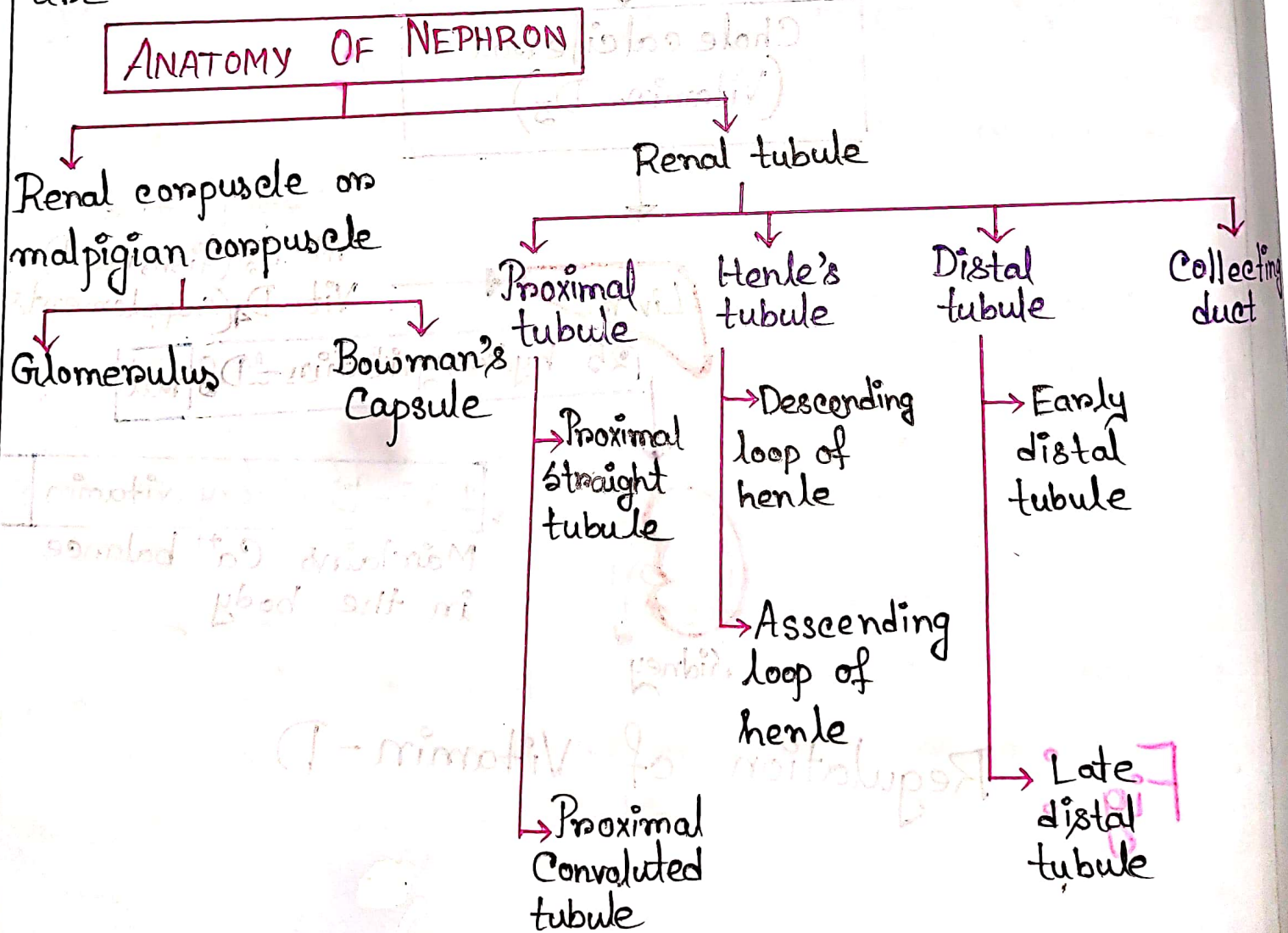
day, our bodies would begin to ... the amino acid in the protein we intake. This process is known as gluconeogenesis.

So, when the kidneys are damaged, this function is crippled, and this can cause death within a few days.

Nephron

DEFINITION Nephron is the microscopic structural and functional unit of kidney.

In an adult healthy person 1.5 millions nephrons are present in each kidney. The anatomical structure of nephron are ——



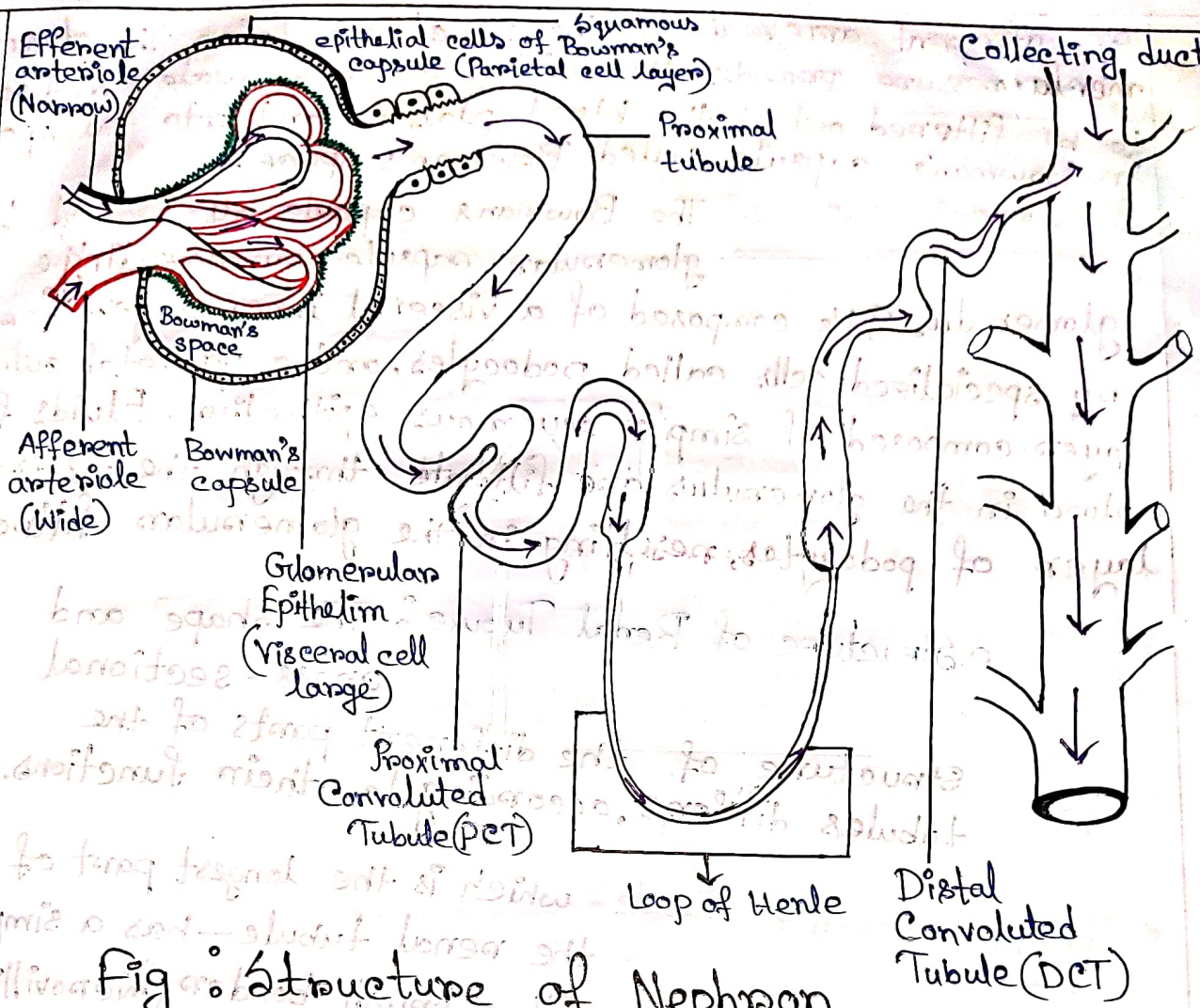


Fig: Structure of Nephron

Structure of Nephron:

Renal Corpusle: The renal corpusle is the site of the filtration of blood plasma. The renal corpusle consists of the glomerulus, and the glomerular capsule or Bowman's capsule. The renal corpuscle has two types/poles — a vascular pole and a urinary pole.

- **Glomerulus:** The glomerulus is the network known as a tuft, of filtering capillaries located at the vascular pole of the renal corpuscle in Bowman's capsule. Each glomerulus recieves its blood supply from

an afferent arterial of the renal circulation. The glomerular blood pressure provides the driving force for water and solutes to be filtered out of the blood plasma and into the space in Bowman's capsule called Bowman's space.

- Bowman's capsule: The Bowman's capsule also called the glomerular capsule, surrounds the glomerulus. It's composed of a visceral inner layer formed by specialized cells called podocytes, and a parietal outer layer composed of simple squamous epithelium. Fluids from blood in the glomerulus are filtered through the visceral layer of podocytes, resulting in the glomerular filtrate.

- Structure of Renal Tubule: The shape and cross-sectional structure of the different parts of the tubules differs, according to their functions.

- Proximal convoluted Tubule: which is the longest part of the renal tubule—has a simple tall cuboidal epithelium, with a brush border (microvilli). The epithelium almost fills the lumen and the microvilli increases the surface area by 30-40 fold.

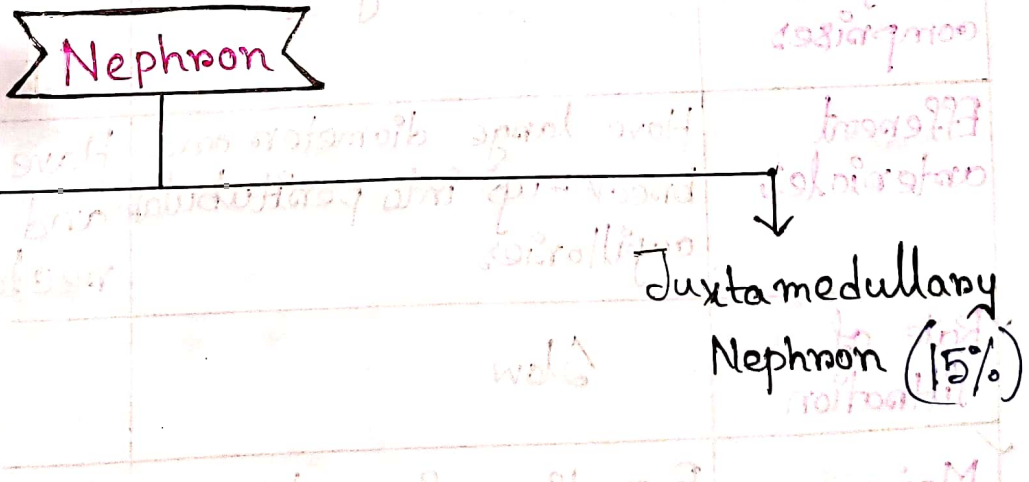
- Loop of Henle: This has a thick descending portion (pars recta), a thin descending portion, a thin ascending portion, and a thick ascending portion.
  - The lumen is made up of simple squamous epithelium.
  - This part of the nephron is hard to tell apart from adjacent capillaries, expect that there are no red blood cells in the lumen.

- **Distal Convoluted tubule:** These tubules are less numerous than the proximal convoluted tubules. The epithelium cells are cuboidal, with very few microvilli. The cells stain more palely than those of the proximal convoluted tubule
- **Collecting tubules:** Collecting tubules are not part of the nephron. The epithelium of these tubules consists of cuboidal or columnar cells. They empty into collecting ducts that are easy to recognize, because they have large lumen, with pale staining columnar epithelium.

Collecting tubules have two main functions:

1. Resorb water in response to the hormone vasopressin.
2. Resorb sodium in response to the hormone aldosteron.

Q. TYPES OF NEPHRON: There are 2 types of nephron.



Q. Write the distinguise between Cortical nephron and juxtamedullary nephron

Feature	Cortical nephron	Juxtamedullary nephron
Location of glomerulus	Upper region of cortex	Near junction of cortex and medulla.
Percentage of total nephron	85%	15%
Size of glomeruli	Small	Large
Size of loop of Henle	Small, extend upto outer layer of medulla	Large, extend deep into the medulla
Descending limb of loop of Henle comprises	Thin segment	Thick segment
Ascending limb of loop of Henle comprises	Thick segment	Thin segment
Efferent arterioles	Have large diameter and break-up into peritubular capillaries	Have small diameter and continue as vasa recta
Rate of filtration	Slow	High
Major function	Excretion of waste products in urine	Concentration of urine by countercurrent system

Q. Write the structure of Juxtaglomerular apparatus.

Juxtaglomerular apparatus: The JA is part of the kidney nephron, next to the glomerulus. It's found between afferent arteriole and the distal convoluted tubule of the same nephron. This location is critical to its functional in regulating renal blood flow and glomerular filtration rate.

▶ The juxtaglomerular apparatus consists of three types of cells:

- The macula densa, a part of the distal convoluted tubule of the same nephron
- Juxtaglomerular cells, (also known as granular cells) which secrete renin.
- Extraglomerular mesangial cells.

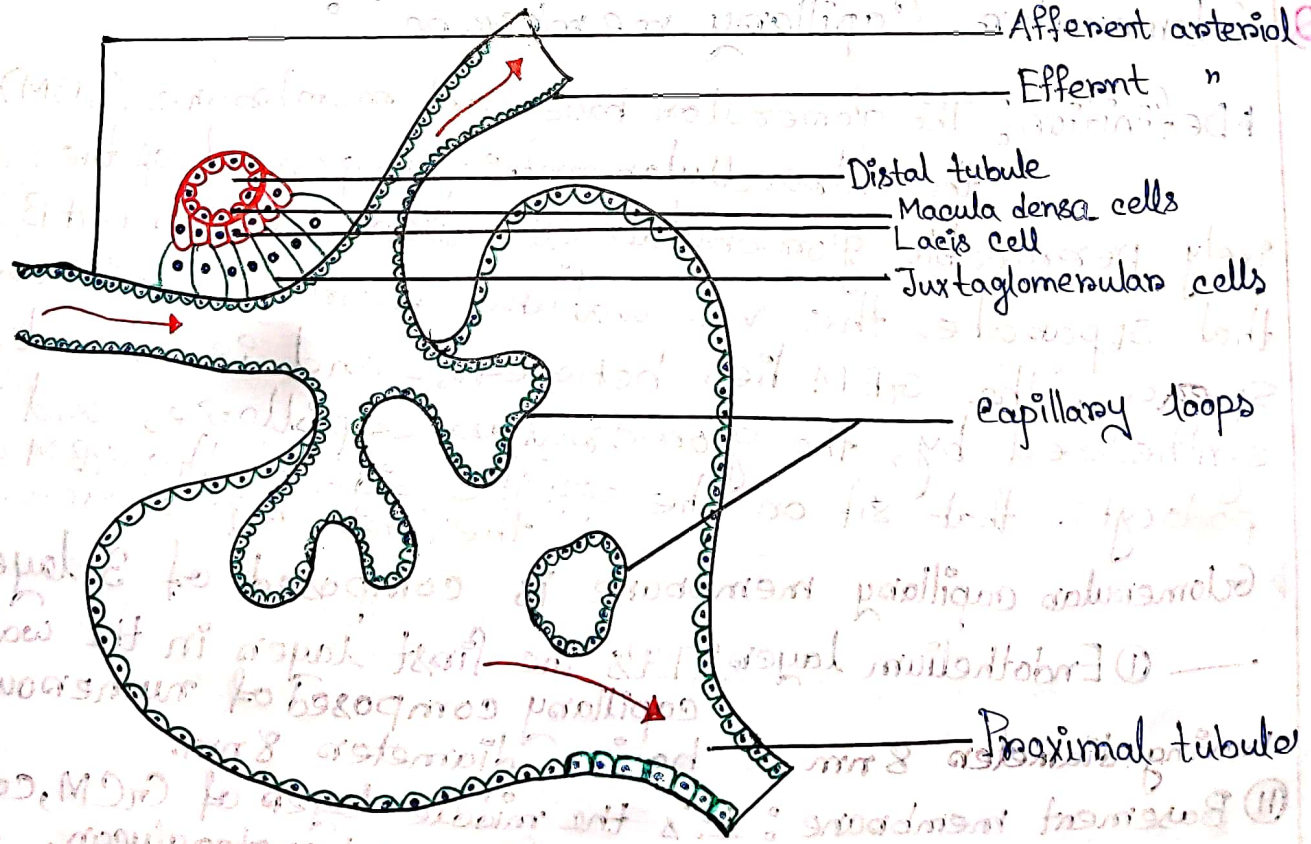


Fig: Juxtaglomerulus apparatus