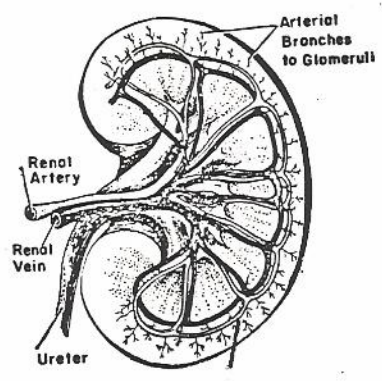
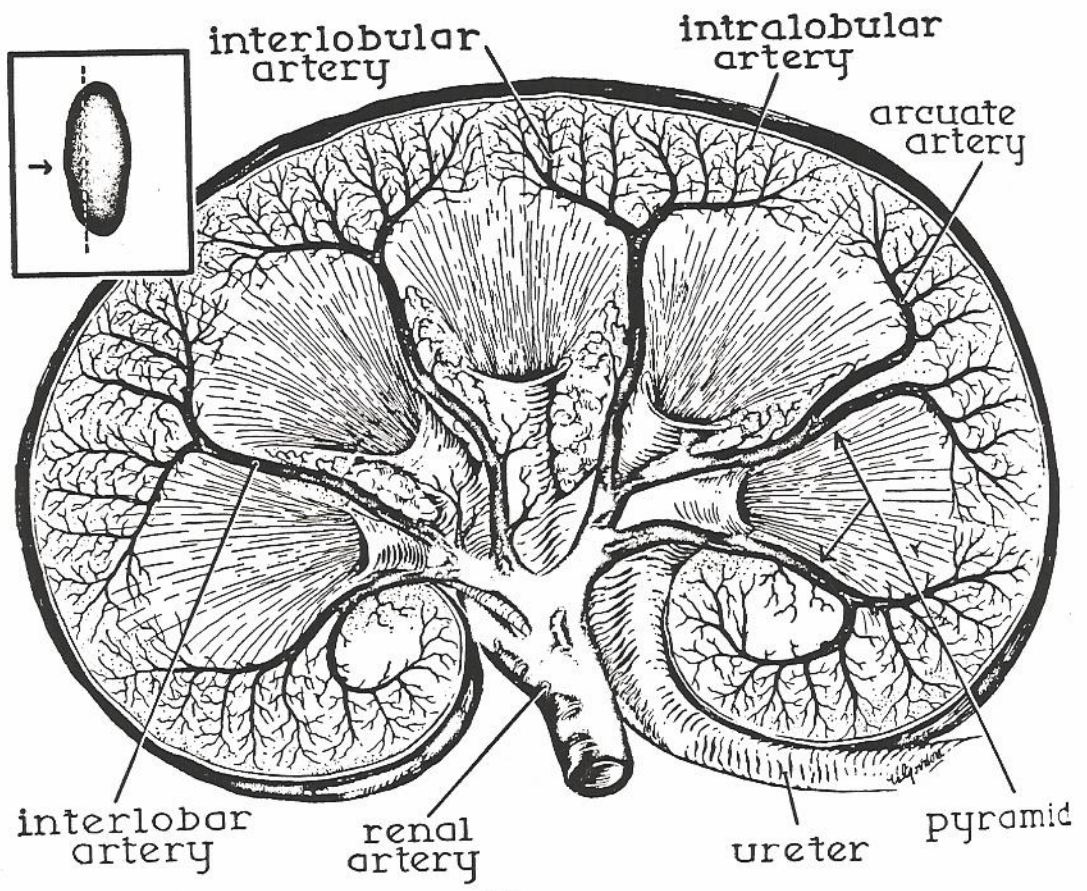


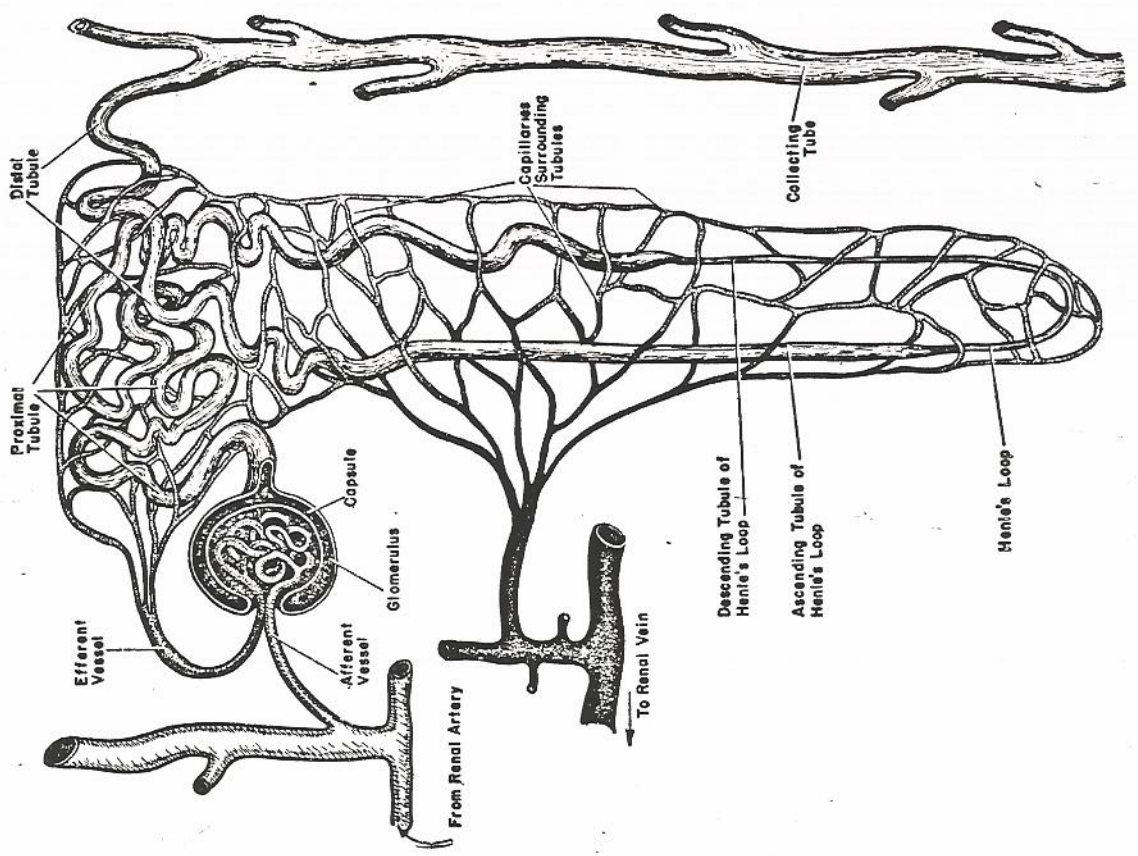
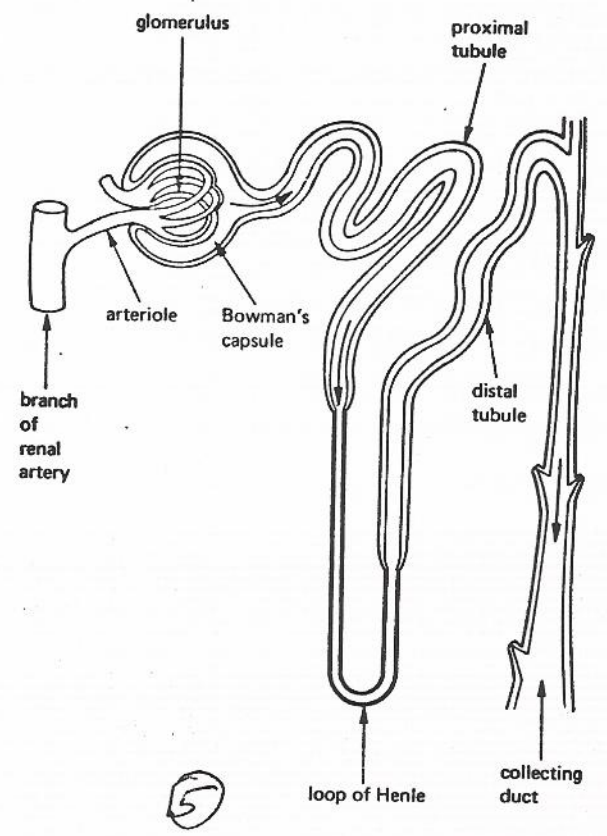
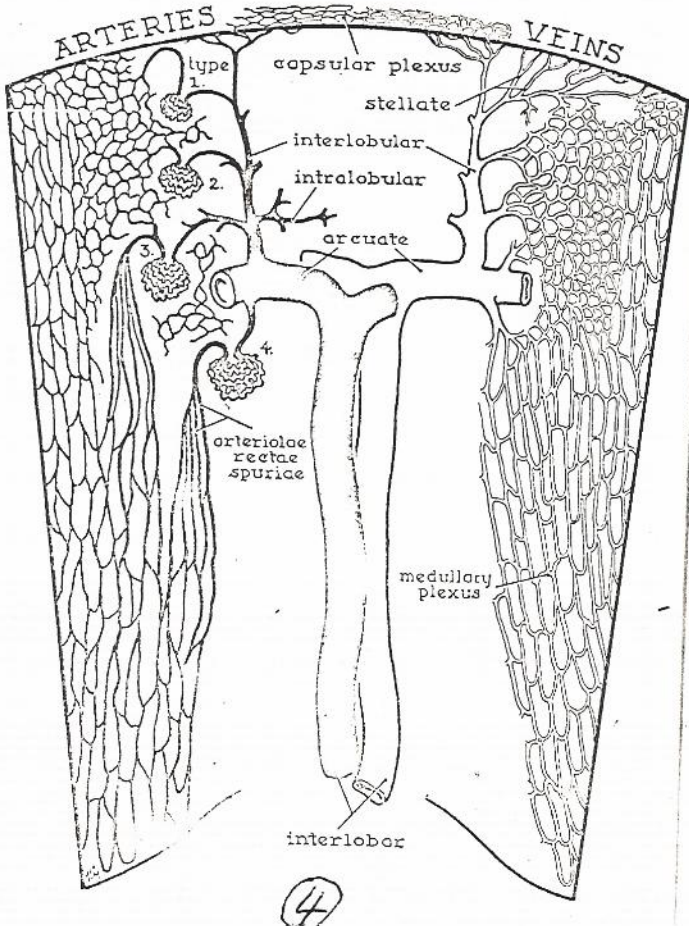
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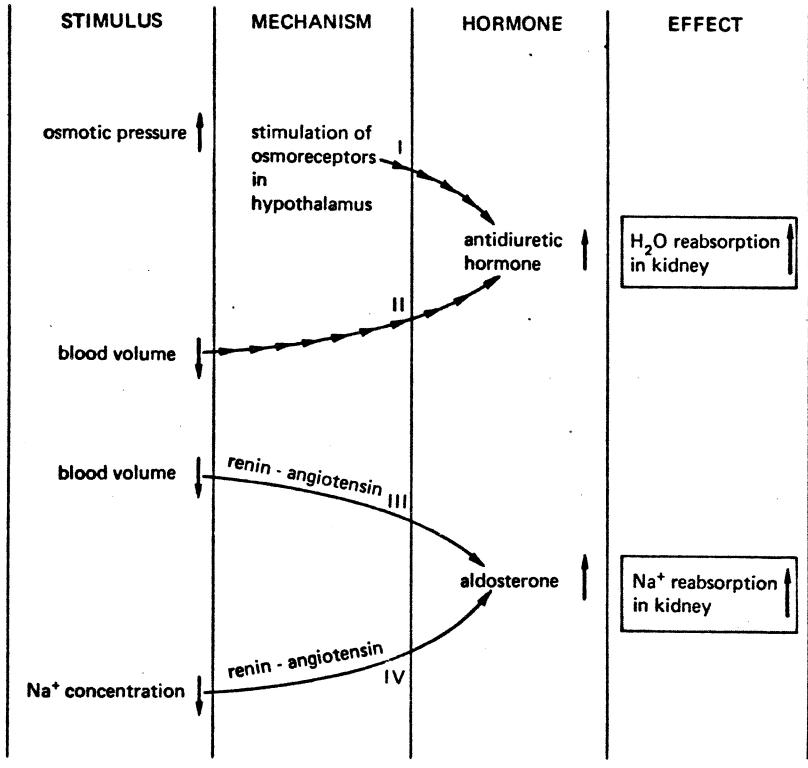
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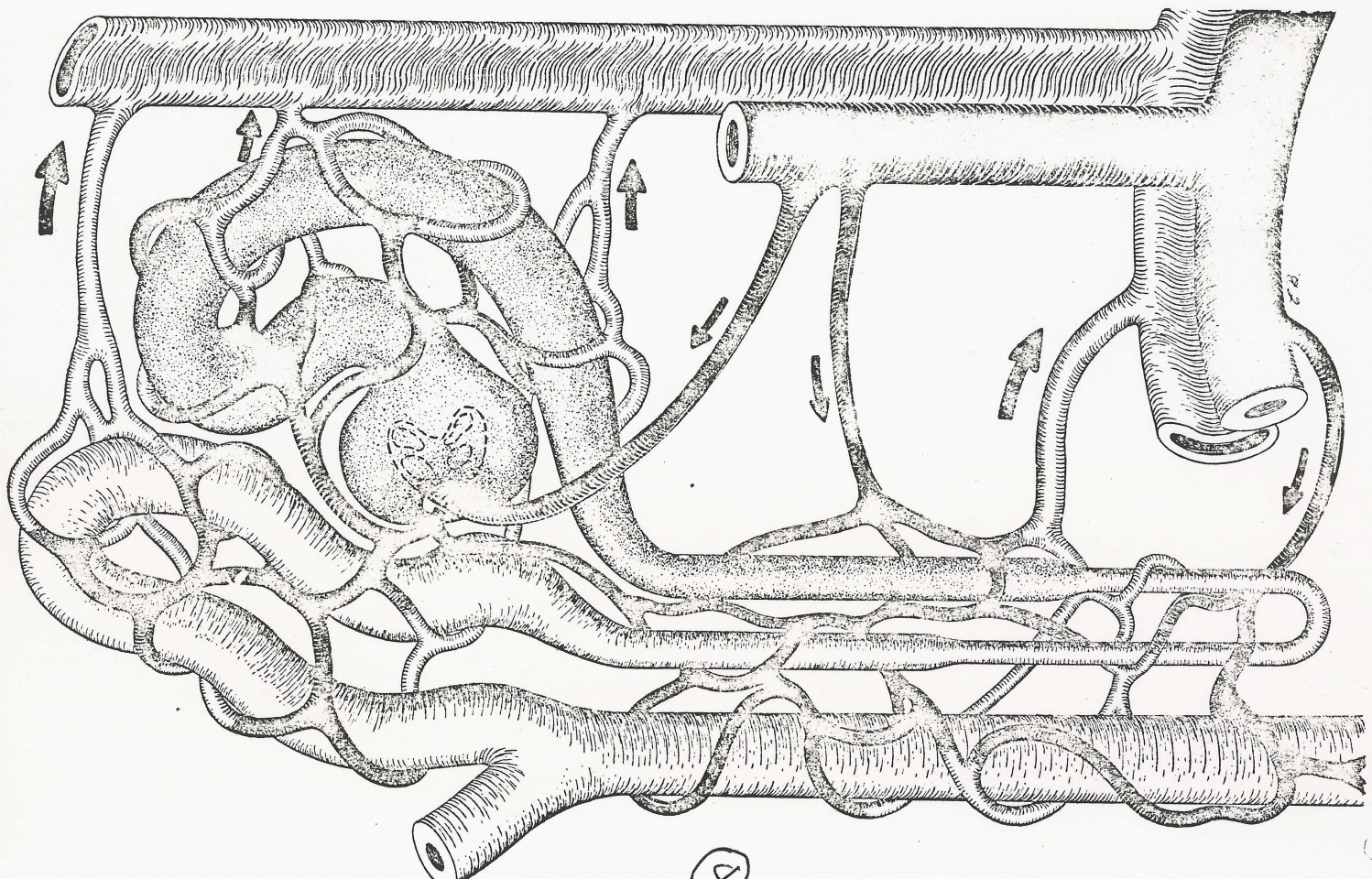
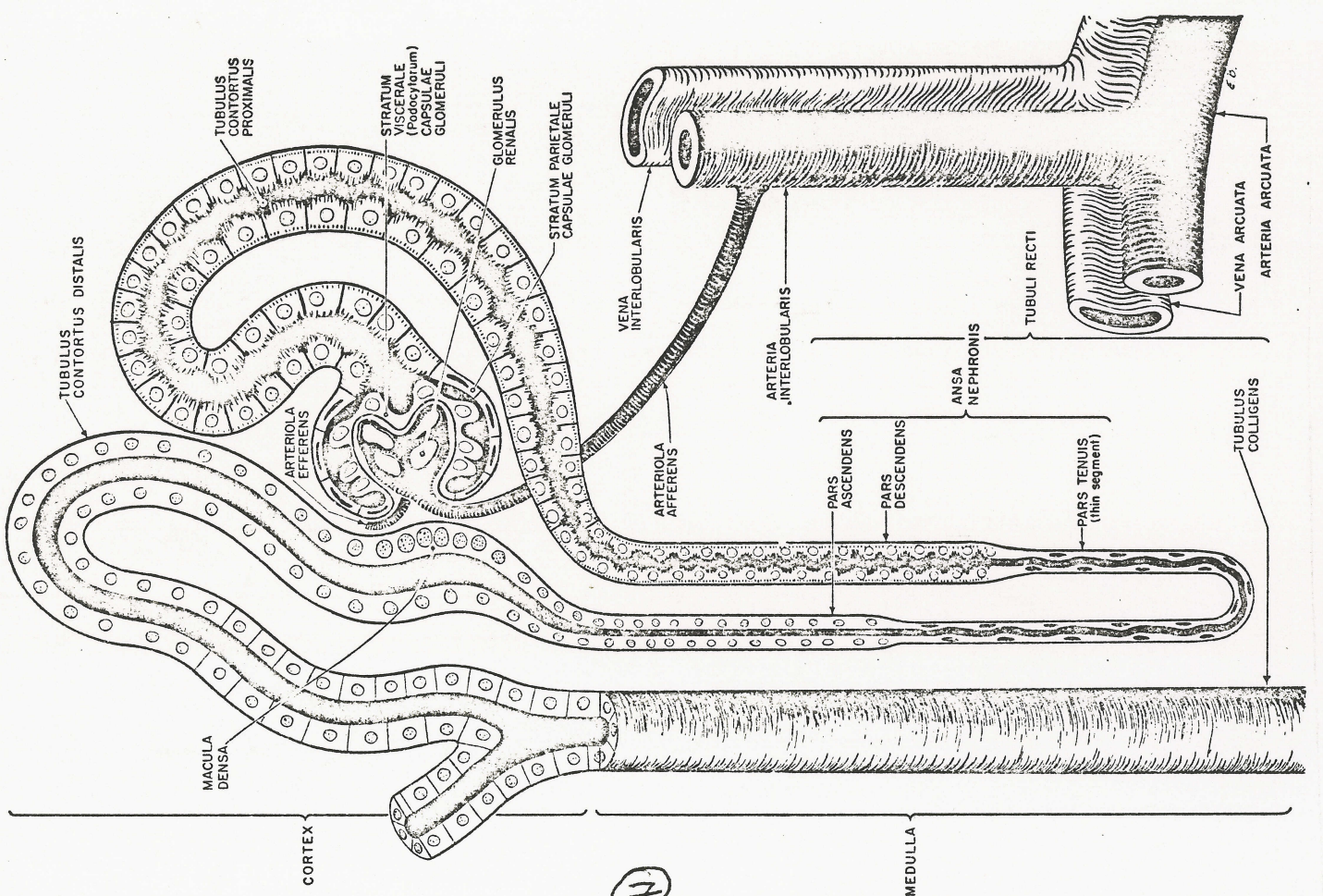


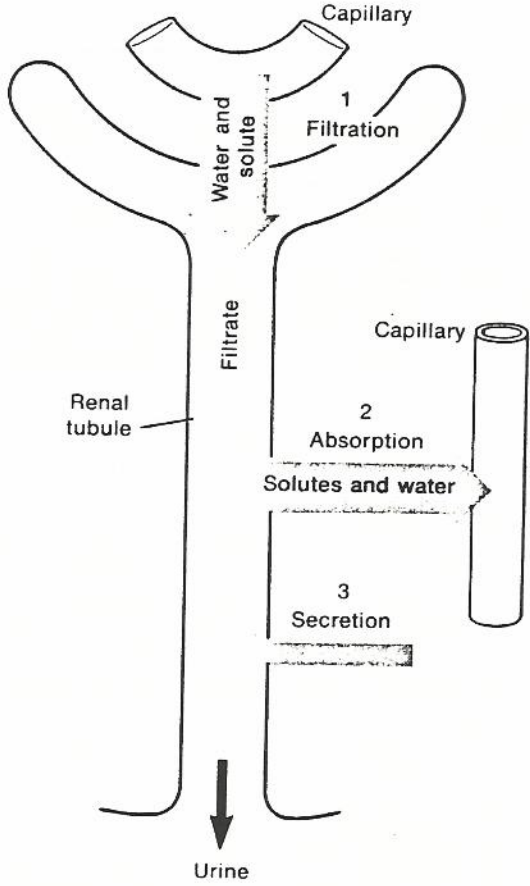
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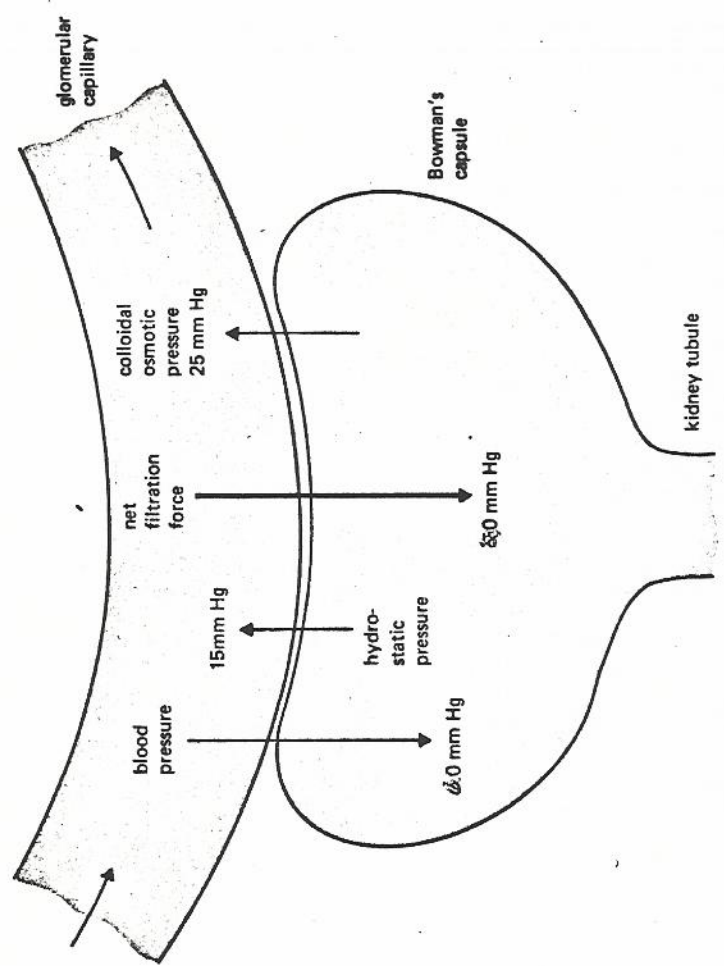
Ion	Distribution	Some Functions
Na ⁺	Main extracellular cation	<ul style="list-style-type: none"> Contributes major osmotic pressure of extracellular fluid Concentration gradient set up by Na pump provides potential energy for transport of substances across cell membrane Carries inward current for membrane excitation
K ⁺	Main cytoplasmic cation	<ul style="list-style-type: none"> Contributes to osmotic pressure of cytoplasm Establishes the resting potential Activates some enzymes Carries outward current for membrane repolarization
Ca ²⁺	Low concentration in cells	<ul style="list-style-type: none"> Stabilizes membranes Regulates muscle contraction Involved in "cementing" cells together Carries inward current in some excitable membranes (e.g., smooth and cardiac muscle) Regulates activity of many enzymes Regulates exocytosis Stabilizes membranes Antagonist of Ca action in many functions Acts as cofactor for many enzymes (e.g., myosin ATPase)
Mg ²⁺	Intra- and extracellular	<ul style="list-style-type: none"> Buffers H⁺ concentration Counterion for cations and positively charged groups of proteins
PO ₄ ³⁻ HCO ₃ ⁻	Intra- and extracellular	
Cl ⁻	Main anion of tissues	



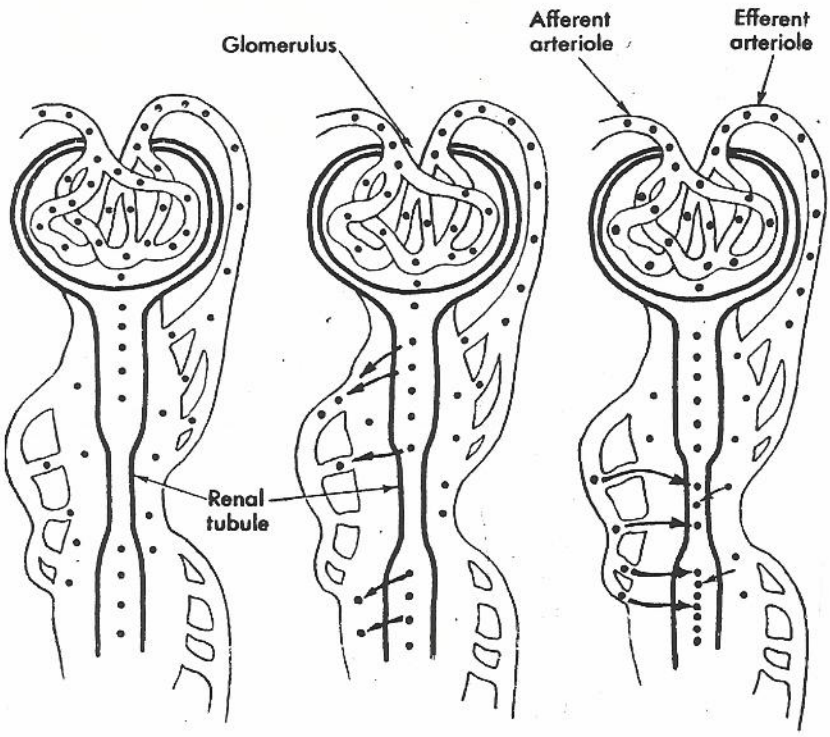




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10

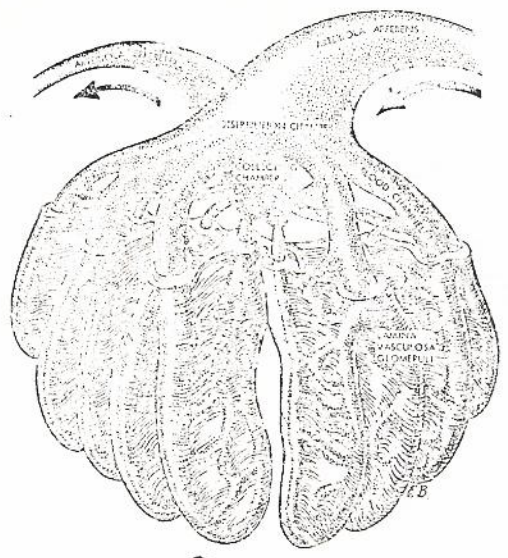


FILTRATION

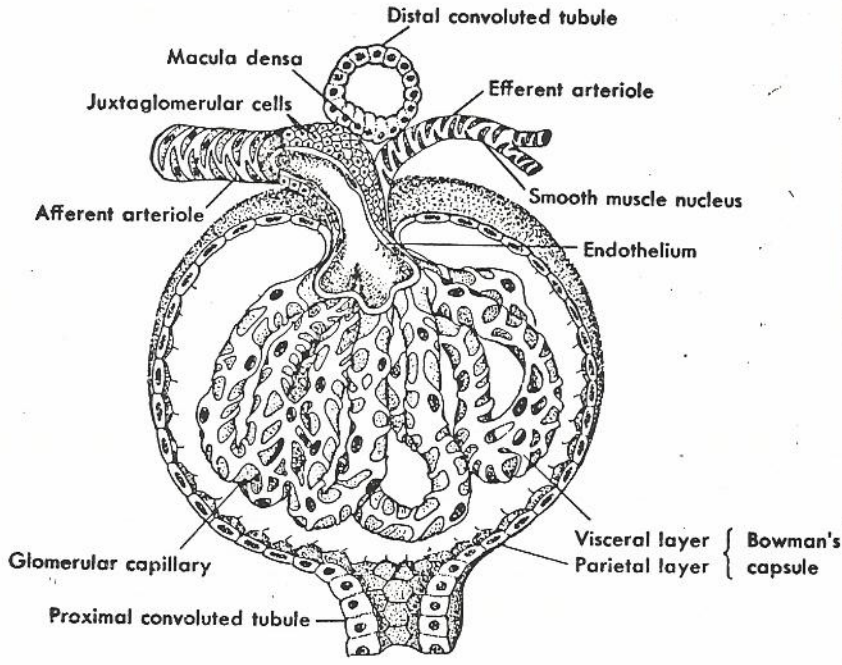
FILTRATION
MINUS
REABSORPTION

FILTRATION
PLUS
SECRETION

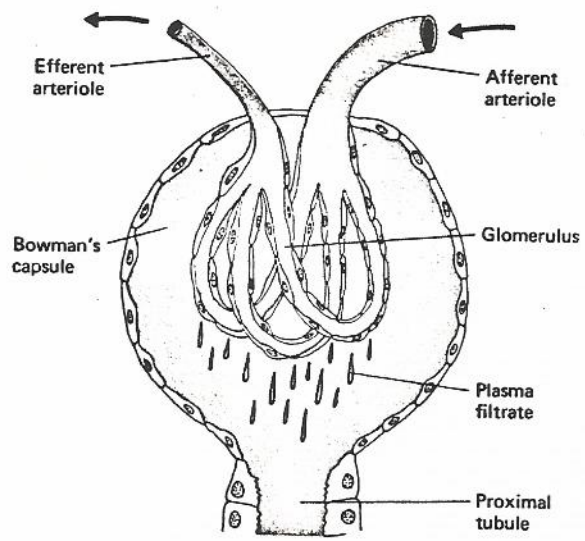
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12



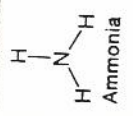
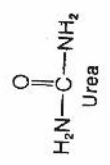
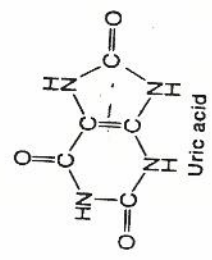
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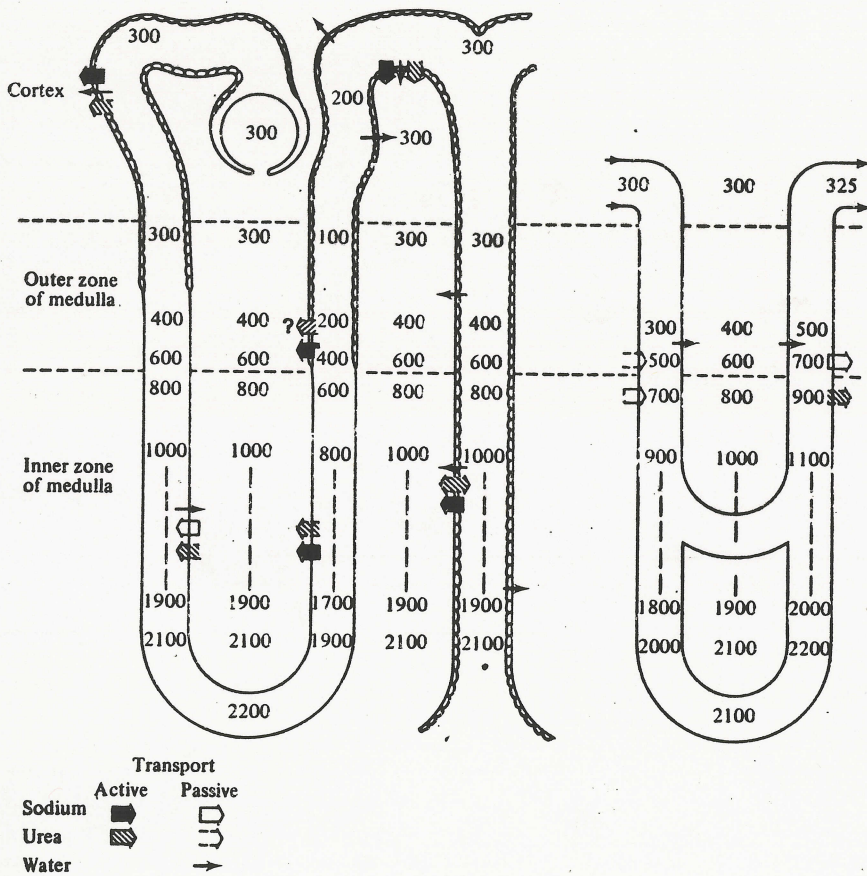
14

	Lumen of Kidney Tubule		Lumen of Capillary
Proximal Tubule	Isosmotic filtrate		
	glucose (100%)	active transport	→
	amino acids (100%)	active transport	→
	Na ⁺ (80%)	active transport	→
	other ions	active transport	→
Loop of Henle and Distal Tubule	Hypoosmotic fluid		
	H ₂ O	osmosis	→
	urea } uric acid }	diffusion	→
	Isosmotic fluid		
Collecting Duct	Hypoosmotic fluid		
	Na ⁺ (19.5%)	active transport (aldosterone)	→
	H ₂ O	osmosis (ADH)	→
	H ₂ O	osmosis (ADH)	→
	Urine		

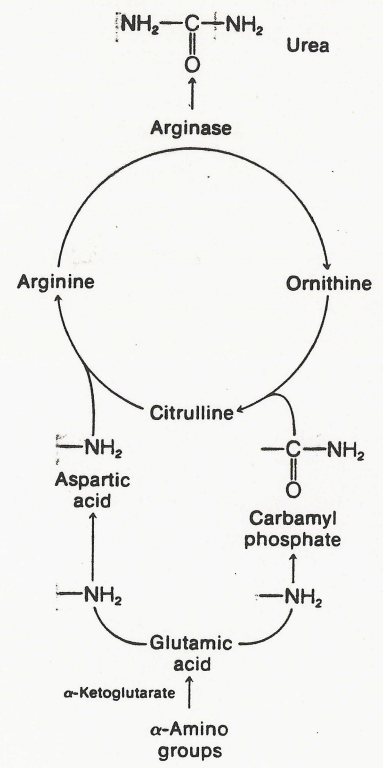
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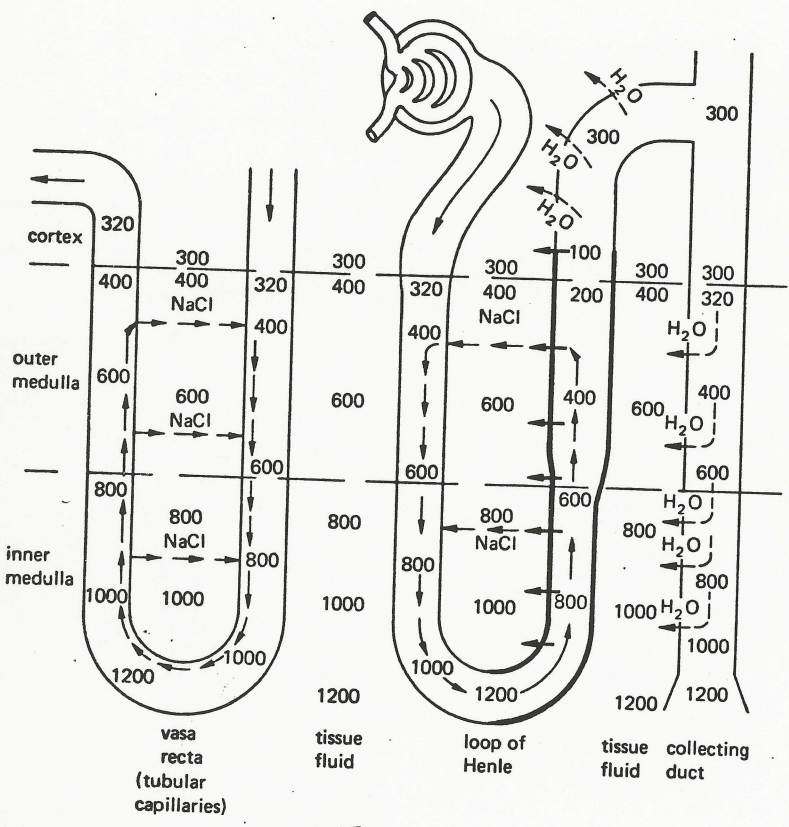
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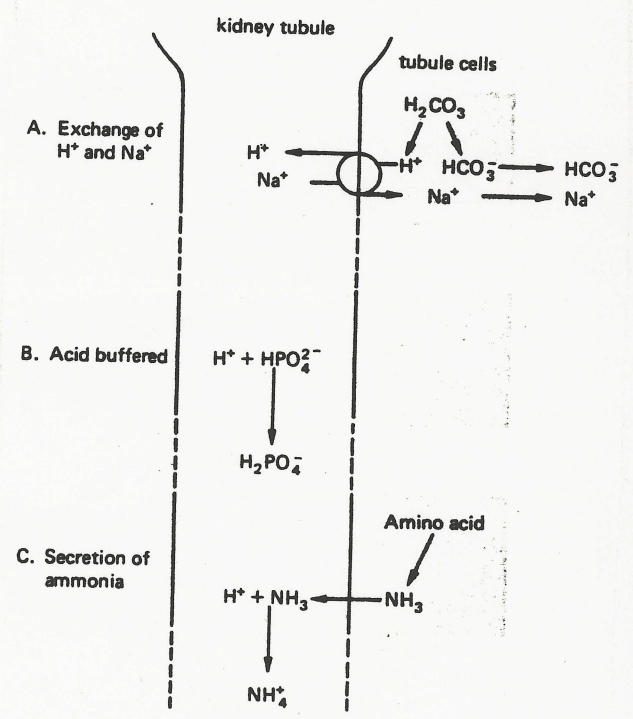
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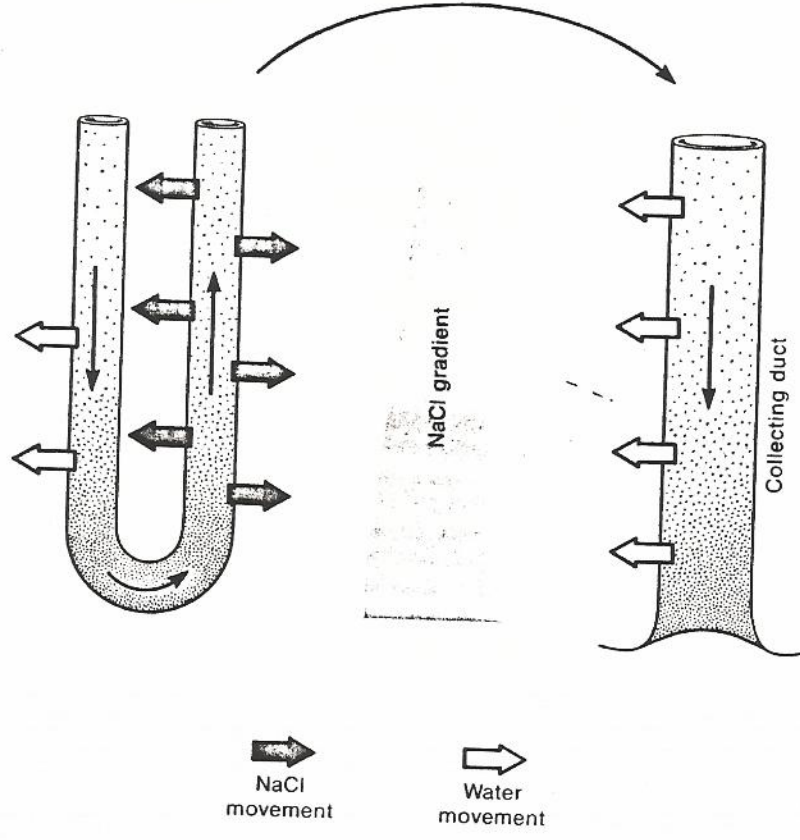
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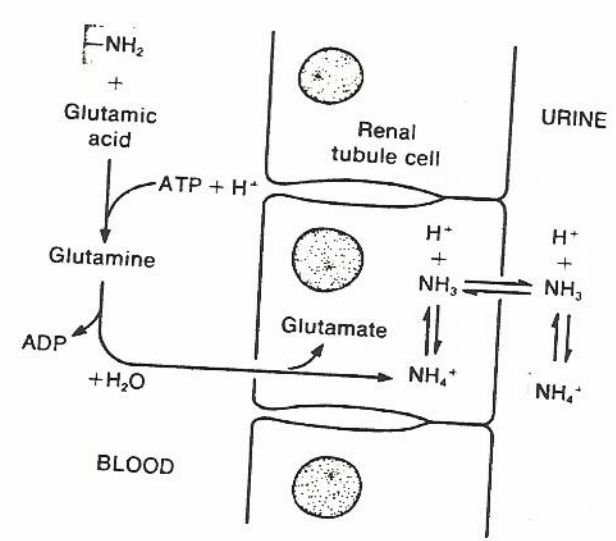
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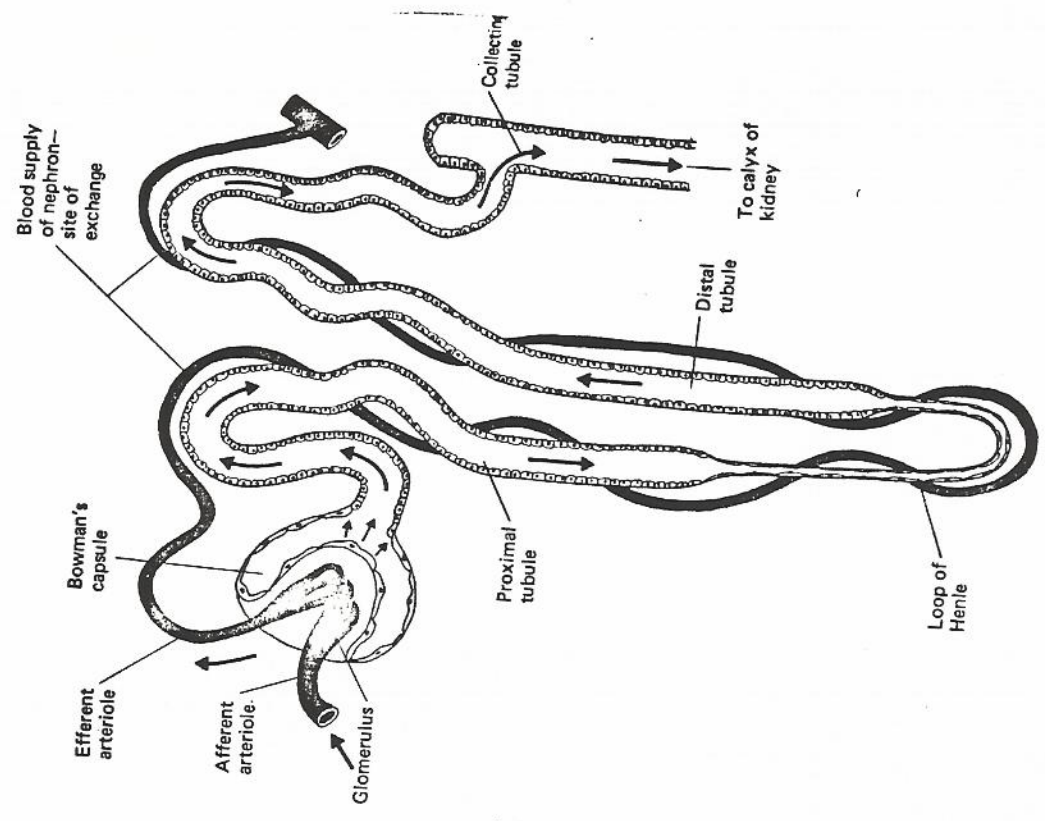
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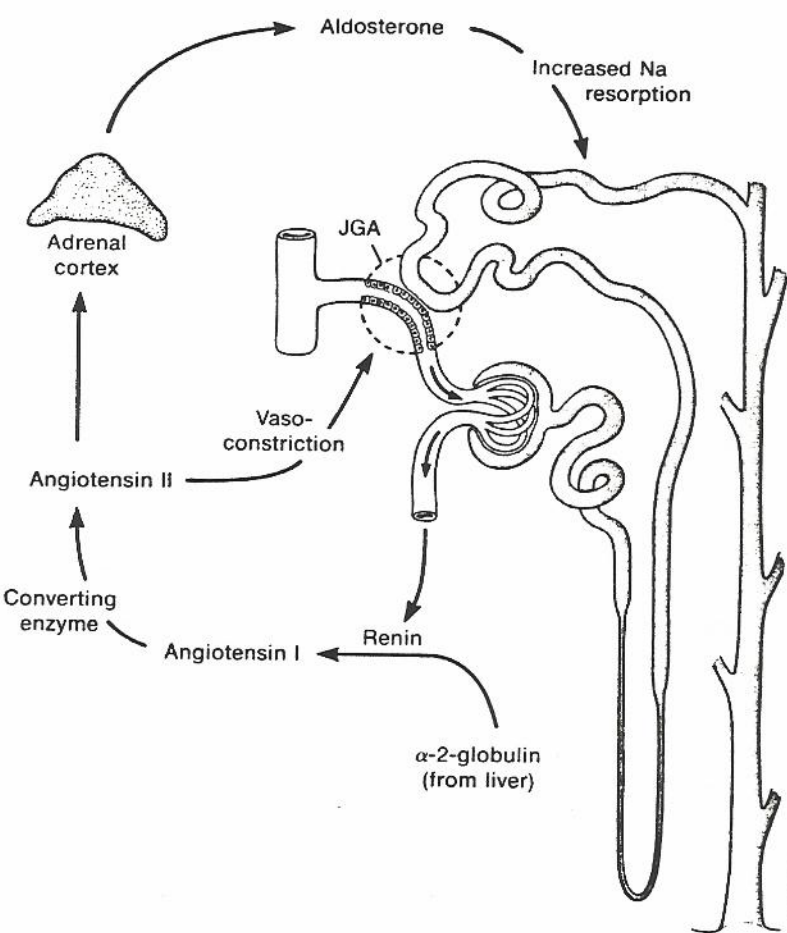
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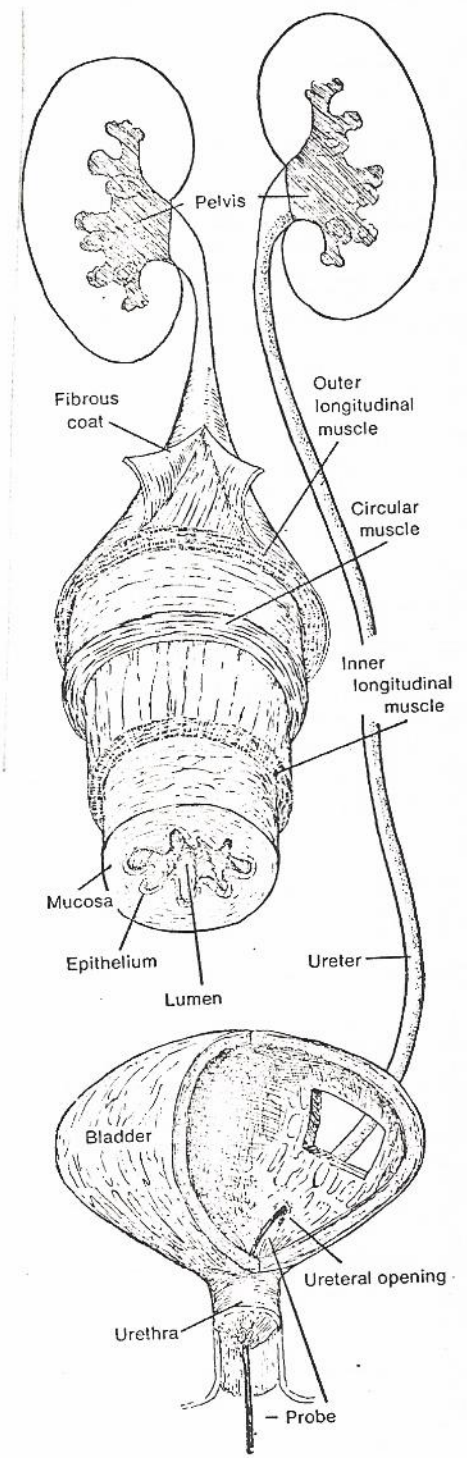
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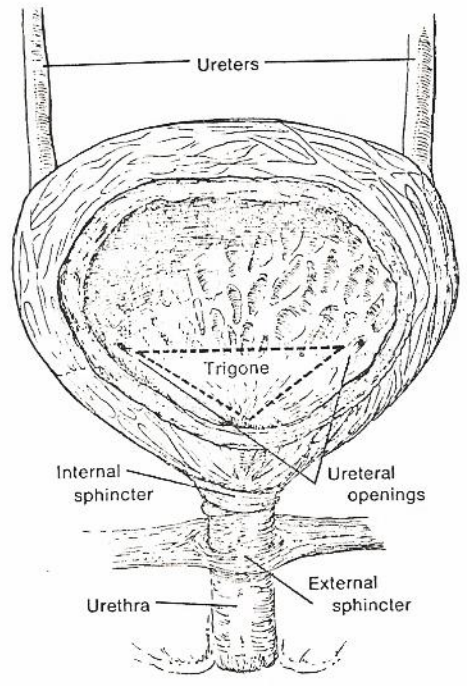
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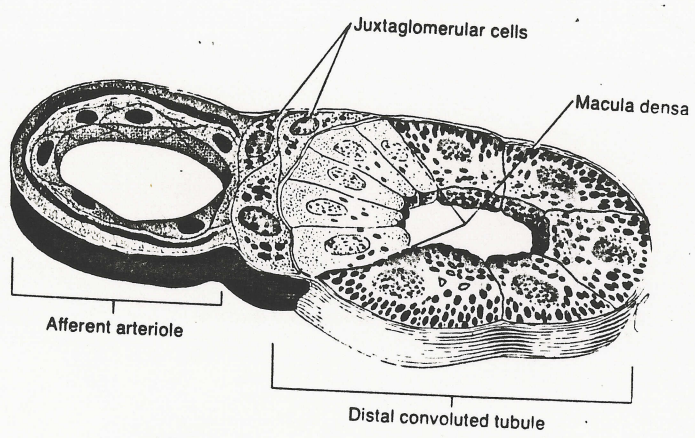
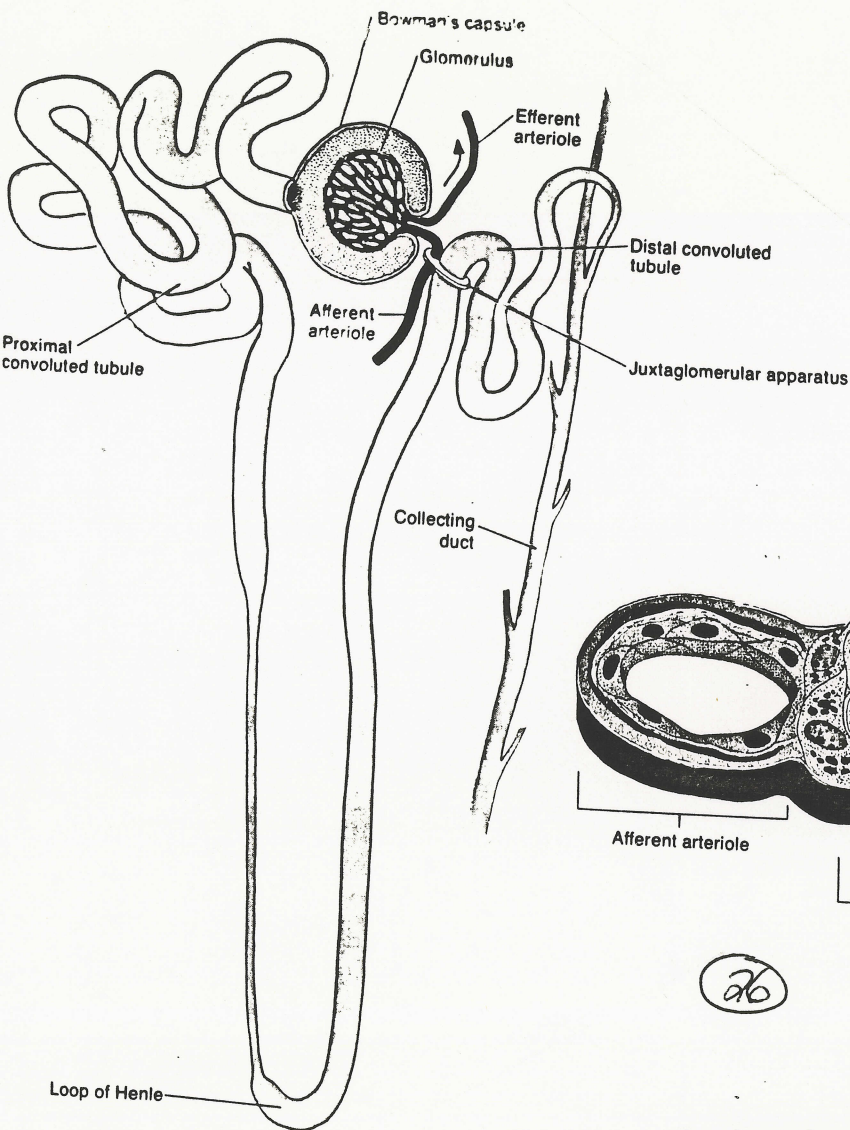


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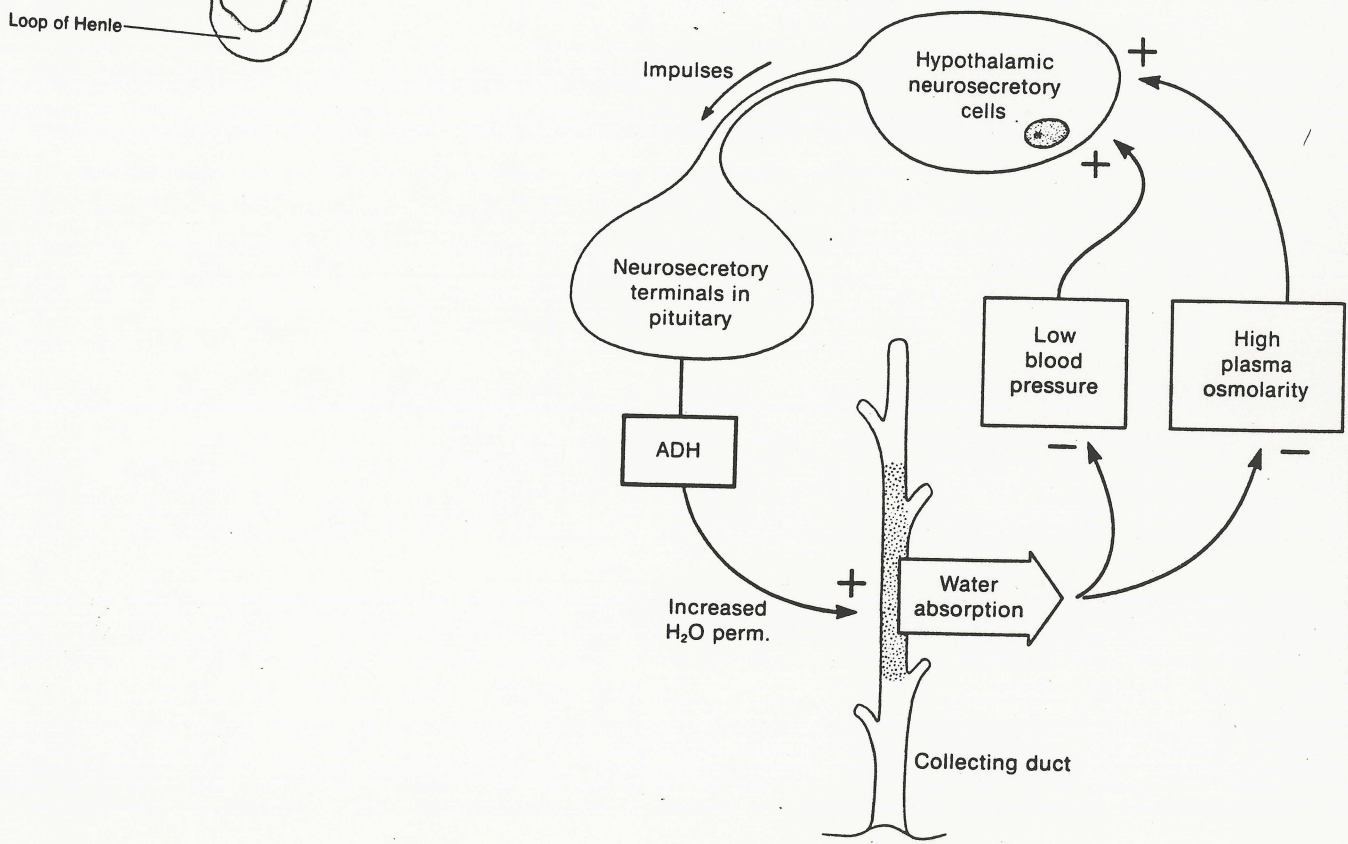


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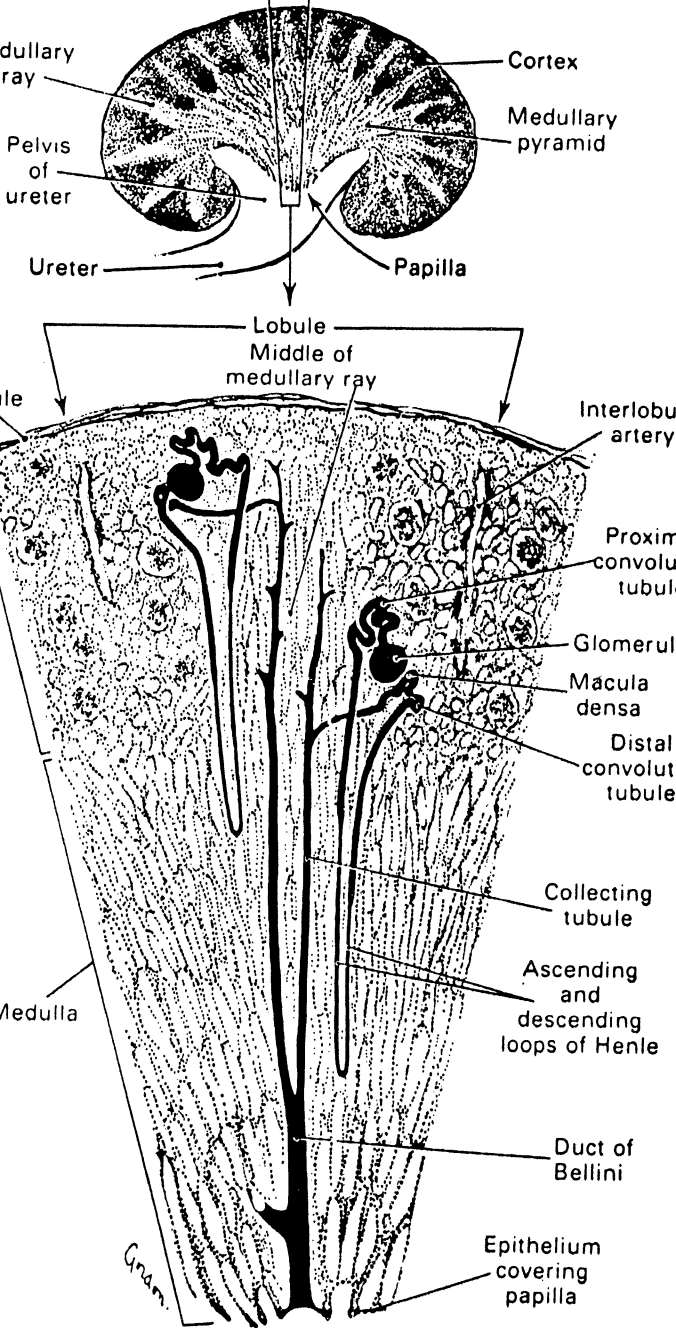


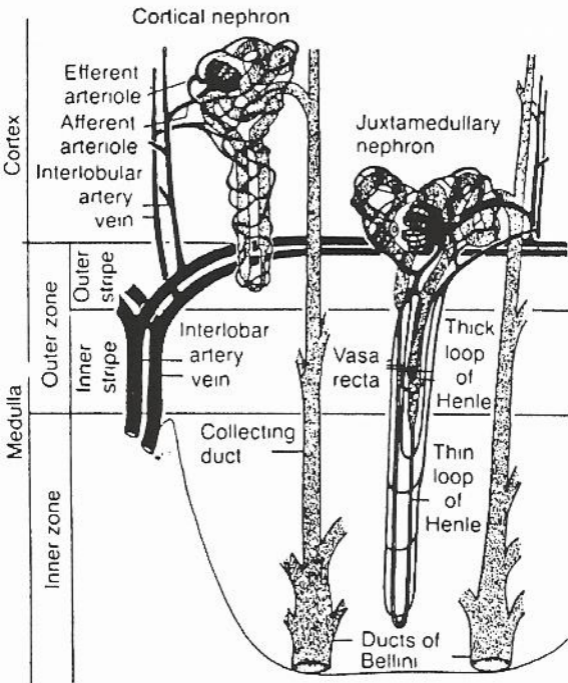


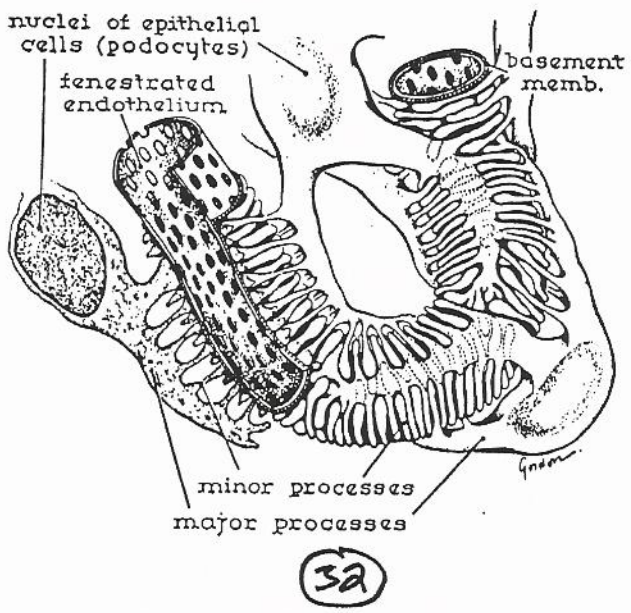
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(27)

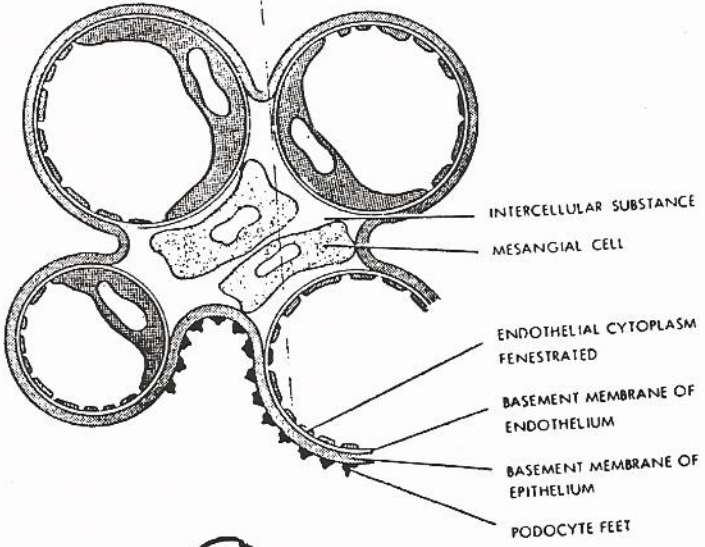




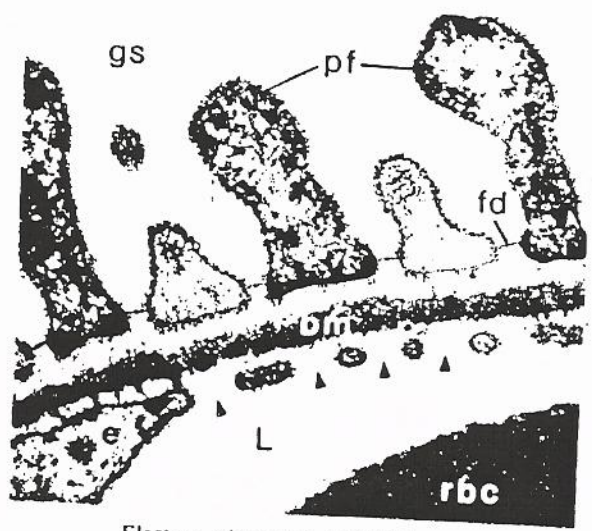


Basement membrane



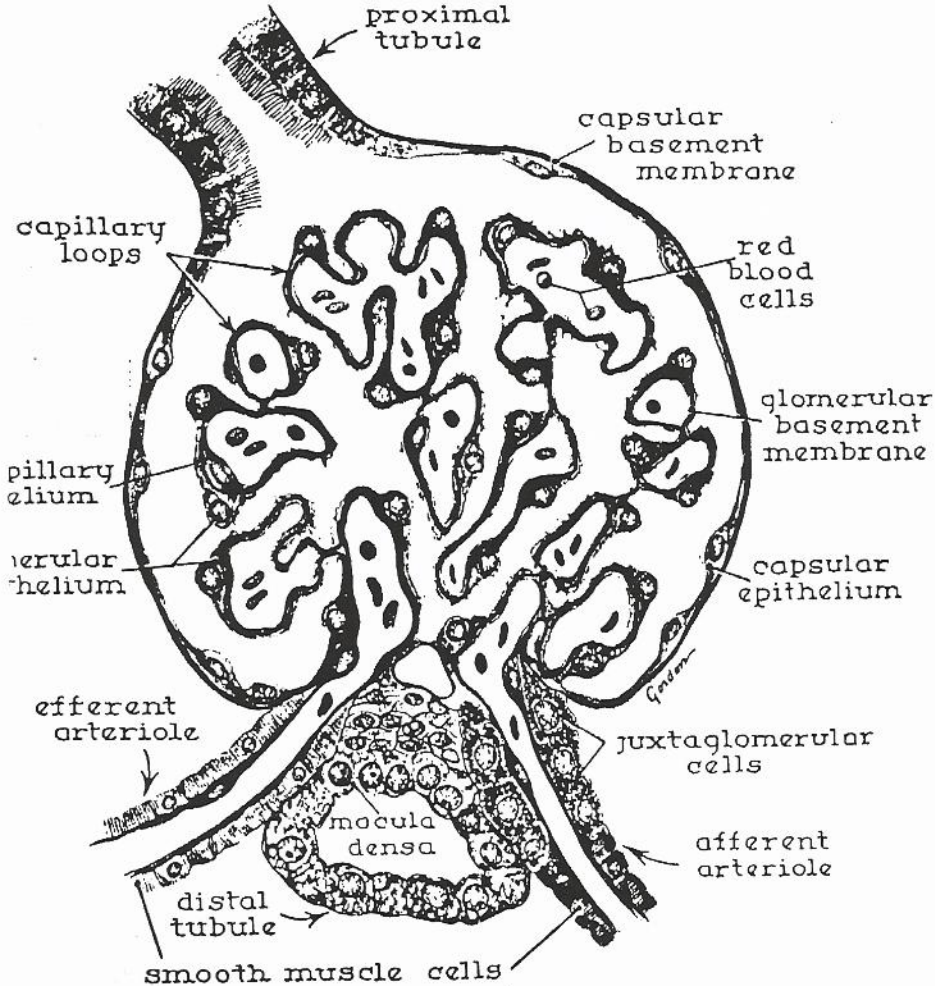


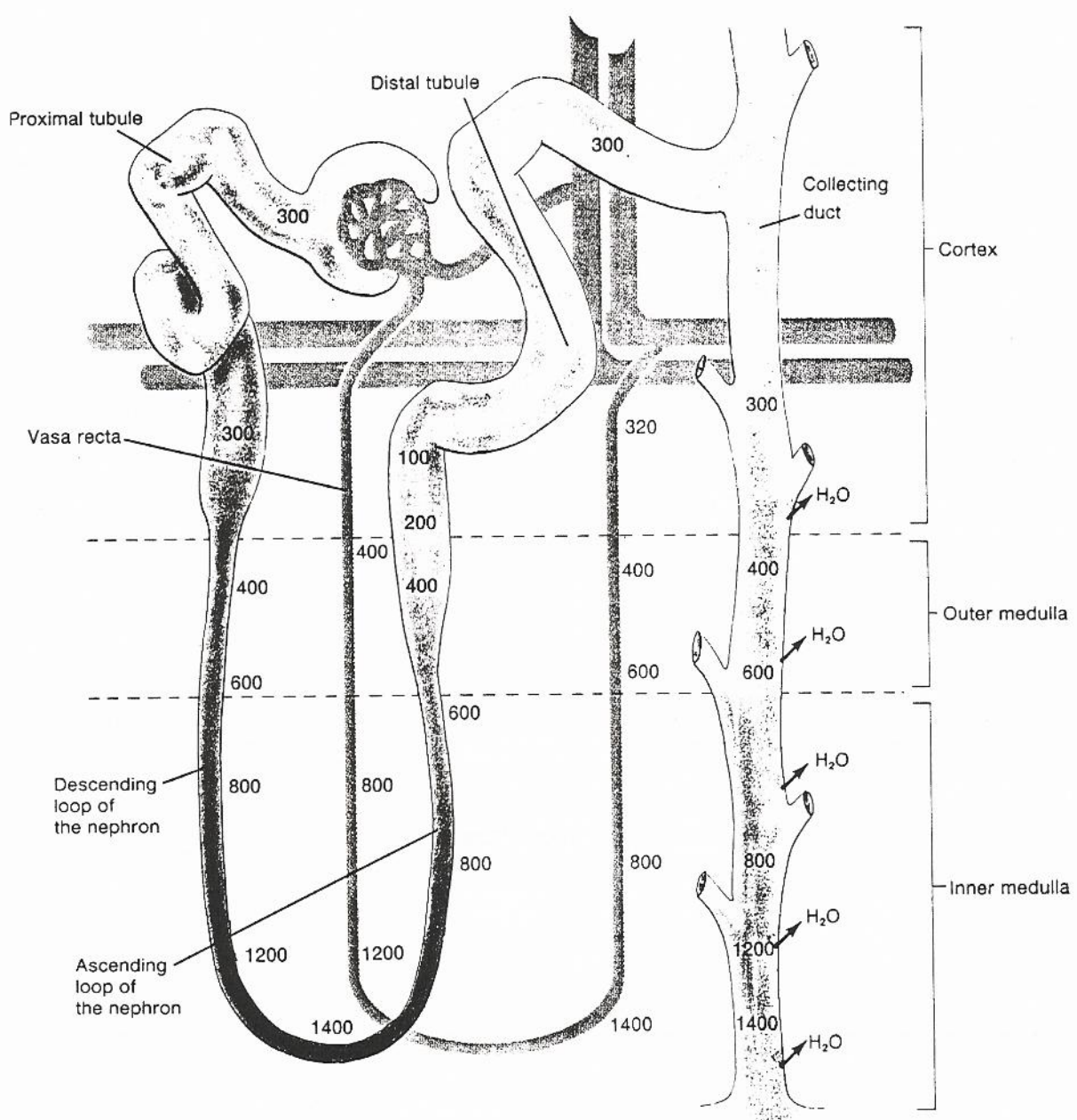
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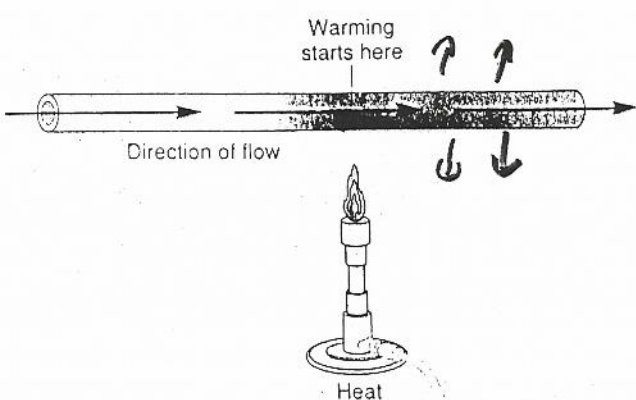


Electron micrograph ($\times 60,000$) of the glomerular filtration barrier.

35

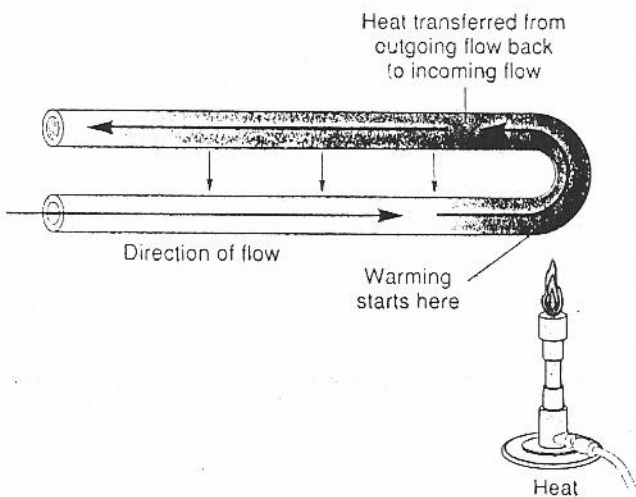






(a)

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(b)

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