

- The urine
 - Is formed in the **nephrons**
 - Flows and collects in the **pelvis**
 - Leaves the kidneys via the **ureter**
 - Is stored in the **bladder**
 - Is discharged thru the **urethra**

KIDNEYS

Internal Anatomy

- A frontal section shows three distinct regions
 - Renal capsule – the **outside covering** or layer
 - **Cortex** – the **outer** region
 - Medulla – the **inner region**, consists of the **pyramids**
 - Renal pelvis – flat, **funnel-shaped** tube leading to the **ureter**
- Inside the cortex and medulla are **nephrons**
 - the structural **functional units** that form urine

SUPERIOR

Renal capsule

Renal cortex

Renal column

Renal pyramid in renal medulla

Renal papilla

Renal sinus

**Adrenal
(suprarenal)
gland**

Minor calyx

Major calyx

Renal artery

Renal pelvis

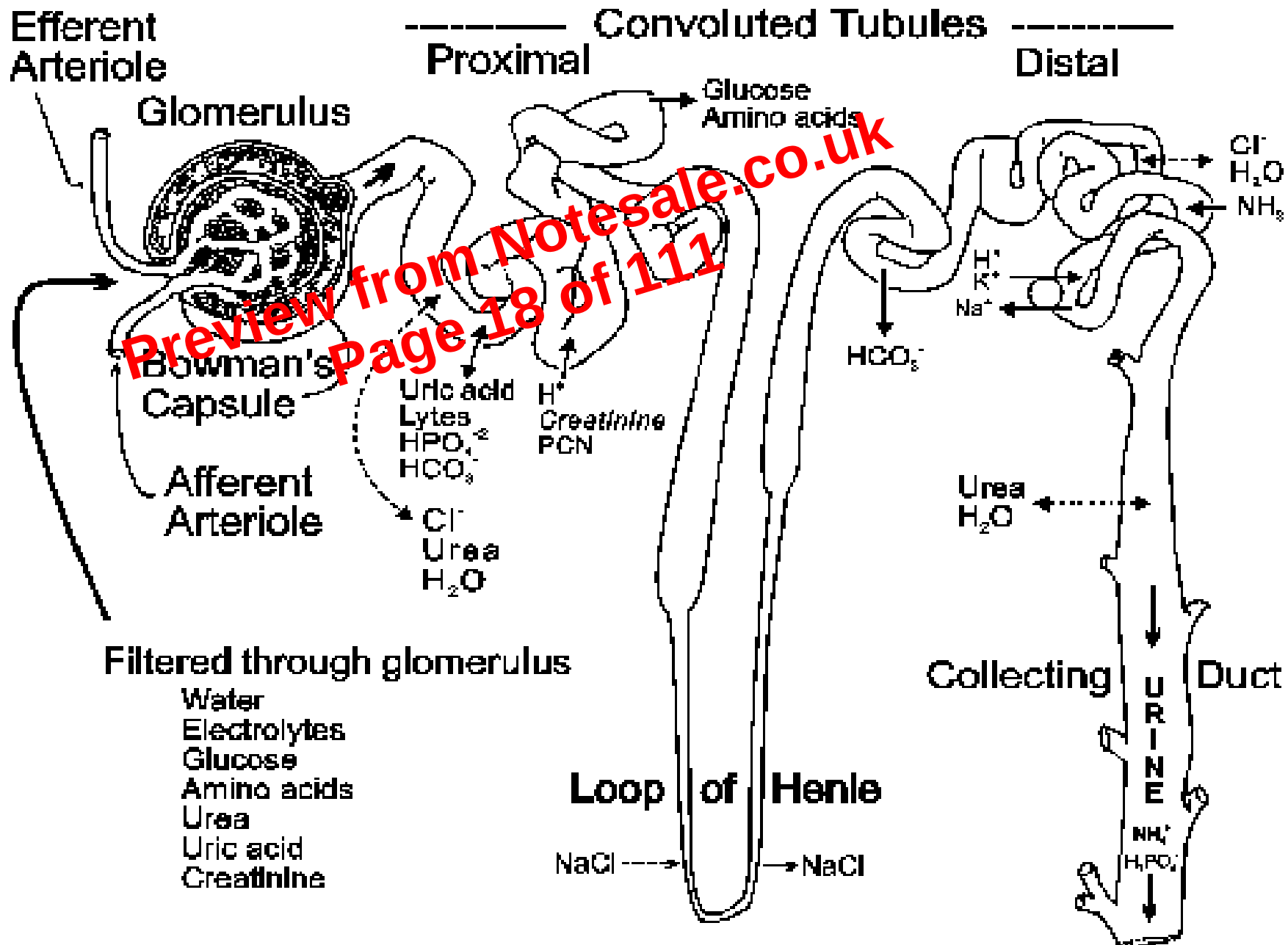
Renal vein

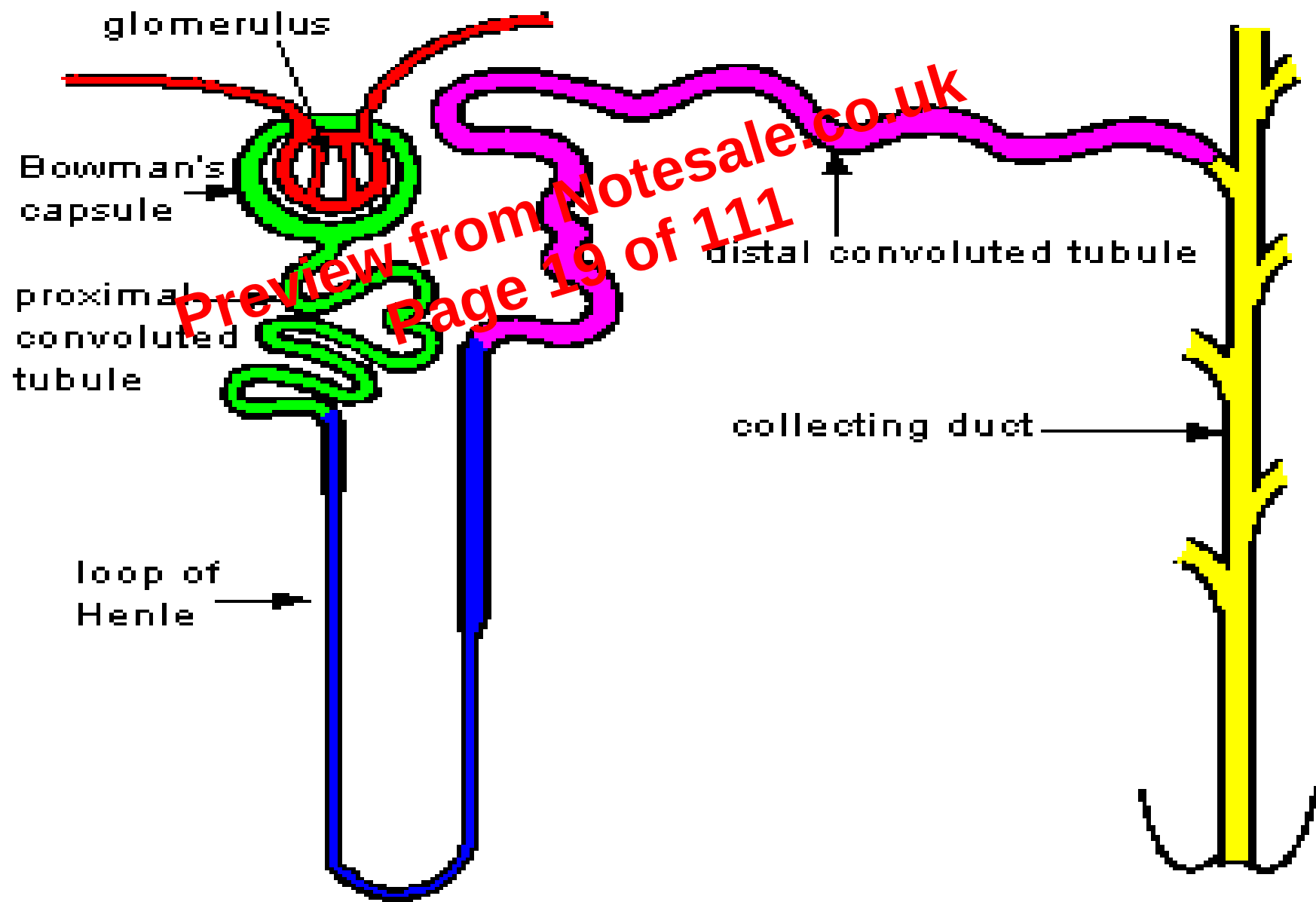
Ureter

LATERAL

MEDIAL

Frontal section of right kidney





NEPHRON

GLOMERULUS

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- Consists of a tuft of **capillaries**
- Lies in the **cortex**
- The high **blood pressure** in the capillaries
 - Pushes the lymph in the blood to **filter** thru the **basement membrane** of the **Bowman's capsule**

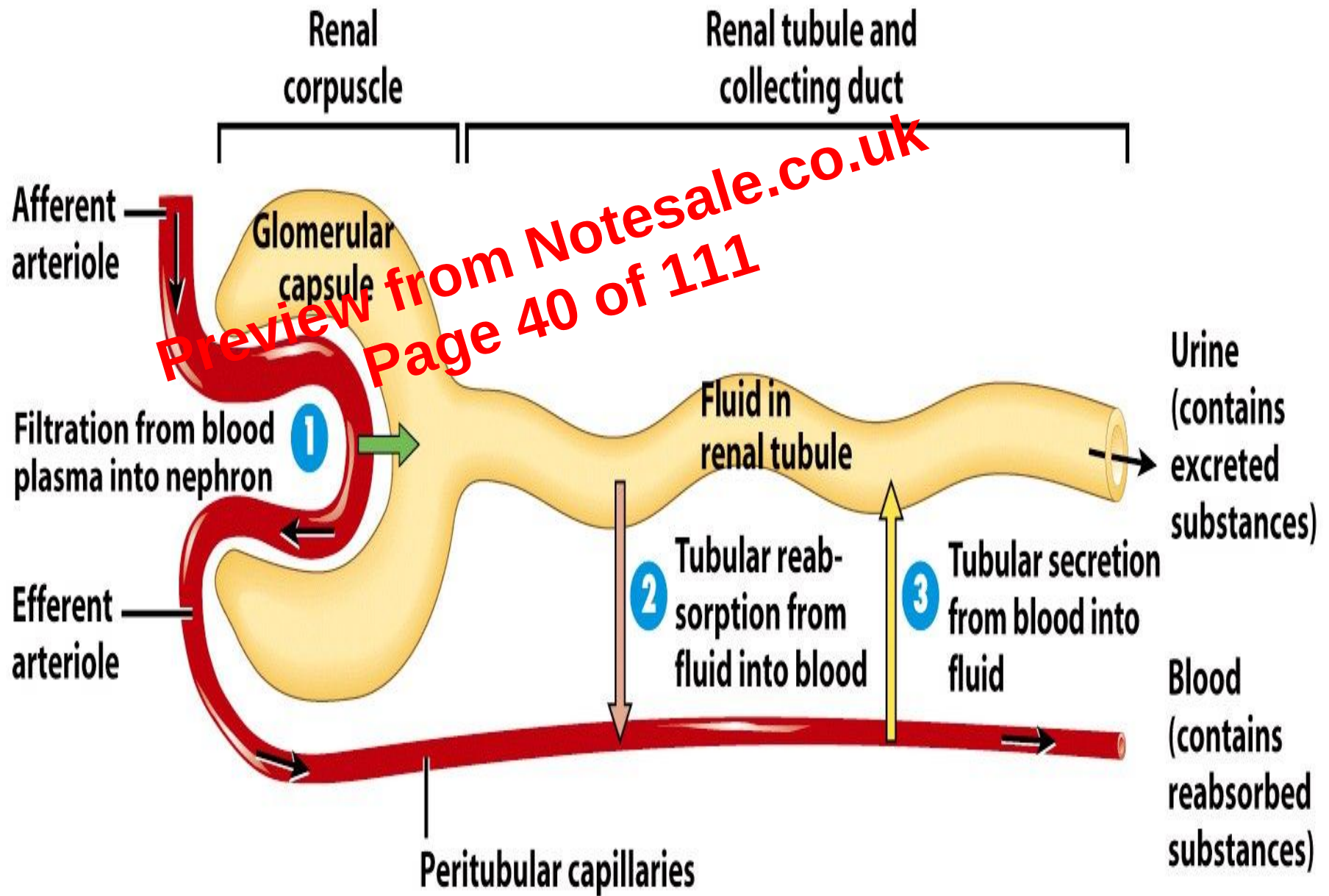
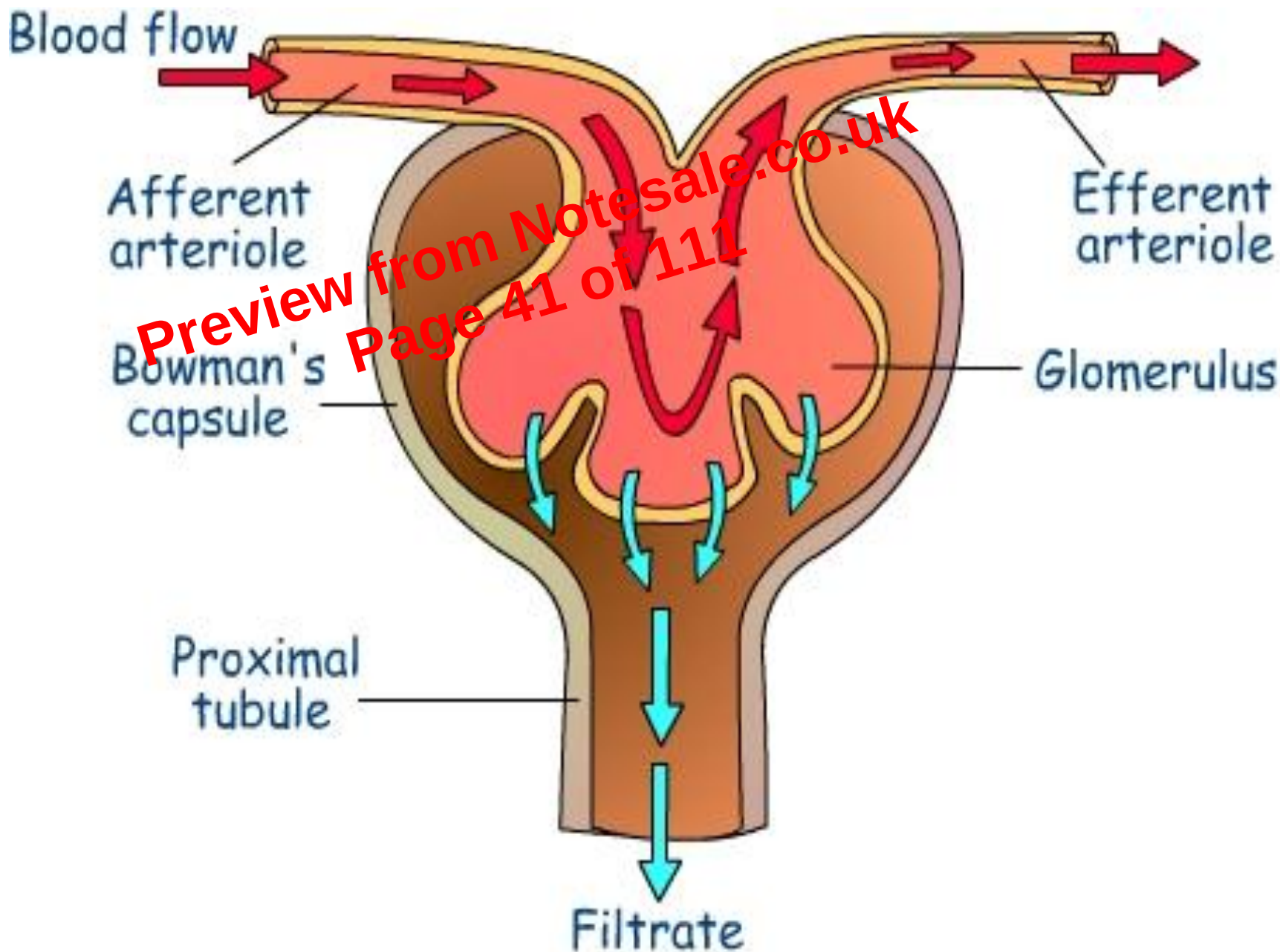
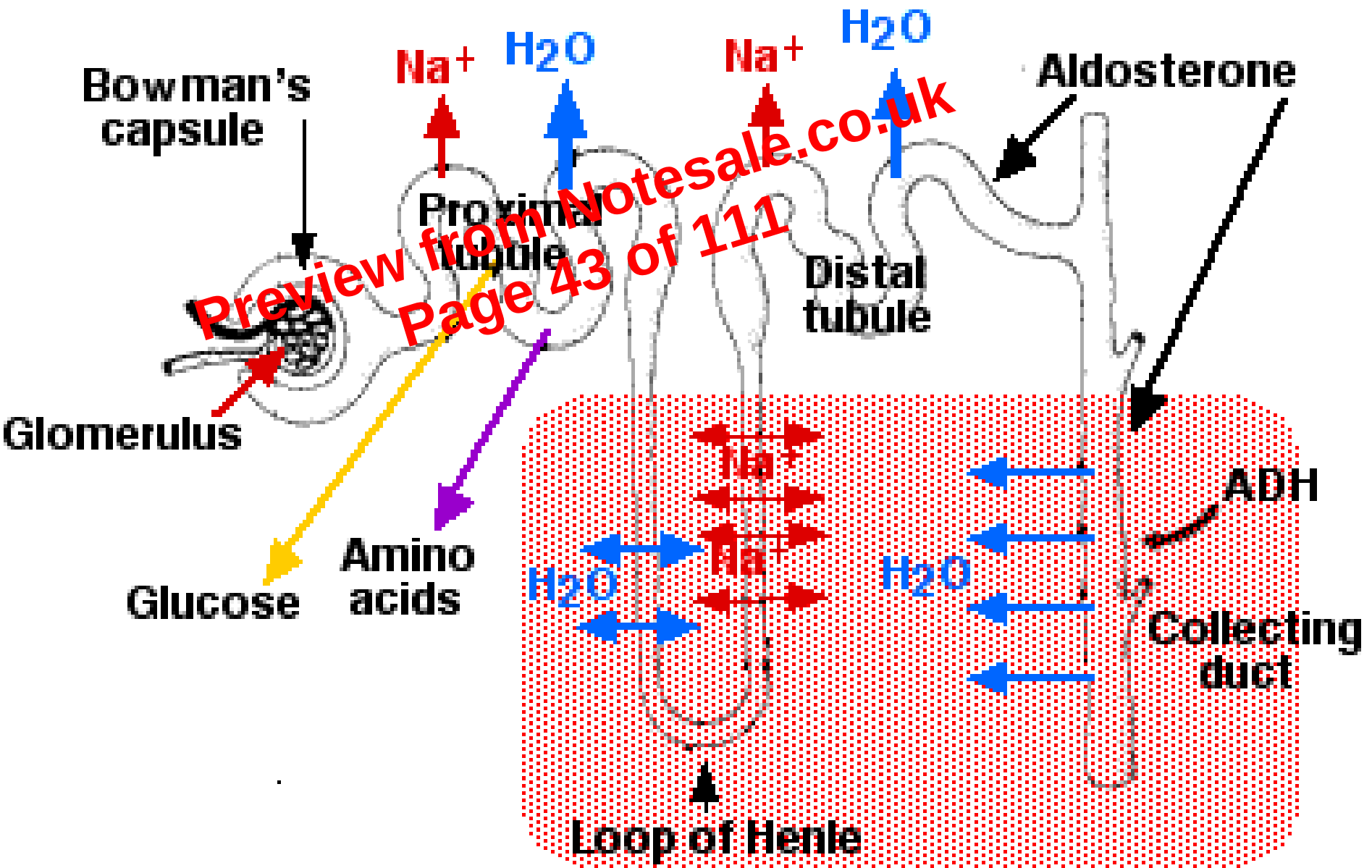


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Mechanism of Urine Formation

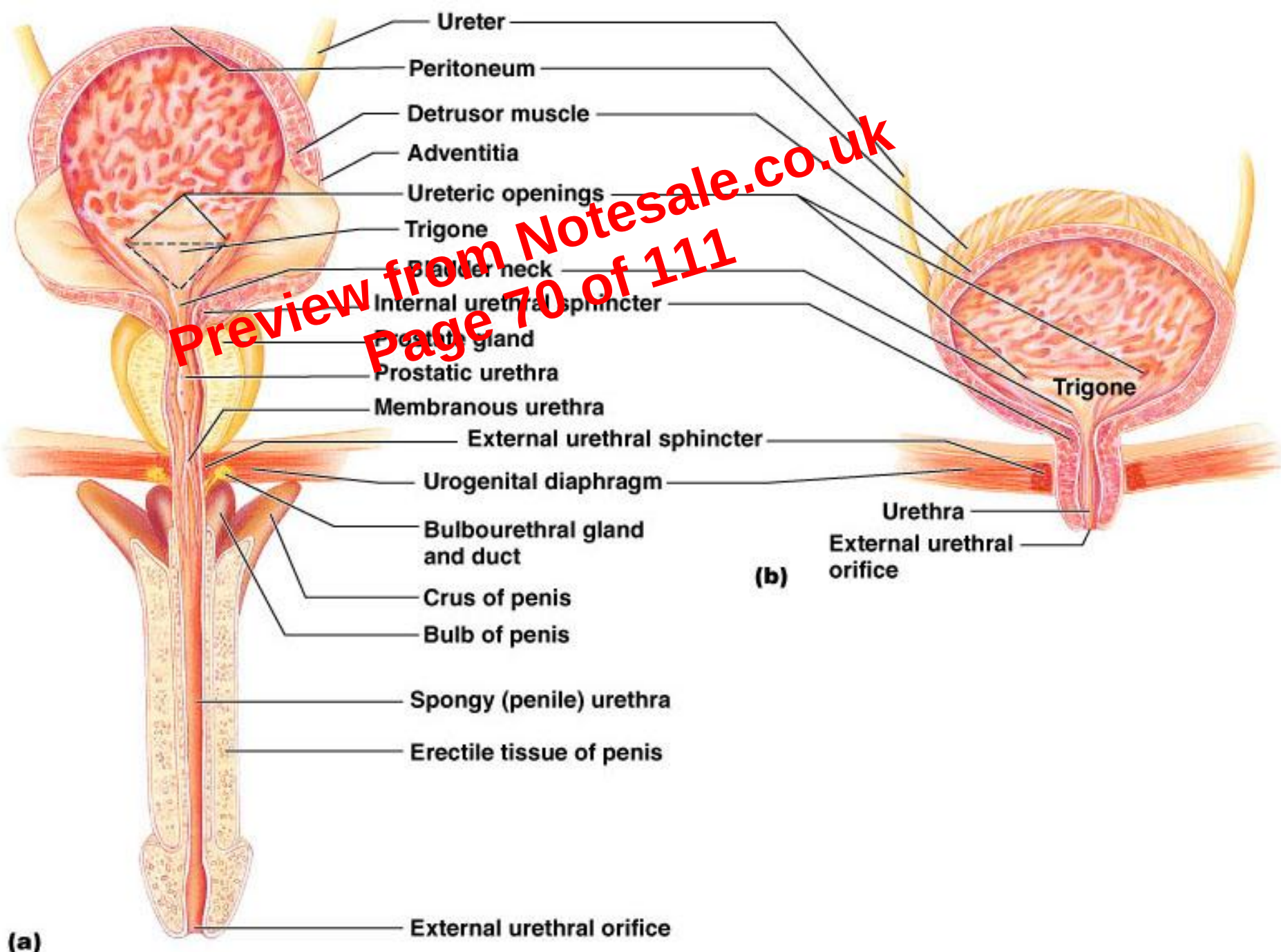
Collecting duct

- The filtrate from the distal collecting tubule passes on to the collecting duct
 - where **further reabsorption** of water and Na ions takes place
 - According to the need of the body to maintain **internal homeostasis**
- The urine then travels down the ureter
 - to be **stored** in the **urinary bladder**
 - before passing thru the **ureter** to the outside during **micturition (urination) process**

KIDNEYS

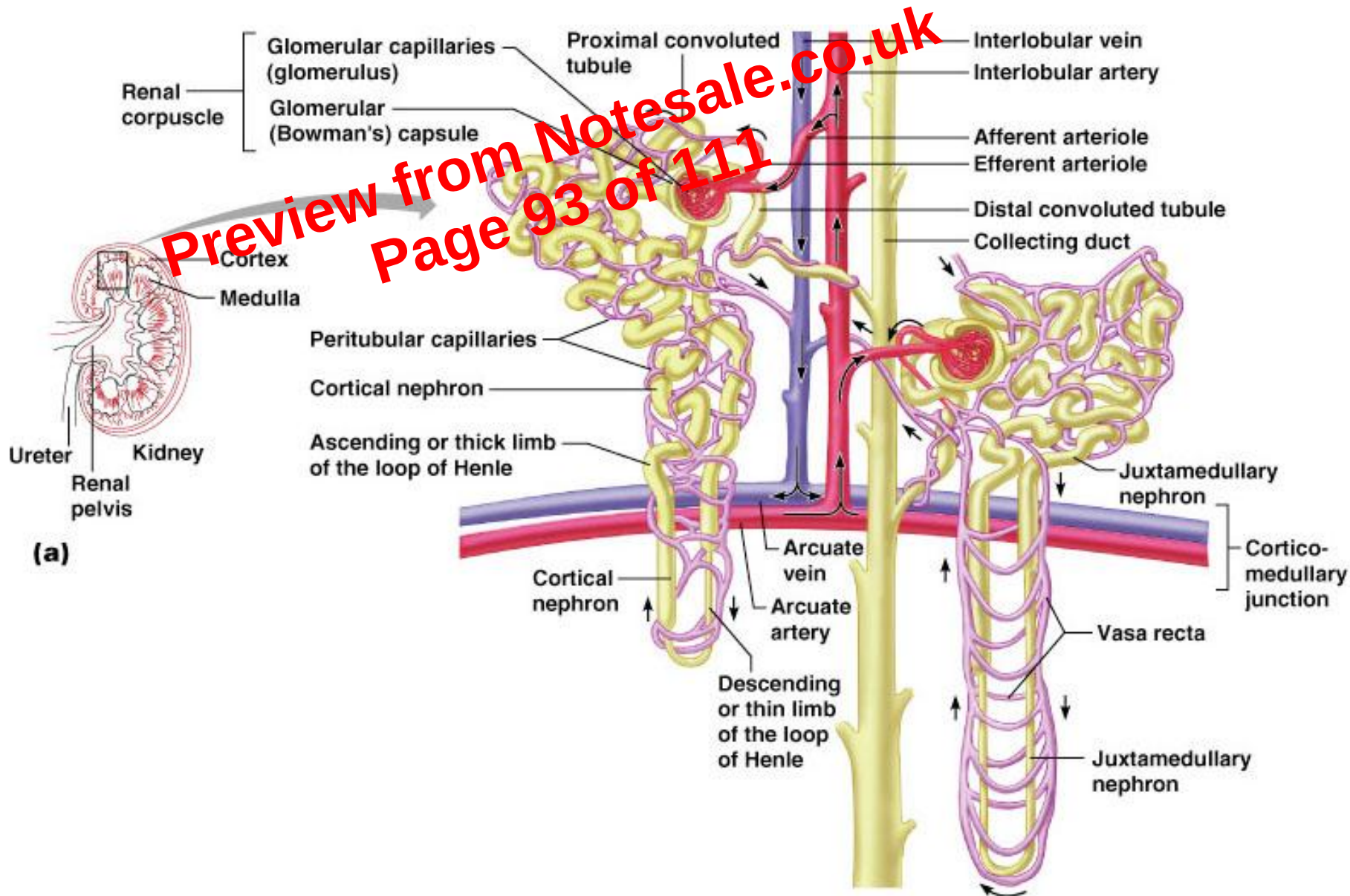
Regulation of Na Ions

- Important to maintain osmotic pressure in the body fluids, including plasma
- A decrease of Na ions in the blood plasma provokes the following events:
 - Increase of **aldosterone** secretion
 - Aldosterone acts on the **distal and collecting tubules**
 - To increase **Na ion reabsorption**
 - **Water** follows Na reabsorption
 - This **prevents** water loss



Mechanisms of Urine Formation

- The kidneys filter the body's entire plasma volume 60 times each day
- The filtrate:
 - Contains all plasma components except protein
 - Loses water, nutrients, and essential ions to become urine
- The urine contains metabolic wastes and unneeded substances



Loop of Henle: descending limb and thin ascending limb

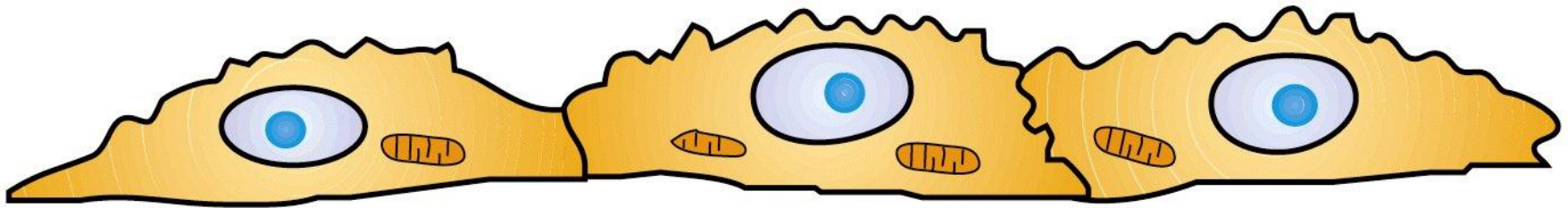
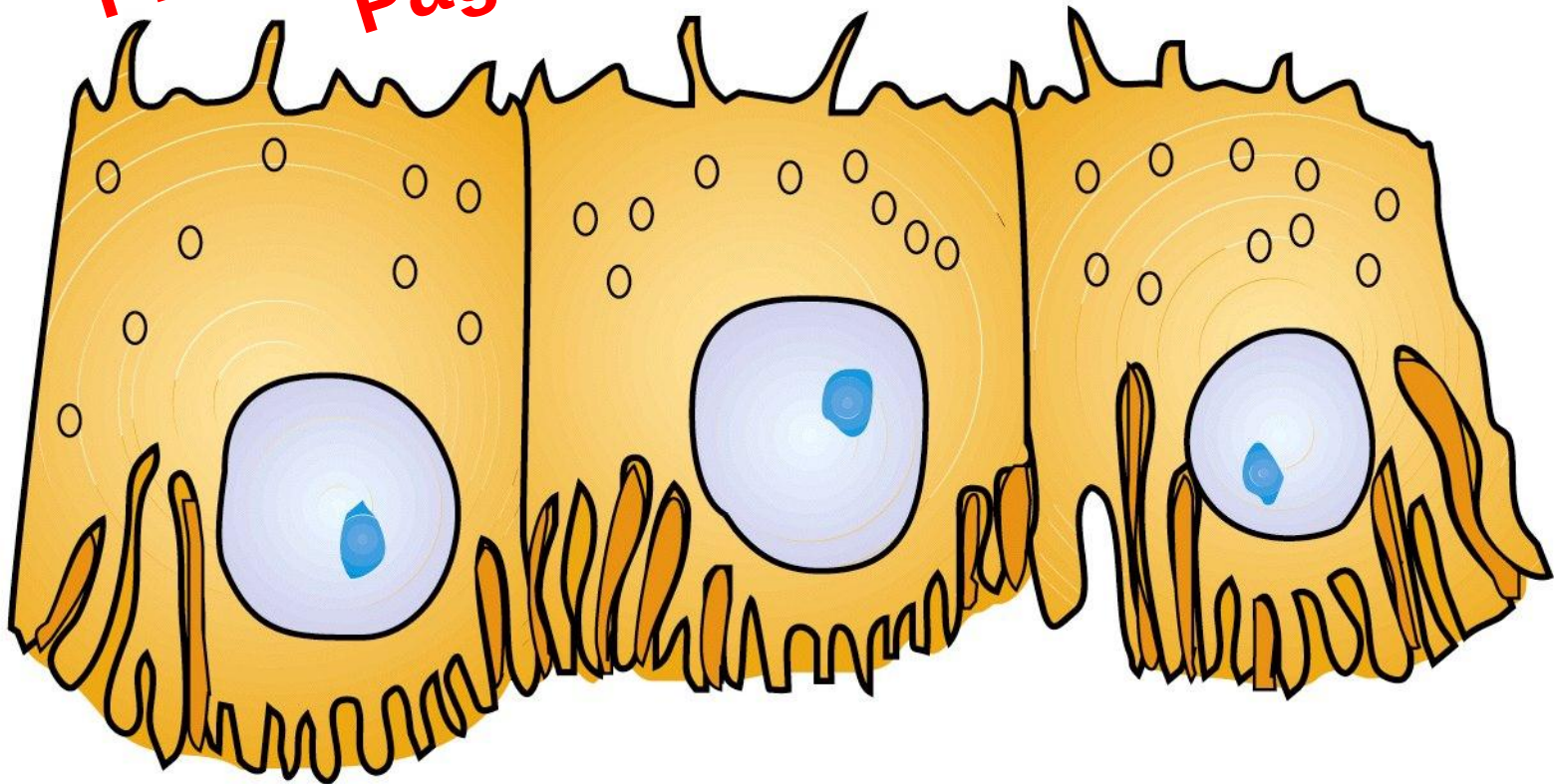


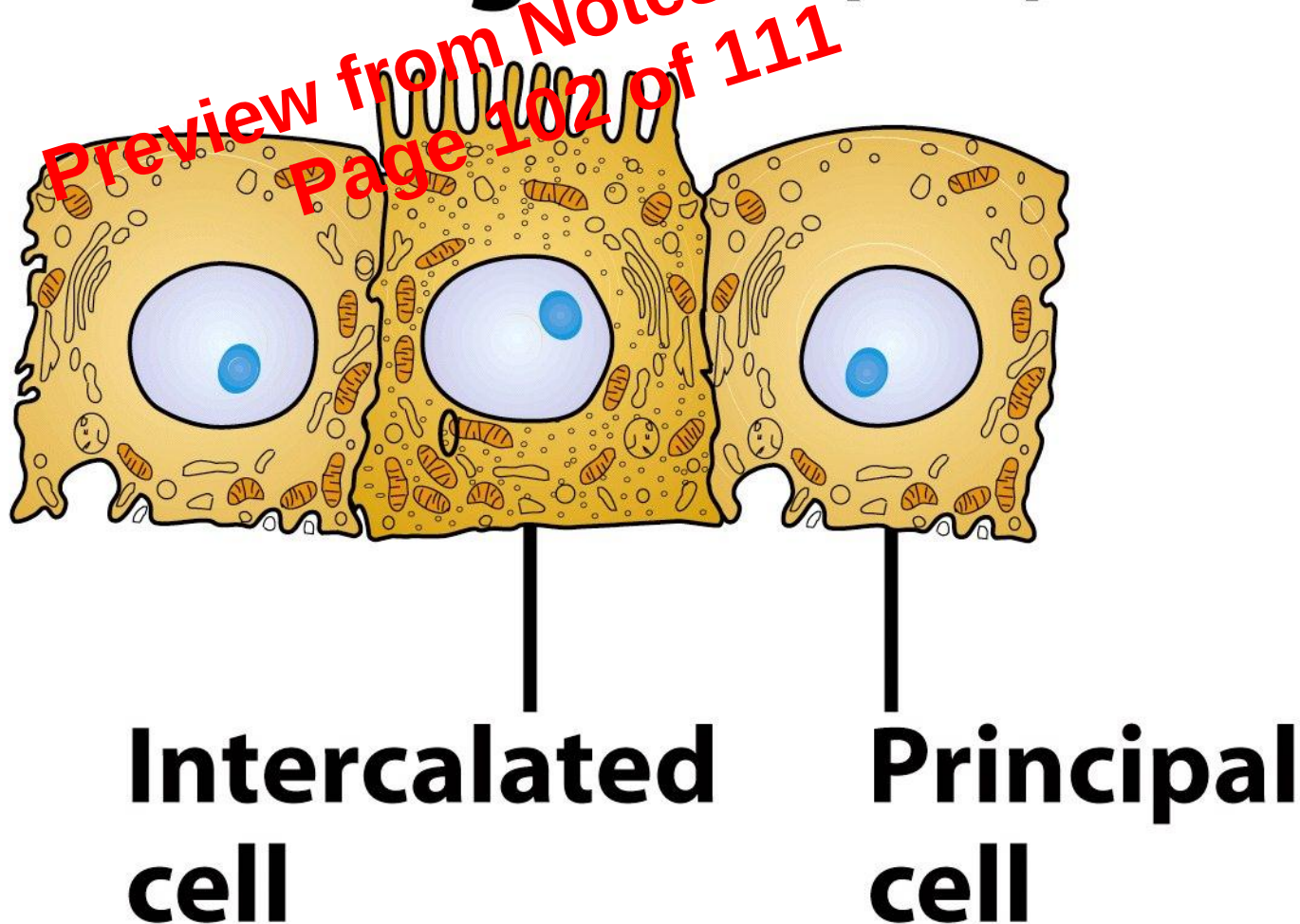
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Loop of Henle: thick ascending limb

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Last part of DCT and all of collecting duct (CD)



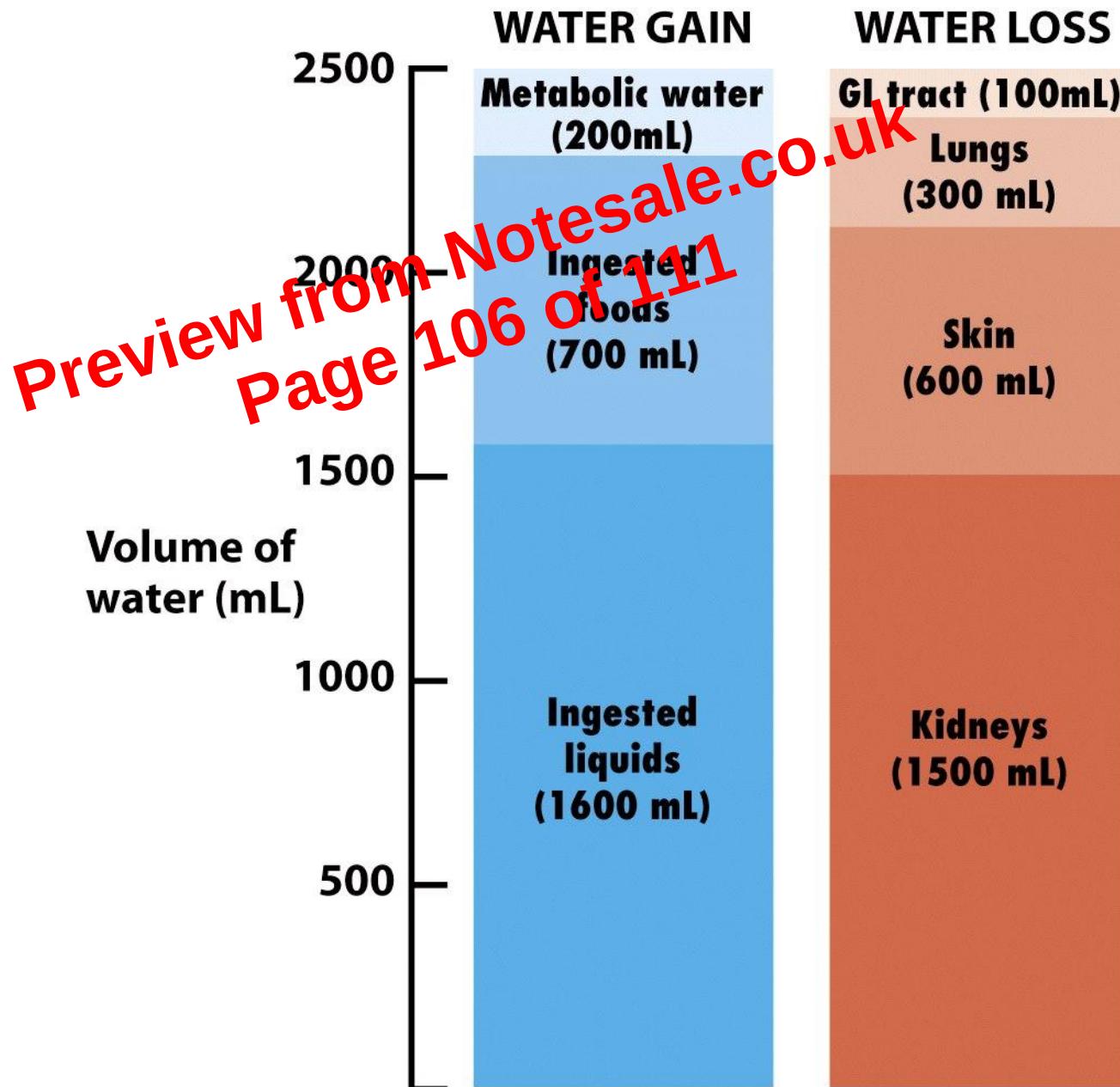


Figure 27-2 Principles of Anatomy and Physiology, 11/e
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