Excretion and osmoregulation

Excretory products and their elimination

Lecture 3

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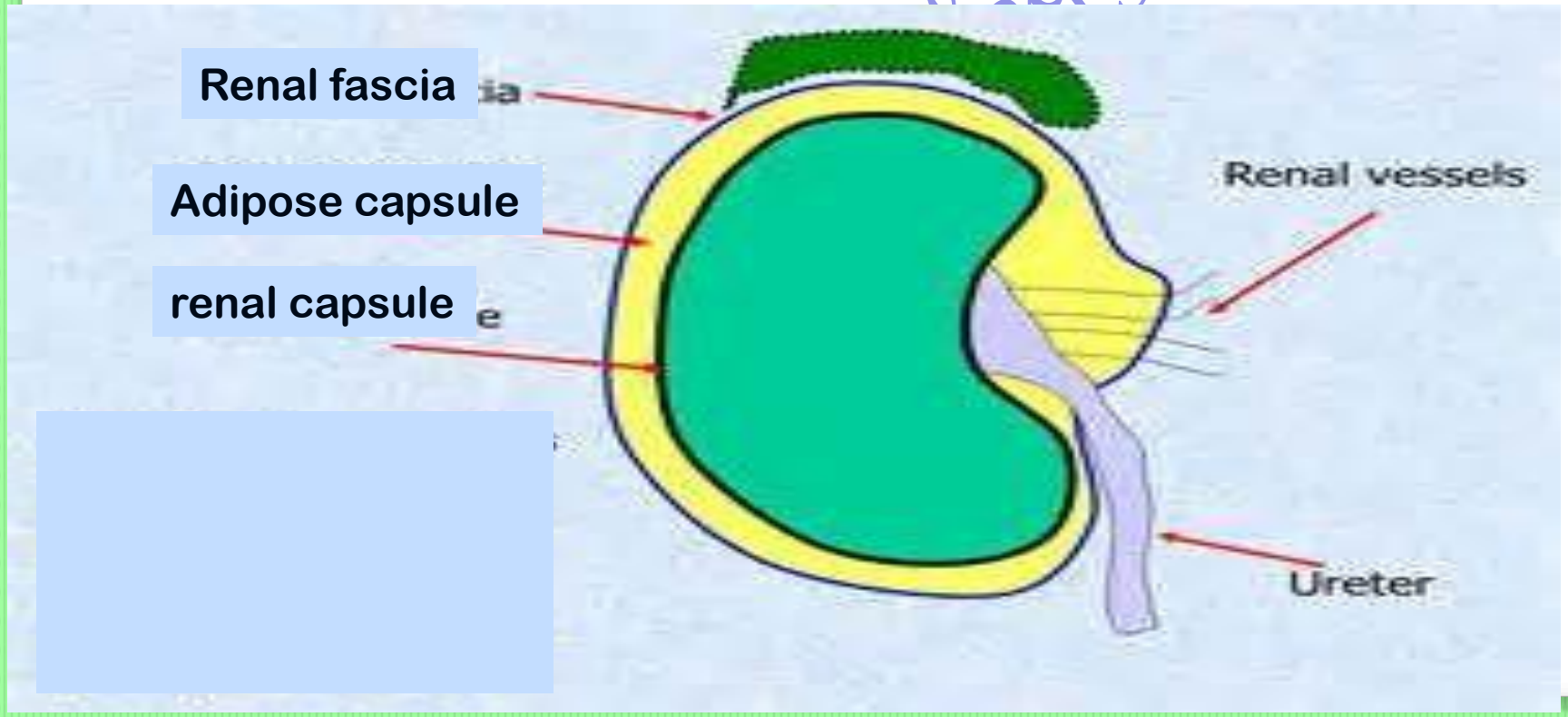
Covering of kidney – 3 layer

1. Outer wall- renal fascia –fibrous connective tissue
2. Middle wall- adipose capsule - fatty tissue
3. Inner wall – renal capsule-
   smooth transparent fibrous membrane



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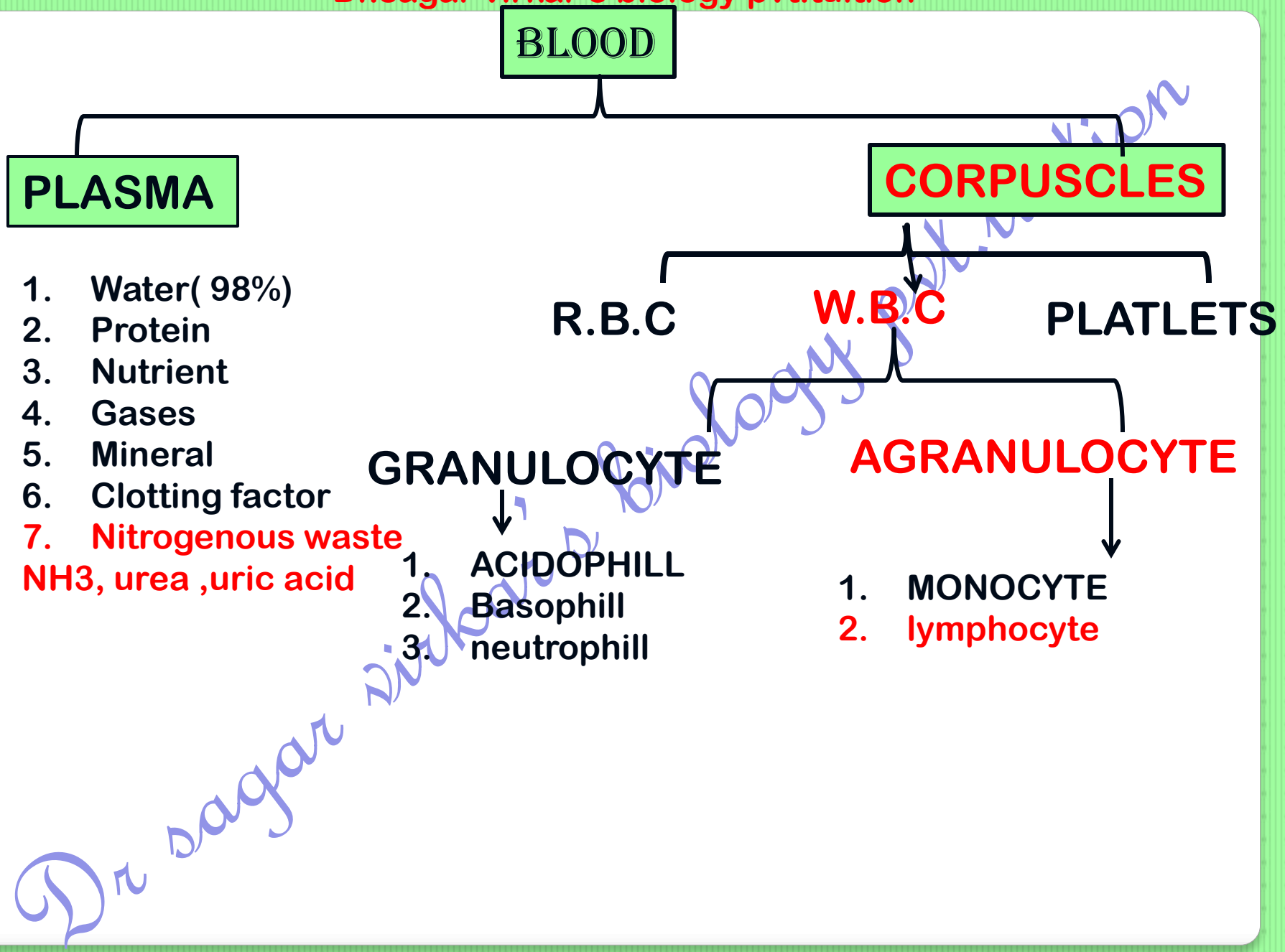

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Nephron

Nephrons are highly coiled ,complex tubular , **structural and functional unit of kidney**

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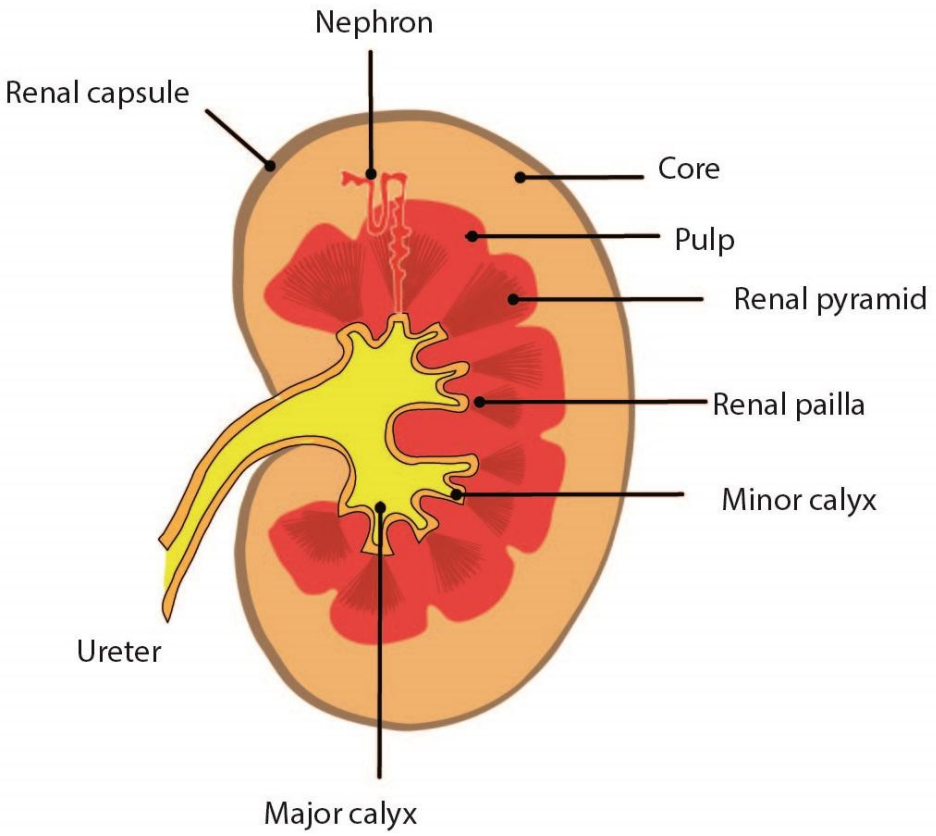

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Number

Nearly 1 million nephron in each kidney

length

4-6 cm renal tubule

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Parts of nephron

glomerulus

⇩

Tuft of capillary

Renal tubule

⇩

1. Bowman's capsule
2. neck
3. PCT –proximal convoluted tubule
4. LOH –loop of henle
5. DCT- distal convoluted tubule
6. CT –collecting tubule

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Renal tubule

René =kidney
tubule = tube like structure

Its highly coiled long tube
Its wall is made up of single layer of epithelial cells

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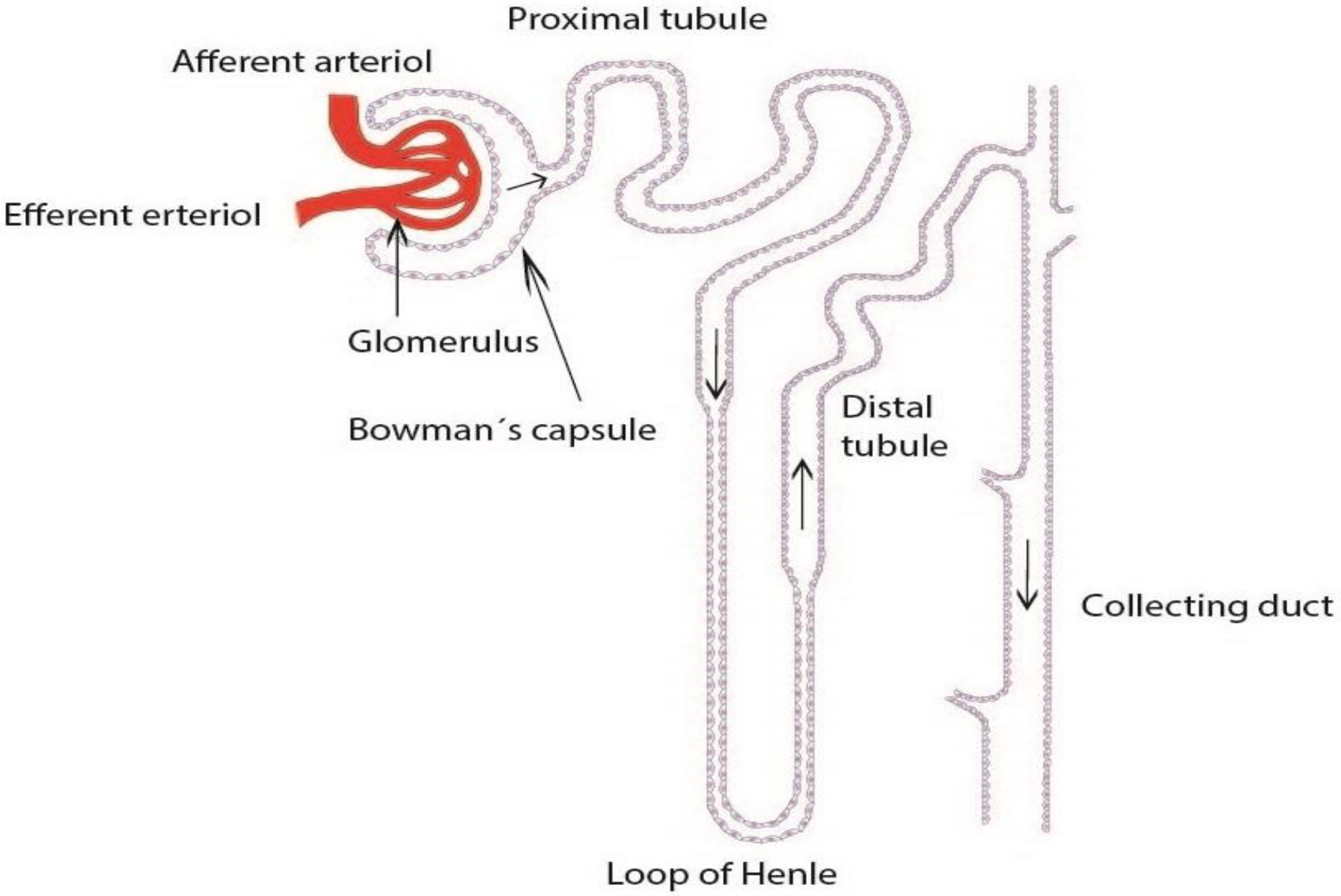
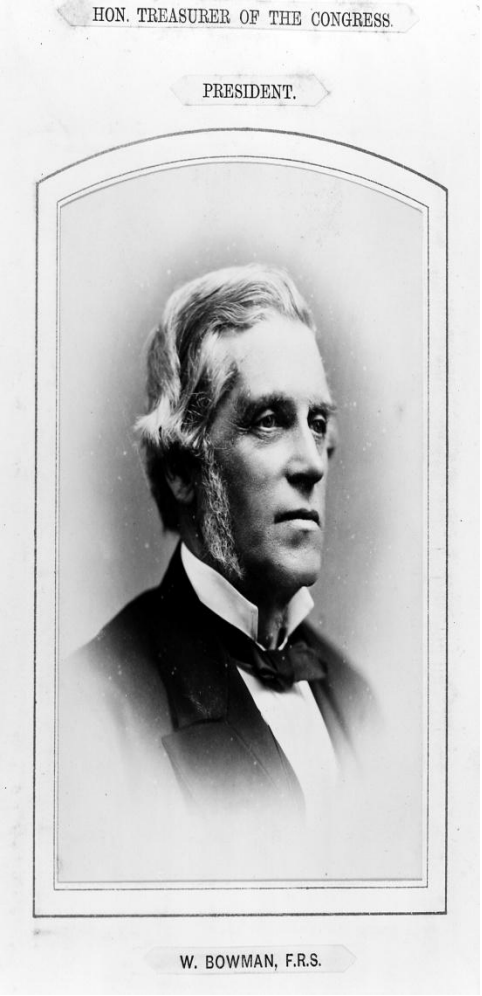

Proximal tubule
Afferent arteriol
Efferent erteriol
Glomerulus
Bowman´s capsule
Distal tubule
Collecting duct
Loop of Henle

1. bowman's capsule

Its named after sir William bowman [1816-1892] ,British surgeon and anatomist



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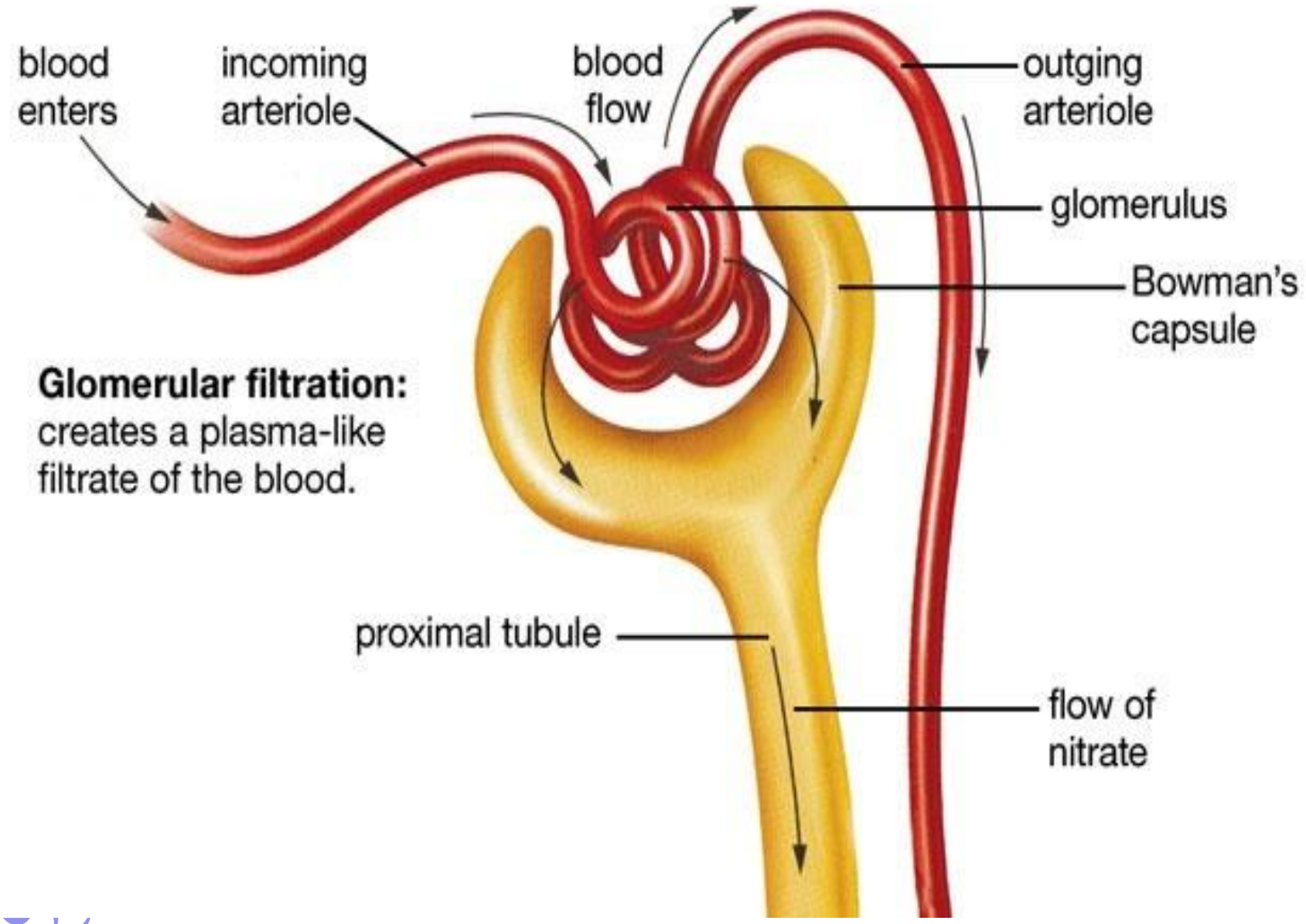
blood enters
incoming arteriole
blood flow
outging arteriole
glomerulus
Bowman's capsule
Glomerular filtration:
creates a plasma-like filtrate of the blood.
proximal tubule
flow of nitrate

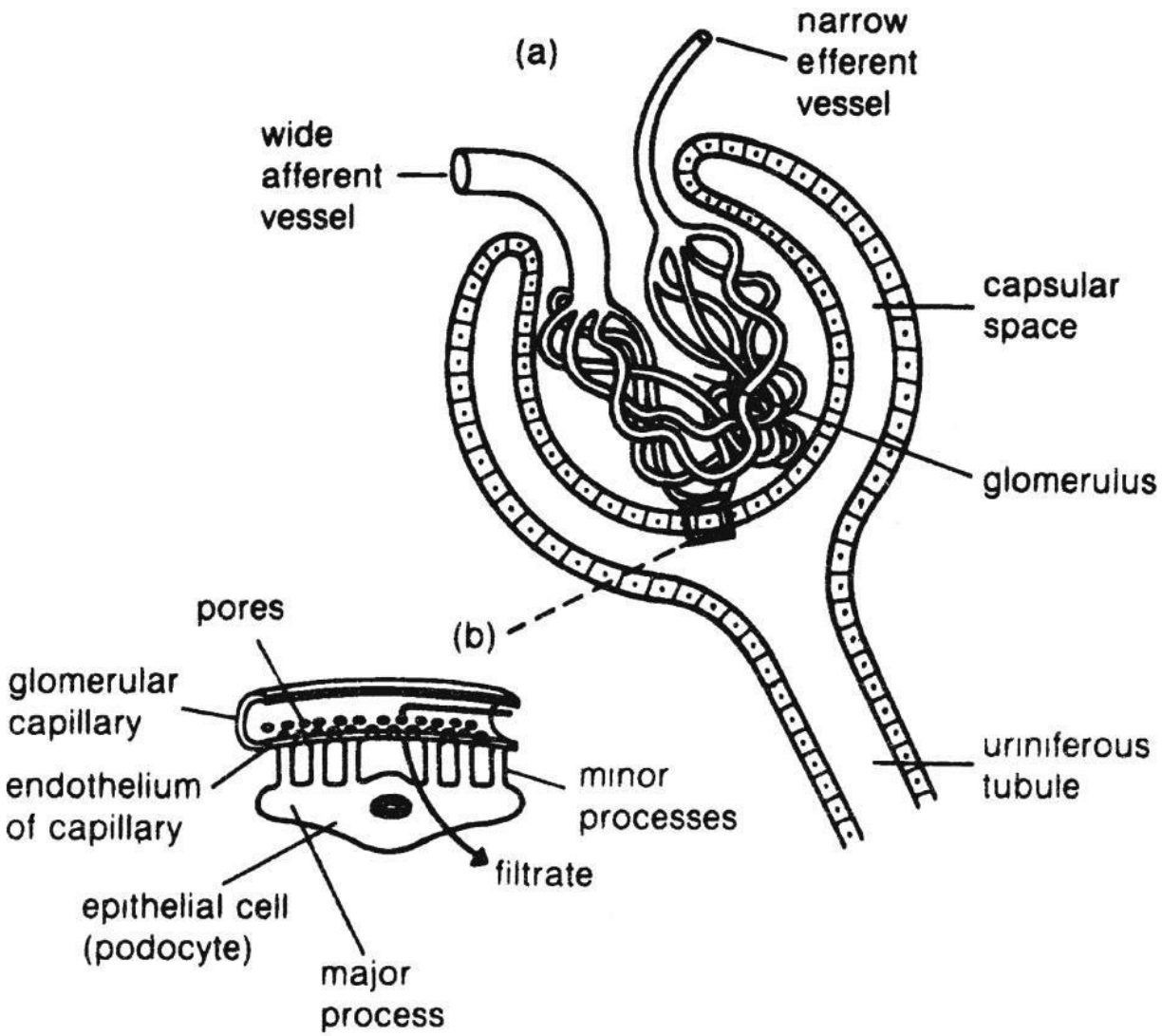

Fig. 79 **Bowman's capsule.** (a) The capsule is a small sac at the end of a kidney nephron. (b) An enlarged section of the uriniferous tubule.

Bowman's capsule

It's cup like structure having double wall

Both walls are composed of squamous epithelium

1. Outer wall- parietal layer
2. Inner wall- visceral layer
3. Space between them- capsular space / urinary space

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Visceral wall made up of special type of squamous epithelium called PODOCYTE

PODOCYTE
Podo – leg cyte - cell

It having foot like process/ pedicel

These podocytes are in close contact with the walls of capillaries of glomerulus

Gaps between these podocytes are called filtration slit

Function -to filter blood

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neck – 1.it's narrow portion connecting Bowman's capsule with PCT
2.it is lined by ciliated epithelium
3. lumen /cavity of neck is called urinary pole
Function- to move filtrate forward

PCT –proximal convoluted tubule –

1.highly coiled
2.internally lined by cuboidal cells with brush border/microvilli
3. lumen –narrow
4.Due to high convolutions /coiling filtrate flows slowly and remains in the pct For longer duration

Function- selective reabsorption
maximum useful molecule are reabsorbed

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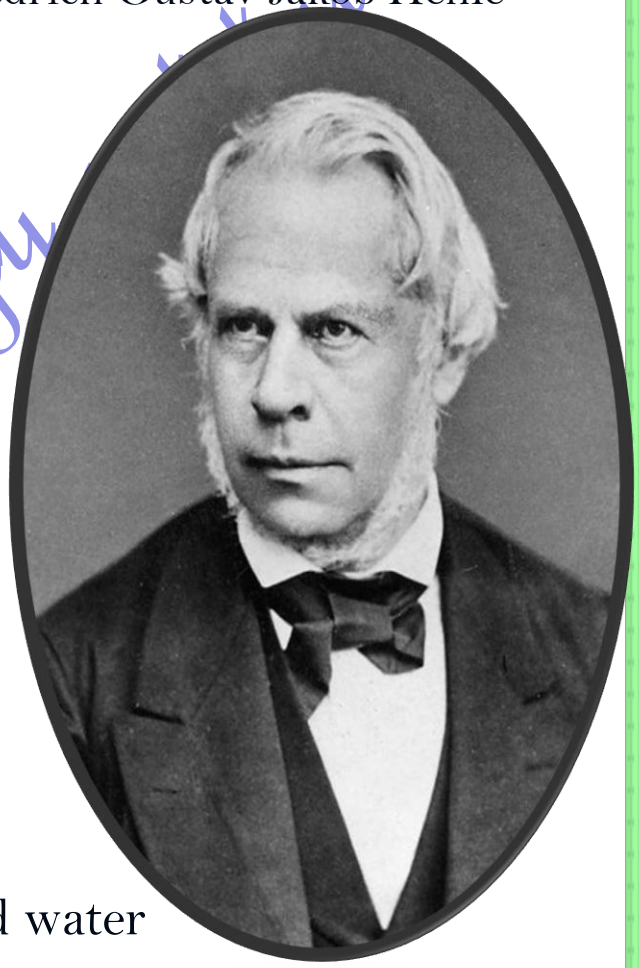
Loop of henle

Its named after it's discover the German anatomist Friedrich Gustav Jakob Henle



Function of LOH –

1. Counter current system
2. OSMOREGULATION- regulation of salt and water

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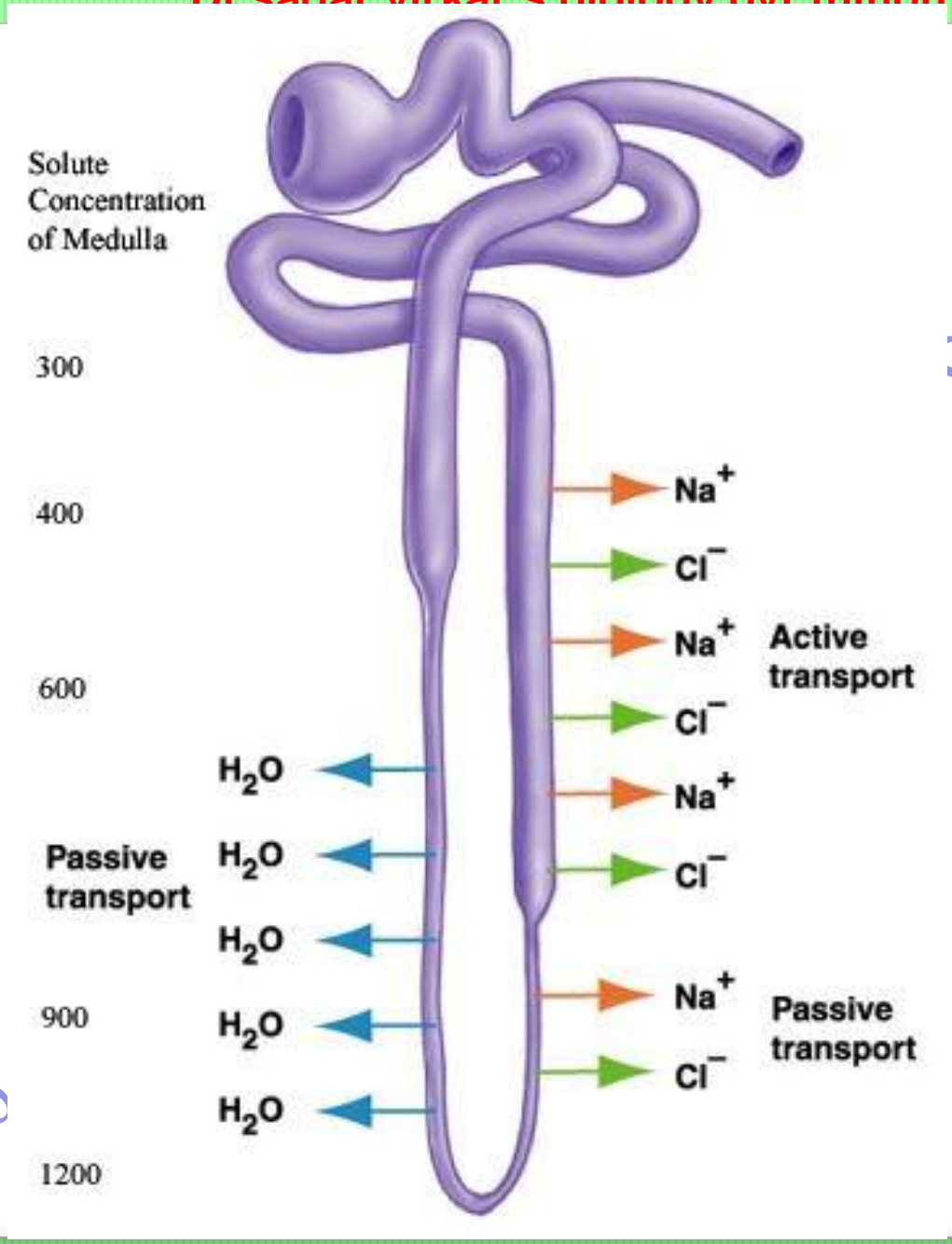

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LOH –loop of henle –

1. 'U' shaped
2. parts – A] Descending limb
   B] Ascending limb

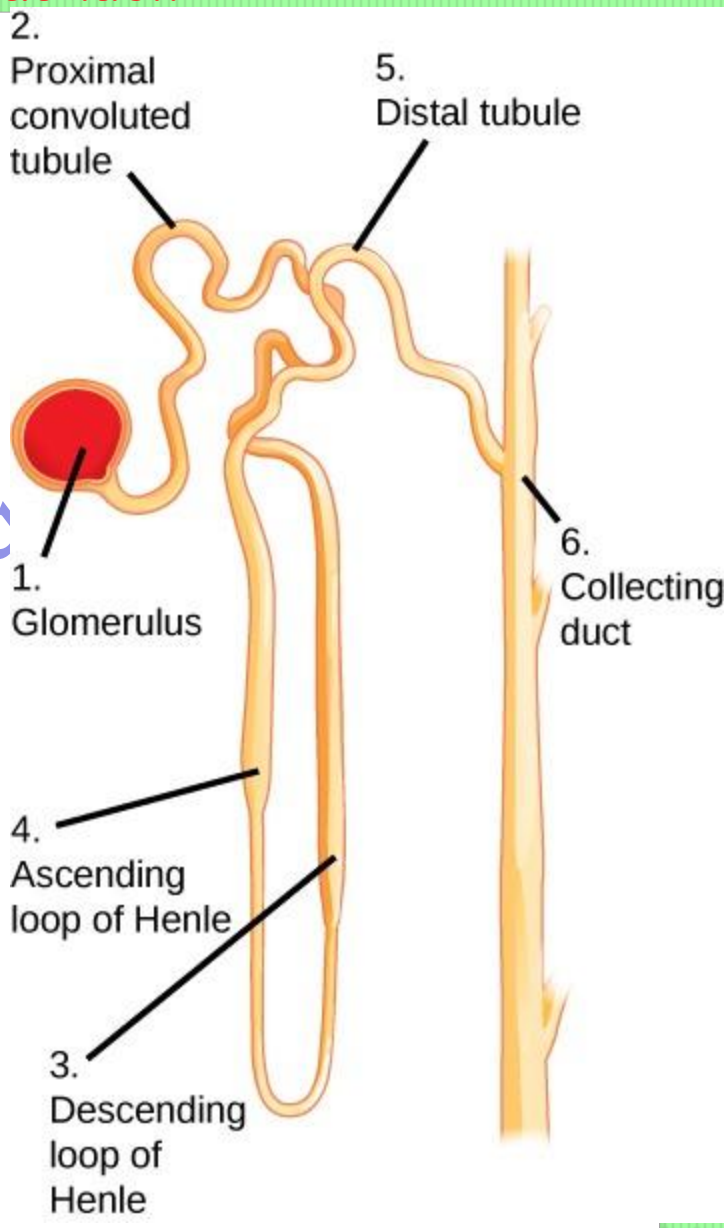
It's surrounded by capillaries called vasa recta

Descending limb –

1. Downward direction
2. Thin walled
3. Permeable to water
4. Impermeable to solute
5. Simple squamous epithelium

Ascending limb –

1. Upward direction
2. Thick walled
3. Permeable to solute
4. Impermeable to water
5. Simple cuboidal epithelium



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DCT –distal convoluted tubule –

1.less coiled
2.internally lined by simple cuboidal cells
3. lumen –broad

Function of DCT –

1. tubular secretion / augmentation /active secretion -wastes are taken up from surrounding capillaries and secreted into passing urine
2. It helps in water reabsorption and regulation of PH of body fluid

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CT –collecting tubule –

1.it is short ,straight part of DCT
2. ct opens to collecting duct /CD

Function of CT –

To reabsorb water and secret proton

