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Paper-IV A

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B.Sc. Part-II
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KIDNEY IN VERTEBRATES or

(Evolution of Kidney)

Q1- Describe the evolution and fate of kidney and urogenital duct in vertebrates.
or,
Describe the evolution and fate of kidney in vertebrates?

Ans:- The separation and elimination of nitrogenous waste products of the metabolism from the body is called excretion. The organ concerned with the latter is called excretory organ. The main excretory organ in the vertebrates is kidney.

The kidney is more or less a compact organ. Each vertebrate has only a pair of kidneys. These are located on the roof of the abdominal cavity and remain attached to the dorsal wall of the body cavity. Ventrally these remain covered by the coelomic epithelium. Each kidney is composed of a number of uriniferous tubules or nephrons.

The nephron is the functional unit of the kidney. The nephron consists of a ciliated peritoneal funnel opening into the coelom through a mouth called nephrostome; A malpighian body formed by the combination of a double walled Bowman's capsule and glomerulus.

The Bowman's capsule is formed by the widening of the neck of the peritoneal funnel to form a thin walled chamber, blind end of the chamber is pushed in by a bunch of afferent and efferent arterioles, which form glomerulus.

and a coiled tube divided into proximal convoluted tubule opens into the collecting tubule. The latter opens into the longitudinal duct communicating with the exterior.

Nephrostomes are lacking in the nephrons of reptiles, birds and mammals, while Malpighian bodies are lacking in some fishes.

Development of Nephron

Each uriniferous tubule develops from a special mass of mesoderm which lies between the dorsal somites and ventral unsegmented lateral plates. This is called nephrostome and its cavity is called nephrocoel. Internally the nephrocoel communicates with the dorsal myocoel and the ventral splanchnocoel.

(1) The nephrocoel becomes cut off from the somite above but its connection with the body cavity persists as the peritoneal funnel.

(2) A projection arises diverticulum from the lateral wall of the nephrostome that grows out towards the ectoderm forming the glandular tubules.

(3) Fuse with one another at their distal end to form the longitudinal duct and extends upto the embryonic cloaca.

(4) The tubules develop first in the anterior segments of the body and continues growing backwards. The kidney in which the tubules develop first anteriorly is called Pronephrous kidney.

These first developed tubules degenerate
later on completely and posterior to
these develops the mesonephrous kidney.
Further in amniota the most posterior
set of tubules develops called the
metanephrous kidney.

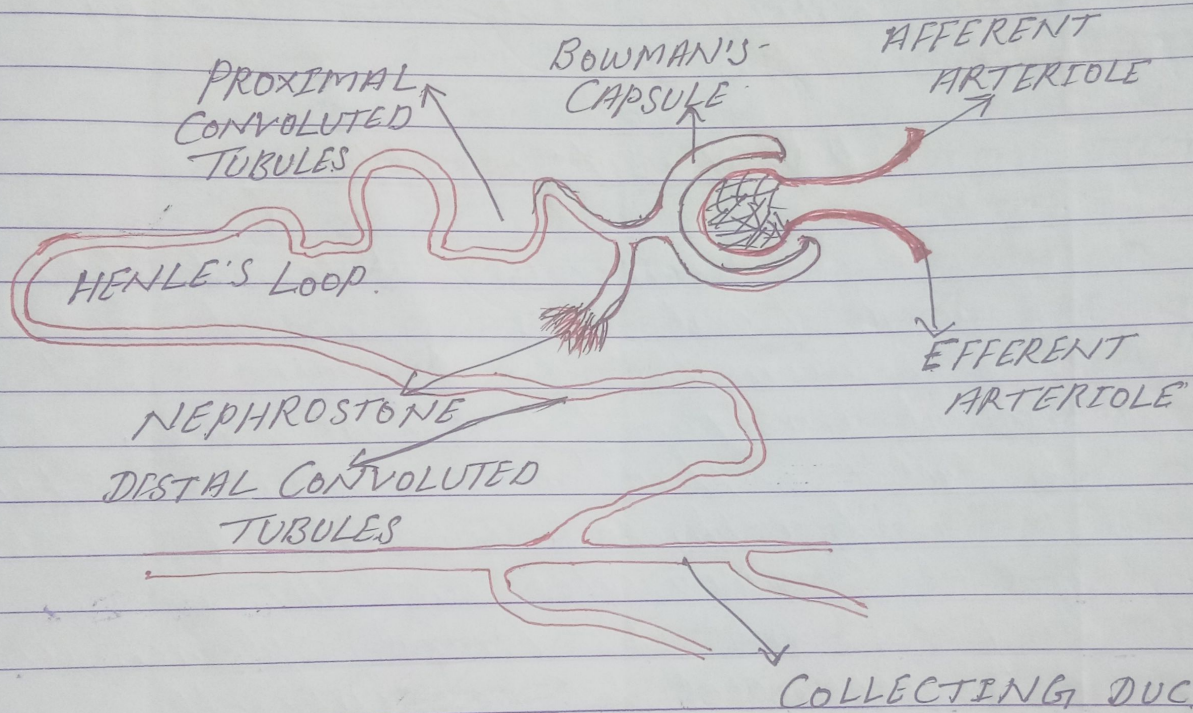


Fig:— structure of a typical nephron.