Urinary System

The urinary system consist of the paired ***kidneys*** , the paired ***ureters*** , which lead form the kidneys to the ***bladder*** , and the ***urethra***, which leads form the bladder to the exterior of the body .

1. Kidney

The kidneys are large reddish ,bean-shaped organs located on either side of the spinal column in the retroperitoneal space of the posterior abdominal cavity . It consist of :(View 67)

A –Capsule

The *capsule is* composed of dense irregular collagenous connective tissue. Occasional fibroblastsand blood vessels may be seen .

B – Cortex

The cortexconsists of renal corpuscles along with the **convoluted tubules** and **straight tubules** of the ***nephrons,collecting tubules***and***collecting ducts***are arranged in *cortical labyrinths*and *medullary rays* . Additionally , blood vessels and associated connective tissue *(renal interstitium*) are also present .

1. Cortical Labyrinth

Are composed of **renal corpuscles** (including the glomerulus and Bowman's capsule) , cross- sections of **proximal convoluted tubules**(constituted of cuboidal cells with bordered brush) , **distal convoluted tubules** (constituted of cuboidal cells) ,the **macula densa**(aregion located in the final portion of the of distal tubules),and collecting tubule .(View 68)

2. Medullary Rays

Medullary raysare continuations of medullary tissue extending into the cortex . They are composed mostly ofproximal straight tubules and cortical collecting ducts and the pars recta of, ascending thick and thin limbs of **Henele's loop** penetratethe cortex.(View 69)

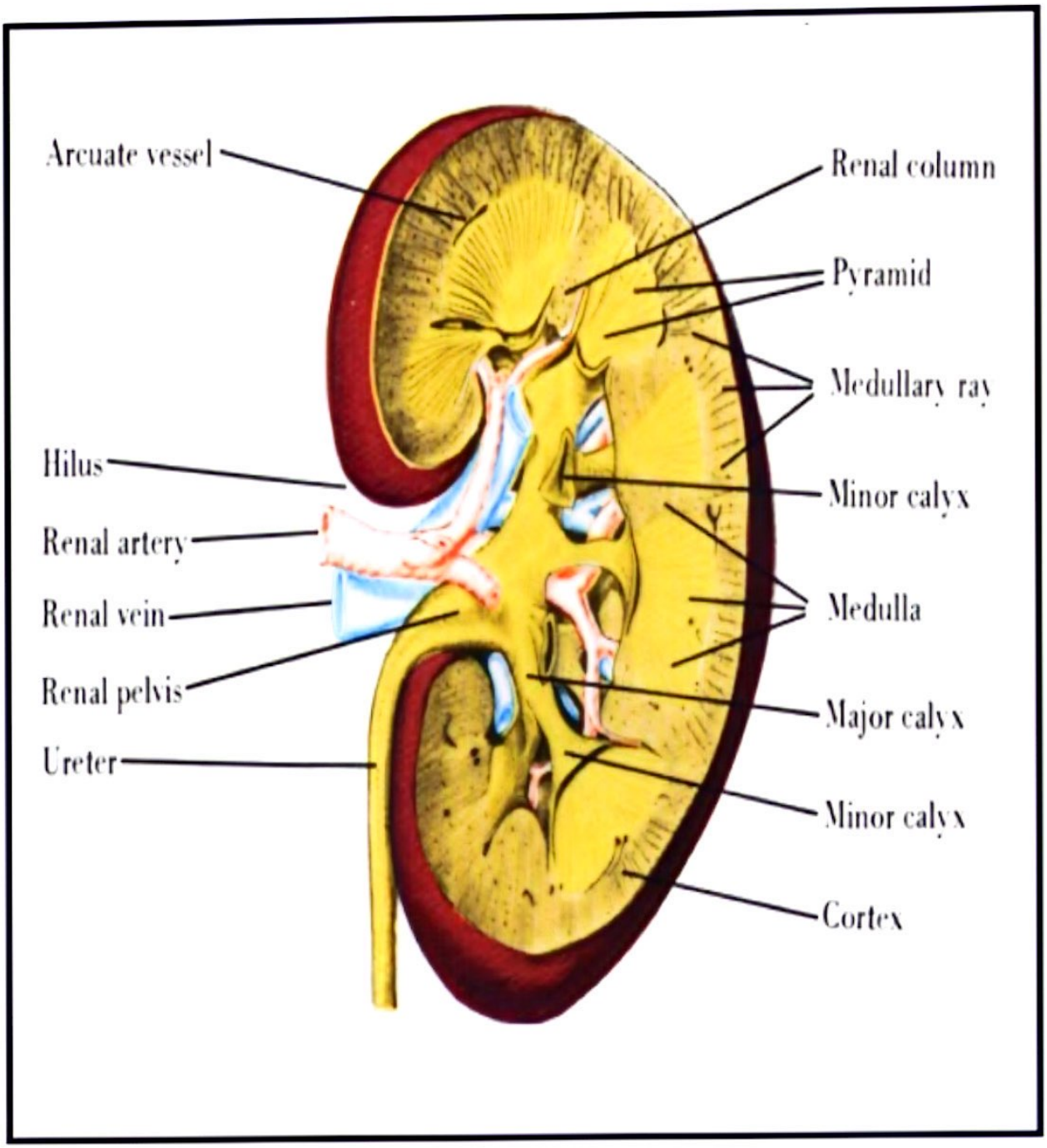
C - Medulla

The medullais composedof 10-18 conical or pyramidal structure**(the medullary pyramids)** that are bordered by cortical columns.from the base ofeach medullary pyramid , parallel arrays of tubules , the **medullaryrays** penetrate the cortex . The renal pyramids consist of collecting tubules .

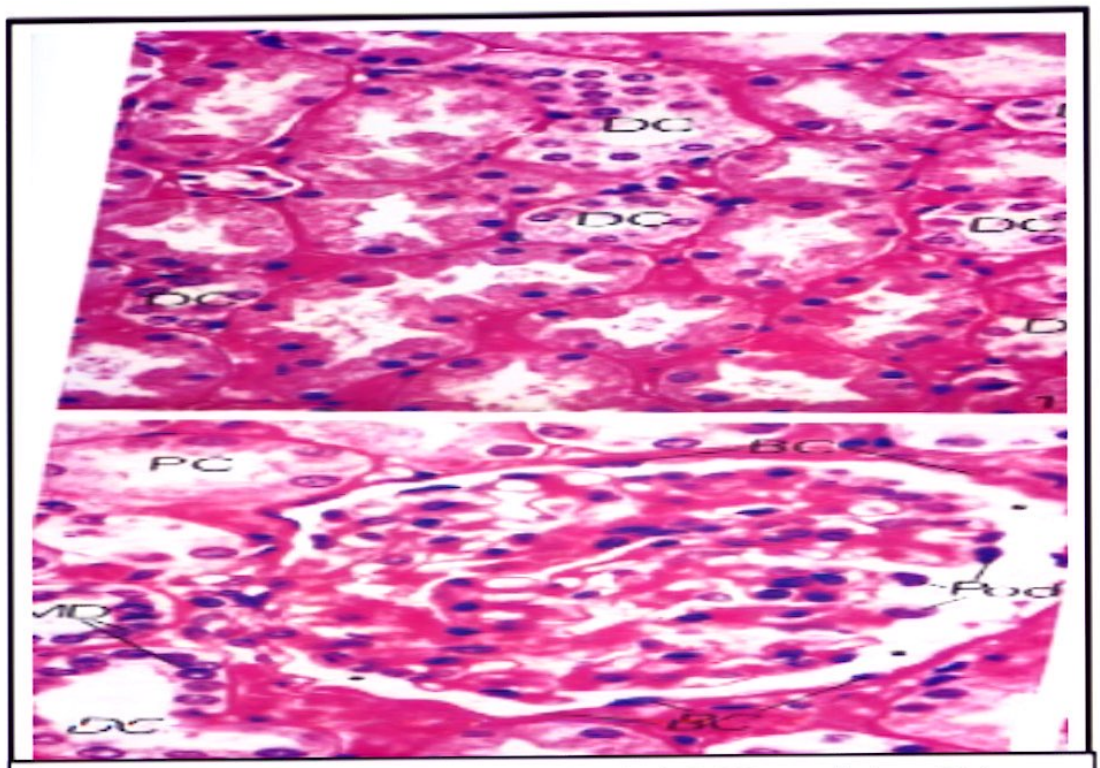
D - Pelvis

Subdivided into the **minor** and **major calyces** , constitutes the beginning of the main excretory ducts of the kidney. The transitional epithelium of the minor calyx is reflected onto the renal papilla . The calyces are lined by transitional epithelium . The subepithelial connective tissue of both is loosely arranged .The

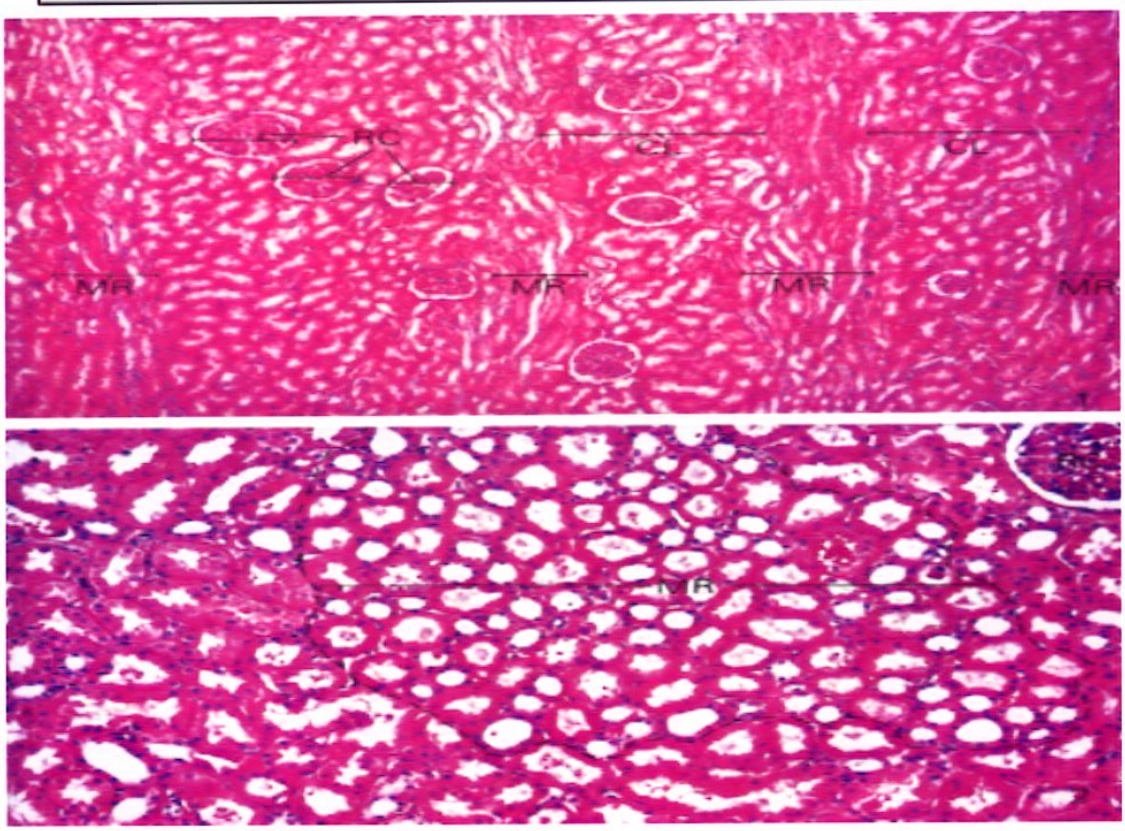
muscularis,composed of inner longitudinaland outer circularlayers of smooth muscle.An adventitia of loose connective tissue surrounds the muscularis .



(View 67)



DC: distal convoluted tubule,**PC;**proximal convoluted tubule,**MD:** macula densa,**BC:**boman's capsule**(View 68)**



(View 69)

2. EXTERNAL PASSAGES

A. Ureter

The ureterpossesses a stellate – shaped lumen that is lined by *transitional epithelium.*The subepithelial connective tissue (sometimes said to be subdivided into *lamina propria* and*submucosa)* is composed of a fibroelastic connective tissue. The *muscularis*is again composed of inner longitudinaland outer circular **layers** of smooth muscle,although in its lower portion near the bladder a third , outermost longitudinal layer of smooth muscleis present . The muscularis is surrounded by a fibroelastic*adventitia.*(View 70)

Ep: transitional ep.,**Muc :** mucosae , **Mus :** muscularis ,**CT:** connective t.,**SM {c}**:circular layer of smooth muscle ,**SM {l}**: longitudinal layer of smooth muscle,**Adv:** adventitia, **AT** :adipose t. **(View 70)**

B. Bladder

The urinary bladderresembles the ureter except that it is a much larger structure and dose not possess a stellate lumen , although the mucosa of the empty bladder is thrown into folds . The lamina propriais fibroelastic in character. The muscularisis composed of three indefinite layers of smooth muscle : **inner longitudinal . middle circular ,** and **outer longitudinal .** The circularmuscle coat forms the **internal sphincter** at the neck of the bladder . An adventitiaor serosasurrounds the bladder . (View 71)

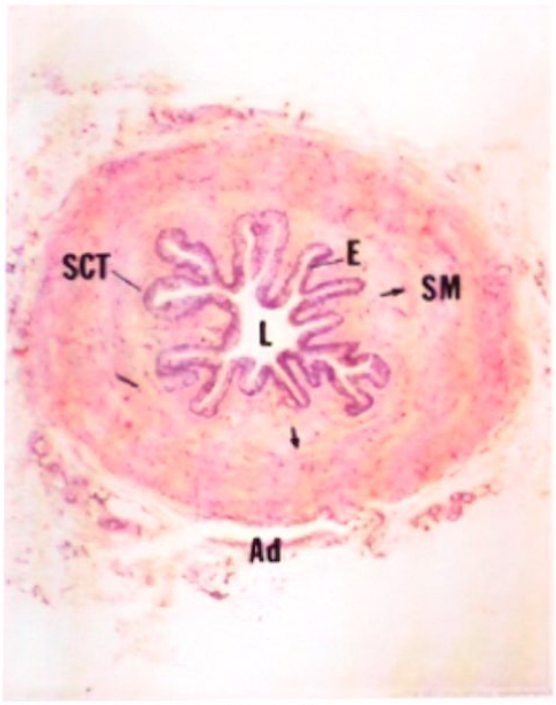


Figure 1

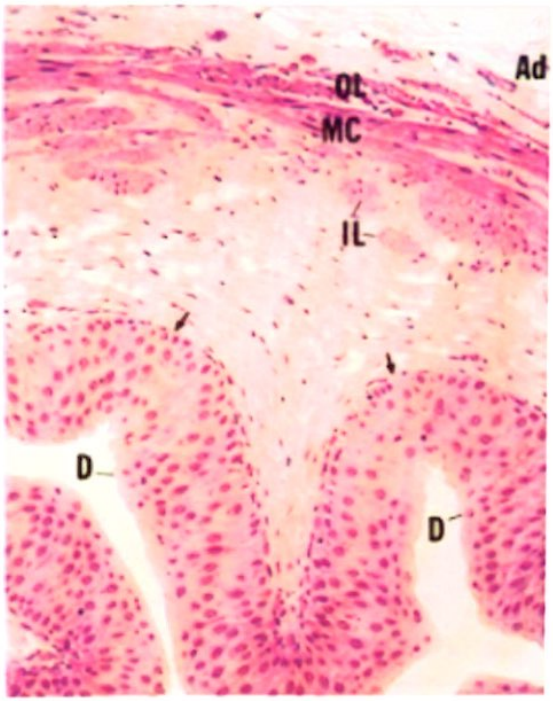
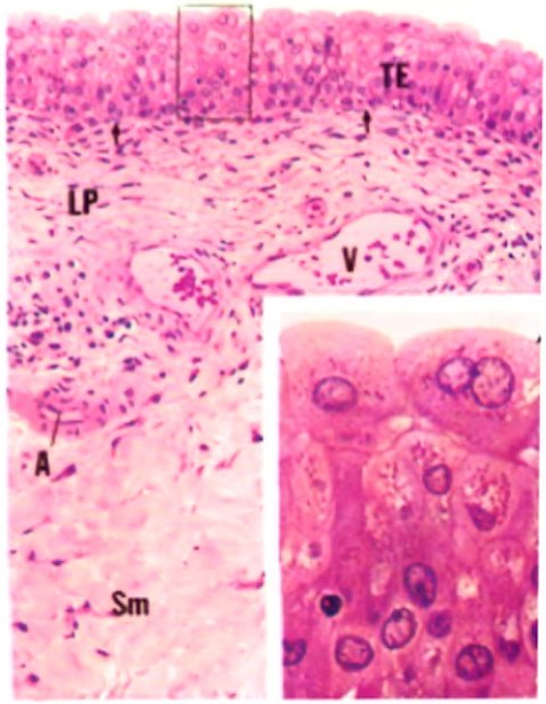


Figure 2



A : arteriole ,**Ad :** adventitia ,**D :** dome- shaped cell,**E :** epithelium,**IL :** inner longitudinal musclaris,**L:** lumen ,**LP:**lamina propria , **MC:** middle circular musclaris, **OL:** outer longitudinal musclaris,**SCT :**subepithelial connectiv tissue ,**SM :** smooth muscle coat ,**Sm :** submucosa **TE :** transitional epithelium,**V :**venule

(View 71)