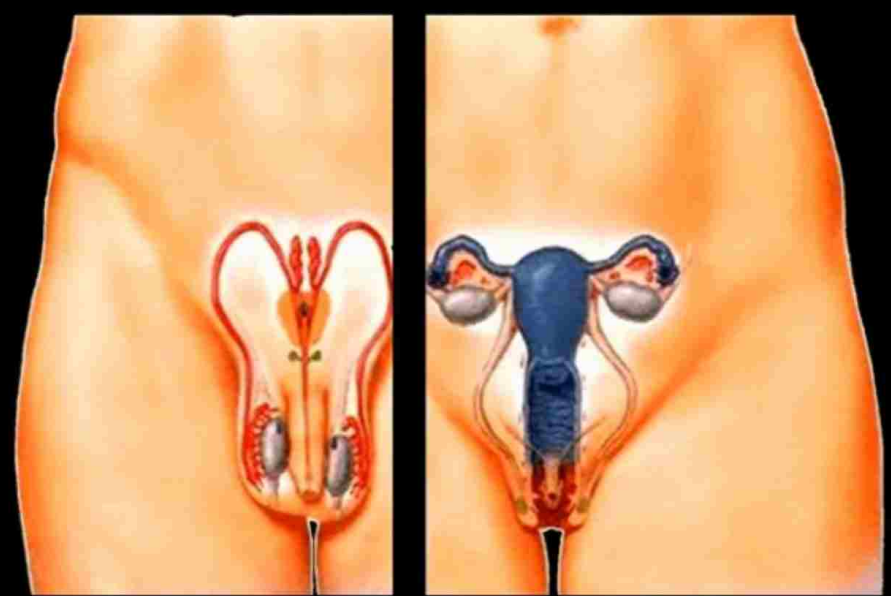




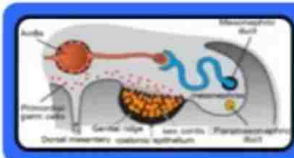
# Development of the Genital System



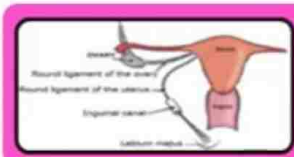
**Dr. Adel Bondok**

Mansoura University, Egypt

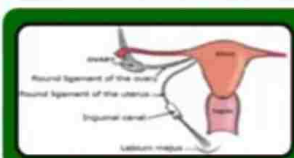
## Development of the GS



Development of the gonads



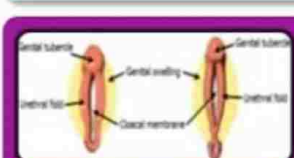
Descent of the ovary



Fate of the gubernaculum



Genital ducts: MD & PMD



External genitalia



# Development of the Gonads

## Stages of Development: 2 stages

### 1. Indifferent Stage: from the 4<sup>th</sup> - 7<sup>th</sup> week

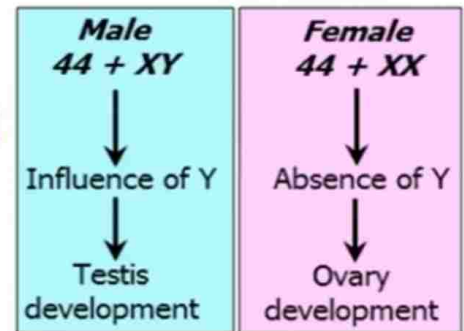
The testis and the ovary appear similar

### 2. Differentiated Stage:

The gonad differentiate into testis or ovary

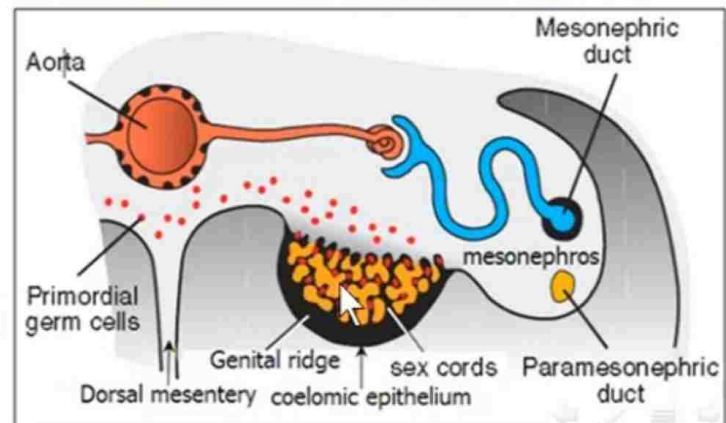
depending on the presence or absence of the **Y-chromosome**

**Y-chromosome** has a testis-determining factor (TDF) (**SRY gene**)



## Site of Development:

called **genital ridge** on the post abdominal wall between the mesonephros (kidney) and the dorsal mesentery.



# Development of the OVARY

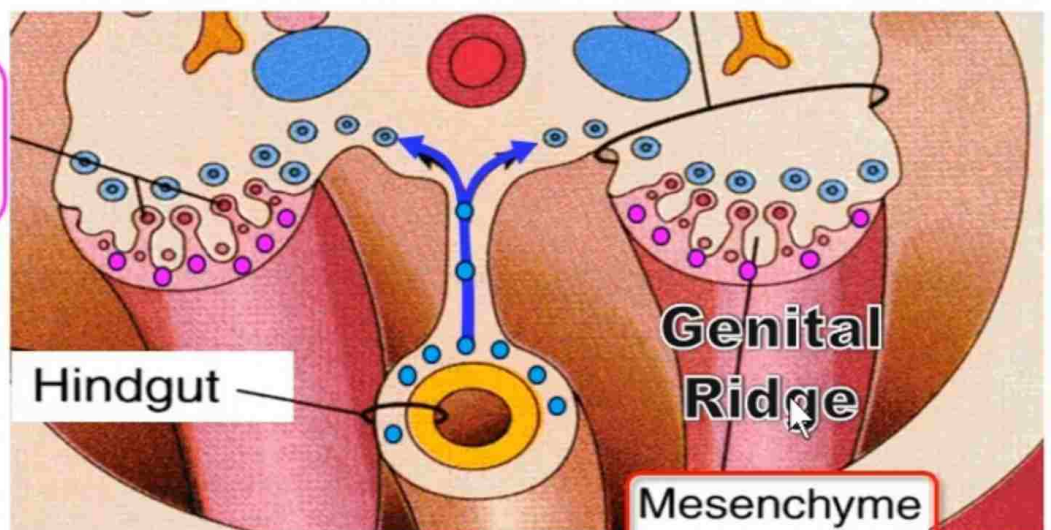
The gonads are derived from **3 sources**:

1. **Celomic Epithelium**: form the **ovarian follicles**

2. **Adjacent Mesoderm**: form the **connective tissue stroma**

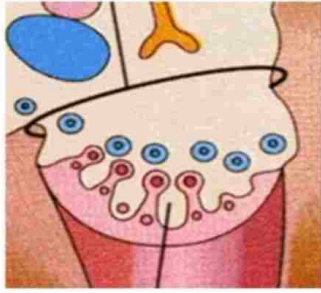
3. **Primordial germ cells**: form the **oogonia**. They **migrate** from the yolk sac and incorporate in the **ovarian follicles**

Celomic Epith:  
Ovarian follicles



Mesenchyme

# Development of the GONAD



Ovary

Testis

Celomic Epithelium

Ovarian follicles

Seminiferous tubules

Adjacent Mesoderm

Connective tissue stroma

Connective tissue stroma and Leydig cells

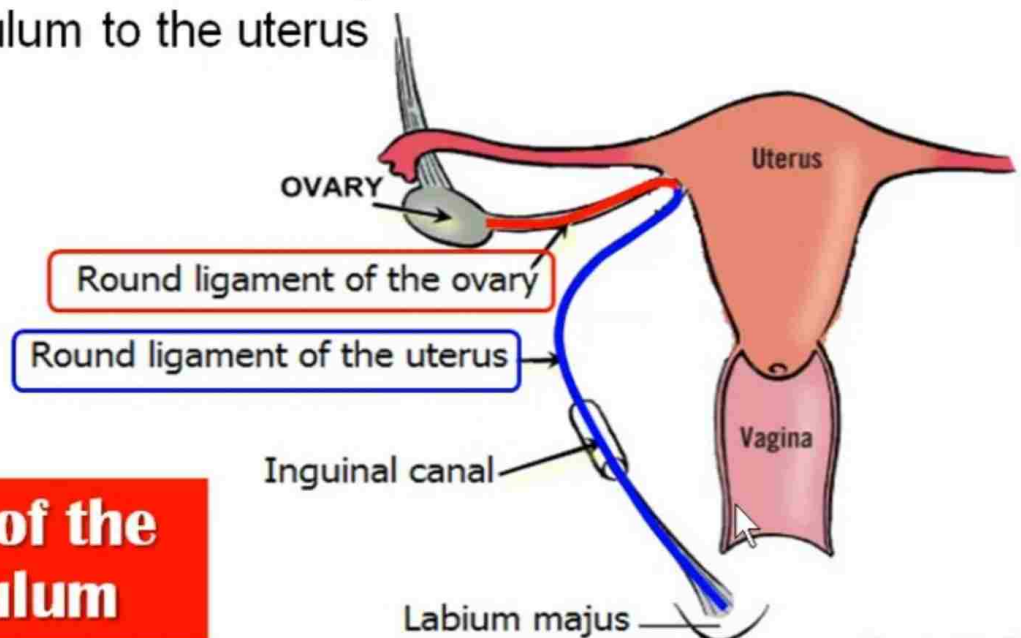
Primordial Germ Cells

Oogonia

Spermatogonia

## Descent of the OVARY

- The ovary descends from the abdomen to the pelvis by a band called **gubernaculum** connecting the ovary with the labium majus
- It doesn't descend outside the pelvis **due to** attachment of the gubernaculum to the uterus



Derivatives of the Gubernaculum

# Development of Genital Ducts

Male and female embryos have 2 pairs of genital ducts:

a. **2 mesonephric ducts (Wolffian ducts):**

form the **male genital tract**

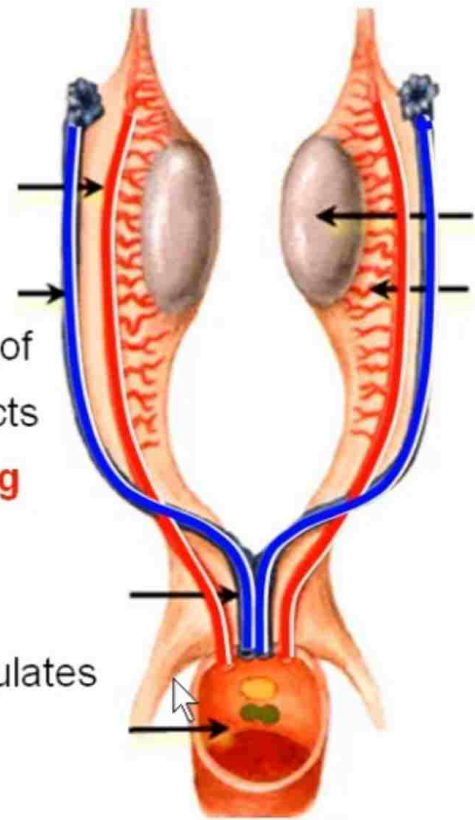
b. **2 paramesonephric ducts (Mullerian ducts):**

form the **female genital tract.**

☐ **Leydig cells of the Testes >> testosterone >>**  
(male inducer factor) >>> stimulates development of the mesonephric duct to form the male genital ducts

☐ **Sertoli cells of the Testes >> Mullerian Inhibiting Factor (MIF) >>>** inhibits development of the paramesonephric duct

☐ **XX (female) no Y >> no testis >> no MIF >>** stimulates development of the paramesonephric duct to form uterus & uterine tubes



# Development of Genital Ducts

## Leydig Cells

Testosterone  
"Male inducer factor"

Induces development of mesonephric duct

## Sertoli Cells

Mullerian inhibiting factor

Inhibits development of Mullerian duct

## NO Testis

NO Mullerian inhibiting factor

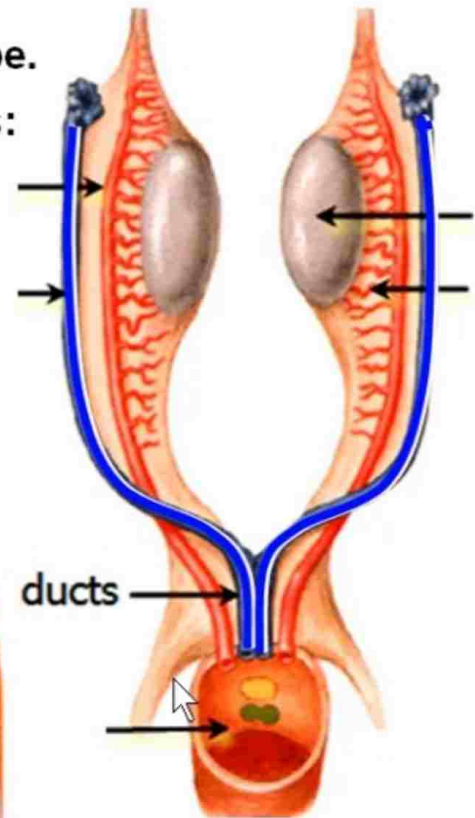
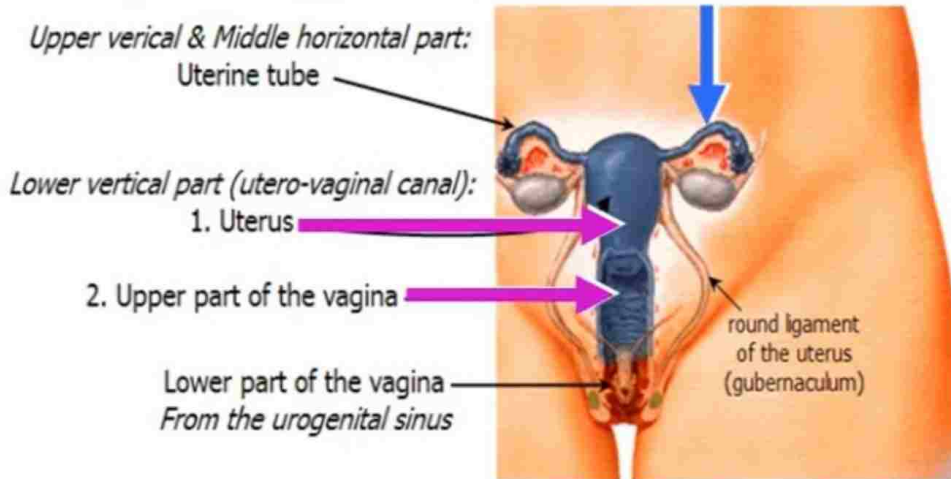
Stimulates development of Mullerian duct

# Derivatives of the Paramesonephric duct in the Female

## Forms:

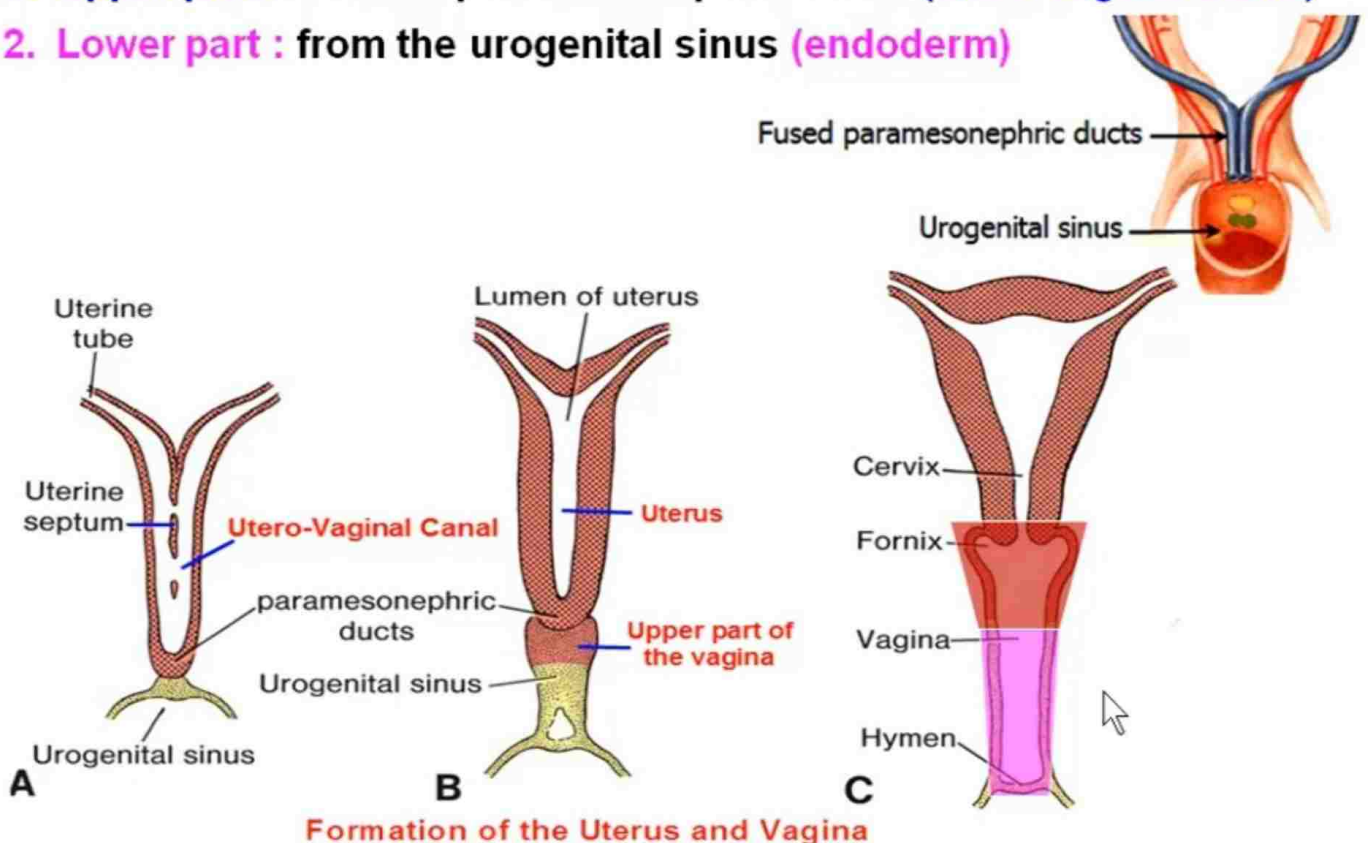
1. Upper and middle part: forms the uterine tube.
2. Lower part: fuse (utero-vaginal canal): forms:
  - a. Uterus
  - b. Upper part of the vagina

### DERIVATIVES OF THE PARAMESONEPHRIC DUCT IN THE FEMALE



# Development of the Vagina

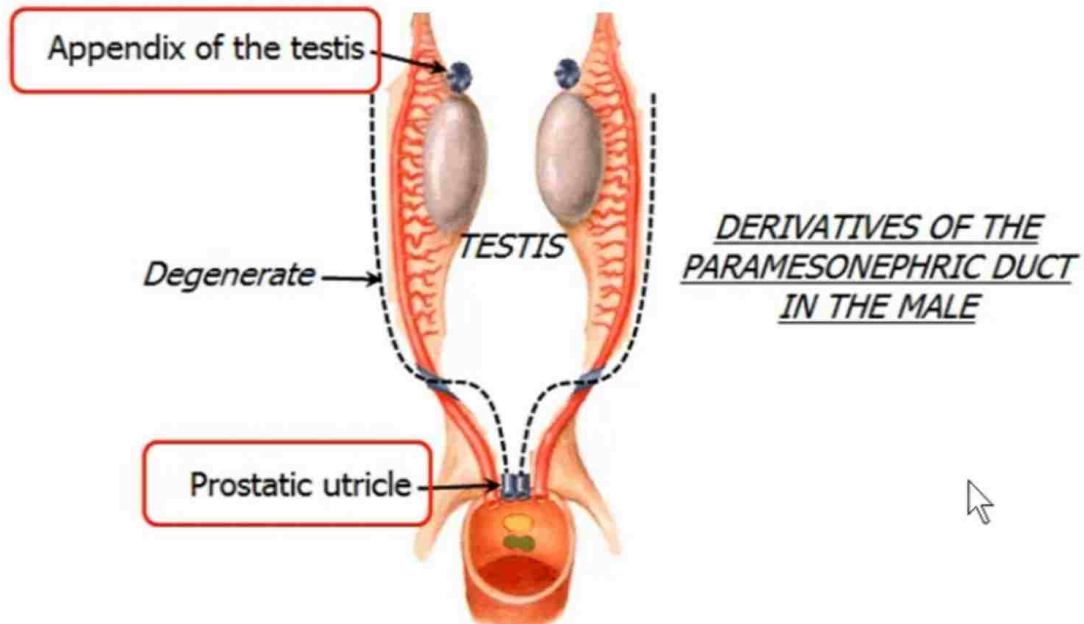
1. Upper part: from the paramesonephric ducts (utero-vaginal canal).
2. Lower part : from the urogenital sinus (endoderm)



# Derivatives of the Paramesonephric duct in the Male

Paramesonephric ducts **degenerate** except the upper and lower end:

1. **Upper end:** forms the appendix of the testis.
2. **Lower end:** forms prostatic utricle



# Derivatives of the Mesonephric Ducts

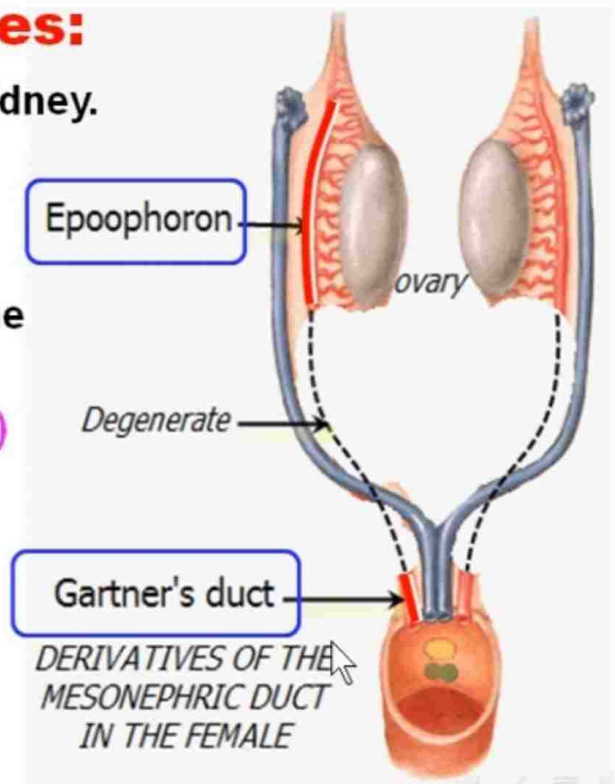
**In Both Males and Females:**

1. Ureter and collecting tubules of the kidney.
2. Trigone (base) of the urinary bladder

**In the Females:**

Mesonephric ducts **degenerate** except the upper and lower end:

1. **Upper end:** epoophoron (similar to VD)
2. **Lower end:** Gartner's duct >> Cyst

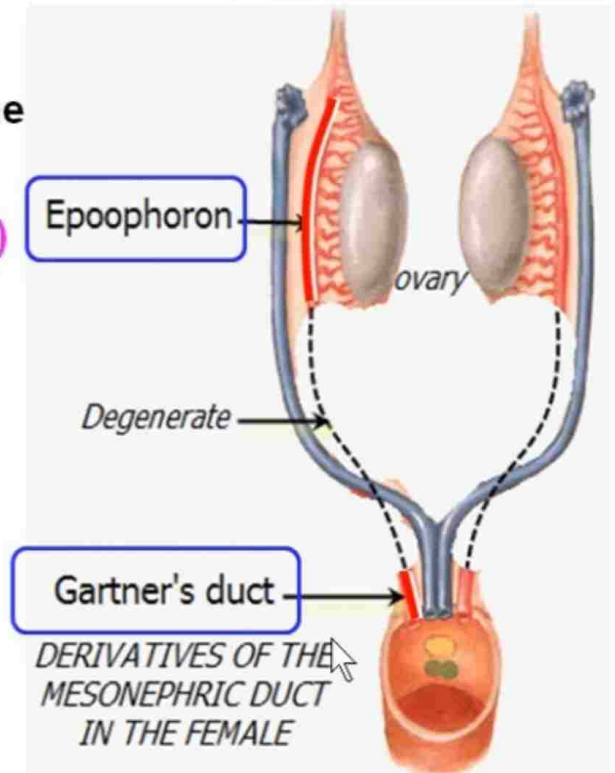
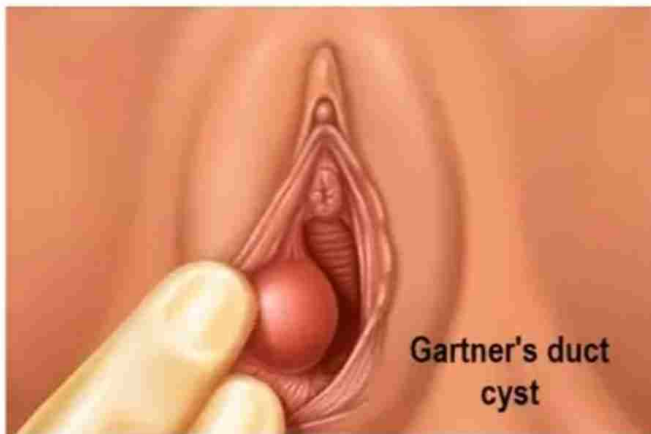


# Derivatives of the Mesonephric Ducts

## In the Females:

Mesonephric ducts **degenerate** except the **upper** and **lower** end:

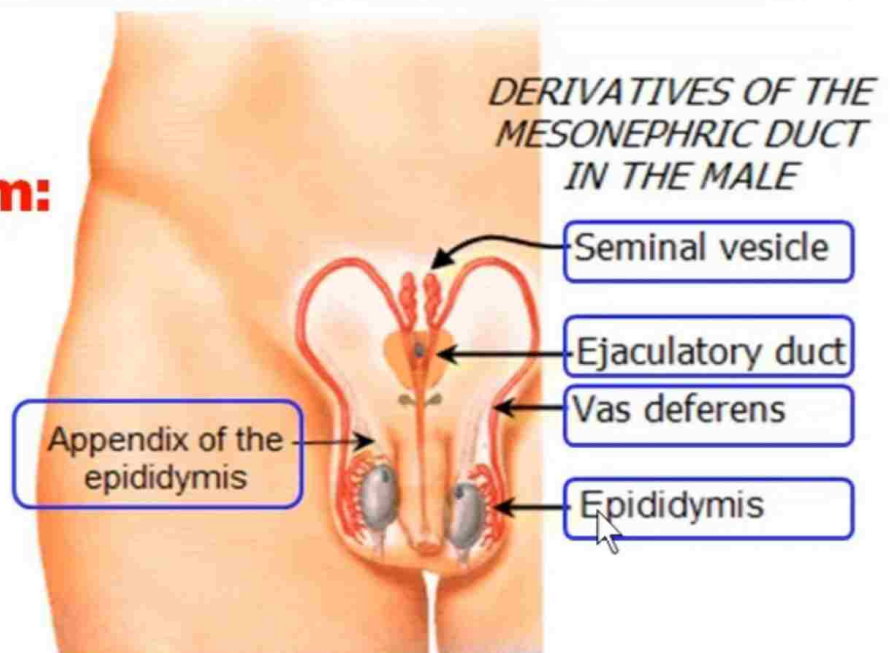
1. **Upper end:** epoophoron (similar to VD)
2. **Lower end:** Gartner's duct >> Cyst



# Derivatives of the Mesonephric Ducts in the Male

**They form the male duct system:**

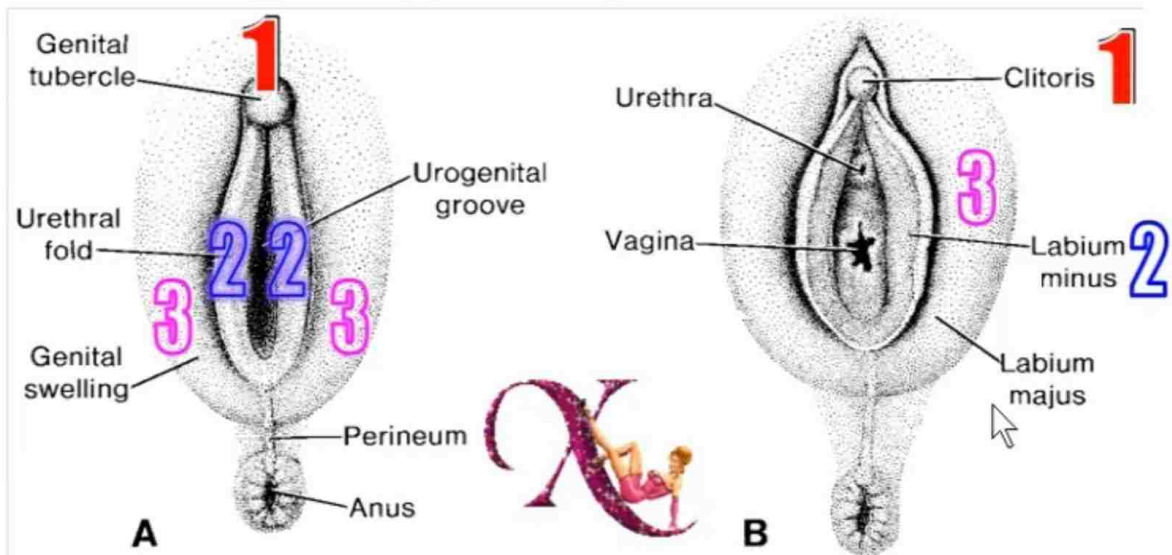
1. Appendix of epididymis
2. Epididymis
3. Vas deferens
4. Seminal vesicle
5. Ejaculatory duct



# Development of the Female External Genital Organs

## 3 Sources:

1. **Median Swelling (Genital Tubercle)** : forms the clitoris.
2. **Two Urethral Folds**: form the labia minora.
3. **Two Genital (Labial) Swellings**: form the labia majora.



# Male & Female External Genital Organs

**Genital Tubercle**



**2 Urethral Folds**

**Labia minora**

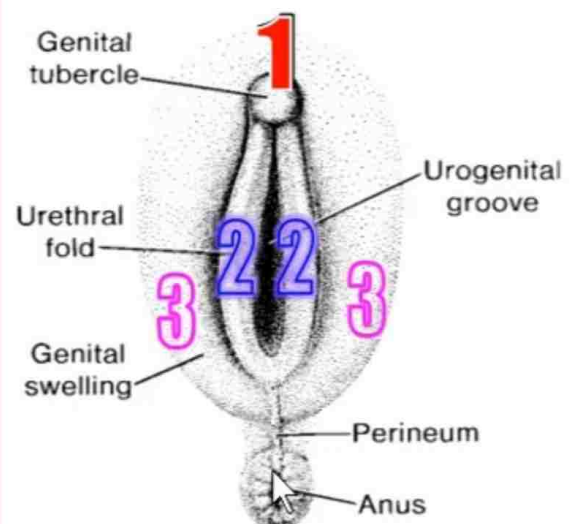
**Fuse to close the urethra**

**2 Genital Swellings**

**Labia majora**

**Fuse to form the scrotum**

## 3 Sources:



**Dr Adel Bondok®**