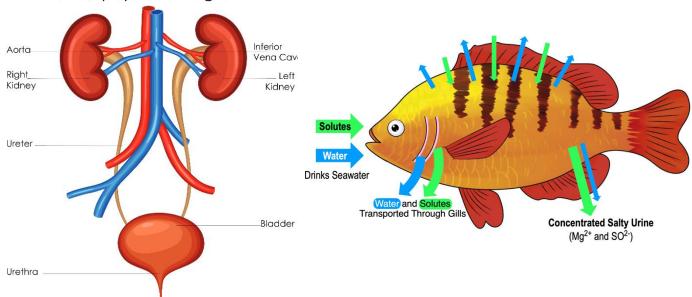
## **TOPIC: FLUID BALANCE**

- Osmoregulation regulation of solute balance and water loss to maintain homeostasis of water content
- Excretion process of eliminating waste from the body, like nitrogenous waste
- Kidney bean-shaped organs that filter blood plasma, and form urine
- *Ureter* transport urine from the kidney to the bladder
- Bladder organ that stores urine for elimination through the urethra
- *Urethra* opening through which urine leaves

**EXAMPLE:** Urinary System Diagram



- Nitrogenous waste nitrogen-containing metabolic wastes
  - □ *Ammonia* toxic substance that must be heavily diluted, forms from the breakdown of proteins and nucleic acids
  - □ **Urea** requires energy to produce, but is far less toxic than ammonia, excreted with minimal water loss
  - □ *Uric acid* mostly insoluble, so excreted with almost no water loss, but energy intensive to produce
  - ☐ Type of waste tied to evolutionary history, habitat, and osmotic stress
  - ☐ Fitness trade-off between energetic cost of excreting waste and conserving water

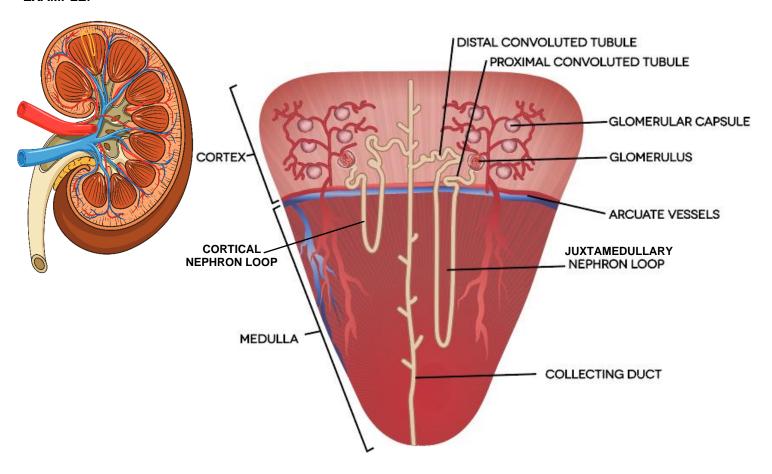
# **EXAMPLE:**

$$H^{NN}$$
 $H$ 
 $H_2N$ 
 $NH_2$ 
 $H_2N$ 
 $NH_2$ 

### **TOPIC**: FLUID BALANCE

- Kidney is mostly made of nephrons, small specialized structures that carry out the filtration and formation of urine
  - □ **Cortex** outer layer of the kidney
  - □ *Medulla* inner, "saltiest" layer of the kidney
- Nephron functional unit of the kidney made of tubule structures that transport filtrate surrounded by blood vessels
  - □ Nephron uses active transport of solutes to create a "salty" environment to reabsorb lots of water
  - □ **Cortical nephron** most common type of nephron that doesn't extend as deeply into the medulla
  - □ **Juxtamedullary nephron** responsible for generating and maintaining strong osmotic gradient for reabsorption

### **EXAMPLE:**



## **TOPIC: FLUID BALANCE**

- Renin-Angiotensin-Aldosterone-System controls blood volume homeostasis, increases water and salt reabsorption
  - □ Renin is released by juxtaglomerular apparatus in response to drops in blood pressure or volume
  - □ Renin leads to the cleavage of angiotensin □ angiotensin II
  - ☐ Angiotensin II raises blood pressure by vasoconstriction, and stimulates adrenal cortex to release aldosterone
- Aldosterone stimulates distal tubule and collecting duct to reabsorb more salt
  - □ Water follows reabsorption of salt, leading to increased blood volume and pressure
    - Isosmotic increase in blood volume because water and salt absorbed together
  - □ Pituitary hormone ACTH also stimulates release of aldosterone

#### **EXAMPLE:**

