

# SEM IV ZOOA

## CC8 UNIT 5: URINOGENITAL SYSTEM (Part - 1)

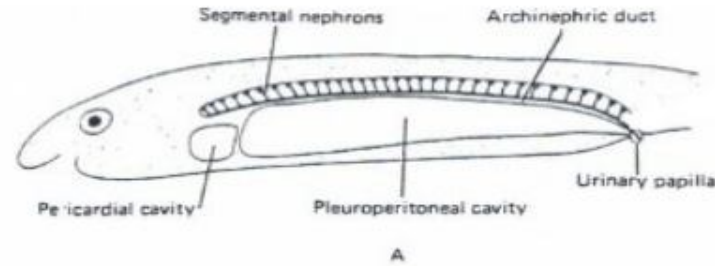
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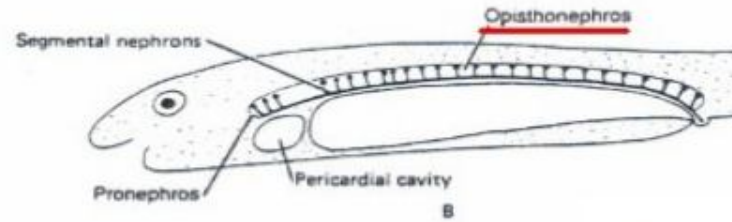
## UROGENITAL SYSTEM

- Combination of excretory and reproductive system.
- **Kidney** is the main excretory organ of vertebrates.
  - Concerned with the elimination of metabolic waste products.
- **Ovary** is the female reproductive organ or gonad.
- **Testis** is the male reproductive organ.
  - These are concerned with the production of the reproductive cells (egg and sperm).
- **Ducts** are passageways for the excretory waste products and reproductive cells from where they are produced to the outside.

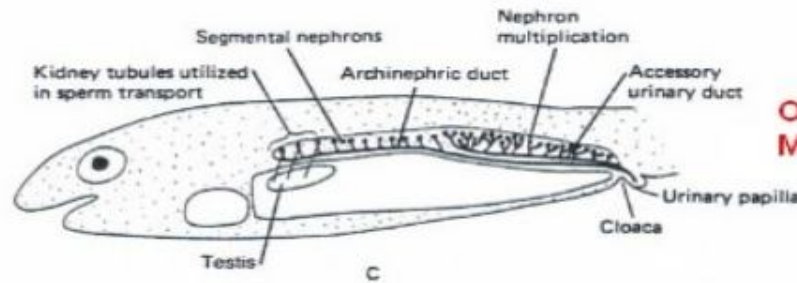
- Ducts of excretory and reproductive systems are intimately associated



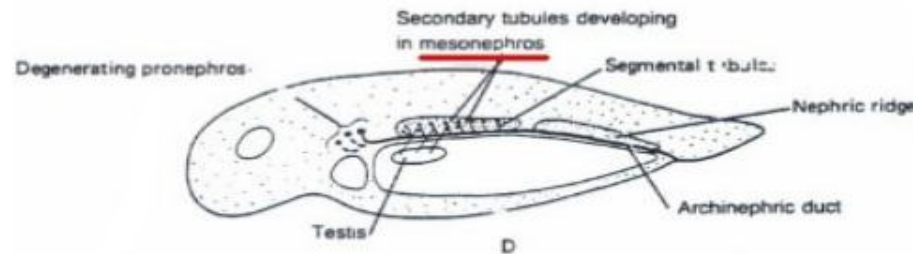
Larval hagfish  
caecilians



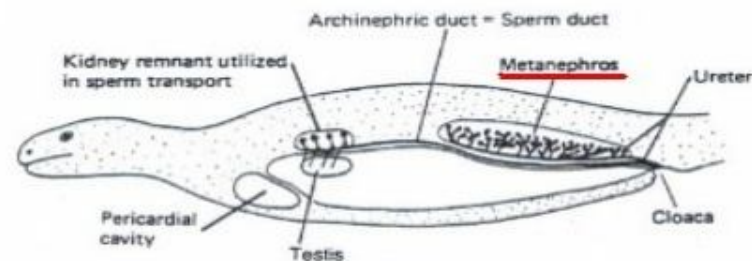
Adult hagfish



Opisthonephros  
Most amniotes



Mesonephros  
Embryonic amniotes



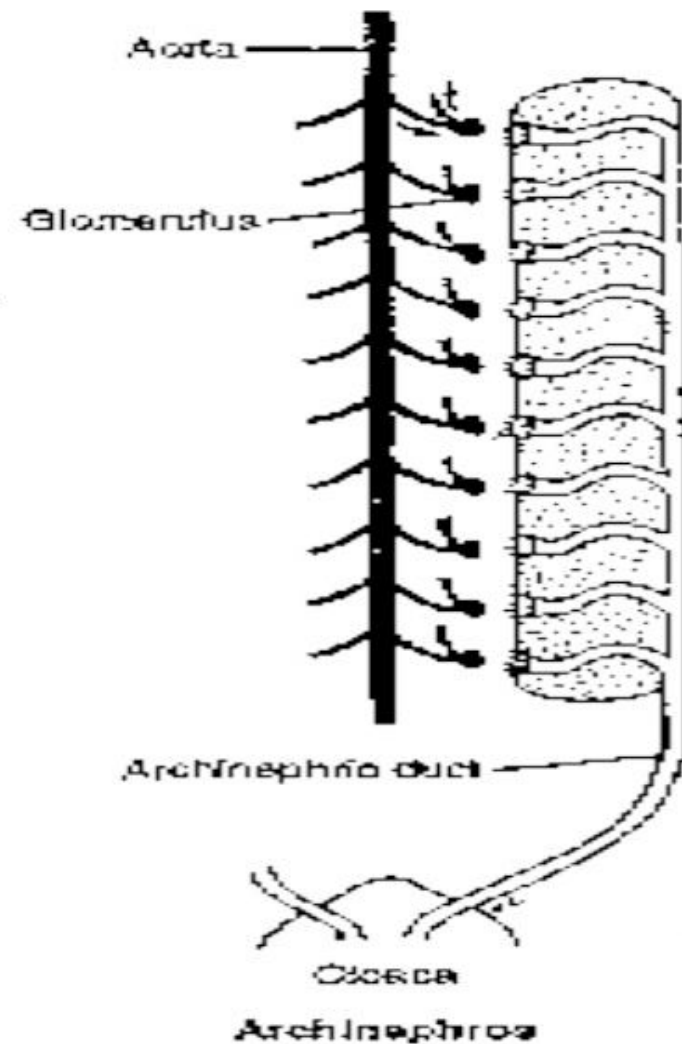
Metanephros  
Adult amniotes

## EXCRETORY SYSTEM

- Waste products of metabolism include: urea, ammonia, uric acid, creatinine, various pigments, inorganic salts, and water.
- These are excreted through the **kidney**.
- **Nephrons** are the functional units of the kidney, where the blood is filtered with these metabolic wastes.
- Metabolic wastes pass to the outside through **ducts**.

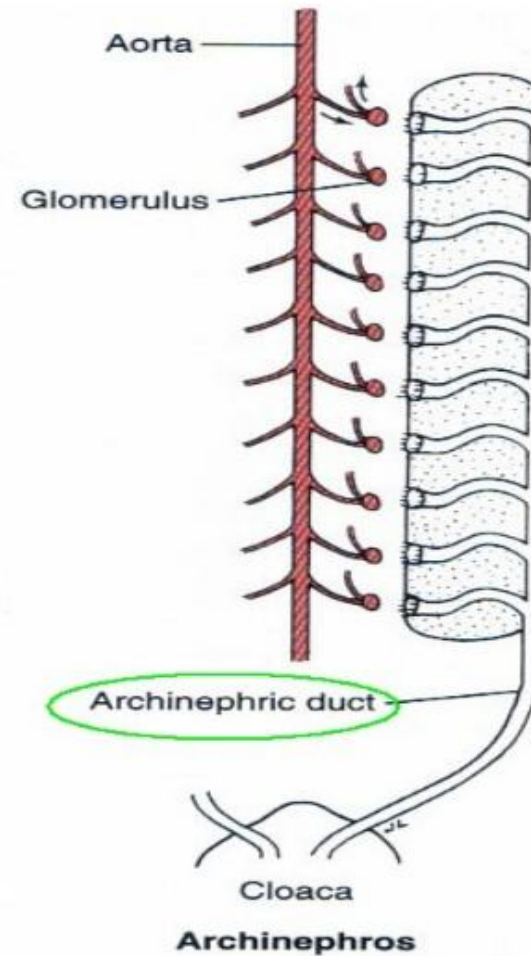
# ARCHINEPHROS/HOLONEPHROS

- Excretory organ of primitive vertebrate ancestors.
- It is composed of paired **archinephric ducts**, located on the dorsal side of the body cavity and extending the length of the coelom.
- Each duct has a pair of **tubules** to a segment.
- The tubules open into a coelom through the **nephrostome**.



# ARCHINEPHROS

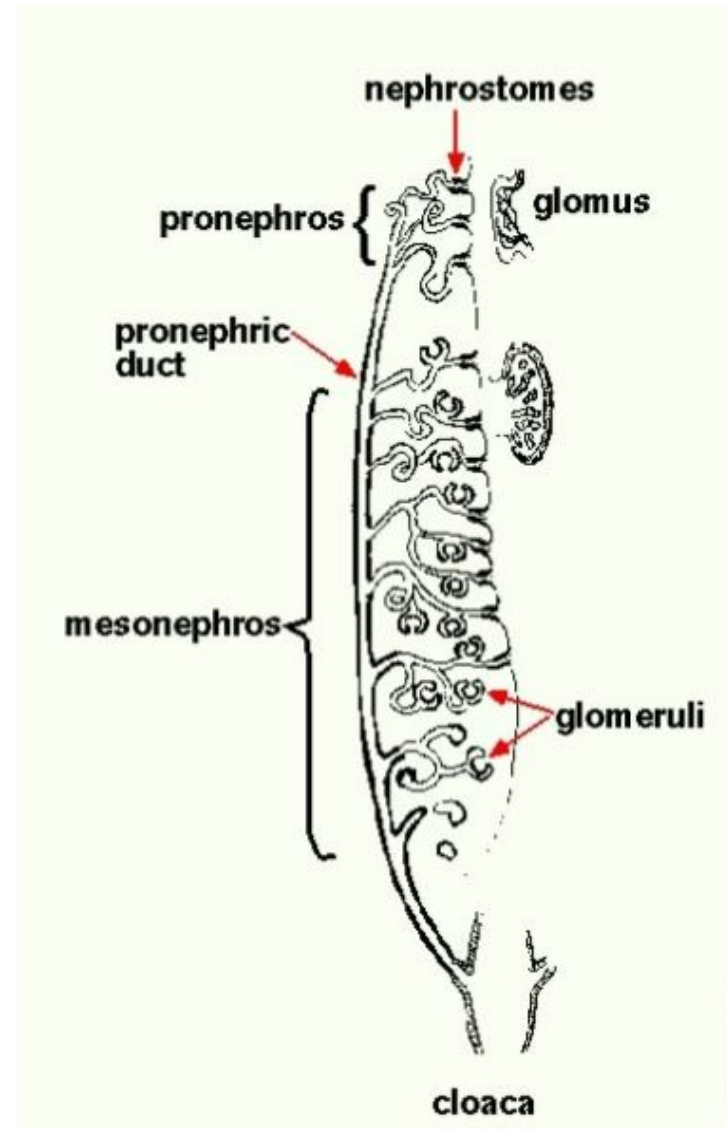
- **External glomeruli** drain the coelomic fluid and are located in close proximity to the nephrostome.
- Larvae of hagfish and caecilians have this type of excretory organ.



- Tissue fluid discharge from glomerulus  
>coelom>nephrostomes>tubules  
>archinephric ducts>to the outside.

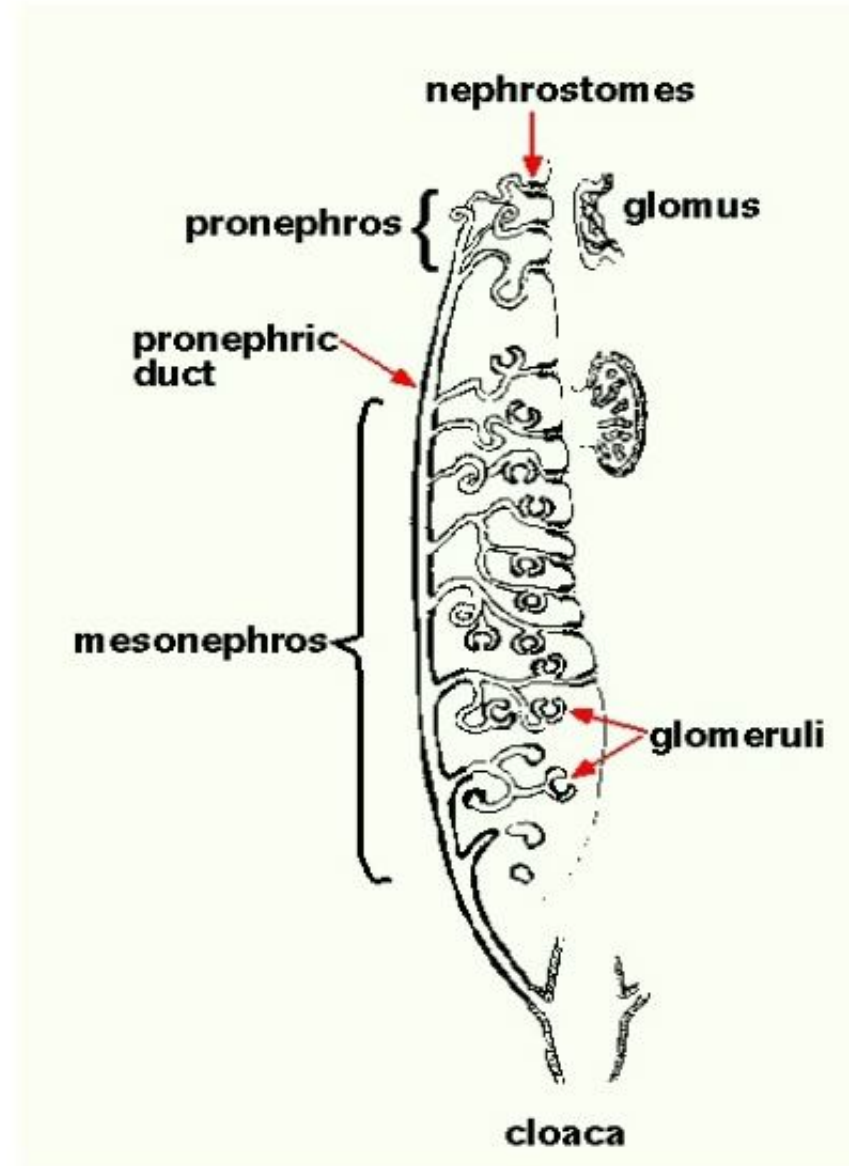
# THE ANAMNIOTE KIDNEY: PRONEPHROS

- 1st embryonic tubules in all vertebrates
- called **pronephric tubules** because they are the 1st to develop & are anteriorly located
- The duct that drains the pronephros is called the **pronephric duct**.
- The pronephros is temporary & function only until glomeruli & tubules further back become functional.



# THE ANAMNIOTE KIDNEY: PRONEPHROS

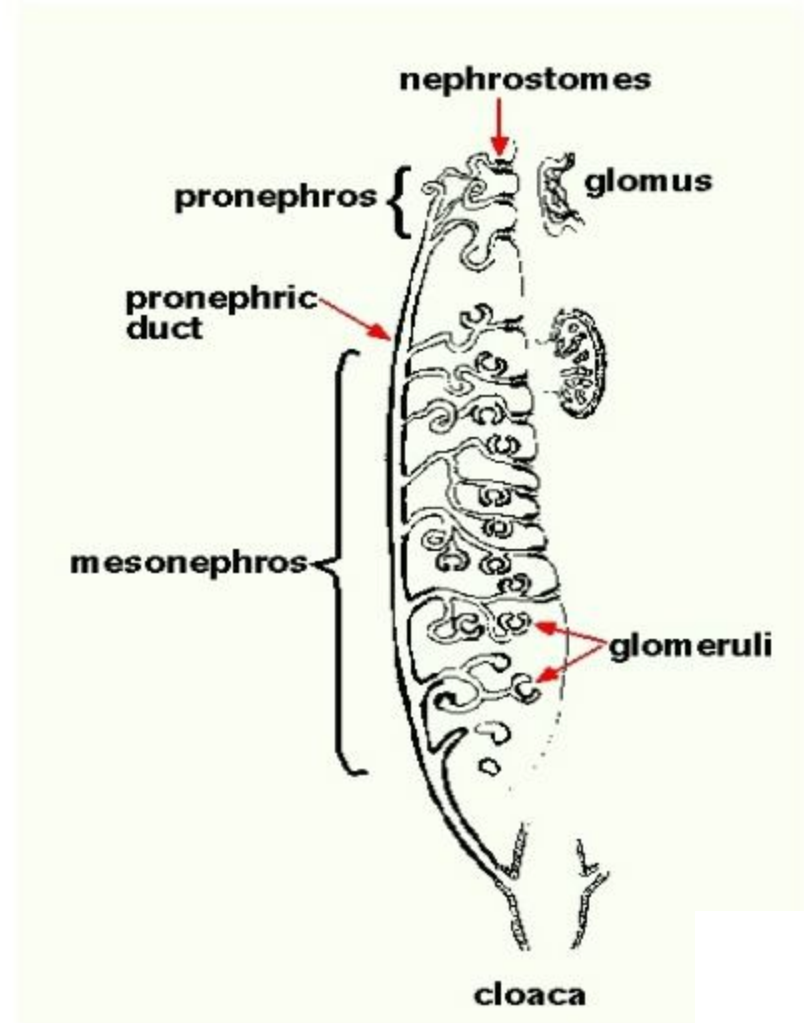
- Some have **external glomerulus**, while most have **internal glomeruli**.
- Internal glomeruli are small knots of arterial capillaries surrounded by the **Bowman's capsule**.
- **Renal or Malphigian corpuscle** is composed of the glomerulus and the Bowman's capsule





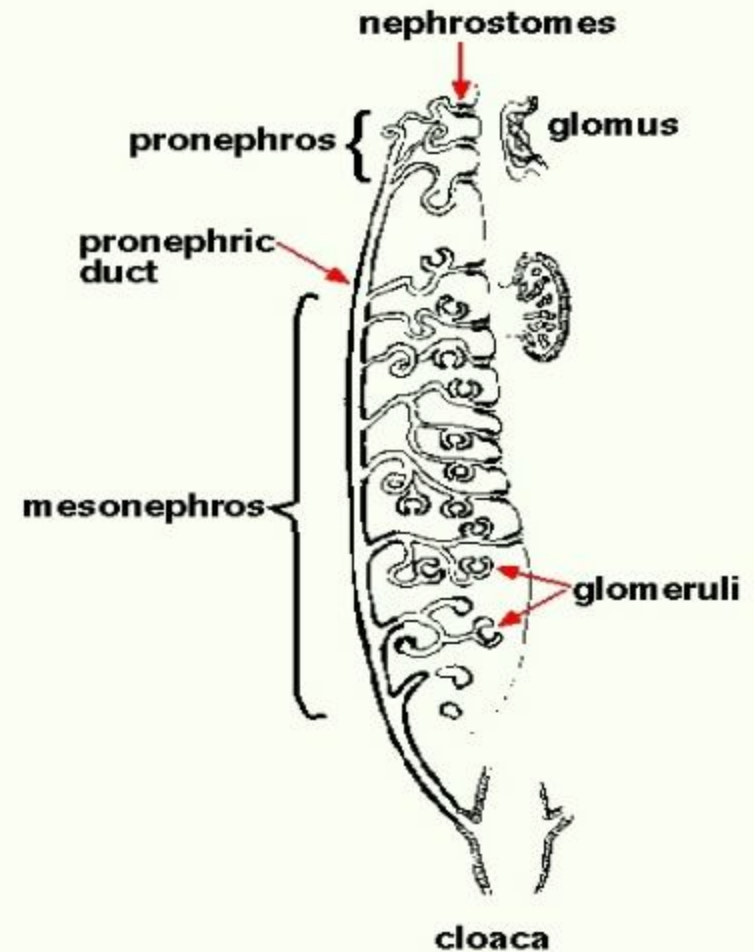
# THE ANAMNIOTE KIDNEY: PRONEPHROS

- Blood → afferent arteriole → glomerulus → efferent arteriole → postcardinal vein → heart
- Filtrate of blood plasma → glomerulus → coelom or cavity of the Bowman's capsule → tubule → pronephric duct → cloaca
- Selective reabsorption of water and other constituents may occur as fluid passes down the tubule.



# THE ANAMNIOTE KIDNEY: PRONEPHROS

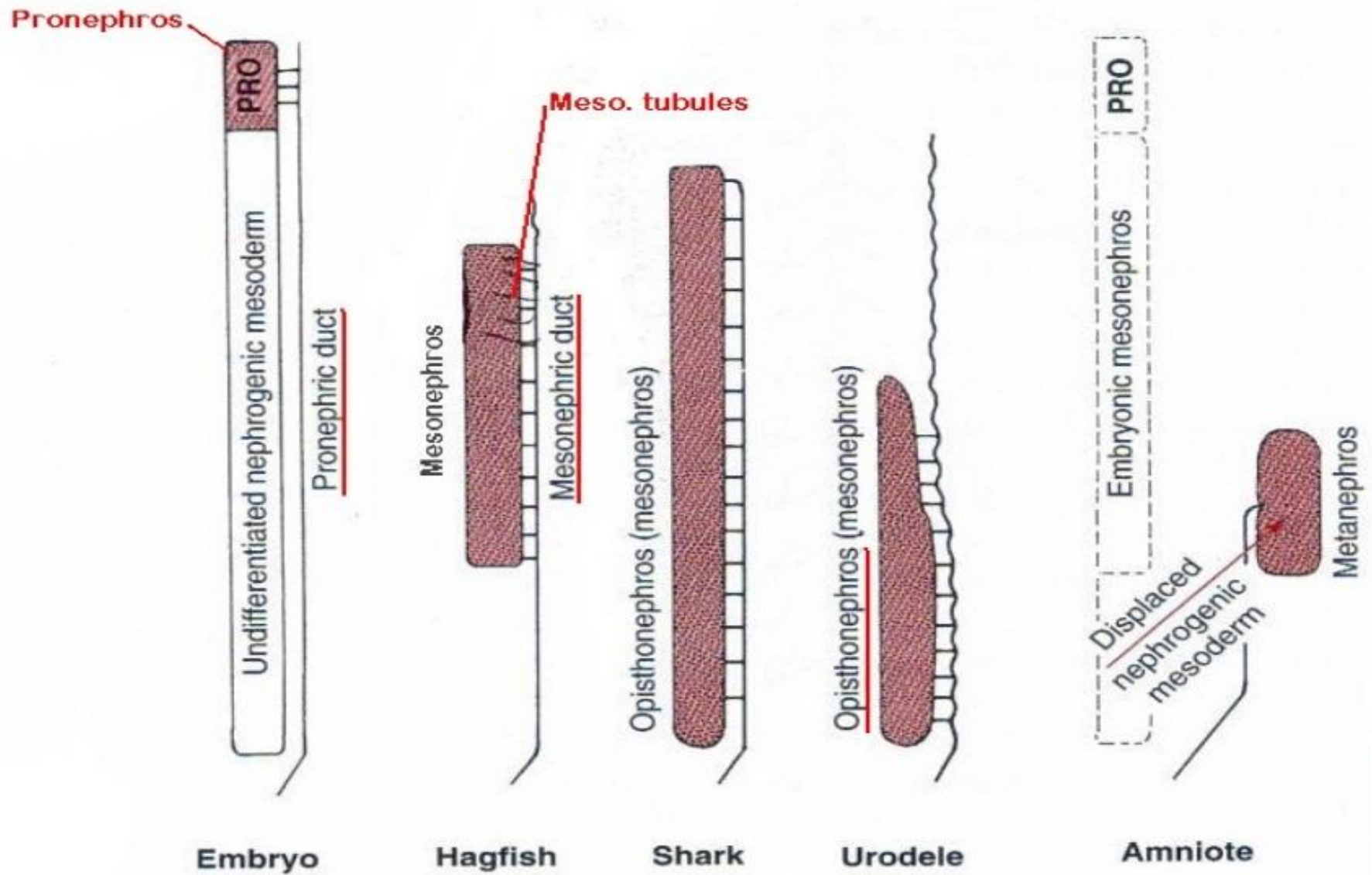
- Pronephric tubules function only until the end of the larval stage in amphibians and equivalent stage in fishes.
- **Glomus** is the term for several united glomeruli.
- **Pronephric chambers** are larger chambers formed by expansion of the pronephric tubules.



## THE ANAMNIOTE KIDNEY: *OPISTHONEPHROS*

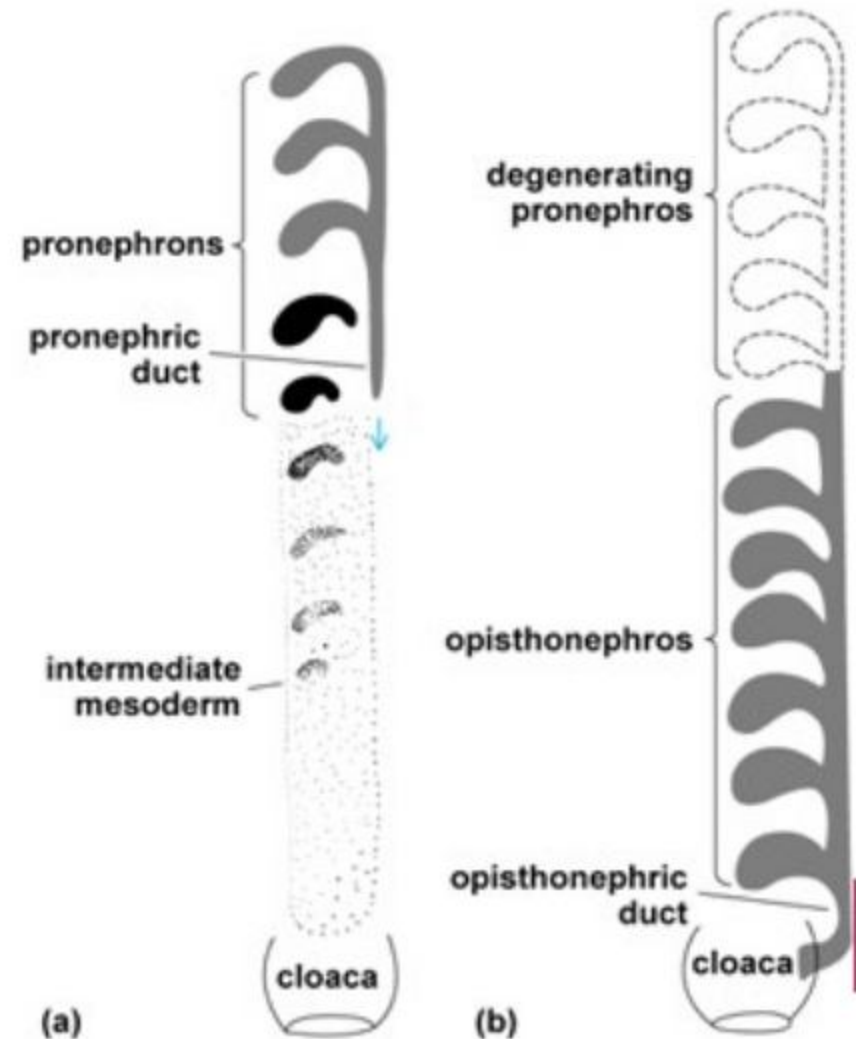
- The kidney mass caudal to pronephric region
  - Functional adult kidney of lampreys, most fishes and amphibians
  - Drained by mesonephric (archinephric) duct
- Mesonephros similar to opisthonephros but mesonephros is the structure that appears during embryonic development in reptiles, birds, and mammals.
  - When it serves as an adult kidney, it is sometimes called **opisthonephros**.

FATE OF NEPHROGENIC MESODERM (RED) (BOOK FIGURE 15.8).



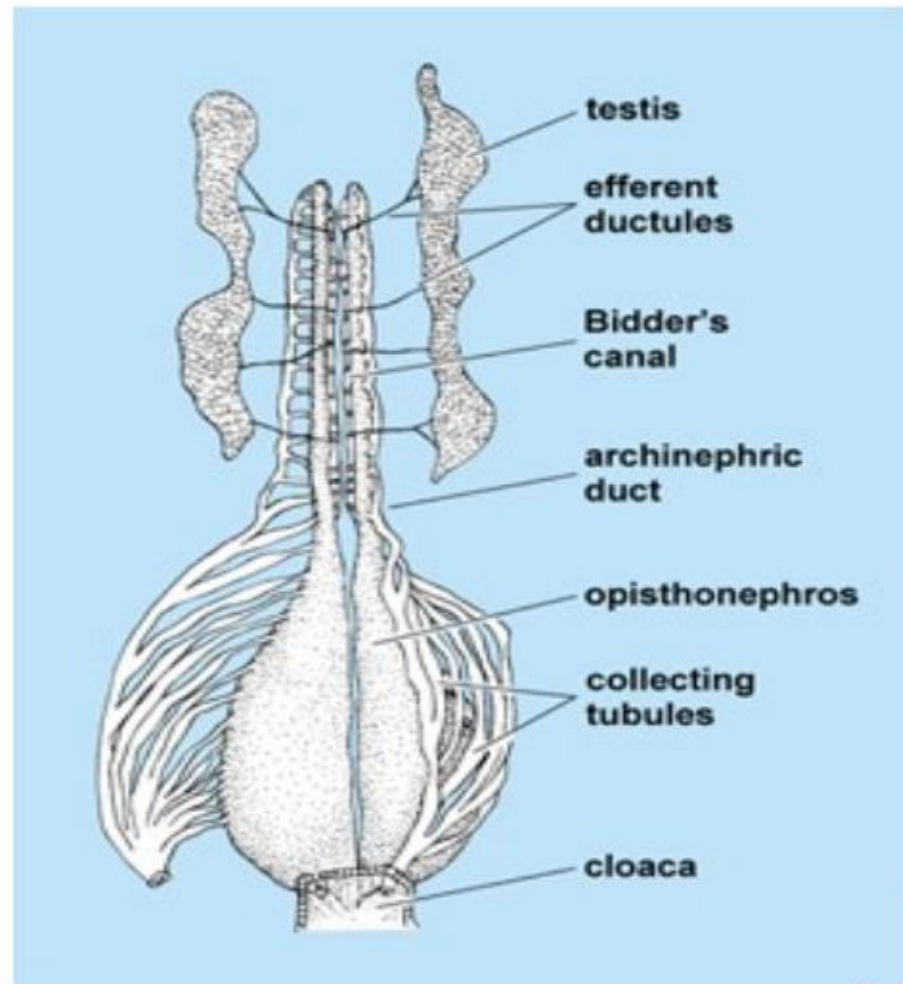
# THE ANAMNIOTE KIDNEY: *OPISTHONEPHROS*

- It is different from pronephros because it lacks segmental tubules that is exhibited by the pronephros.
- Kidney tubules and coelom are rarely connected.
- Renal corpuscles with internal glomeruli are typically present.



# THE ANAMNIOTE KIDNEY: *OPISTHONEPHROS*

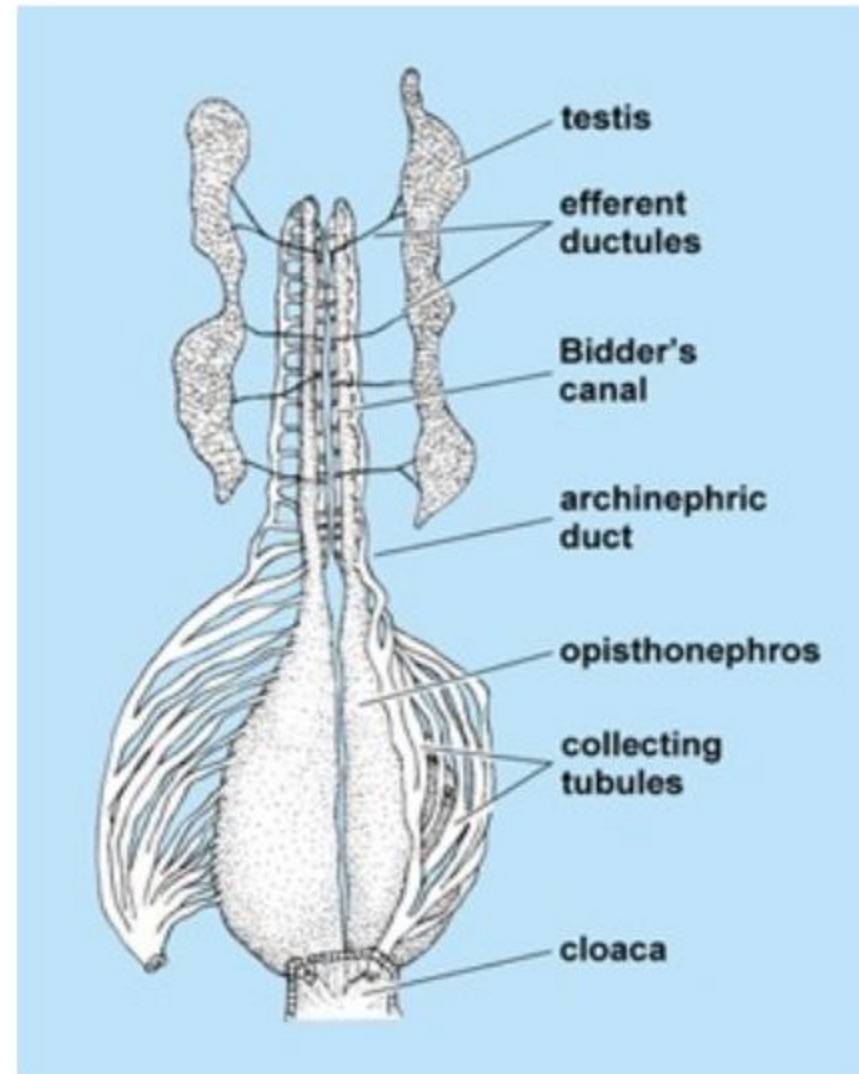
- An opisthonephric tubule has a narrow neck adjacent to the renal corpuscle.
- Neck is followed by the:
  - **collecting portions**, which joins the archinephric duct and;
  - **secretory part**, which forms the proximal and distal convoluted tubules.



Urogenital organs of male salamander,

# THE ANAMNIOTE KIDNEY: OPISTHONEPHROS

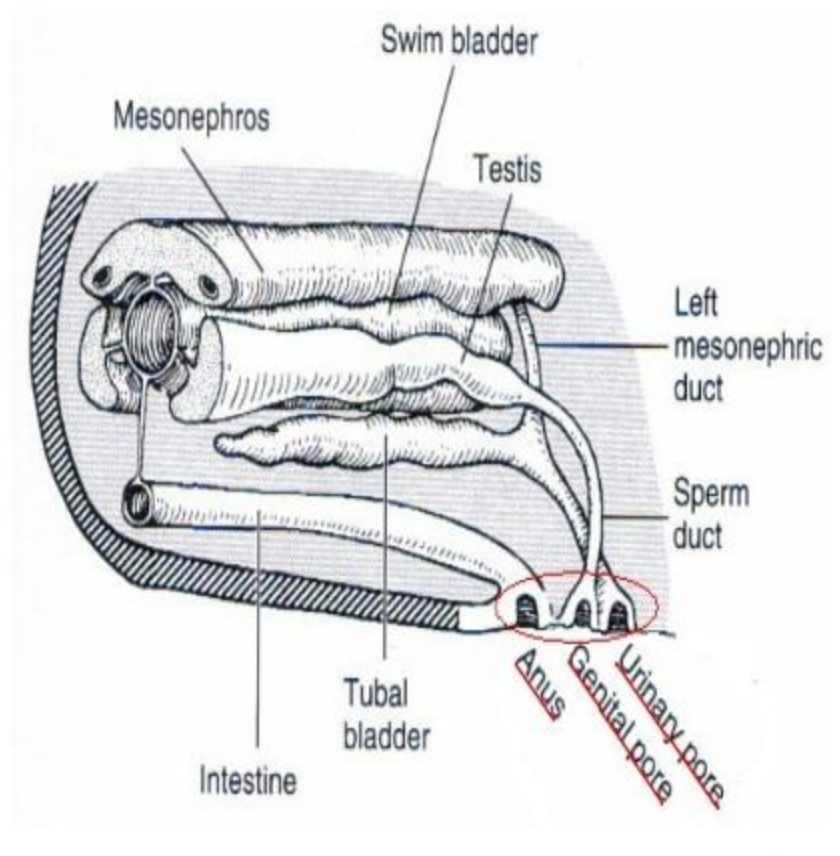
- Ureter-like duct is formed by the union of collecting ends of several collecting tubules.
- This may open into the archinephric duct or may connect independently with the cloaca.



# THE ANAMNIOTE KIDNEY: OPISTHONEPHROS

## Opisthonephric kidneys of fishes

- Males have longer kidneys than females.
- *Efferent ductules* connect the testes with the archinephric duct.
- Archinephric duct becomes the ductus deferens which serve for sperm transport.
- Female fishes have the posterior ends of their archinephric ducts enter a common **urinary sinus** inside a small **urinary papilla**.





# THE ANAMNIOTE KIDNEY: OPISTHONEPHROS

- Urinary papilla enters the cloaca in sharks.
- It opens directly to the outside in fishes without cloaca.
- Seminal vesicles and sperm sacs may develop for the temporary storage of spermatozoa.

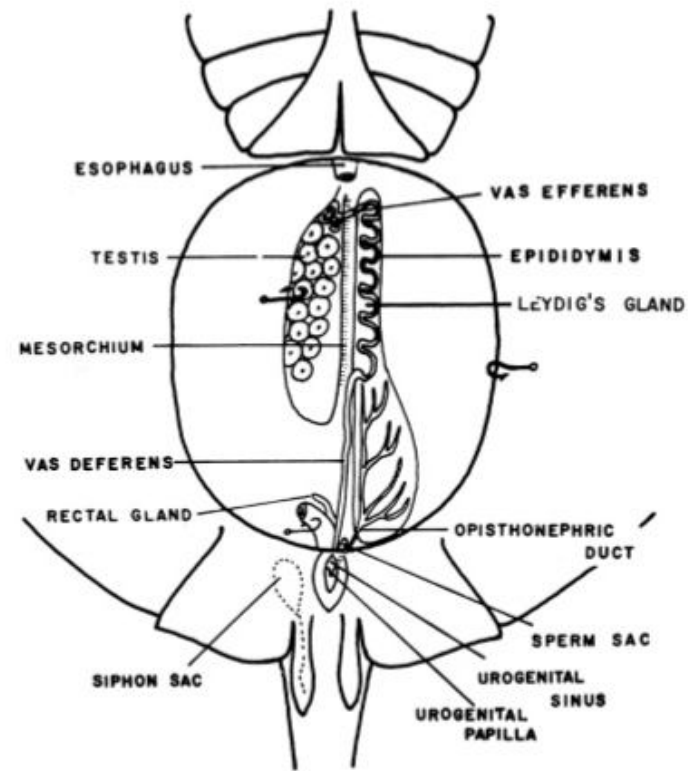
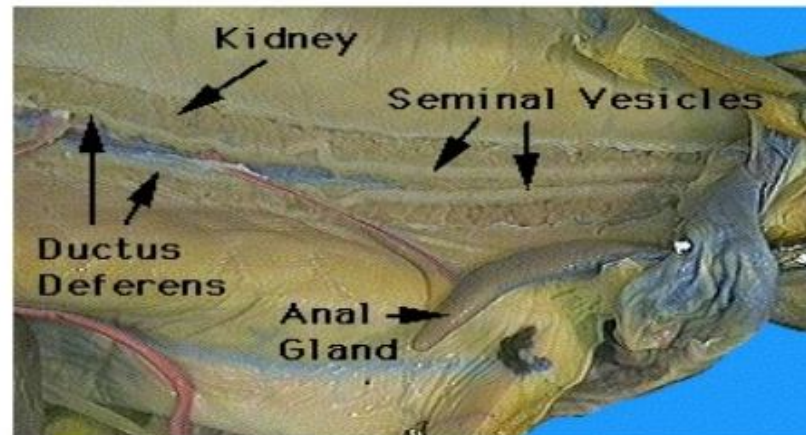


FIGURE 10. Urogenital system of male round stingray. Rectum and left testis moved to animal's side.



# THE ANAMNIOTE KIDNEY: OPISTHONEPHROS

## Opisthonephric kidneys of Anurans

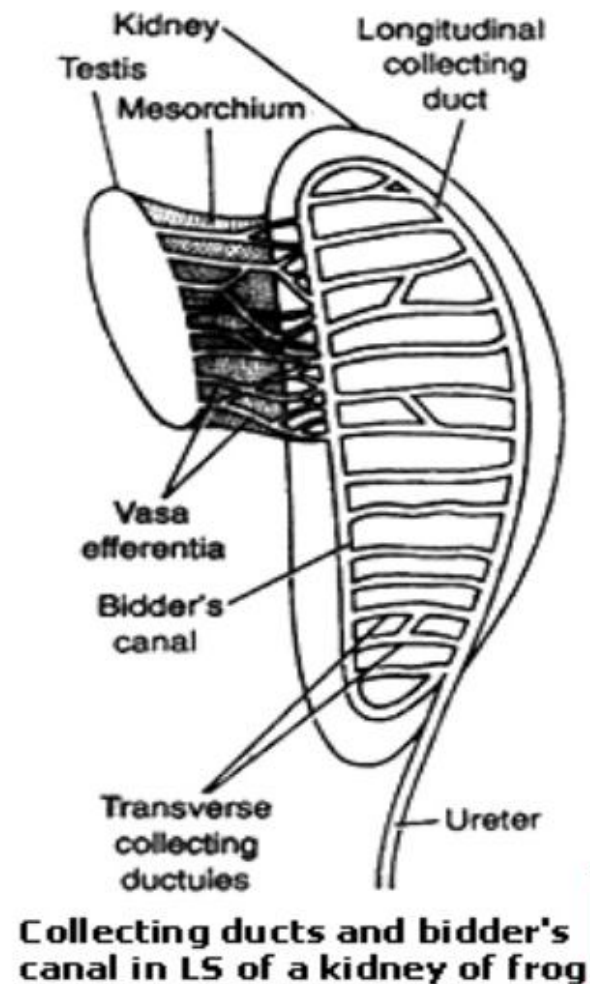
- Tubules are more concentrated on the posterior end and are confined to the posterior part of the abdominal cavity.
- Dorsally located, retroperitoneal, and dorso-ventrally flattened
- Kidneys of the females have no relation to the reproductive system.



# THE ANAMNIOTE KIDNEY: OPISTHONEPHROS

## Opisthonephric kidneys of Anurans

- In males, certain anterior kidney tubules became modified as *efferent ductules/vasa efferentia*.
  - They connect the testis with the kidney .
  - **Archinephric duct** serves to transport spermatozoa and urine.
  - **Urinary bladder** is thin-walled and serve for the temporary storage of urine.



## **REFERENCES:**

**Kent, George C & Carr, Robert K. Comparative Anatomy of the Vertebrates. *Urinogenital System.***