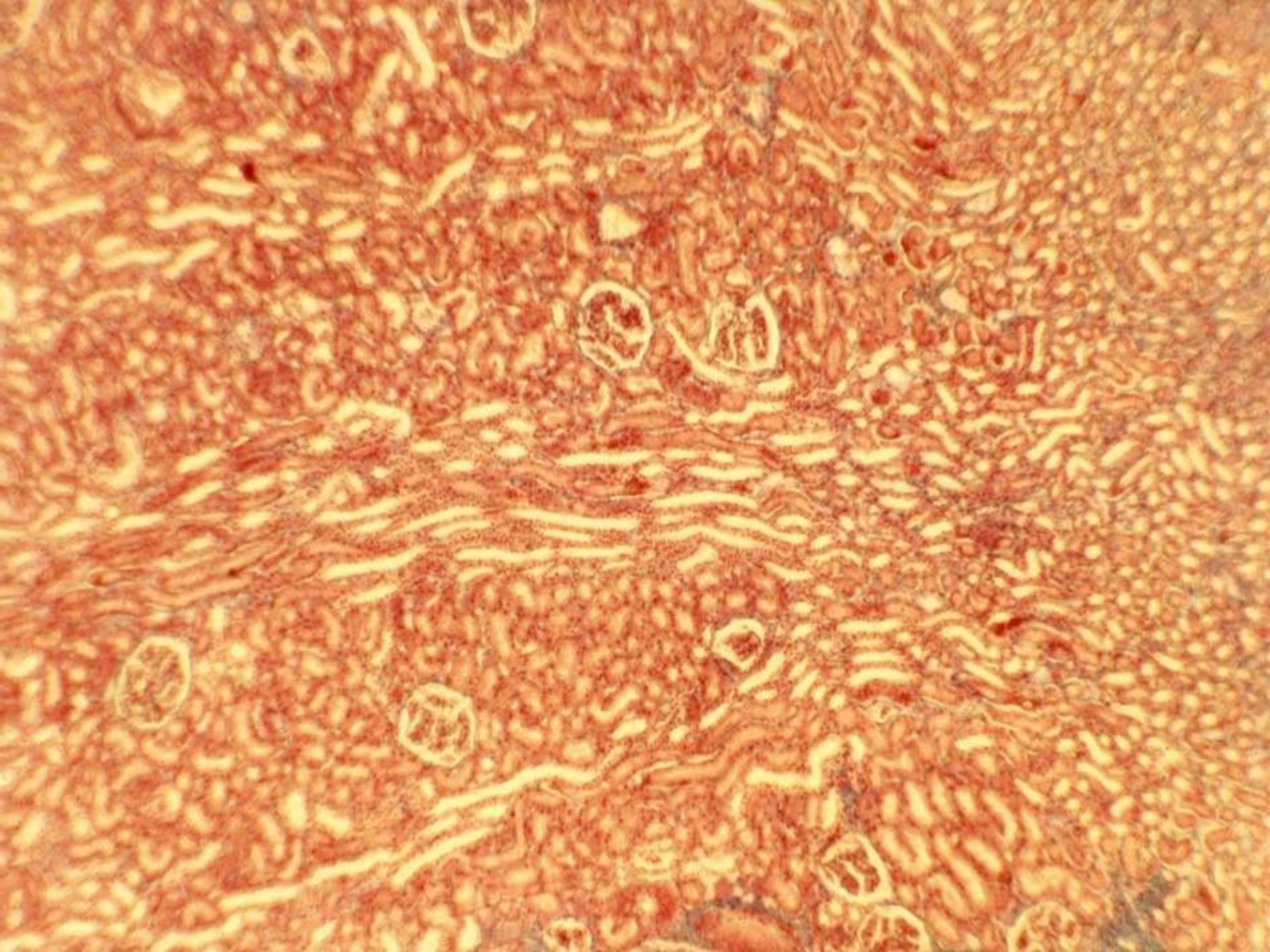


Ren (HE)

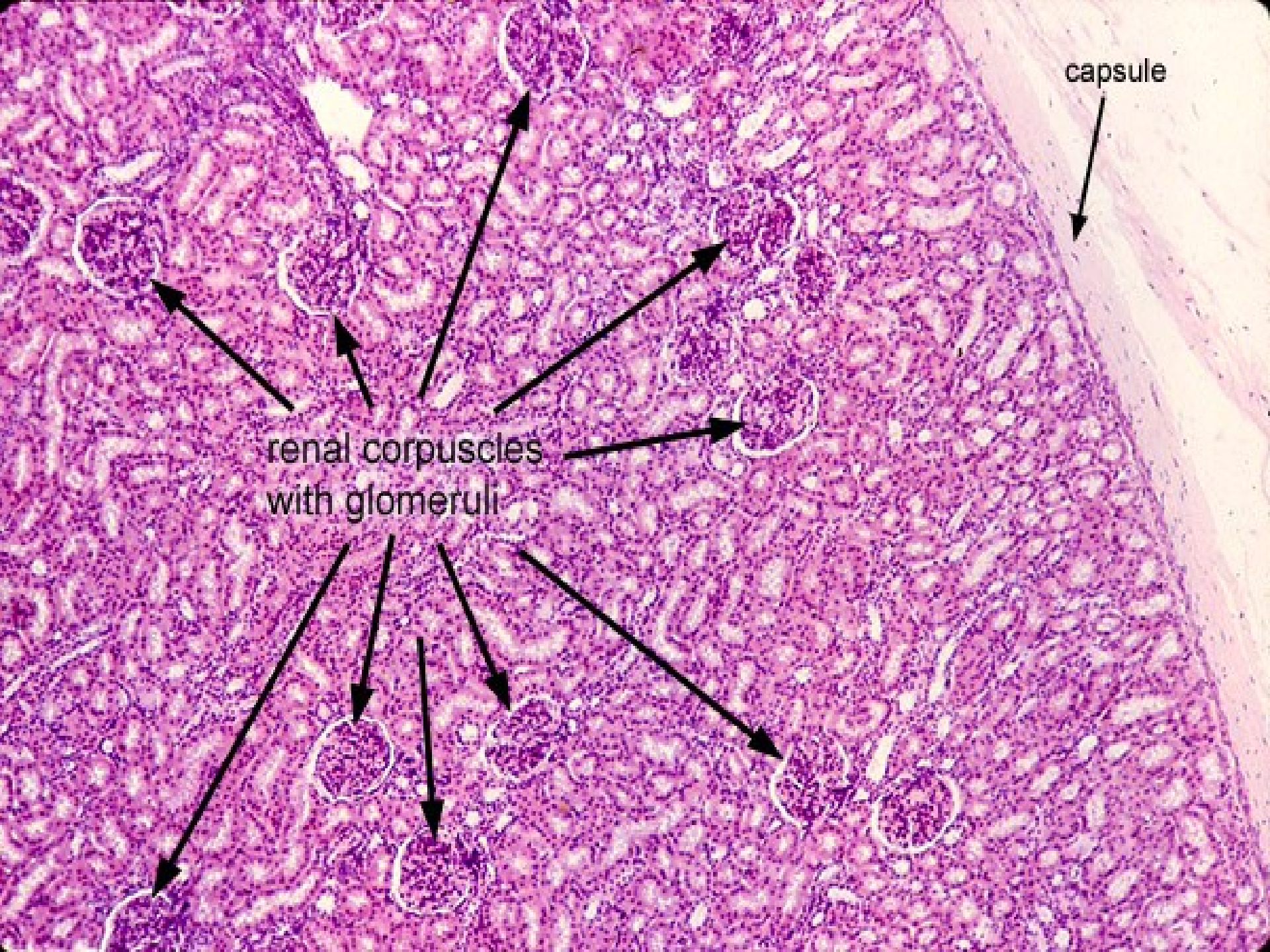


20  $\mu$ m





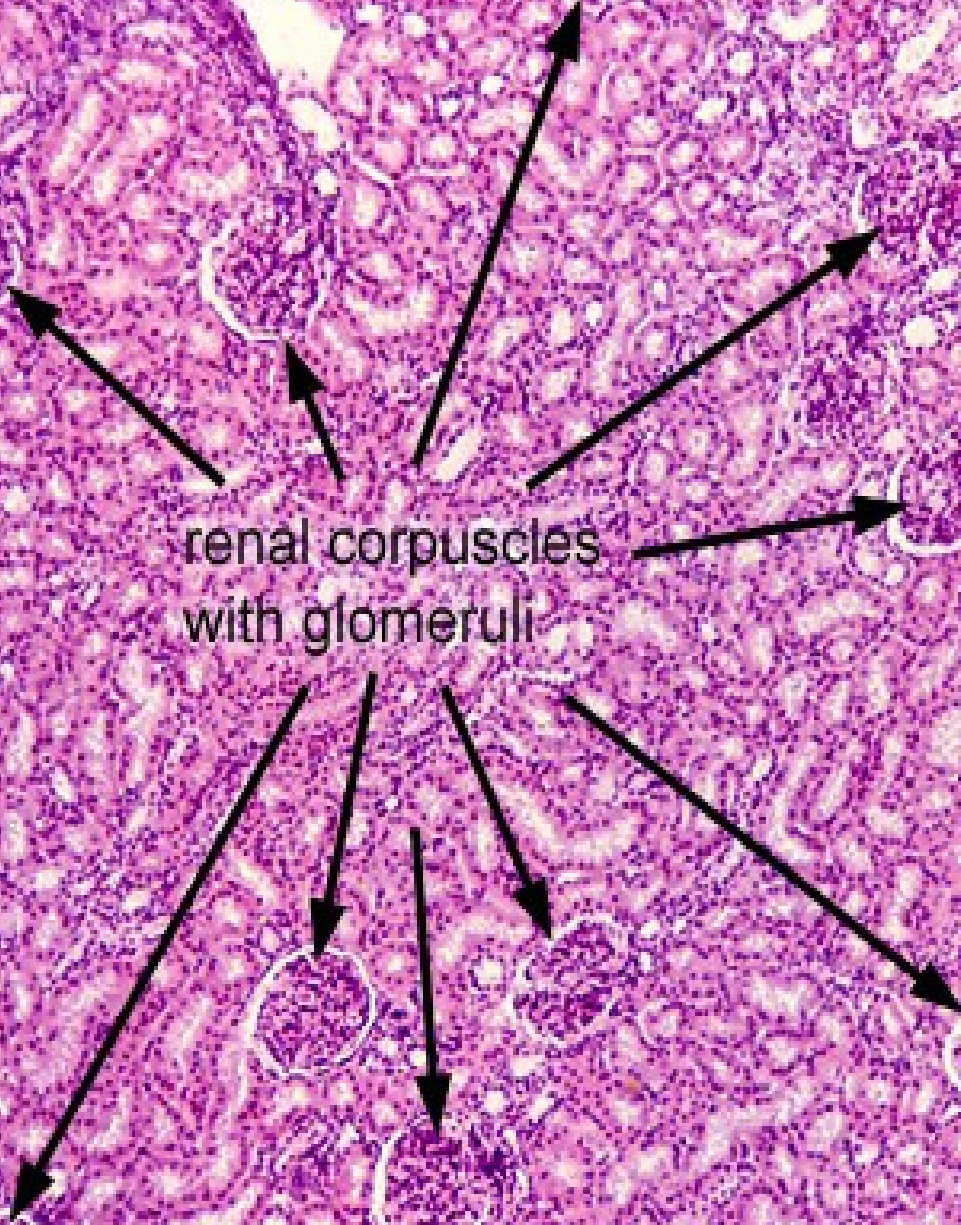




capsule

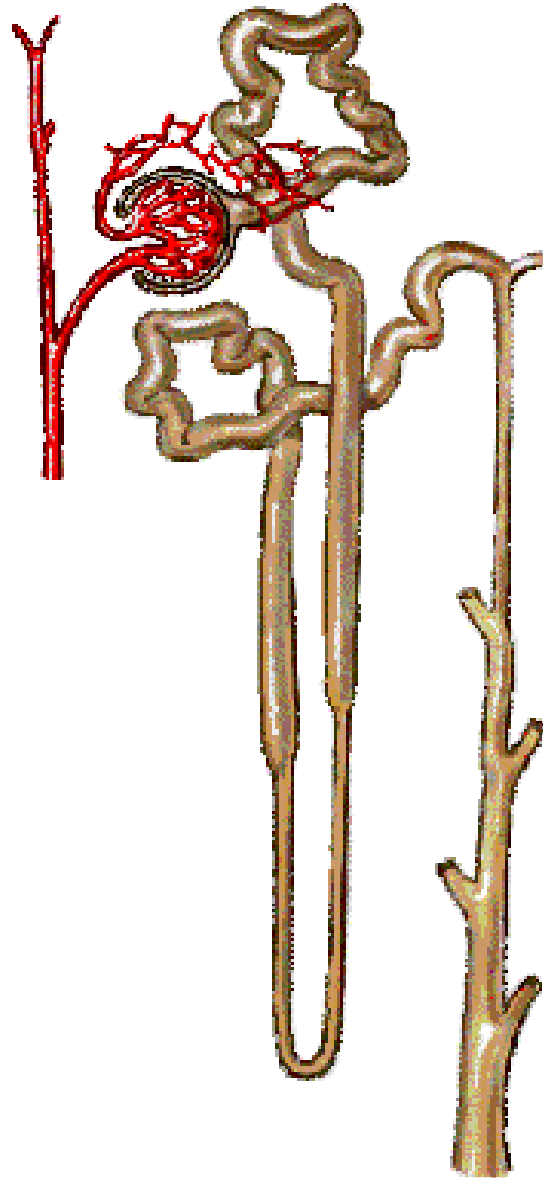


renal corpuscles  
with glomeruli



# NEFRON

**Ledvinné tělísko**  
corpusculum renis  
(Malpighi)

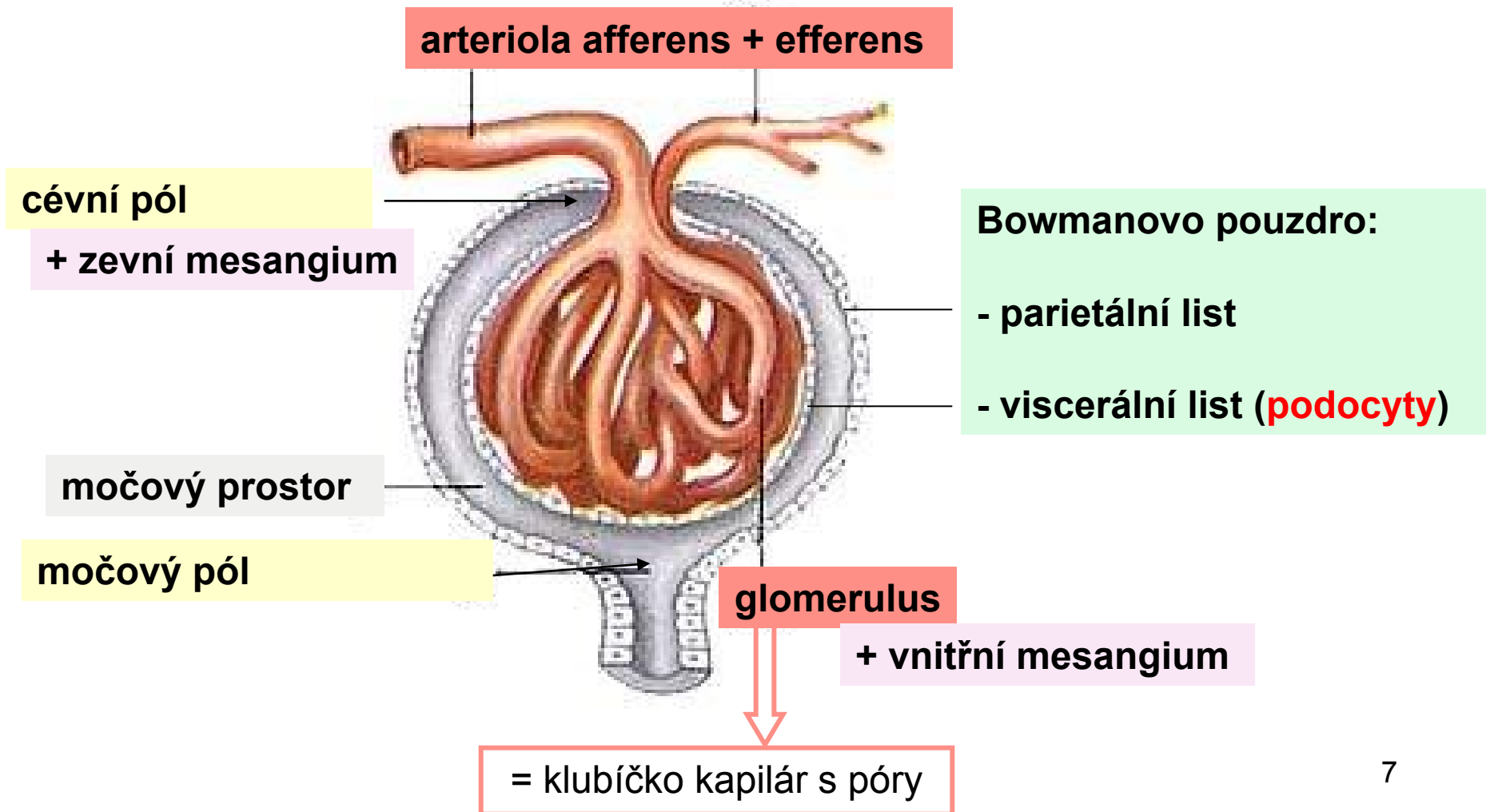


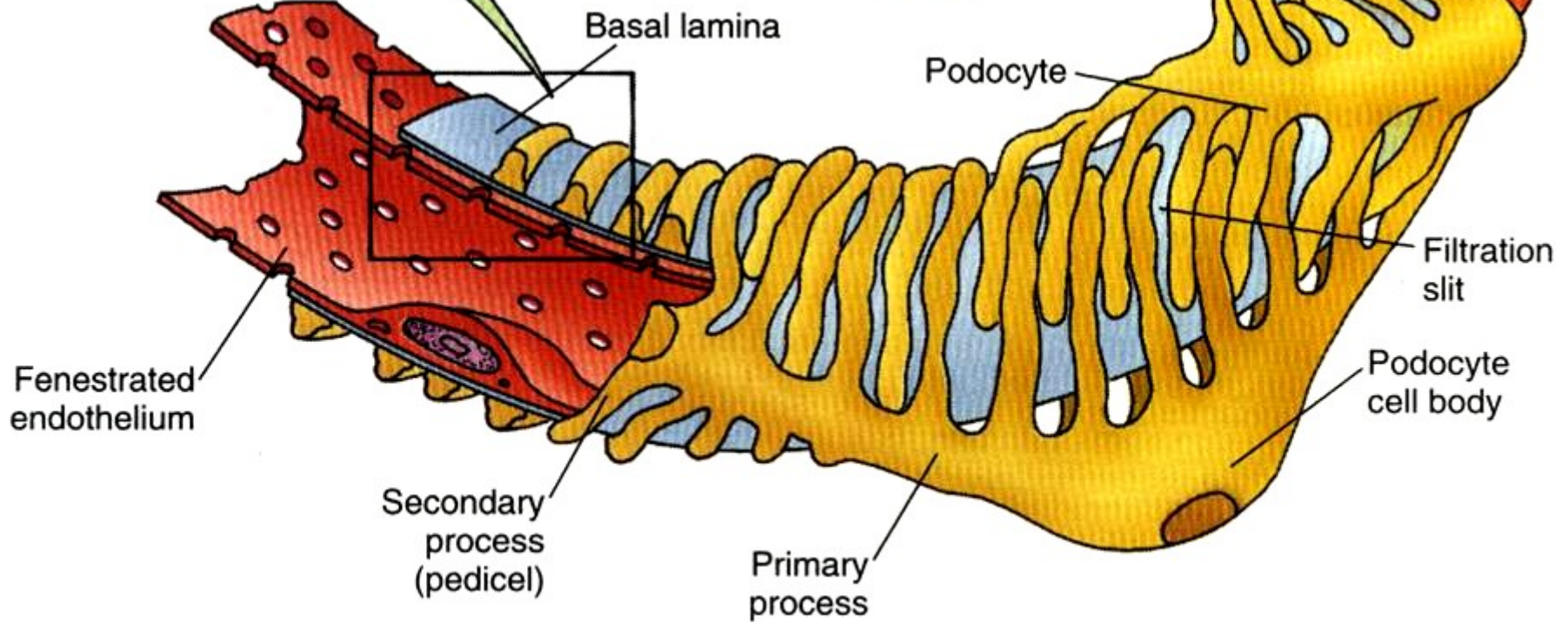
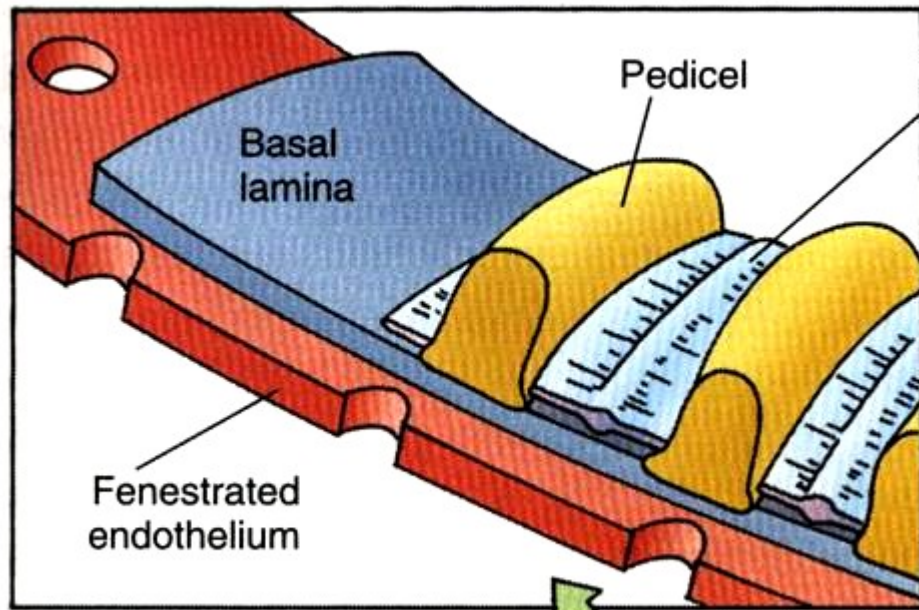
**Glomerulus**  
**Bowmanovo pouzdro**

**Ledvinný kanálek**  
tubulus renis

**Proximální tubulus**  
**Henleho klička**  
**Distální tubulus**

# Ledvinné tělíčko ( $\varnothing$ 200 $\mu\text{m}$ )



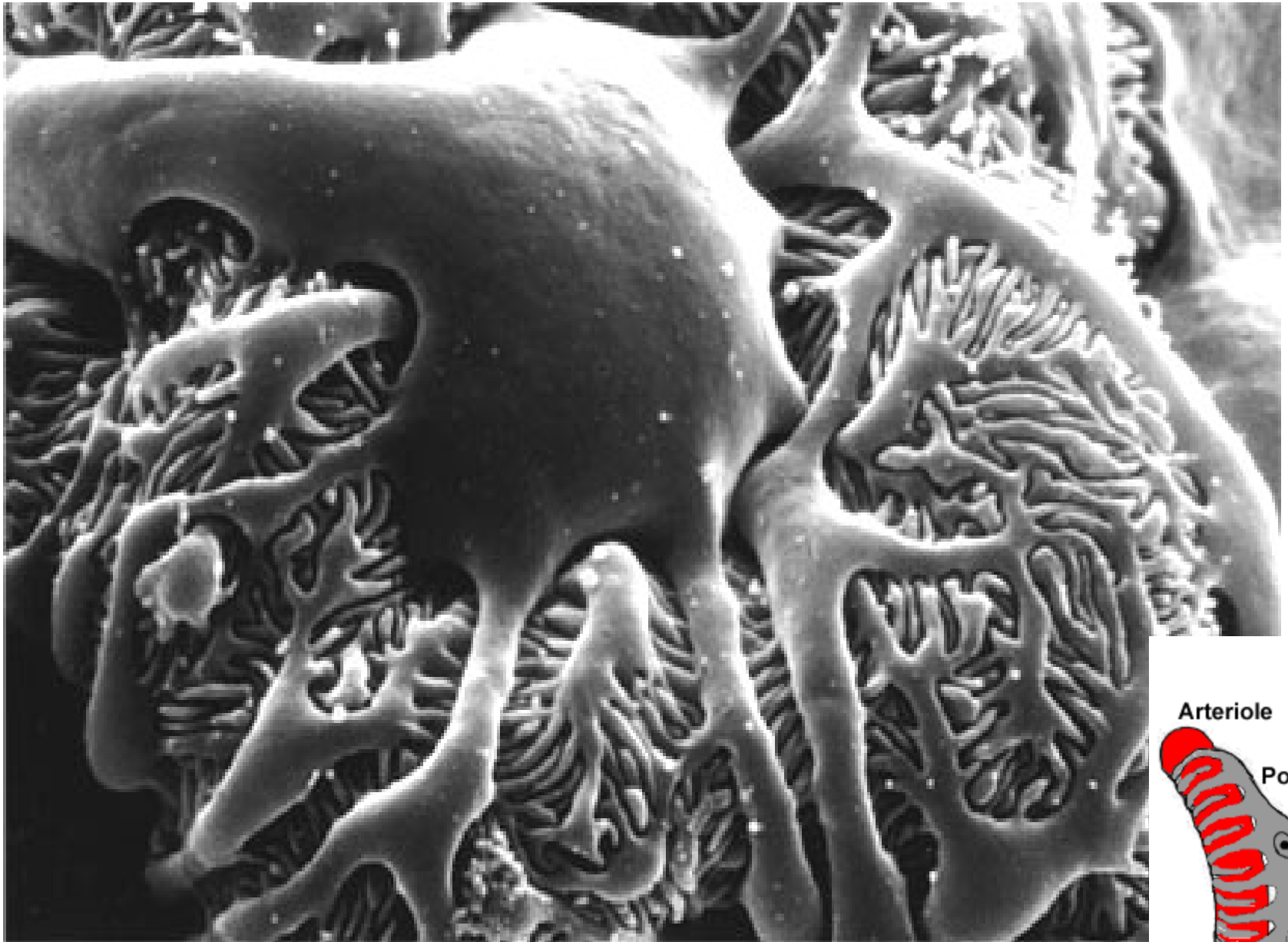




# Filtrační membrána

- endotelové buňky – fenestrace (póry)
- **splynulé bazální membrány** endotelu a podocytů:
- podocyty – **diafragma** přepažující štěrbinu mezi pedikly

# Podocyt (SEM)



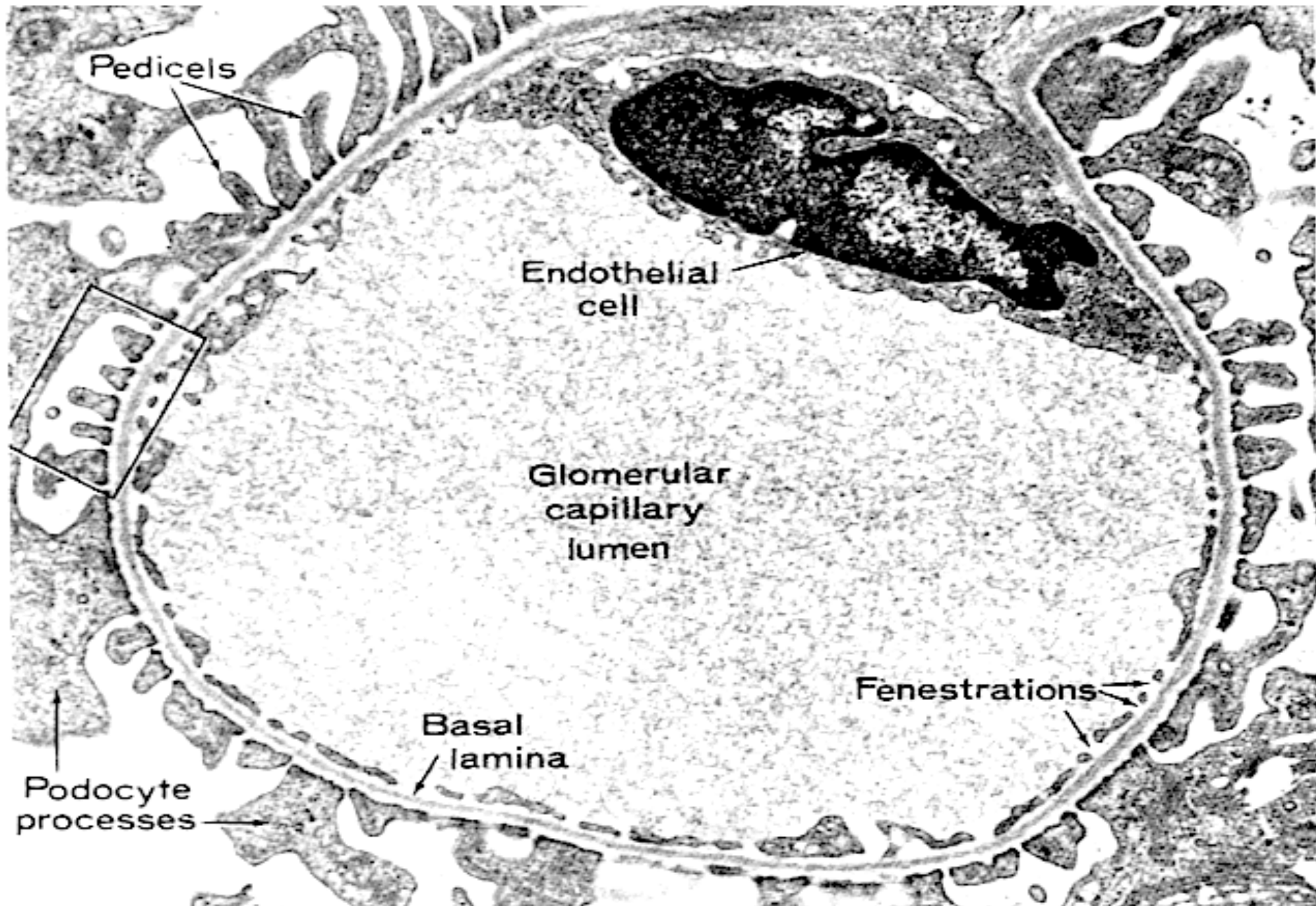
Arteriole

Podocyte

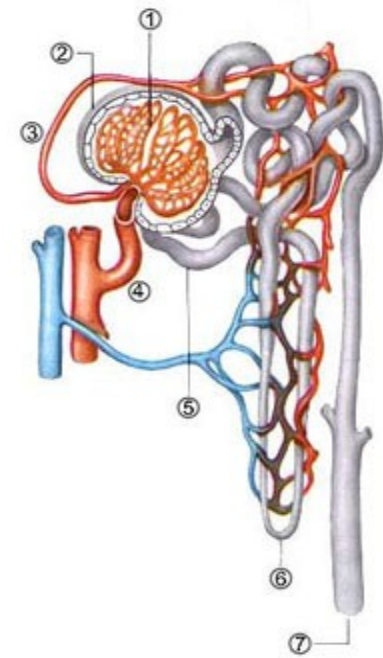
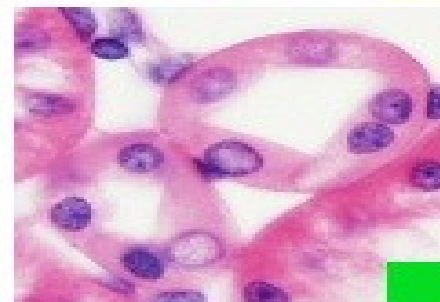
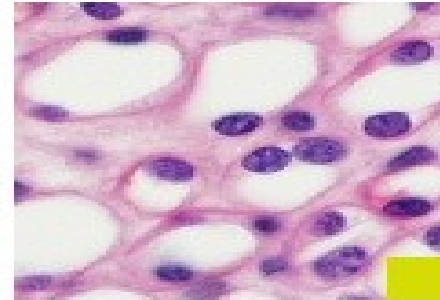
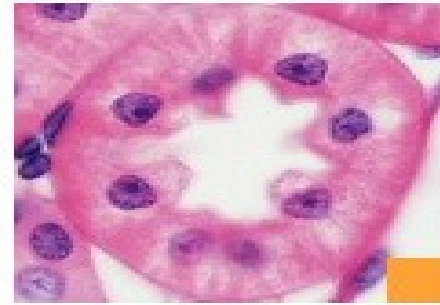
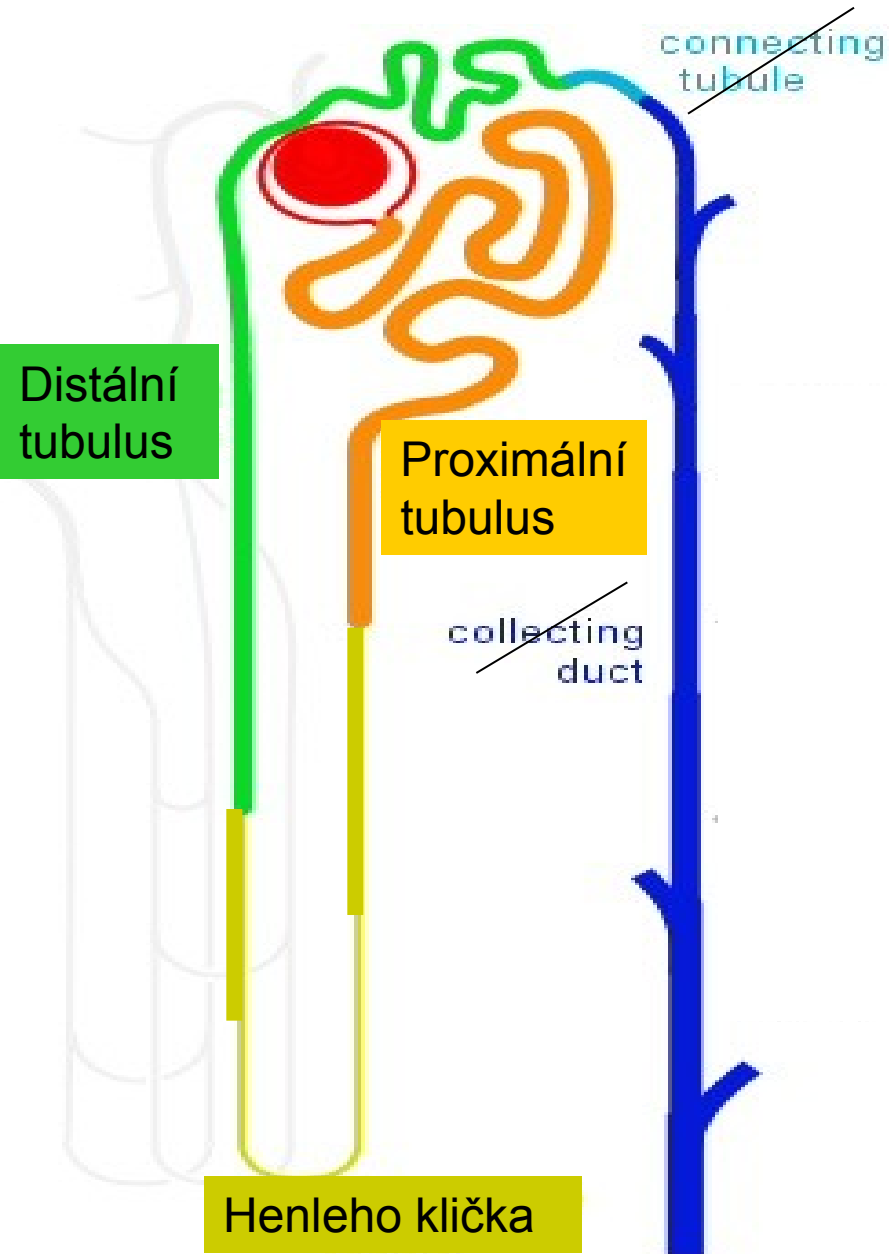




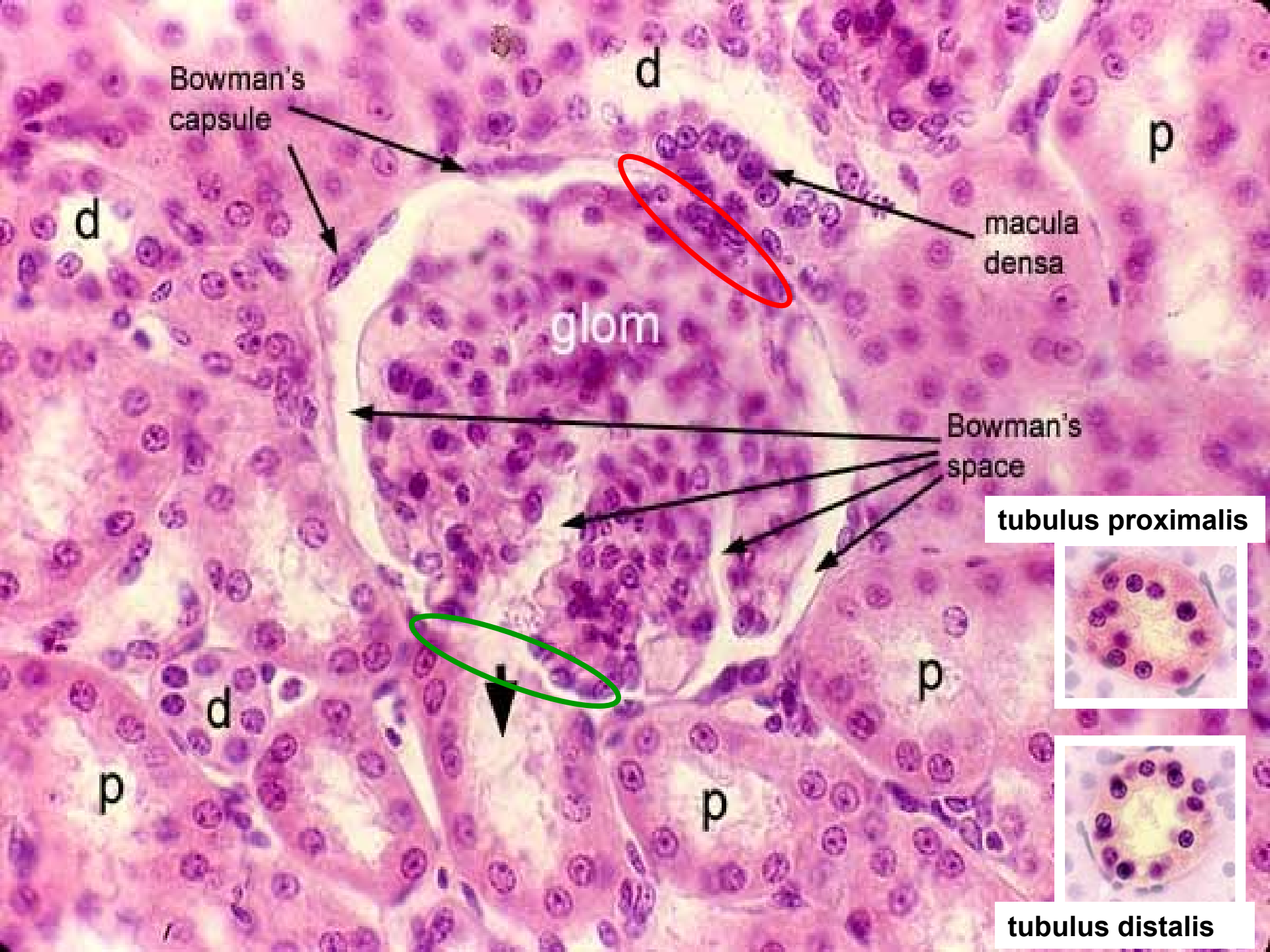
# Filtrační bariéra (TEM)



# Tubulus renis







Bowman's capsule

d

p

d

macula densa

glom

Bowman's space

tubulus proximalis

p

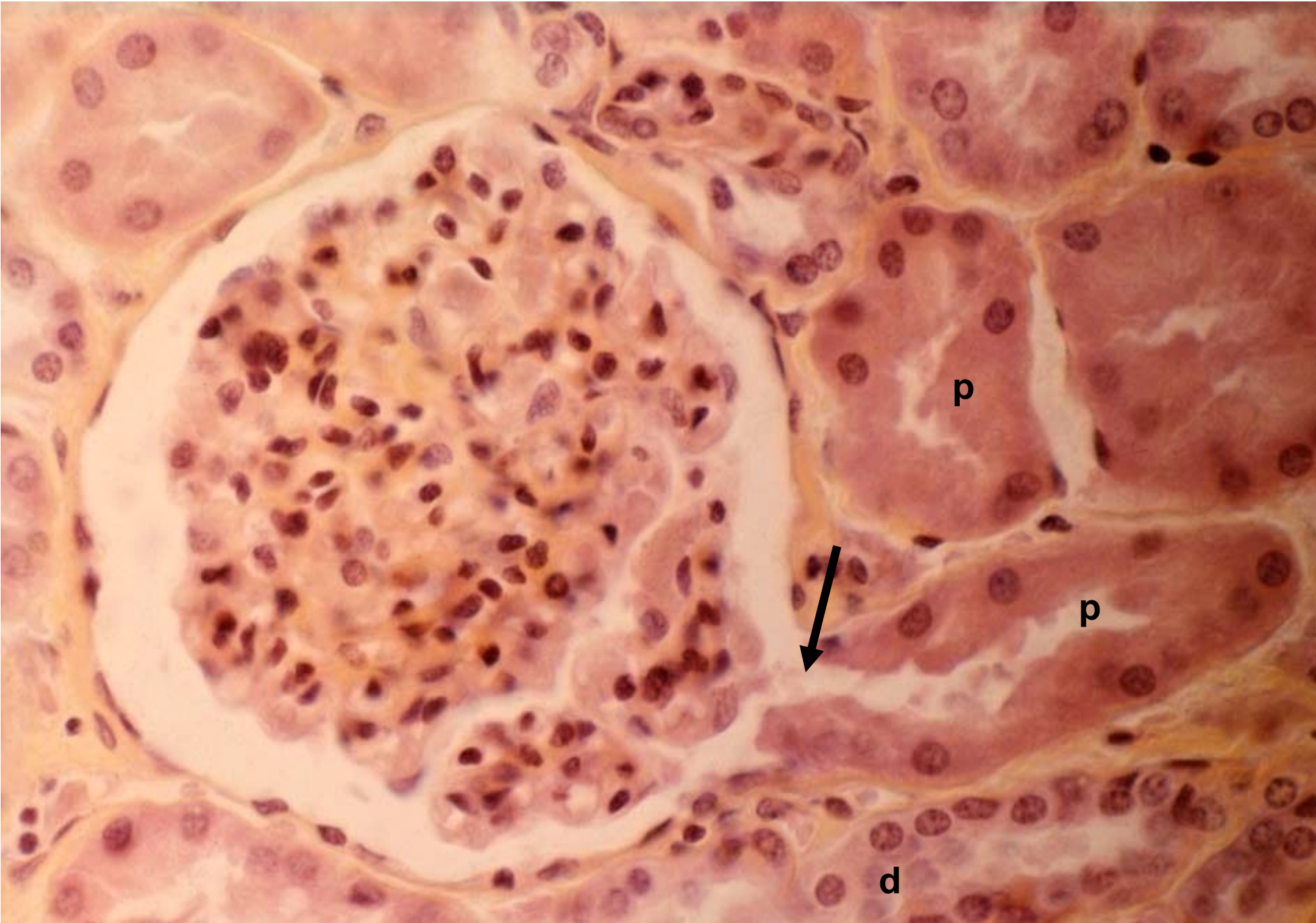
d

p

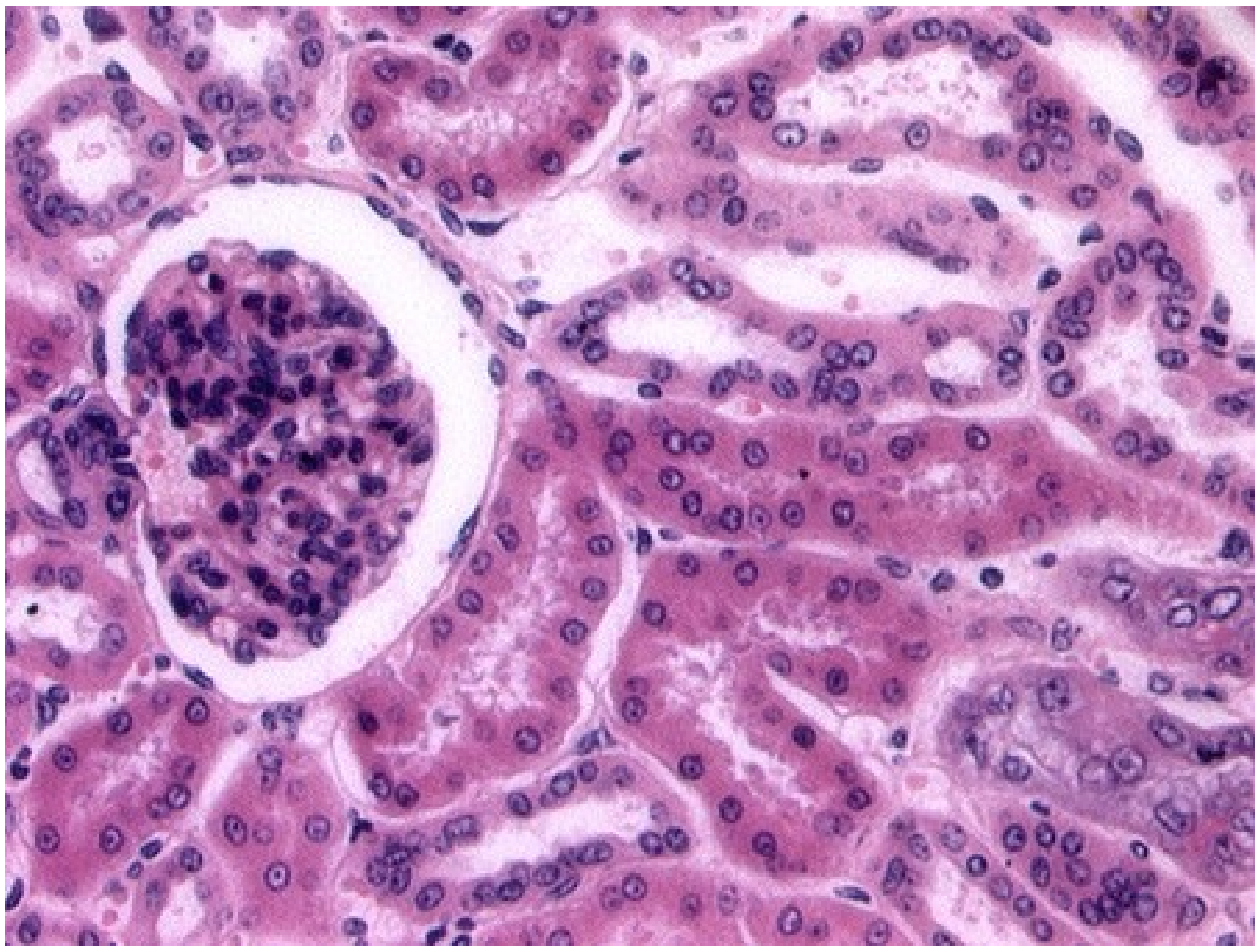
p

tubulus distalis

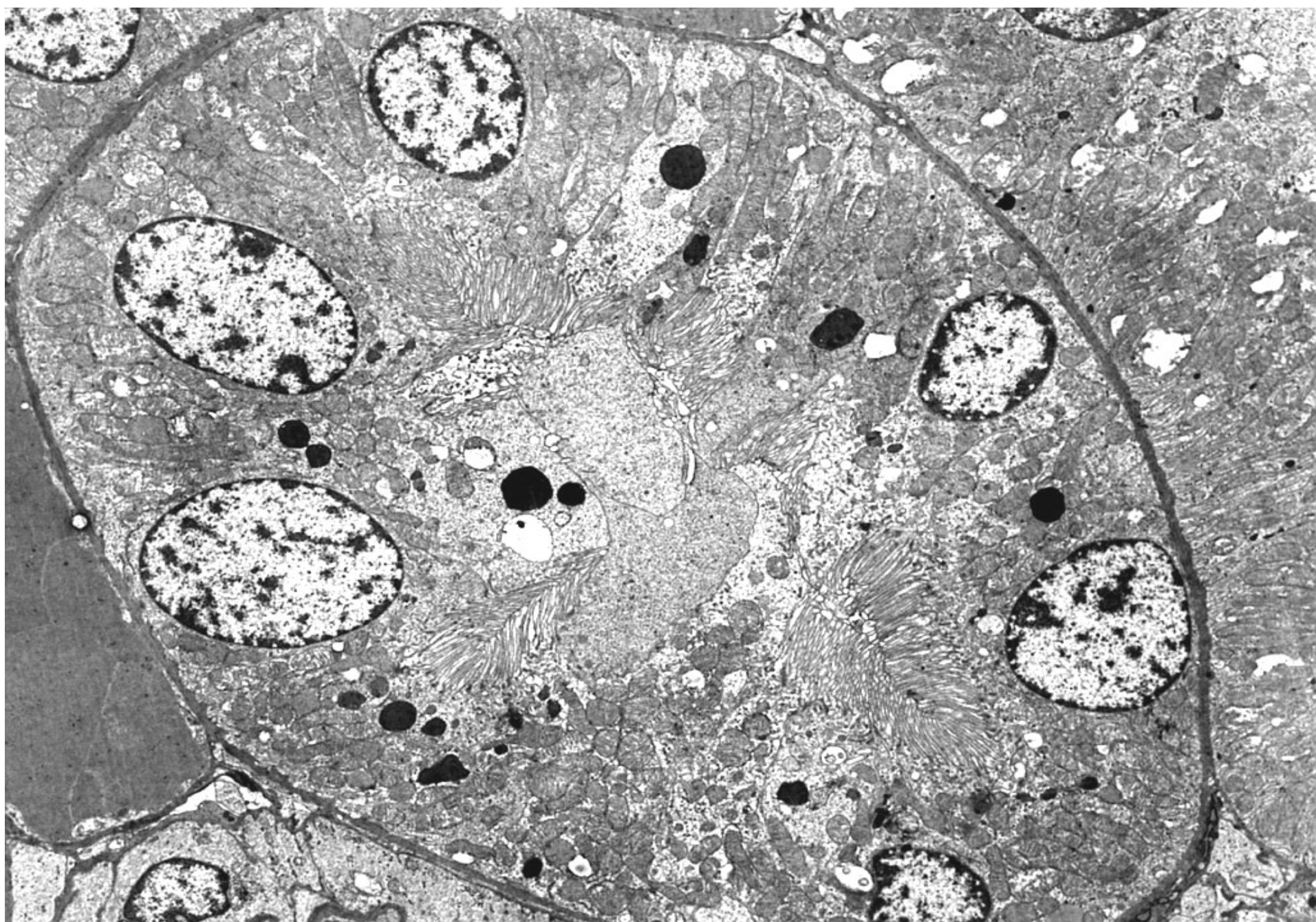
Ren (HE) – corpusculum renis, močový pól ↓



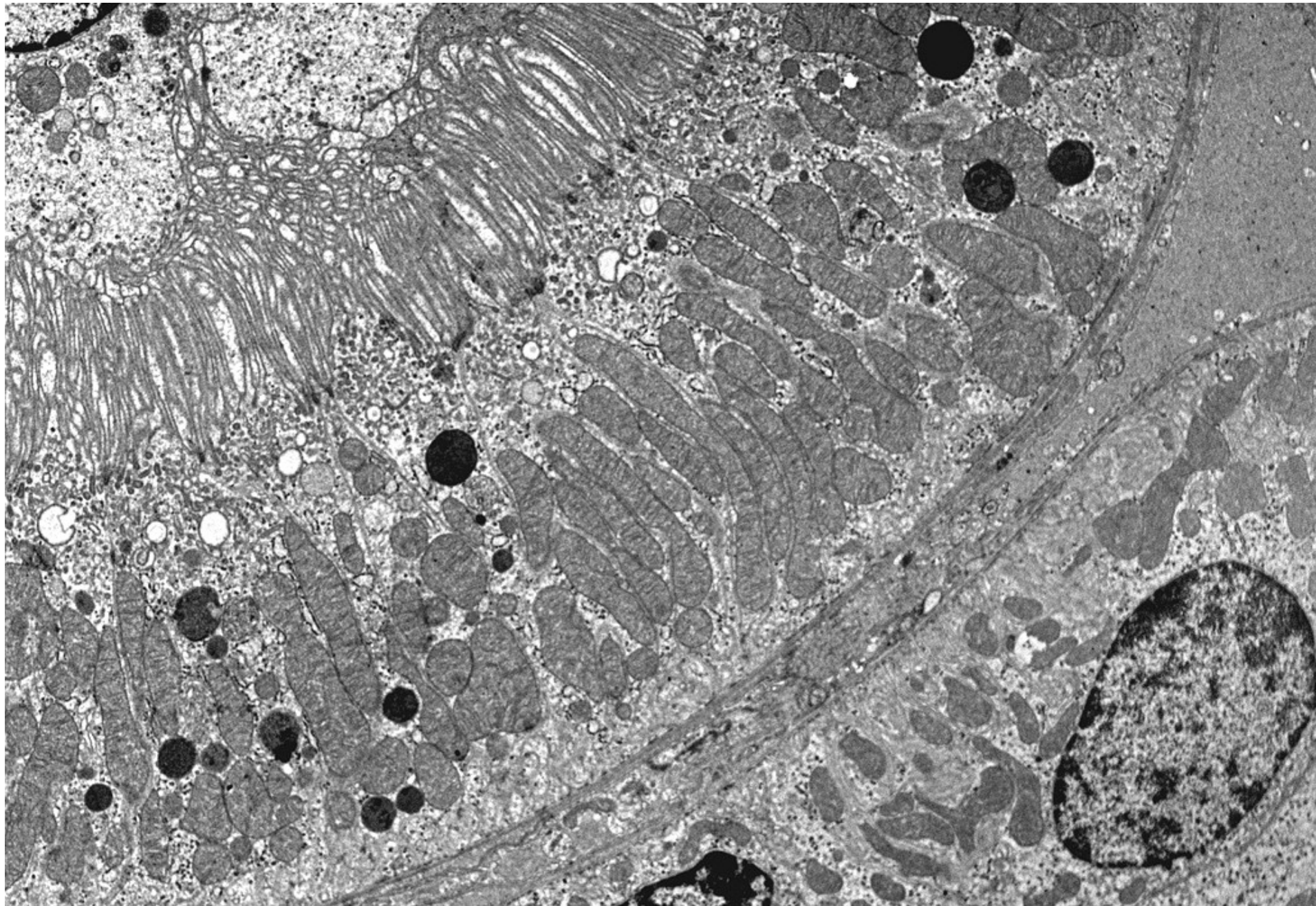




Ren – proximální tubulus (ELM): kartáčový lem, bazální labyrint



Ren – proximální tubulus (ELM): kartáčový lem, bazální labyrint



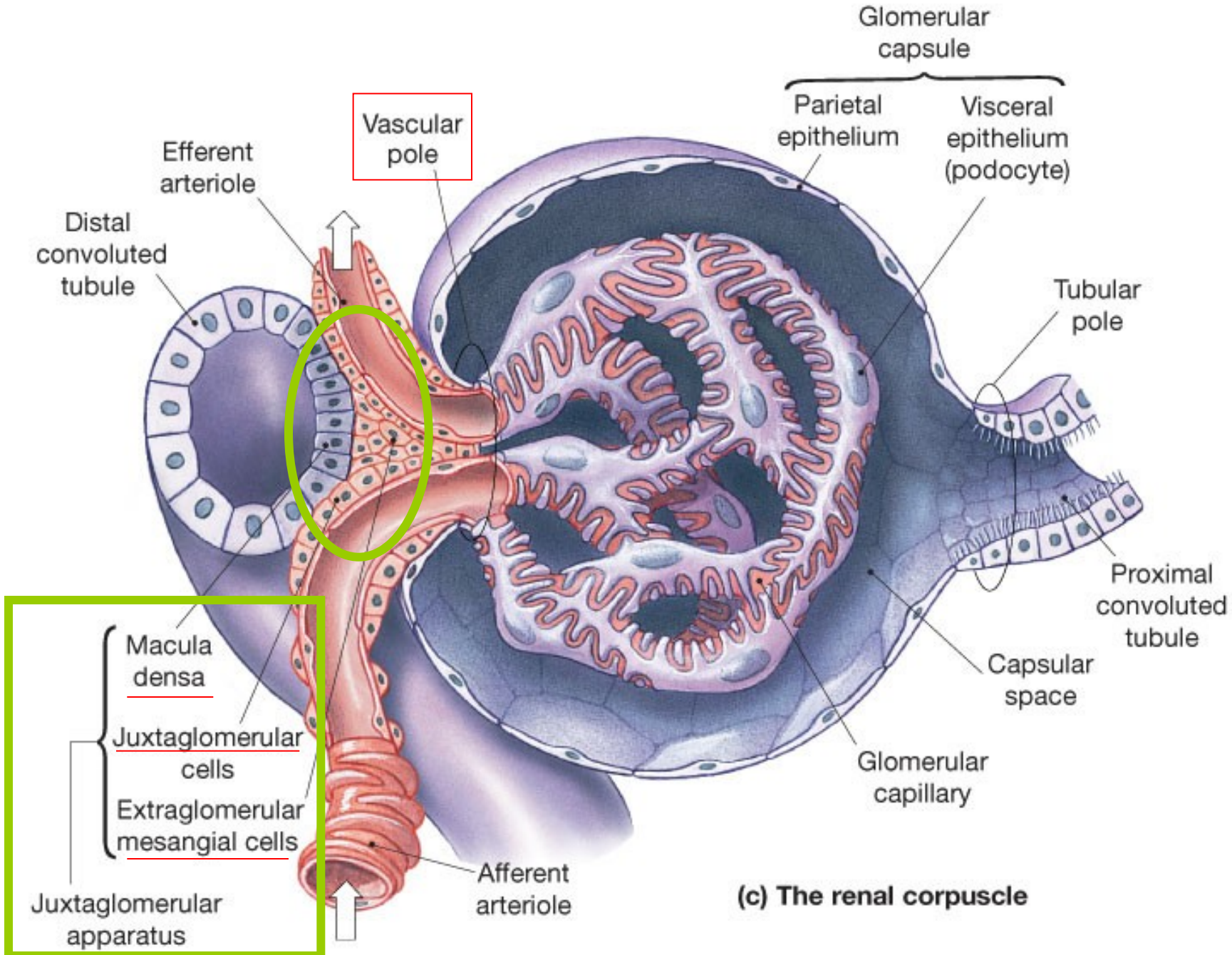


# Juxtaglomerulární aparát

(produkce reninu a erythropoetinu)

## Endokrinní buňky ledviny

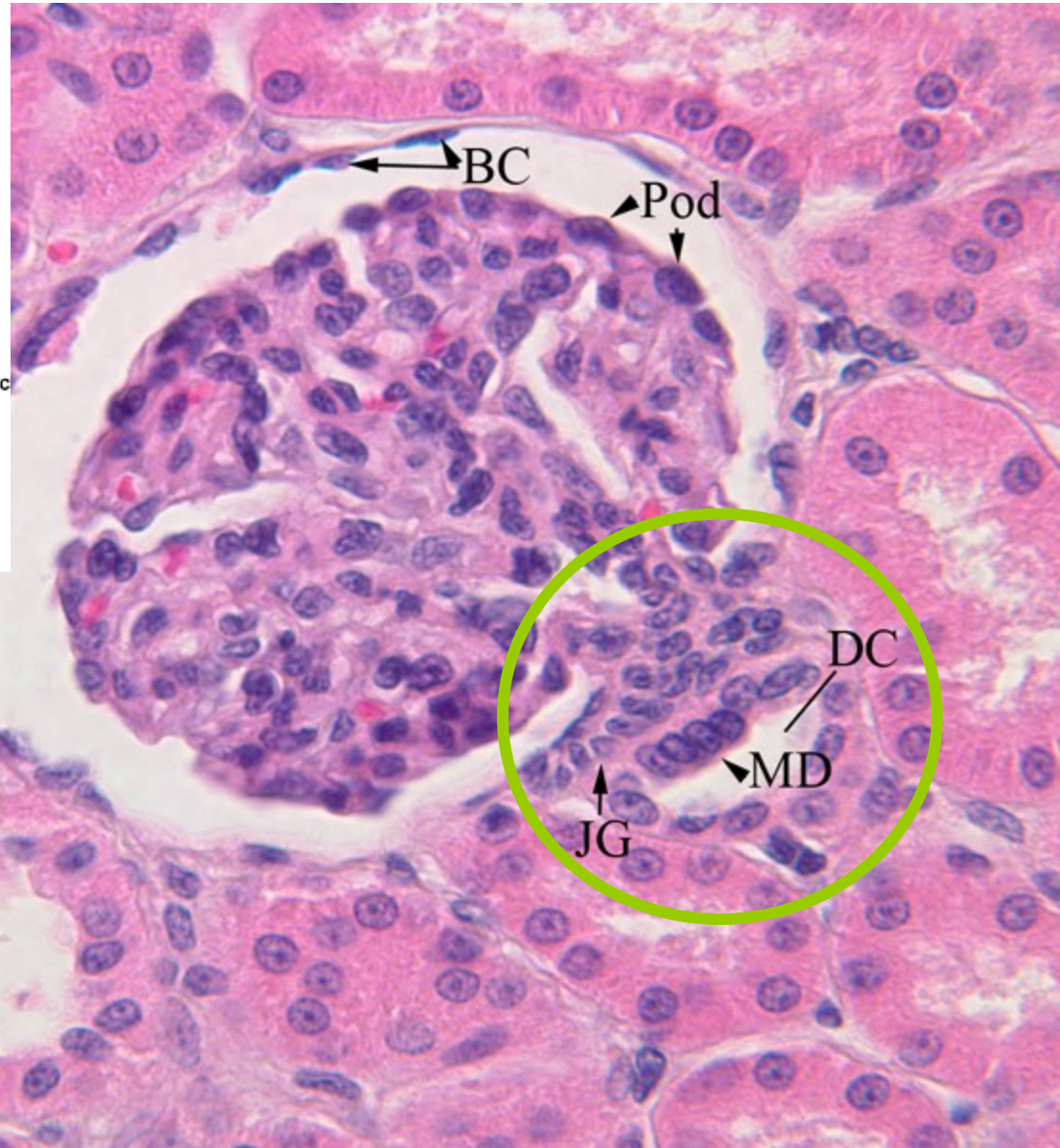
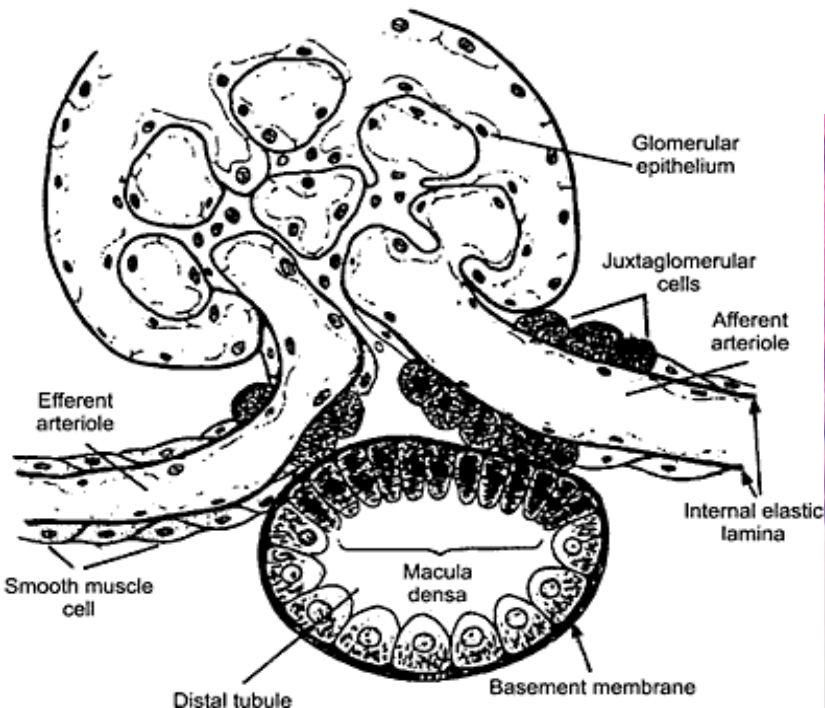
- **juxtaglomerulární buňky** (přeměněné hladké svalové buňky ve stěně vas afferens)
- **macula densa** (bb. distálního tubulu)
- **mesangiální buňky** (extraglomerulární mesangium – přeměněné fibroblasty vmezeřené mezi kapiláry na vaskulárním pólu)



(c) The renal corpuscle



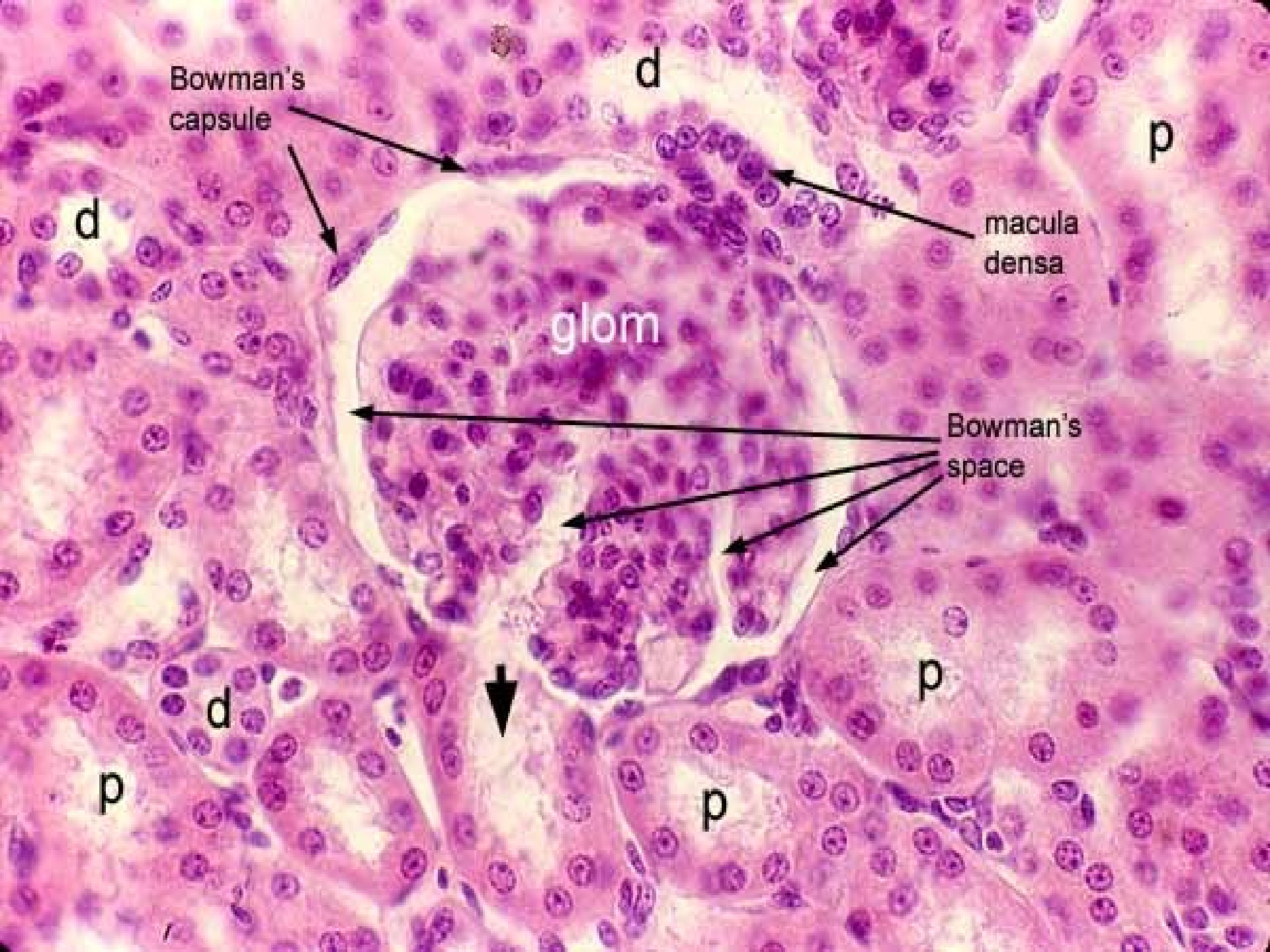
# Juxtaglomerulární aparát



BC - Bowman's capsule (parietal layer) Pod - podocyte (visceral layer of Bowman's capsule)

MD - macula densa JG - juxtaglomerular cells DC - distal convoluted tubule





Bowman's capsule

d

p

d

macula densa

glom

Bowman's space

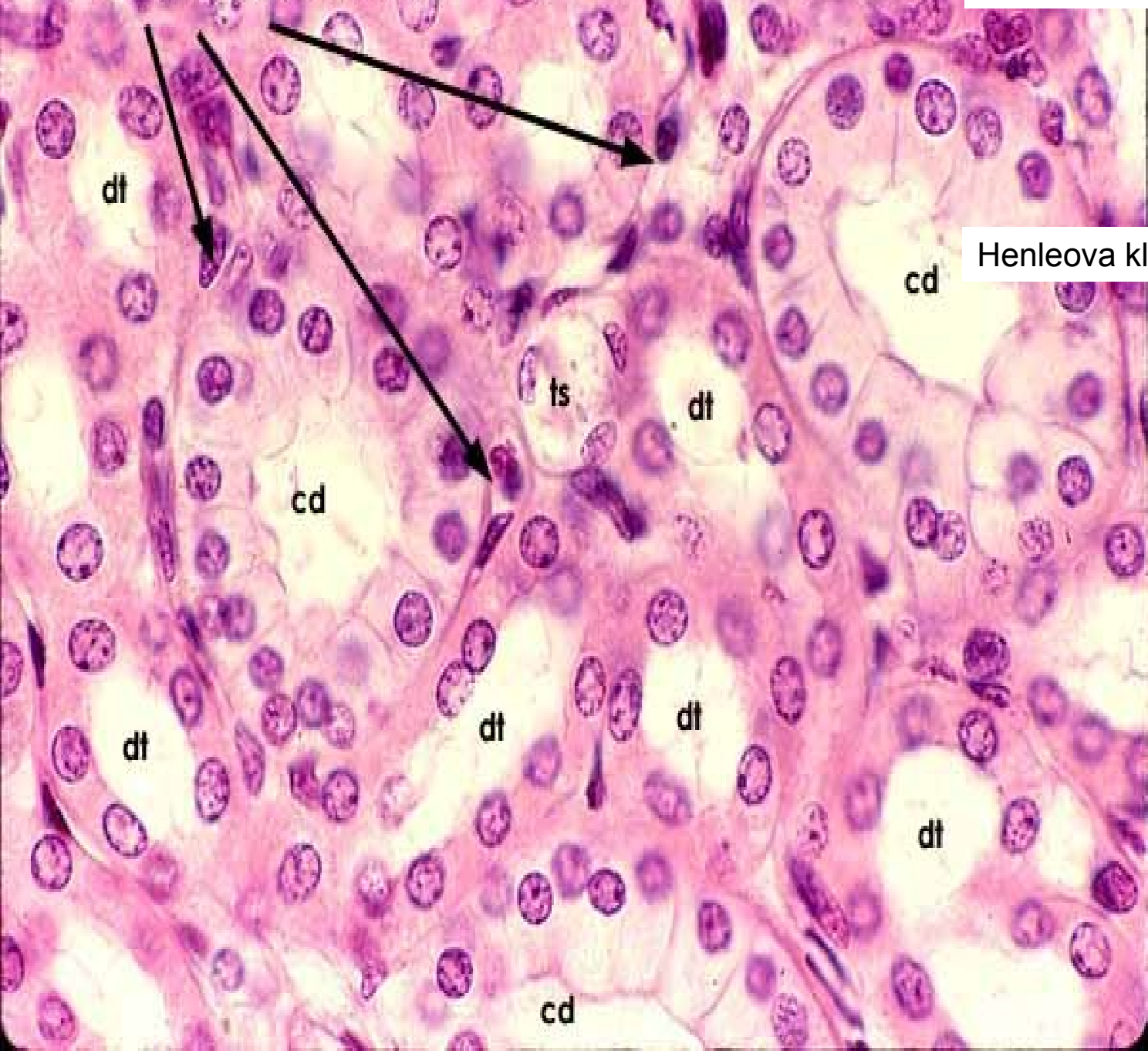
p

d

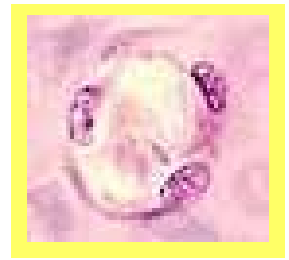
p

p

**stroma (medullary capillaries) Ren (HE): medulla**



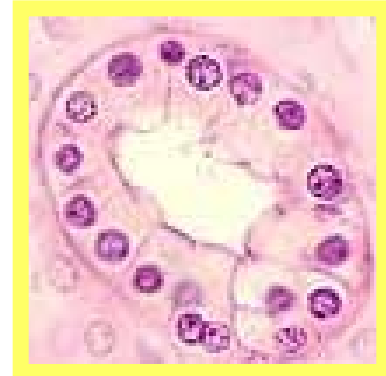
Henleova klička – tenký segment



Henleova klička – tlustý segment

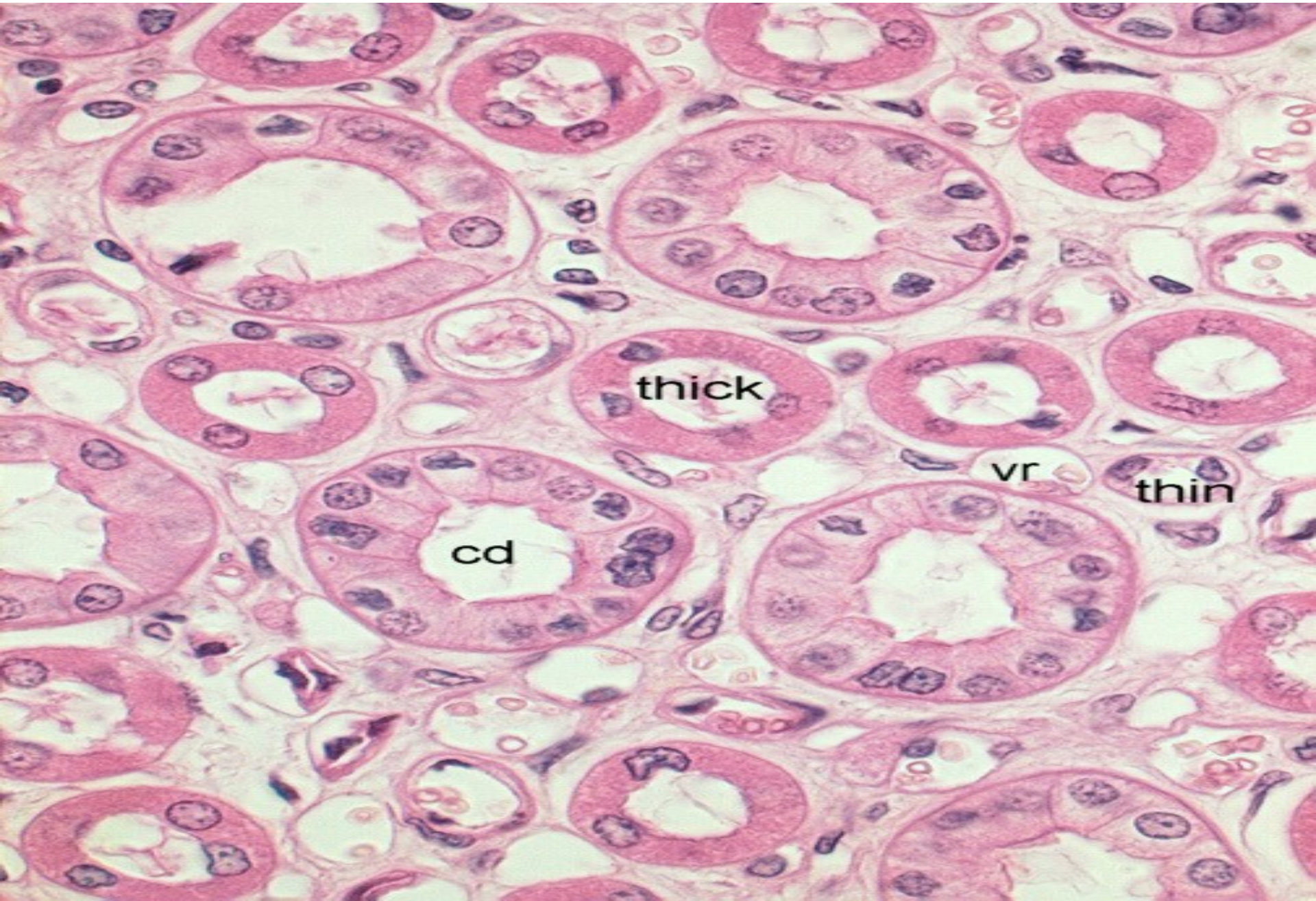


ductus colligens



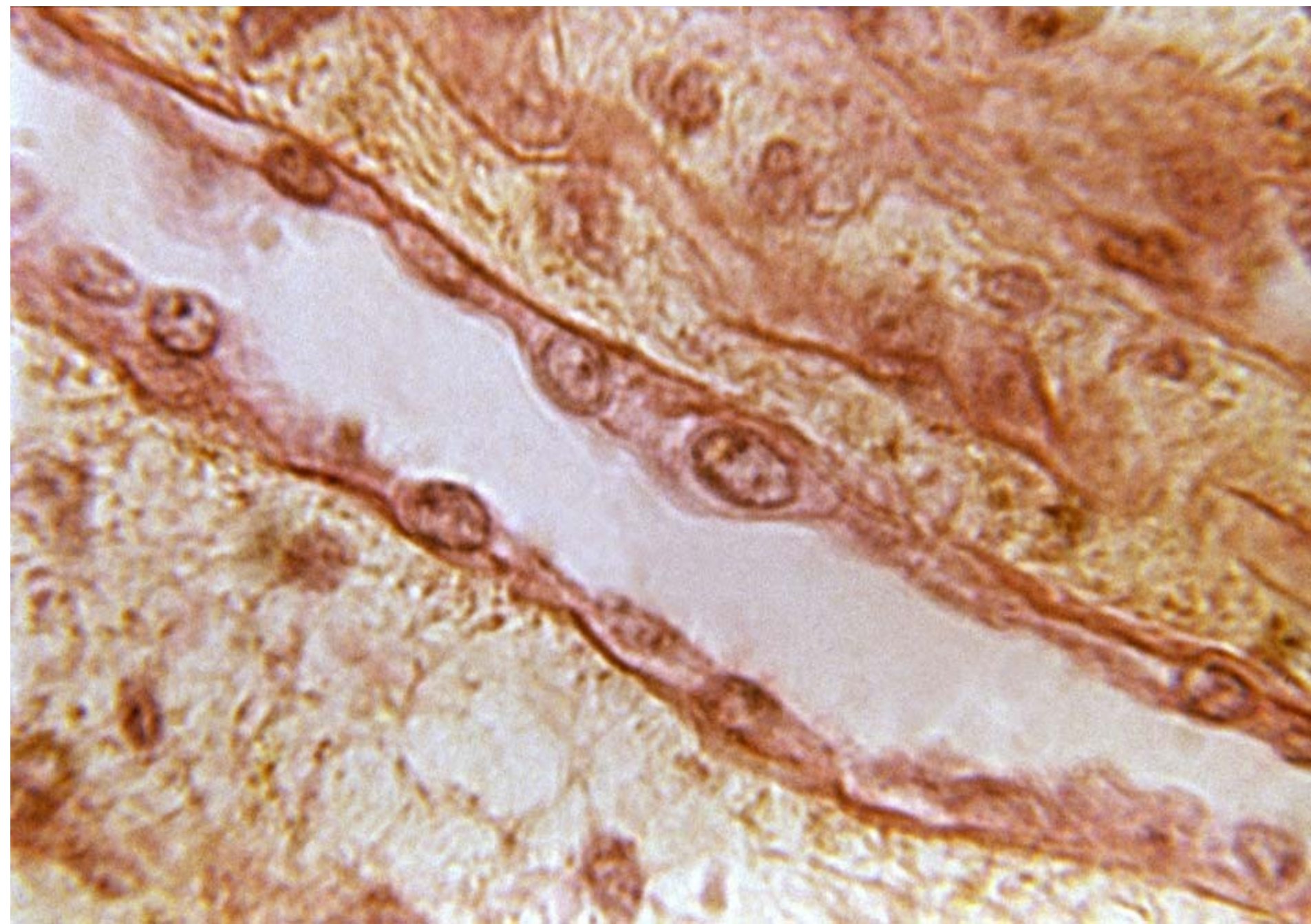


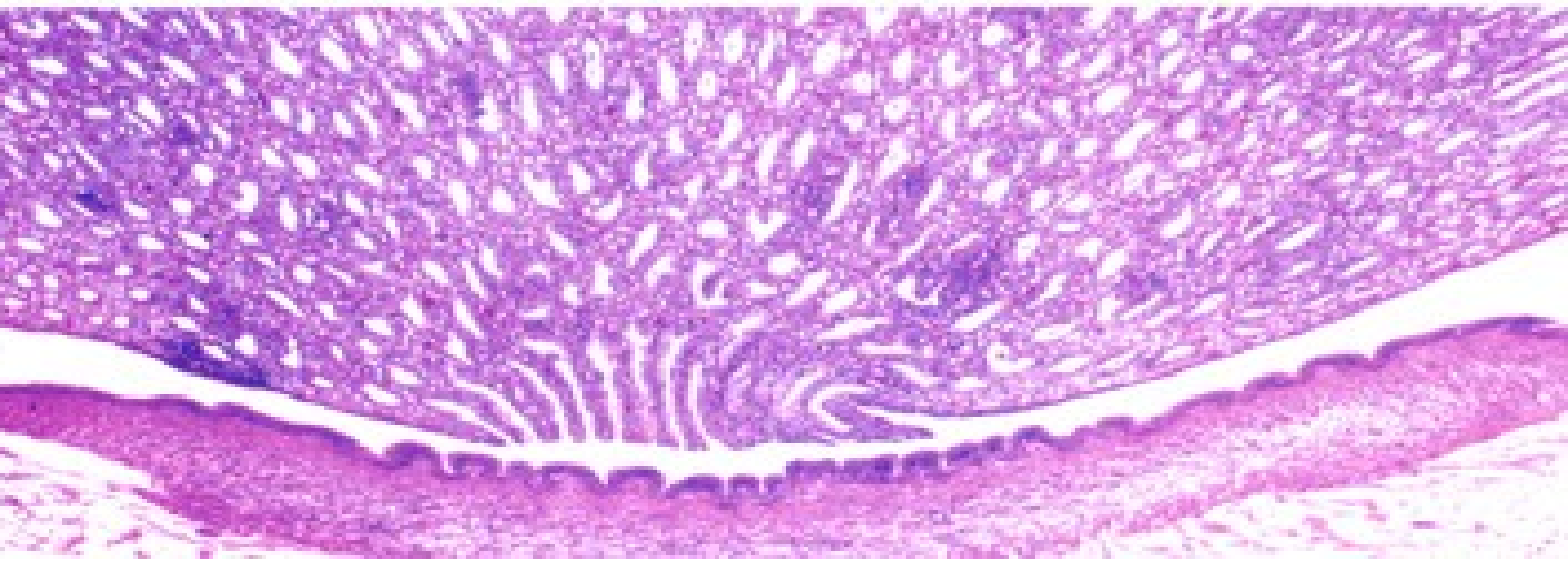
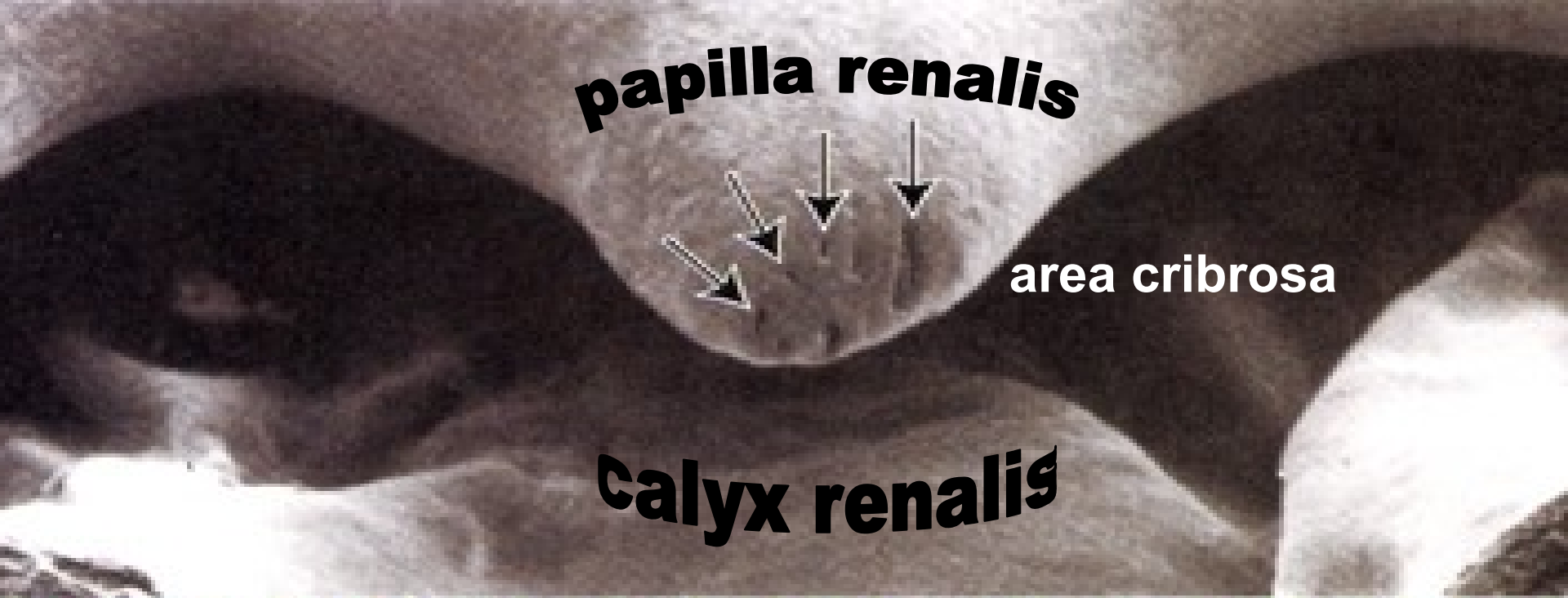
# Ren – medulla (HE)



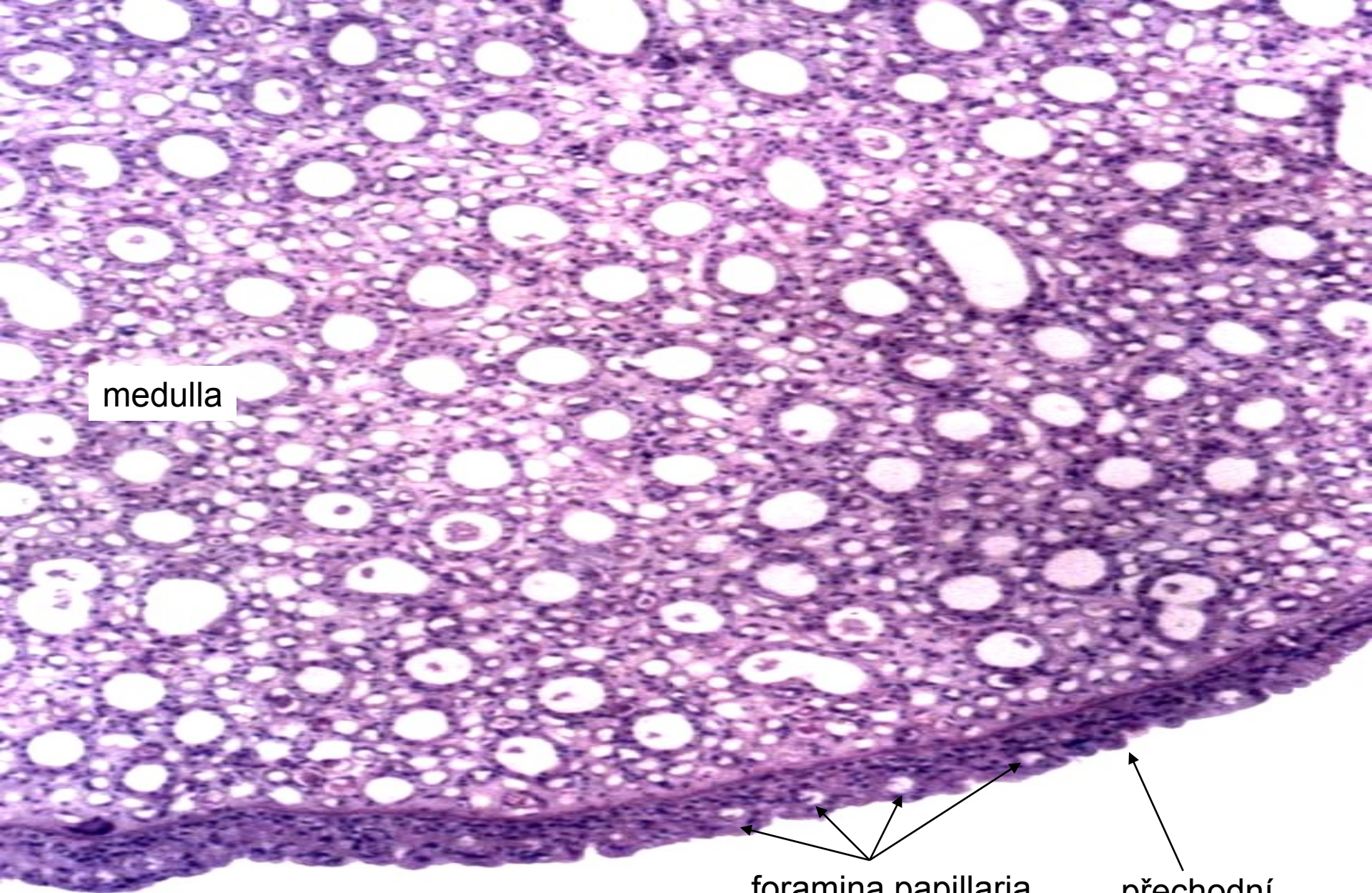


Ren (HES) – medulla: tenký segment Henleovy kličky (*podélně*)









medulla

foramina papillaria

přechodní  
epitel  
[urotel]

Area cribrosa na papilla renalis



# Vývodné močové cesty

- **intrarenální:**

  - sběrací kanálky**

  - papilární kanálky**

- **extrarenální:**

  - kalíšky a kalichy**

  - pánvička ledvinná**

  - močovod (ureter)**

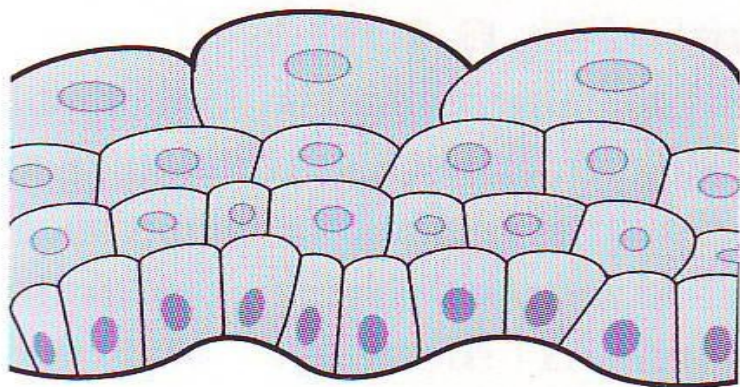
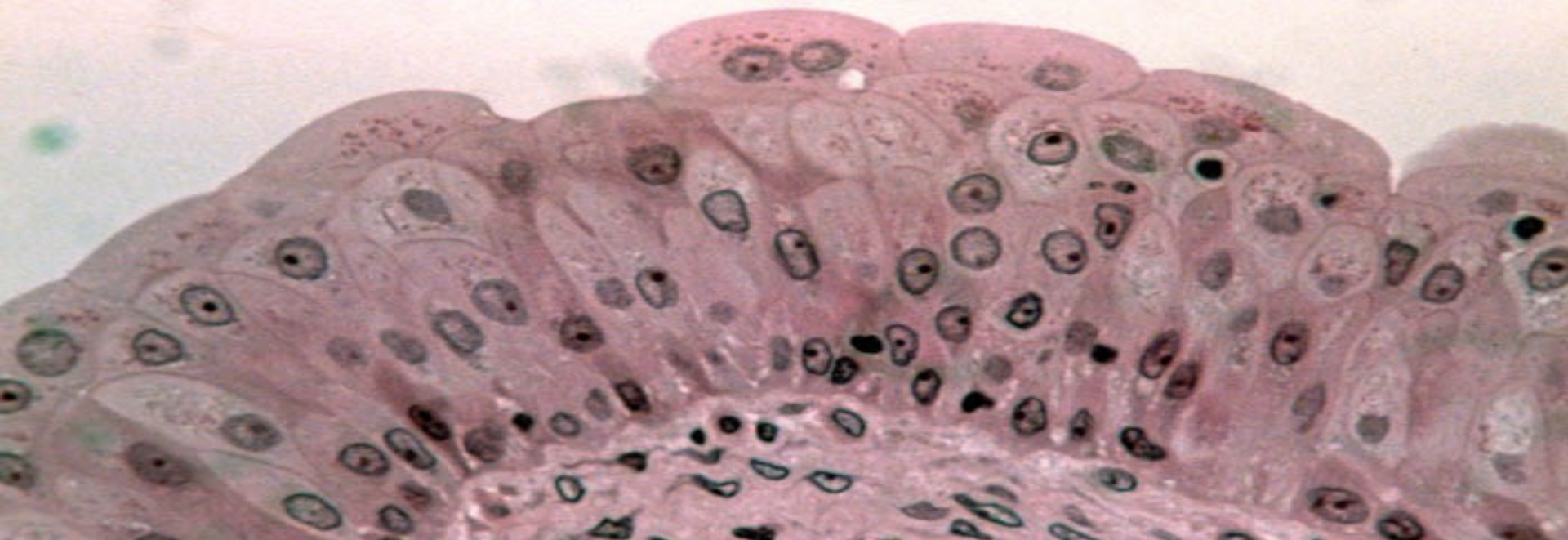
  - močový měchýř (vesica urinalis)**

  - močová trubice (urethra)** (ženská, mužská)

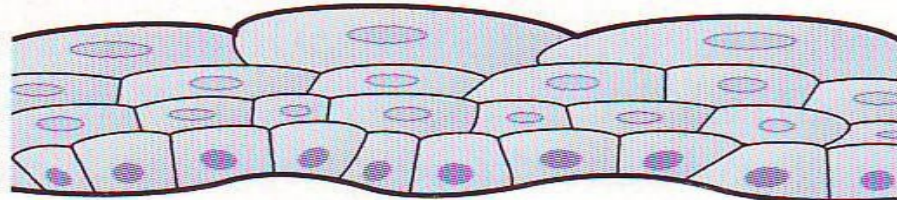
# Extrarenální vývodné cesty

stavba stěny – obecně

- **sliznice:** epitel, lamina propria mucosae
- **tunica muscularis:** hladká svalová tkáň uspořádaná do 2 vrstev (nebo 3 – dolní 1/3 ureteru, močový měchýř)
- **adventicie**  
(močový měchýř – částečně seróza)



A - prázdný orgán

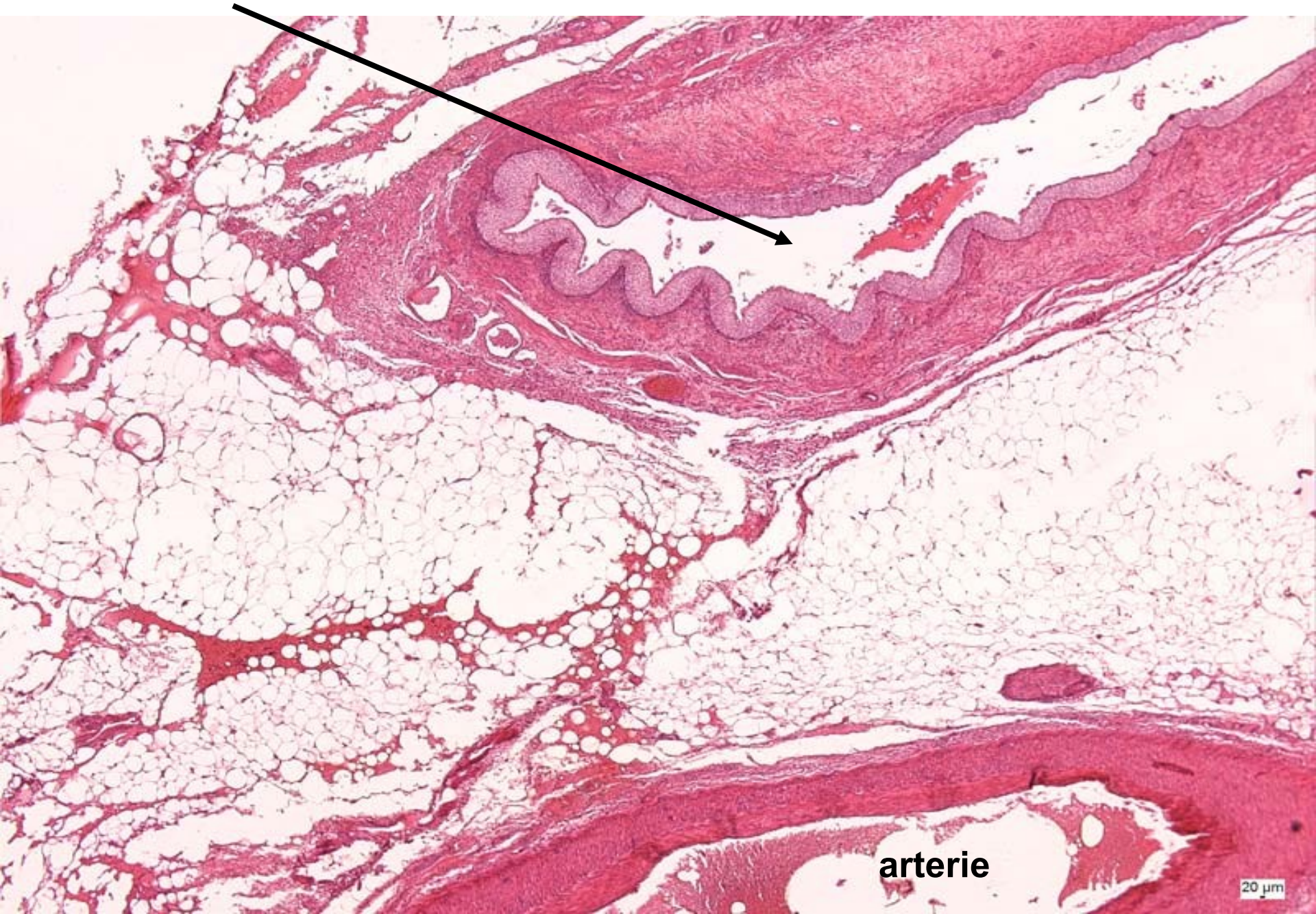


B - plný orgán

**Přechodní epitel** (kalichy a pánvička, močovod, moč. měchýř)



# Calyx renalis (HE)



arterie

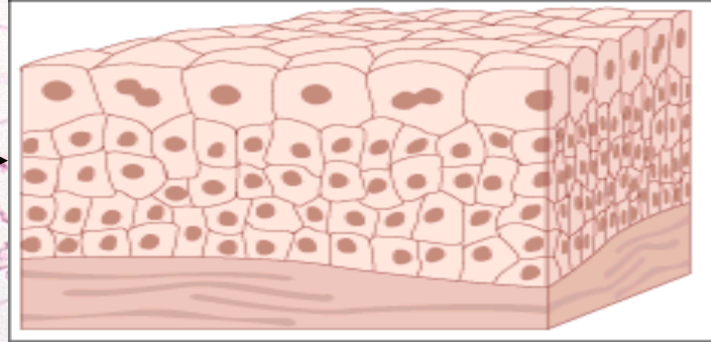
20 µm



# Ureter: podélné řasy

Sliznice – přechodní epitel  
l. propria

Zevní vrstva svalová – long., cirk., (long.)  
Adventicie





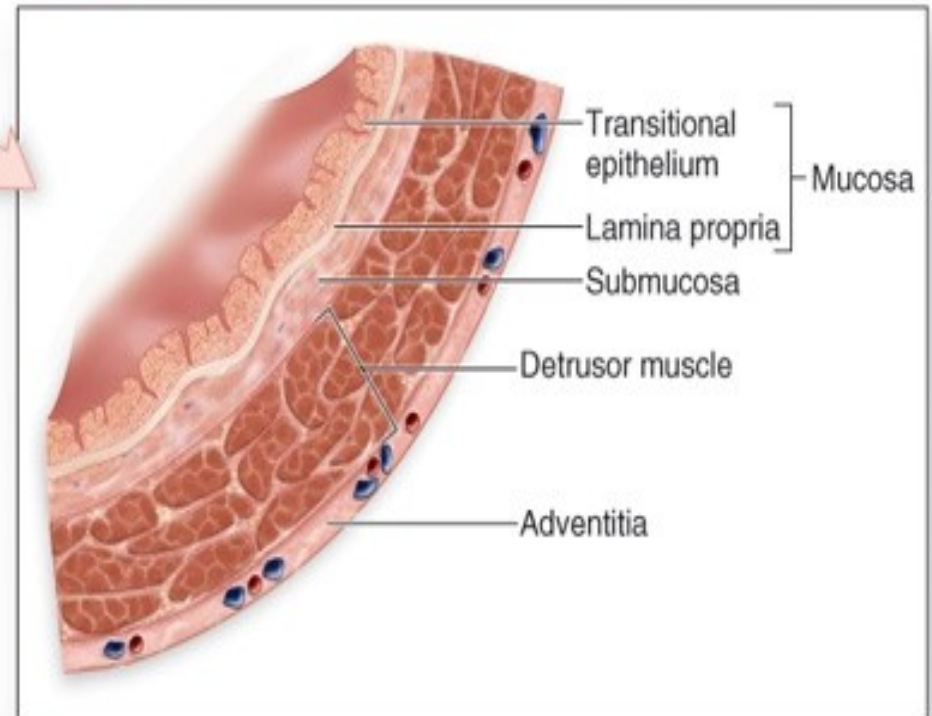
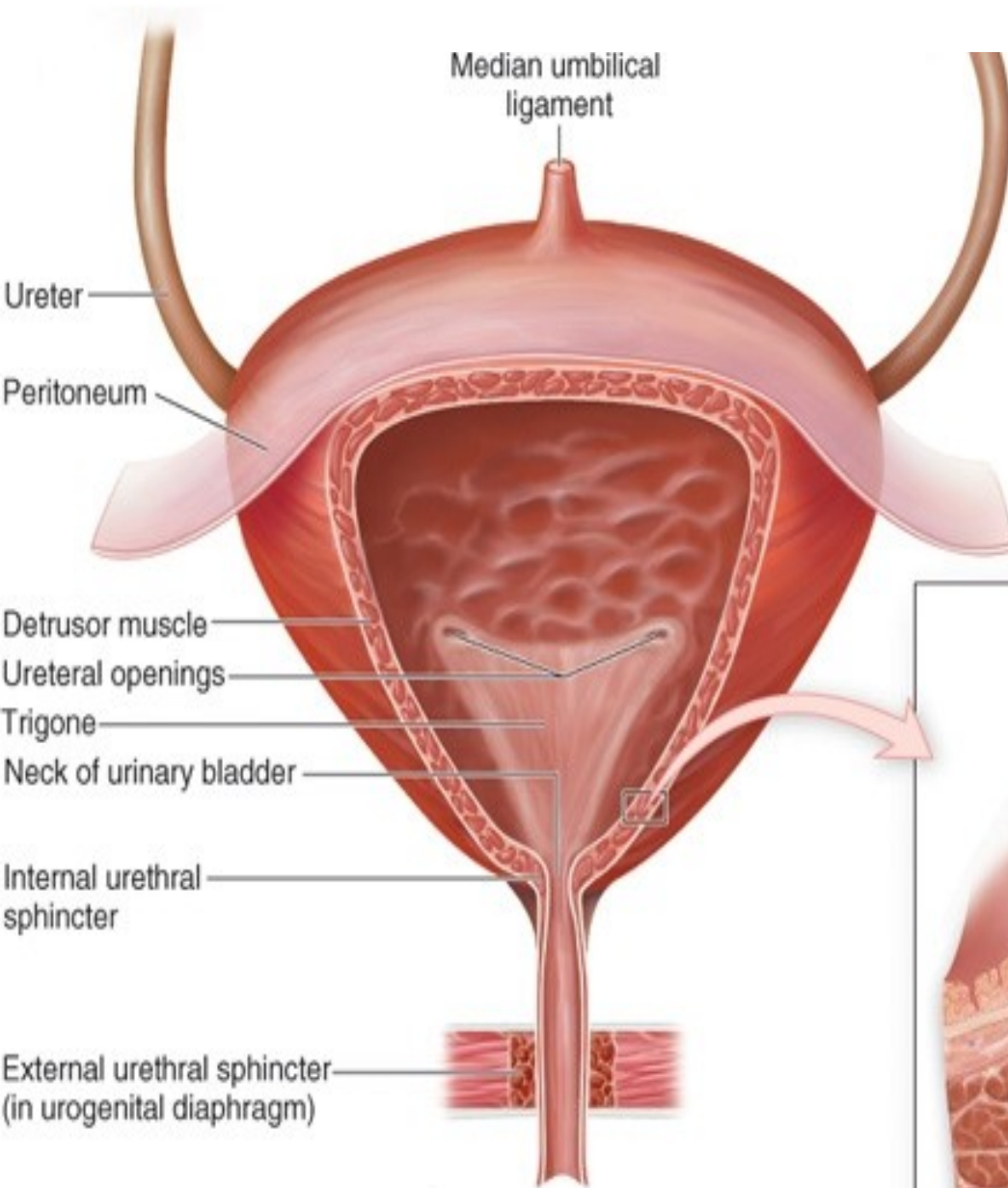
# Ureter (HEŠ)





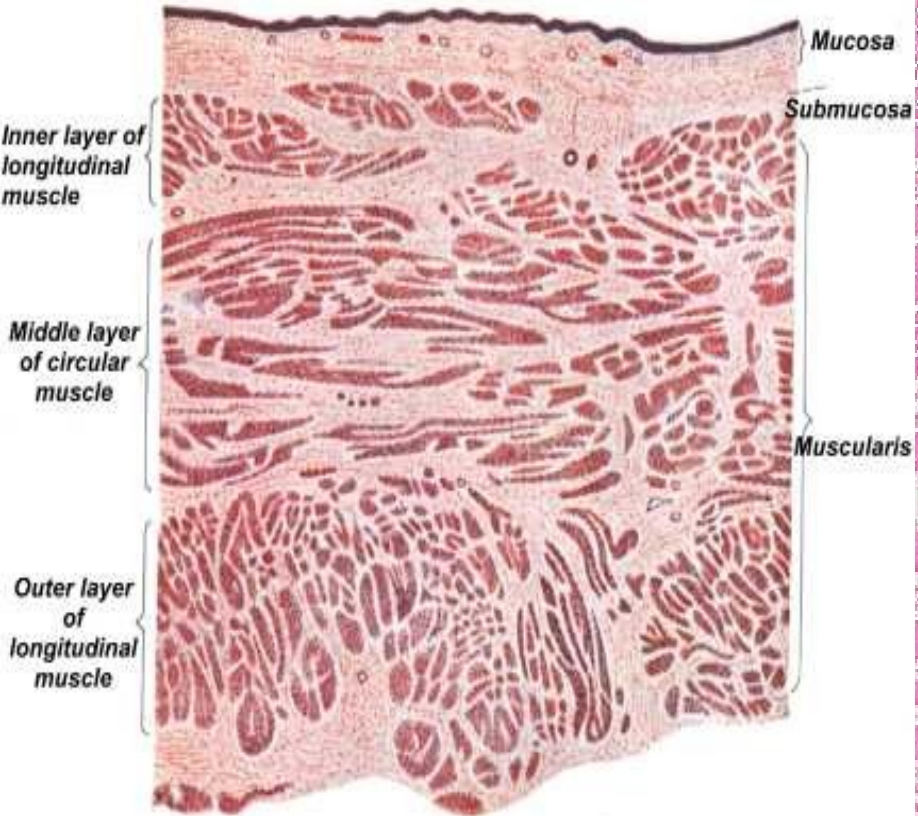
# Vesica urinalis

Sliznice – přechodní epitel  
lamina propria  
Zevní vrstva svalová  
Adventicie



(a)

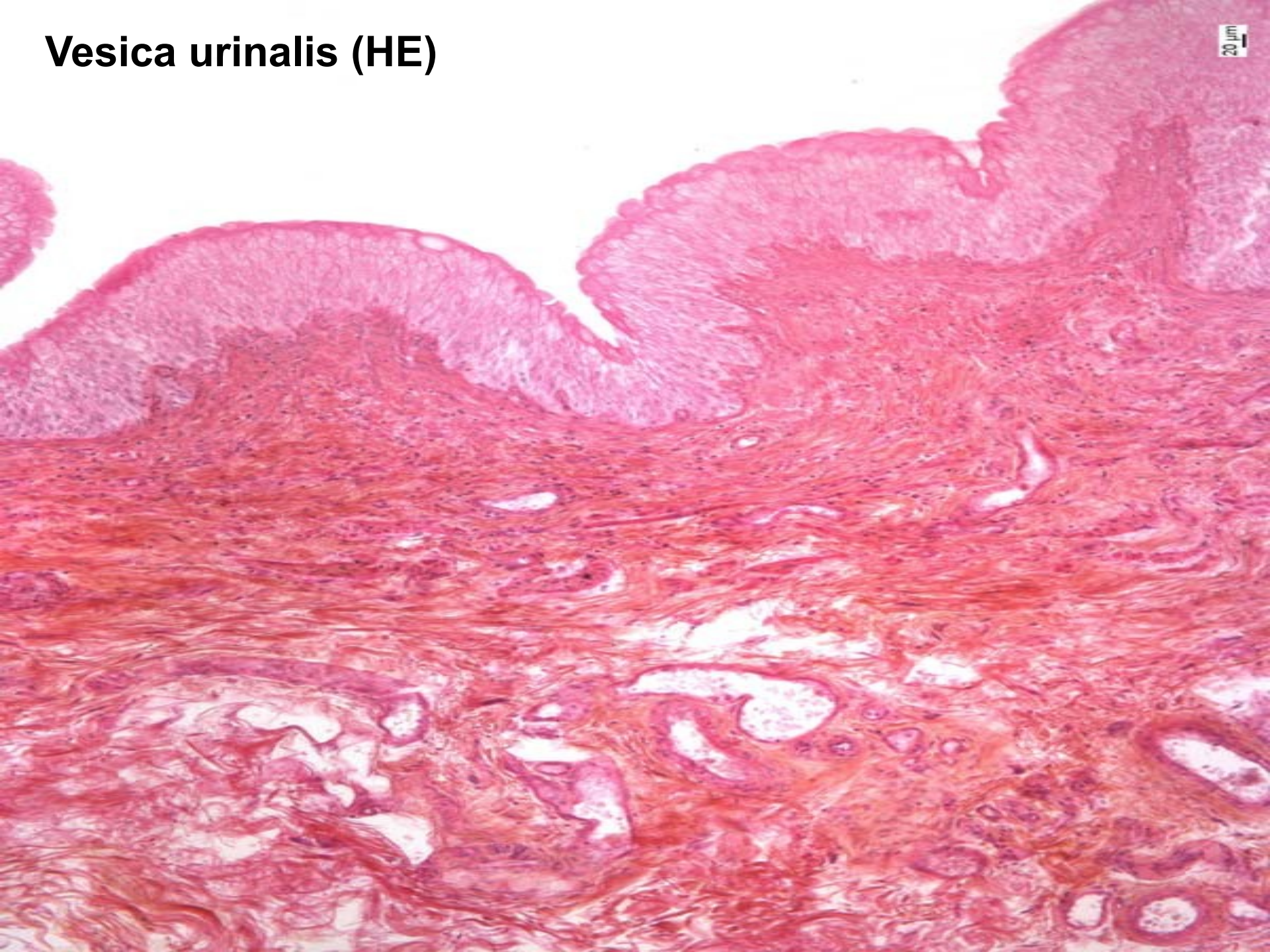
# Močový měchýř





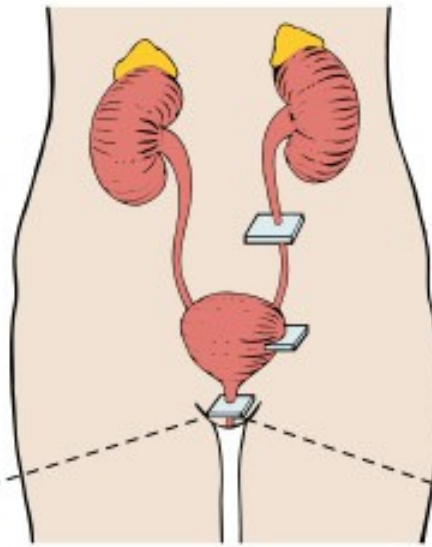
# Vesica urinalis (HE)

20 µm

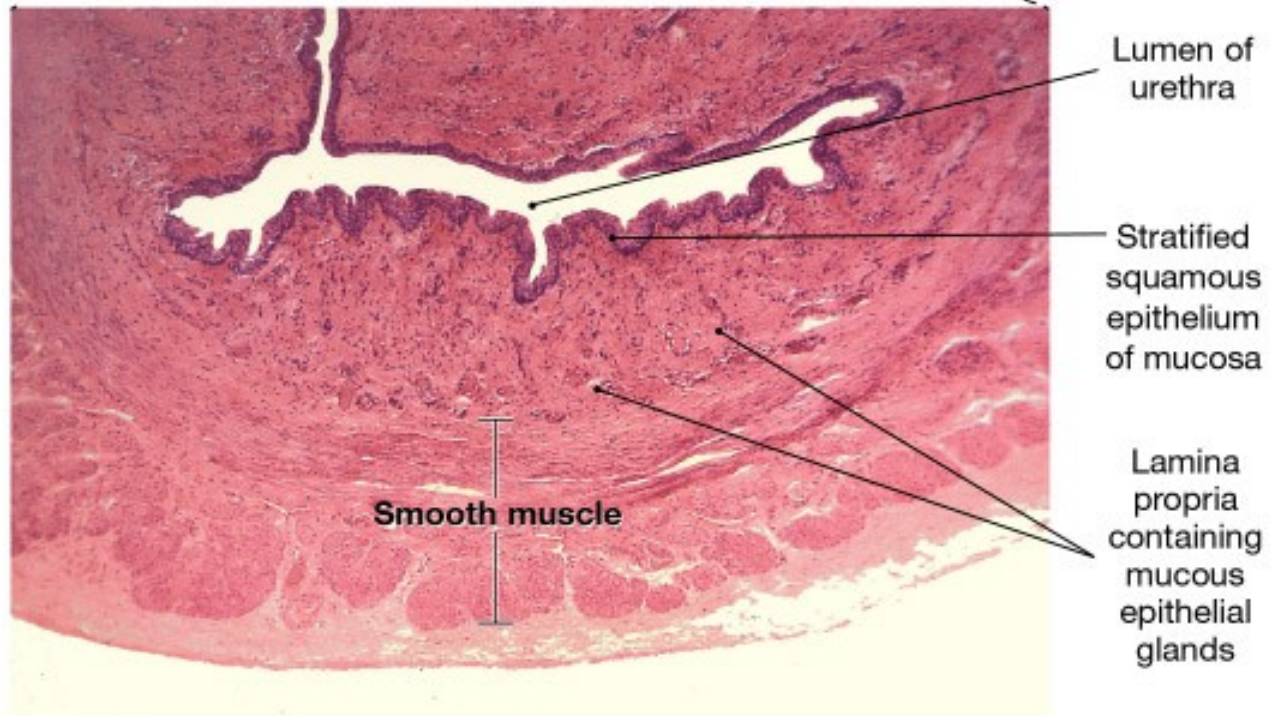




# Urethra feminina



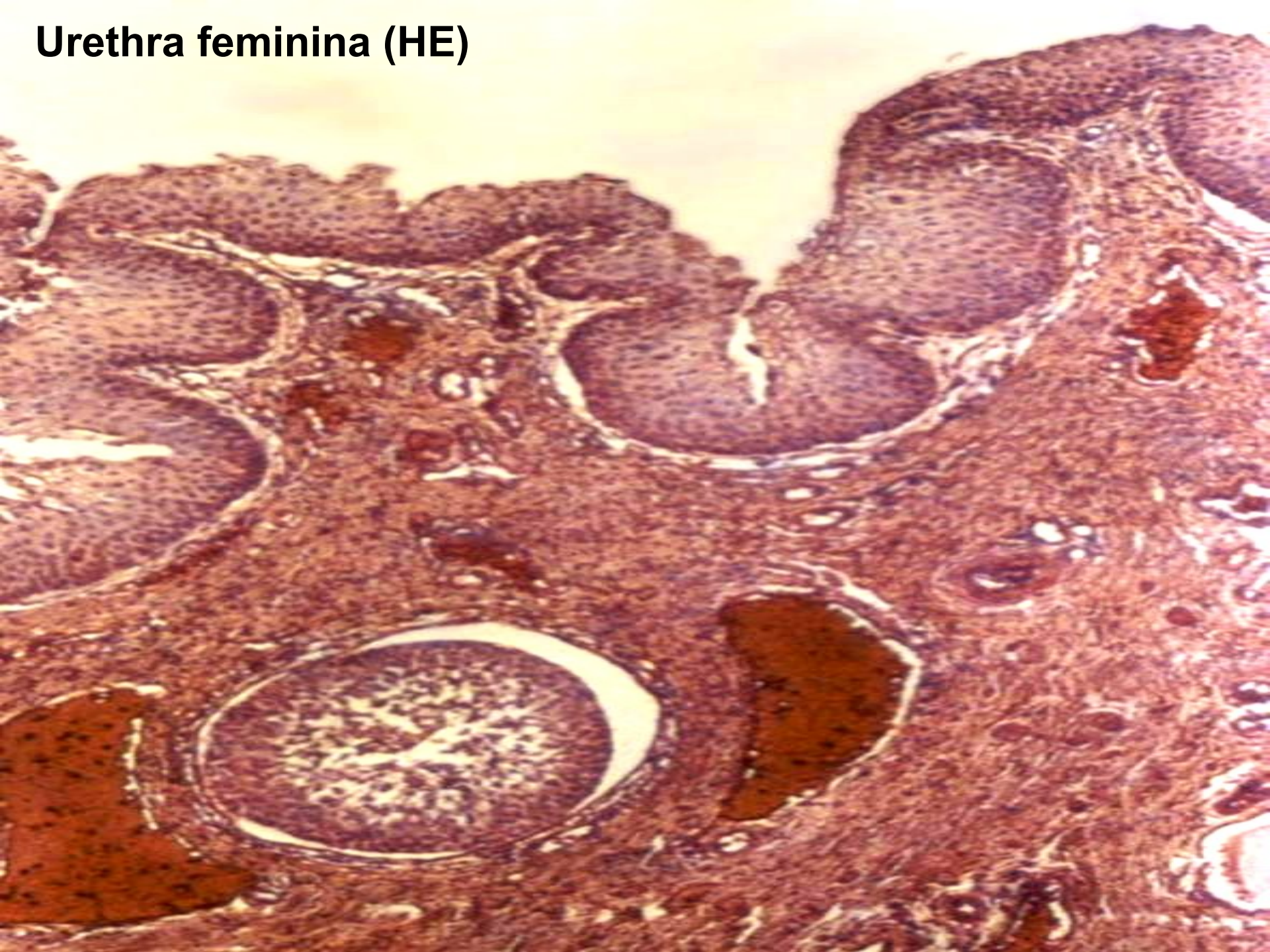
Sliznice – vrstevnatý  
dlaždicový epitel  
– lamina propria  
Zevní vrstva svalová  
Adventicie



(c) Female urethra (LM × 61)

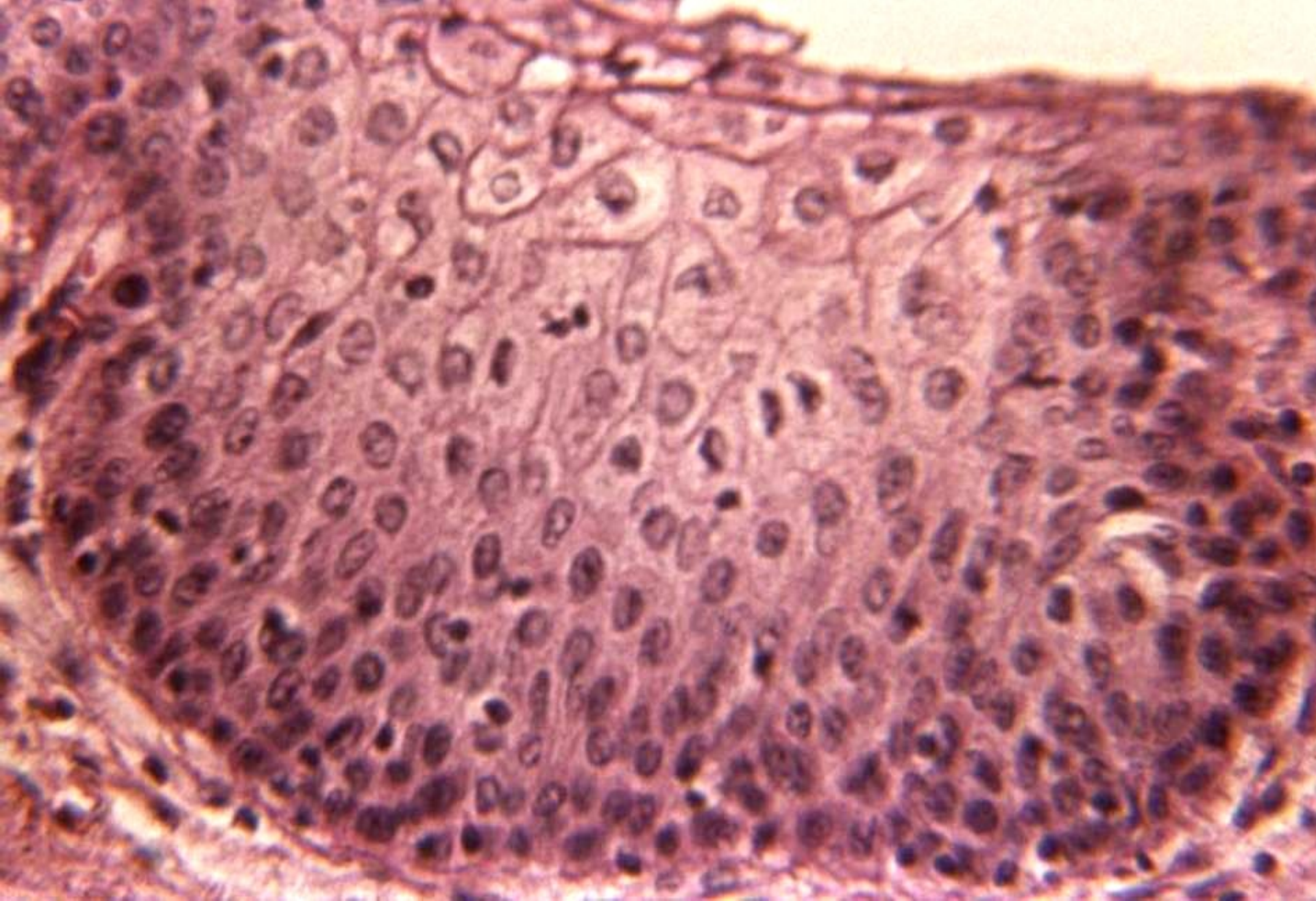


**Urethra feminina (HE)**





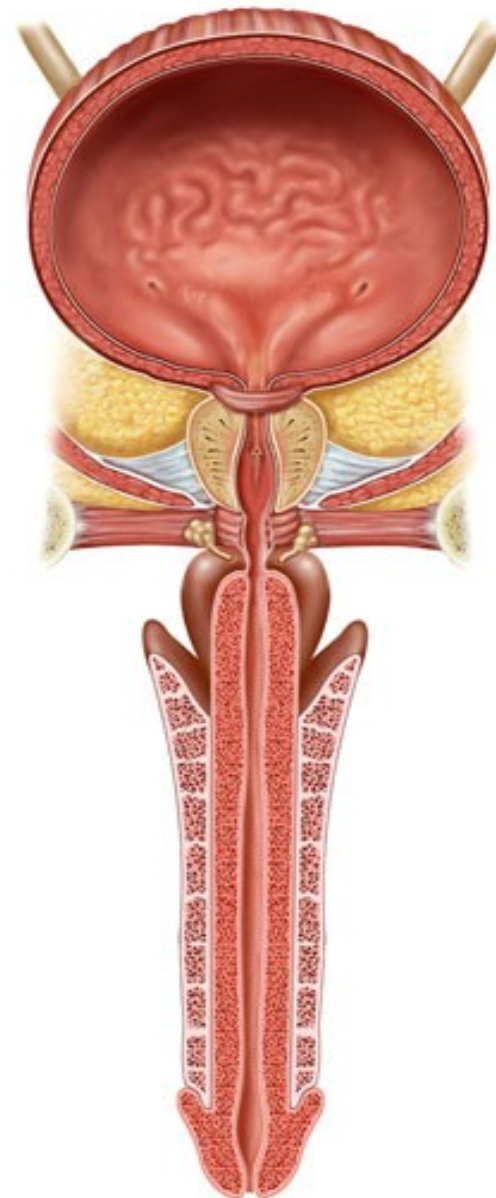
**Urethra feminina - epitel**





# Urethra masculina

- Pars intramuralis
  - přechodní ep.
- Pars prostatica
  - přechodní ep.
  - od colliculus seminalis:
    - víceřadý cyl.ep.
- Pars diaphragmatica
  - vrstevnatý cyl. ep.
  - Tunica musc: *m. sphincter urethrae ext.*
- Pars spongiosa
  - vrstevnatý cyl. ep.
  - ve fossa navicularis:
    - vrstevnatý dlaždicový

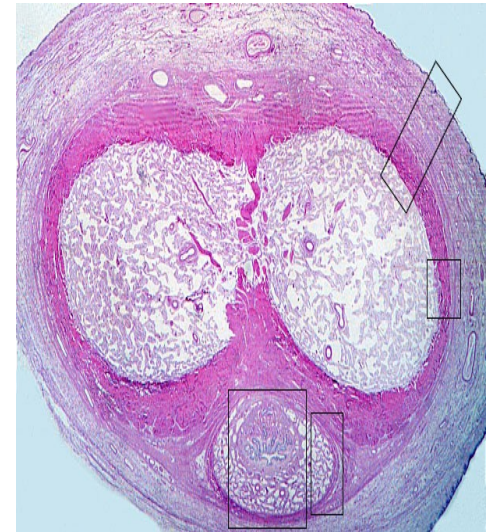
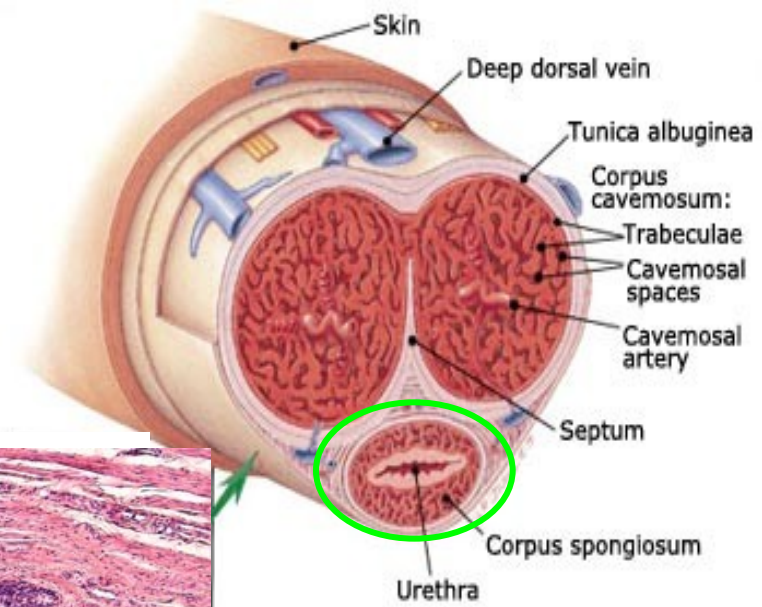
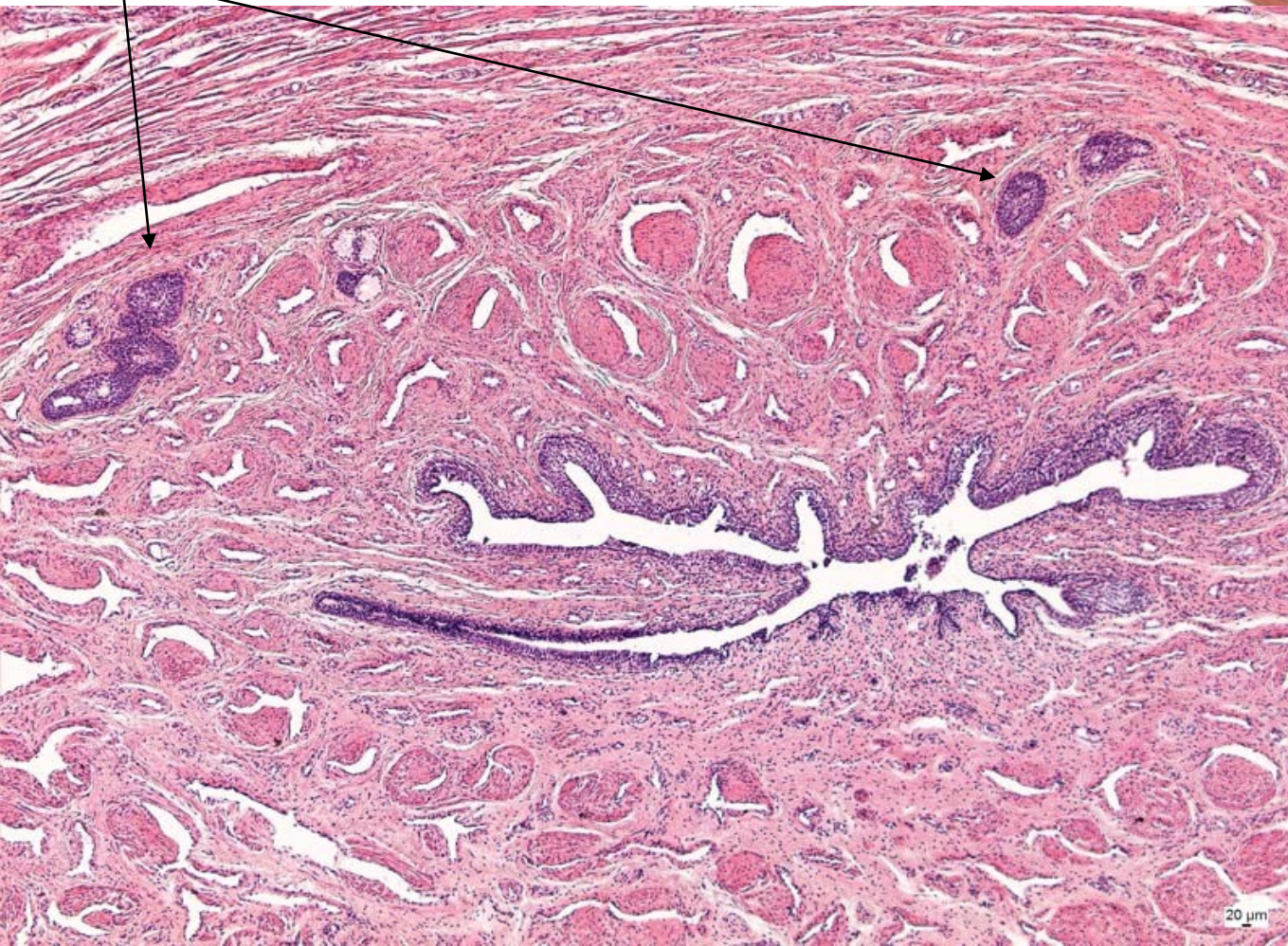


(a) Male



# Urethra masculina – pars spongiosa

Gll. paraurethrales (Littre)



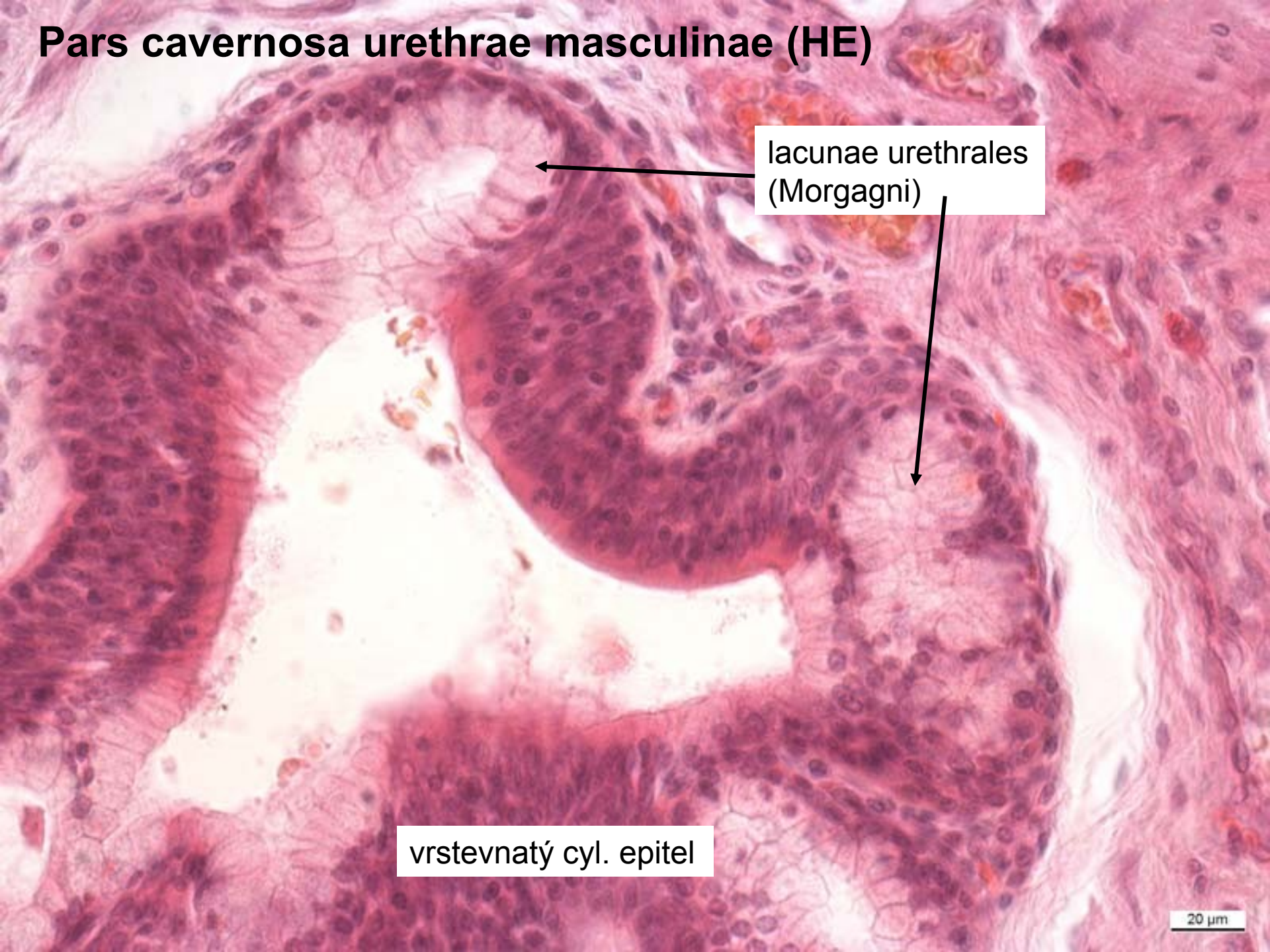


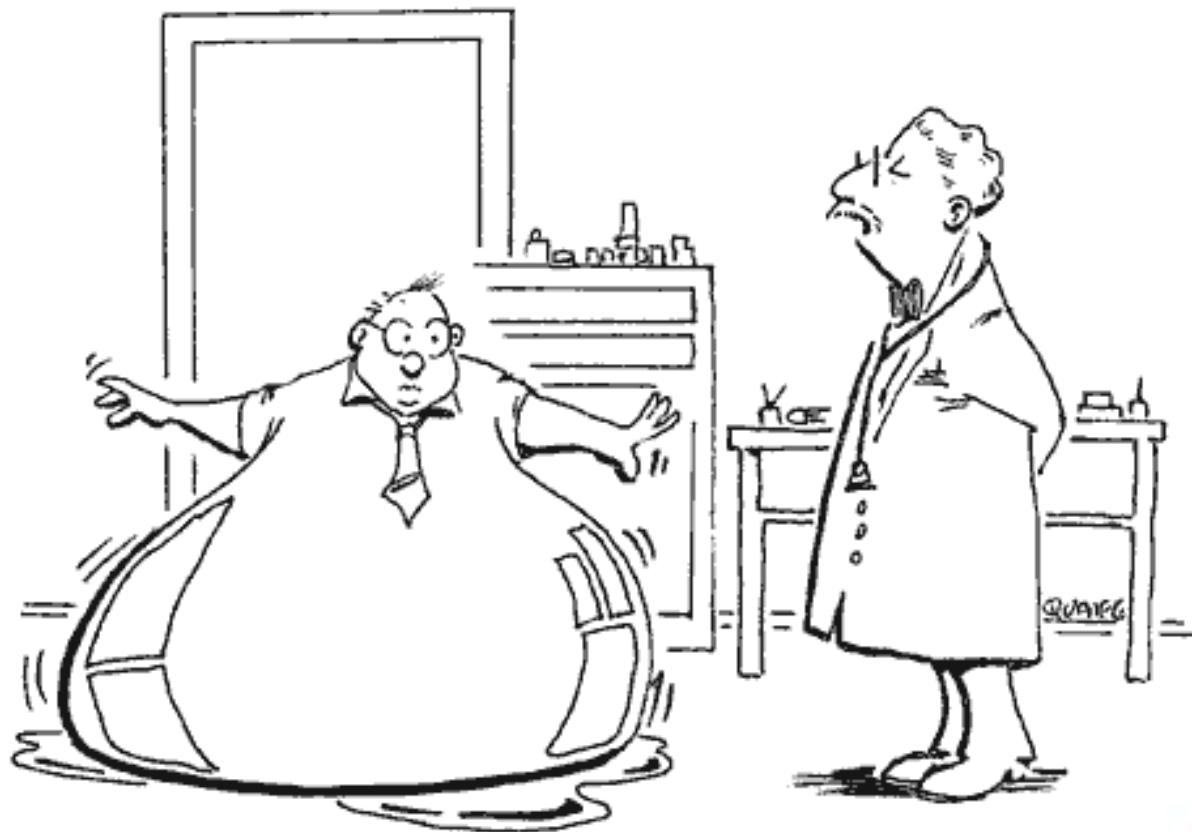
# Pars cavernosa urethrae masculinae (HE)

lacunae urethrales  
(Morgagni)

vrstevnatý cyl. epitel

20 µm





Your tests reveal that  
you are retaining fluids!

*End*



# Další obrázky - navíc

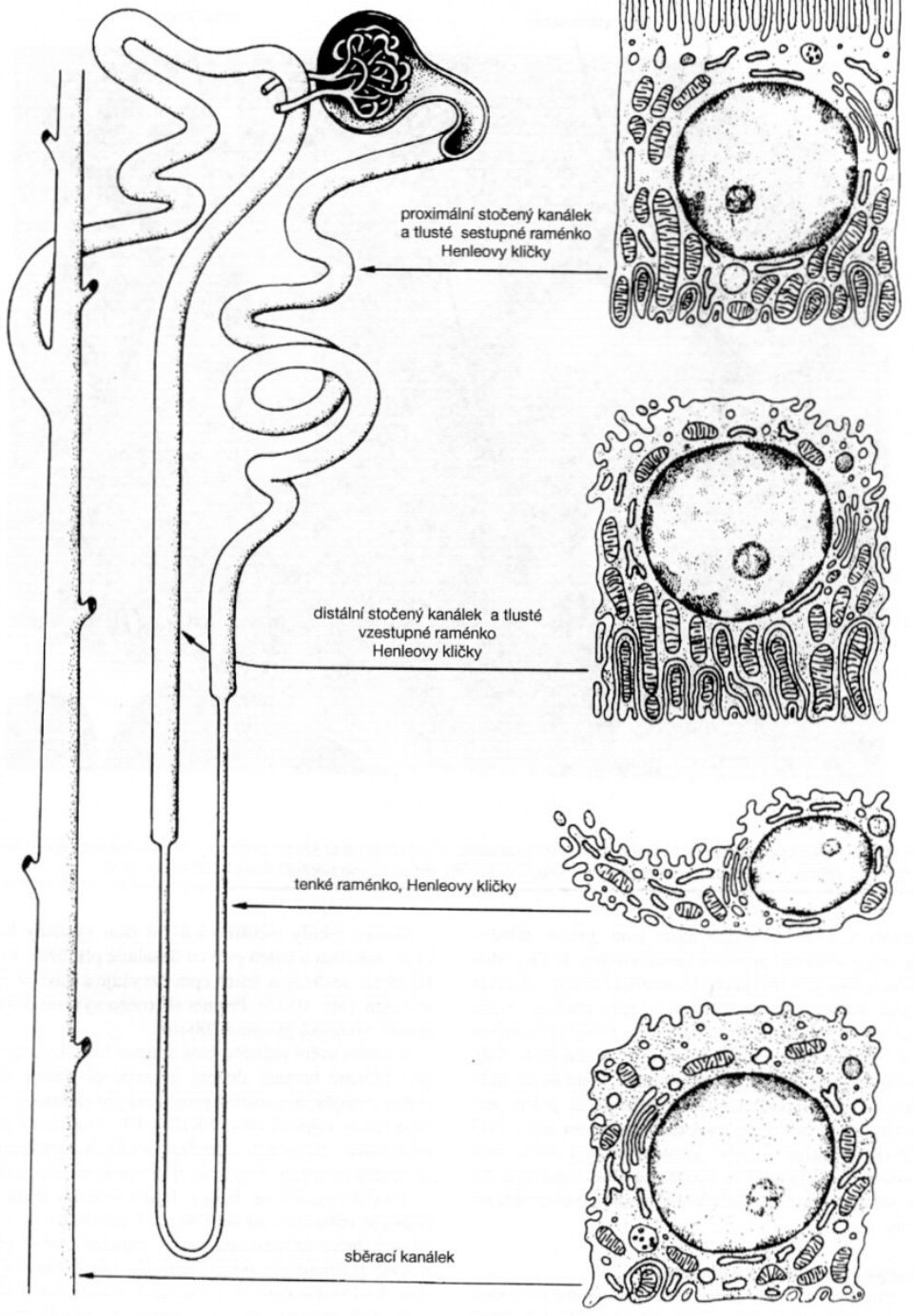
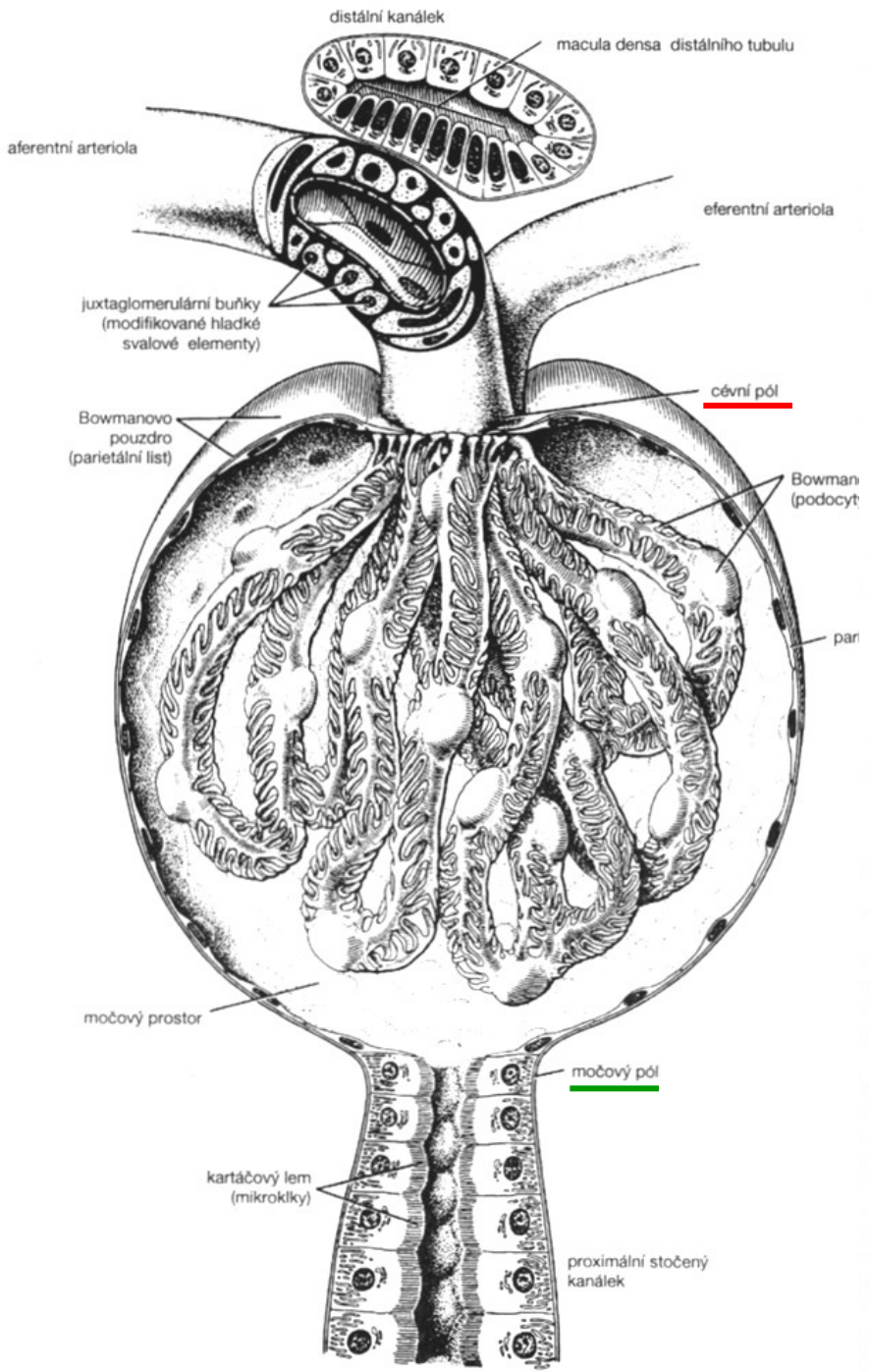
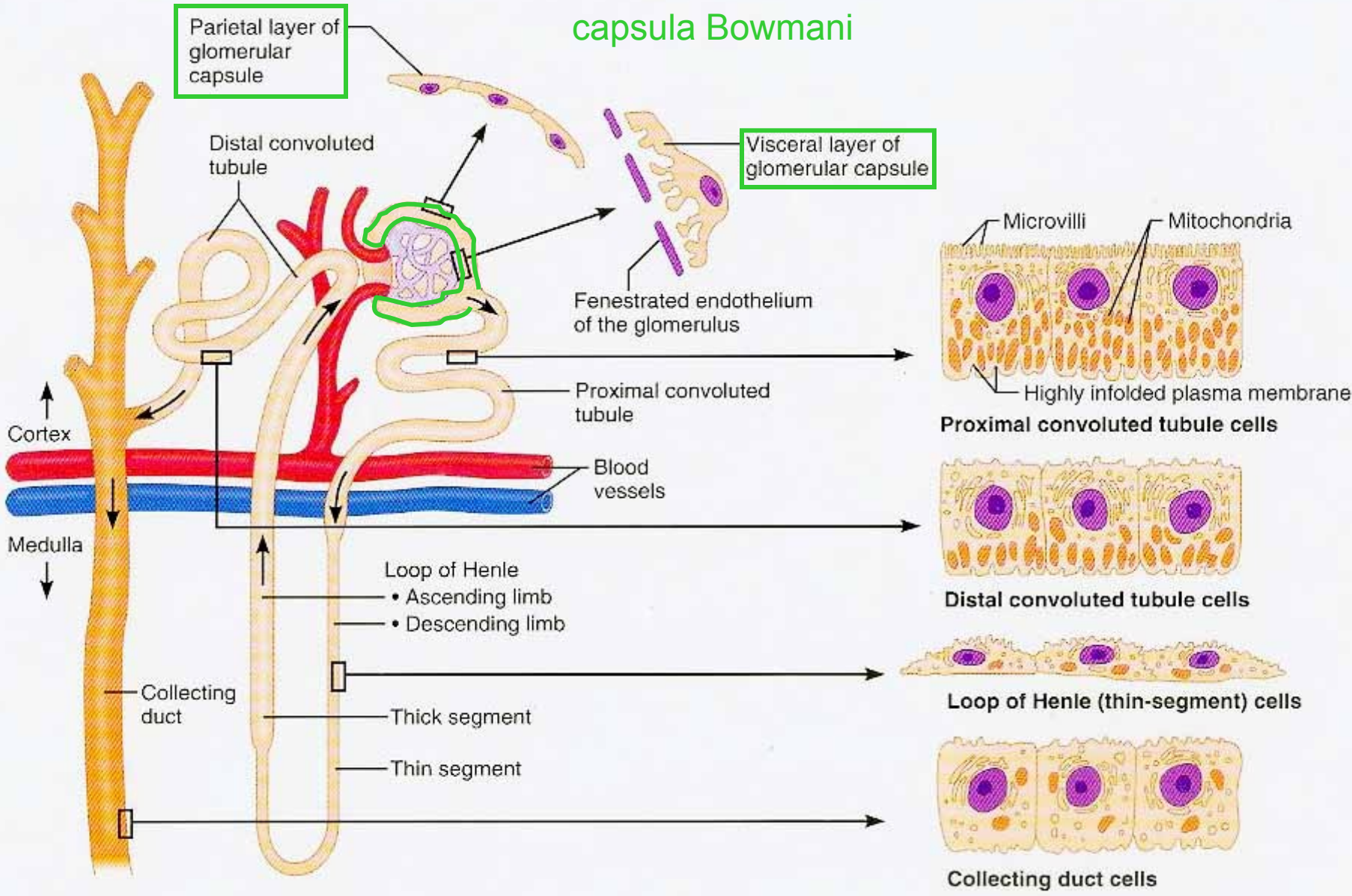
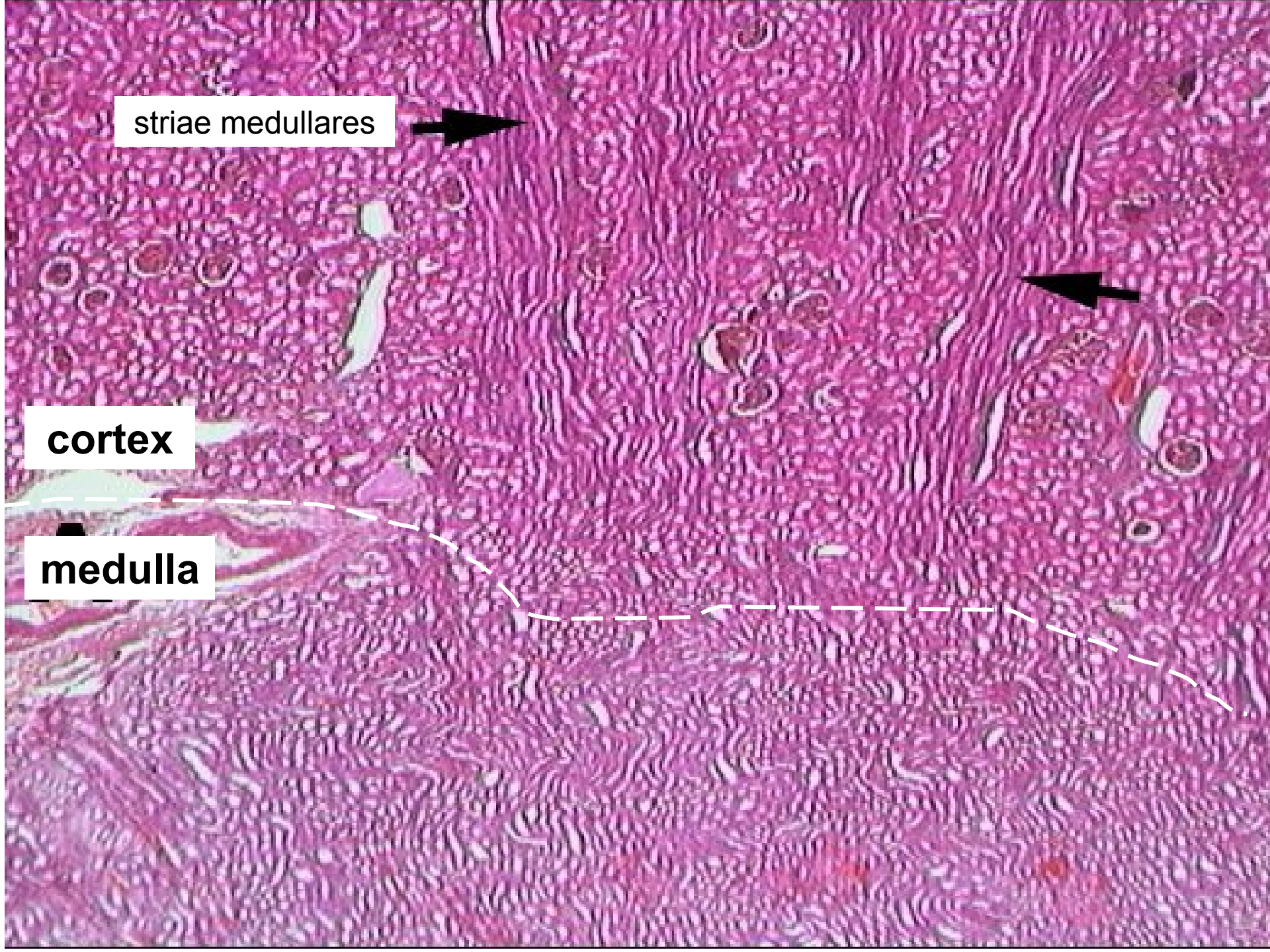




Figure 26.4b: Location and structure of nephrons, page 1008



(b)



striae medullares

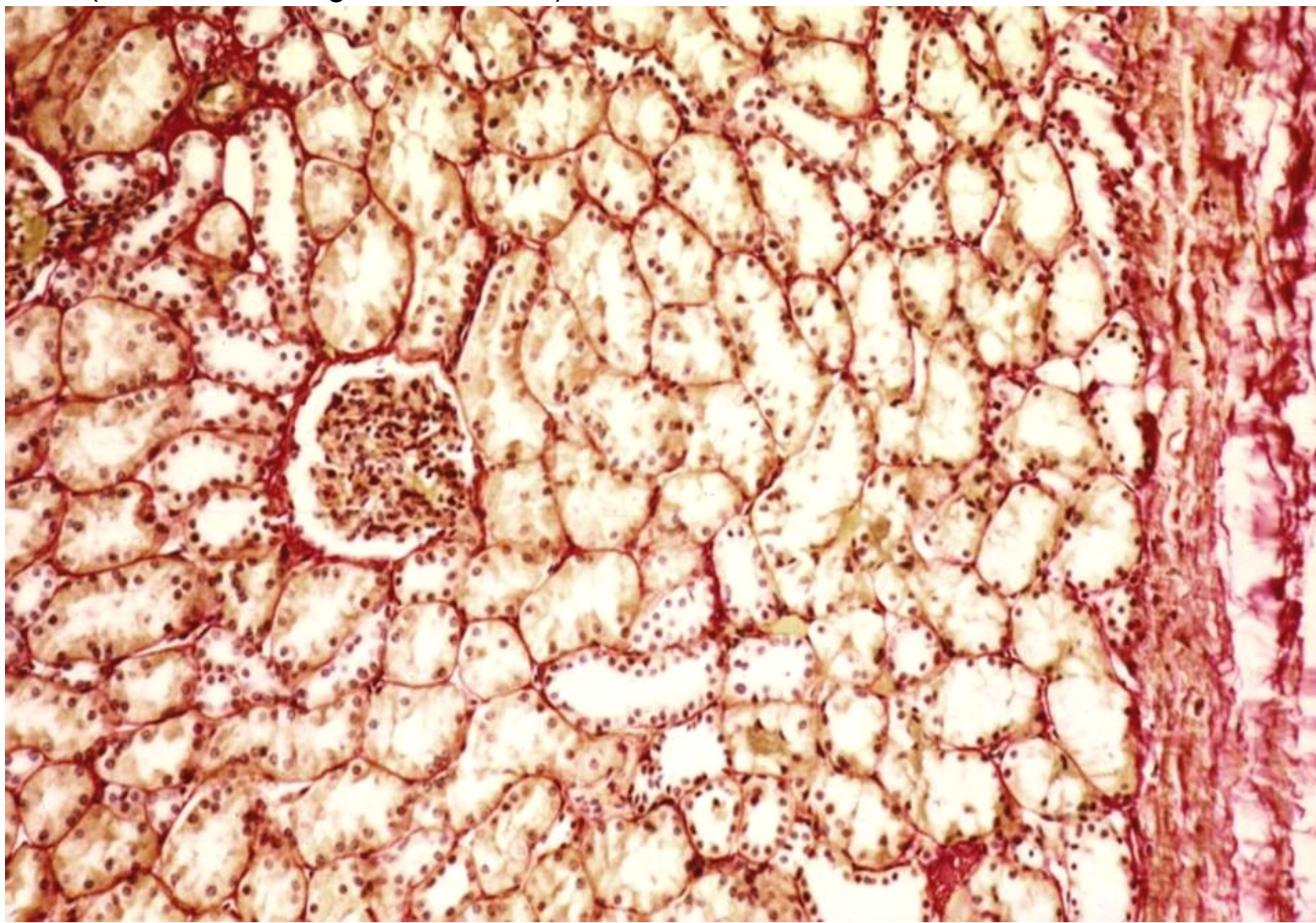


cortex

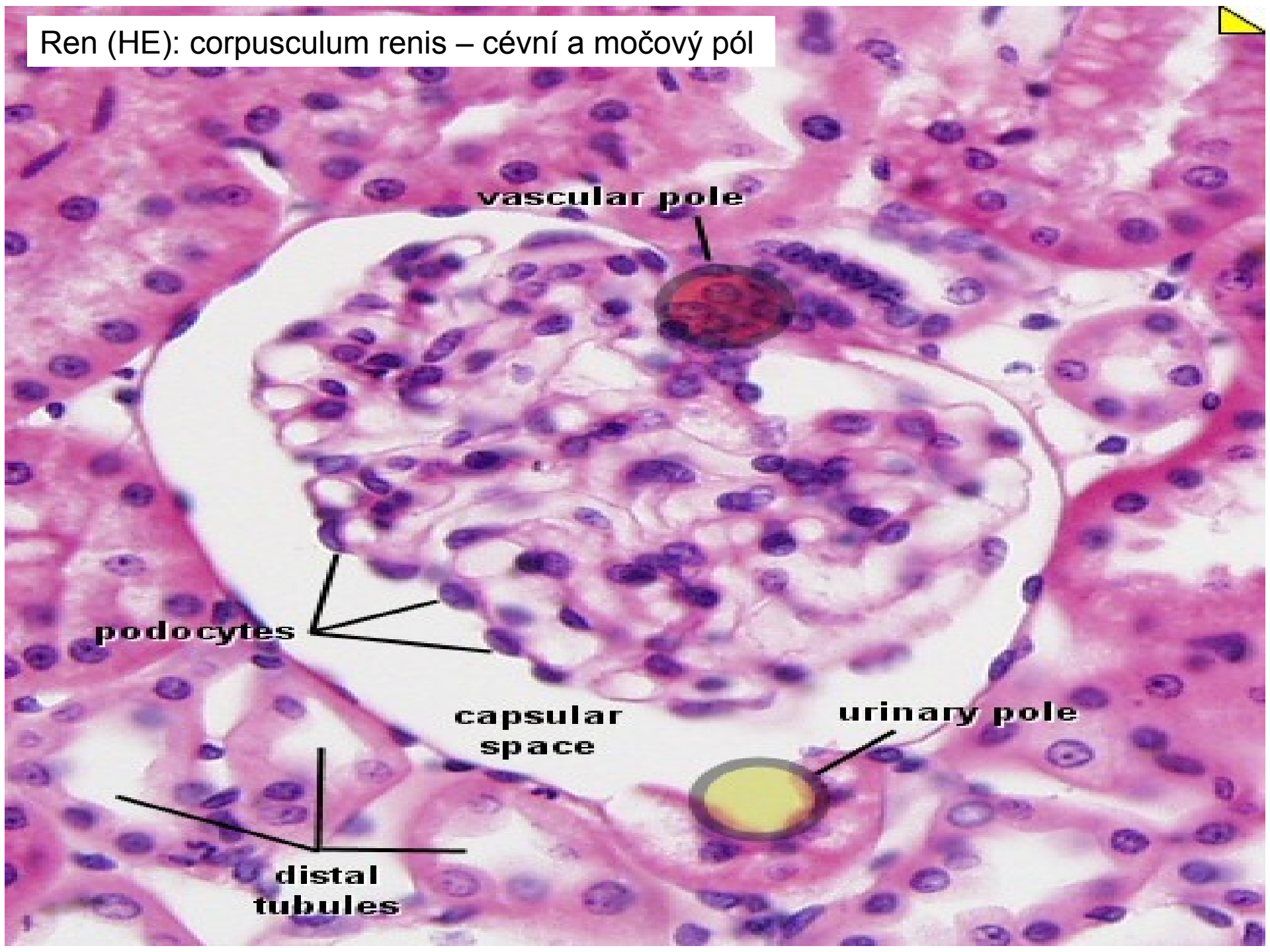
medulla



Ren (barvení dle Weigert-vanGieson) – červené vazivo

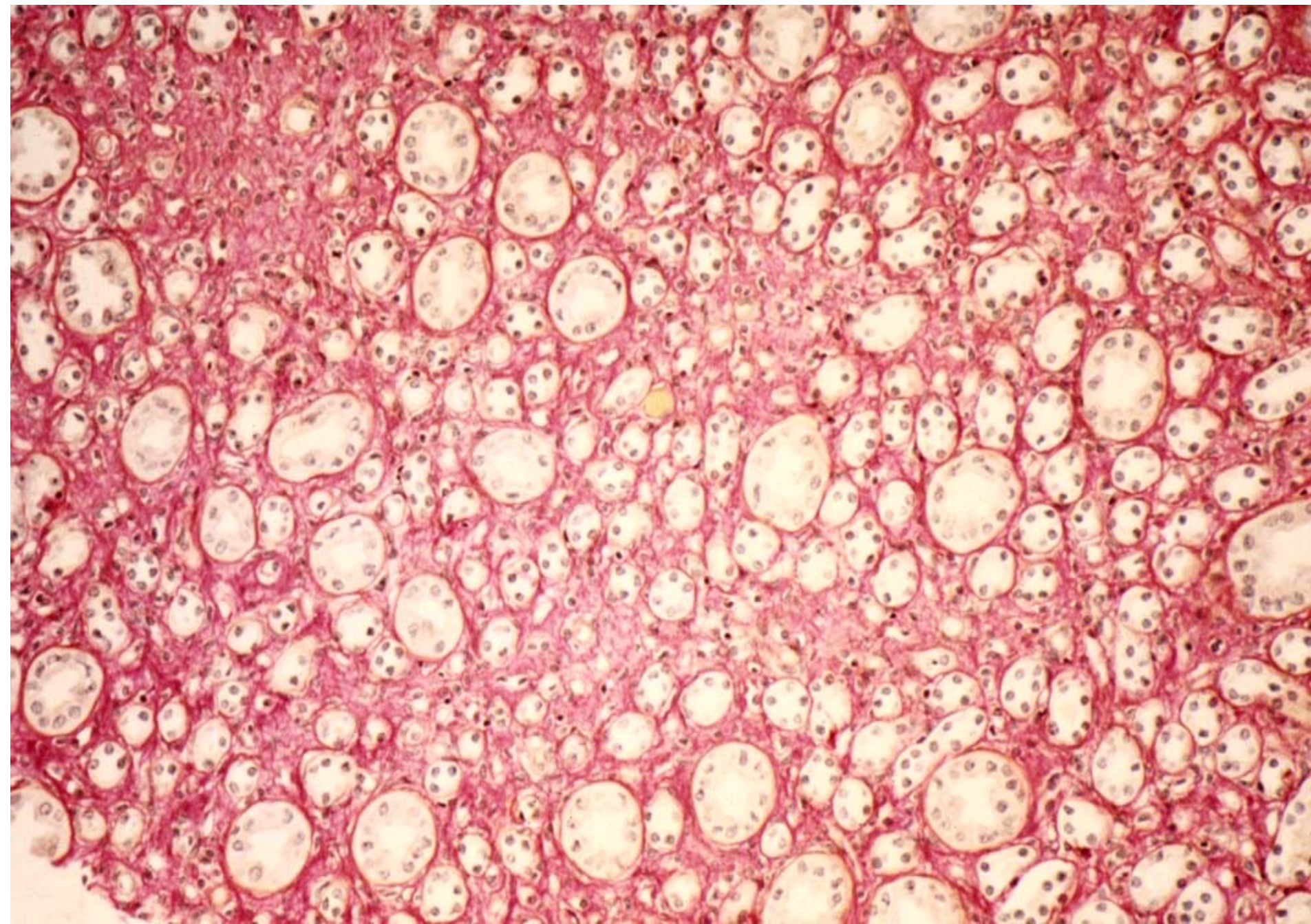


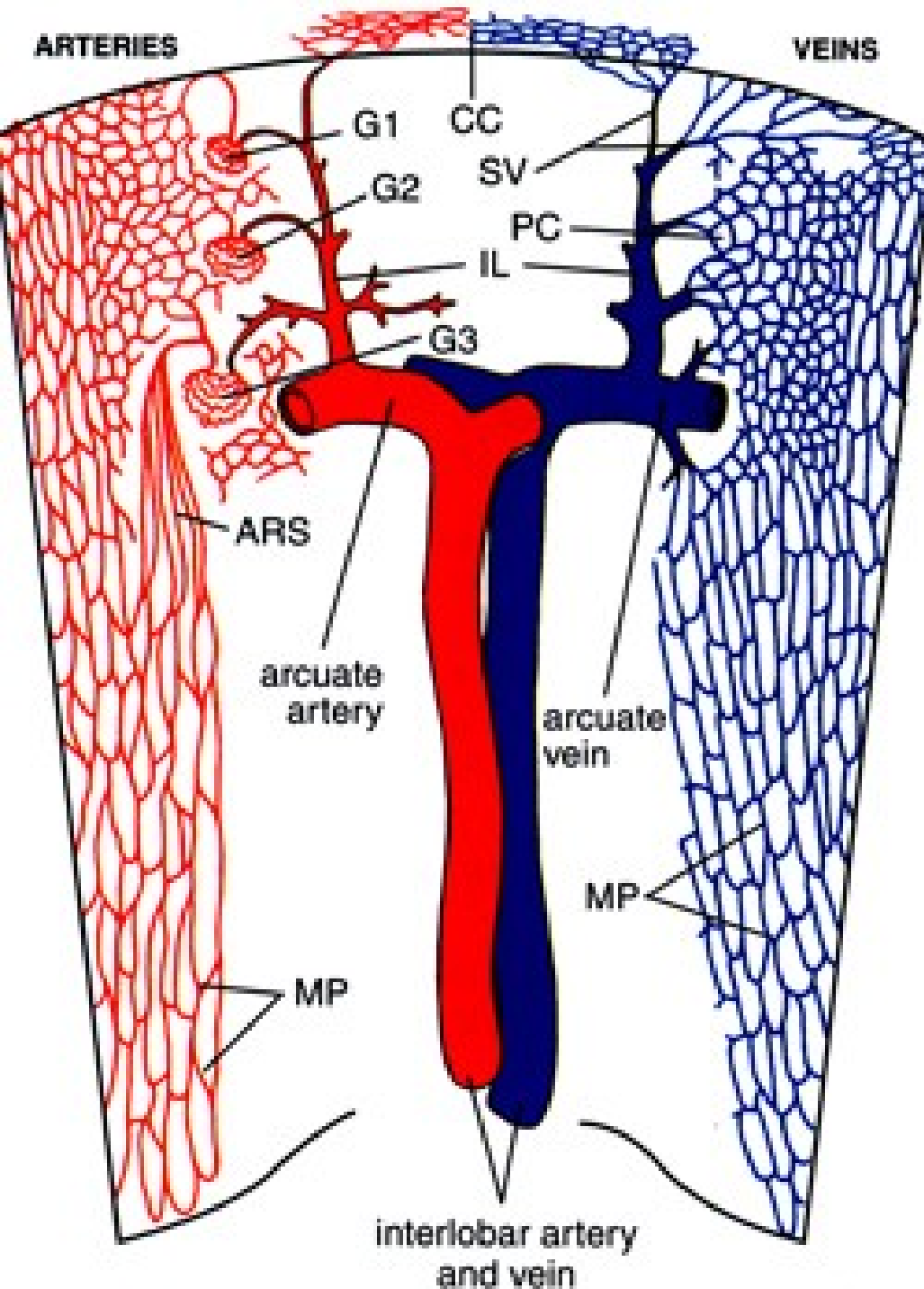
Ren (HE): corpusculum renis – cévní a močový pól





# Ren (Weigert-van Gieson) - medulla





## Krevní oběh v ledvině:

a. renalis

aa. segmentales

aa. interlobares

aa. arcuatae

aa. interlobulares

aferentní arteriola

\* glomerulus

eferentní arteriola

\* peritubulární kapilární

síť + vasa recta

vv. interlobulares

vv. arcuatae

vv. interlobares

vv. renales

(\* portální oběh)



# Ureter (HE)



**Ureter (HE)**

