

EMBRYOLOGY OF THE GENITAL TRACT

Dr SALWA NEYAZI

CONSULTANT OBSTETRICIAN GYNECOLOGIST
PEDIATRIC & ADOLESCENT GYNECOLOGIST

SEXUAL DIFFERENTIATION

- The first step in sexual differentiation is the determination of genetic sex (XX or XY)
- ♀ sexual development does not depend on the presence of ovaries
- ♂ sexual development depend on the presence of functioning testes & responsive end organs
- ♀ exposed to androgens in- utero will be muscularized

EXTERNAL GENITALIA

1-UNDEFERENTIATED STAGE (4-8 WK)

The neutral genitalia includes:

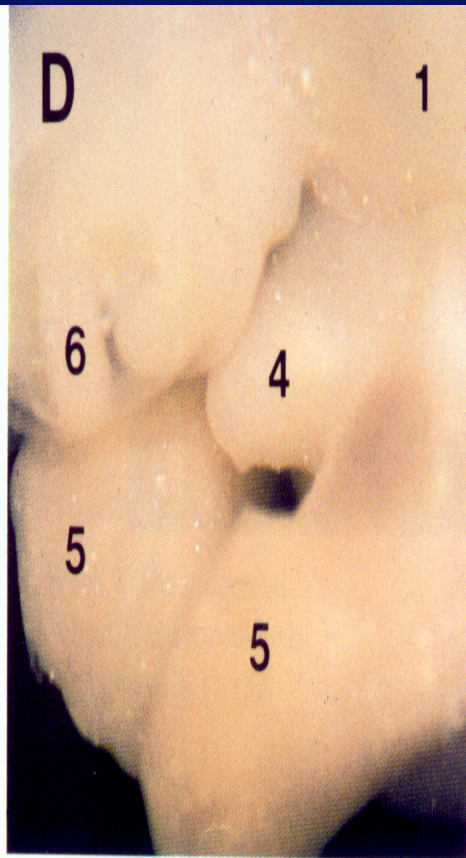
genital tubercle (phalus)
labioscrotal swellings
urogenital folds
urogenital sinus

2-♂ & ♀ EXTERNAL GENITAL DEVELOPMENT (9-12 WK)

- By 12 wk gestation ♂ & ♀ genitalia can be differentiated
- In the absence of androgens ⇒ ♀ external genitalia develop
- The development of ♂ genitalia requires the action of androgens, specifically DHT

5 alpha reductase
testosterone ⇒ ⇒ ⇒ ⇒ ⇒ DHT

EXTERNAL GENITALIA INDIFFERENT STAGE

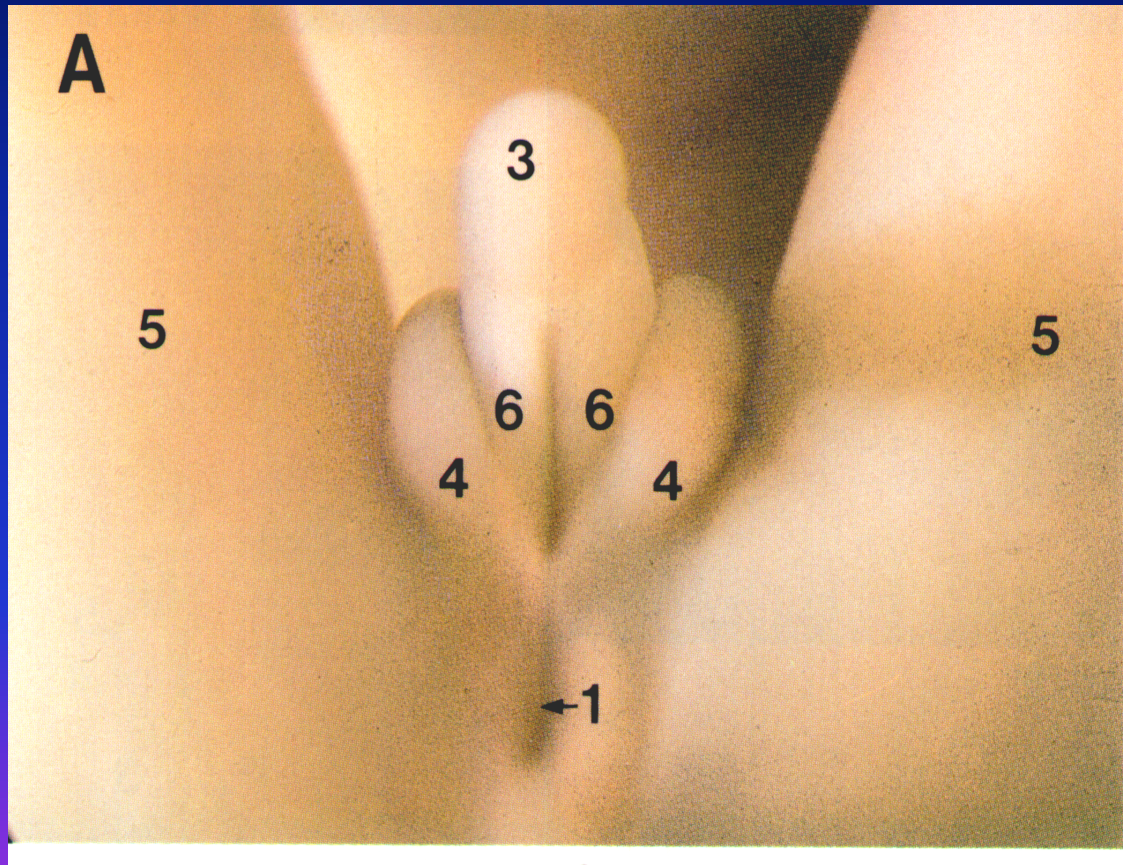


D. Horizon XIX (Day 38-40).
20mmCR (×15.9)

- 1-abdomen
- 4-genital tubercle
- 5-leg bud
- 6-midgut herniation to the umbilical cord

FEMALE EXTERNAL GENITALIA

Week 9



1-anus

2-buttocks

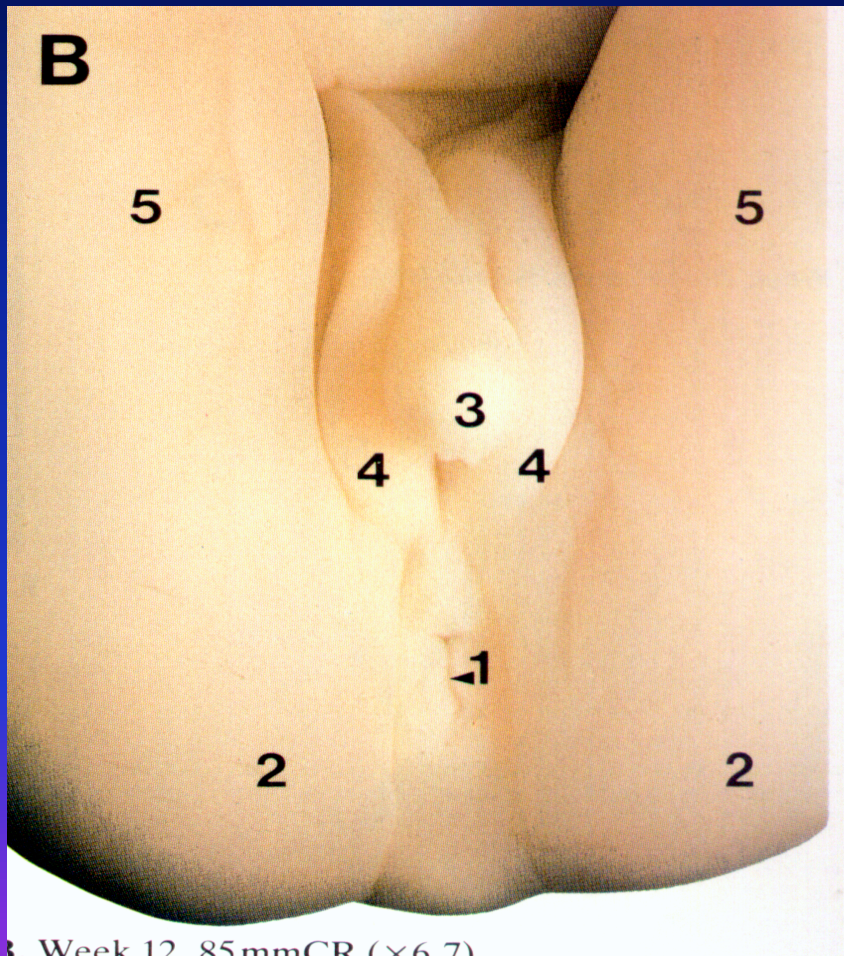
3-clitoris

4-labioscrotal
swelling(labia
majora)

5-leg

6-urogenital
fold(labia minora)

FEMALE EXTERNAL GENITALIA



Week 12

1-anus

2-buttocks

3-clitoris

4-labioscrotal swelling(labia
majora)

5-leg

6-urogenital fold(labia
minora)

FEMALE EXTERNAL GENITALIA

Week 13

1-anus

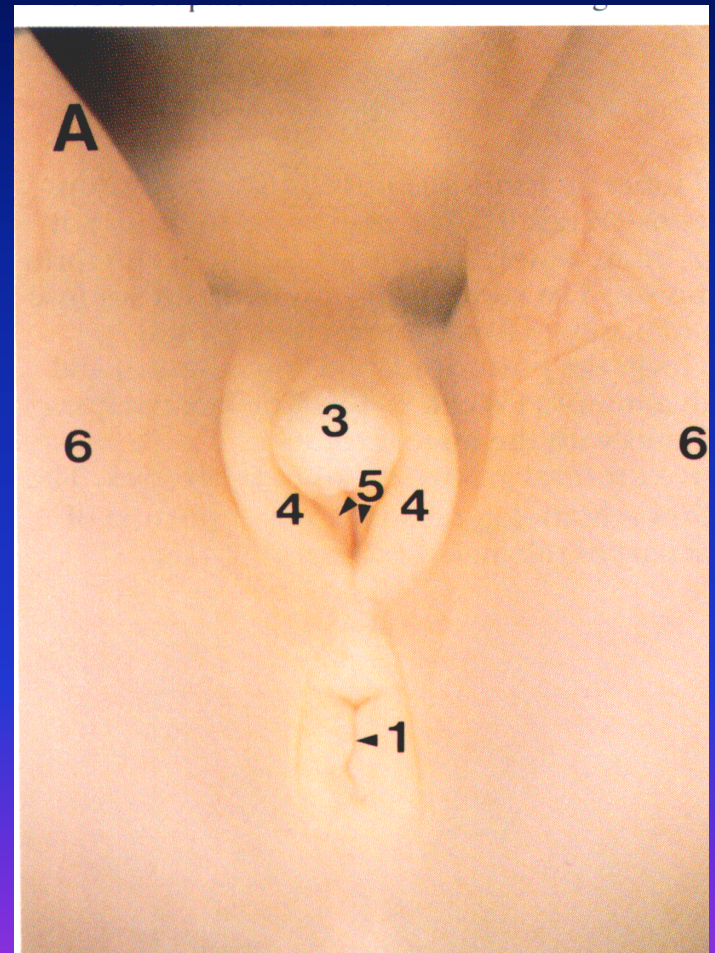
2-buttocks

3-clitoris

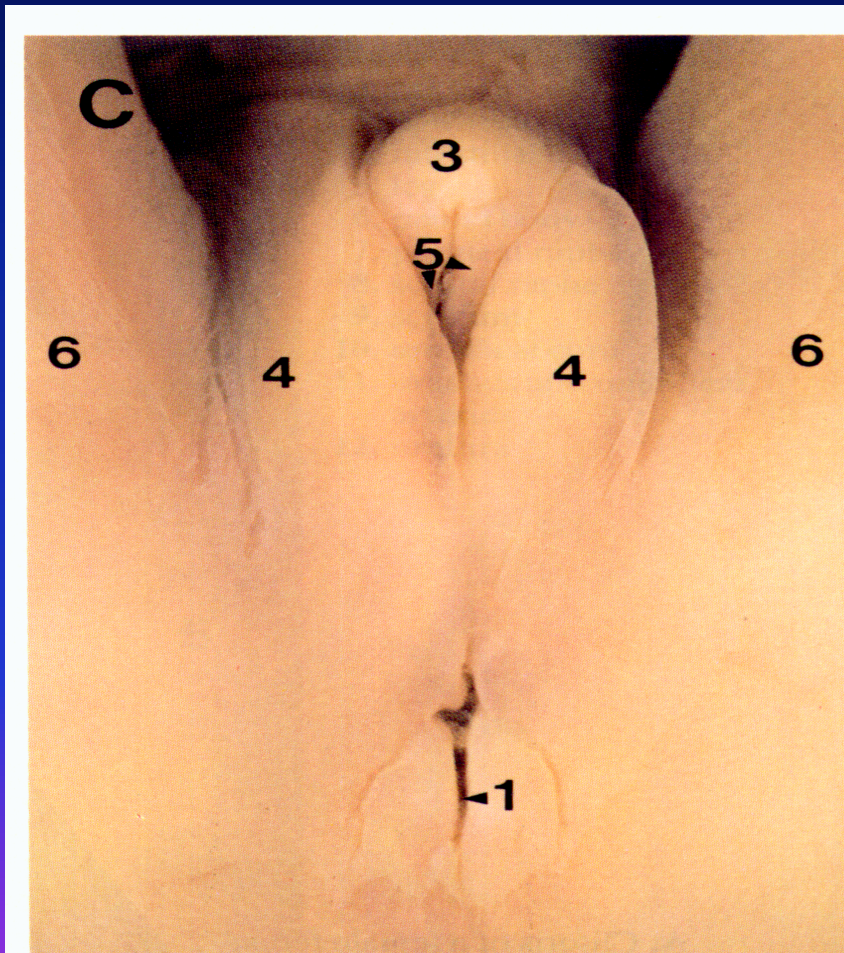
4-labia majora

5-labia minora

6-leg



FEMALE EXTERNAL GENITALIA



Week 17

1-anus

2-buttocks

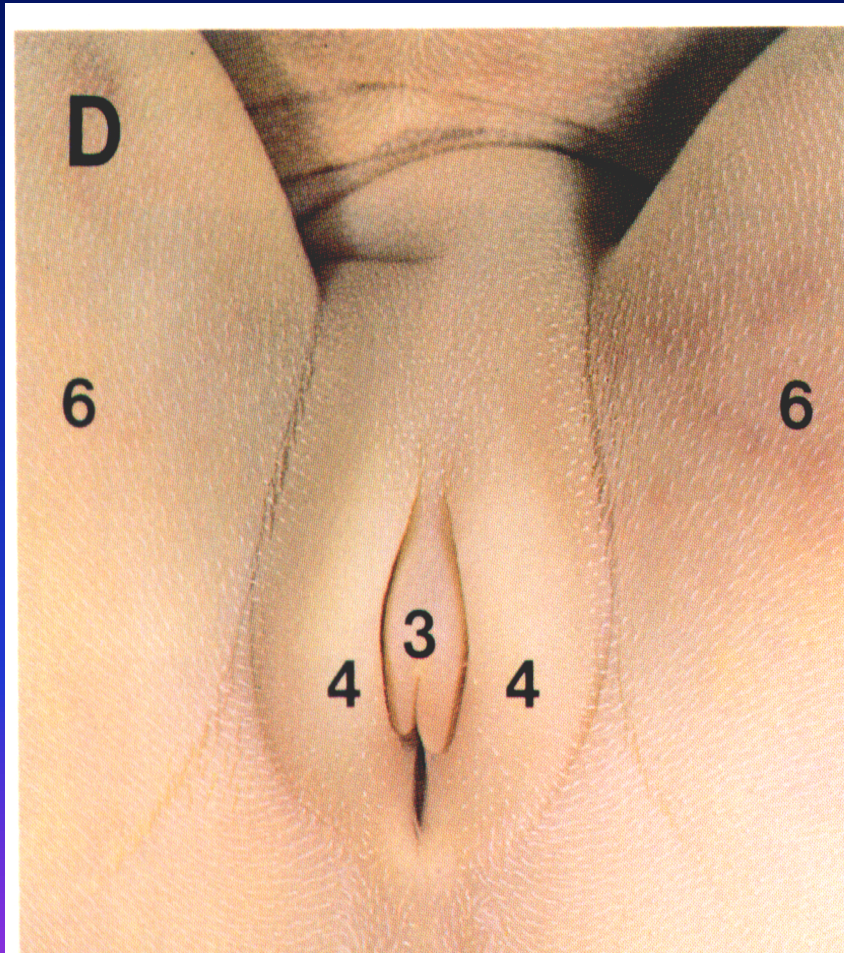
3-clitoris

4-labia majora

5-labia minora

6-leg

FEMALE EXTERNAL GENITALIA



Week 20

1-anus

2-buttocks

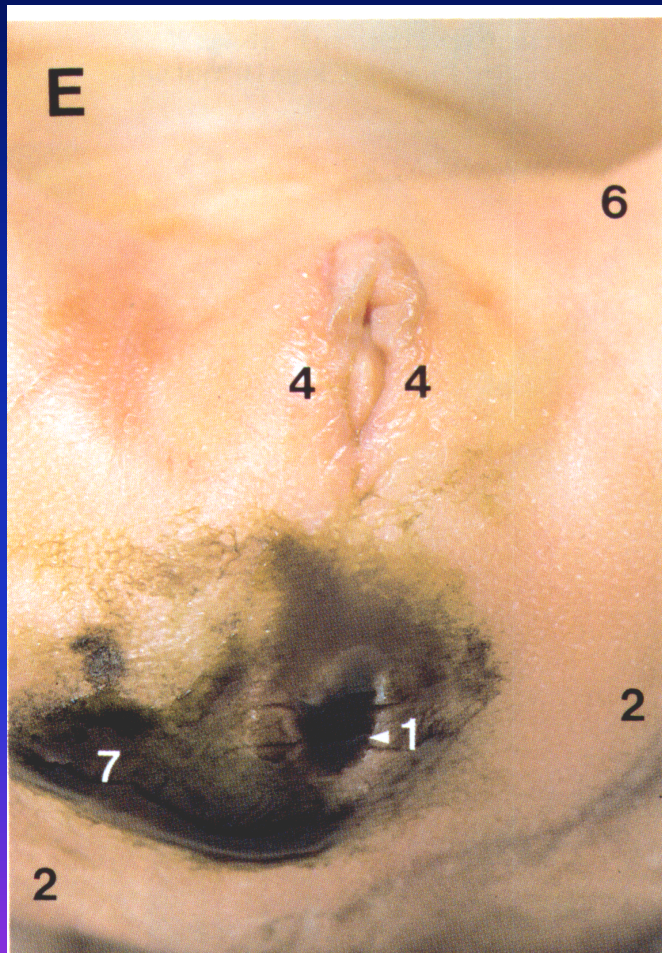
3-clitoris

4-labia majora

5-labia minora

6-leg

FEMALE EXTERNAL GENITALIA



Week 35

1-anus

2-buttocks

3-clitoris

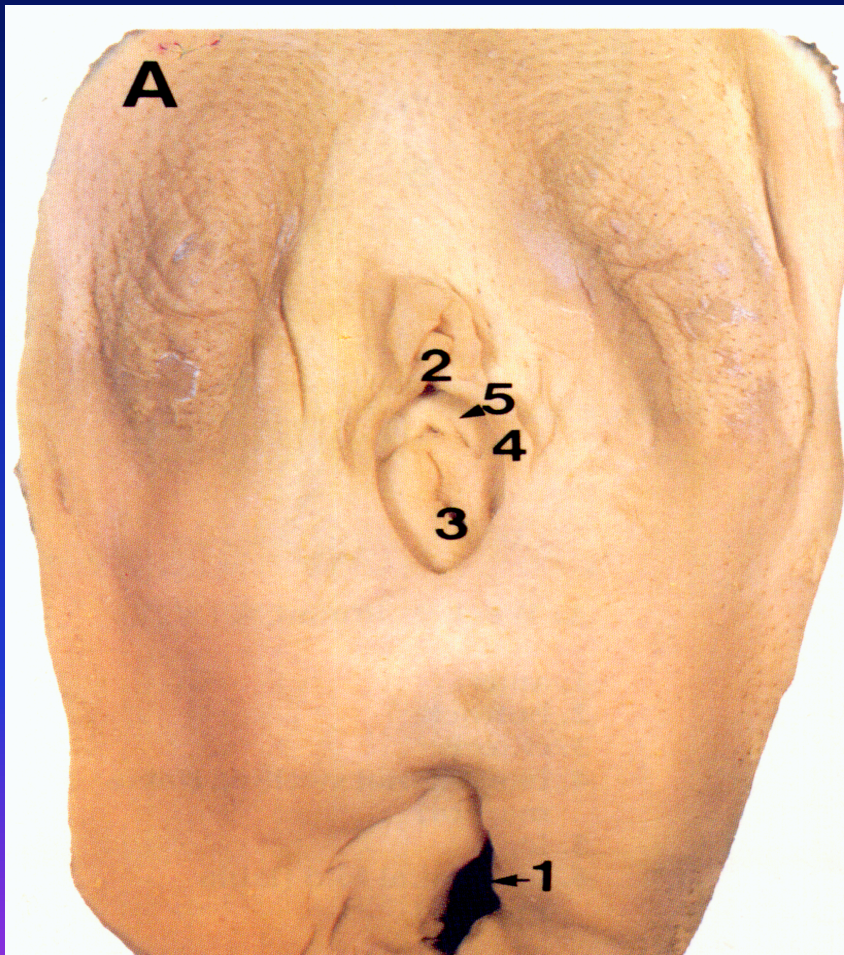
4-labia majora

5-labia minora

6-leg

7-meconium

NEONATAL EXTERNAL GENITALIA



1-ANUS

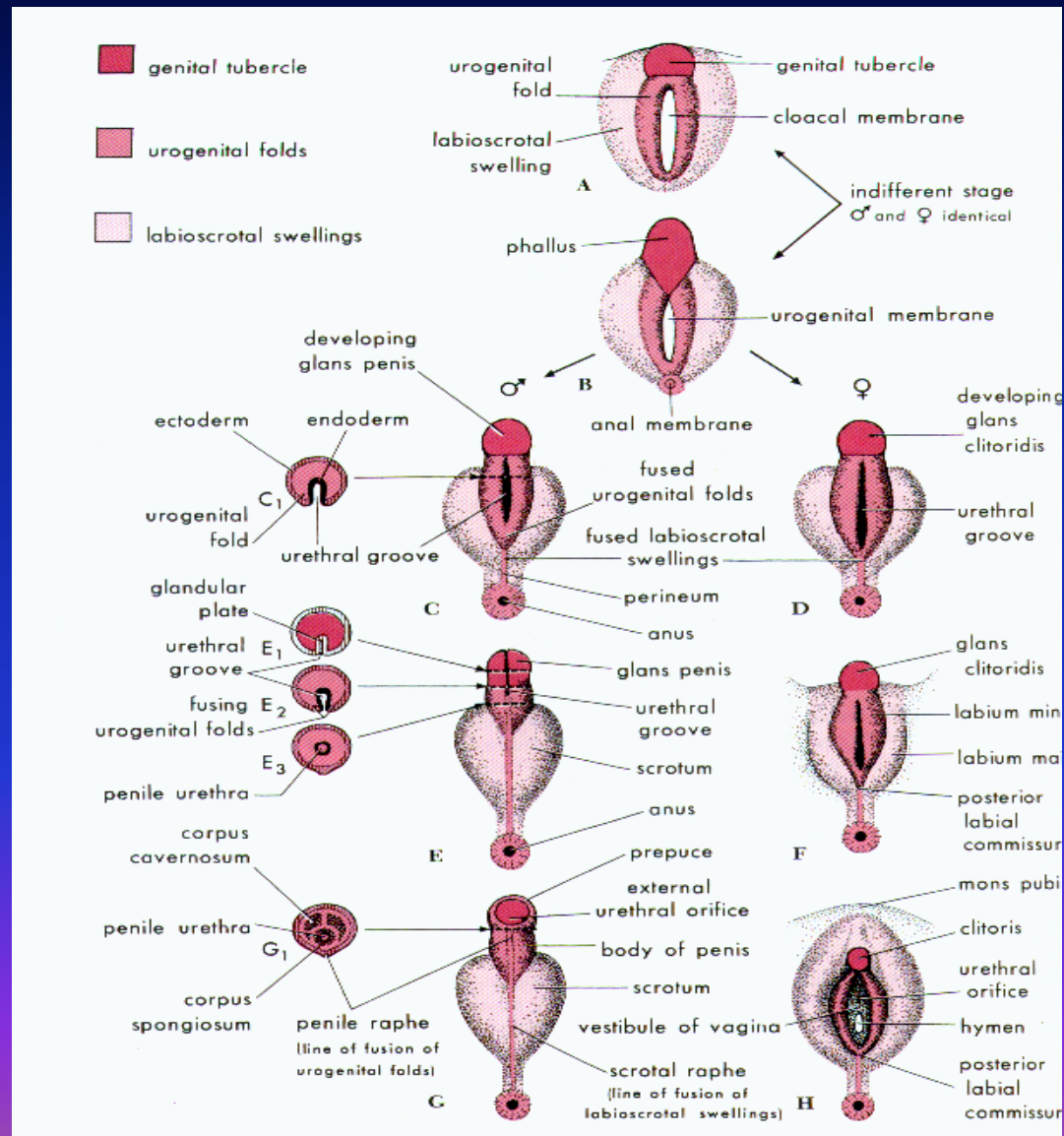
2-CLITORIS

3-HYMEN

4-LABIA MAJORA

5-LABIA MINORA

DEVELOPMENT OF MALE & FEMALE EXTERNAL GENITALIA



INTERNAL GENITAL ORGANS

1-GONADS

- Undifferentiated gonads begin to develop on the 5th wk
- Germ cells originate in the yolk sac & migrate to the genital ridge
- In the absence of Y chromosome the undiff gonad develop into an ovary
- 45XO embryo the ovaries develop but undergo atresia ⇒ streak ovaries
- The gonads develop from the mesothelium on the genital ridge ⇒ 1ry sex cords grow into the mesenchyme ⇒ outer cortex & inner medulla

INTERNAL GENITAL ORGANS (GONADS)

- The ovary develop from the cortex & the medulla regress
- The testes develop from the medulla & the cortex regress
- The development of the testes requires the presence of SRY gene
(sex determining region Y) found on Y chromosome
- The ovary contains 2 million 1ry oocytes at birth

INTERNAL GENITAL ORGANS

2-UTERUS & FALLOPIAN TUBES

- Invagination of the coelomic epithelium on the cranio-lateral end of the mesonephric ridge \Rightarrow Paramesonephric ducts
- Fusion of the two PMN ducts (mullerian ducts) \Rightarrow uterus, cx & F tubes (at 8-11 wk)
- 12-16 wks \Rightarrow proliferation of the mesoderm around the fused lower part \Rightarrow muscular wall
- In the male fetus the testes secrete the mullerian inhibiting factor \Rightarrow regression of the mullerian ducts

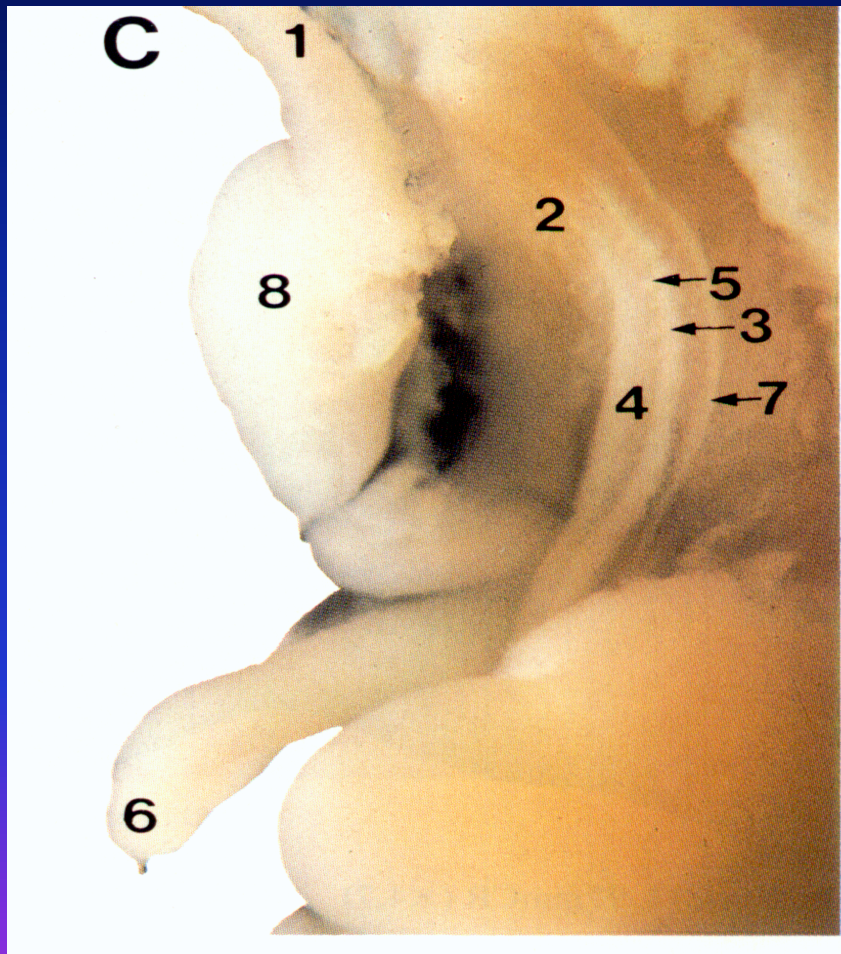
INTERNAL GENITAL ORGANS

3-VAGINA

- The caudal ends of the mullerian ducts form the mullerian tubercle at the dorsal wall of the urogenital sinus
- Mullarian tubercle is obliterated \Rightarrow vaginal plate \Rightarrow 16-18 wk the central core breaks down \Rightarrow vaginal lumen
- The upper 2/3 of the vagina \Rightarrow formed by mullerian tubercle
- The lower 1/3 \Rightarrow urogenital sinus

INTERNAL GENITAL ORGANS

INDIFFERENT STAGE



DAY 36-38

1-ESOPHAGUS

2-GONADAL RIDGE

3-MESONEPHRIC DUCT

4-MESONEPHRIC KIDNEY

5-MESONEPHRIC TUBULES

6-MIDGUT HERNIATION

7-PARAMESONEPHRIC
DUCT

8-STOMACH

FEMALE INTERNAL GENITAL ORGANS

Week 8

1-bladder

2-kidney

3-ovary

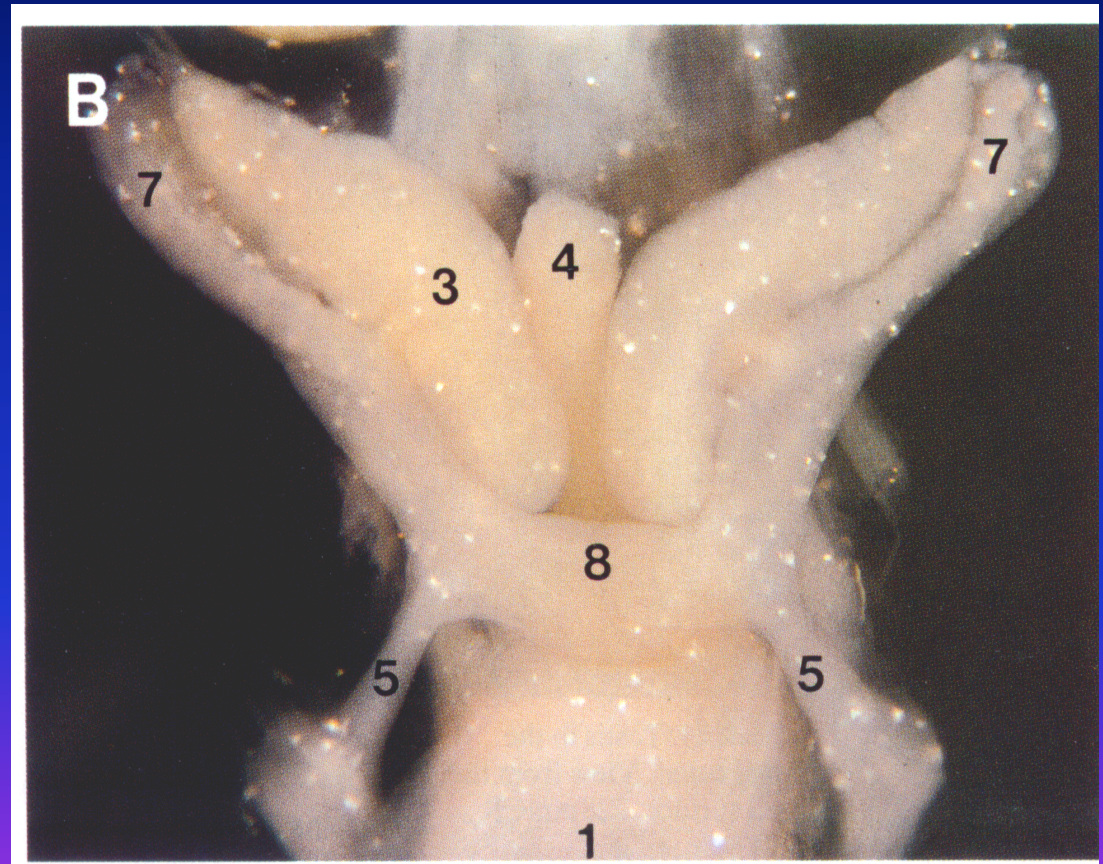
4-rectum

5-round ligament of
the uterus

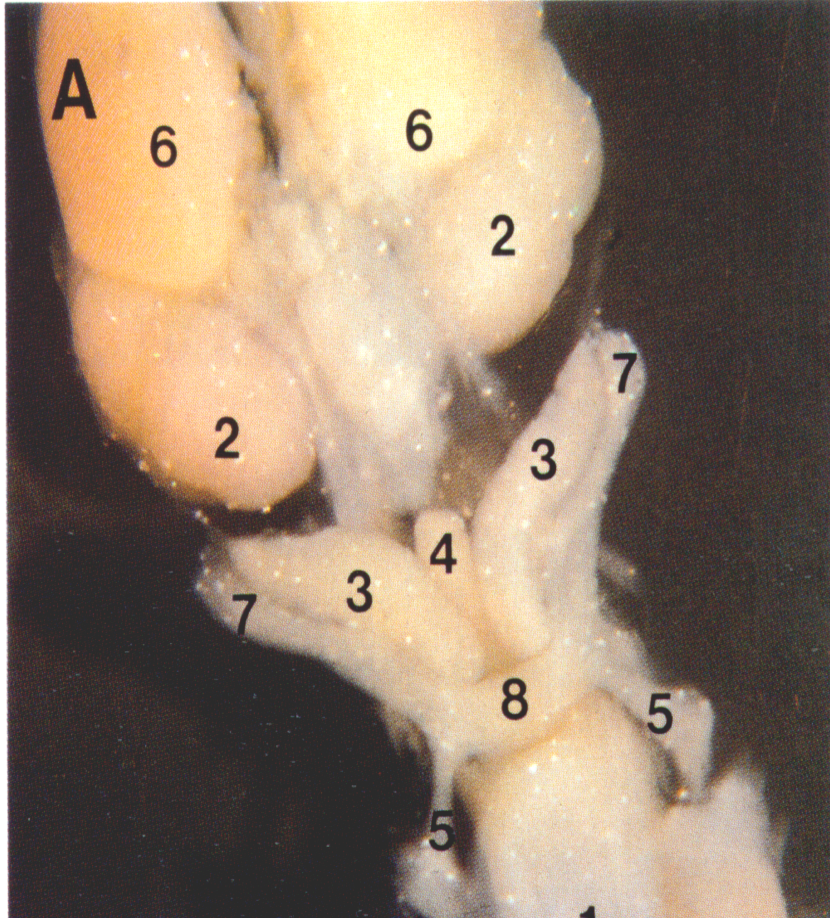
6-adrenal gland

7-Fallopian tube

8-utero vaginal
primordium



FEMALE INTERNAL GENITAL ORGANS



Week 8

1-bladder

2-kidney

3-ovary

4-rectum

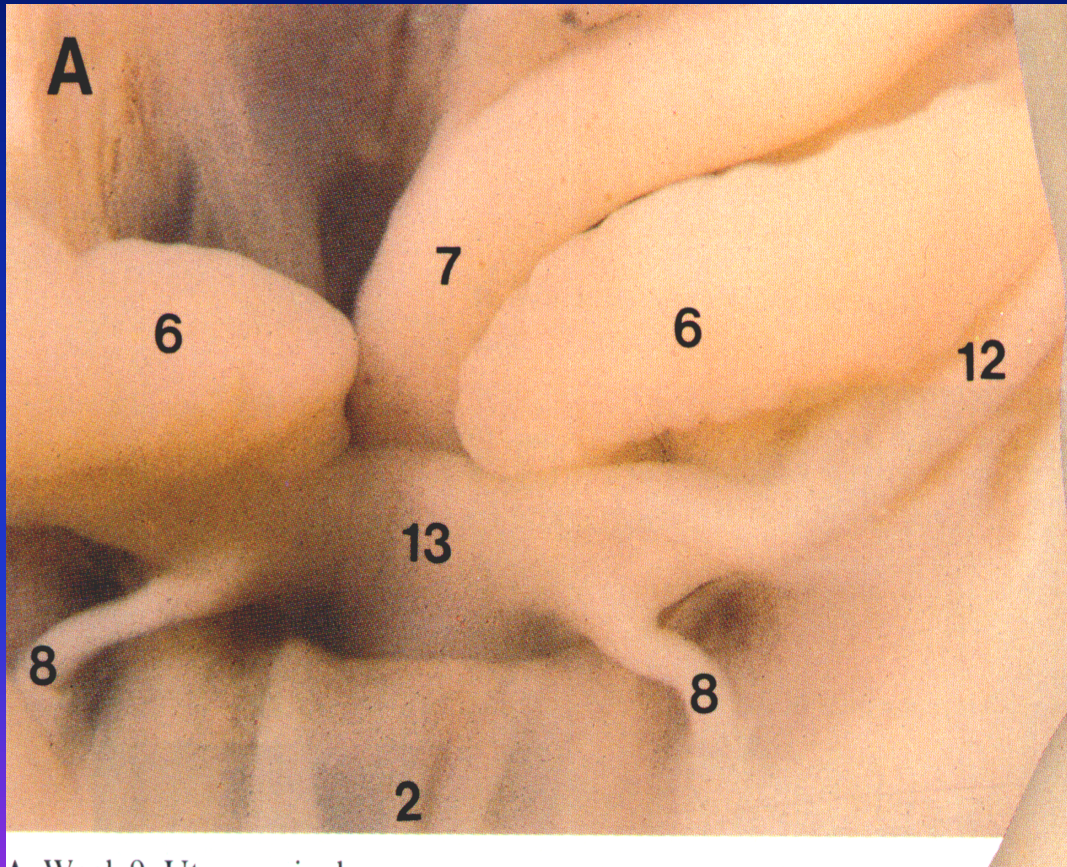
5-round ligament of the
uterus

6-adrenal gland

7-uterine tube

8-utero vaginal primordium

FEMALE INTERNAL GENITAL ORGANS



Week 9

2-bladder

6-ovary

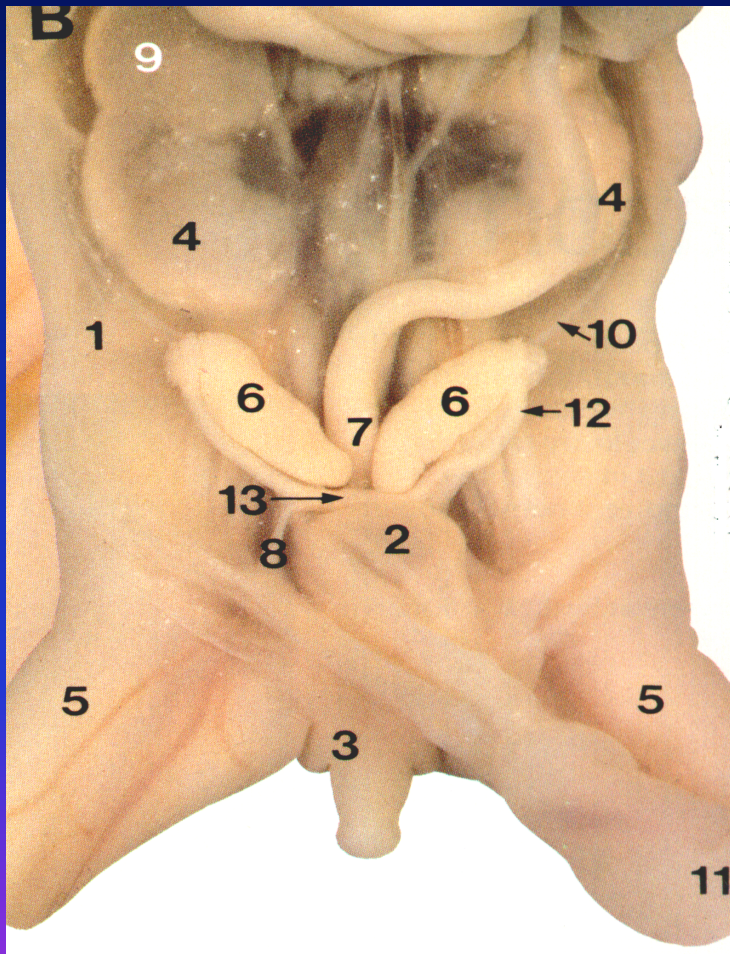
7-rectum

8-round ligaments

12-uterine tube

13-uterovaginal
primordium

FEMALE INTERNAL GENITAL ORGANS



Week 9

1-abdomen

2-bladder

3-external genitalia

4-kidney

5-leg

6-ovary

7-rectum

8-round ligaments

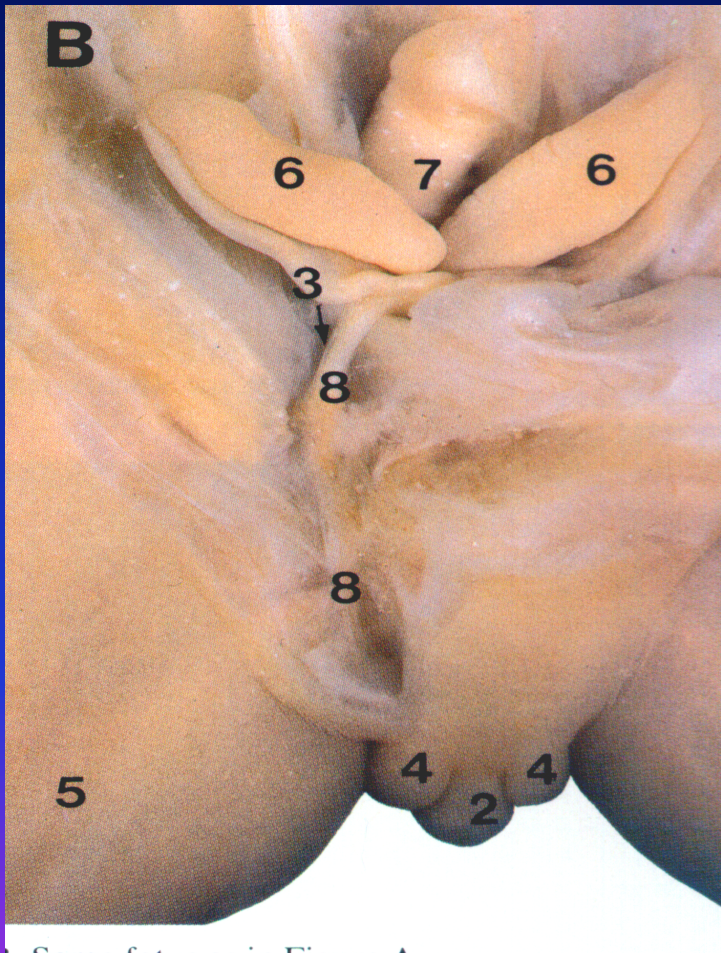
9-adrenal

10-suspensory ligament

12-uterine tube

13-uterovaginal primordium

FEMALE INTERNAL GENITAL ORGANS



Week 15

1-bladder

2-clitoris

3-vaginal process

4-labia majora

5-leg

6-ovary

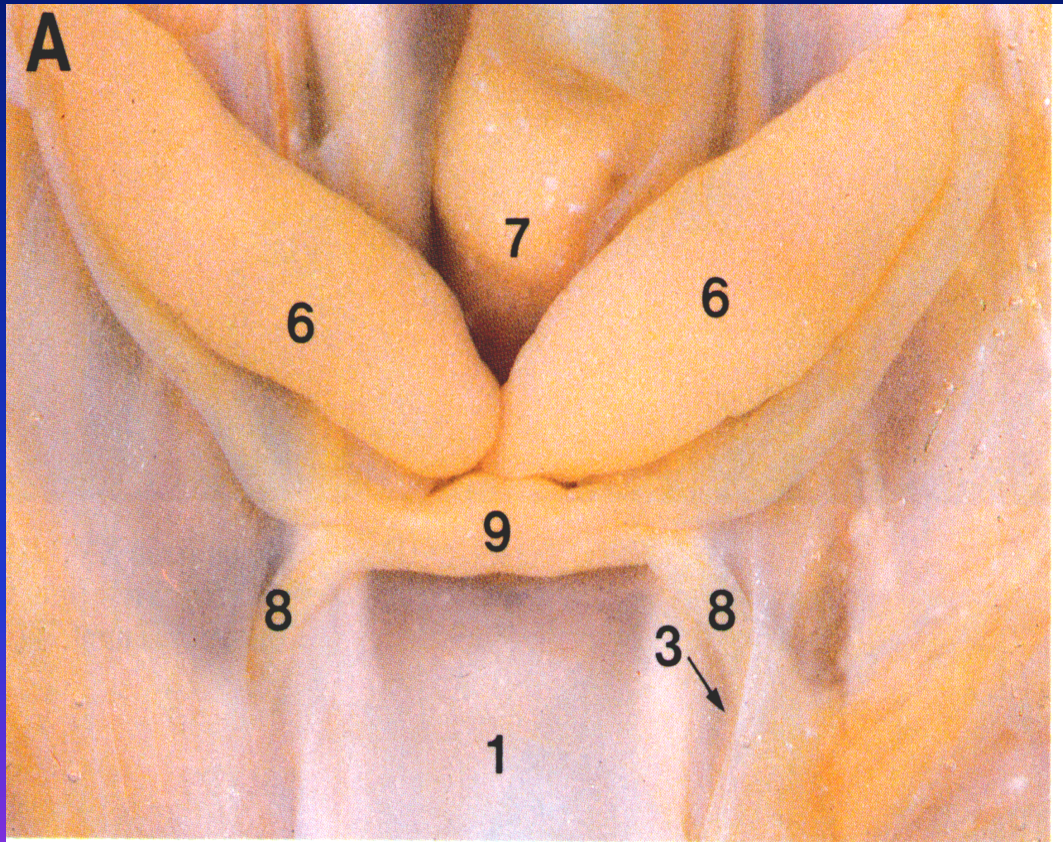
7-rectum

8-uterine round ligament

9-uterovaginal primordium

FEMALE INTERNAL GENITAL ORGANS

Week 15



122mmCB (x7.2)

1-bladder

2-clitoris

3-vaginal process

4-labia majora

5-leg

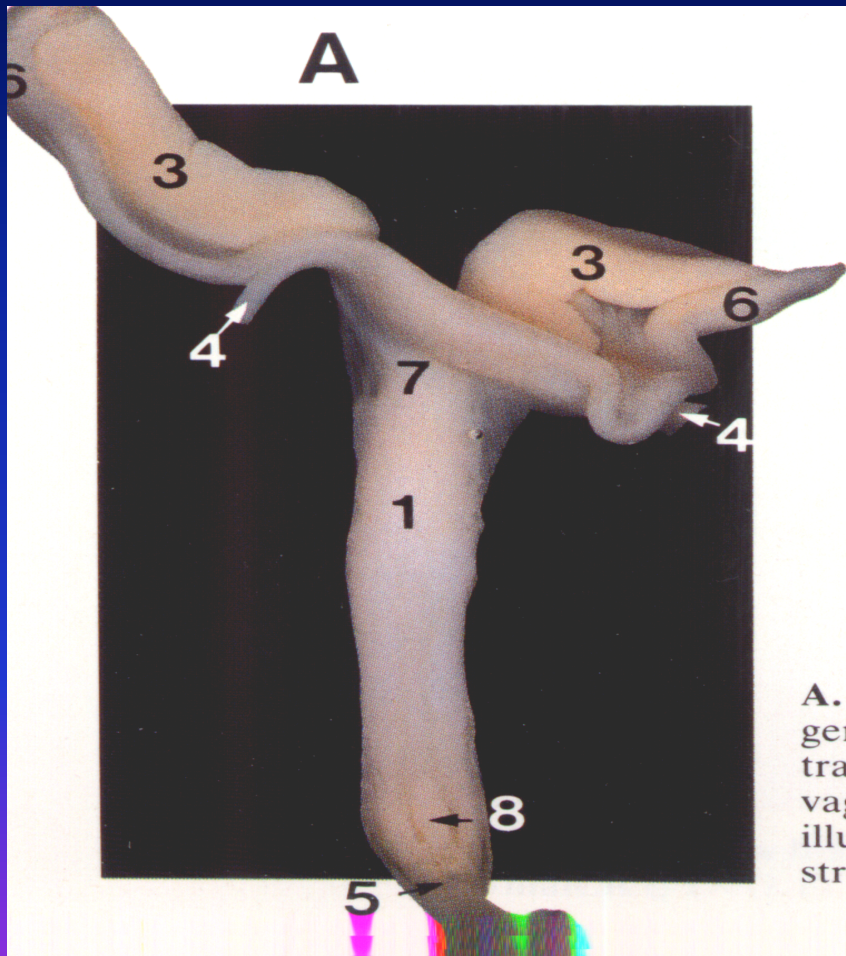
6-ovary

7-rectum

8-uterine round ligament

9-uterovaginal primordium

FEMALE INTERNAL GENITAL ORGANS



Week 13 (dissected genital tract)

1-body of uterus

2-clitoris

3-ovary

4-round ligament

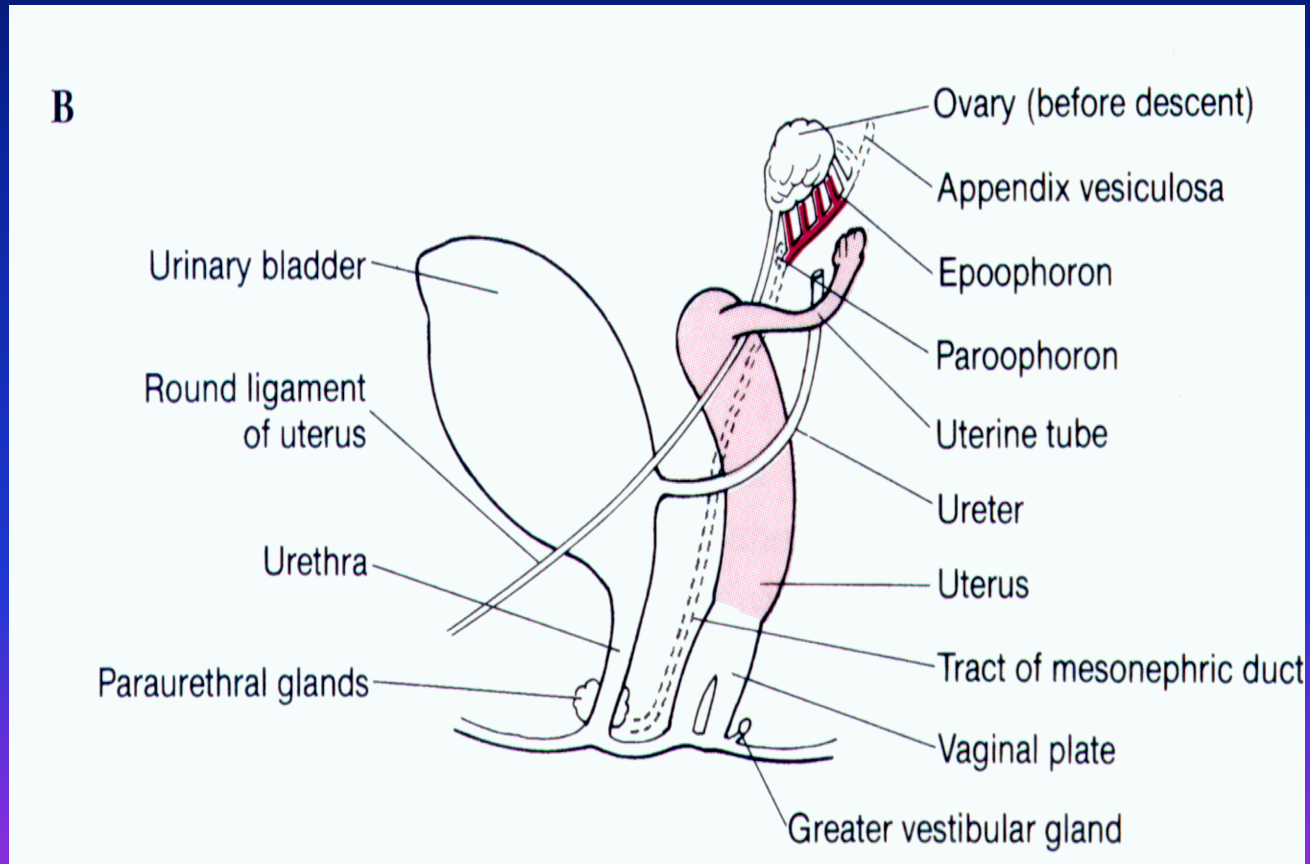
5-solid epithelium (vagina meets urogenital sinus)

6-fallopian tube

7-uterus

8-vagina

FEMALE INTERNAL GENITAL ORGANS (Week 12)



FEMALE INTERNAL GENITAL ORGANS (Newborn)

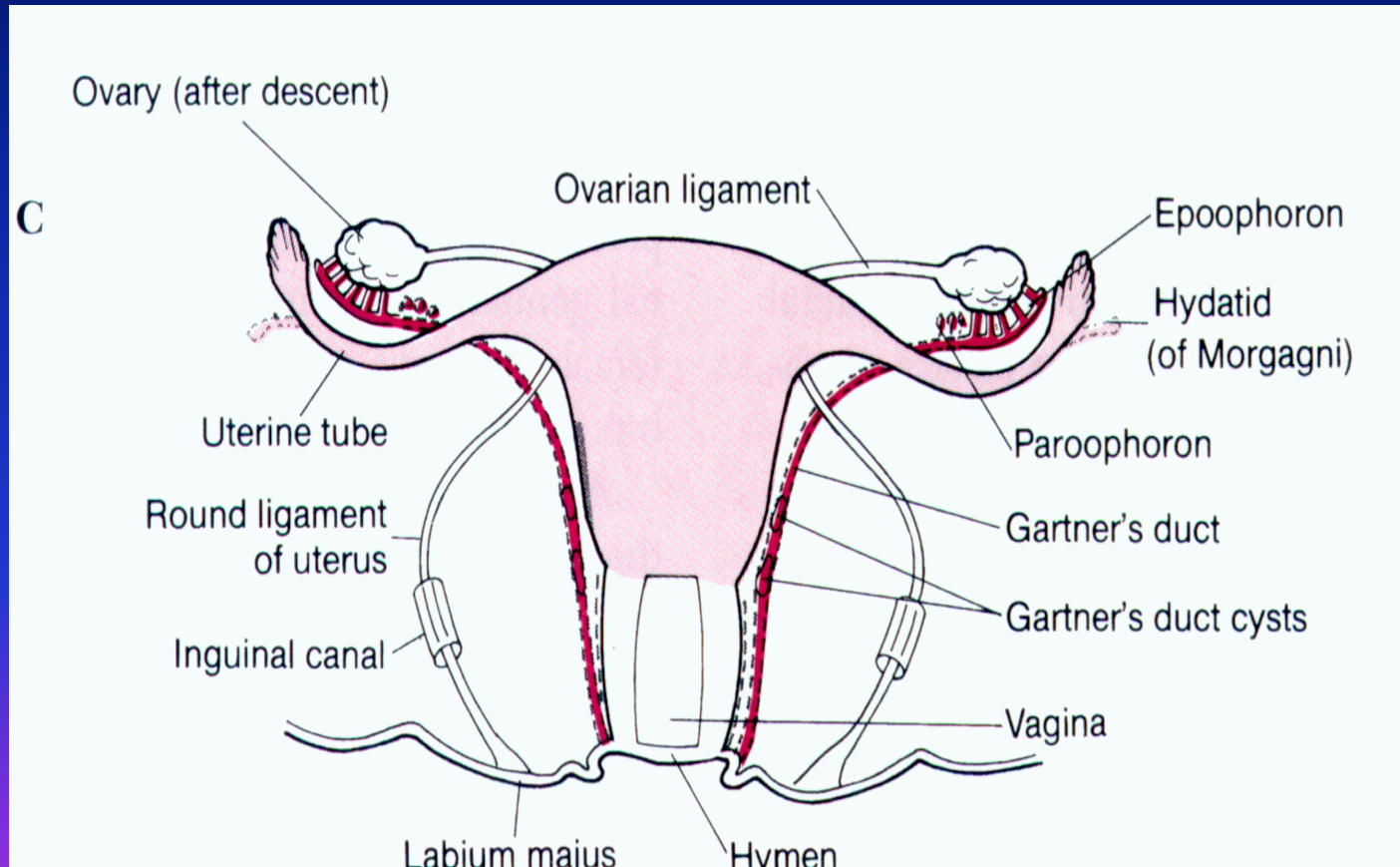


TABLE 1-2

Male and Female Derivatives of Embryonic Urogenital Structures

Embryonic Structure	Derivatives	
	Male	Female
Labioscrotal swellings	Scrotum	Labia majora
Urogenital folds	Ventral portion of penis	Labia minora
Phallus	Penis Glans, corpora cavernosa penis, and corpus spongiosum	Clitoris Glans, corpora cavernosa, bulb of the vestibule
Urogenital sinus	Urinary bladder Prostate gland Prostatic utricle Bulbourethral glands Seminal colliculus	Urinary bladder Urethral and paraurethral glands Vagina Greater vestibular glands Hymen
Paramesonephric duct	Appendix of testes	Hydatid of Morgagni Uterus and cervix Fallopian tubes
Mesonephric duct	Appendix of epididymis Ductus of epididymis Ductus deferens Ejaculatory duct and seminal vesicle	Appendix vesiculosus Duct of epoophoron Gartner's duct
Metanephric duct	Ureter, renal pelvis, calyces, and collecting system	Ureter, renal pelvis, calyces, and collecting system
Mesonephric tubules	Ductuli efferentes Paradidymis	Epoophoron Paroophoron
Undifferentiated gonad	Testis	Ovary
Cortex	Seminiferous tubules	Ovarian follicles
Medulla	— Rete testis	Medulla Rete ovarii
Gubernaculum	Gubernaculum testis	Round ligament of uterus