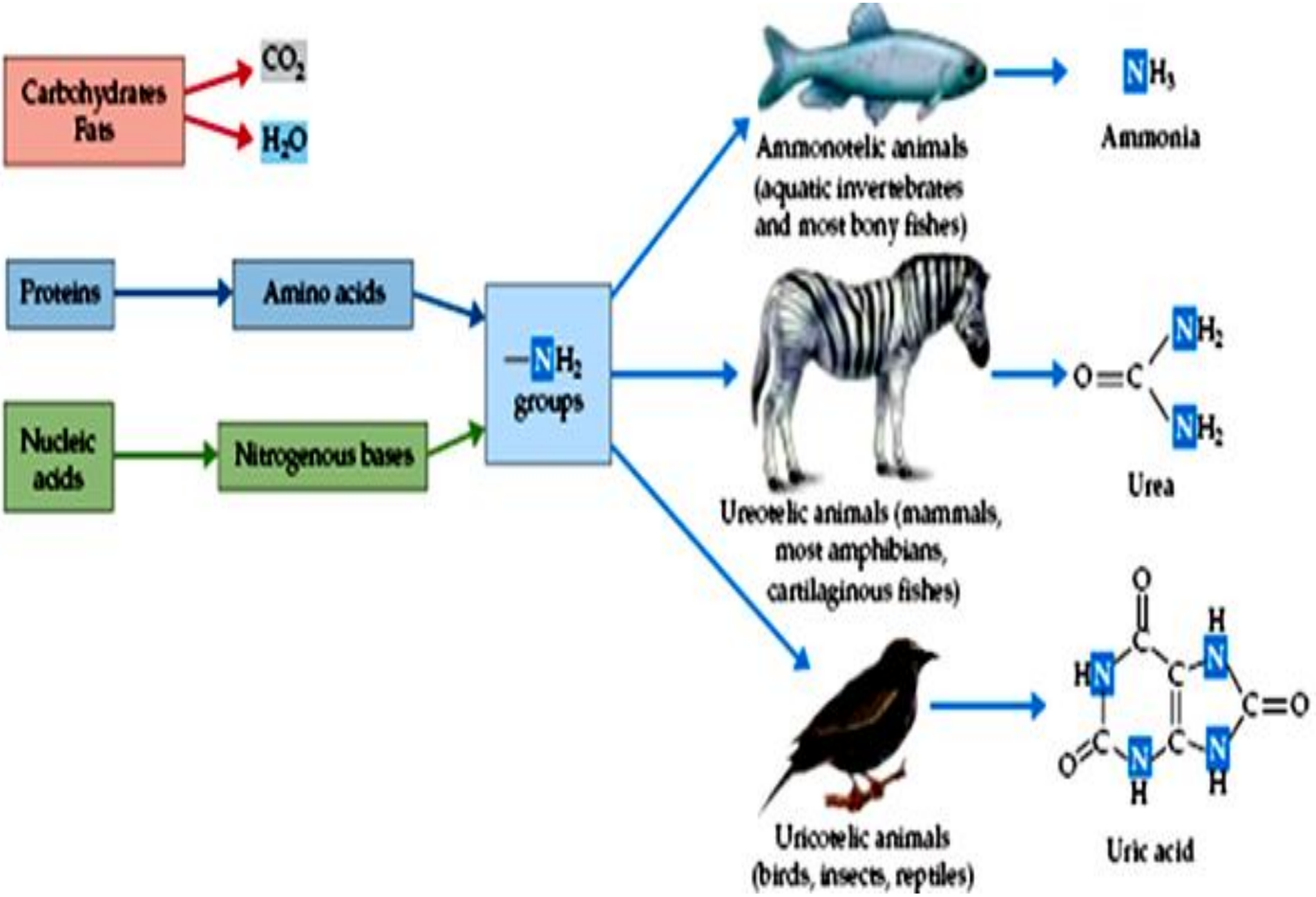
Excretory System in finfish

- *Excretory organs* control the osmolarity and the volume of blood and tissue fluid by excreting solutes that are present in excess.
- **Give out nitrogenous wastes**
- **Keep homeostatsis**
- **Balance blood pH**


Carbohydrates
Fats
CO_2
H_2O
Proteins
Amino acids
Nucleic acids
Nitrogenous bases
$-NH_2$ groups
Ammonotelic animals (aquatic invertebrates and most bony fishes)
NH_3
Ammonia
Ureotelic animals (mammals, most amphibians, cartilaginous fishes)
$O=C(NH_2)_2$
Urea
Uricotelic animals (birds, insects, reptiles)
Uric acid

	Ammonnia	Urea	Uric acid
Poisonous	High	Medium	Low
Water amount it needs	High	Medium	Low
Energy spent	Low	Medium	High
	Organisms living in water fish, amphibia	Mammals	Birds, reptiles, arthropoda

Pronephrotic kidney	Mesonephrotic kidney	Metanephrotic kidney
Composed of ciliated funnels. Blood is filtered in glomerulus and enters funnel. **Can be seen in shark.** filters wastes from the coelom (body cavity) and excretes them to the outside.	This kidney filters wastes from the blood, not the body cavity, and excretes them to the outside of the body via a pair of tubes called the mesonephric ducts (also "Wolffian ducts"). **The mesonephric kidney develop into the adult kidney of fish and amphibians.** Can also be seen in embryo of bird reptile and mammals	Can be seen in Reptile, bird and mammal. filters wastes from the blood, but excretes them to the outside through a pair of new tubes, the ureters.

Excretory organ

Chief excretory organ

- **A. Kidney**
- **B. Ureters**
- **C. Urinary bladder**
- **D. urinogenital apperture**

✓**Kidney composed of large number of kidney tubules (generally 100-10000 no.)**

✓**Each tubules known as nephron (unit of kidney)**

Part of kidney

- **i) Head kidney**
- **ii) Trunk kidney**

Type of kidney

According to Ogava(1961) marine fish kidney may divided into five types:

Type-I (Clupeidae).

Type-II (Marine catfishes and eel)

Type-III (Most common)

Type-IV (Sea horse, pipe fishes)

Type-V(Lophius)

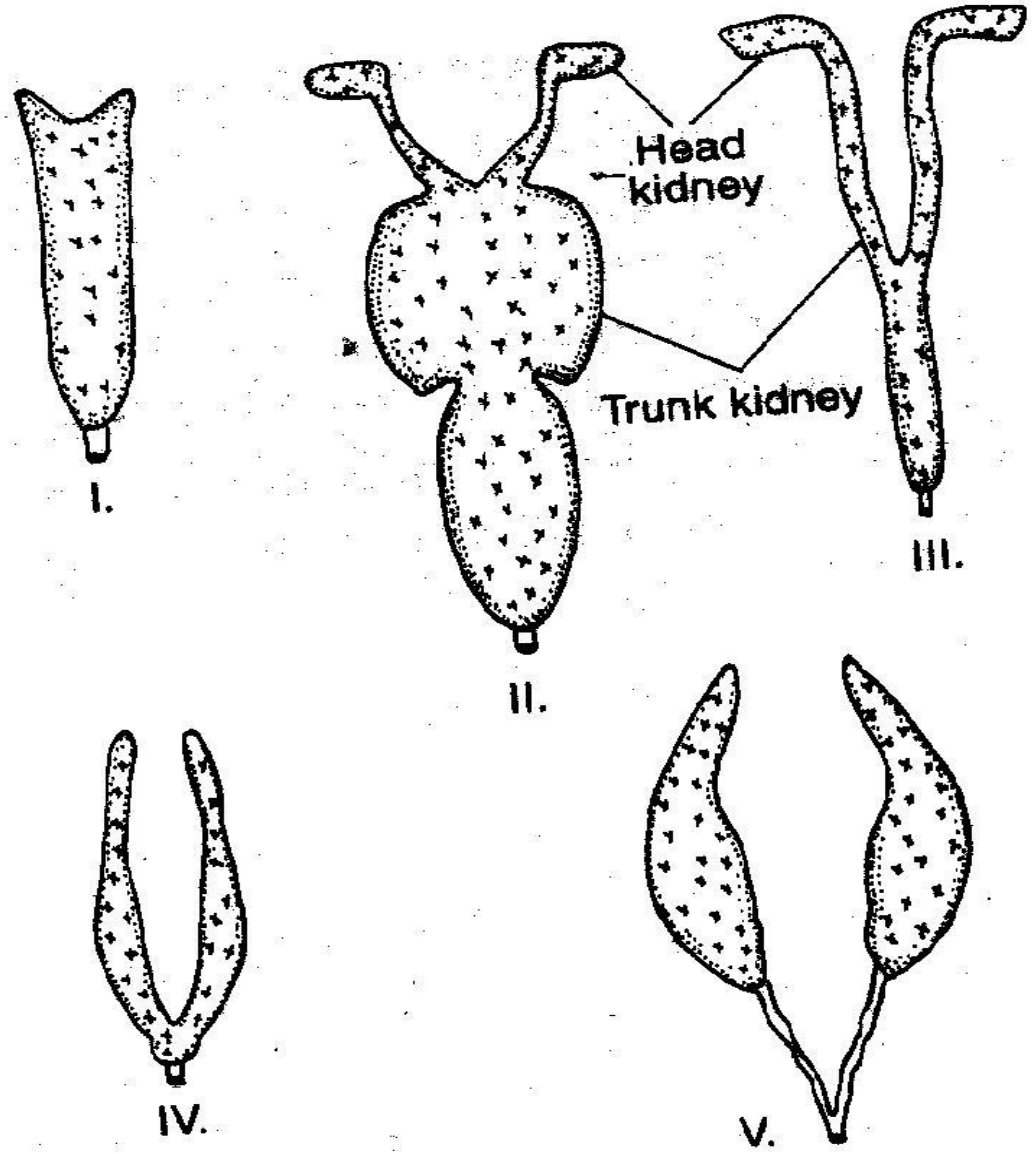
Freshwater fish kidney may divided :

Type-I (salmon, trout).

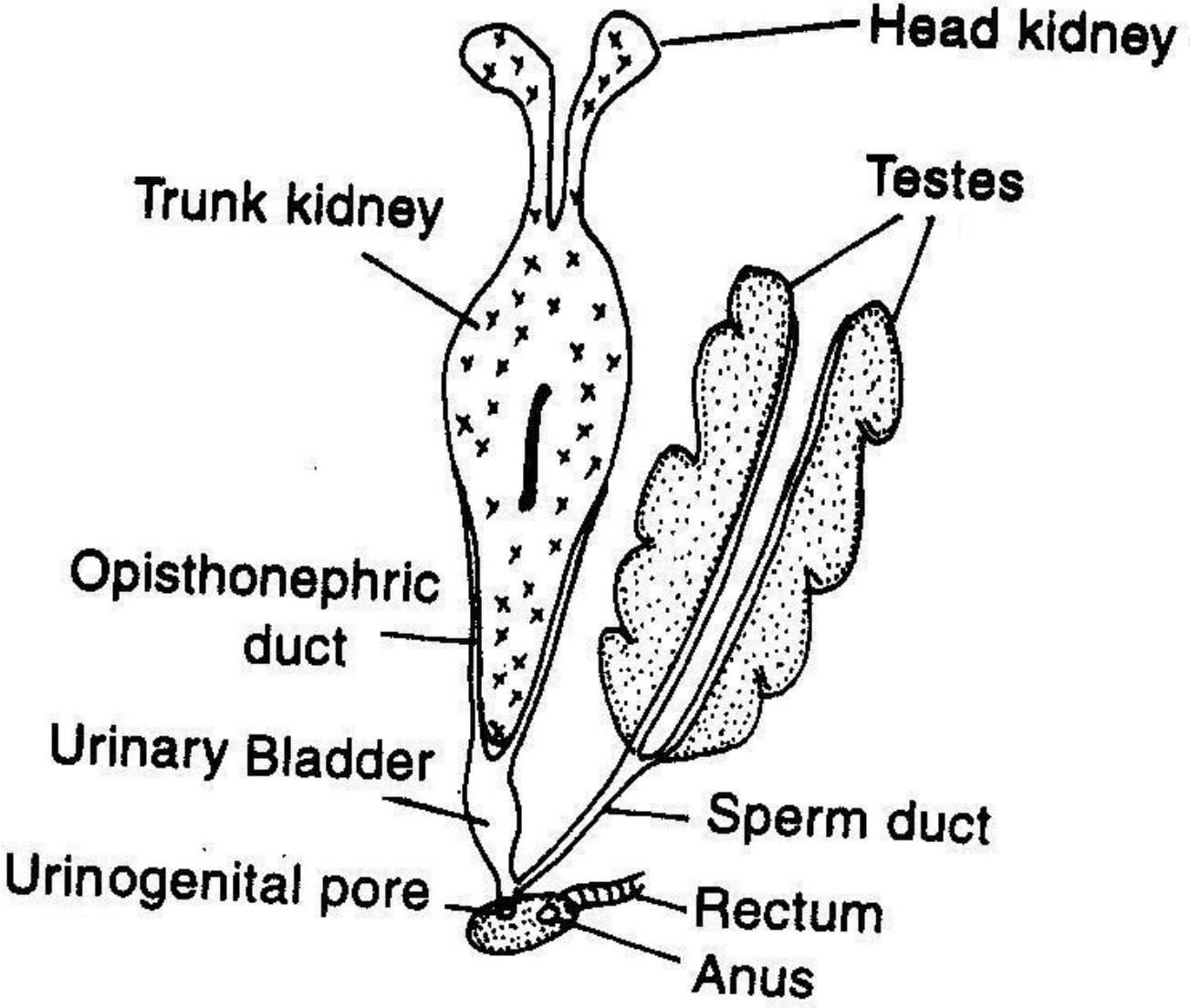
Type-II (cypridae)

Type-III (cyprinodontidae, cottidae, gasterostidae)

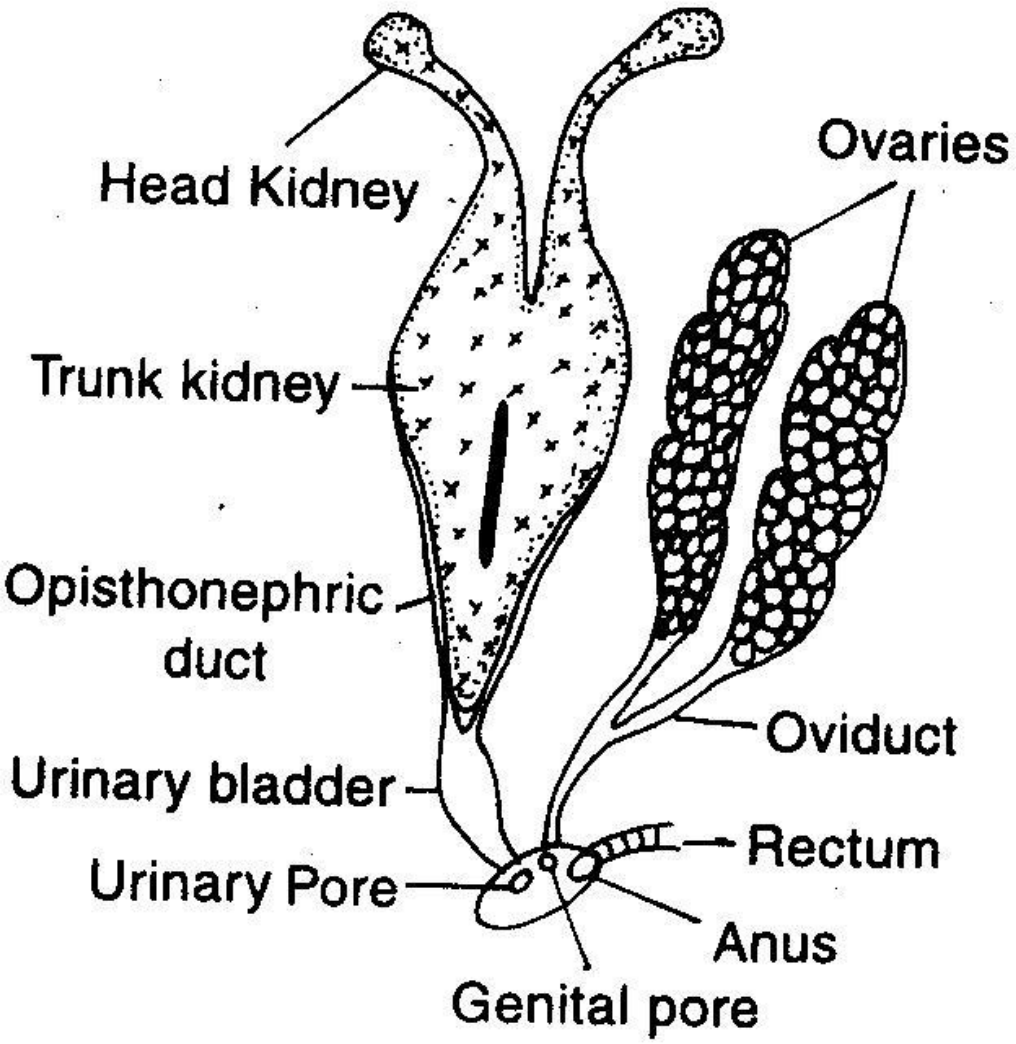
Different types of kidney in fishes



Urinogenital system in male fish



Urinogenital system in female fish



Part of a nephron

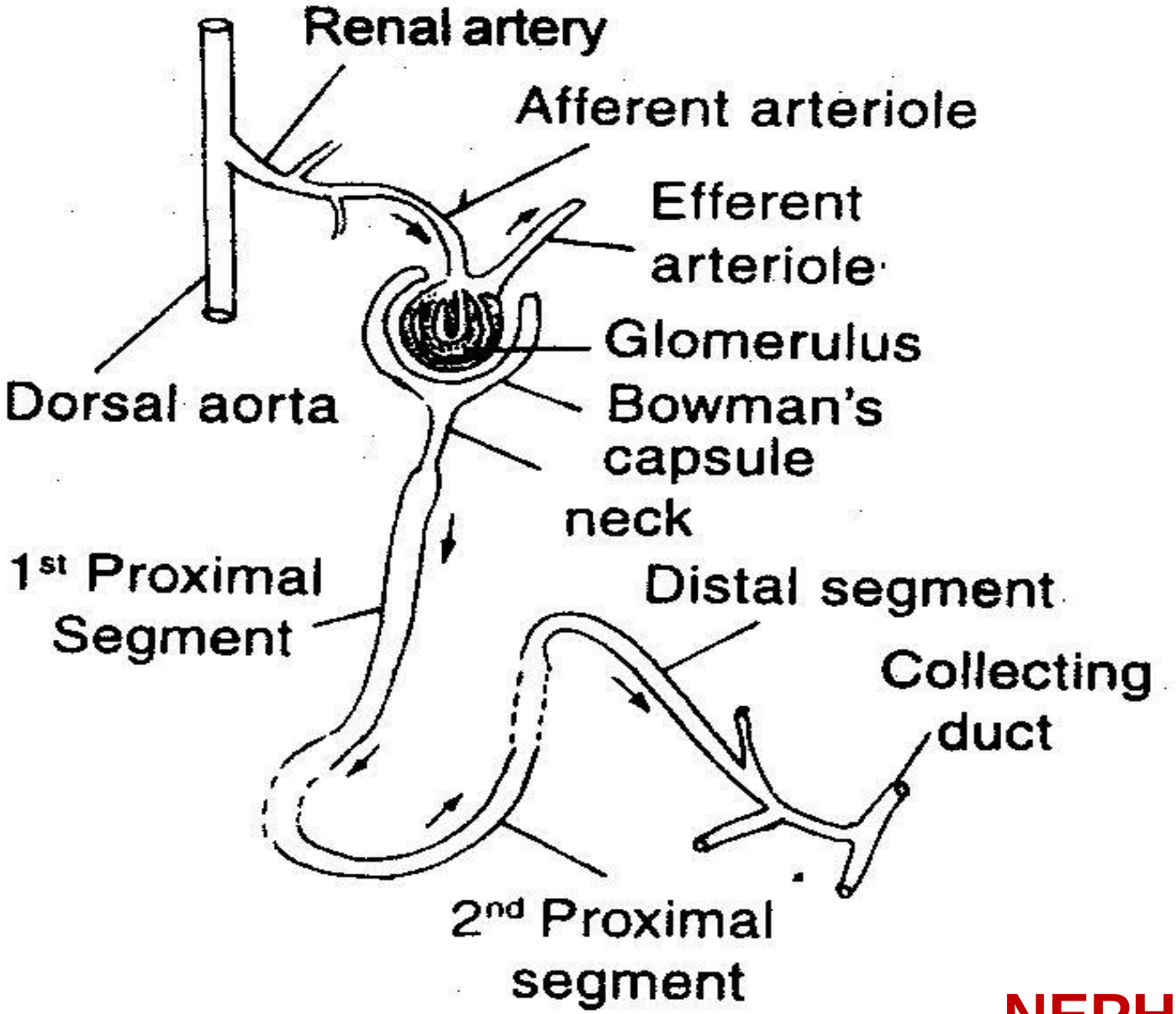
A) Renal or malpighian corpuscle

- **i) Glomerulus**
- **ii) Bowman's capsule**

B) Renal Tubules

- **i) Neck region**
- **ii) 1st proximal segment**
- **iii) 2nd proximal segment**
- **iv) Distal segment**

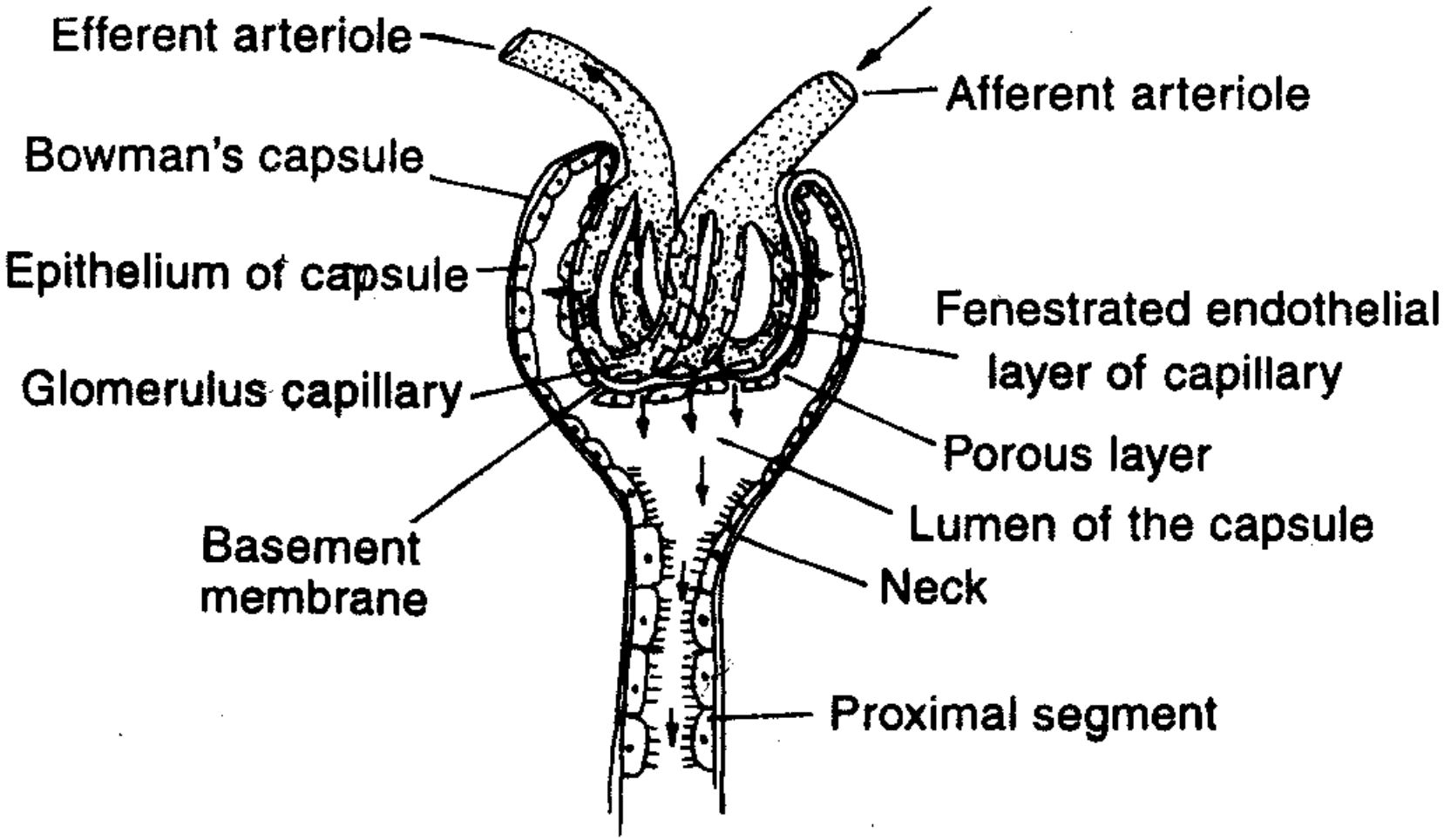
C) Collecting duct or tubules


Renal artery
Afferent arteriole
Efferent arteriole
Glomerulus
Dorsal aorta
Bowman's capsule
neck
1st Proximal Segment
Distal segment
Collecting duct
2nd Proximal segment

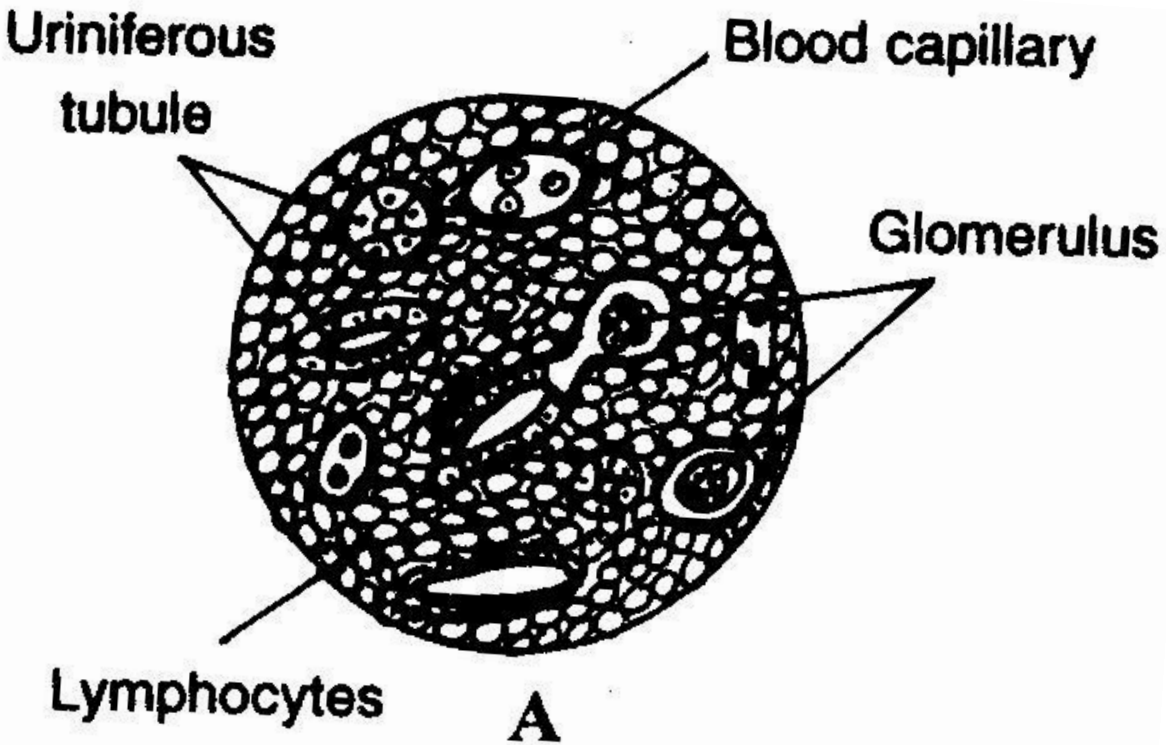
NEPHRON

Renal or malpighian corpuscle

i) Glomerulus
ii) Bowman's capsule

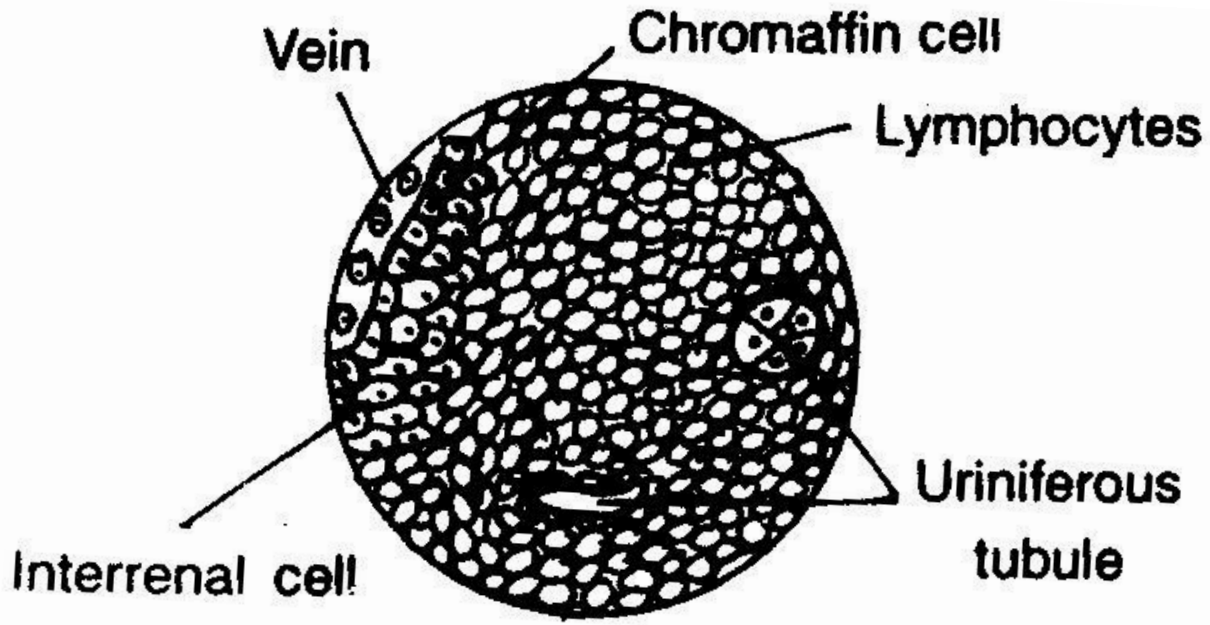


Trunk Kidney consist of large number of (100-10000) of tubular nephrons each of which produce urine. Each tubule consist of renal corpuscles while intracellular sapce is full of lymphoid tissue function



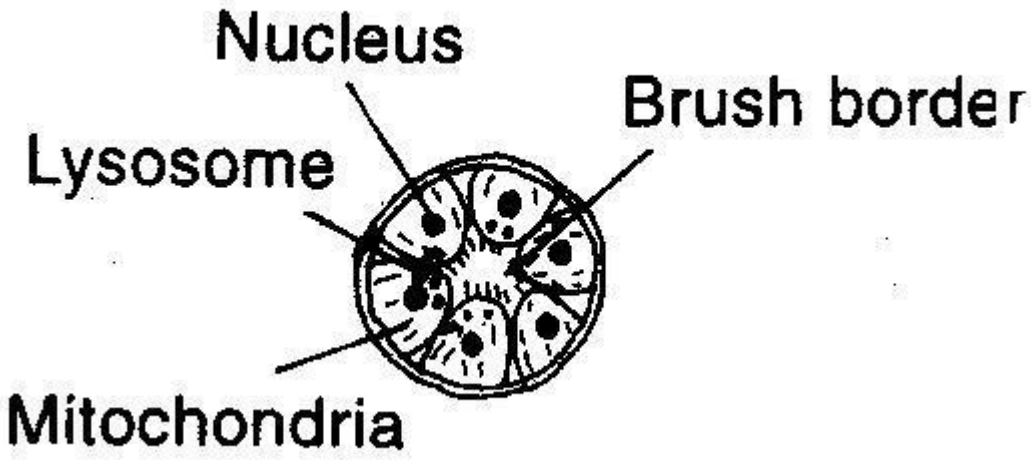
T.S. Trunk Kidney,

Head Kidney composed of lymphoid tissue, haematopoietic, interrenal and chromaffin tissue. Few nephrons may seen in some species but renal corpuscles are absent, so it is not excretory in function

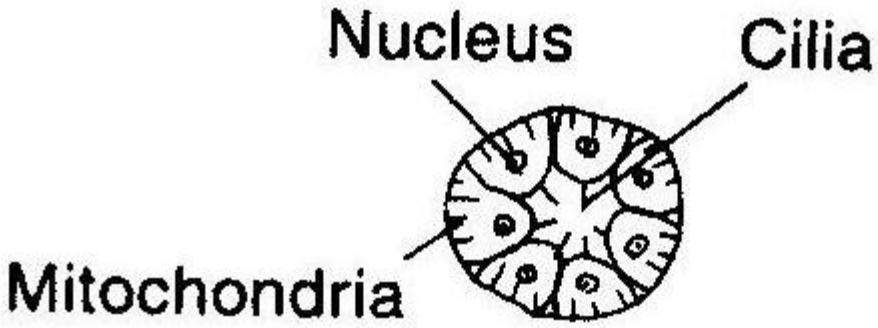


B

T.S. Head Kidney.



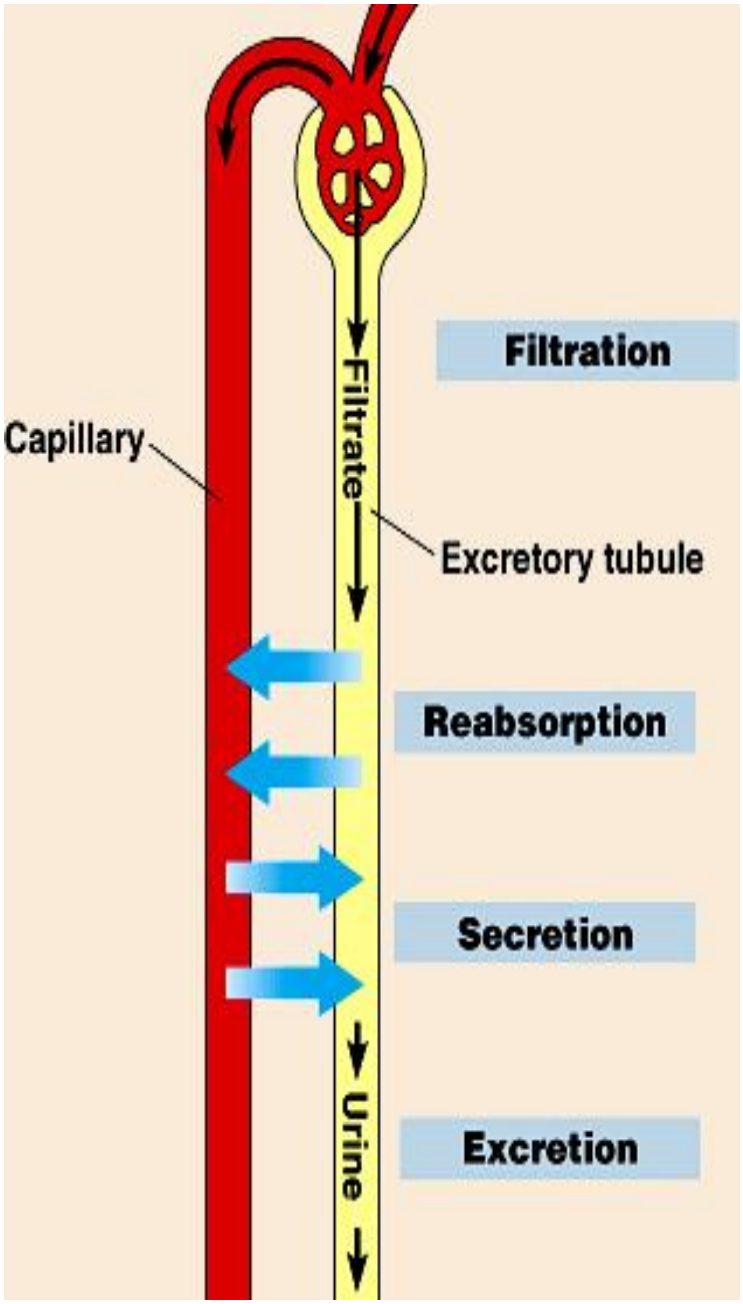
T. S. proximal segment



T. S. distal segment

Excretory Systems

- Dispose of metabolic wastes
- Regulate solute concentrations in the body
- Transport epithelia arranged in tubes
- 4 major processes
  1. Filtration, pressure-filtering of body fluids producing a filtrate (water, salts, sugars, amino acids, N-wastes)
  2. Reabsorption, reclaiming valuable solutes (glucose, salts, amino acids) from the filtrate
  3. Secretion, addition of larger molecules like toxins and other excess solutes from the body fluids to the filtrate
  4. Excretion, the filtrate leaves the system



Function of excretory system

Kidney:

i) To remove excess salt and water

ii) To produce and remove urine which contain creatin, creatinine nitrogenous compound and urea

iii) Uric acid

iv) In marine fishes kidney remove Mg and sulphate ions and TMAO

Gill:

i) Ammonia

ii) CO_2

iii) urea