

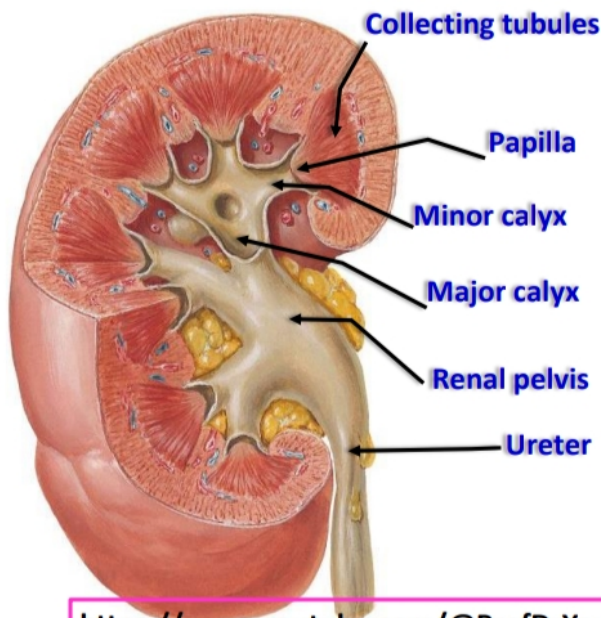
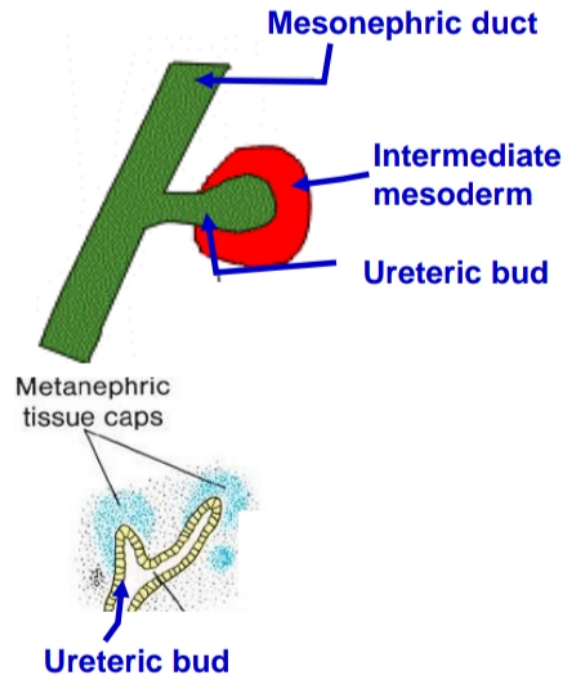
• **Third stage**

(The Metanephros, Permanent Kidney)

* Before the disappearance of mesonephros (by the 5th week), the metanephros starts its development:

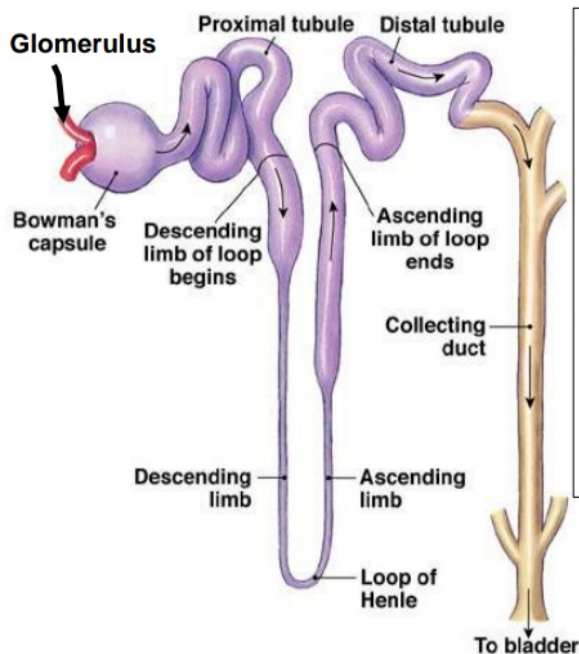
a- Ureteric bud from mesonephric duct.

b) This bud grows upward and backward till invading caudal part of intermediate mesoderm that called metanephric cap or blastema (opposite the lower lumbar and sacral somites).



The ureteric bud gives
ureter--- renal pelvis...
major calyces----- minor calyces
----- papillae -----
- collecting tubules

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- **Changes in the metanephric cap (blastema)**

- * **Dorsal end** lies in contact with **collecting tubule** but **without** canalization.
- * **Ventral end** invaginated by branch from **internal iliac artery** forming glomerulus and Bowman's capsule.
- This tubule will elongate forming **proximal convoluted tubules**, **loop of Henle** and **distal convoluted tubule**.
- Later on **distal convoluted tubule** **will be canalized** with the collecting tubule.

- **Descent of the Testis**

- **Aim of descend:** Because the process of spermatogenesis requires degree of temperature lower than that of the abdomen
- The testes descend through inguinal canal into the scrotum **by age 3 months** of pregnancy, In most cases, the testes pass down by **age 6 months without any treatment.**

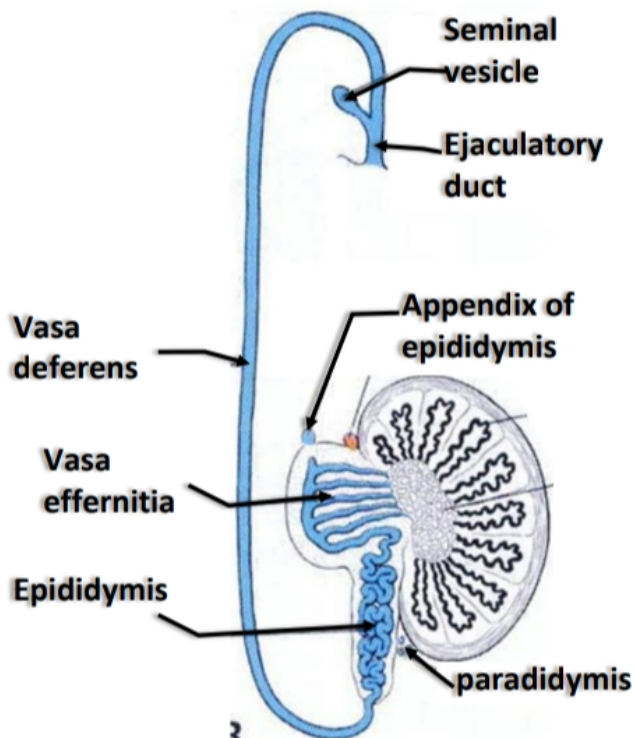
- **Factors controlling the descent:**

- **Gubernaculum** (after mesonephros has atrophied) Cranially it has its **origin** at the testis and **inserts** in the region of the genital swelling (future scrotum).
- **Formation of the processes vaginalis** on which testes will slide through inguinal canal.
- Human chorionic gonadotrophin hormone from placenta, testosterone and Anti Mullerin Hormone.
- **Increasing intra-abdominal pressure** due to organ growth.

- **Developing of the cells:**

- 1- **Primordial germ cells** give the spermatogonia.
- 2- **Coelomic epithelium** gives rise the supporting cells of Sertoli.
- 3- **Mesenchymal cells**, give rise the interstitial cells of Leydig.

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**** Fate (derivatives) of mesonephros**

- By the end of the **5th week** of development shows the following changes:

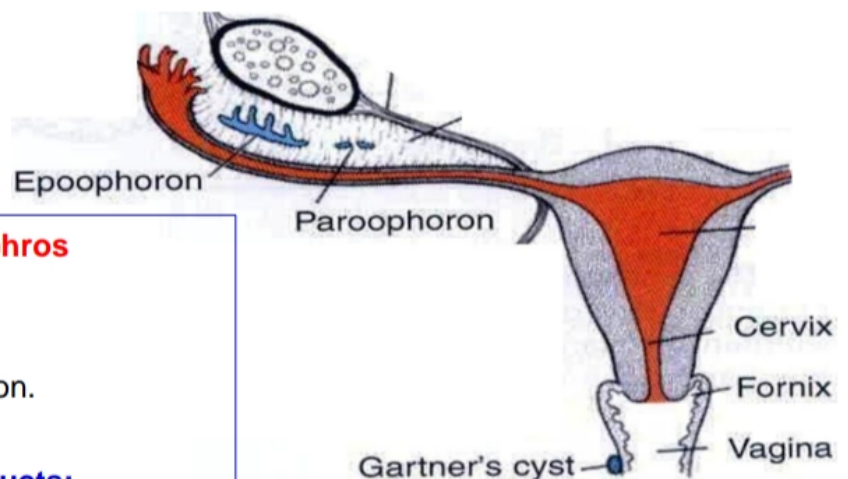
- In male embryo:

1- Mesonephric tubules:

- **Cranial part** forms appendix of Epididymis.
- **Middle part** will form vasa efferentia.
- **Caudal part** forms Paradidymis.

2- Mesonephric (Wolffian) duct:

- It forms epididymis, vas deferens, seminal vesicle and ejaculatory duct.
- Trigone of urinary bladder
- Ureteric bud



**** Fate (derivatives) of mesonephros**

- In female embryo:

1- The mesonephric tubules:

- **Cranial part** forms the Epoophoron.
- **Caudal part** forms Paroophoron.

2- The mesonephric (Wolffian) ducts:

- Gartner's cyst in the vaginal wall.
- Trigone of urinary bladder
- Ureteric bud

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- **Development of the hymen**

- It is a thin membrane separate definitive urogenital sinus from uterovaginal canal
- **Hymen about 1.5 cm from the opening of vagina.**
- The central part of the hymen degenerate forming an opening.

- **Variations of the hymen;**

- 1- Thin membrane with central opening. 2- Ring.
 - 3- Semilunar. 4- Cribriform. 5- Completely absent. 6- Imperforate.
-

- **Congenital anomalies of the Testis:**

1- Agenesis of one or both testis. Bilateral agenesis resulted in sterility.

2- Primordial Germ cell aplasia (**No** spermatogonia) either degeneration or failure of migration

3- Abnormality in the descent of the testis:

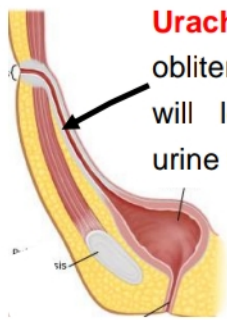
a- Cryptorchidism (Undescended testis) remains in the abdomen. It causes sterility due to atrophy of spermatogenic cells or malignancy.

b- Incomplete descent: It may be found in inguinal canal or superficial inguinal ring.

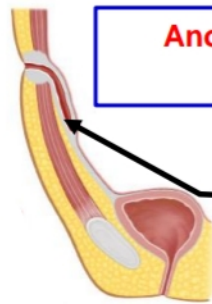
c- Ectopic testis: the testis descends to an abnormal site.

4- Klinefelter syndrome (44+ XXY) leads to sterility

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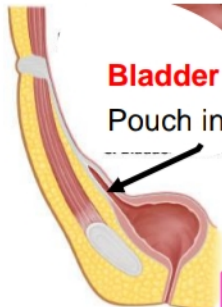


Urachal fistula: failure of obliteration of **urachus**. This will lead to discharge of urine from umbilicus.

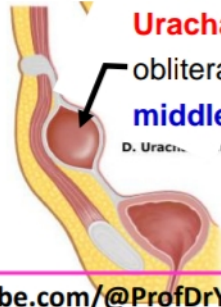


Anomalies of urachus (allantois):

Urachal sinus: failure of obliteration of **distal** part of urachus.

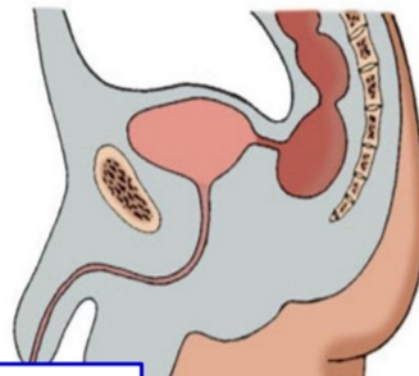
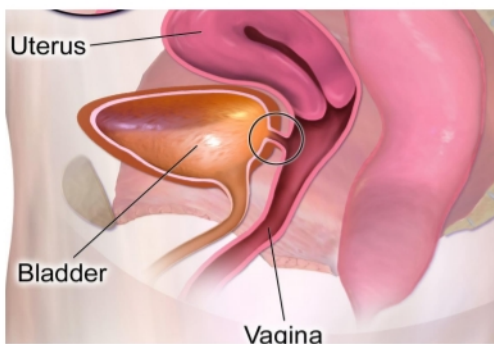


Bladder diverticulum:
Pouch in the apex



Urachal cyst: failure of obliteration of the **middle** part of urachus.

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Fistulae of the urinary bladder: due to defect in the urorectal septum.

- (a) **Vesicovaginal fistula:** communication between urinary bladder and vagina (**female**).
- (b) **Rectovesical fistula:** communication between urinary bladder and rectum (**male**).

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• Ectopia vesica:

- The inner aspect of the urinary bladder is exposed below the umbilicus.
- This occurs due to failure of the formation of the anterior abdominal wall and anterior wall of the urinary bladder.

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