

## 6. BLOOD AND HEMATOPOIESIS

### BLOOD

Blood is a specialized connective tissue consisting of **cells** and **plasma**. These components may be separated by centrifugation if blood is collected in the presence of anticoagulants. The sedimented erythrocytes or red blood cells (RBCs) constitute about 45% of blood volume. This percentage of erythrocyte volume is the **hematocrit**. Sitting on top of the erythrocyte layer is the **buffy coat** layer, which contains **leukocytes** (white blood cells) and **platelets**. The translucent supernatant fraction above the packed RBCs consists of plasma. Normal adult blood volume measures 5 to 6 L.

### Plasma

Plasma is the fluid component of blood (Figure 6-1). Plasma contains salts and organic compounds (including amino acids, lipids, vitamins, proteins, and hormones). In the absence of anticoagulants, the cellular elements of blood, together with plasma proteins (mostly **fibrinogen**), form a clot in the test tube. The fluid portion is called **serum**, which is essentially fibrinogen-free plasma.

### Cellular elements of the blood: Red blood cells (erythrocytes)

RBCs, also called erythrocytes (Greek *erythros*, red; *kytos*, cell), are non-nucleated, biconcave-shaped cells measuring 7.8  $\mu\text{m}$  in diameter (unfixed). RBCs lack organelles and consist only of a plasma membrane, its underlying cytoskeleton (Figure 6-2), hemoglobin, and glycolytic enzymes.

RBCs (average number:  $4$  to  $6 \times 10^6$  per  $\text{mm}^3$ ) circulate for 120 days. Senescent RBCs are removed by phagocytosis or destroyed by **hemolysis** in the spleen. RBCs are replaced in the circulation by **reticulocytes**, which complete their hemoglobin synthesis and maturation 1 to 2 days after entering the circulation. Reticulocytes account for 1% to 2% of circulating RBCs. RBCs transport oxygen and carbon dioxide and are confined to the circulatory system.

Figure 6-1. Blood: Plasma, serum, and cells

