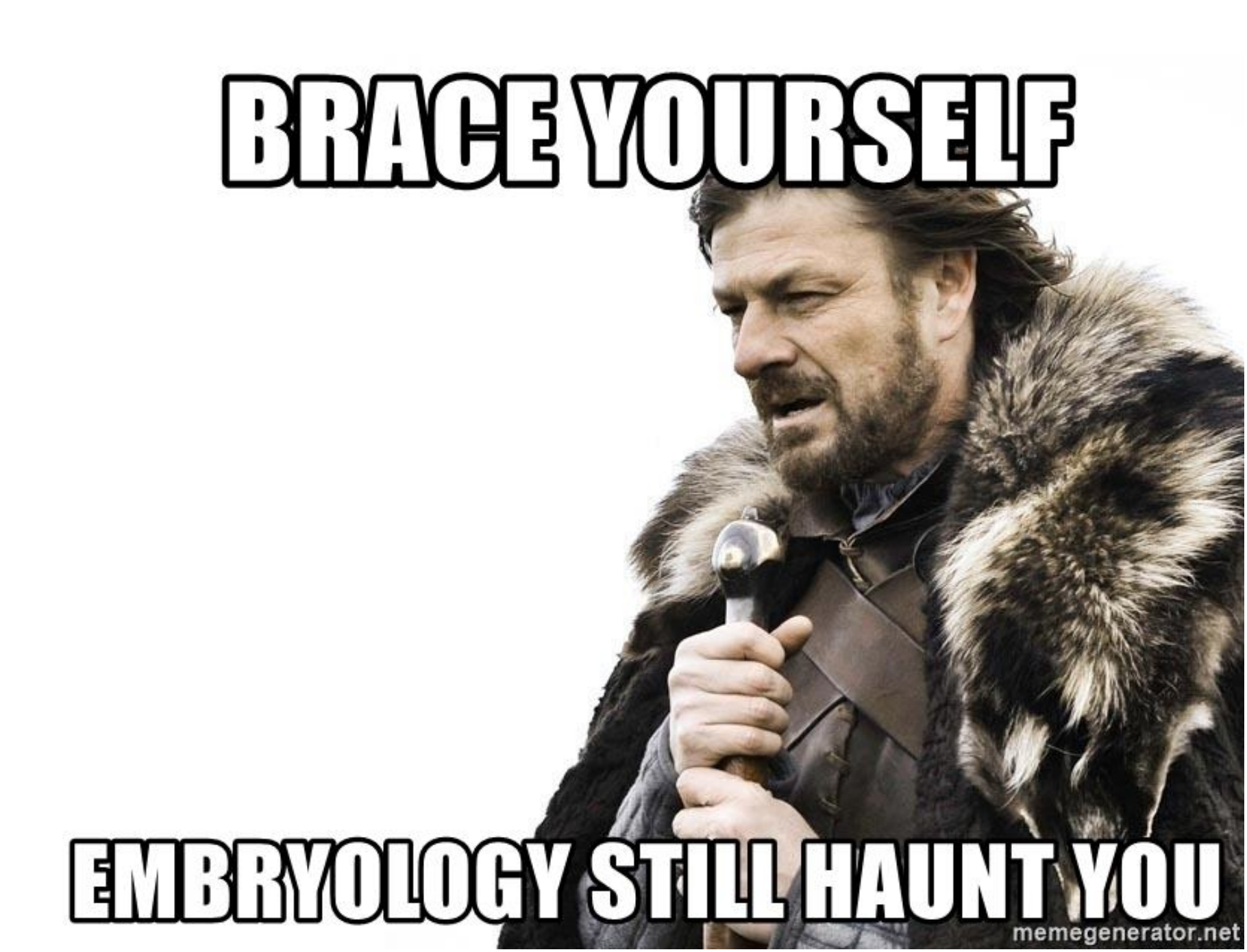
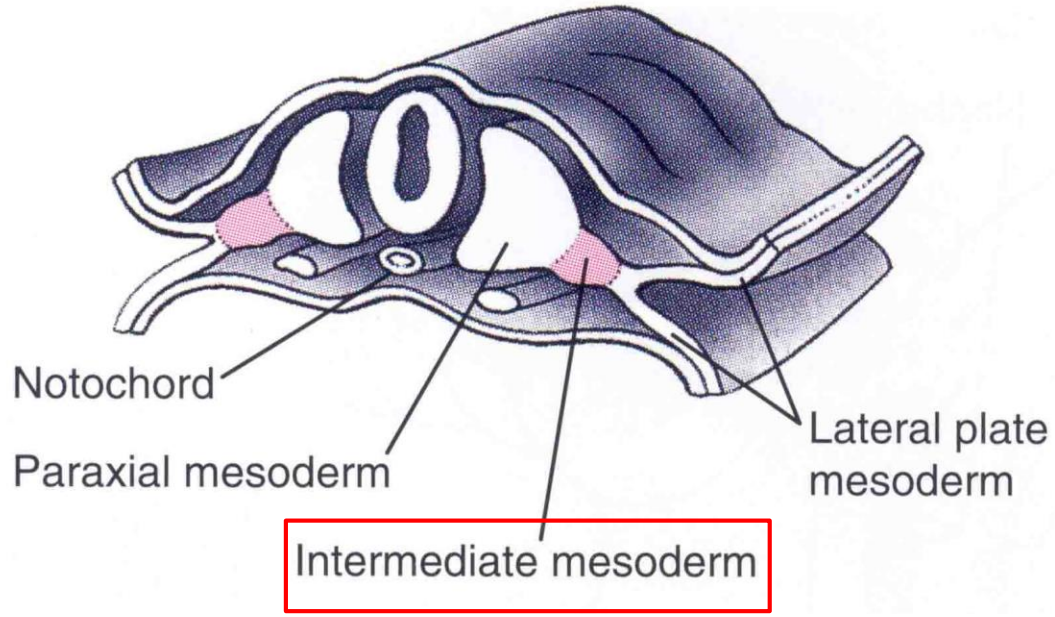
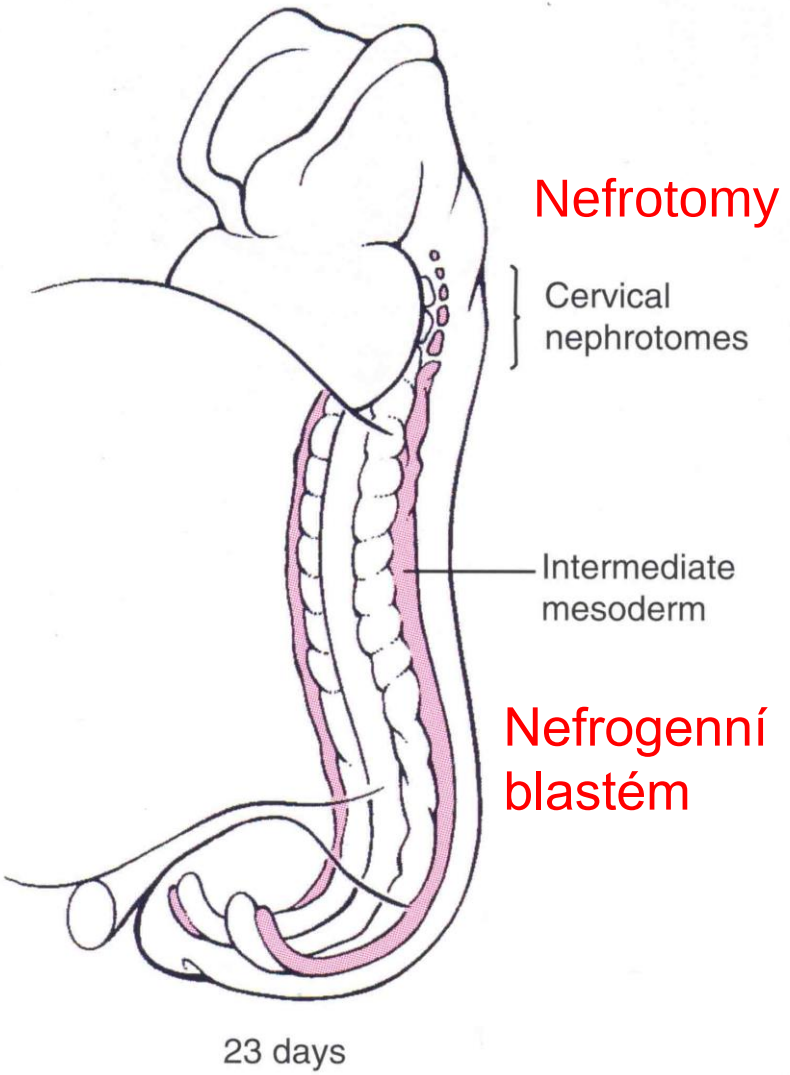
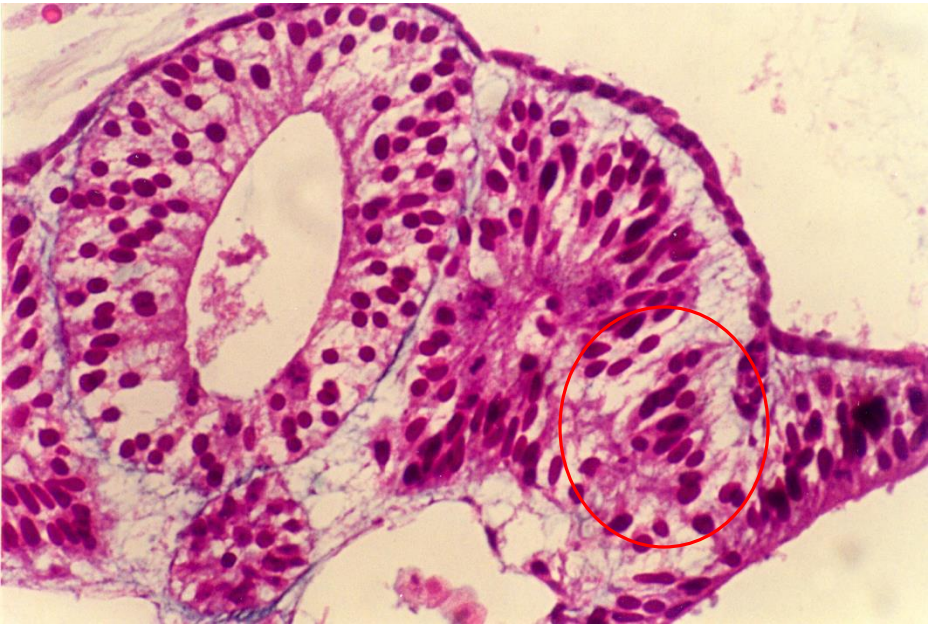
# ORGANOGENESE
# MOČOVÉHO A POHLAVNÍHO SYSTÉMU


BRACE YOURSELF
EMBRYOLOGY STILL HAUNT YOU
memegenerator.net


Notochord
Paraxial mesoderm
Intermediate mesoderm
Lateral plate mesoderm


Nefrotomy
Cervical nephrotomes
Intermediate mesoderm
Nefrogenní blastém
23 days

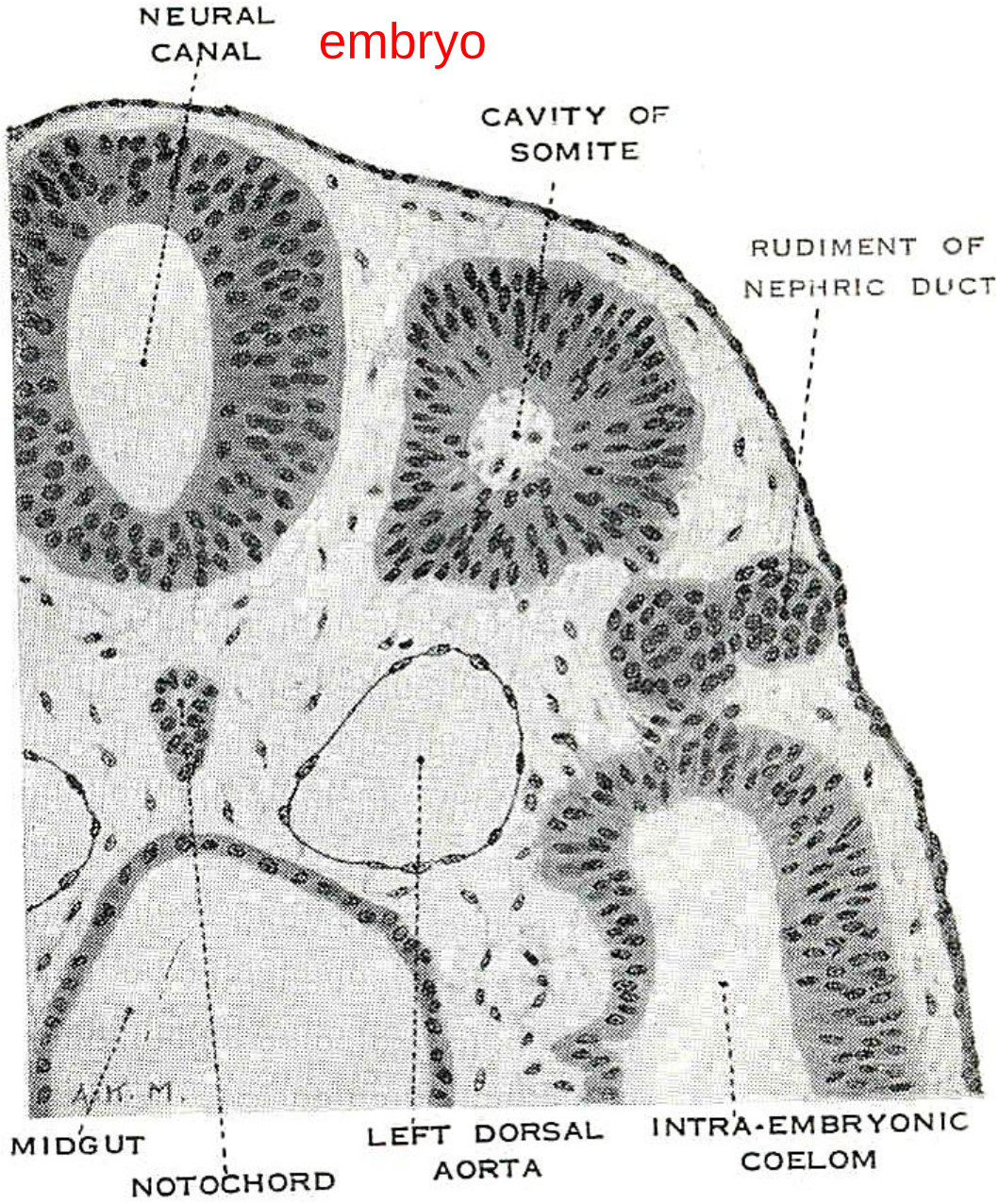


# VÝVOJ LEDVIN

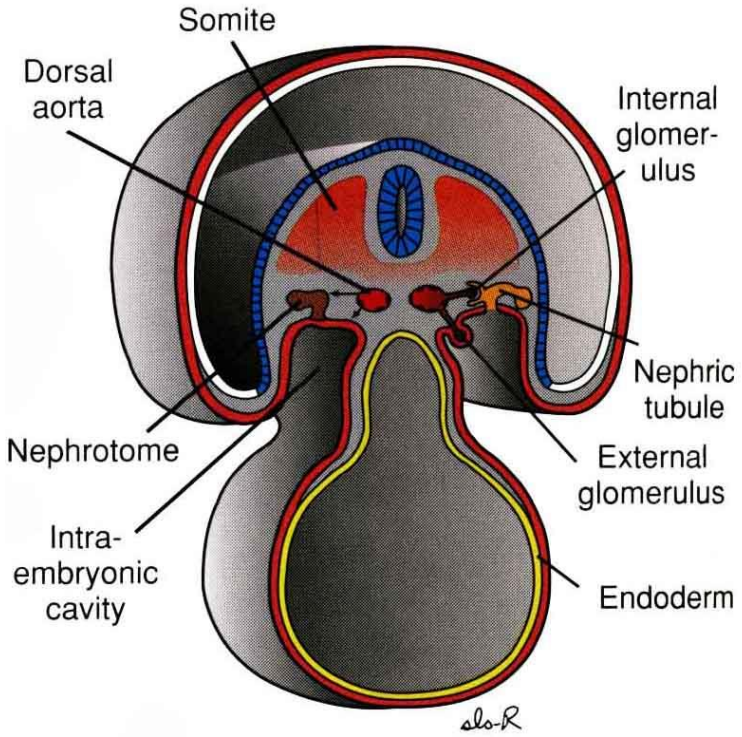
| Orgány | Charakteristika | Lokalizace | Týden |
|---|---|---|---|
| Pronephros | Segmentované shluky buněk nefrotomů, někdy luminizované (5-7)<br><br>Formování primárního močovodu (pronefrického vývodu) | C2,3 – Th1<br><br>C5 – Th1 | začátek 4. – konec 4. |
| Mesonephros | Mesonefrické nefrony (tvoří se 2-3 v každém segmentu)<br>Celkem se jich vyvíjí kolem 40 na každé straně, kraniální brzy zanikají, v 5. týdnu 32-34 nefronů, funkčních 20 kaudálních.<br>Mesonefrický (Wolffův) vývod<br>- ureterový pupen | Th2 – L3 | vývoj od 4.<br><br>funkční 6. – 10. |
| Metanephros<br>(definitivní LEDVINA) | Metanefrogenní blastém<br><br>Metanefrické nefrony | L 4,5 | vývoj od 5.<br><br>funkční od 10. |

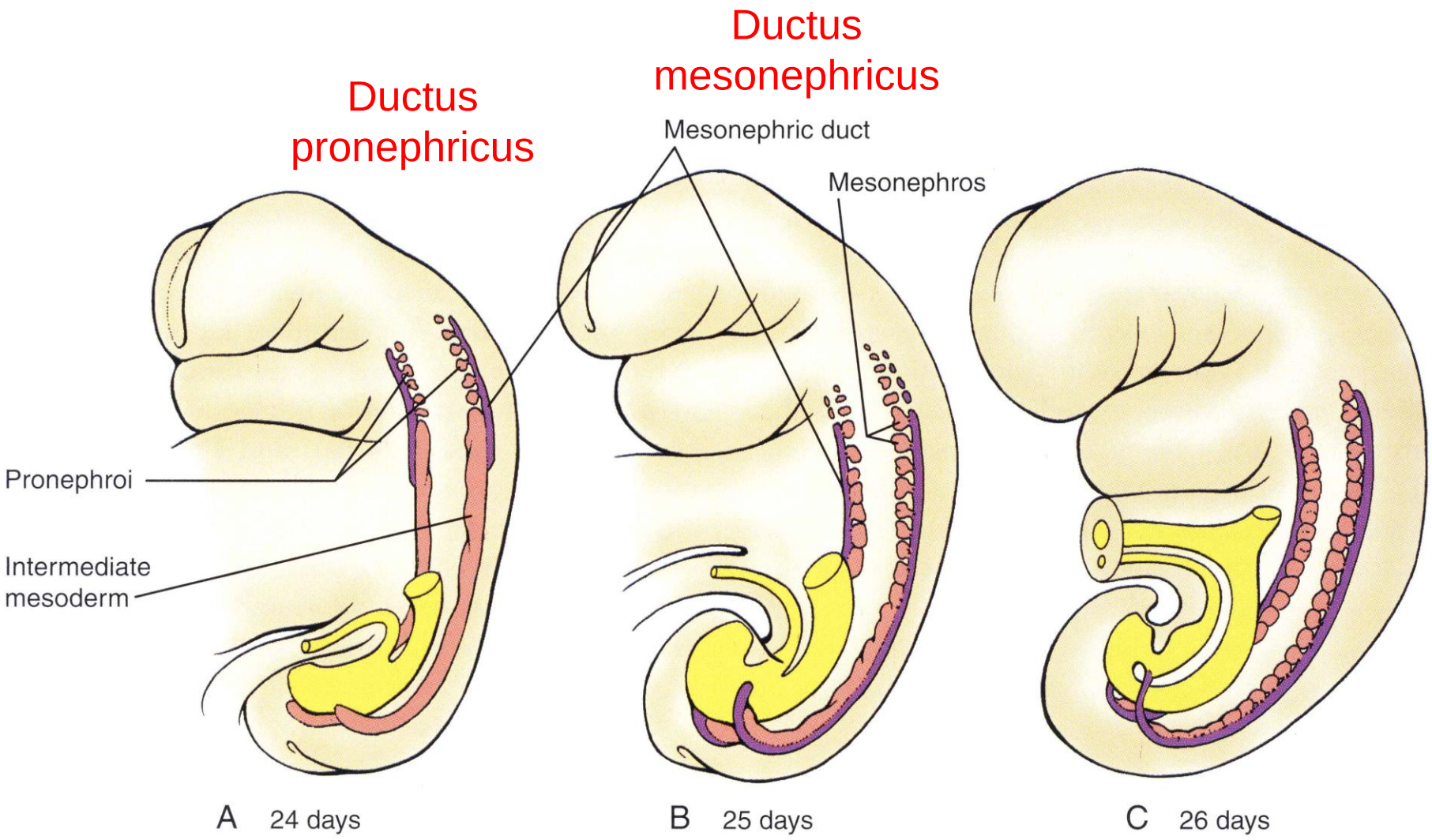
# Pronephros

Lidské embryo




pouze u nižších obratlovců




Ductus pronephricus
Ductus mesonephricus
Mesonephric duct
Mesonephros
Pronephroi
Intermediate mesoderm
A 24 days
B 25 days
C 26 days

| Orgány | Charakteristika | Lokalizace | Týden |
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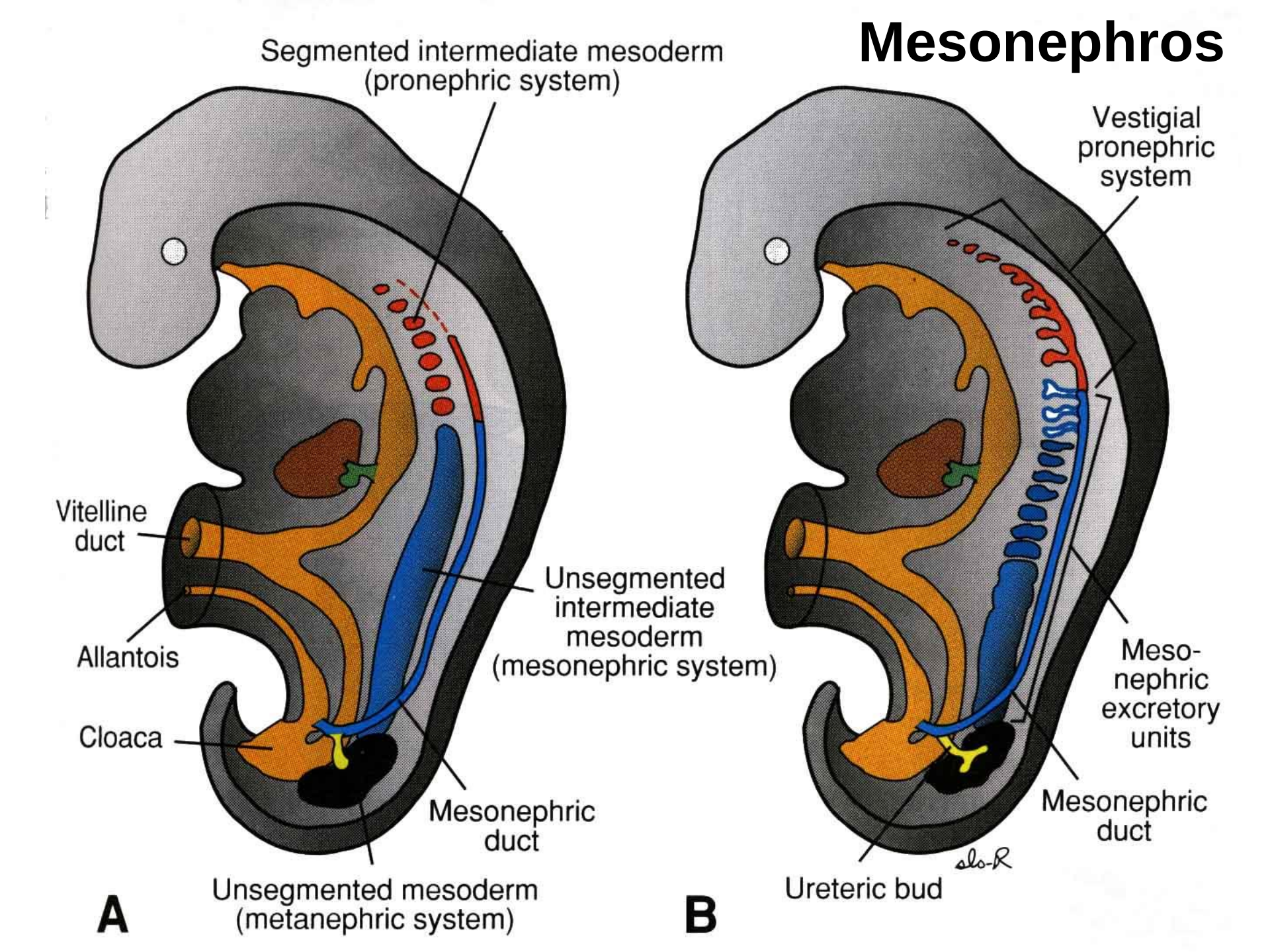
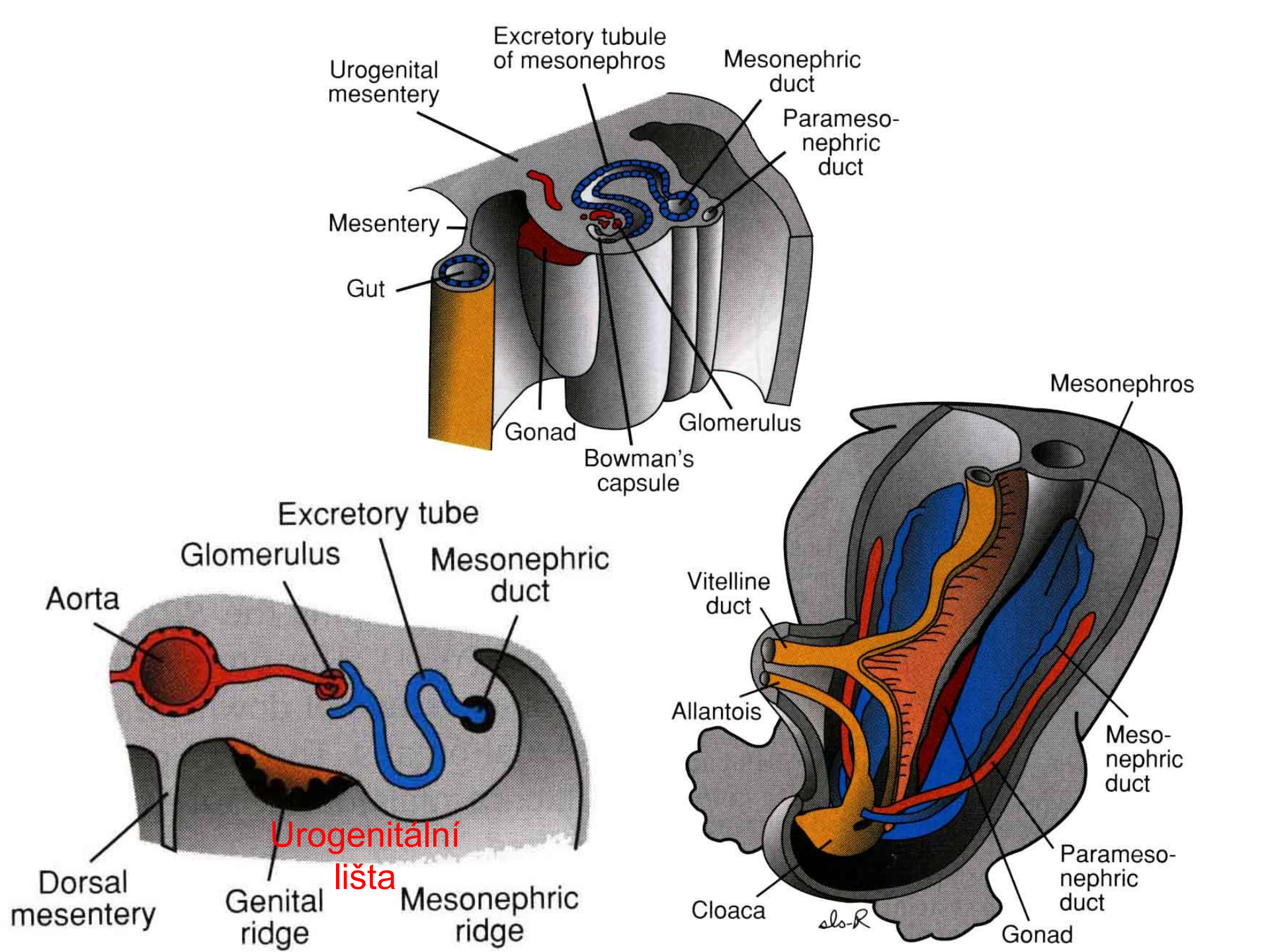
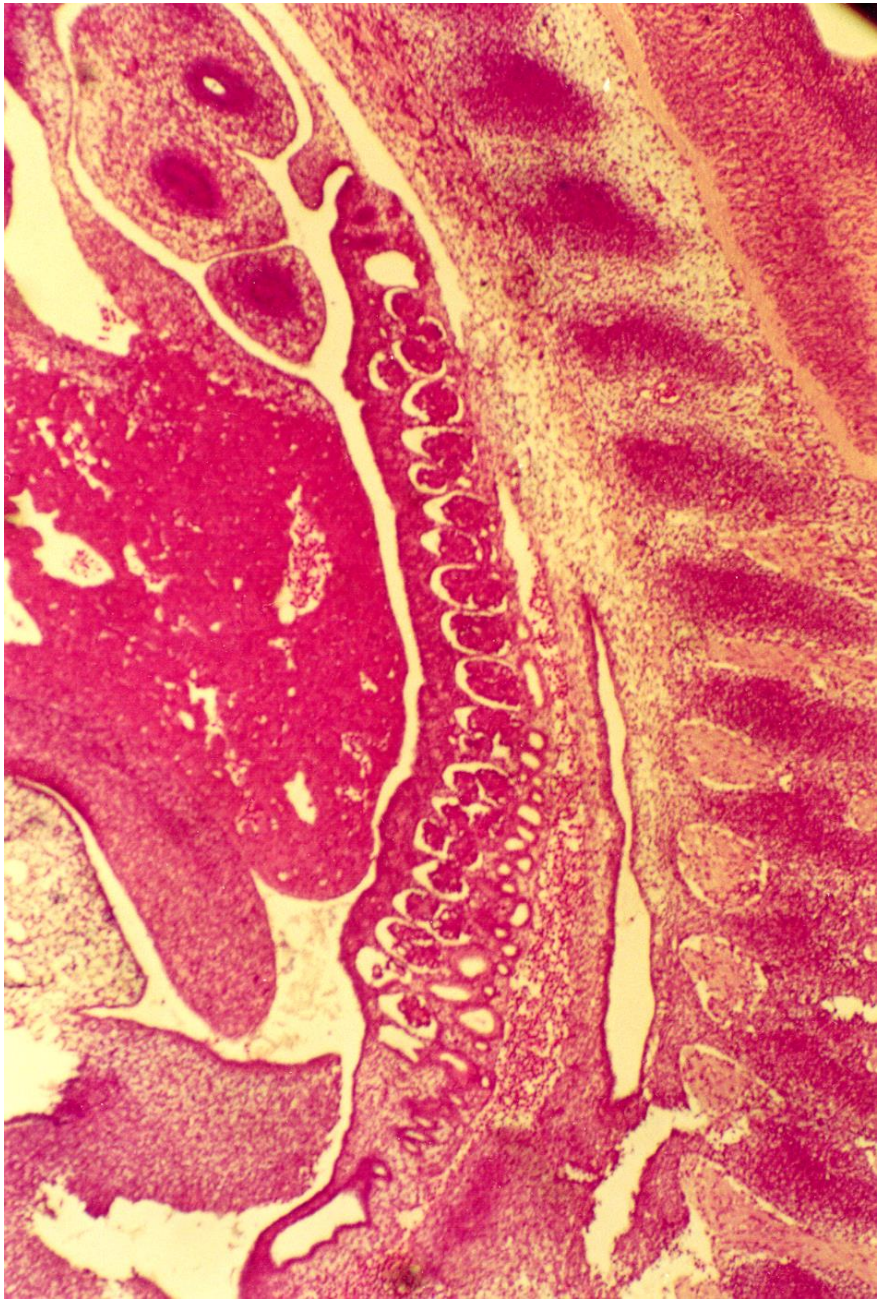
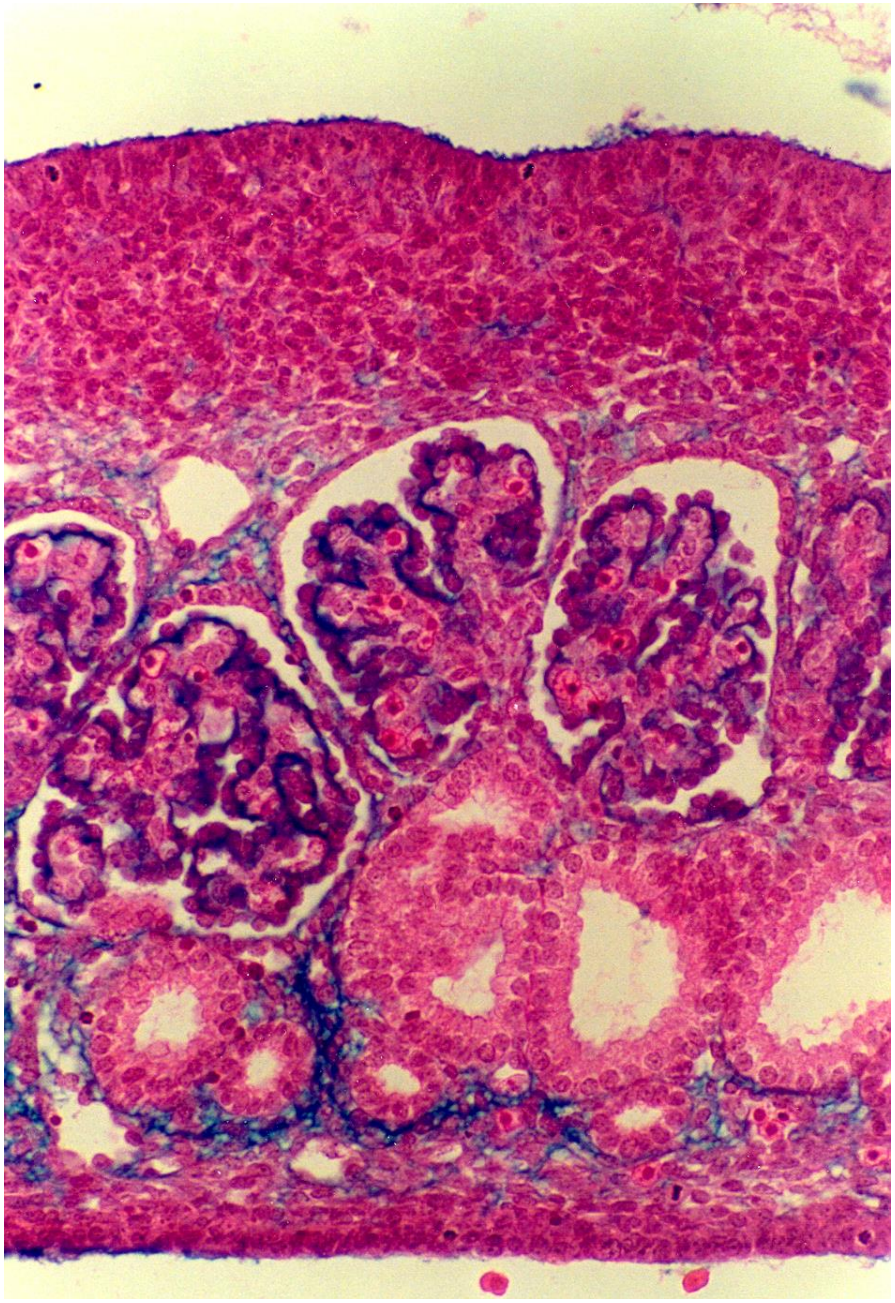
# Mesonephros




Urogenital mesentery
Excretory tubule of mesonephros
Mesonephric duct
Parameso-nephric duct
Mesentery
Gut
Gonad
Glomerulus
Bowman's capsule
Mesonephros
Excretory tube
Glomerulus
Mesonephric duct
Aorta
Vitelline duct
Allantois
Meso-nephric duct
Urogenitální lišta
Dorsal mesentery
Genital ridge
Mesonephric ridge
Cloaca
Parameso-nephric duct
Gonad


100.0 µ





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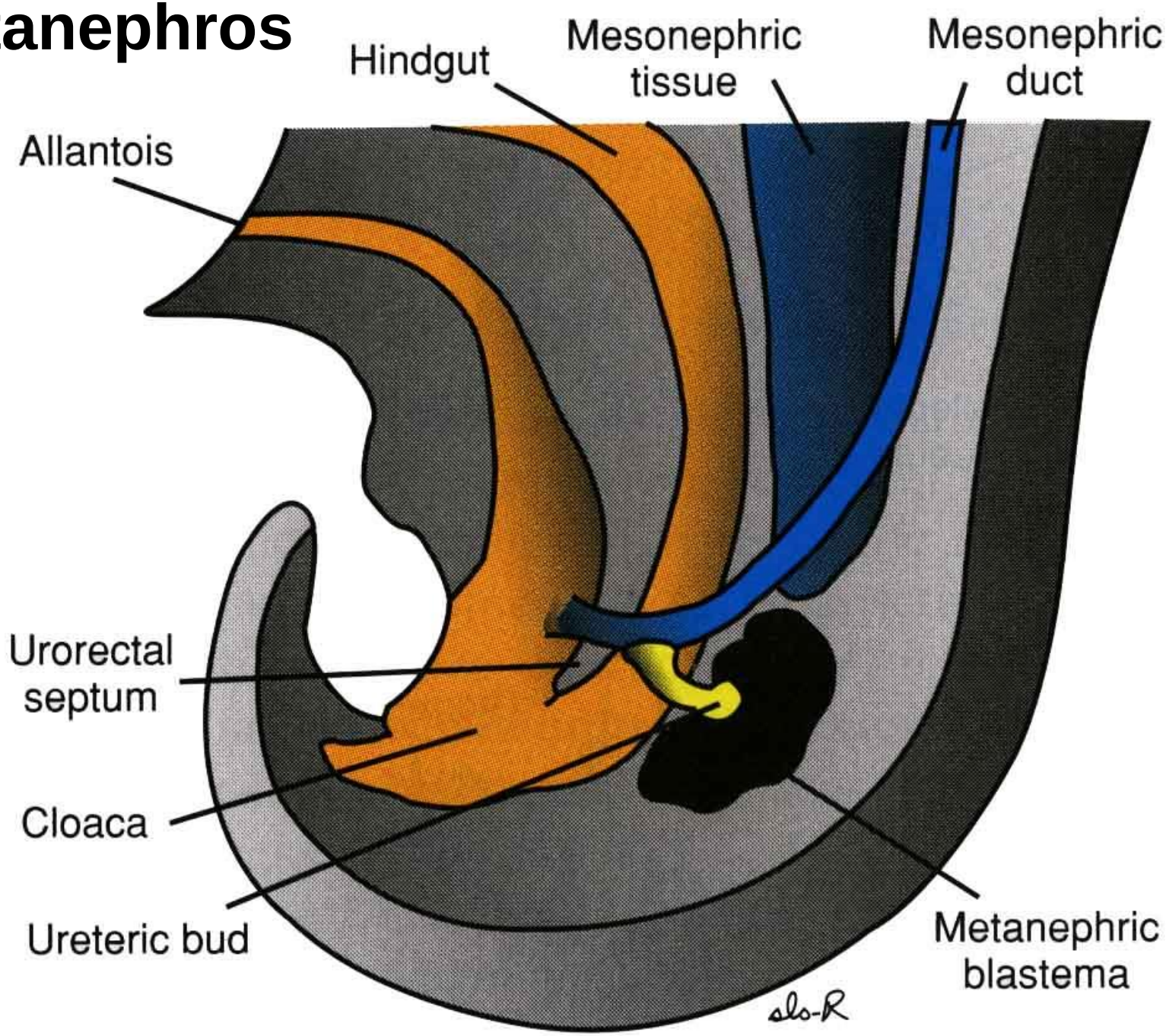
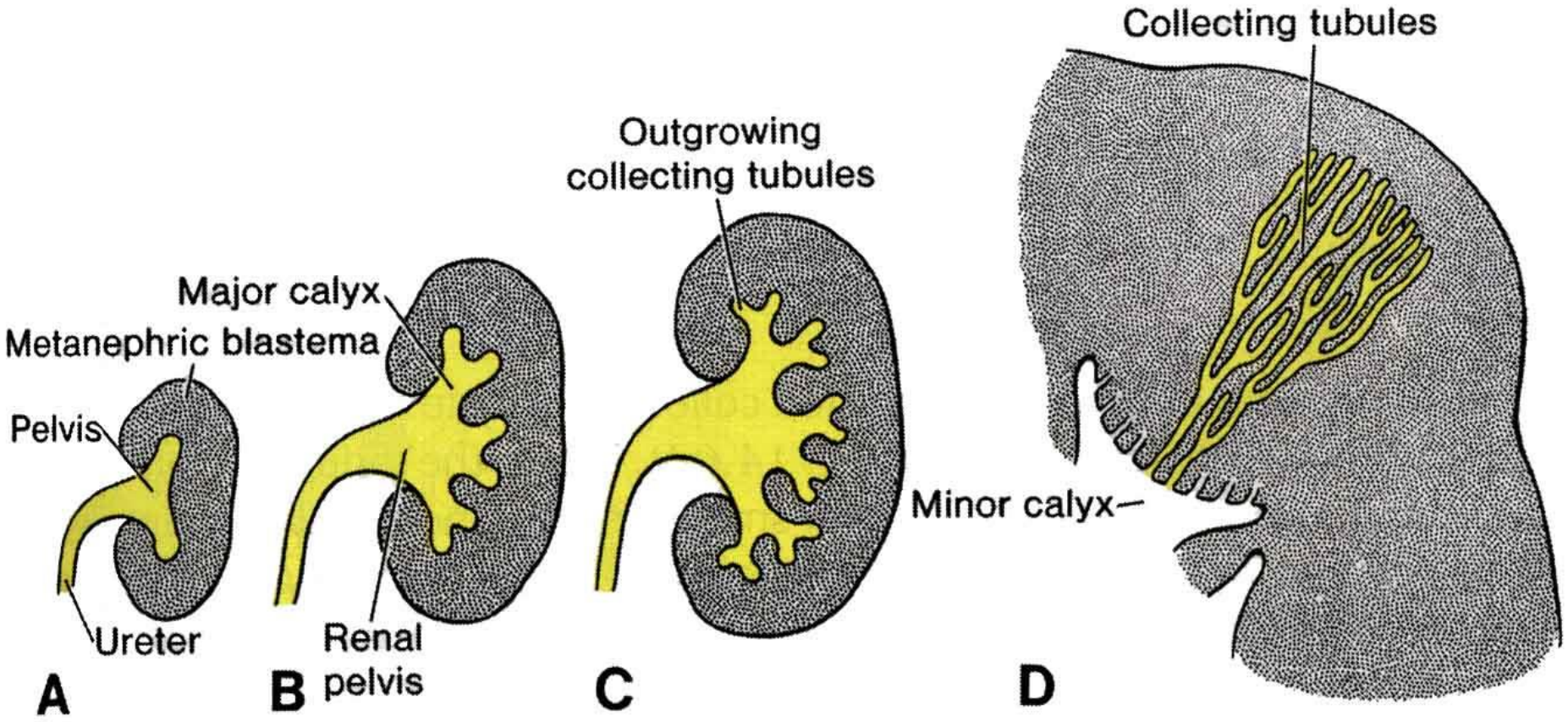
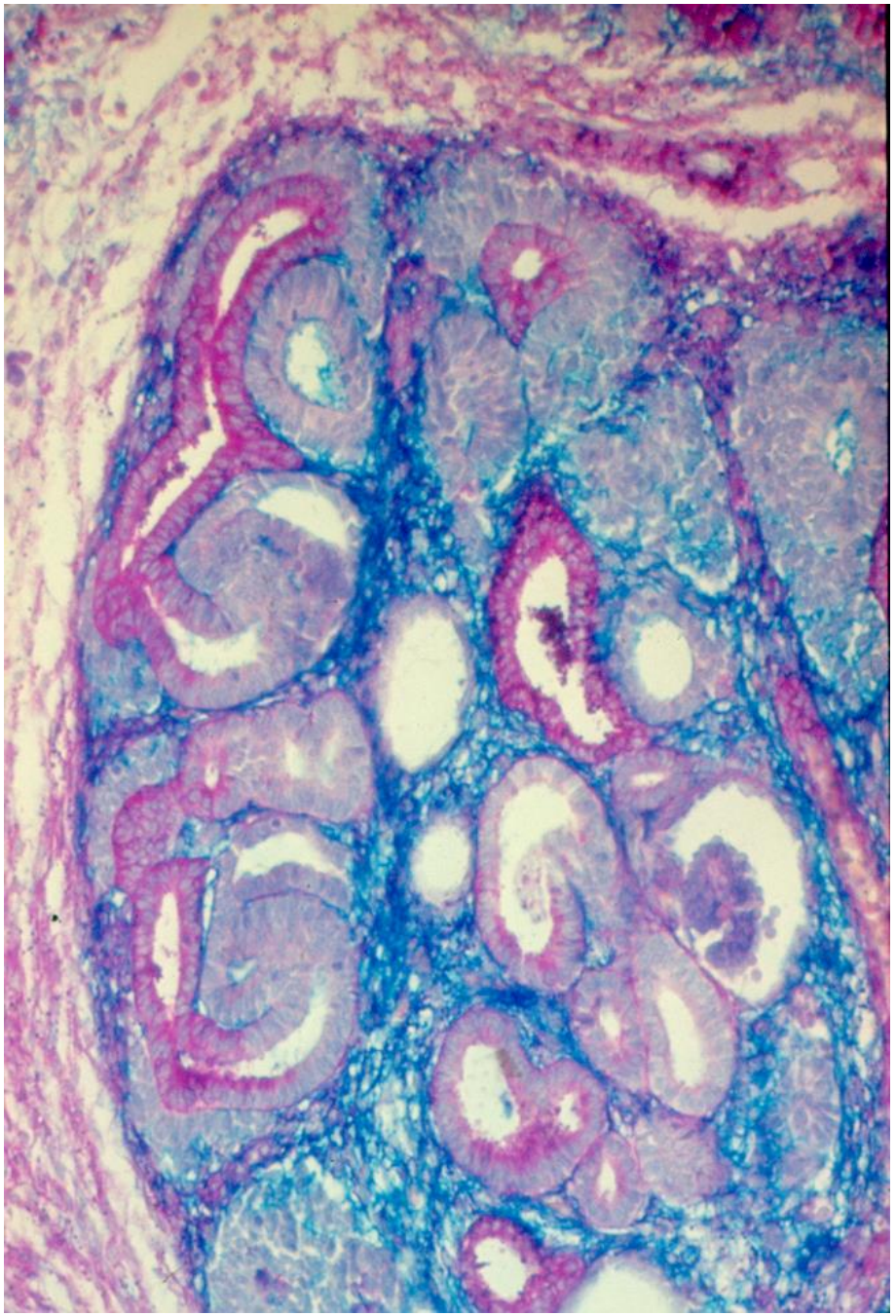
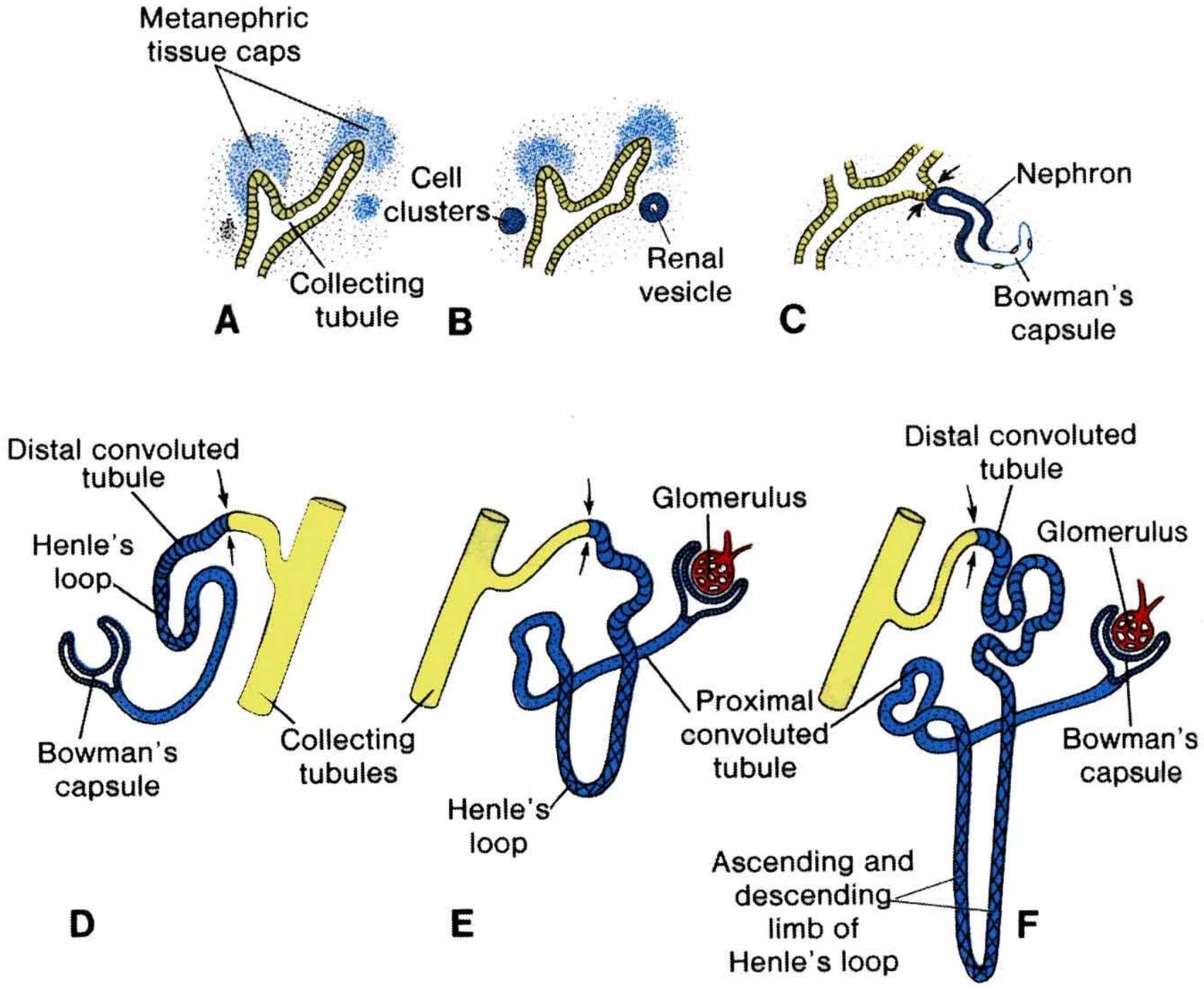
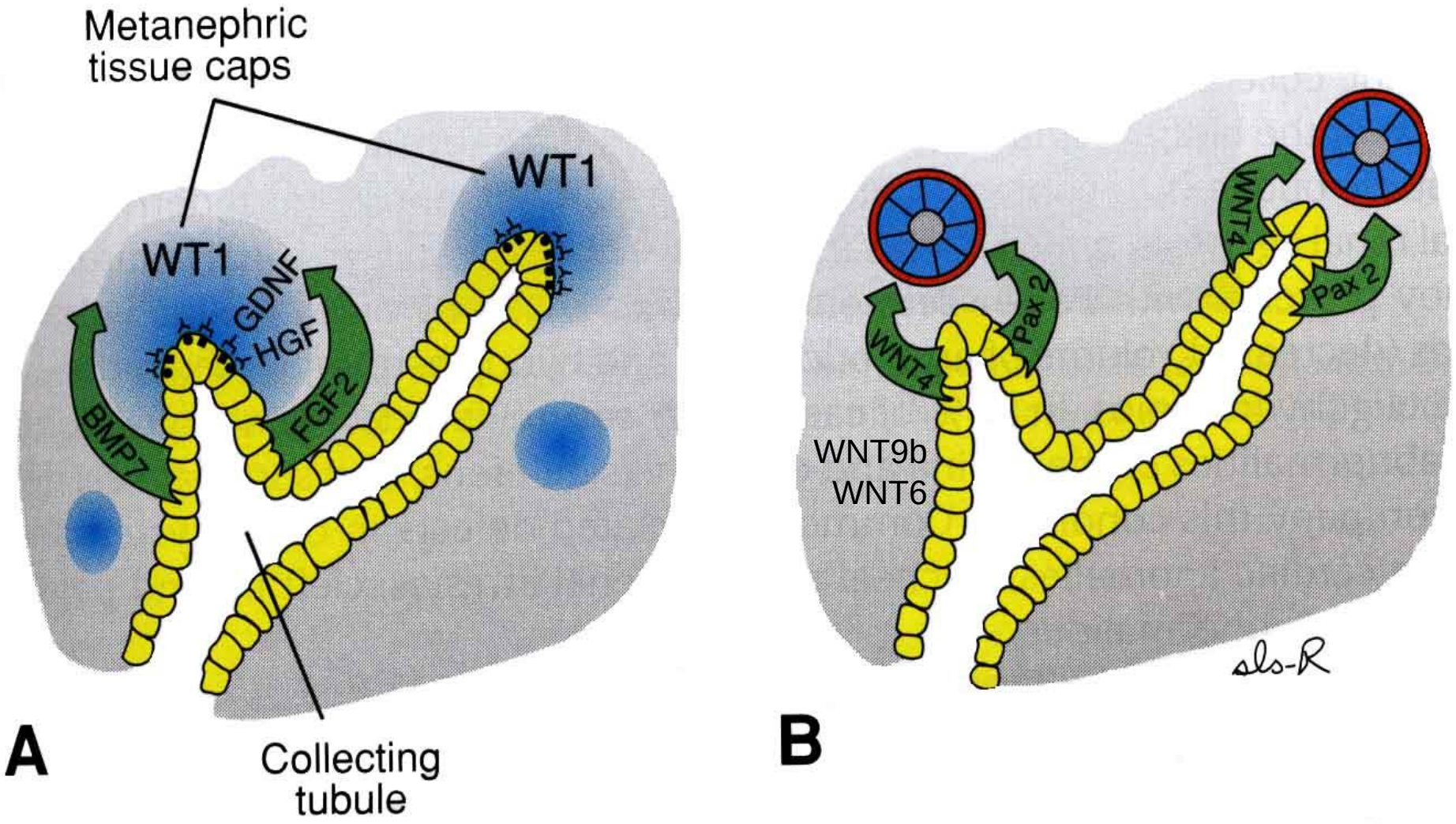
# Metanephros

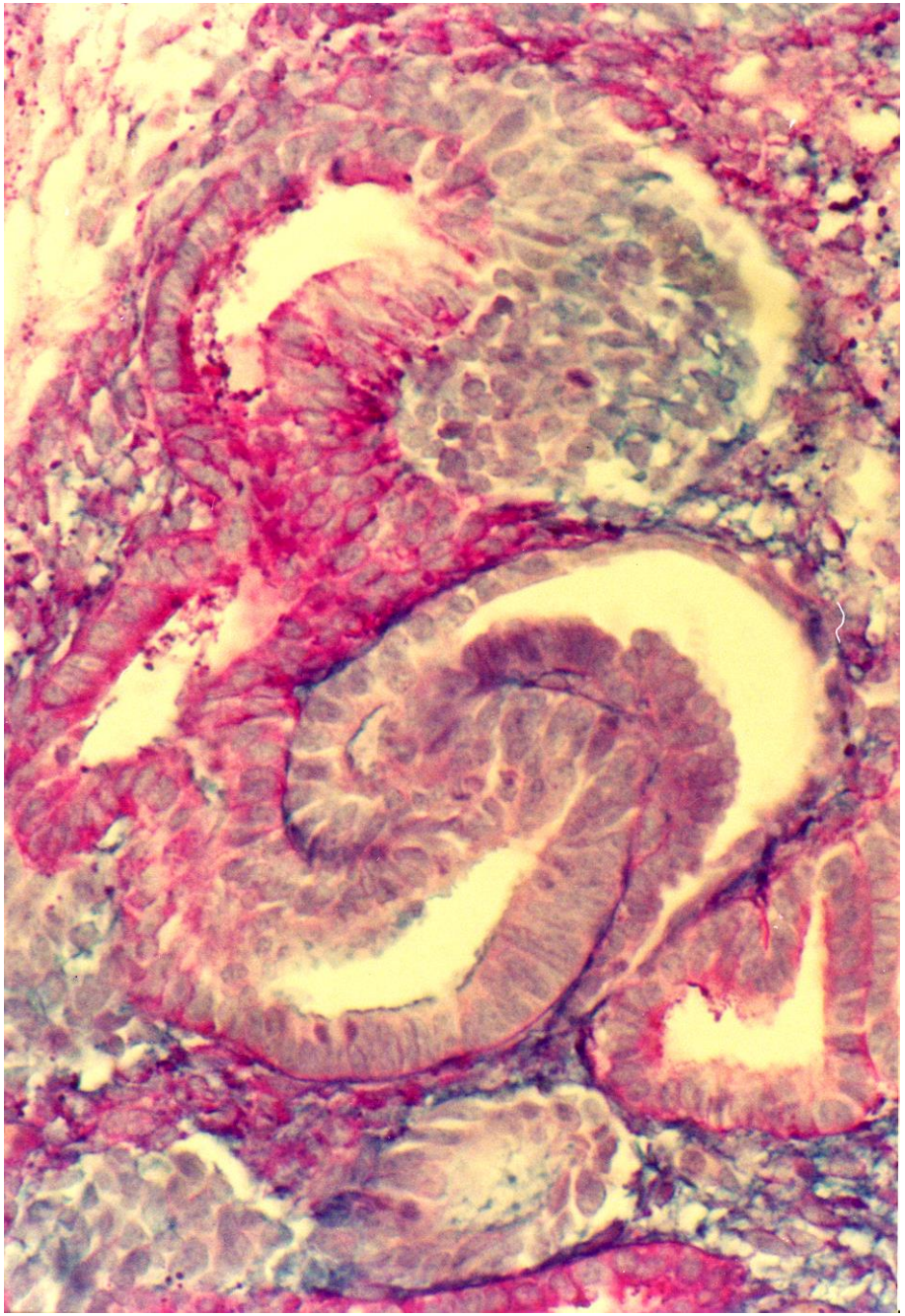



Collecting tubules
Outgrowing collecting tubules
Major calyx
Metanephric blastema
Pelvis
Minor calyx
Ureter
Renal pelvis
A
B
C
D

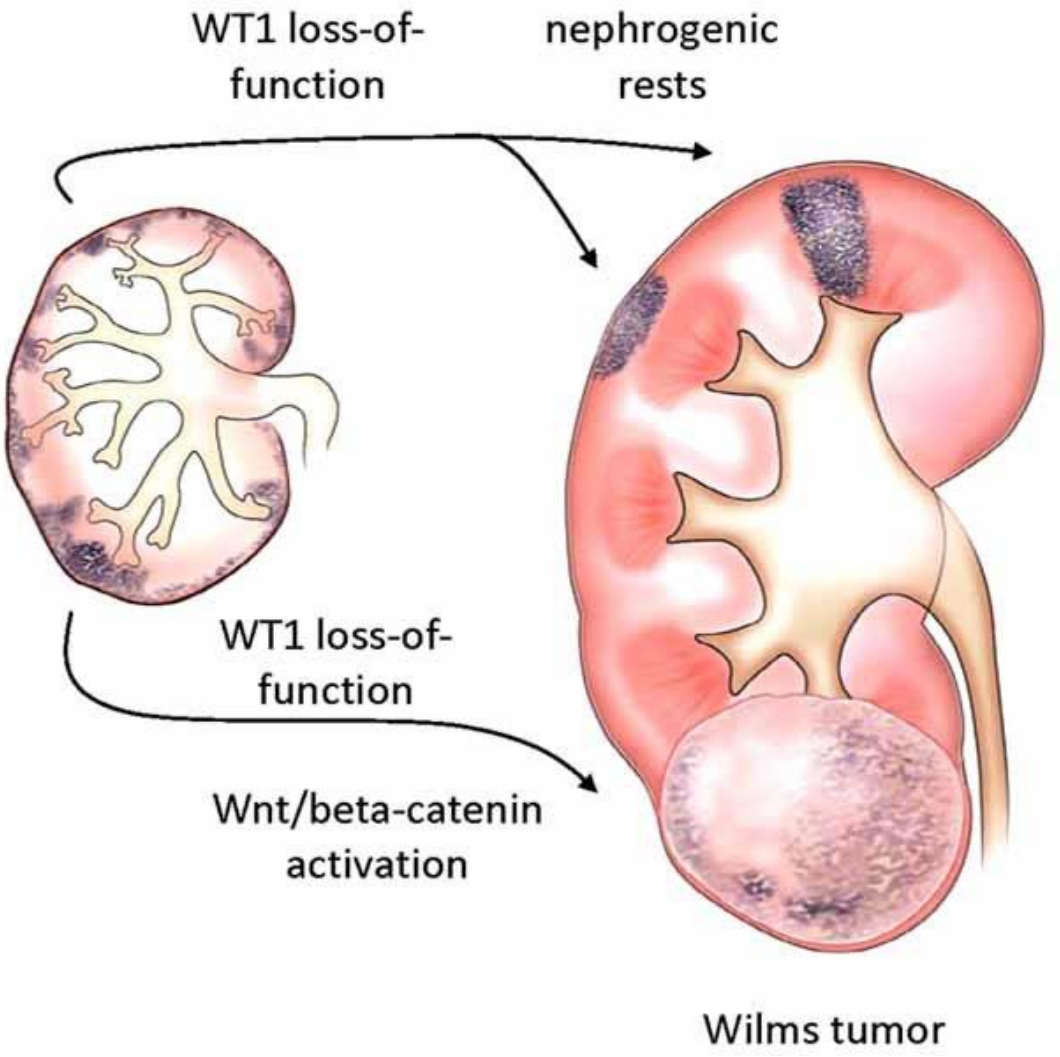



Metanephric tissue caps
Collecting tubule
A
Cell clusters
Renal vesicle
B
Nephron
Bowman's capsule
C
Distal convoluted tubule
Henle's loop
Bowman's capsule
Collecting tubules
D
Glomerulus
Proximal convoluted tubule
Henle's loop
E
Distal convoluted tubule
Glomerulus
Bowman's capsule
Ascending and descending limb of Henle's loop
F

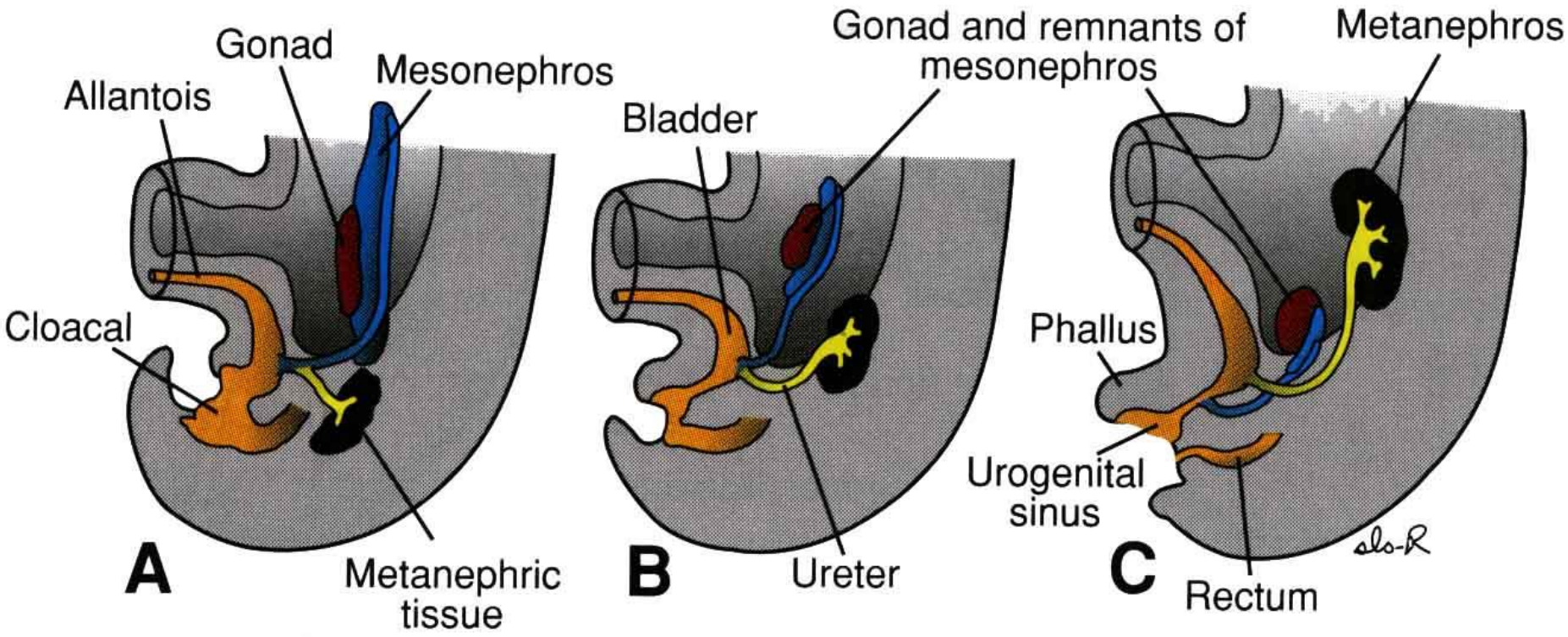

Metanephric tissue caps
WT1
WT1
GDNF
HGF
FGF2
BMP7
Collecting tubule
A
WNT4
Pax 2
WNT4
Pax 2
WNT9b
WNT6
sls-R
B

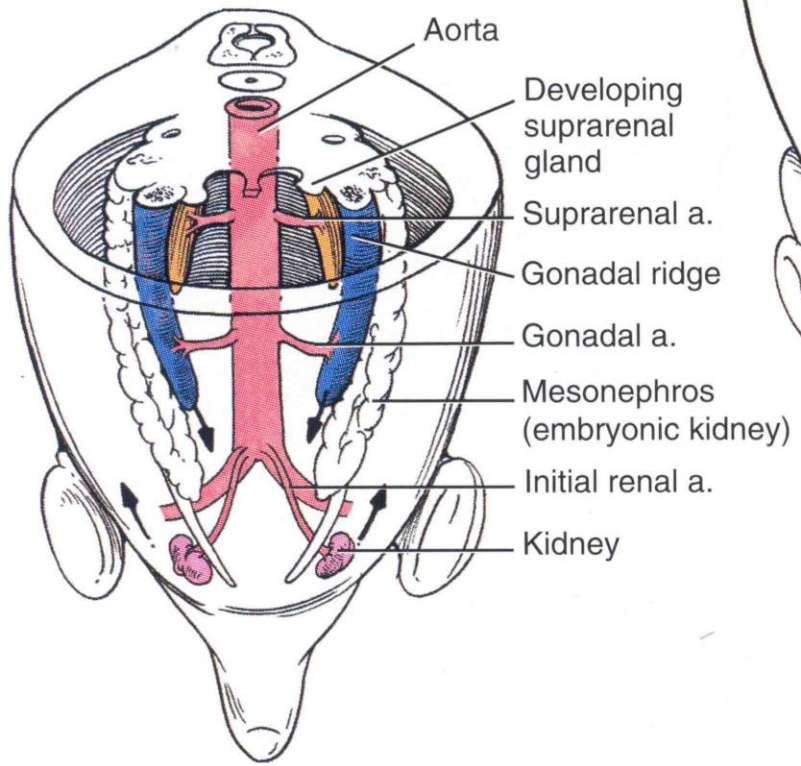


# Mutace genu WT1- Wilmsův tumor (nefroblastom)

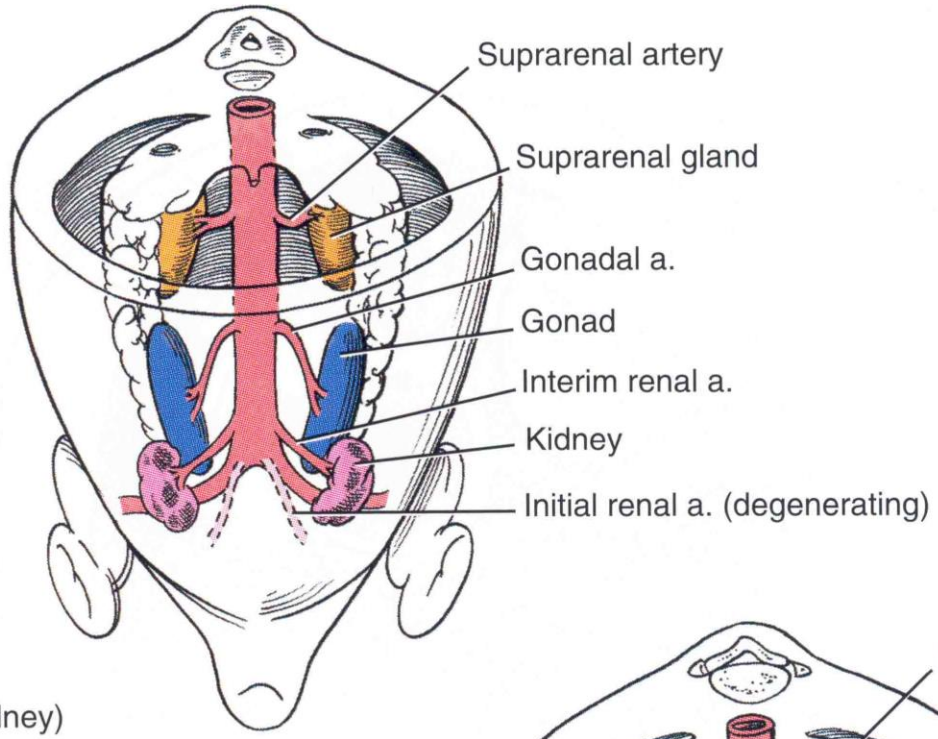



# Vzestup ledvin

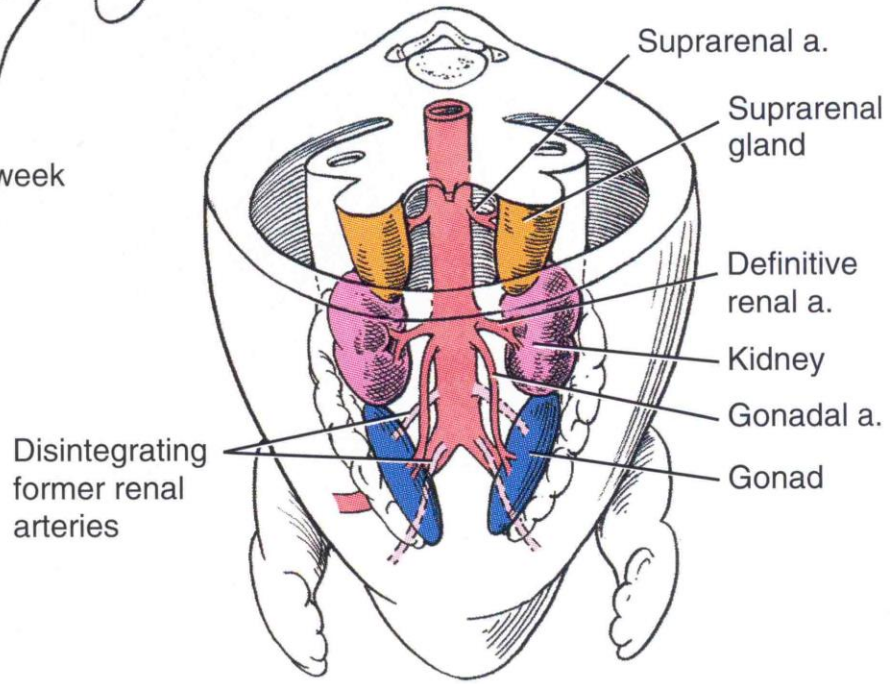





**A** Late 5th week

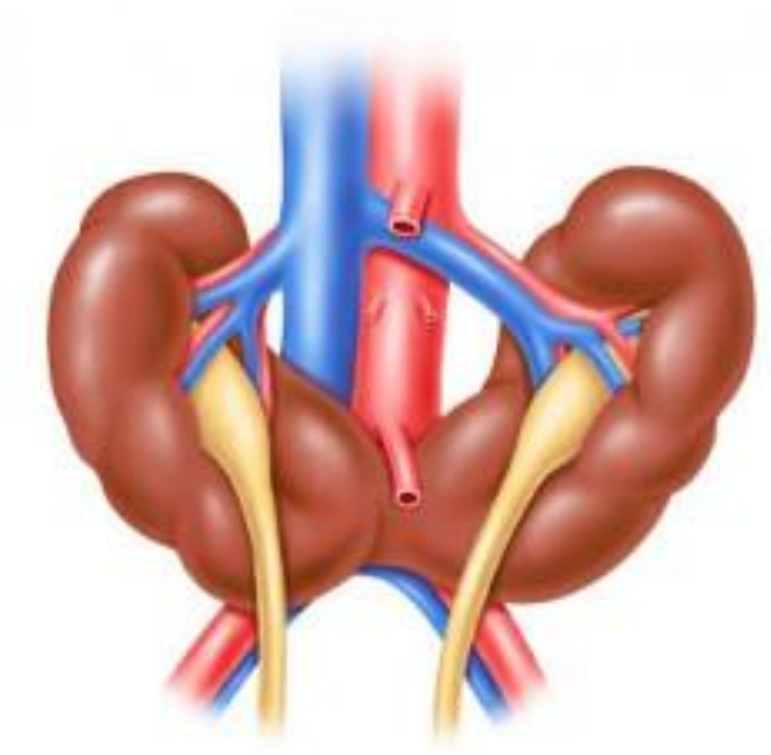



**B** Mid-6th week

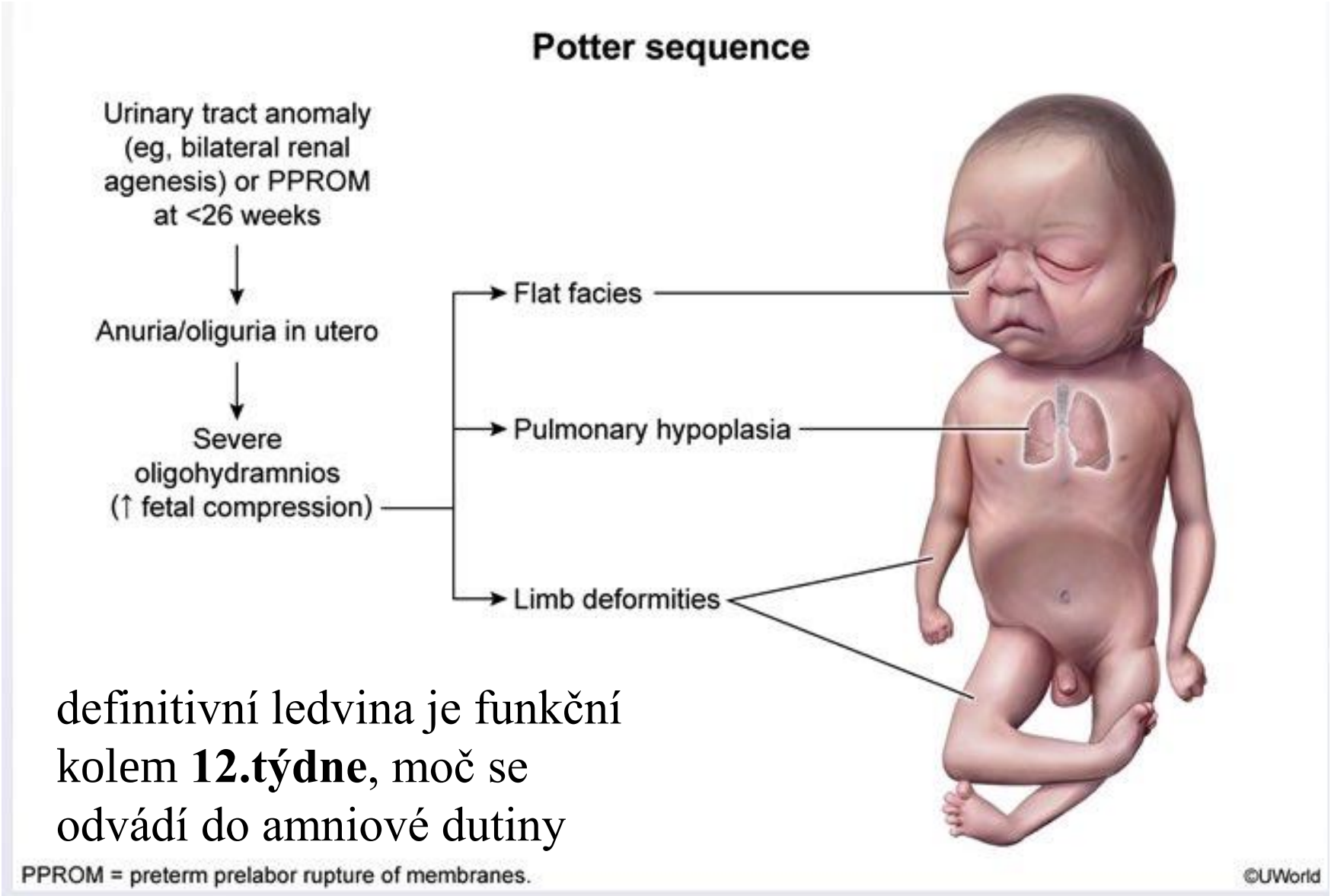



**C** 7th week

# VVV ledvin: ageneze ledviny, podkovovitá ledvina

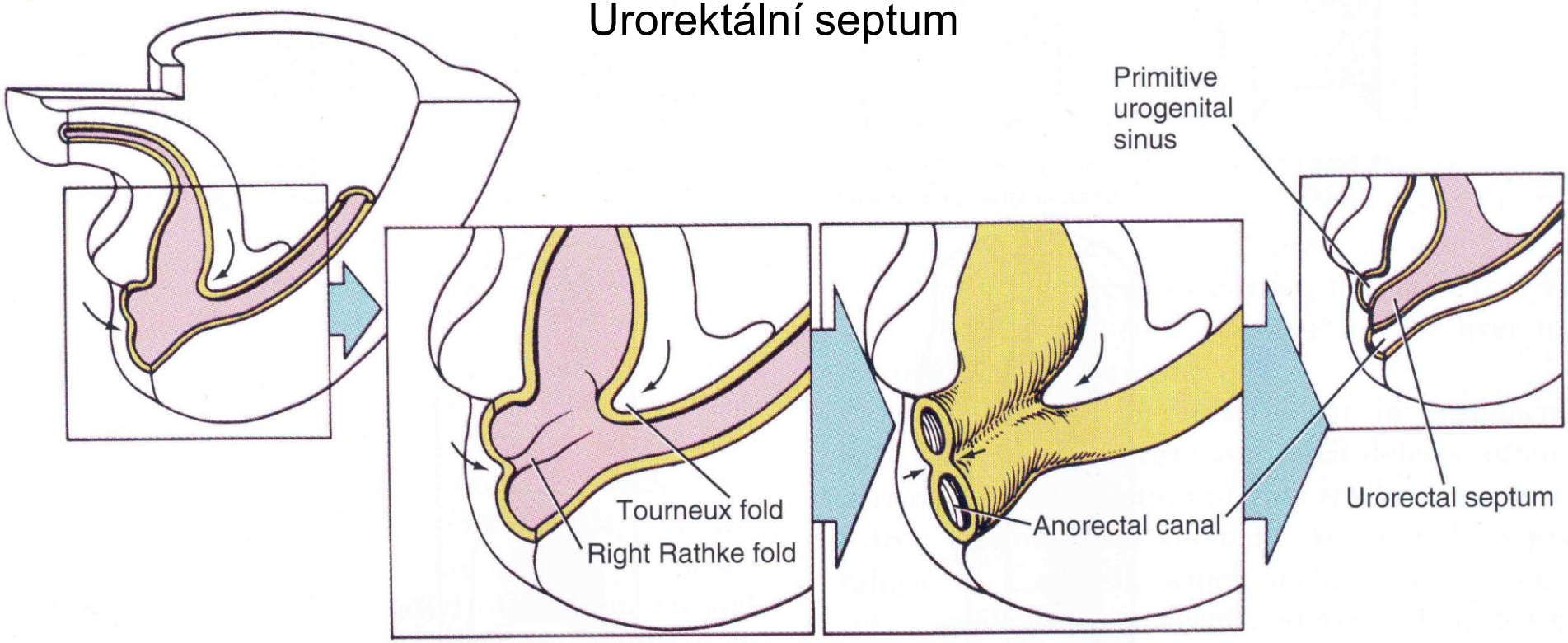
# Syndrom (sekvence) Potterové

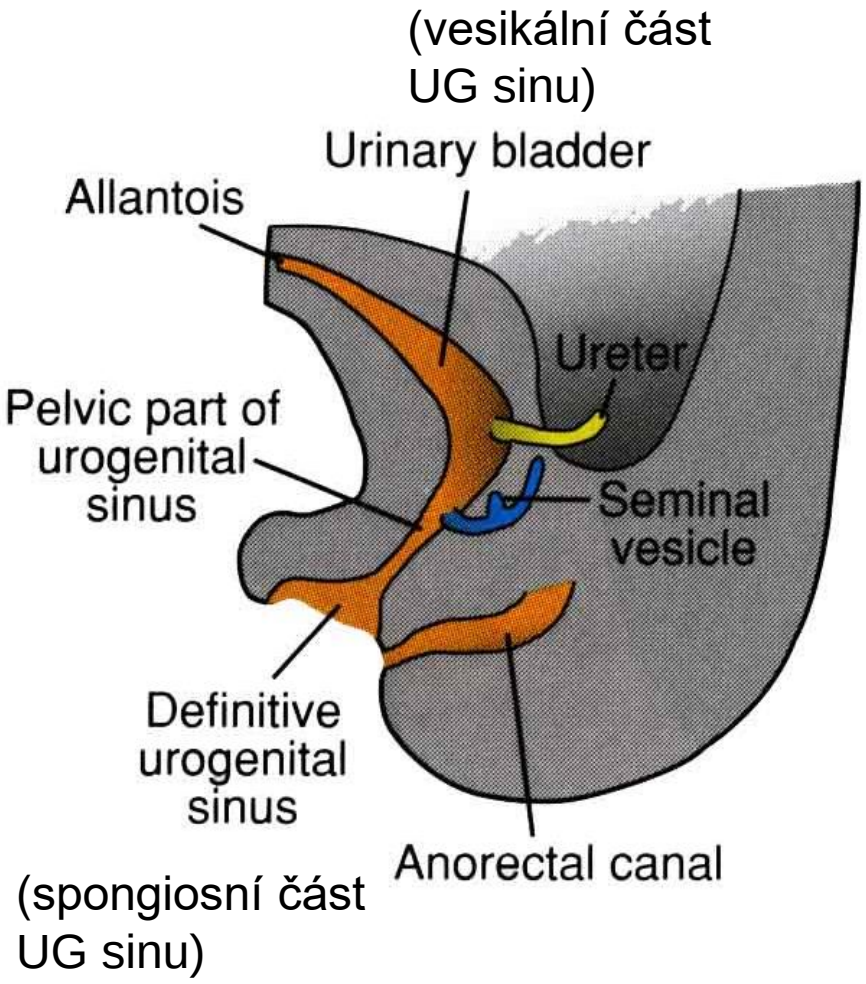


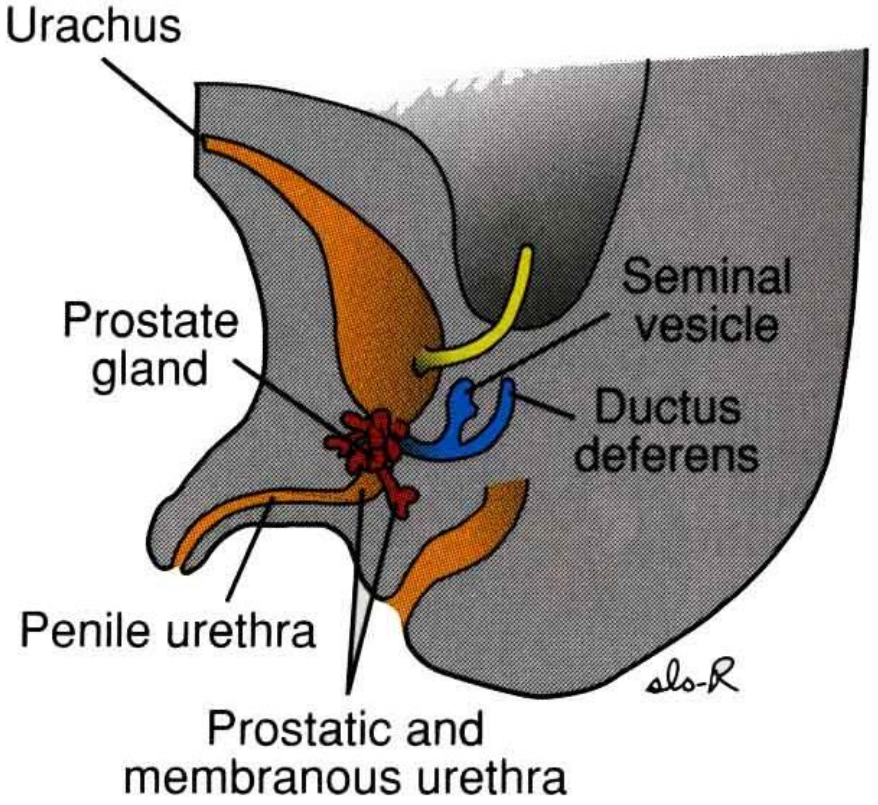

definitivní ledvina je funkční kolem **12.týdne**, moč se odvádí do amniové dutiny

# KLOAKA, VÝVOJ MOČOVÉHO MĚCHÝŘE A MOČOVÉ TRUBICE

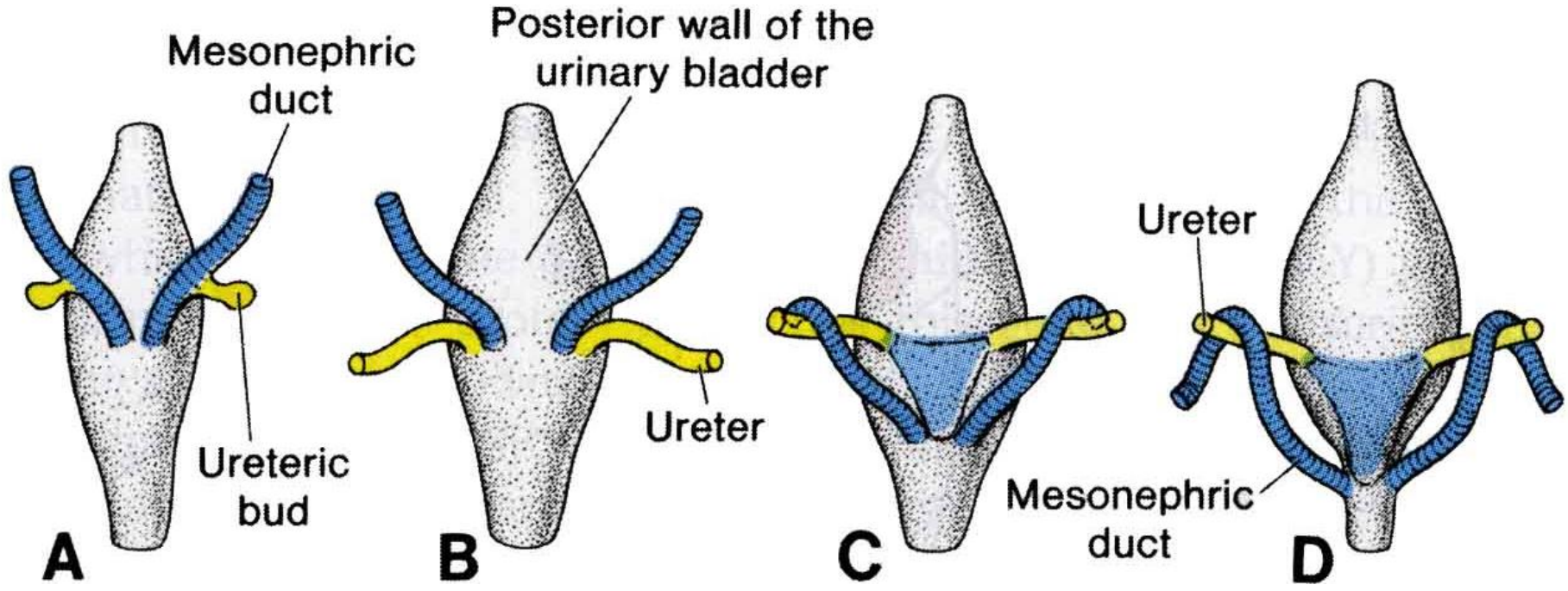
# Urorektální septum



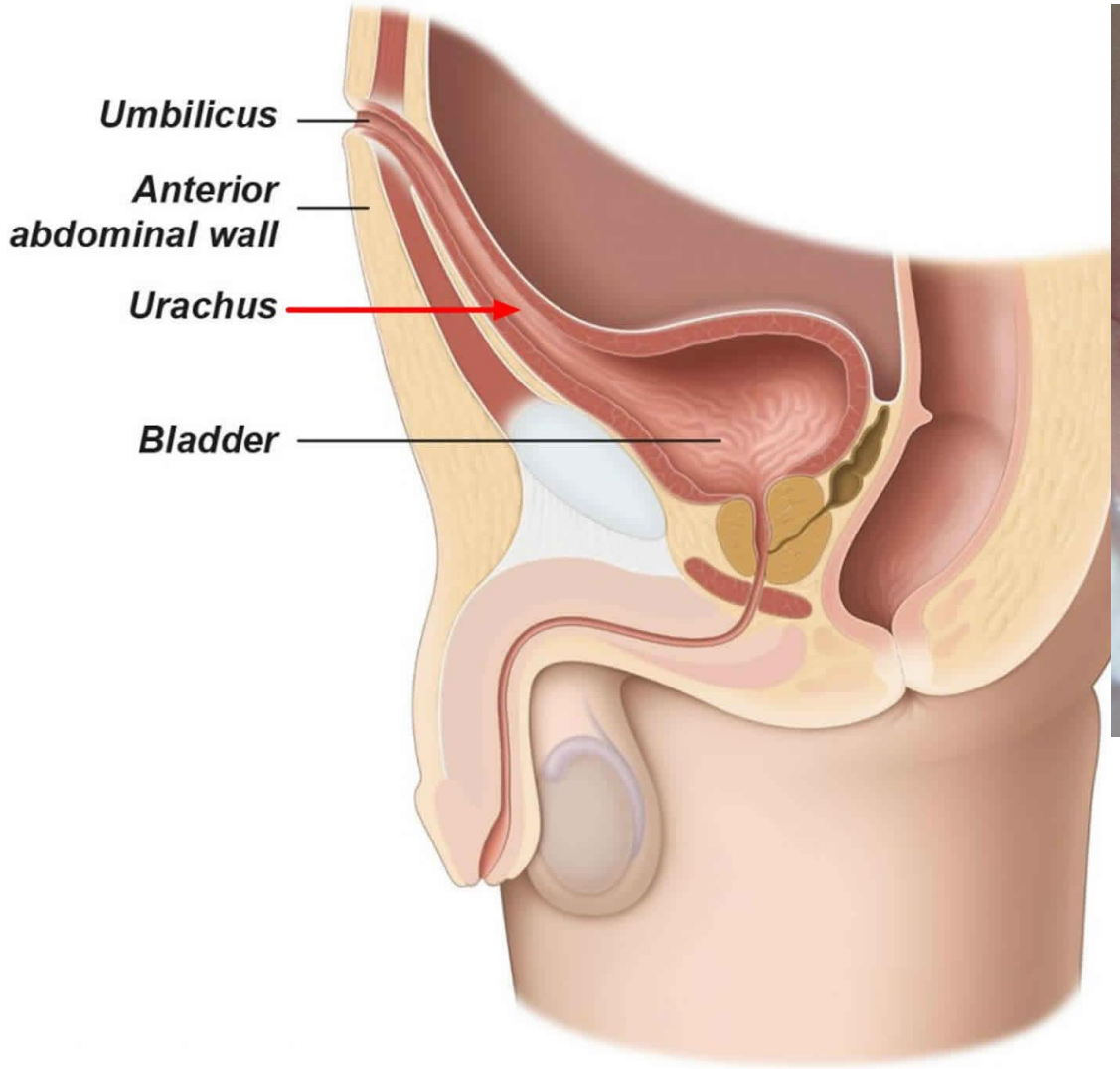


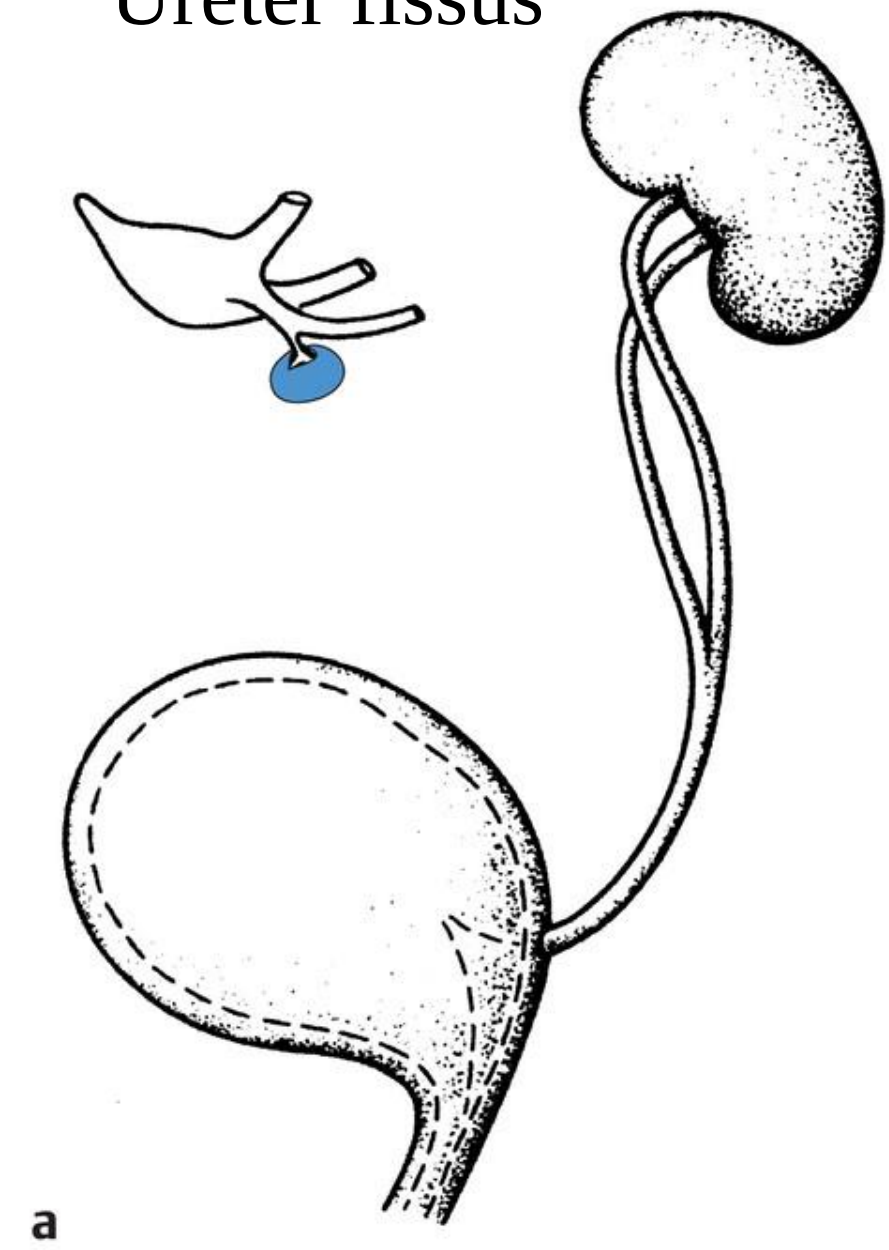

1.vesikální část
2.pánevní část: prostatická a membranózní část urethry,
u ženy celá urethra
3.spongiosní část: spongiosní část urethry u muže, u ženy vestibulum vagina


Mesonephric duct
Ureteric bud
A
Posterior wall of the urinary bladder
Ureter
B
C
Ureter
Mesonephric duct
D

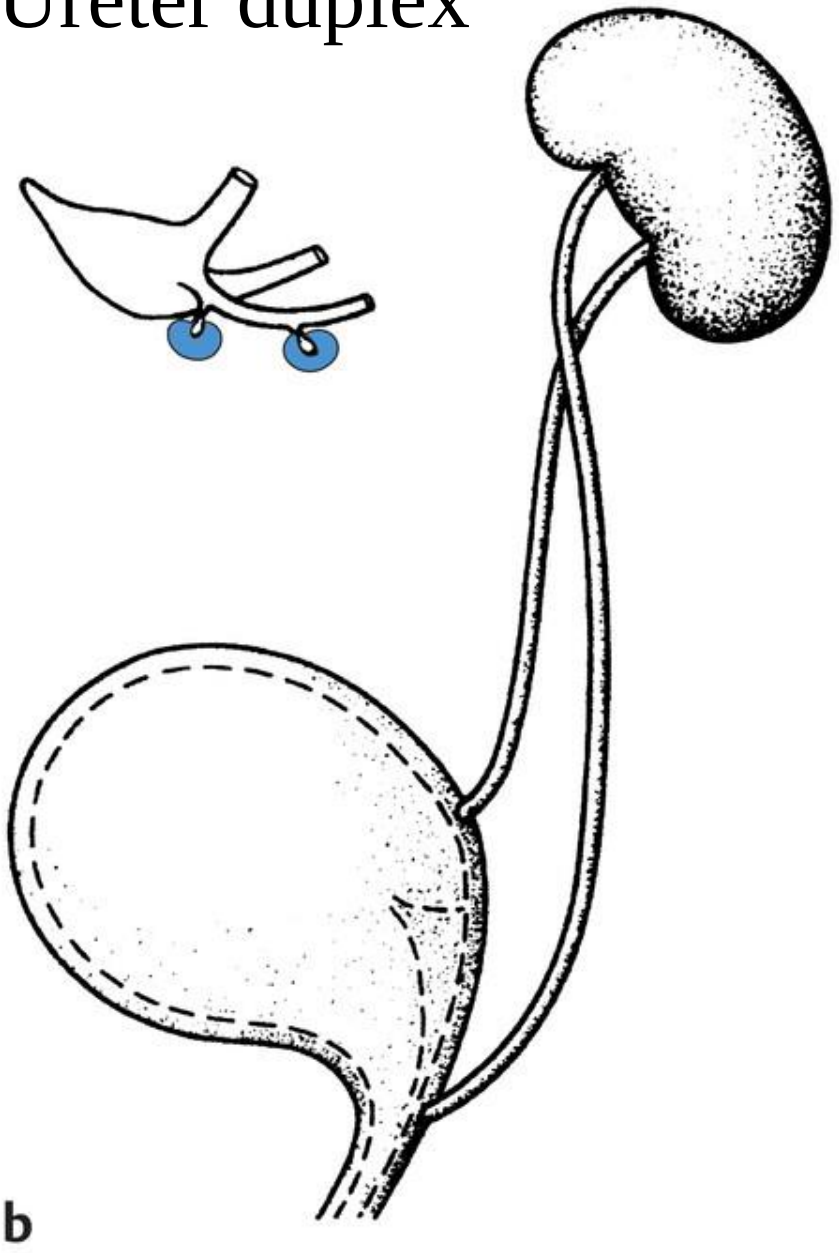
# VVV močový měchýř: píštěl urachu, extrofie měchýře



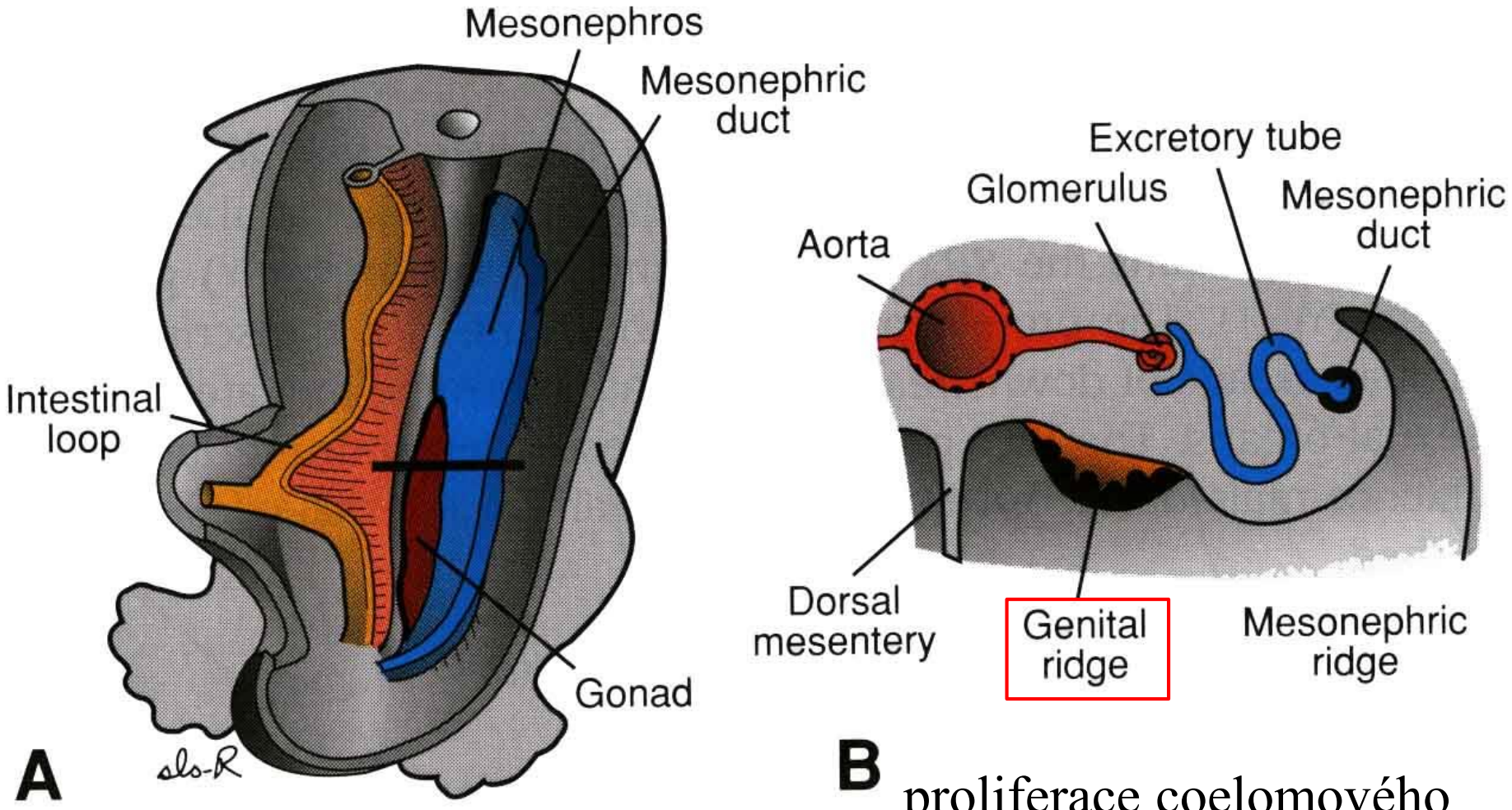

Ureter fissus



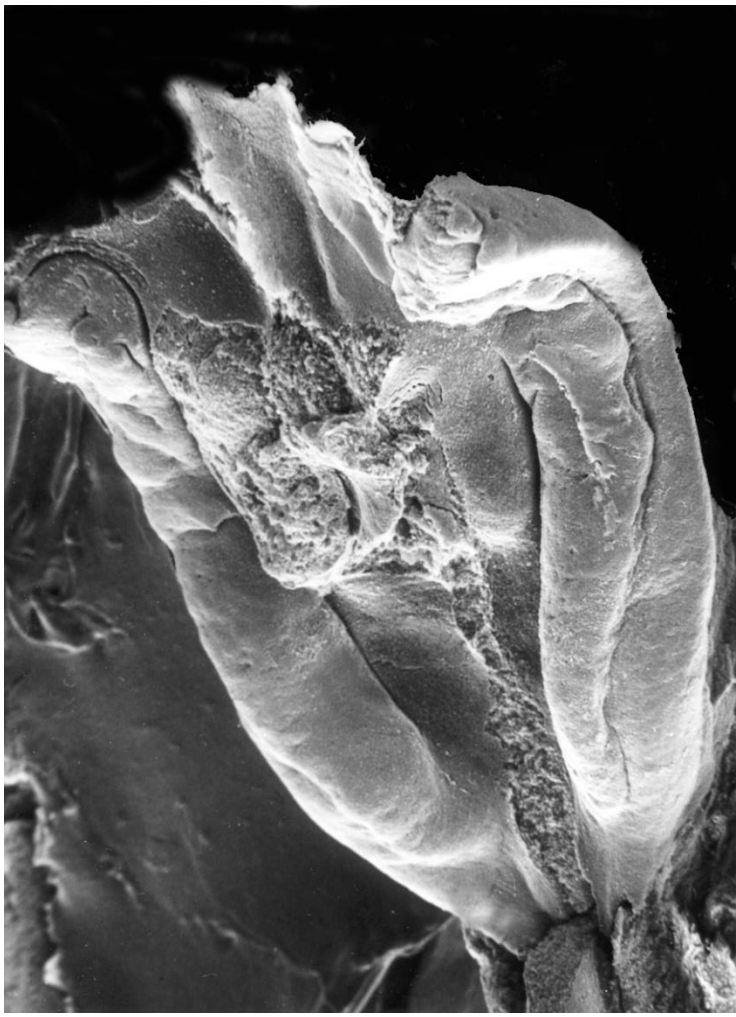

Ureter duplex

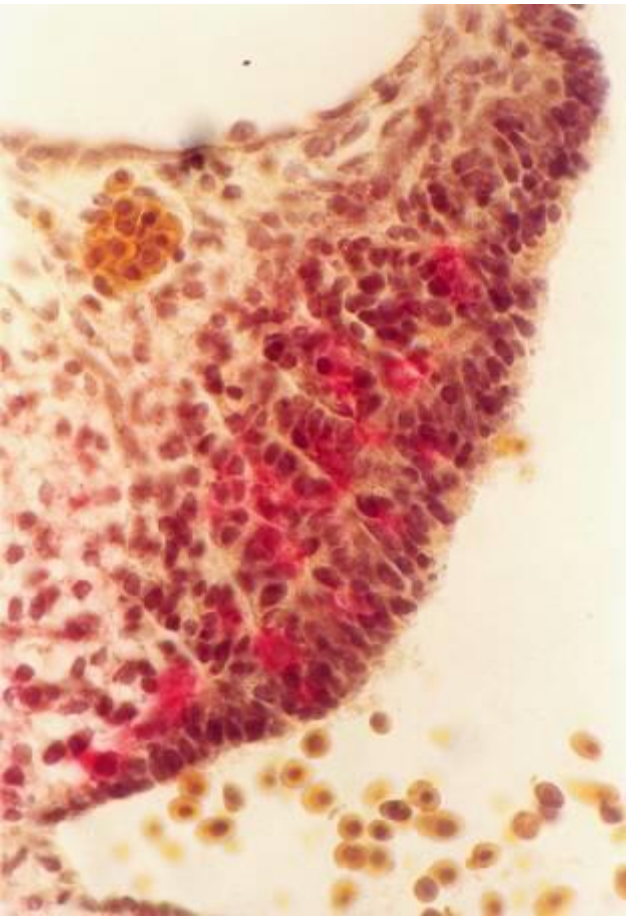
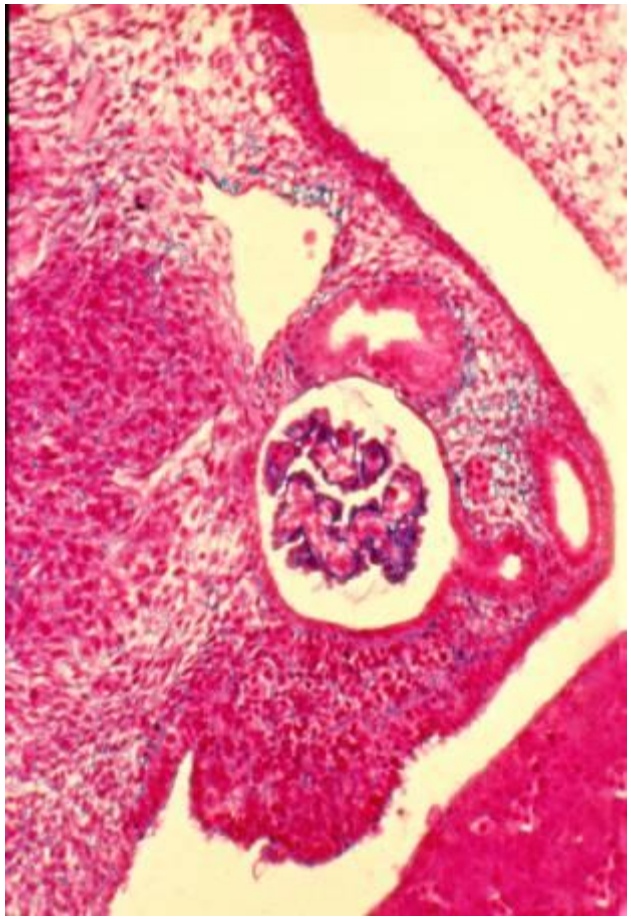
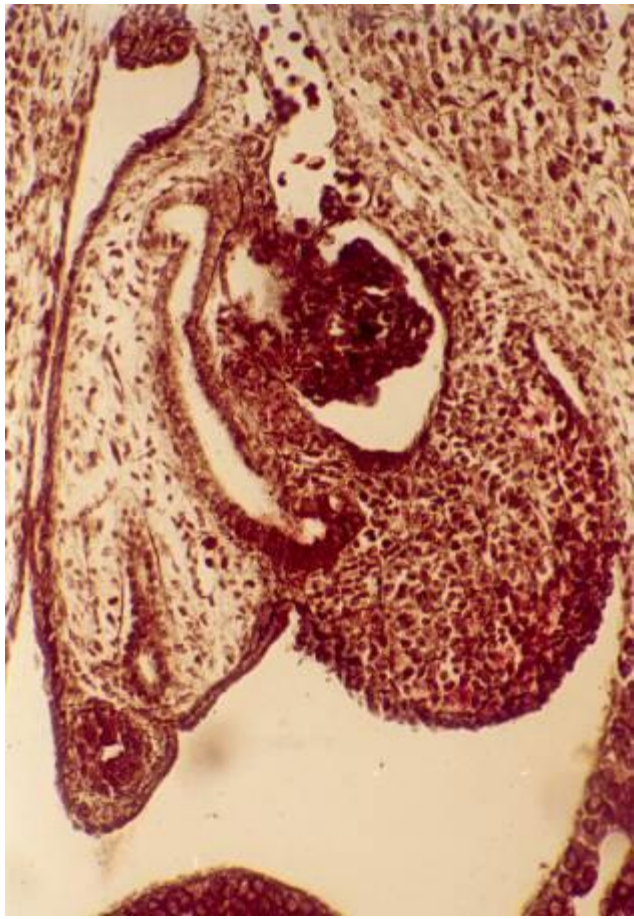


# VÝVOJ GONÁD,
# DETERMINACE POHLAVÍ

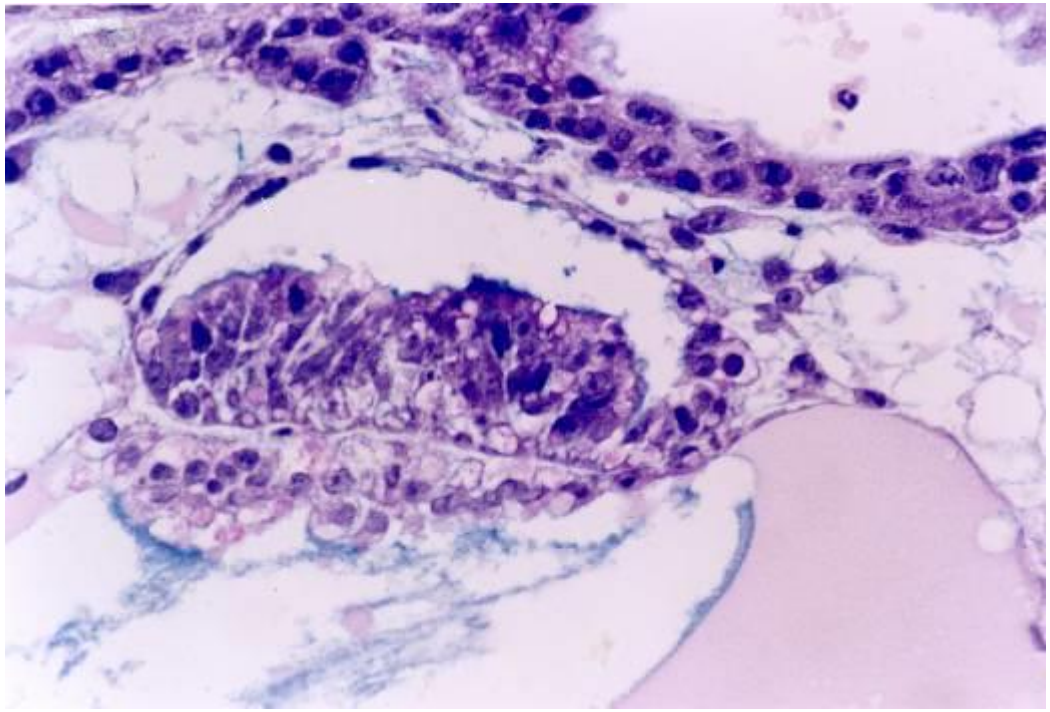


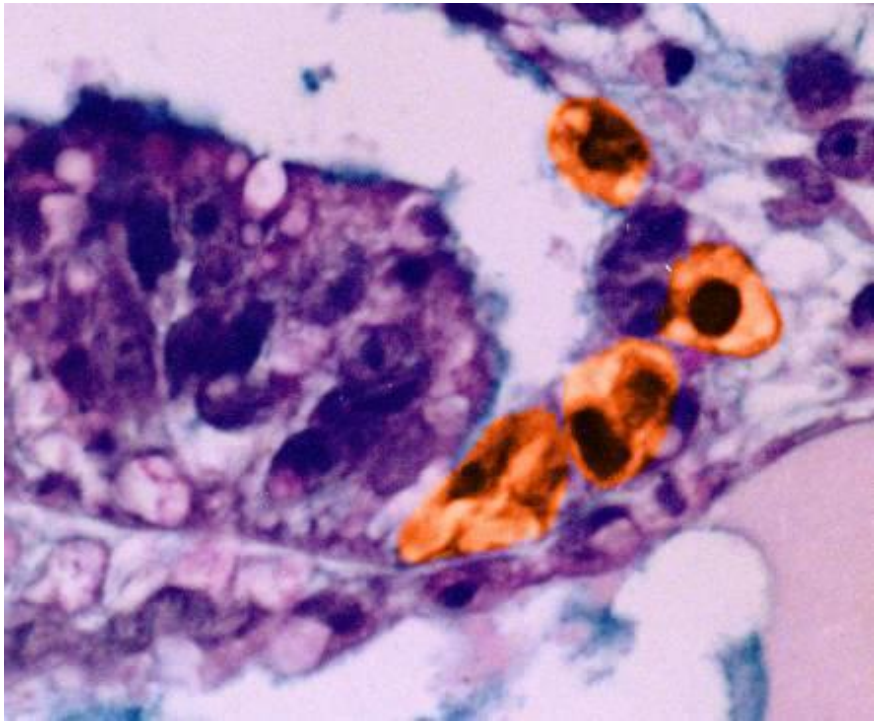

proliferace coelomového epitelu + kondenzace mesenchymu pod ním

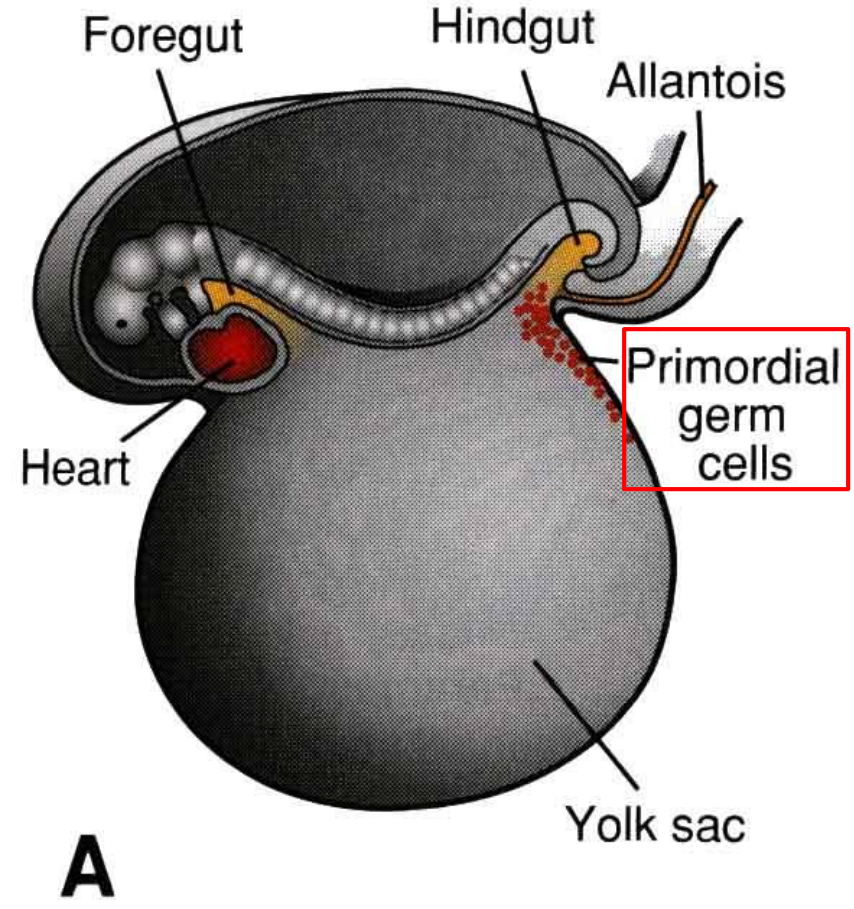


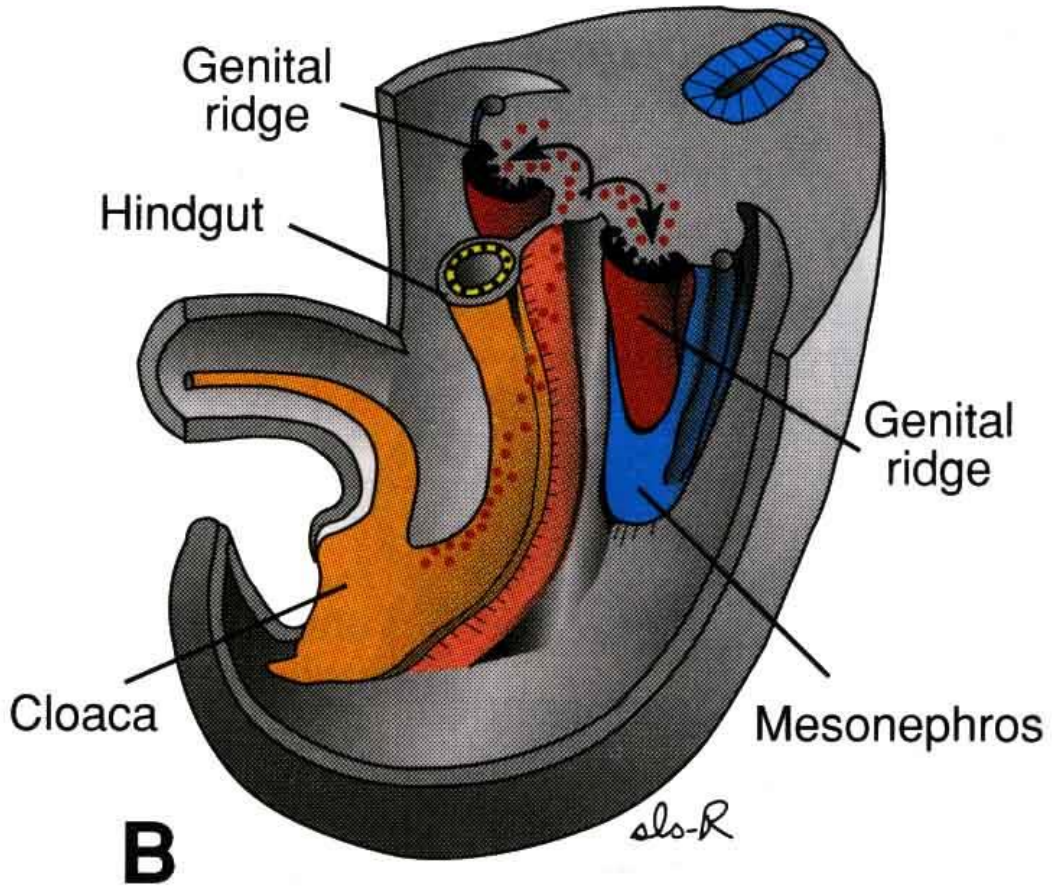




# Prvopohlavní buňky

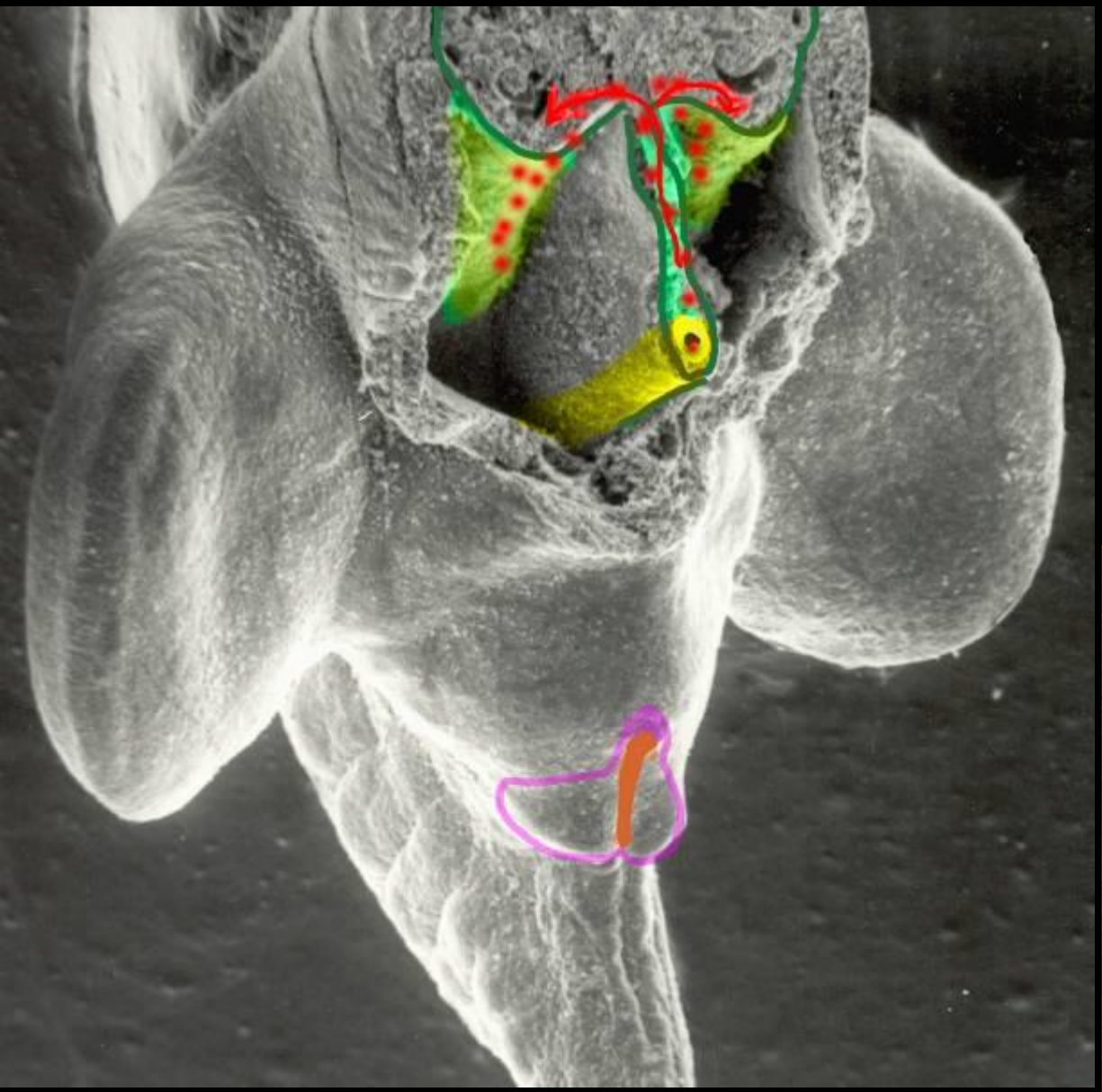


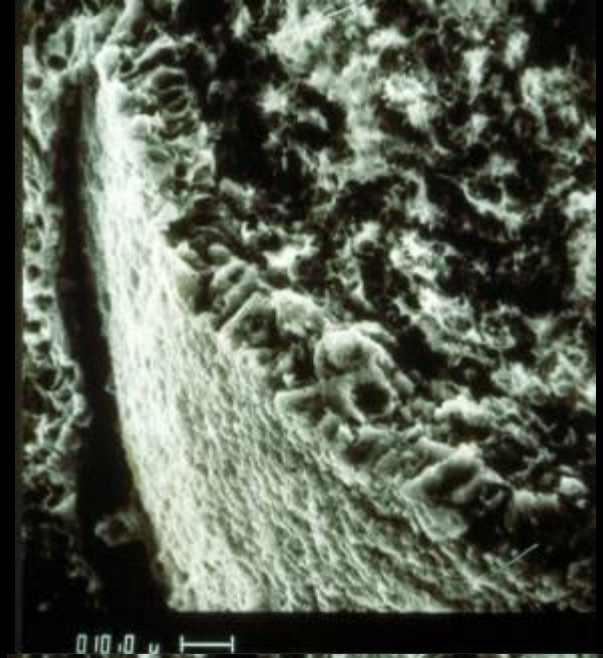


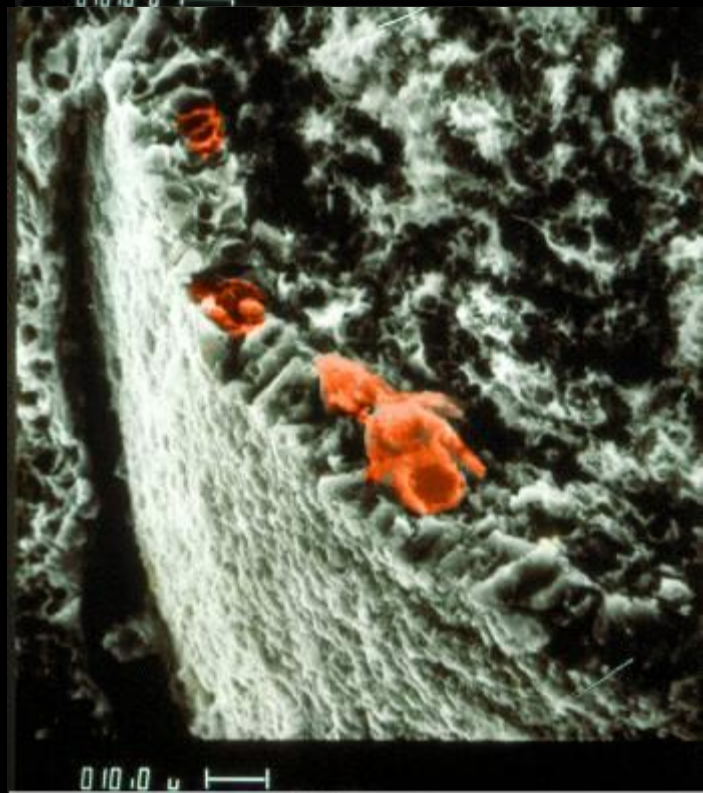


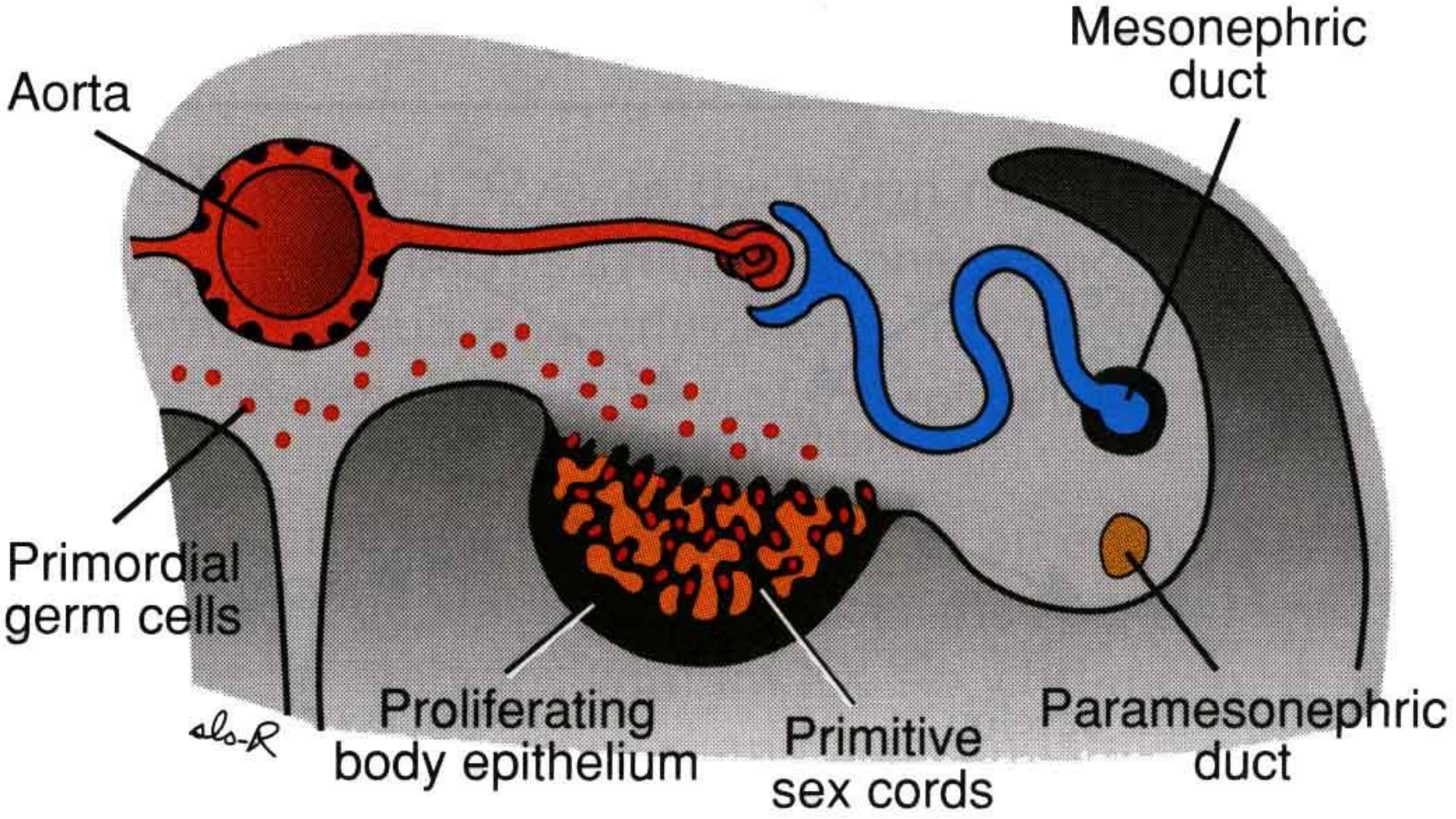

osídlení gonád: **6.týden** vývoje
- migrace dorsálním mesenteriem



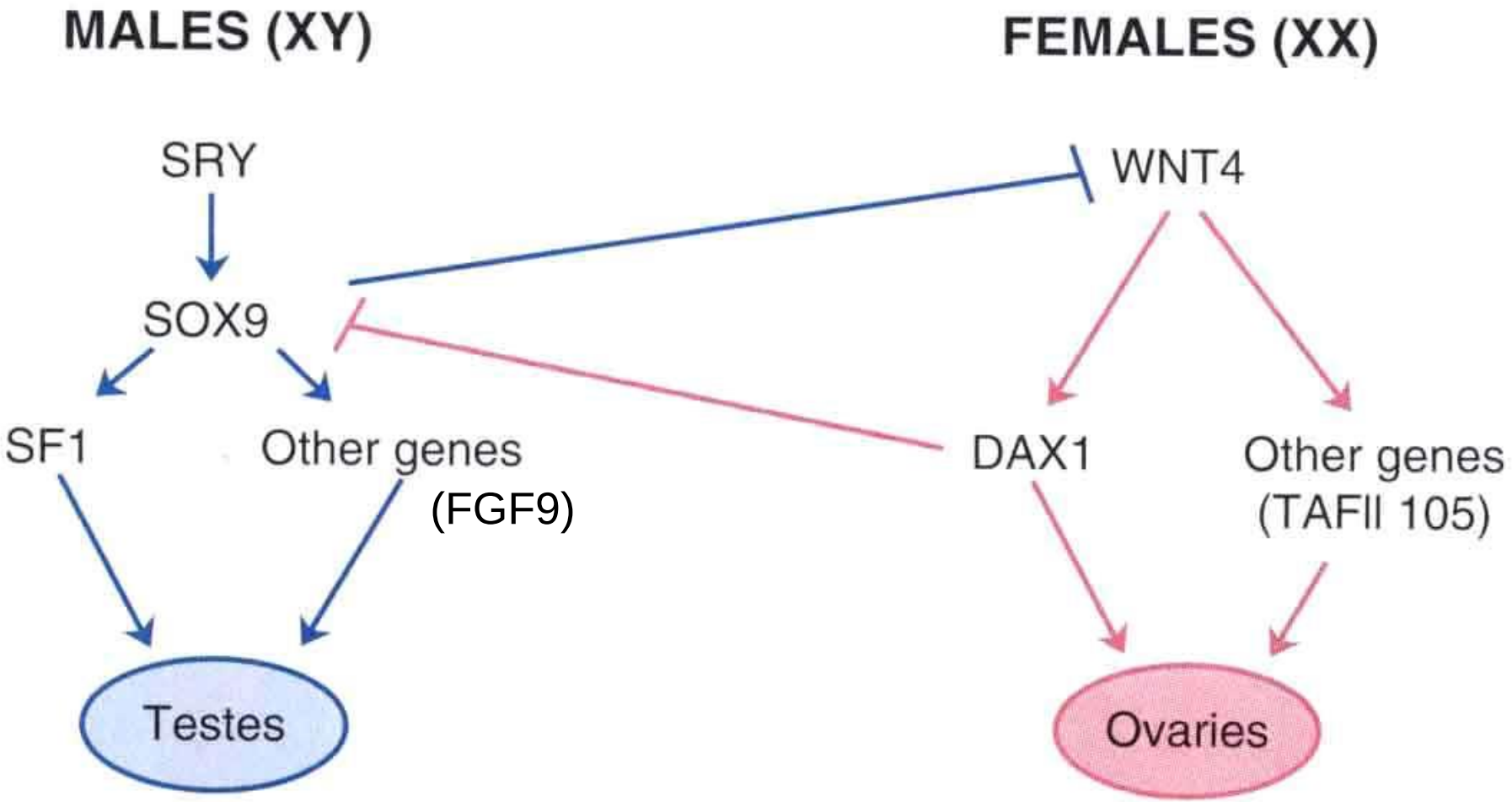

0 10.0 µ


0 10.0 µ

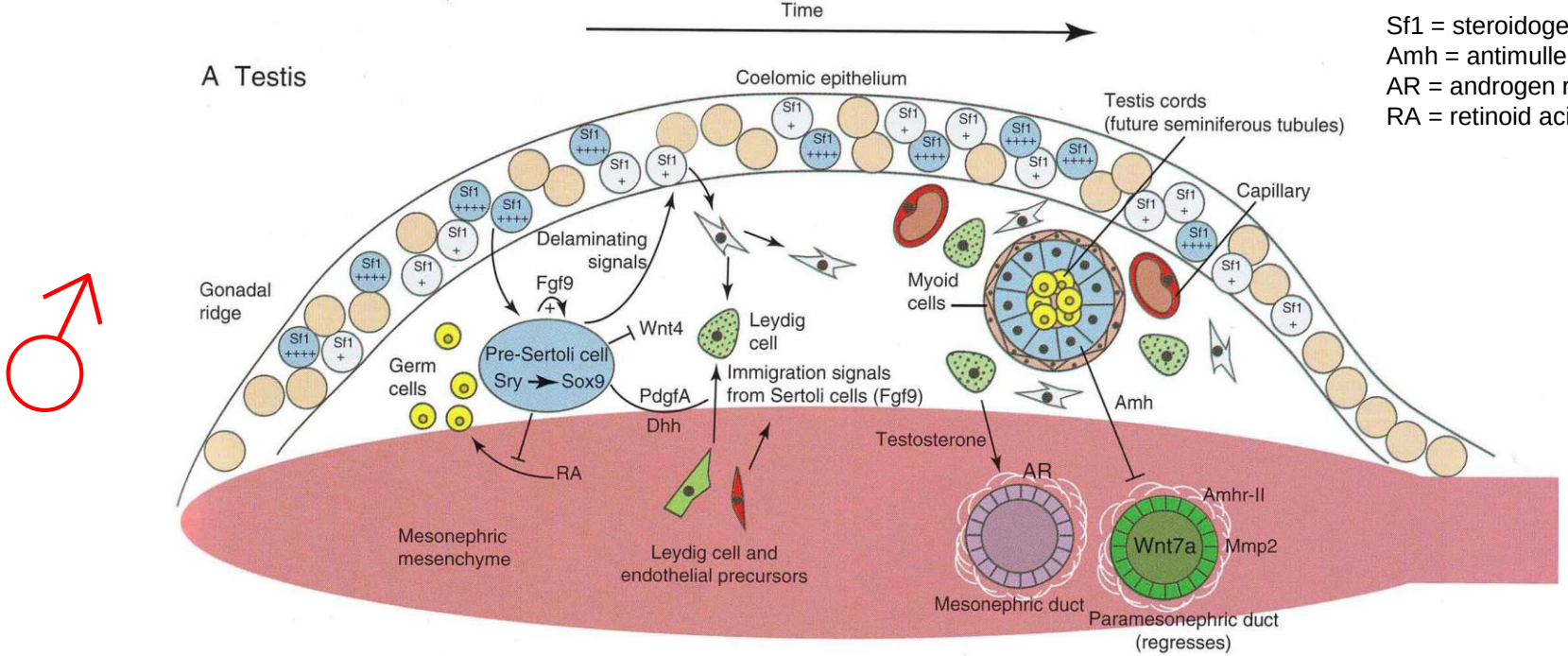
# Indiferentní gonáda



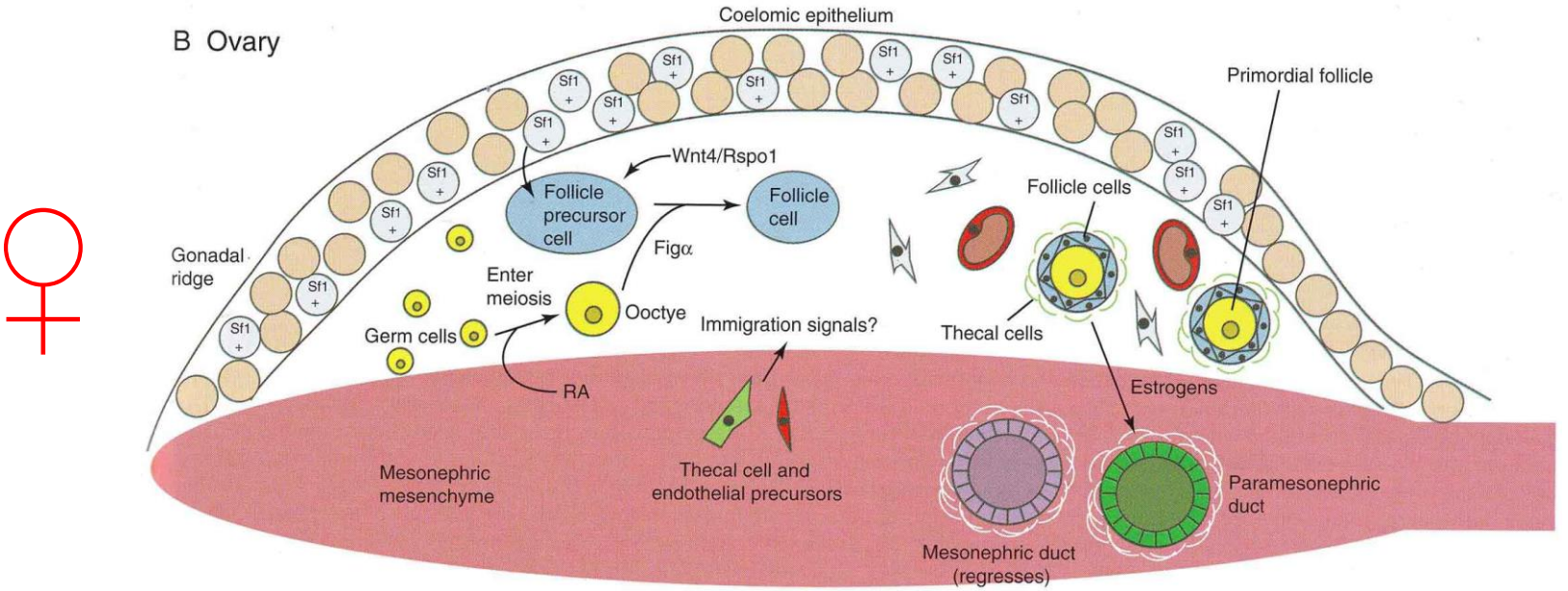

Did you want a boy or girl?
I wanted him to pull out but here I am.
BuzzFeed


MALES (XY)
FEMALES (XX)
SRY
SOX9
SF1
Other genes
(FGF9)
Testes
WNT4
DAX1
Other genes
(TAFII 105)
Ovaries

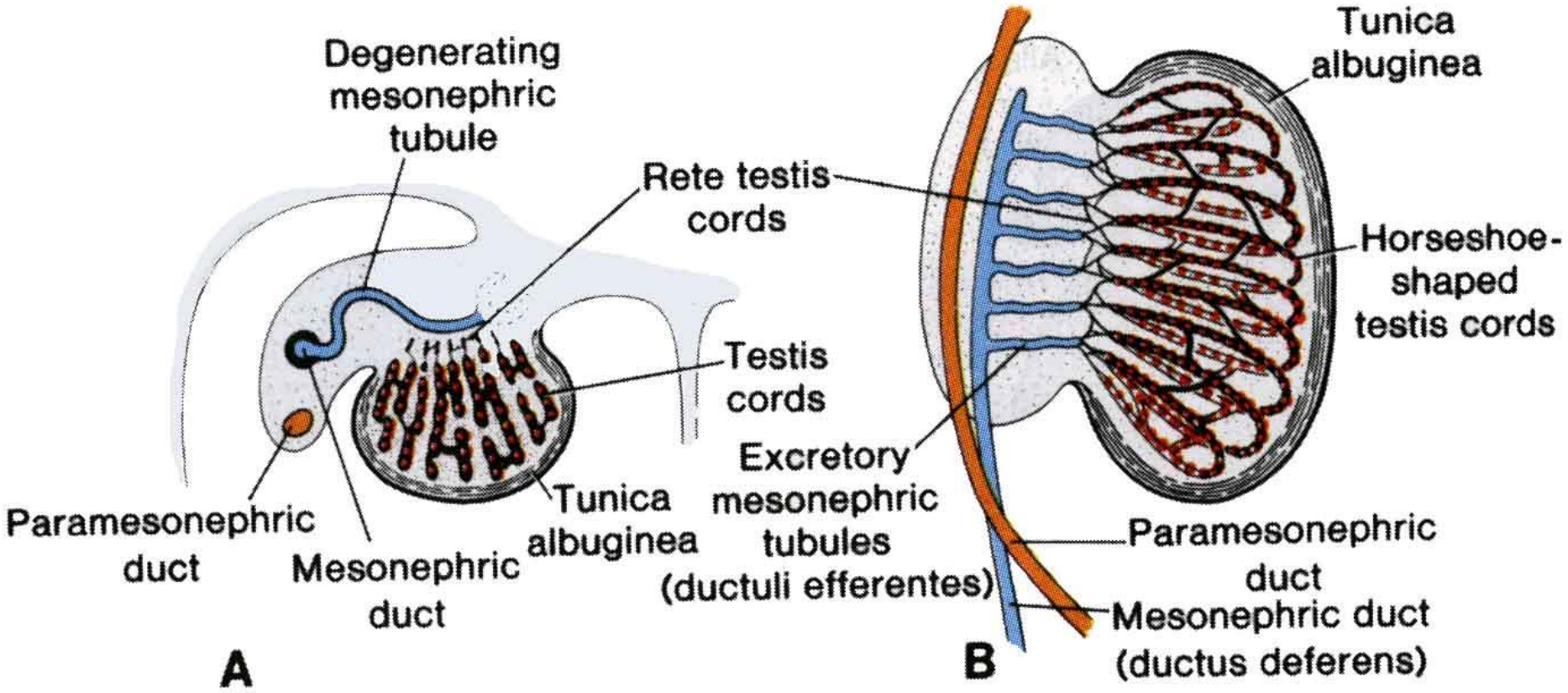
Sf1 = steroidogenic factor-1
Amh = antimullerian hormone
AR = androgen receptor
RA = retinoid acid

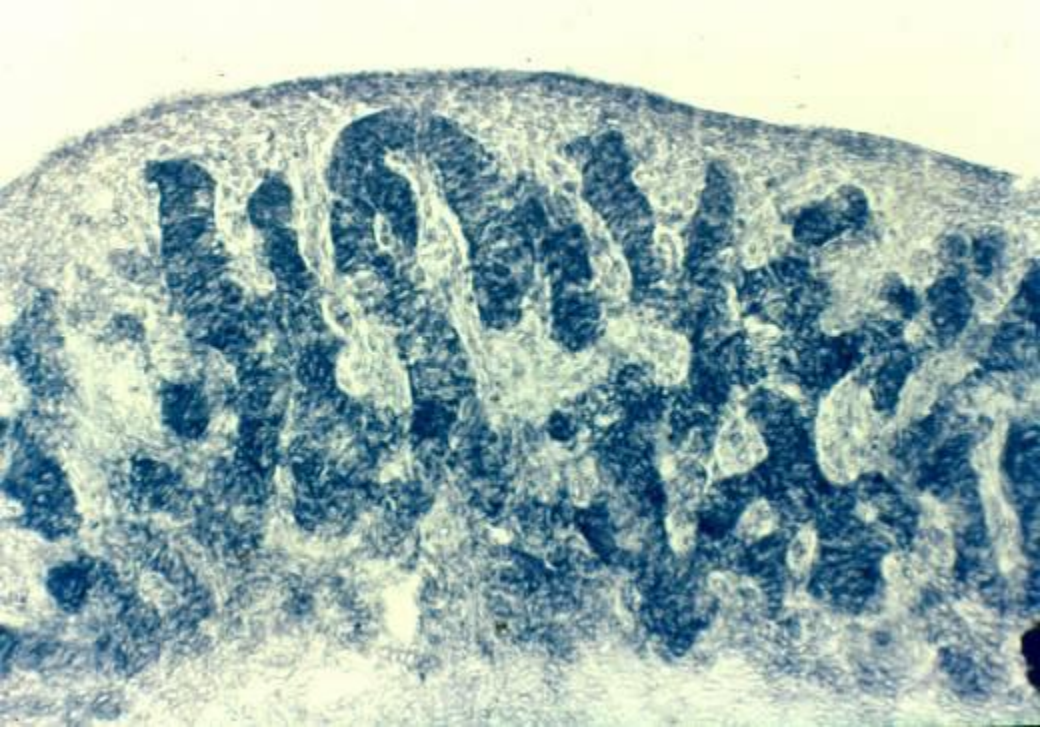


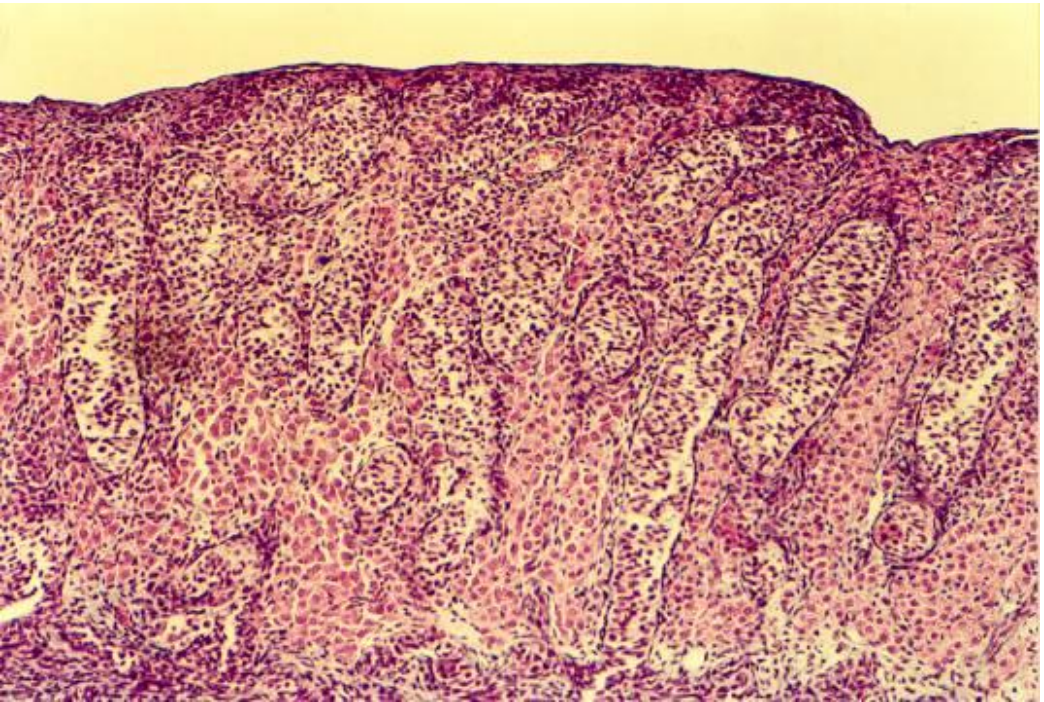

Schoenwolf, G.C. et al.: Larsen's Human Embryology, 5th Ed., Churchill Livingstone, 2015.

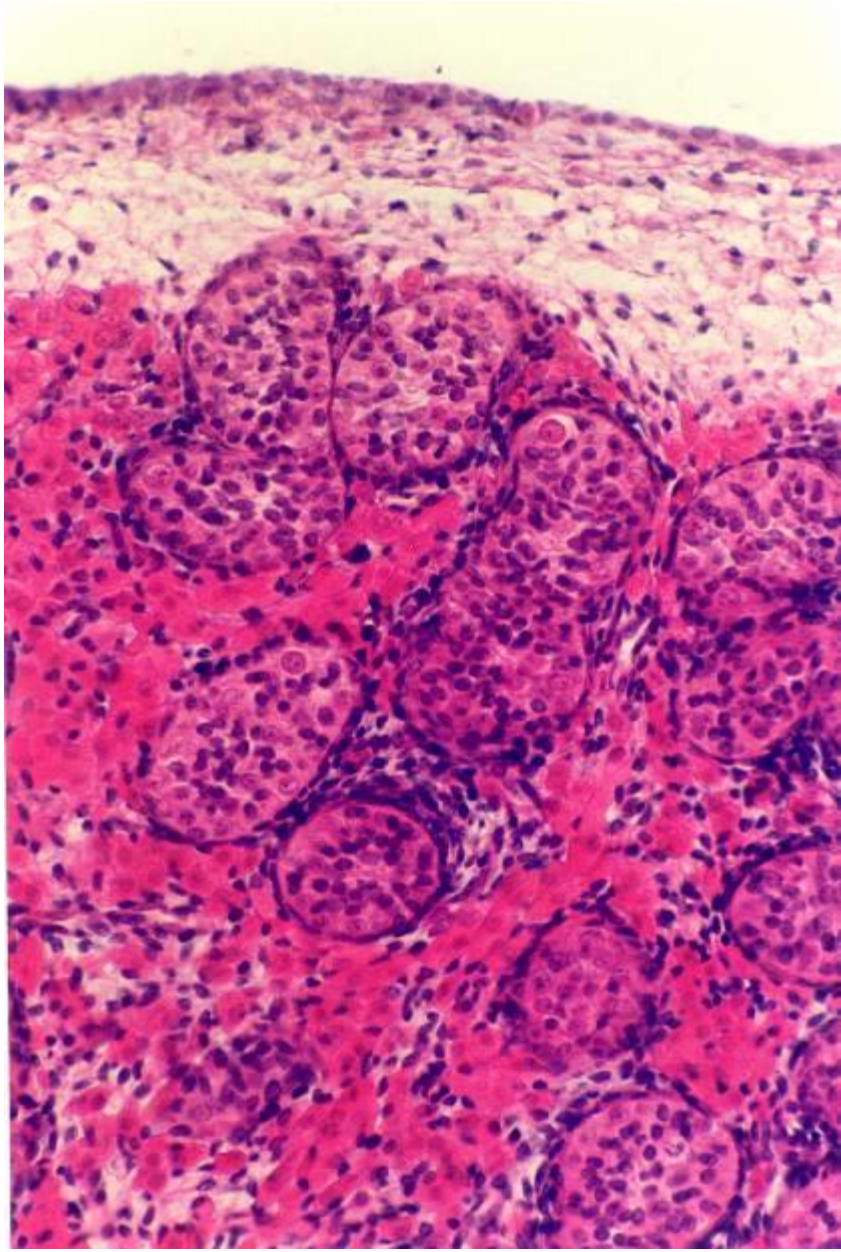


# Formování varlete

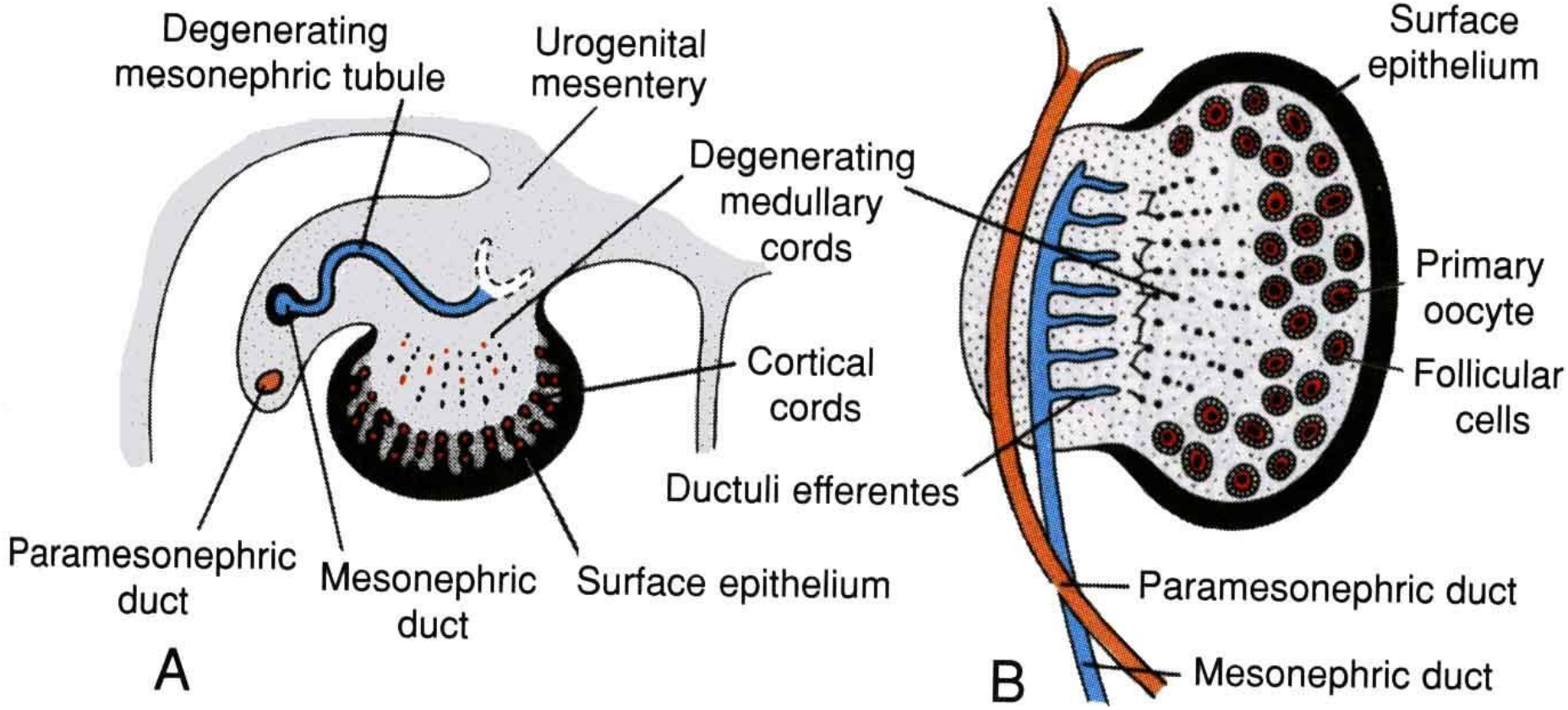


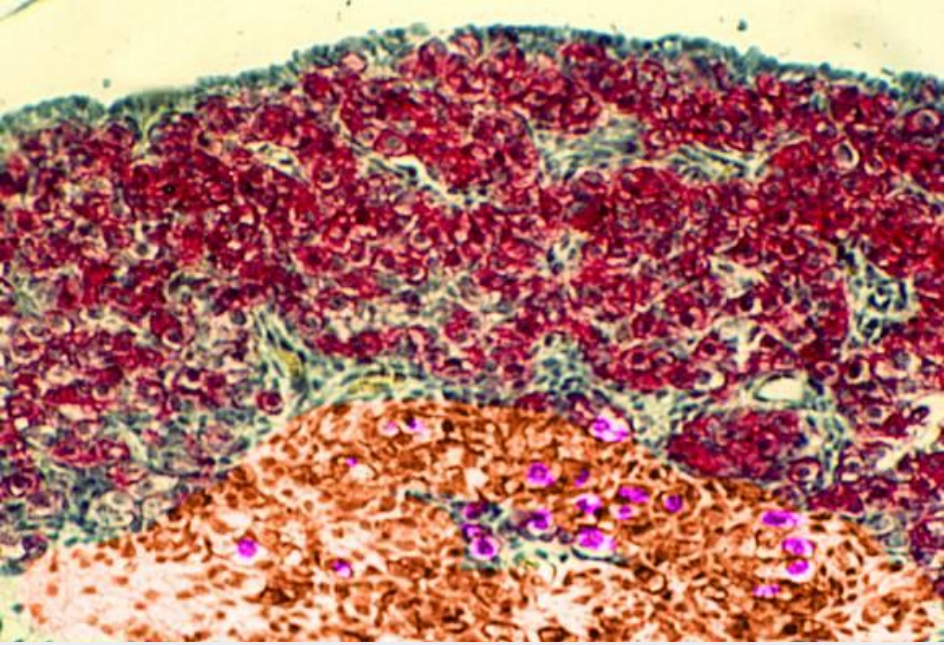


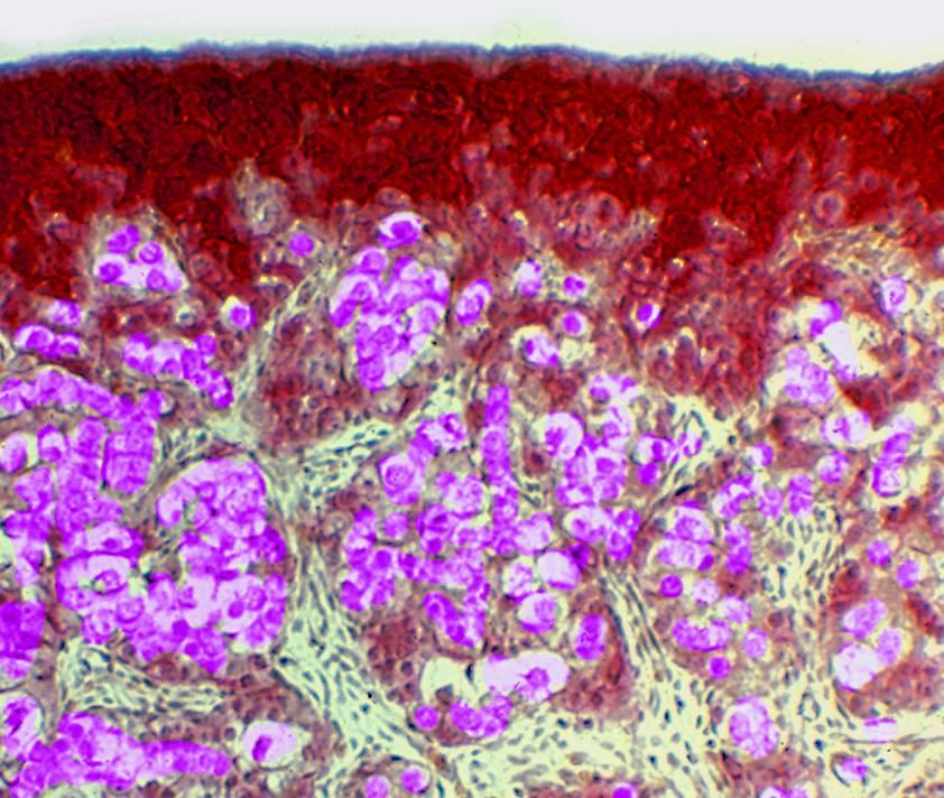


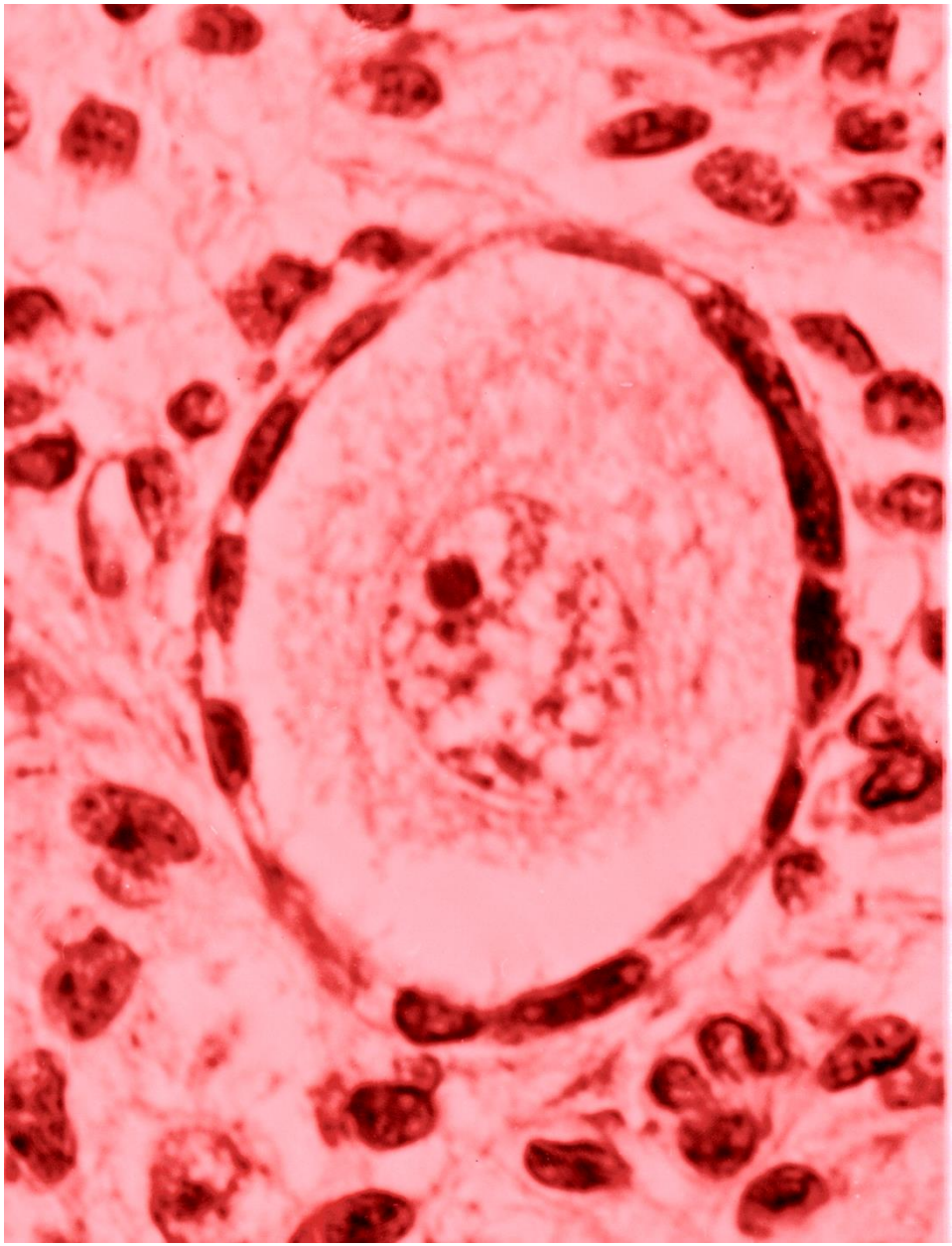


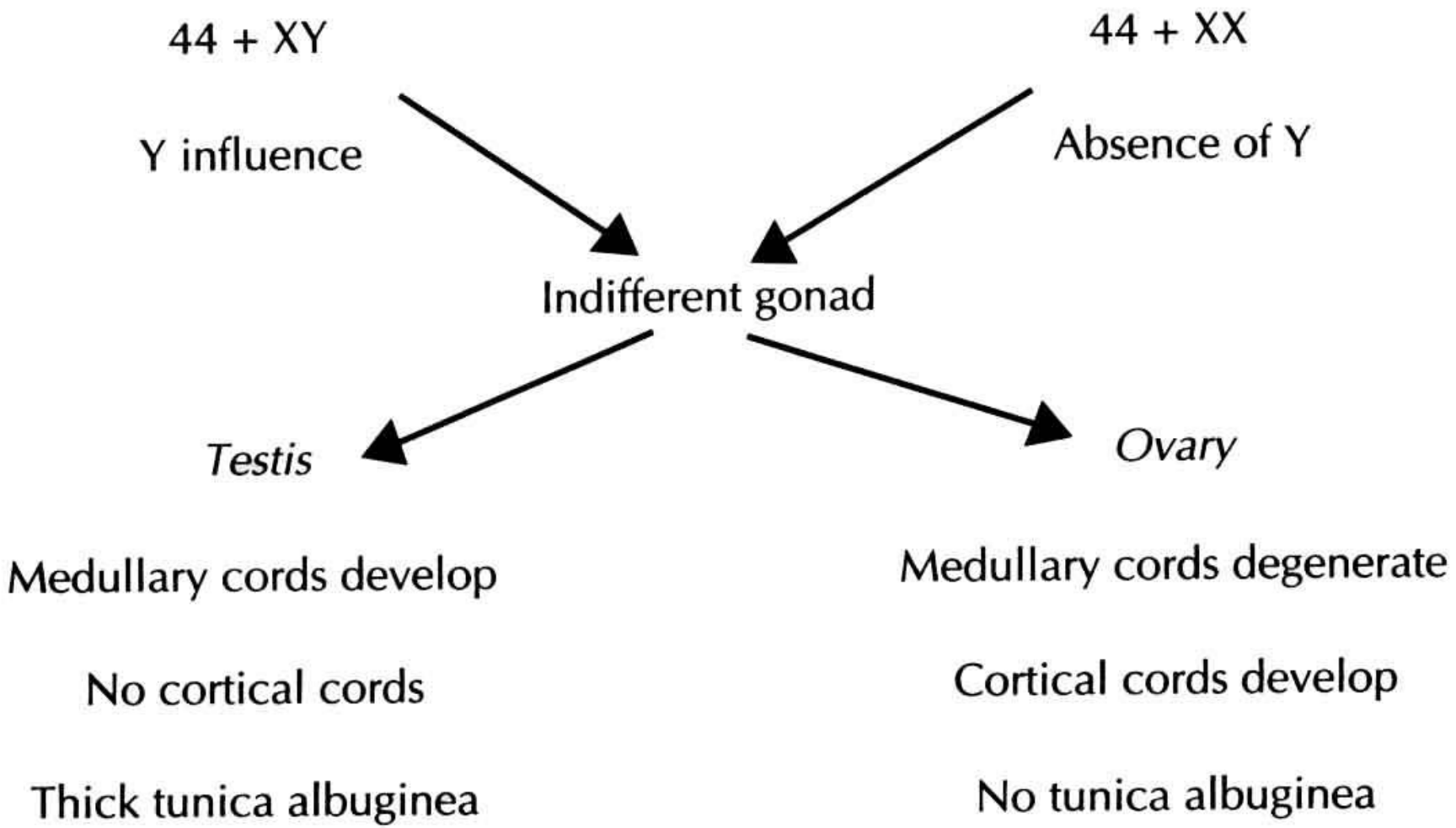
# Formování vaječníku



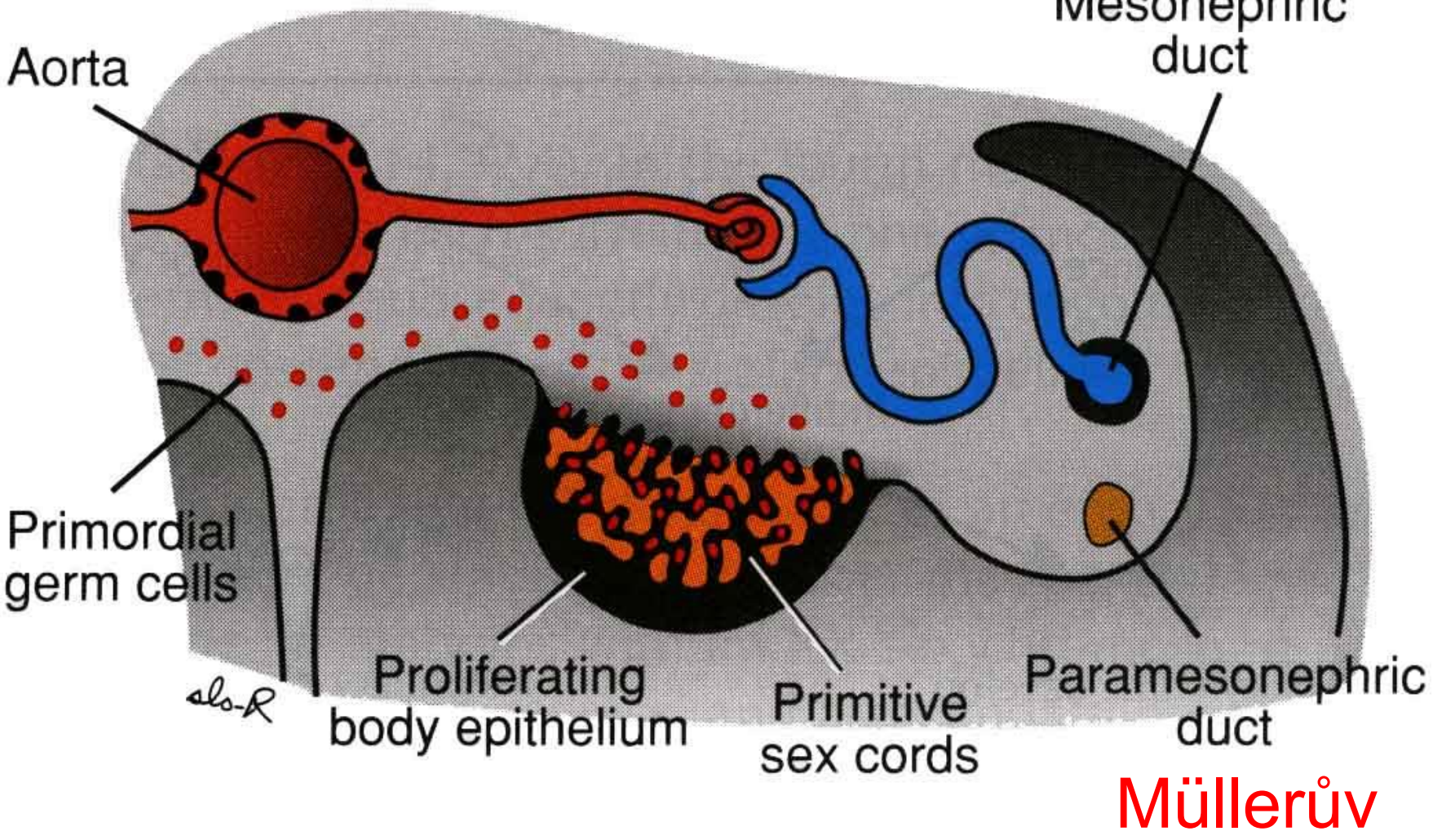


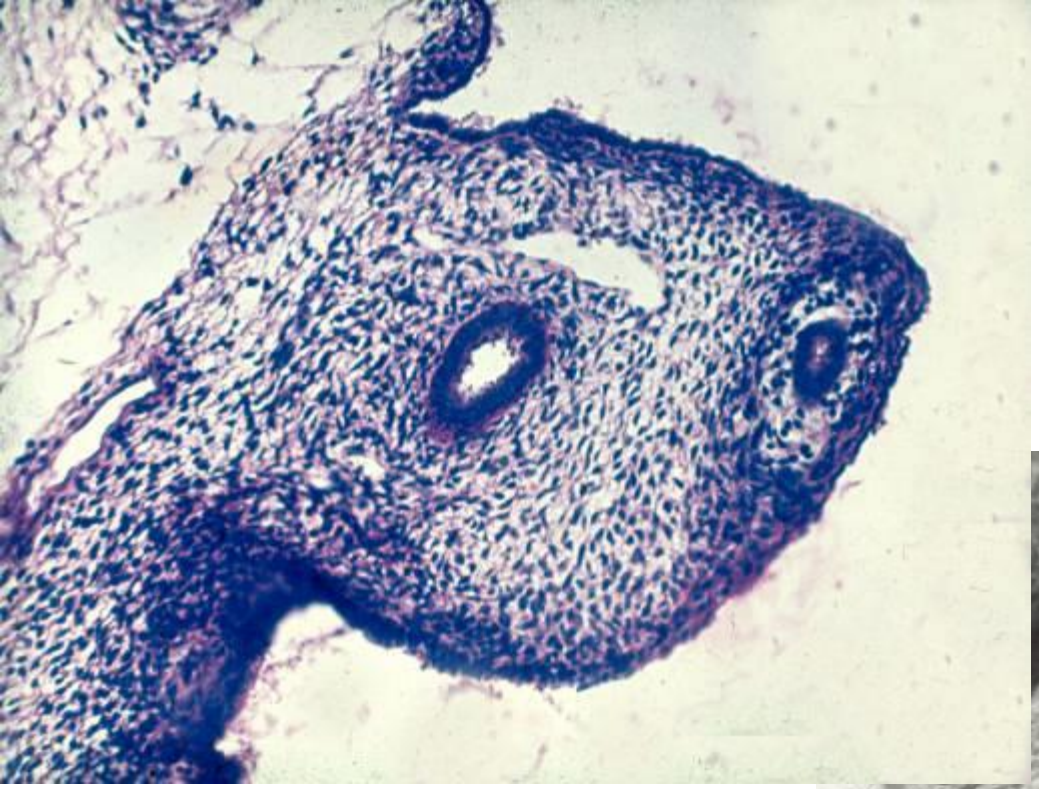




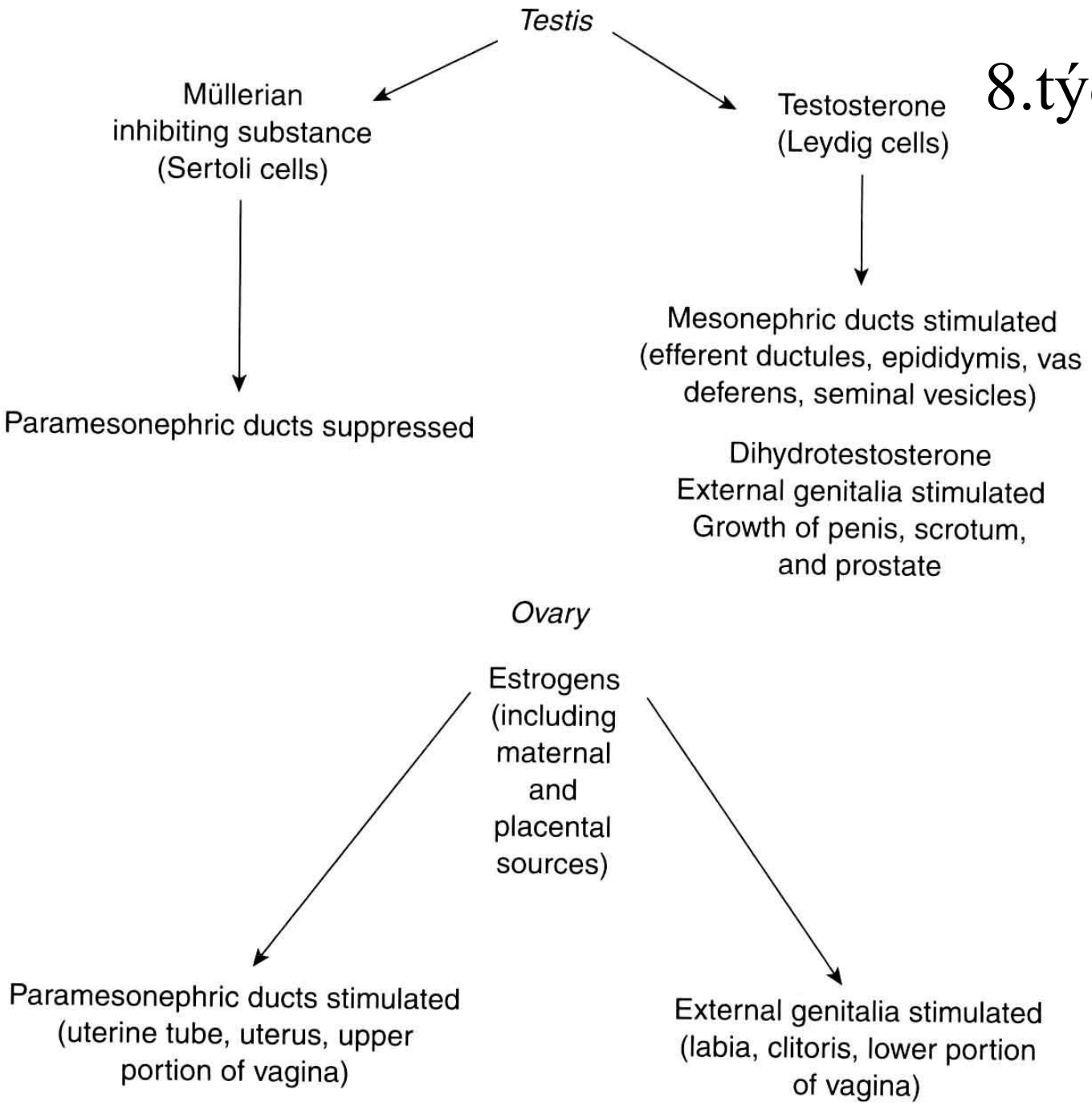

44 + XY
Y influence
44 + XX
Absence of Y
Indifferent gonad
Testis
Ovary
Medullary cords develop
No cortical cords
Thick tunica albuginea
Medullary cords degenerate
Cortical cords develop
No tunica albuginea

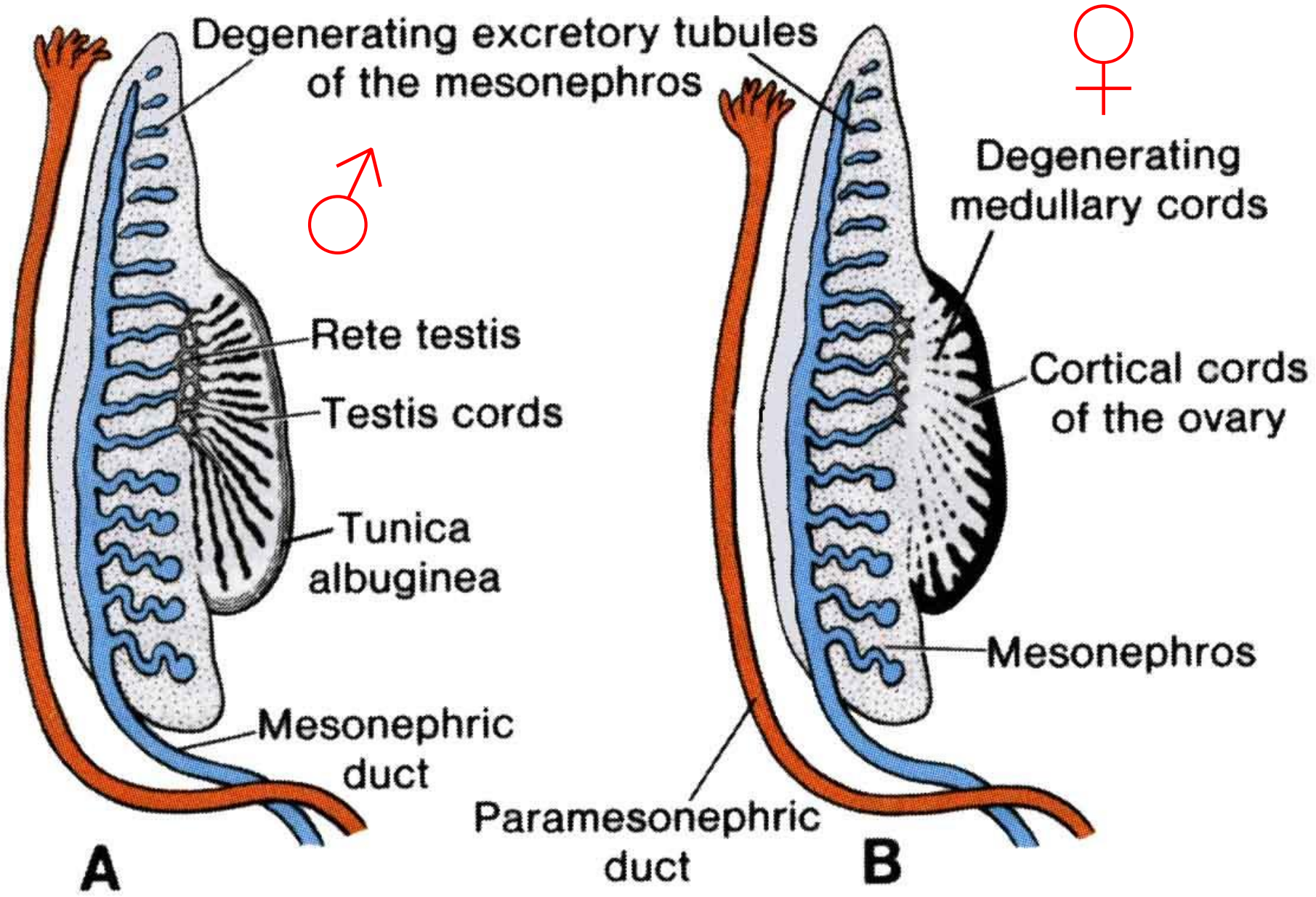
# VÝVOJ VÝVODNÝCH CEST POHLAVNÍCH

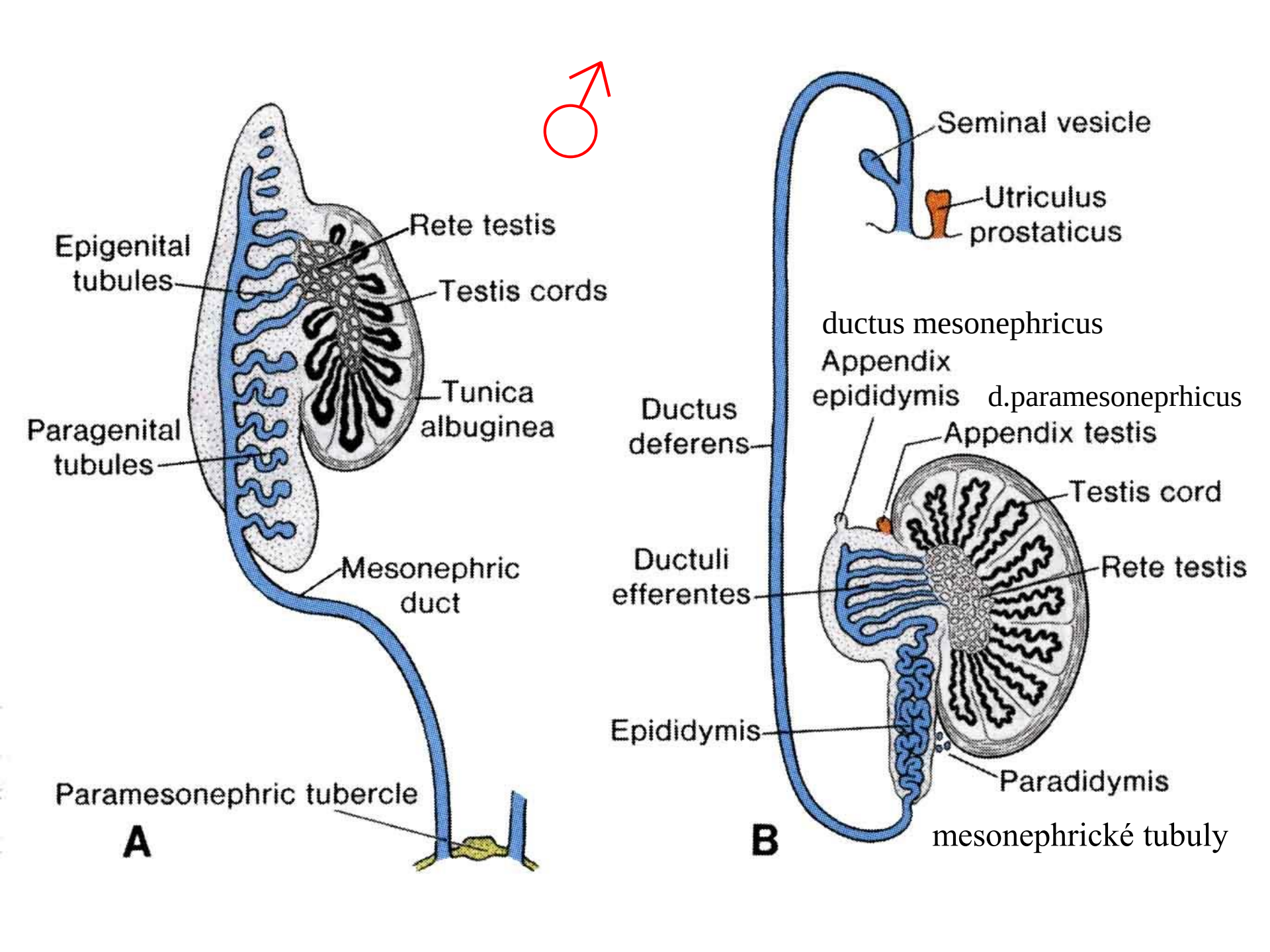

Wolffův
Mesonephric duct
Aorta
Primordial germ cells
Proliferating body epithelium
Primitive sex cords
Paramesonephric duct
Müllerův



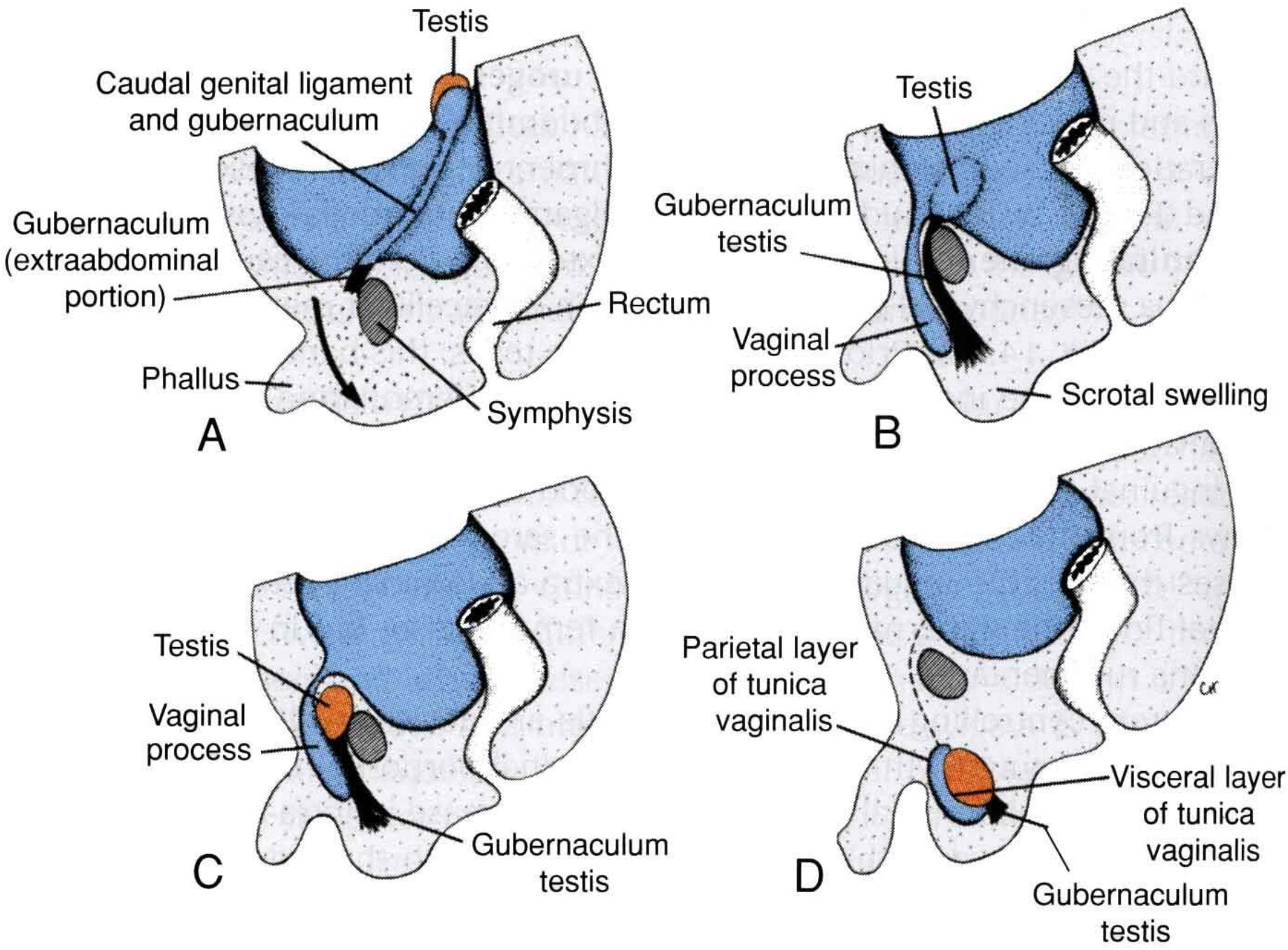
8.týden

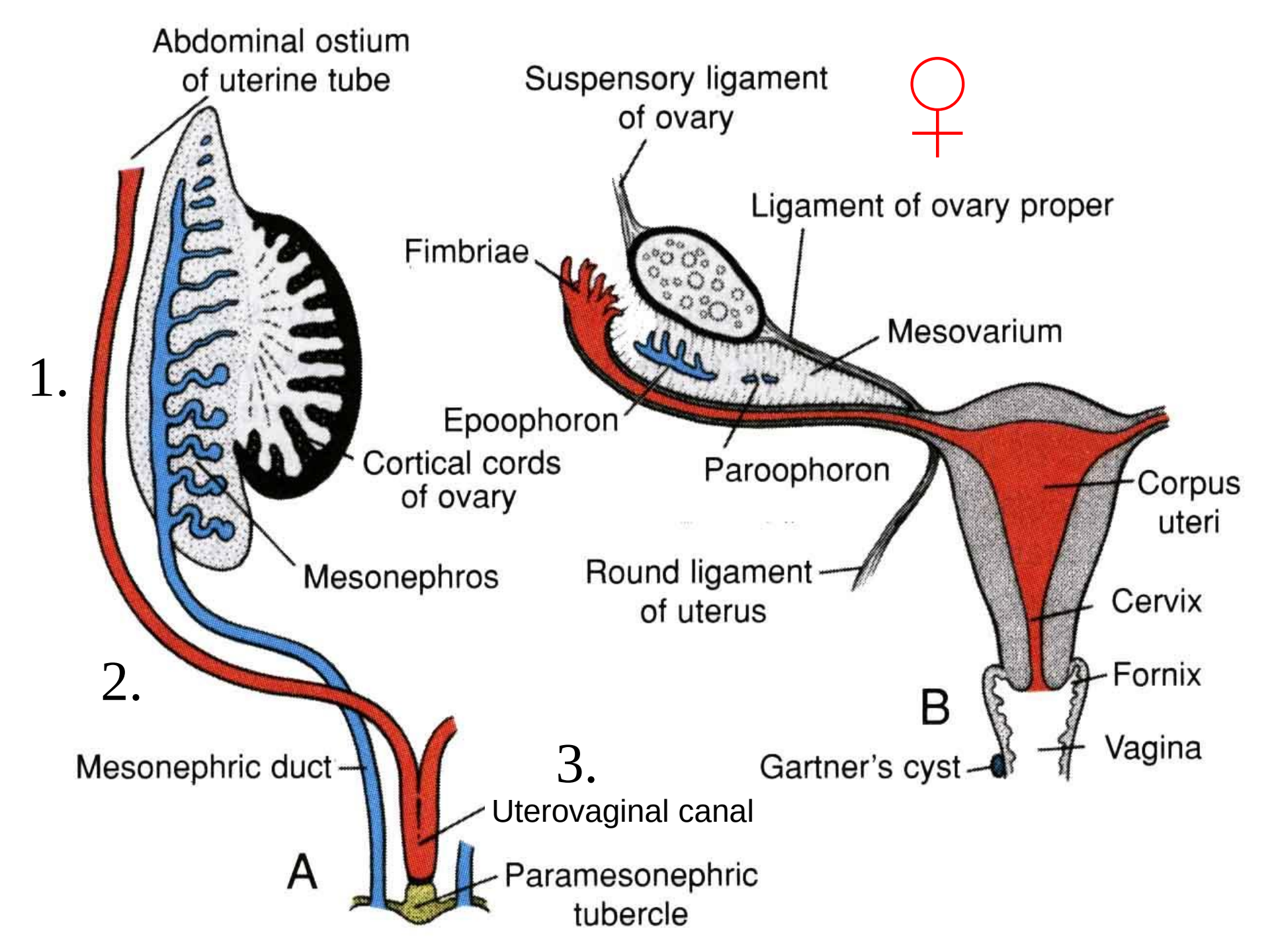

Testis
Müllerian inhibiting substance (Sertoli cells)
Testosterone (Leydig cells)
Paramesonephric ducts suppressed
Mesonephric ducts stimulated (efferent ductules, epididymis, vas deferens, seminal vesicles)
Dihydrotestosterone
External genitalia stimulated
Growth of penis, scrotum, and prostate
Ovary
Estrogens (including maternal and placental sources)
Paramesonephric ducts stimulated (uterine tube, uterus, upper portion of vagina)
External genitalia stimulated (labia, clitoris, lower portion of vagina)


Degenerating excretory tubules of the mesonephros
♂
Rete testis
Testis cords
Tunica albuginea
Mesonephric duct
A
♀
Degenerating medullary cords
Cortical cords of the ovary
Mesonephros
Paramesonephric duct
B

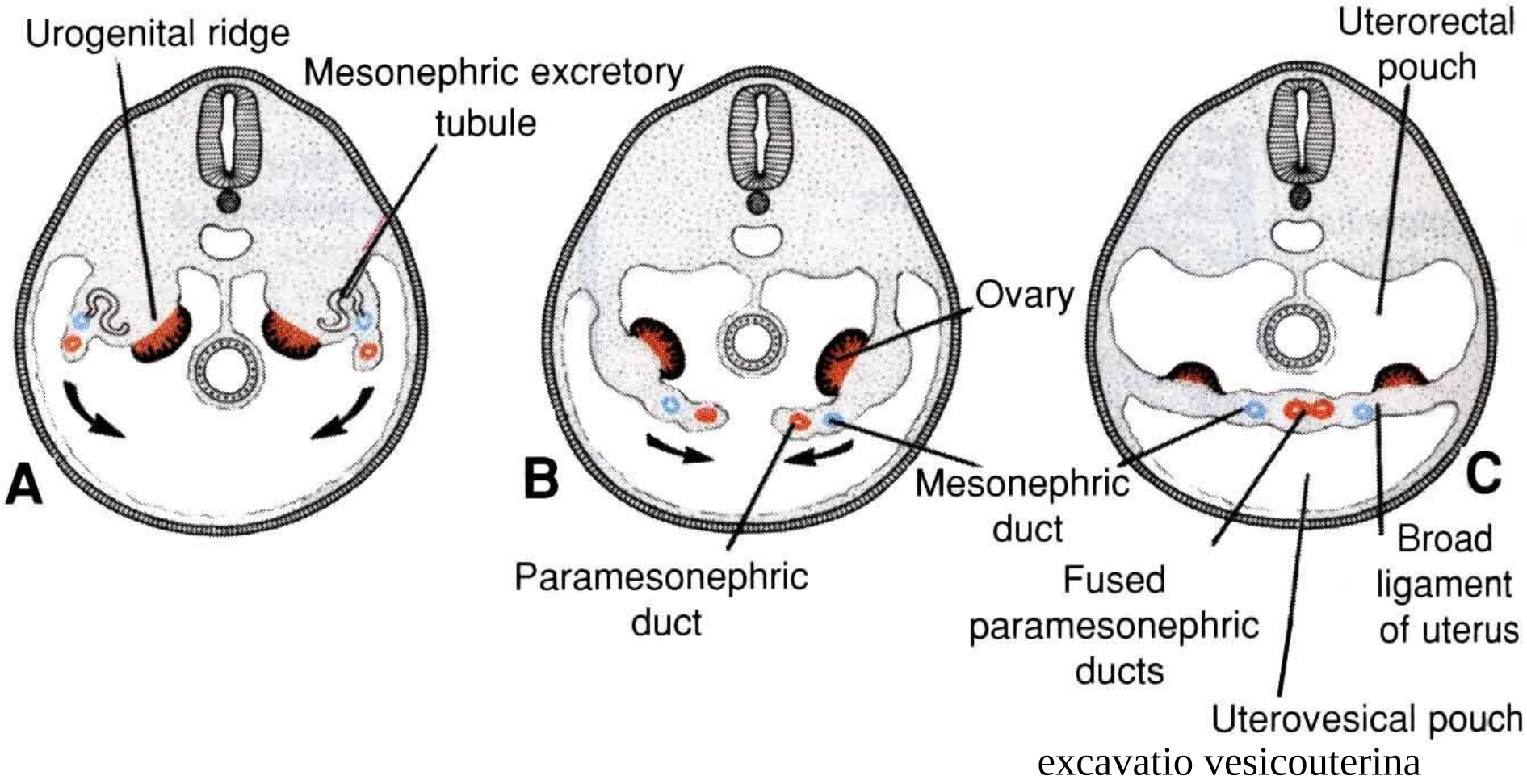



mesonephrické tubuly


Testis
Caudal genital ligament and gubernaculum
Gubernaculum (extraabdominal portion)
Rectum
Phallus
Symphysis
A
Testis
Gubernaculum testis
Vaginal process
Scrotal swelling
B
Testis
Vaginal process
Gubernaculum testis
C
Parietal layer of tunica vaginalis
Visceral layer of tunica vaginalis
Gubernaculum testis
D

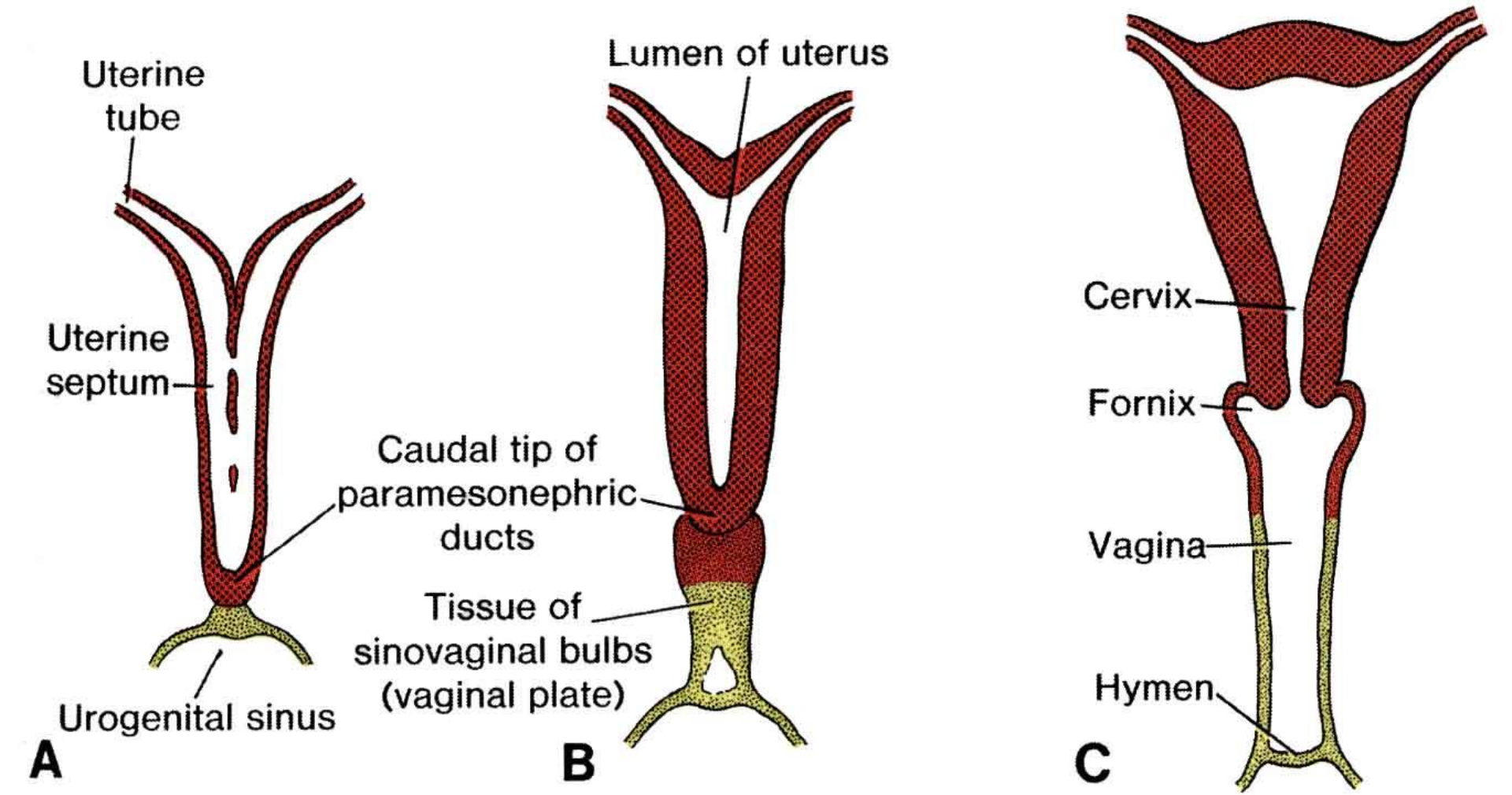

Abdominal ostium
of uterine tube
Suspensory ligament
of ovary
Ligament of ovary proper
Fimbriae
Mesovarium
1.
Epoophoron
Cortical cords
of ovary
Paroophoron
Corpus
uteri
Mesonephros
Round ligament
of uterus
Cervix
2.
Fornix
B
3.
Vagina
Gartner's cyst
Mesonephric duct
Uterovaginal canal
A
Paramesonephric
tubercle

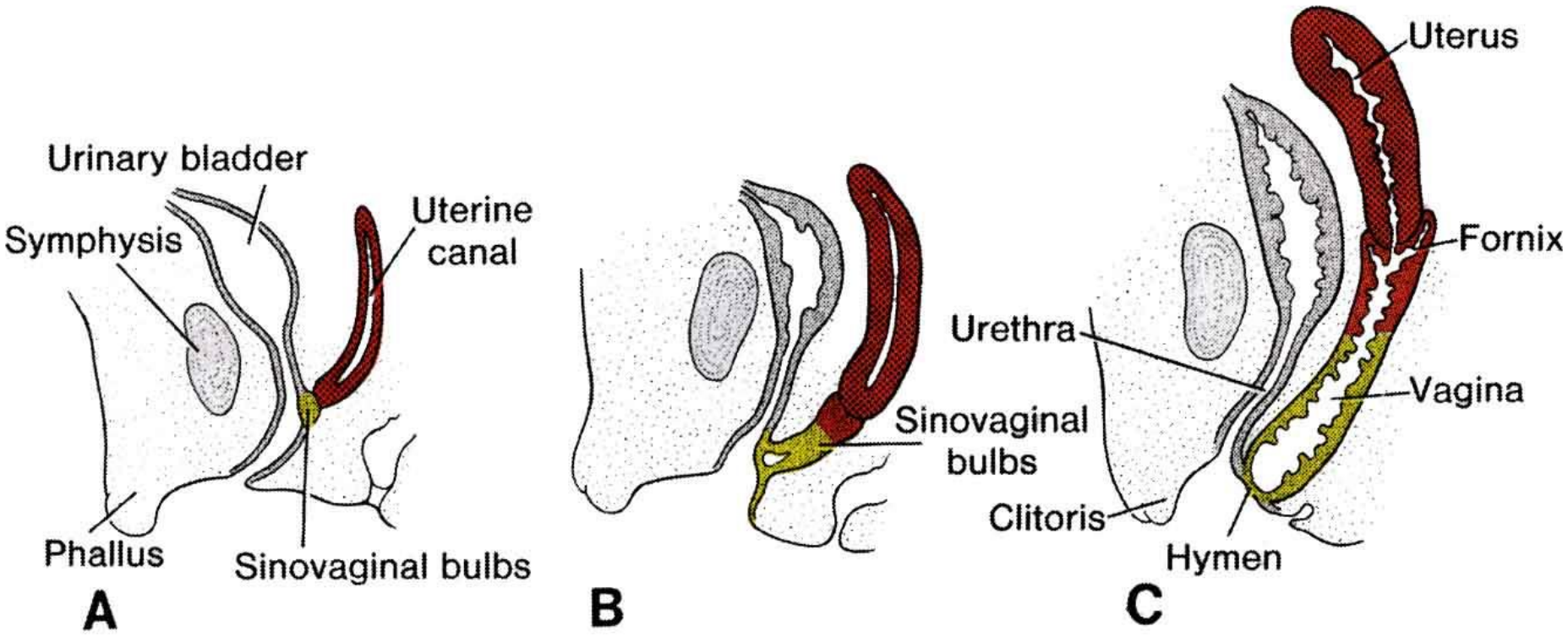
excavatio rectouterina




excavatio vesicouterina

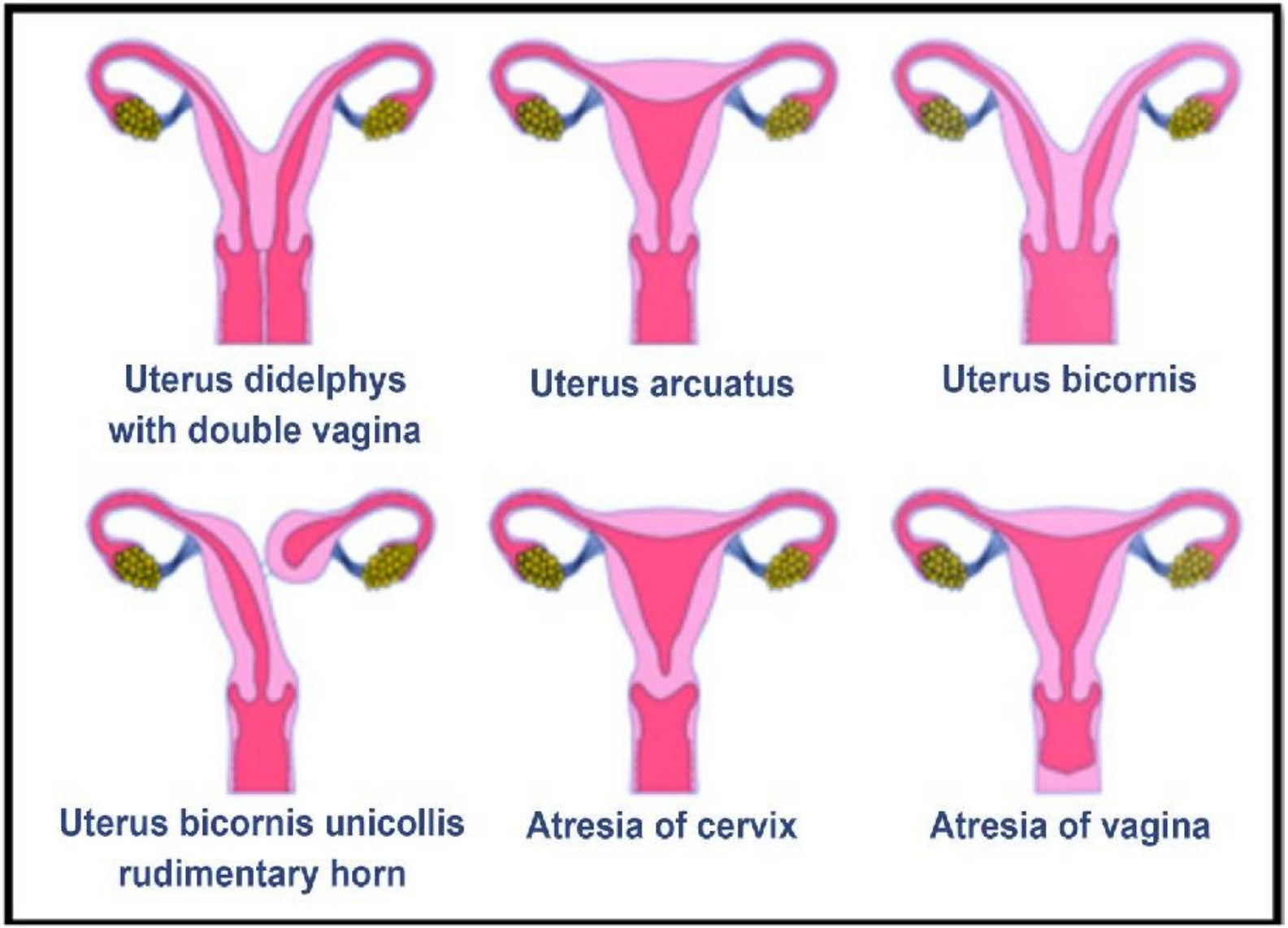
plica lata uteri


Uterine tube
Uterine septum
Urogenital sinus
A
Lumen of uterus
Caudal tip of paramesonephric ducts
Tissue of sinovaginal bulbs (vaginal plate)
B
Cervix
Fornix
Vagina
Hymen
C



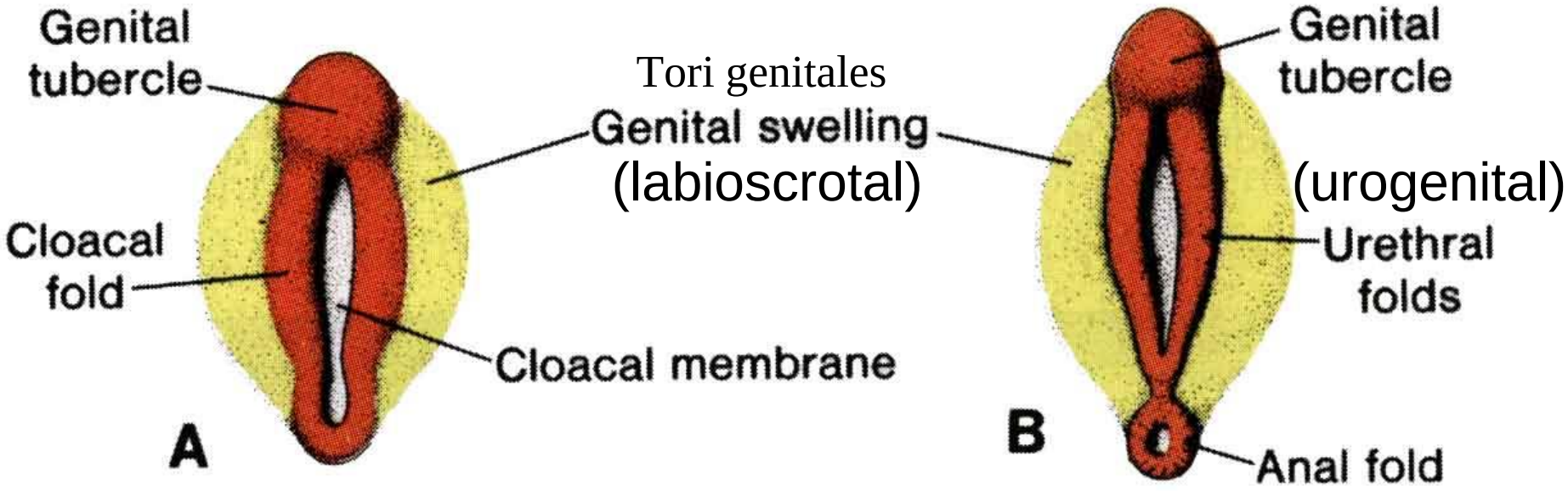

hymen: odděluje dutinu vaginy od urogenitálního sinu

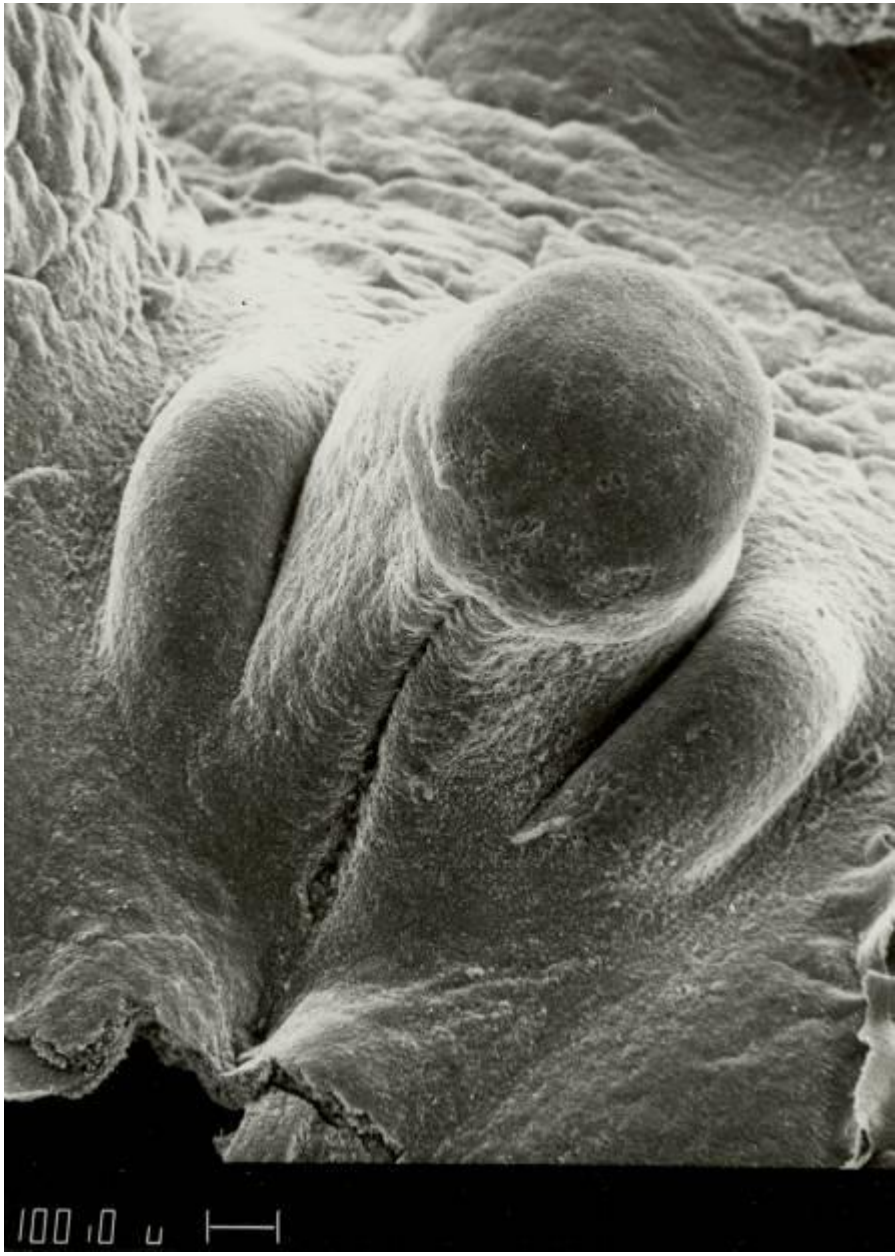
# VVV dělohy

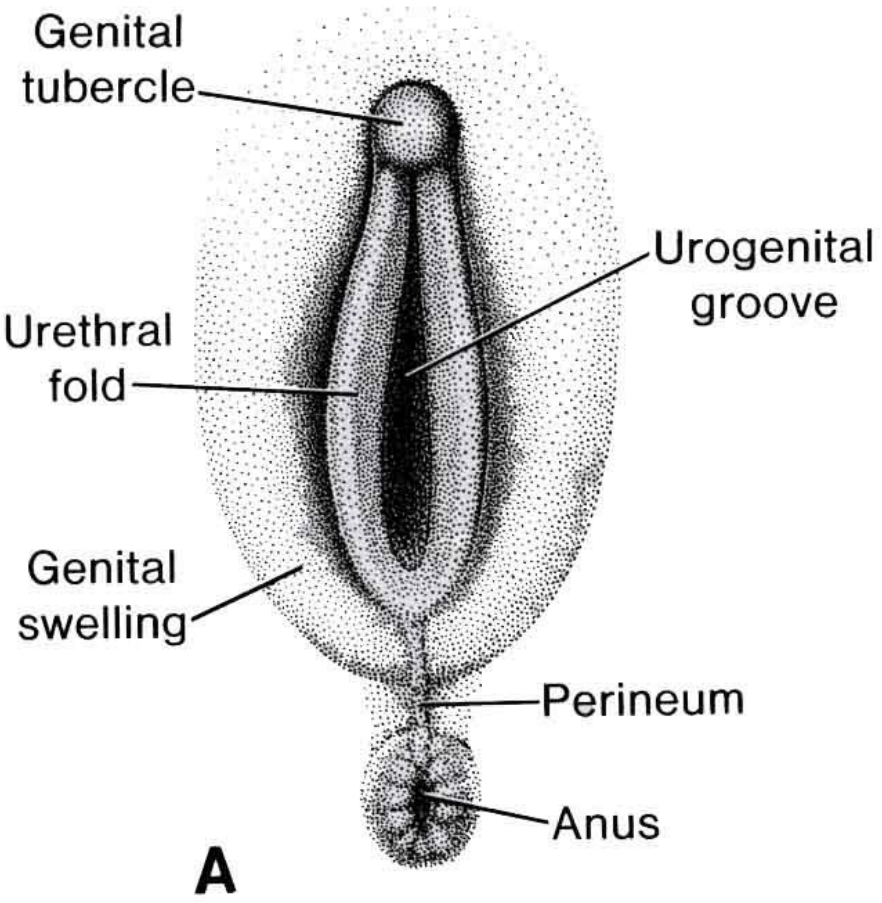

Uterus didelphys with double vagina
Uterus arcuatus
Uterus bicornis
Uterus bicornis unicollis rudimentary horn
Atresia of cervix
Atresia of vagina

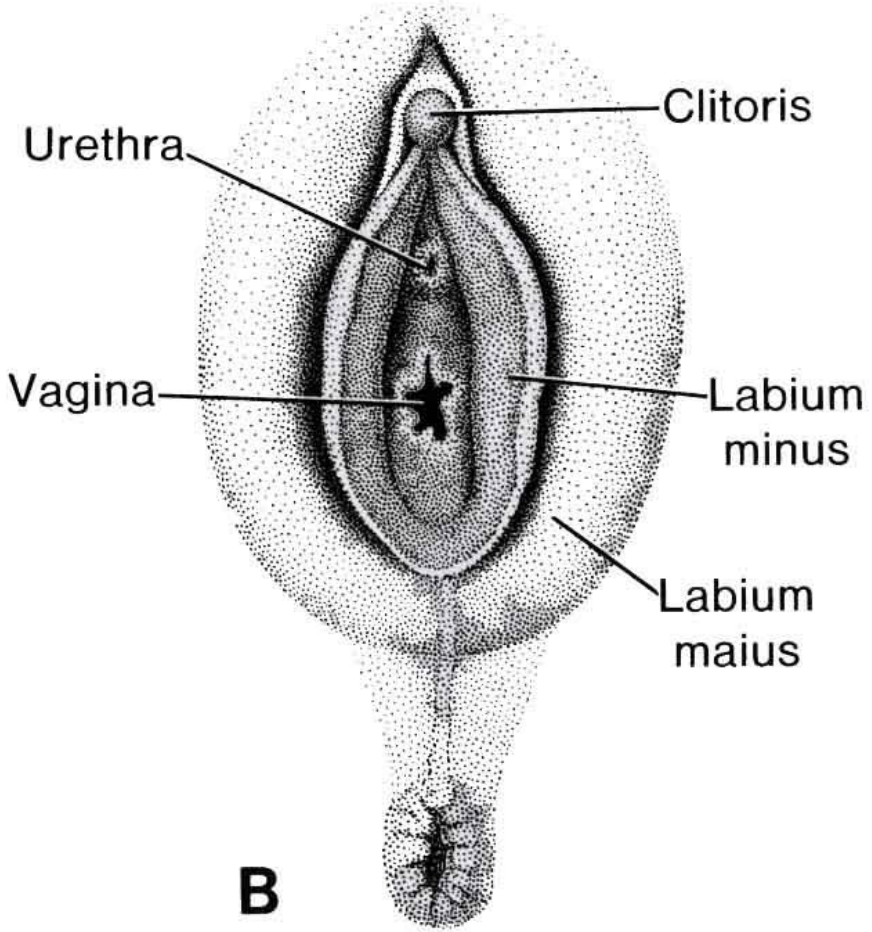
# VÝVOJ ZEVNÍHO GENITÁLU

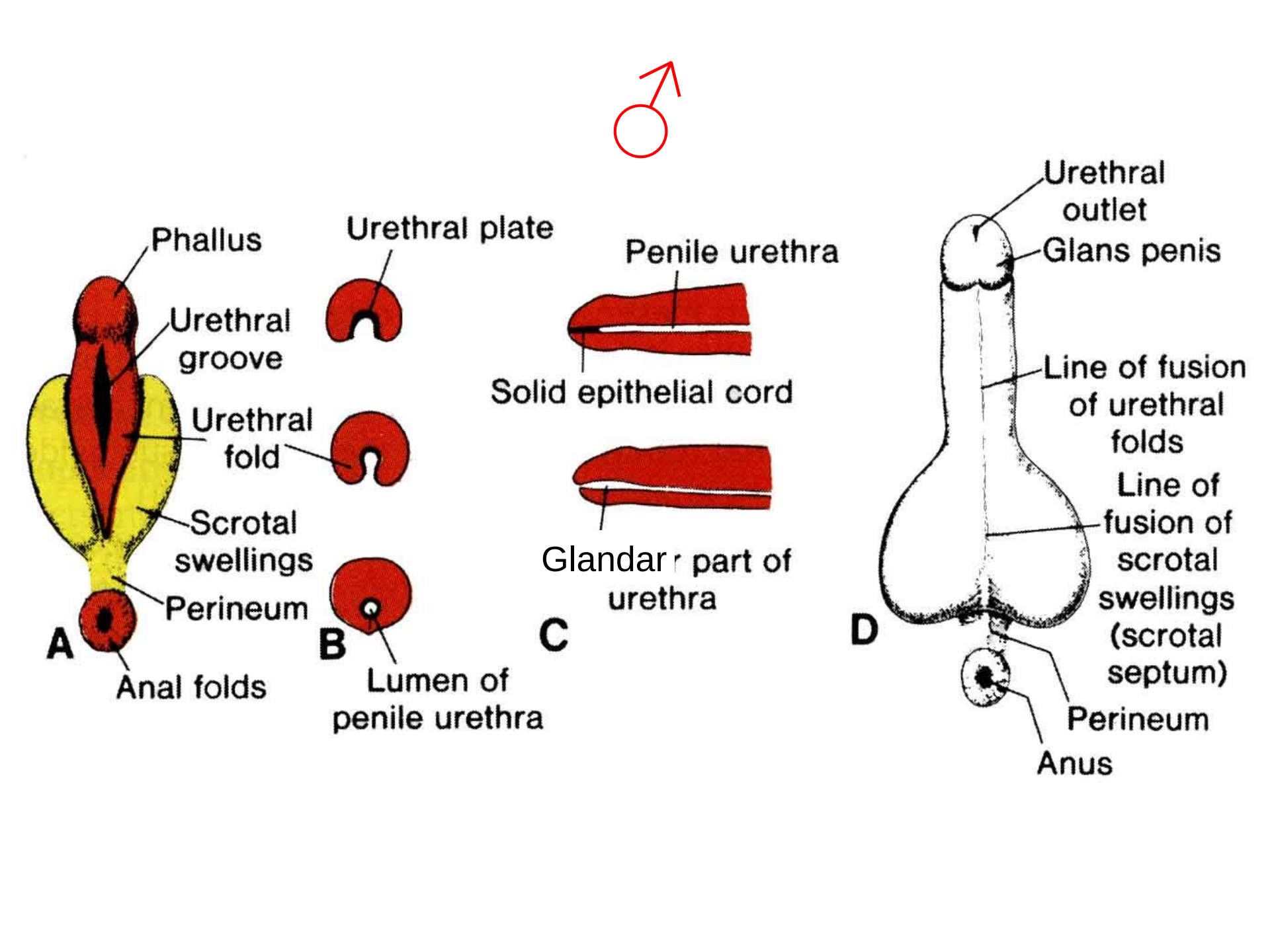
# Indiferentní stádium

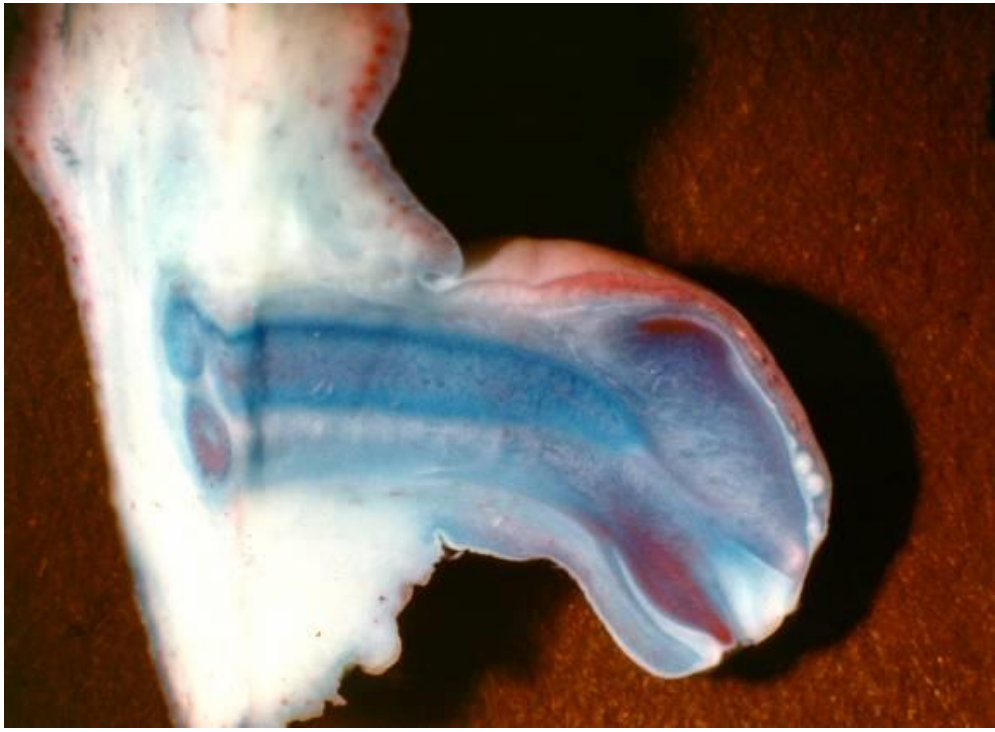



100.0 µ

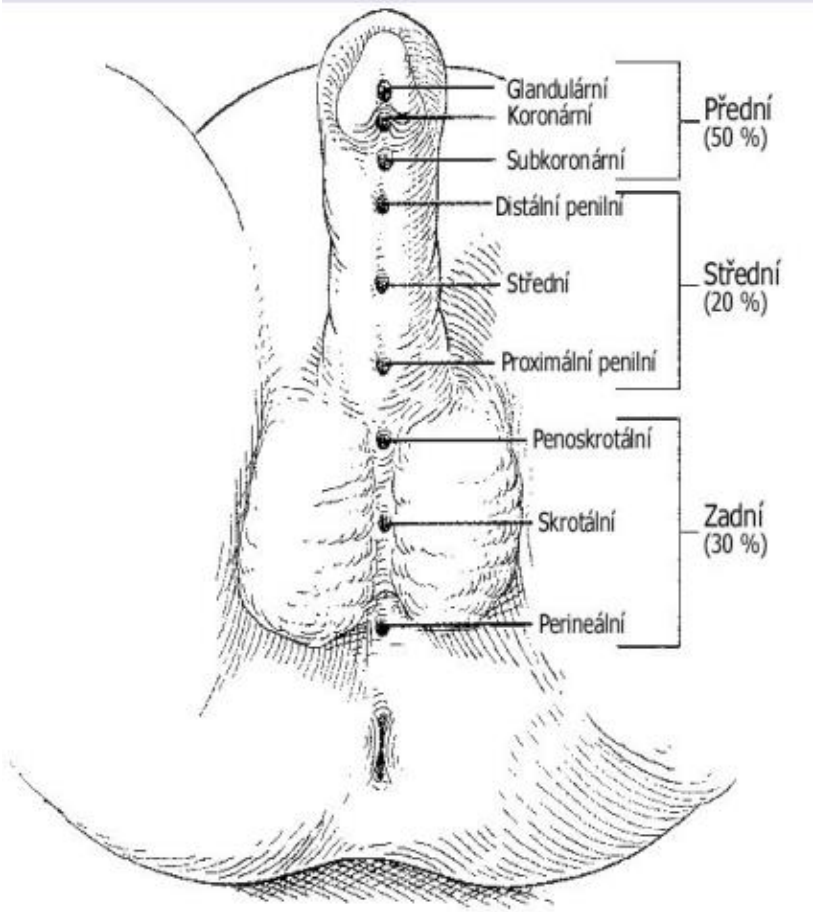

Genital tubercle
Urogenital groove
Urethral fold
Genital swelling
Perineum
Anus
A

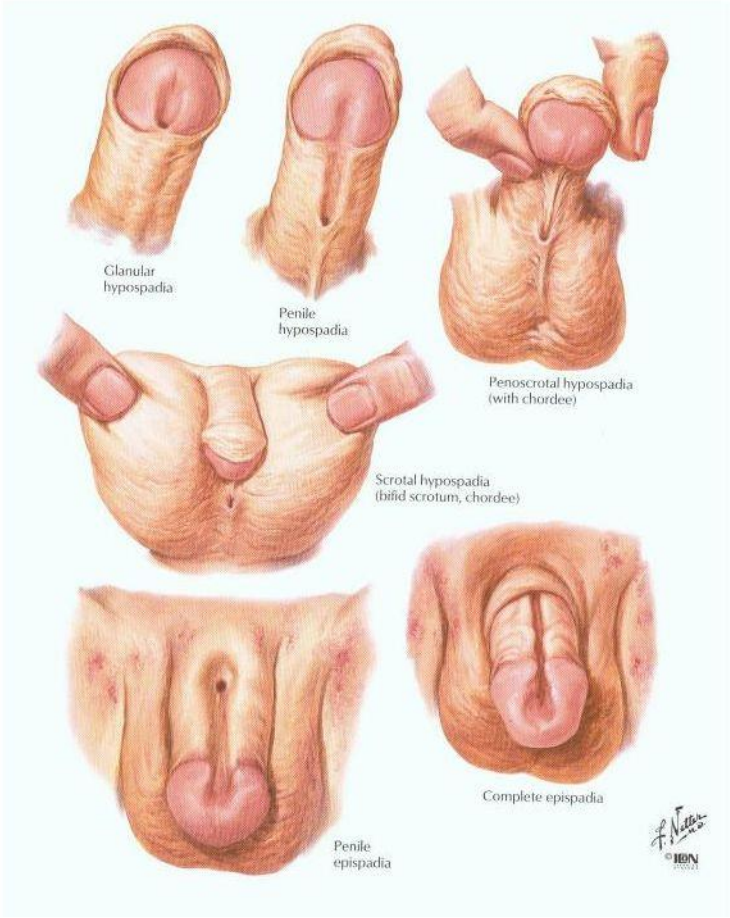

Clitoris
Urethra
Vagina
Labium minus
Labium maius
B


Phallus
Urethral groove
Urethral fold
Scrotal swellings
Perineum
Anal folds
A
Urethral plate
B
Lumen of penile urethra
Penile urethra
Solid epithelial cord
Glandar part of urethra
C
Urethral outlet
Glans penis
Line of fusion of urethral folds
Line of fusion of scrotal swellings (scrotal septum)
Perineum
Anus
D



# VVV mužských pohlavních orgánů: hypospadie, epispadie, micropenis, penis bifidus




Thank you for your attention
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