

## ACTIVITY 8-2. HUMAN EXCRETORY SYSTEM

In humans, waste materials from the cells diffuse into the blood. As the blood circulates through the body, four different organs remove the wastes. The four organs of excretion are the liver, kidneys, lungs, and skin.

**liver** The liver removes worn-out red blood cells and excess amino acids from the blood and breaks them down. Iron compounds and bile are produced from the breakdown of the hemoglobin of the red cells. The iron is reused by the body. The bile is stored temporarily in the *gallbladder*. It then passes into the small intestine where it aids in the breakdown of fats. It is eventually eliminated from the body with the digestive wastes.

Excess amino acids entering the liver are broken down by a process called *deamination*. This separates the nonamino portion of the molecule from the amino group. The nonamino portion may be used in the synthesis of carbohydrates or fats or further oxidized for energy. The amino group,  $\text{NH}_2$ , combines with a hydrogen atom to form ammonia,  $\text{NH}_3$ . Then, through a series of reactions called the *ornithine cycle*, the ammonia is quickly converted to urea,  $\text{NH}_2\text{CONH}_2$ , which is less toxic to the cells than ammonia. Urea is carried from the liver to the kidney by the blood and is excreted from the body in the form of urine.

### Questions

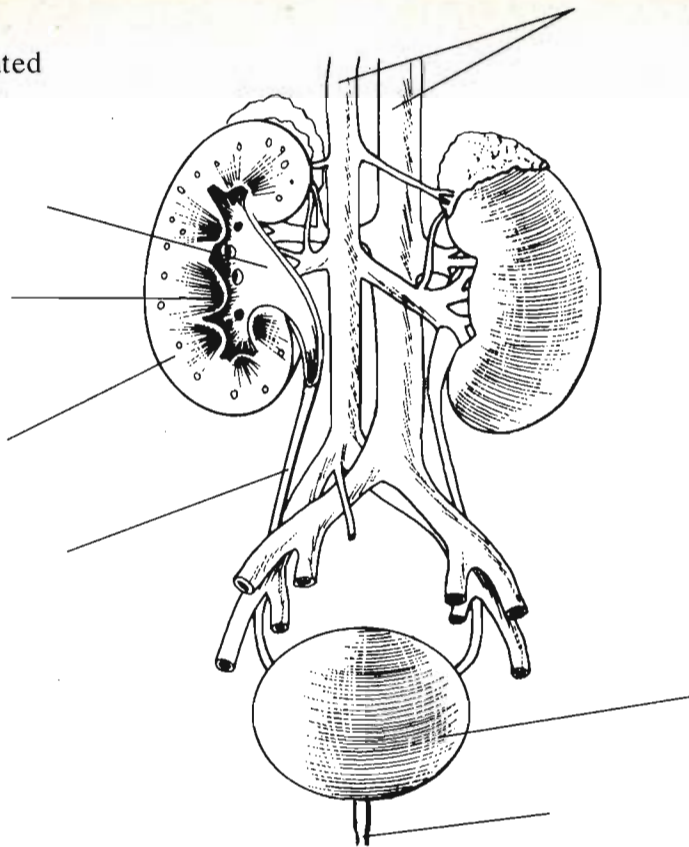
1. What happens to worn-out red blood cells in the liver?
2. What happens to excess amino acids in the liver?
3. What nitrogenous waste passes from the liver to the urinary system? By what series of reactions is this substance formed?

**urinary system** The *urinary system* consists of the kidneys and associated structures — the ureters, bladder, and urethra.

The renal arteries, which branch off the aorta, carry blood to the *kidneys*, which filter out urea, salts, and water. These substances form the *urine* which passes from the kidneys into the *ureter*, a tube leading to the *urinary bladder*. The urine is stored temporarily in the bladder, and then excreted from the body through the *urethra*.

## Questions

1. Label the parts indicated in the drawing below.



2. What is the function of the urinary system?

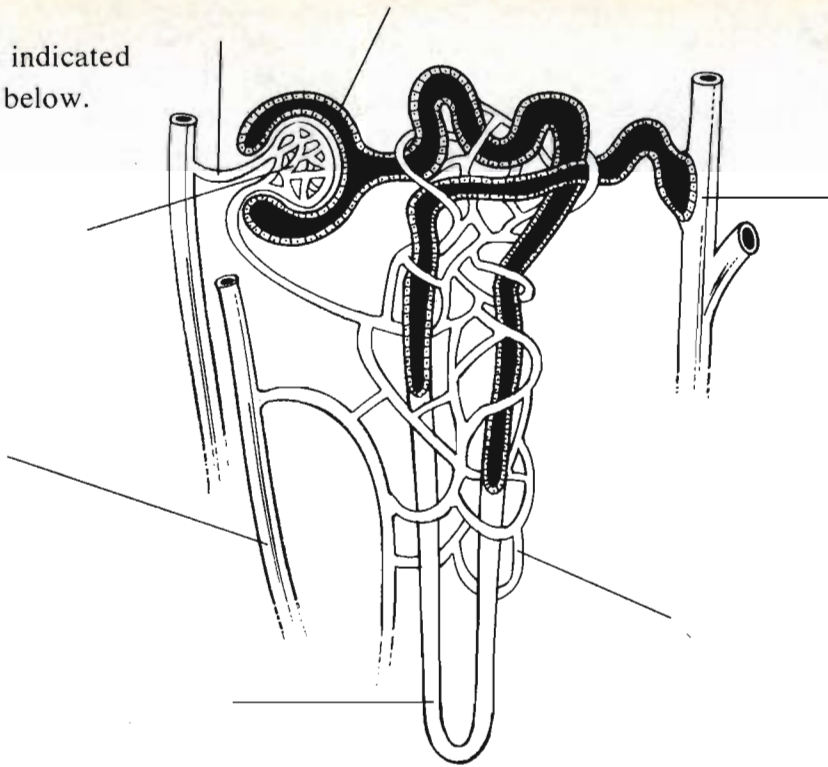
### kidneys

The kidney is divided into three distinct regions. The outermost layer is the *cortex*, which consists of filtering structures called *nephrons*. The middle layer, the *medulla*, consists of collecting tubes, which drain the urine from the nephrons. The inner area is the *pelvis*, where urine is drained from all the collecting tubes. From the pelvis, urine drains into the ureter and then into the bladder.

The nephron is the functional unit of the kidney. A nephron begins with an arteriole, which carries blood to be filtered. The arteriole enters a cup-shaped structure called *Bowman's capsule*. Within the capsule, the arteriole divides, forming a ball of capillaries called the *glomerulus*. The blood in the glomerulus is under high pressure, and water containing urea, salts, and a variety of other substances is forced out of the blood and diffuses into the cells of the surrounding capsule. From the capsule this *nephric filtrate* passes into the loop of the *renal tubule*, which is surrounded by capillaries. As the filtrate passes through the tubule, most of the water and useful substances are reabsorbed into the blood, a process requiring active transport. The remaining concentrated filtrate is the urine, which passes into collecting tubes and is drained from the kidneys.

## Questions

1. Label the parts indicated in the drawing below.



2. The three layers of the kidney are the \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
3. What materials are filtered out of the blood in the glomerulus?
4. What materials are reabsorbed back into the blood from the nephric filtrate?
5. What substances are found in urine?

**lungs** The lungs are considered to be excretory organs because water vapor and carbon dioxide, by-products of cell respiration, are excreted from the body by the lungs.

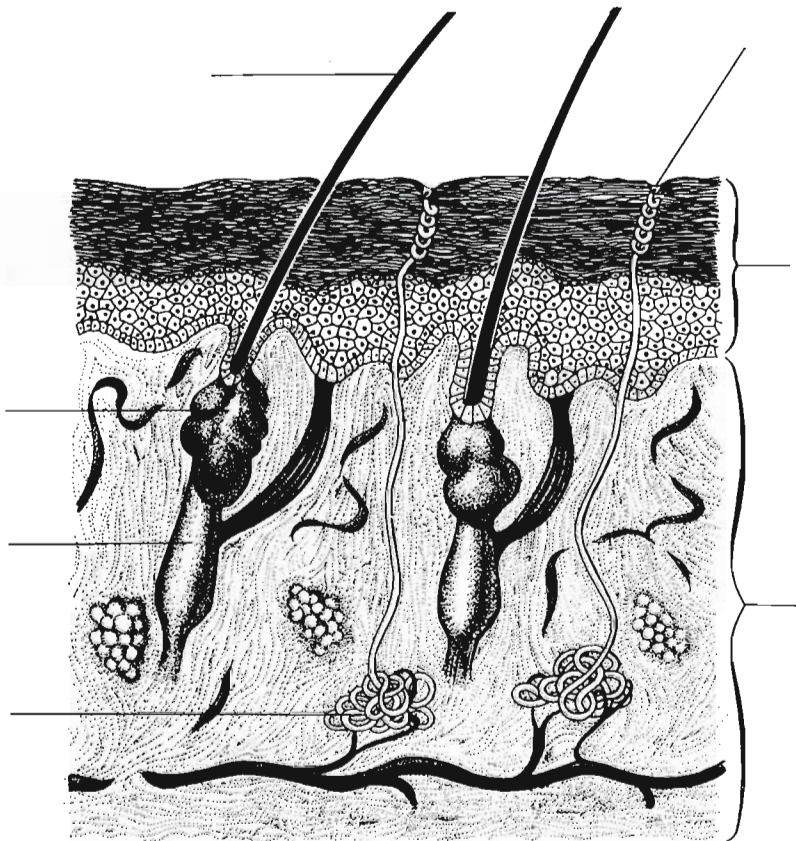
## Questions

1. What metabolic wastes are excreted by the lungs?
2. During which life process are these wastes produced?

**skin** The skin is an excretory organ because sweat glands filter water, urea, and salts from the blood, and these substances, in the form of sweat, pass to the surface of the skin and are removed. In addition to removing some metabolic wastes, the skin is involved in regulation of body temperature.

## Questions

1. Label the parts indicated in the drawing below.



2. What metabolic wastes are excreted by the skin?
3. How are these wastes removed from the bloodstream and how do they reach the surface of the skin?
4. How does the skin function in the regulation of body temperature?

# PUZZLE: UNIT 8

## Across

1. Process by which amino groups are removed from amino acids.
5. The nitrogenous wastes of grasshoppers are in the form of \_\_\_\_\_ acid.
8. The excretory tubules of earthworms are called \_\_\_\_\_.
9. In the earthworm nitrogenous wastes are in the form of ammonia and \_\_\_\_\_.
10. The excretory product of the skin is \_\_\_\_\_.
11. The formation of urea from ammonia takes place in the \_\_\_\_\_.
13. The functional units of the kidneys are \_\_\_\_\_.
16. The excretory organ that is divided into a cortex, medulla, and pelvis is the \_\_\_\_\_.
17. The ball of capillaries within Bowman's capsule is the \_\_\_\_\_.

## Down

2. Highly toxic nitrogenous waste of protozoa.
3. Process by which wastes are removed from the blood in the kidney.
4. Organs responsible for excretion of carbon dioxide.
6. The reactions by which ammonia is converted to urea form the \_\_\_\_\_ cycle.
7. Urine drained from the kidneys is stored temporarily in the \_\_\_\_\_.
12. Tubes that connect renal pelvis with urinary bladder.
14. Excretory organs of human body are the kidneys, liver, lungs and \_\_\_\_\_.
15. The blood supply of the kidneys is from the \_\_\_\_\_ arteries and veins.

