

FIGURE 3.2 Levels of organization in the human body. Cells are composed of chemicals; tissues are made up of cells; organs are composed of tissues, and the organism contains organ systems.

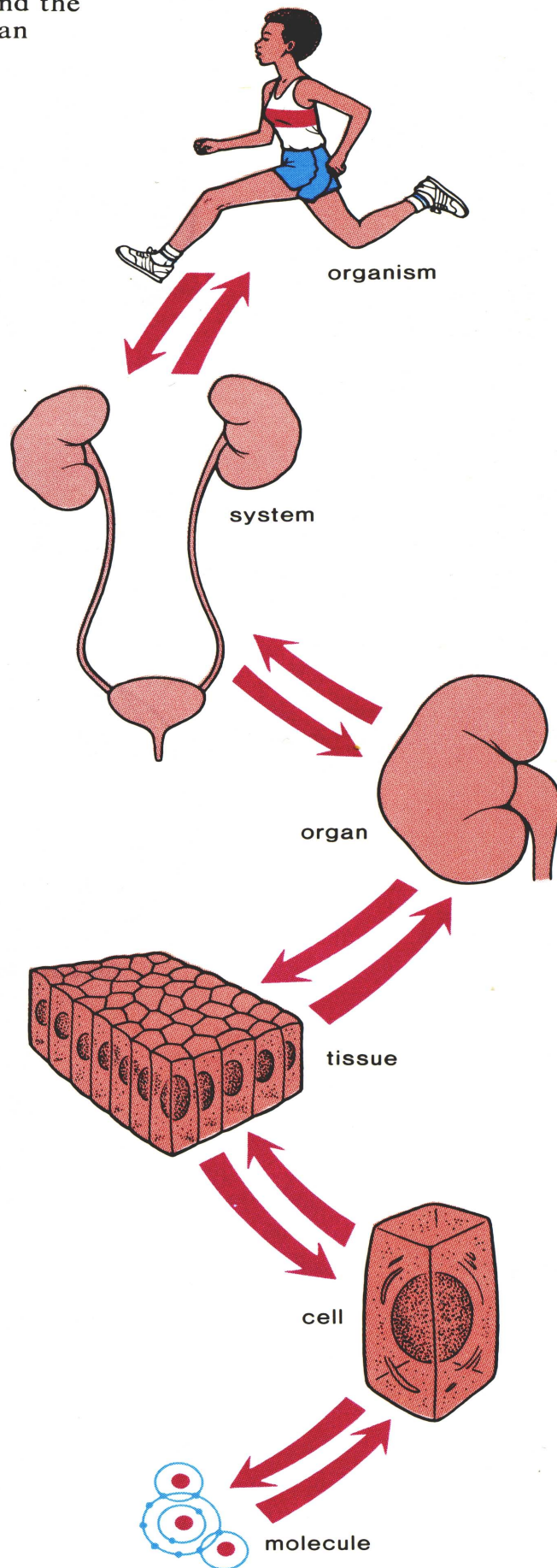
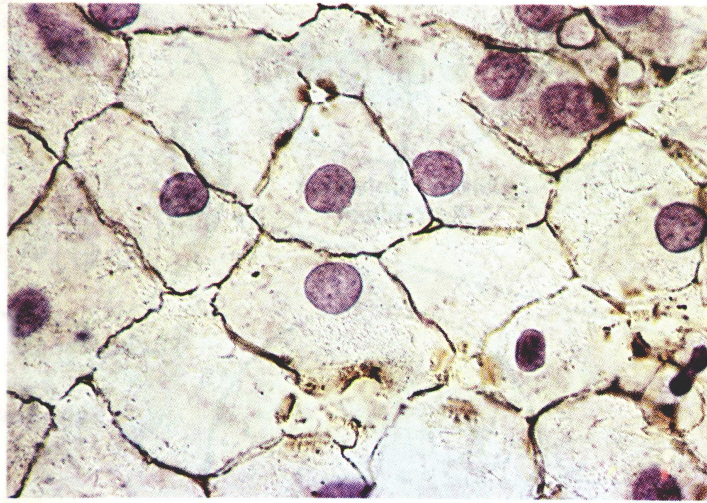
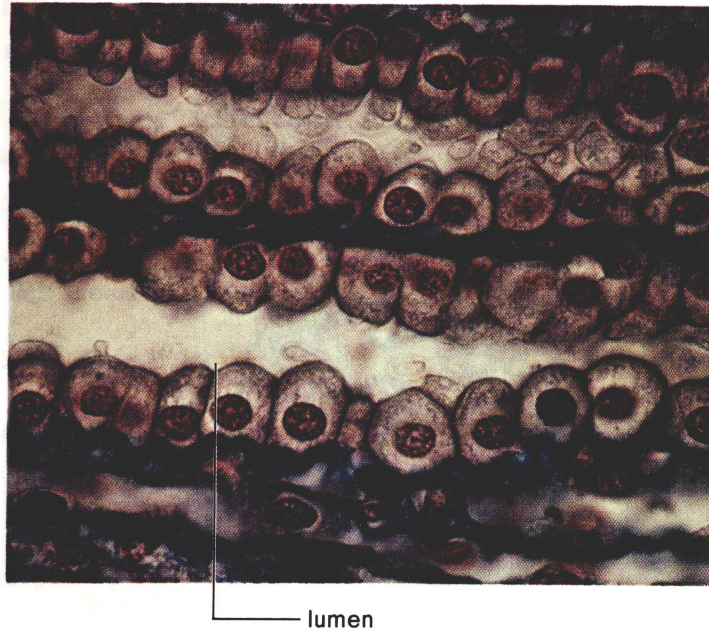


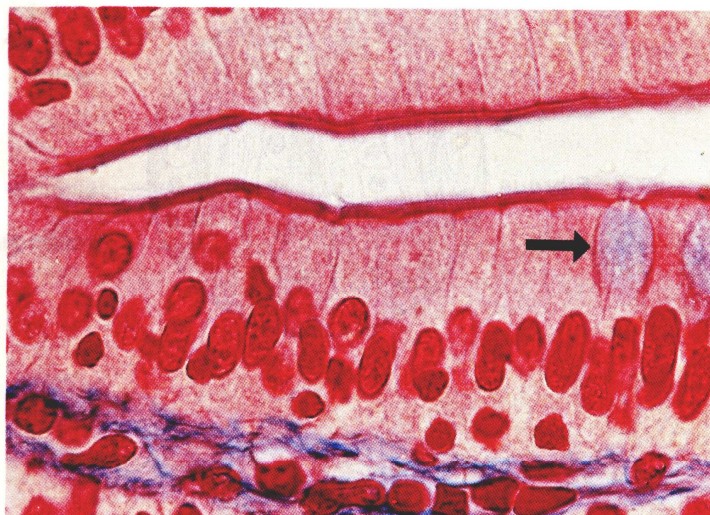
FIGURE 3.4 Simple epithelial tissue. *a.* Simple squamous consists of a single layer of thin cells. *b.* Simple cuboidal is composed of cells that look like cubes. *c.* Simple columnar cells resemble columns because they are elongated. (The arrow points to a goblet cell.)



a.



b.

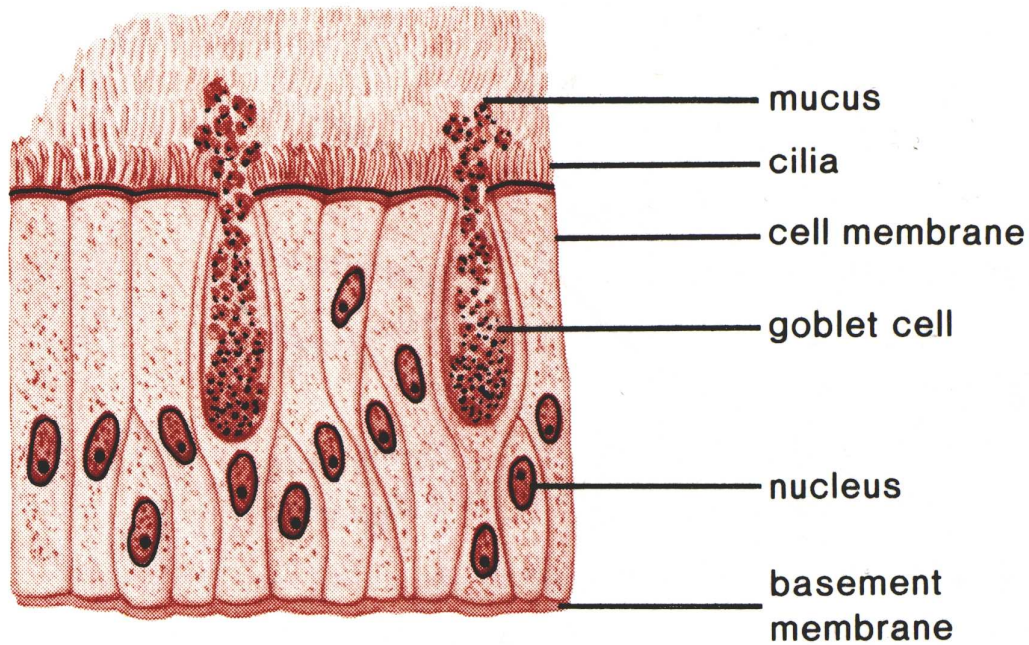


c.

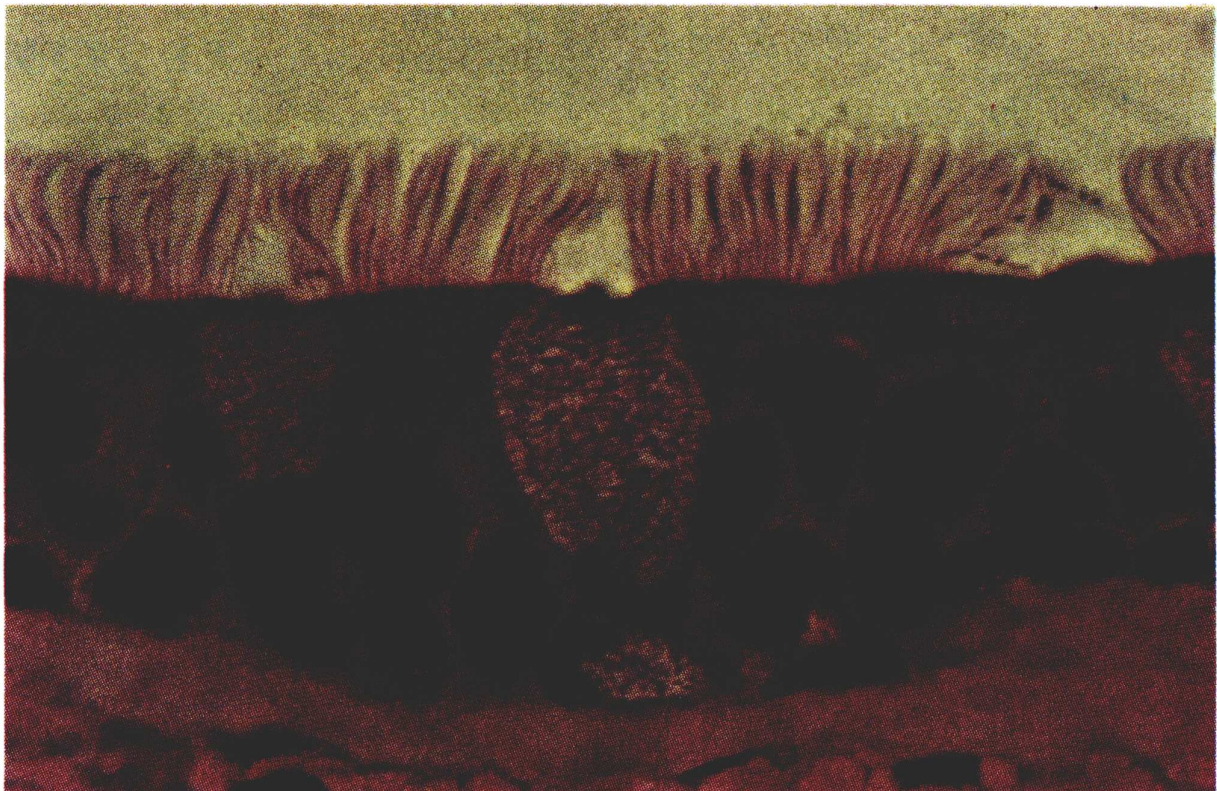
Epitelové tkáně

Druh	Funkce	Lokalizace
Jednovrstevný plošný	filtrace, difuze, osmóza	ústní dutina, stěny kapilár, výstelka krevních vlásečnic
Jednovrstevný krychlový	sekrece, absorbce	povrch vaječníků, výstelka ledvinových kanálků
Jednovrstevný válcový	ochrana, sekrece, absorbce	výstelka dělohy, trubice zažívacího traktu
Pseudostratifikovaný válcový	ochrana, sekrece, posun hlenů a pohlavních buněk	výstelka dýchacích cest, různé trubice reprodukčního systému
Vícevrstevný plošný	ochrana	vnější vrstva kůže, pochva a konečník

FIGURE 3.6 *a.* Pseudostratified ciliated columnar epithelium from the lining of the windpipe. When you cough, material trapped in the mucus secreted by goblet cells is moved upward to the throat, where it can be swallowed. *b.* Photomicrograph of pseudostratified ciliated columnar epithelium.

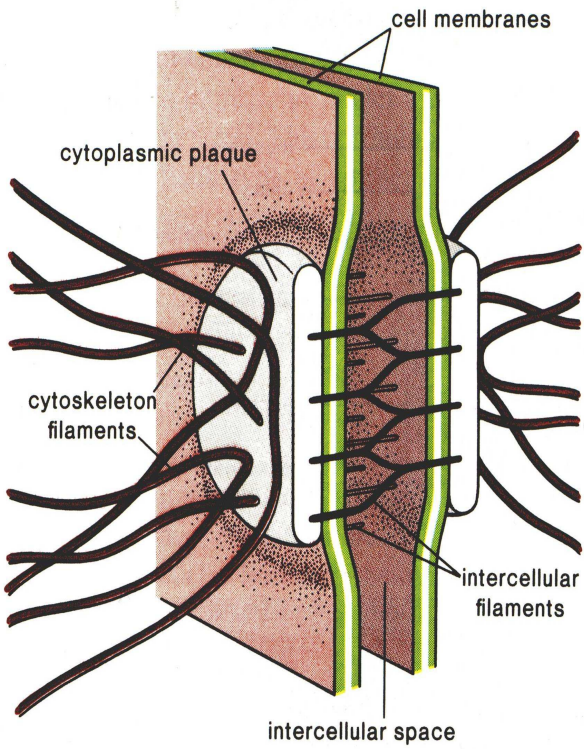


a.

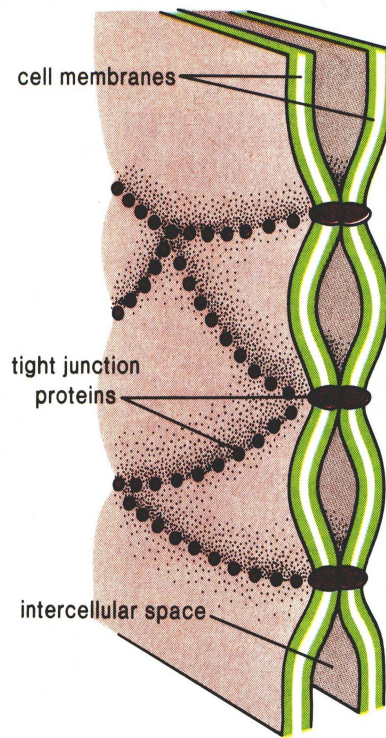


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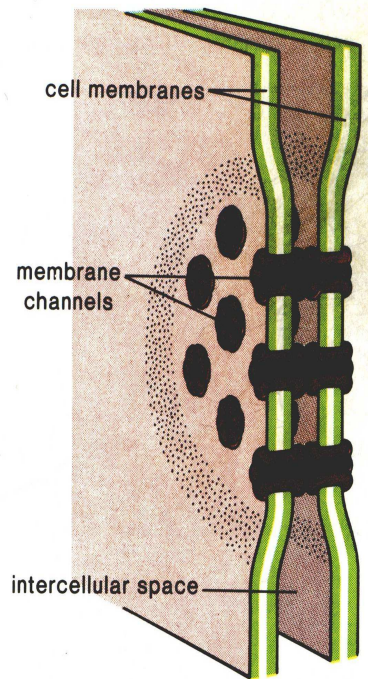
FIGURE 3.7 Epithelial cells are held tightly together by (a) desmosomes and (b) tight junctions. c. Gap junctions allow materials to pass from cell to cell.



a. spot desmosome



b. tight junction



c. gap junction

FIGURE 3.8 Loose connective tissue has plenty of space between components. This type of tissue is found surrounding and between the organs.

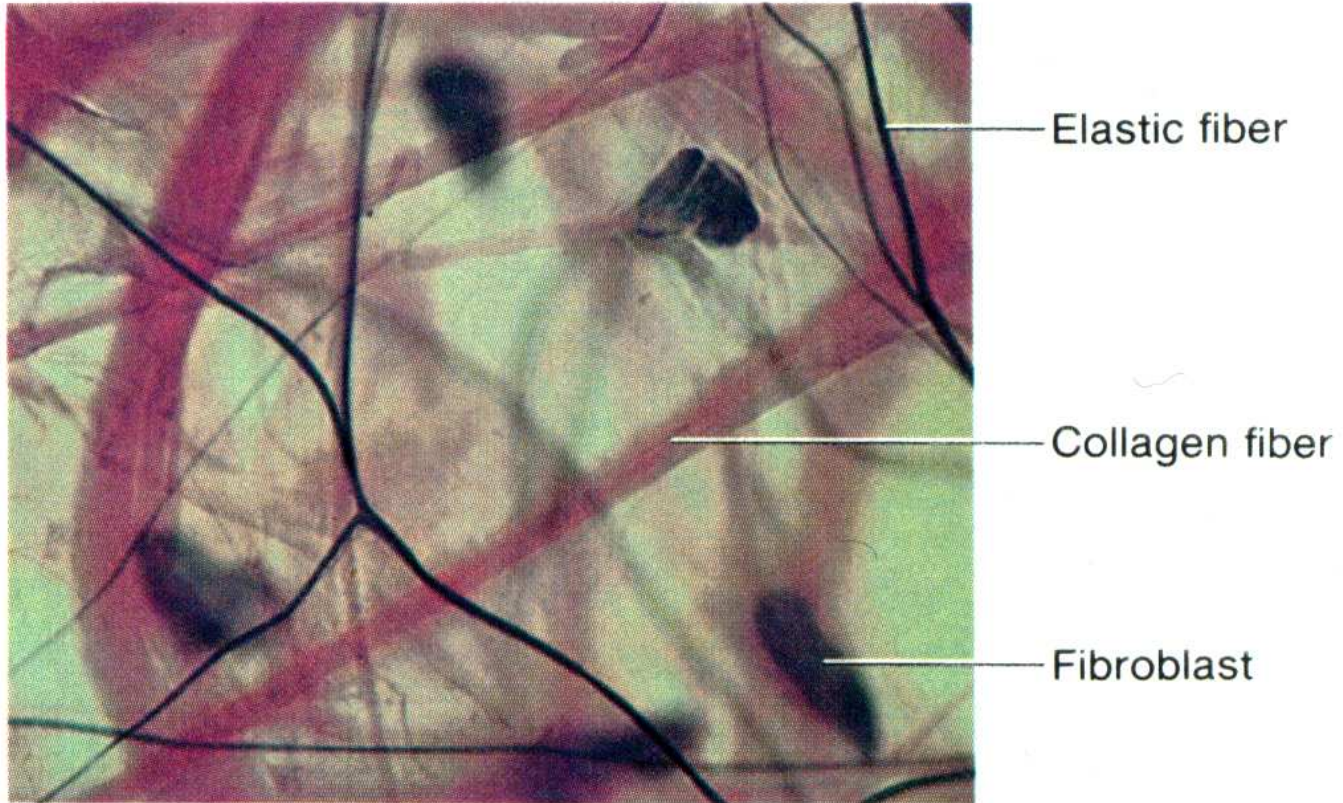


FIGURE 3.9 Adipose tissue cells look like white “ghosts” because they are filled with fat. The nucleus of one cell is indicated by the arrow.

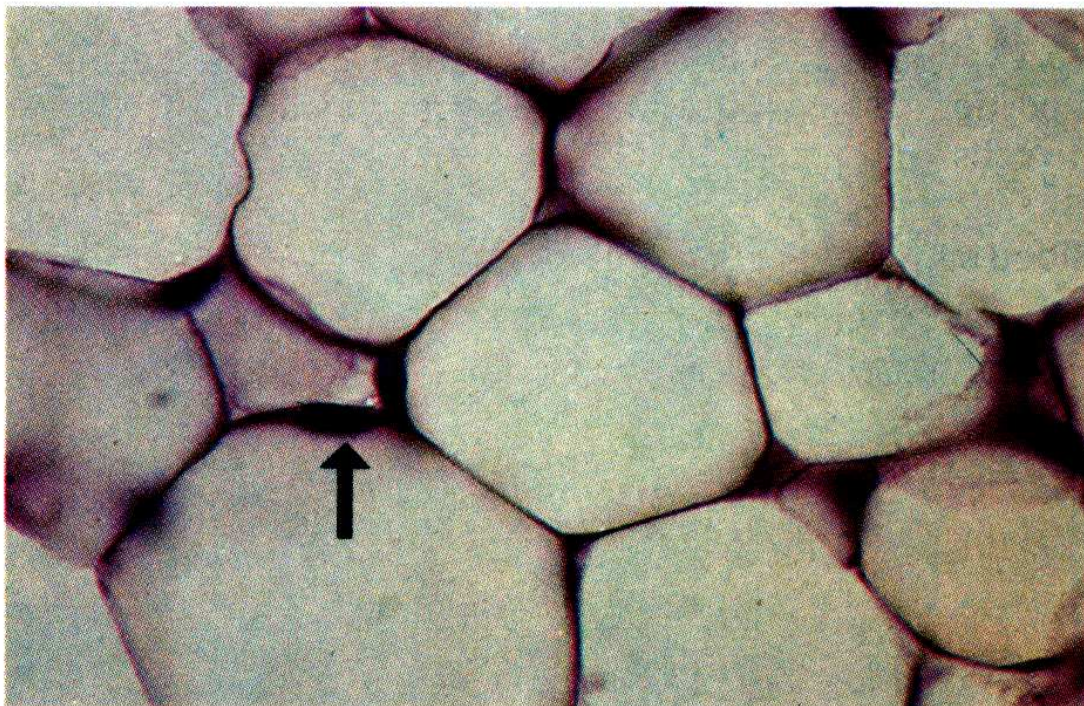


FIGURE 3.10 Hyaline cartilage cells, located in lacunae, are separated by a flexible matrix rich in protein and fibers. This type of cartilage forms the embryonic skeleton, later replaced by bone.

cells
within lacuna



Pojivové tkáně

Druh	Funkce	Lokalizace
Vazivová tkáň	spojuje dohromady orgány	pod kůží, pod většinou epitelových vrstev
Tuková tkáň	izolace, ukládání tuku	pod kůží, okolo ledvin
Vláknité pojivo	spojuje dohromady orgány	šlachy a vazy
Hyalinní chrupavka	ochrana a opora	konce kostí, chrupavka nosu, chrupavky ve stěně průdušnice
Elastická chrupavka	ochrana a opora	vnější ucho, část hrtanu
Vazivová chrupavka	ochrana a opora	meziobratlové ploténky, kolenní kloub
Kostní tkáň	ochrana a opora	celá kostra

FIGURE 11.8 Anatomy of a long bone. A long bone is encased by fibrous membrane except where it is covered by articular cartilage at the ends. The central shaft is composed of compact bone, but the ends are spongy bone, which can contain red marrow. A central medullary cavity contains yellow marrow.

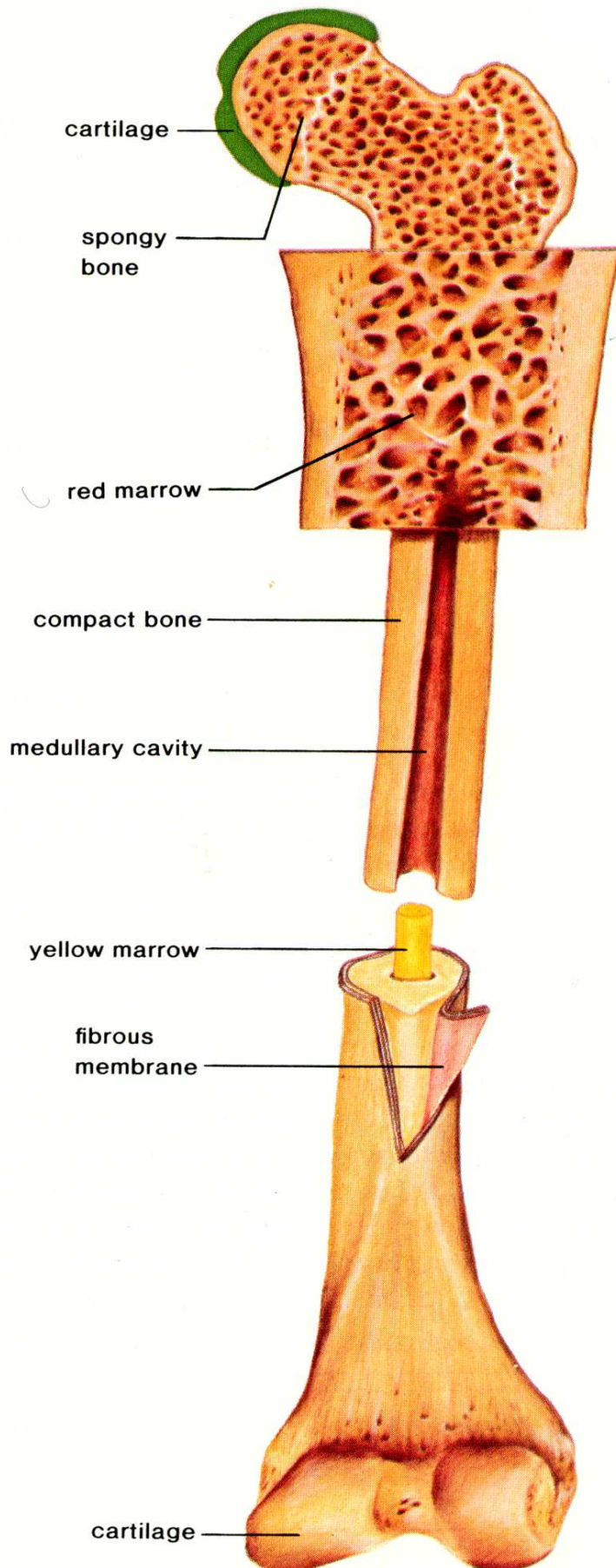
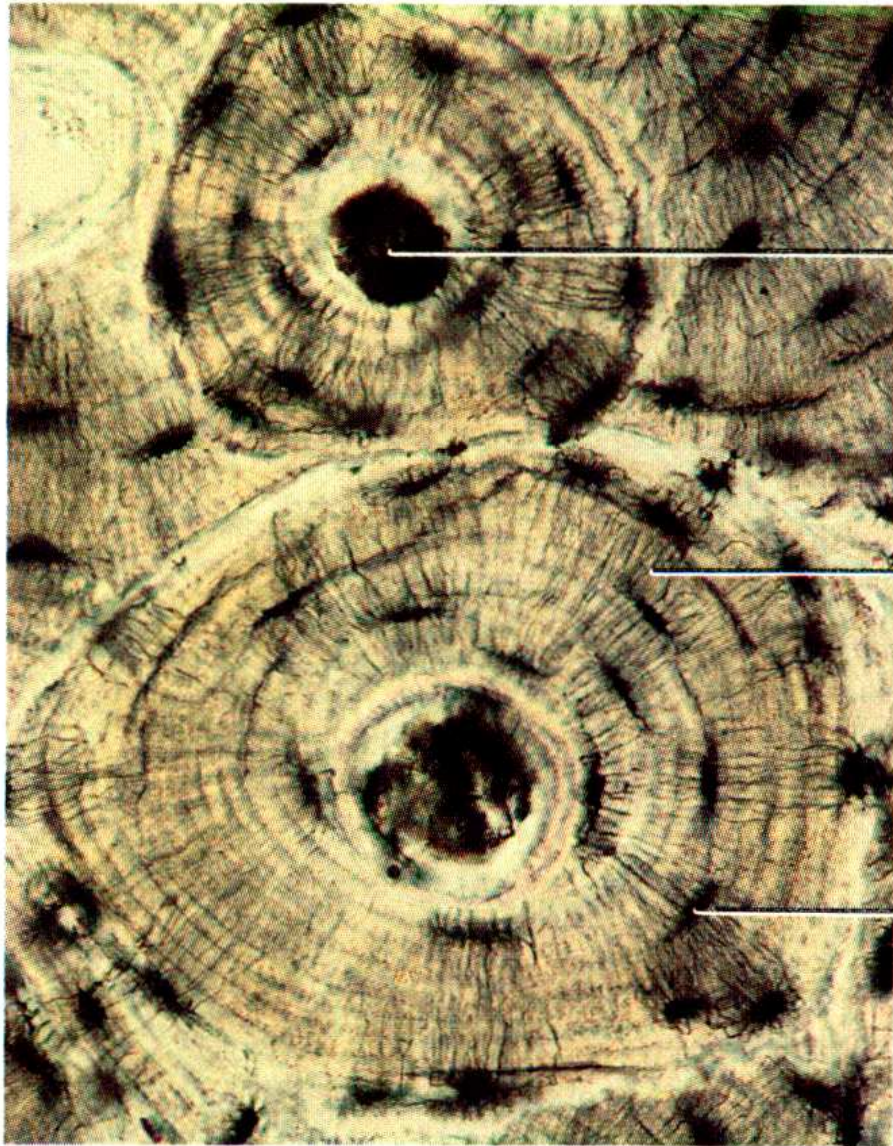


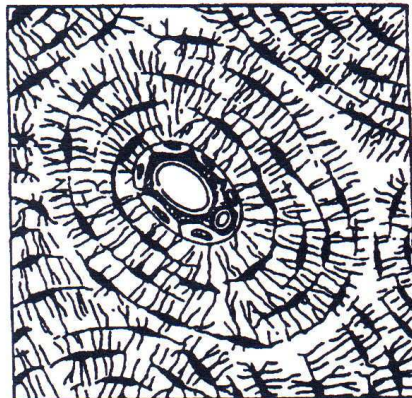
FIGURE 3.11 Compact bone is highly organized. The cells are arranged in circles about a central (Haversian) canal that contains a nutrient-bearing blood vessel.



Haversian canal

canaliculi

osteocyte
within a lacuna

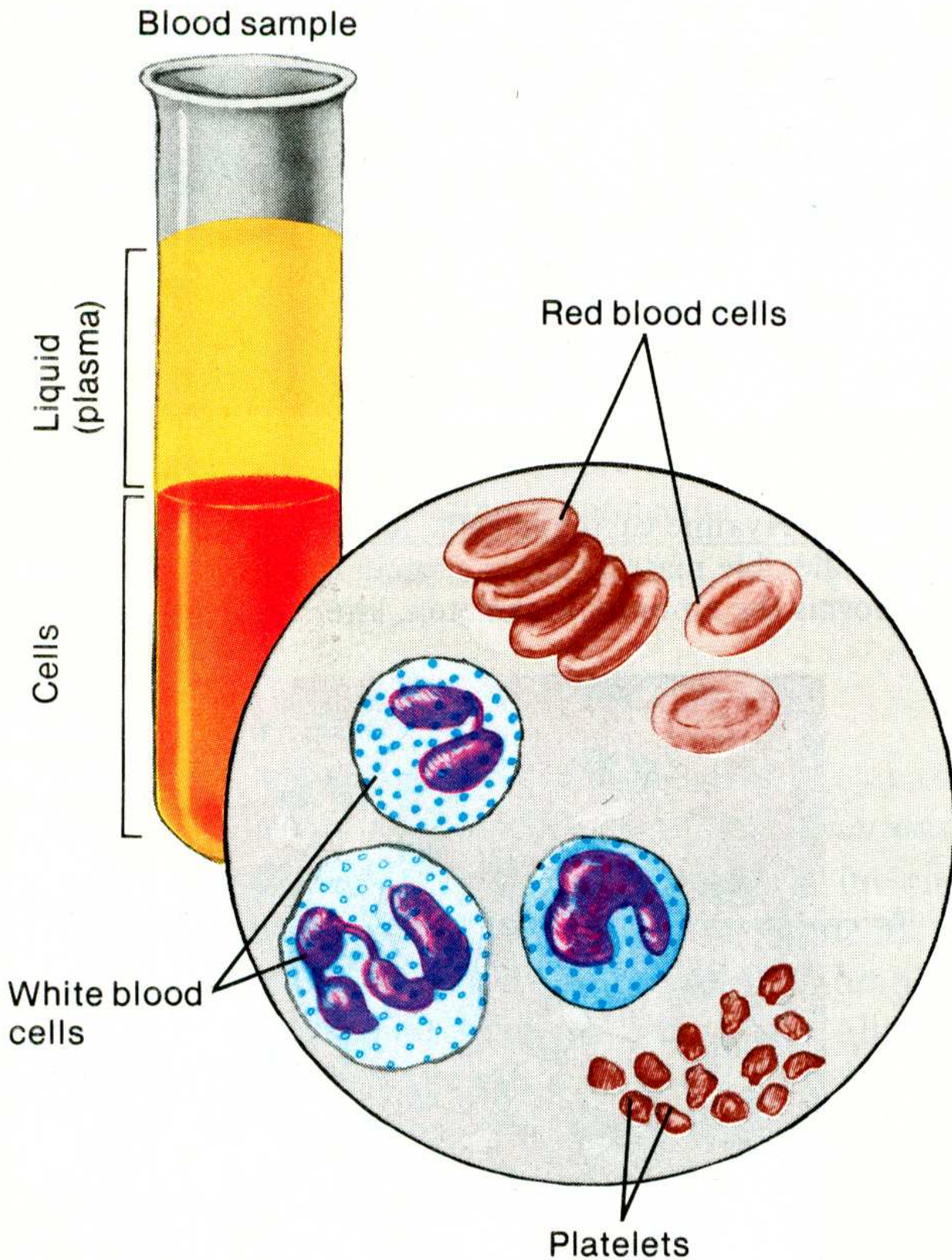


A



B

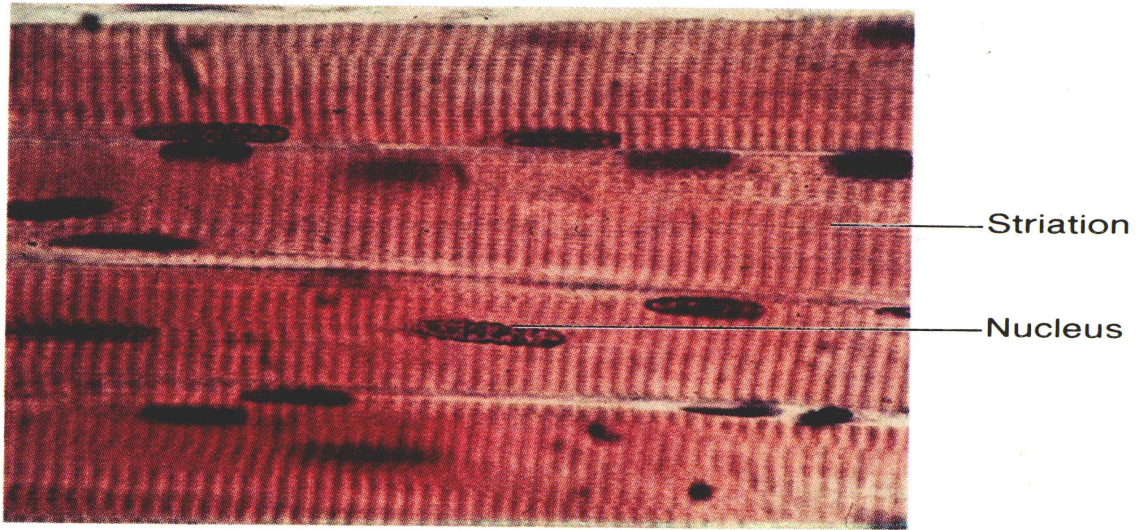
FIGURE 3.12 Blood is classified as connective tissue. Plasma, the liquid portion of blood, contains the formed elements (red cells, white cells, and platelets).



Složení krevní plasmy

voda	92% plasmy
Anorganické ionty (soli)	Na⁺, Ca⁺⁺, K⁺, Mg⁺⁺, Cl⁻, HCO₃⁻, HPO₄⁻, SO₄⁻,
Plyny	O₂, CO₂
Plasmatické bílkoviny	albumin, globulin, fibrinogen
Organické živiny	glukóza, tuky, fosfolipidy, aminokyseliny atd.
Dusíkaté odpadní látky	močovina, amoniak, kyselina močová
Regulační látky	hormony, enzymy

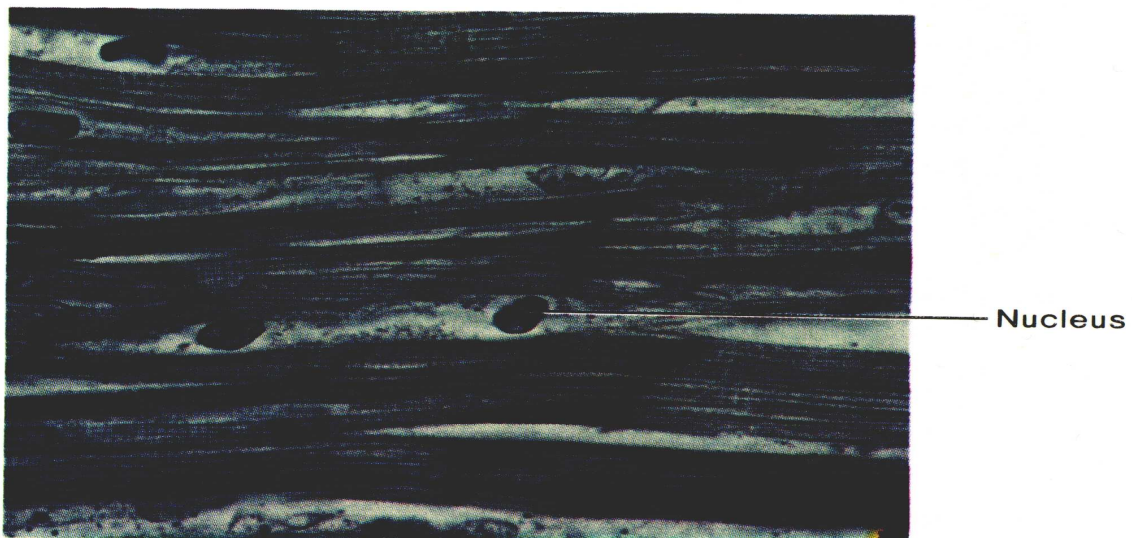
FIGURE 3.13 How do you distinguish a plant from an animal? One way is to detect motion—only animals have contractile fibers that permit movement. *a.* Skeletal muscle is found within the muscles attached to the skeleton. *b.* Smooth muscle cells are found in the walls of internal organs. *c.* Cardiac muscle permits the pumping of the heart.



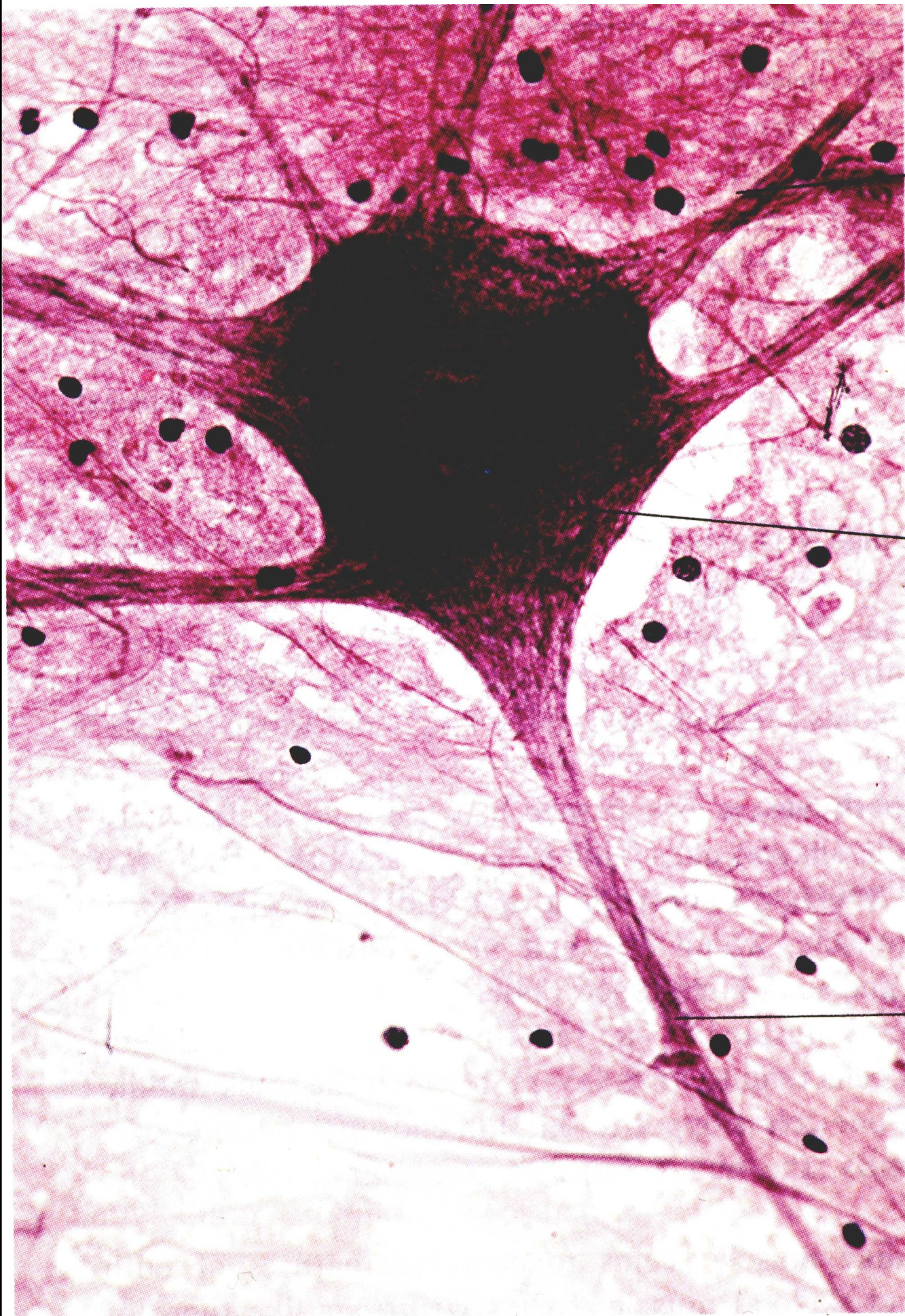
a.



b.



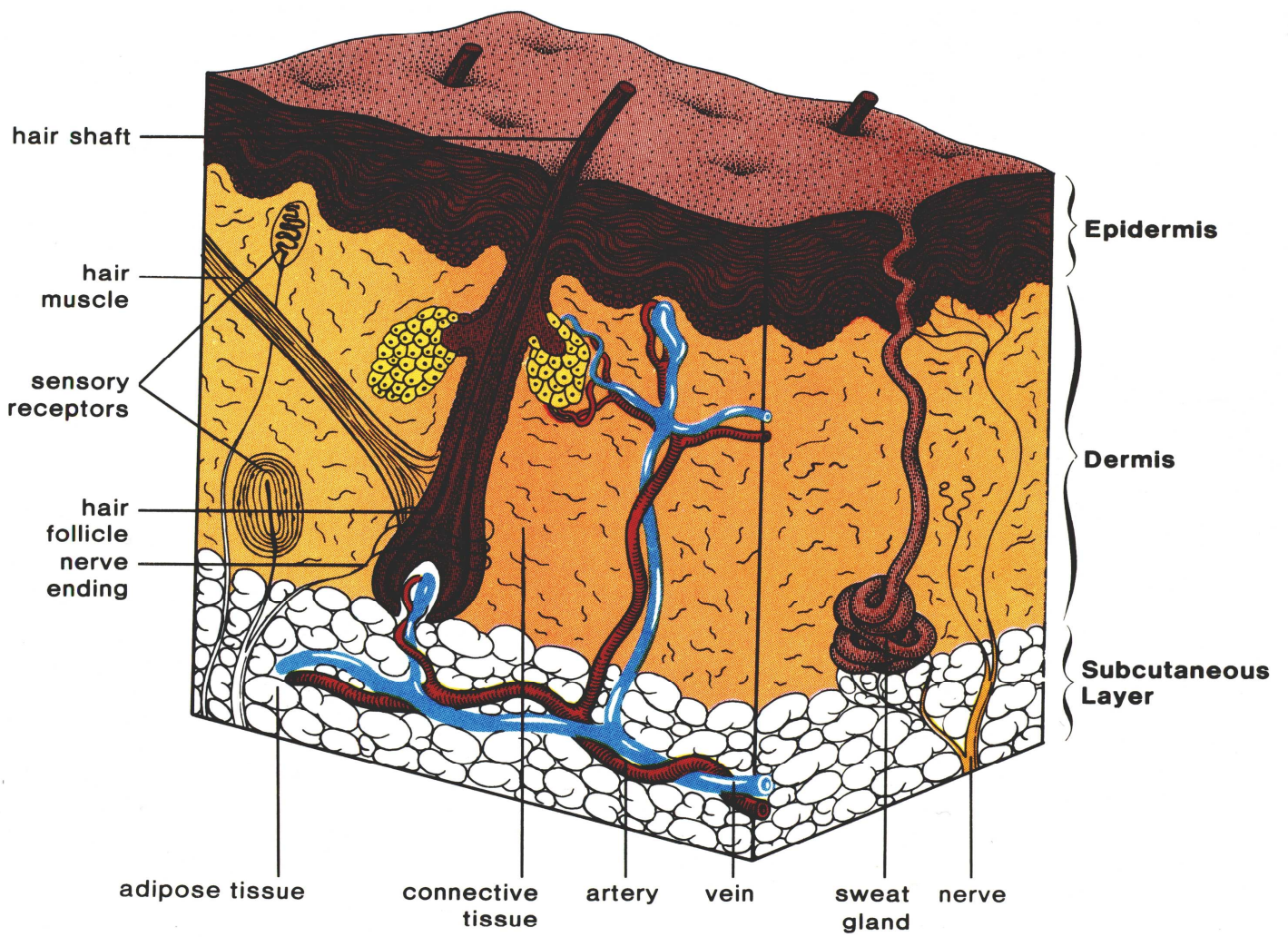
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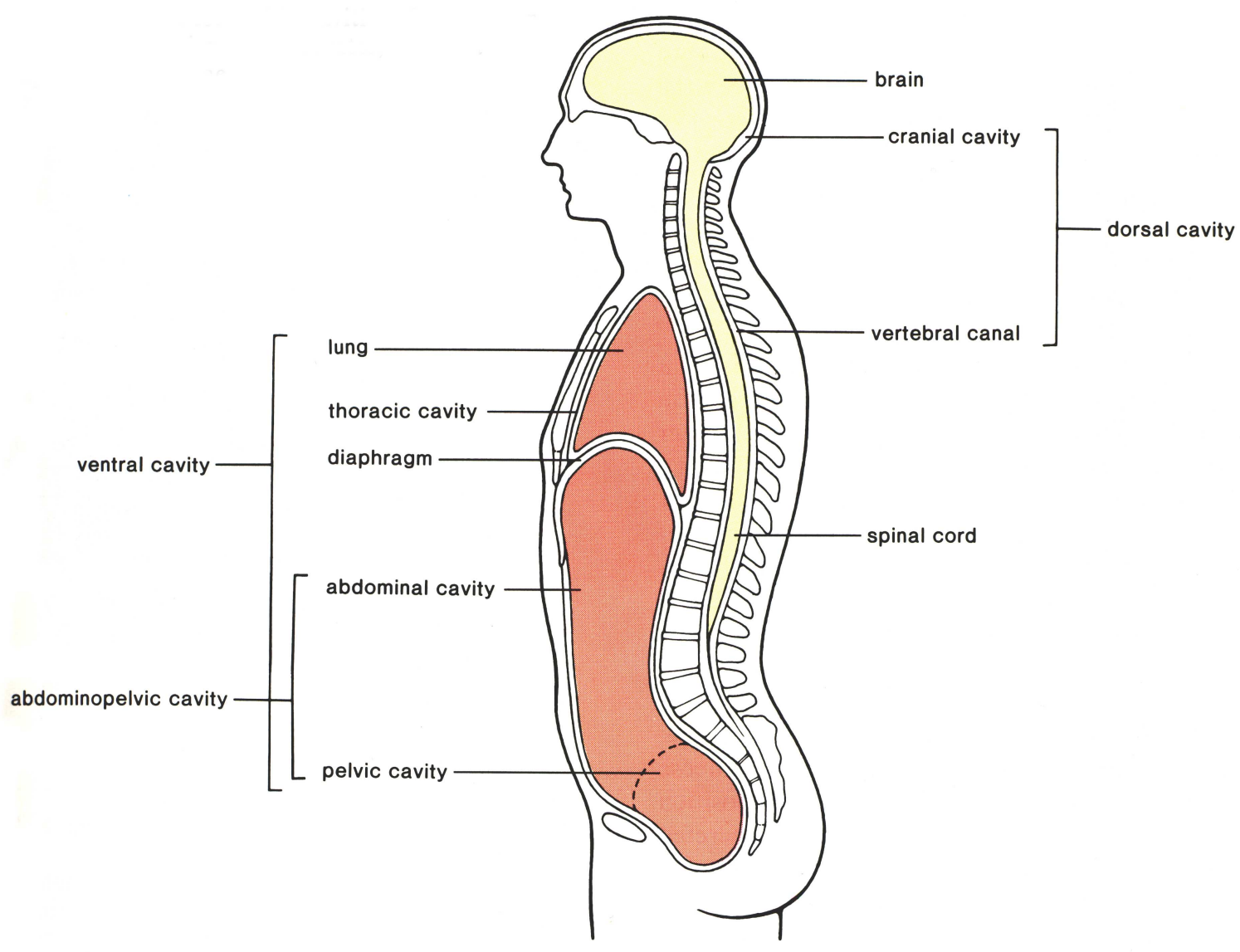


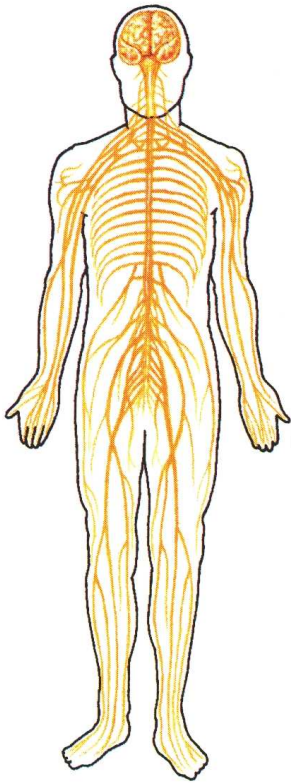
dendrite

cell body

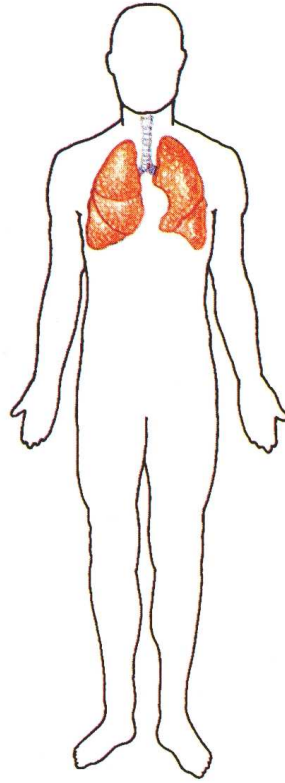
axon



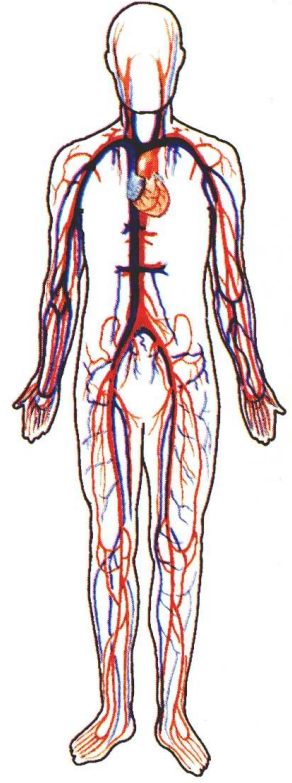




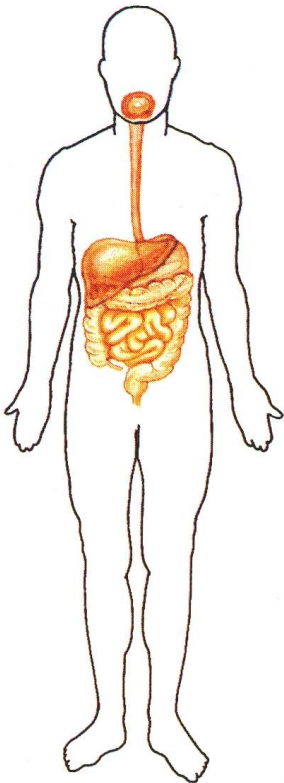
Nervous system Function: regulation of all body activities; learning and memory



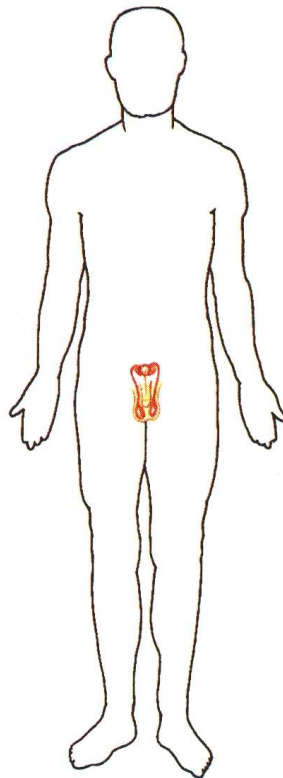
Respiratory system Function: gaseous exchange between external environment and blood



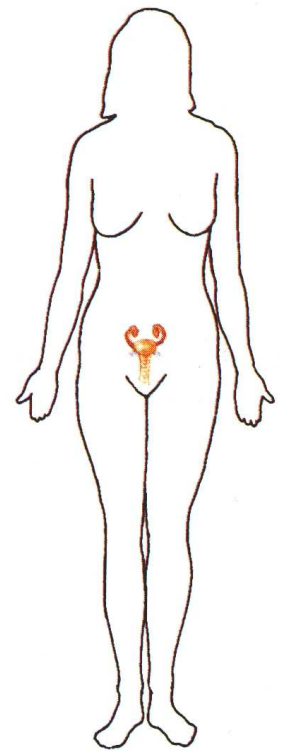
Circulatory system Function: transport of life-sustaining materials to body cells; removal of metabolic wastes from cells



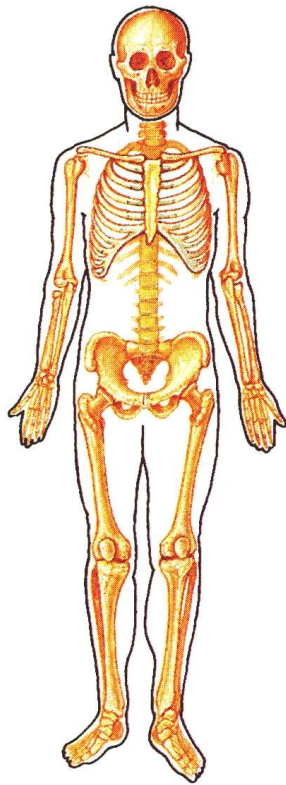
Digestive system Function: breakdown and absorption of food materials



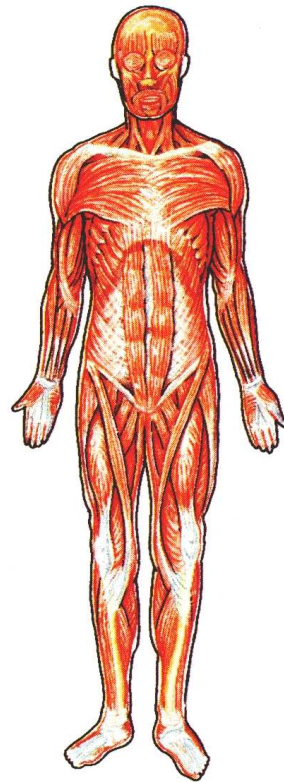
Male reproductive system Function: production of male sex cells (sperm); transfer of sperm to reproductive system of female



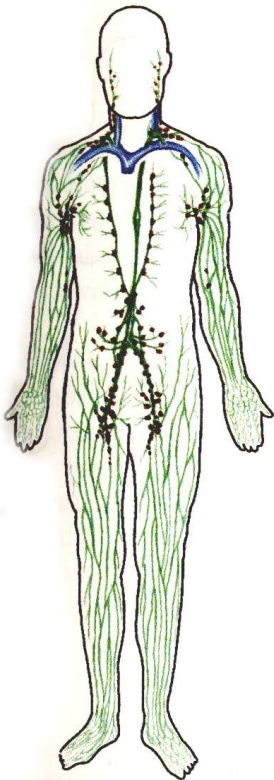
Female reproductive system Function: production of female sex cells (ova); receptacle of sperm from male; site for fertilization of ovum, implantation, and development of embryo and fetus; delivery of fetus



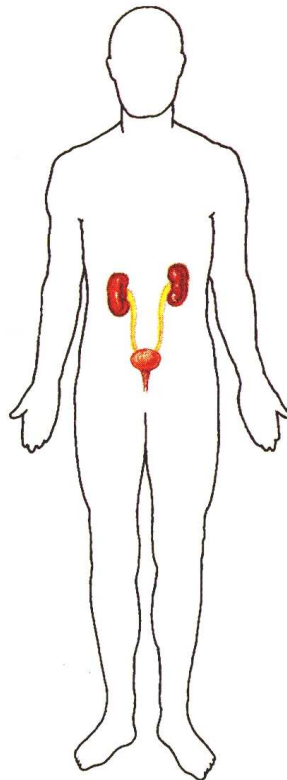
Skeletal system Function: internal support and flexible framework for body movement; production of blood cells



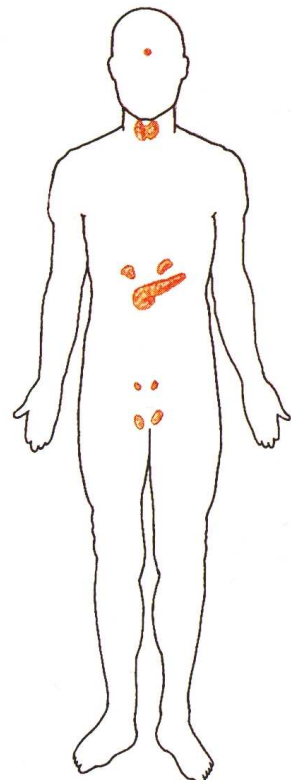
Muscular system Function: body movement; production of body heat



Lymphatic system Function: body immunity; absorption of fats; drainage of tissue fluid



Urinary system Function: filtration of blood; maintenance of volume and chemical composition of the blood



Endocrine system Function: secretion of hormones for chemical regulation

FIGURE 3.18 The internal environment of the body is the blood and tissue fluid. Tissue cells are surrounded by tissue fluid, which is continually refreshed because nutrient molecules constantly exit from and waste molecules continually enter the bloodstream as shown.

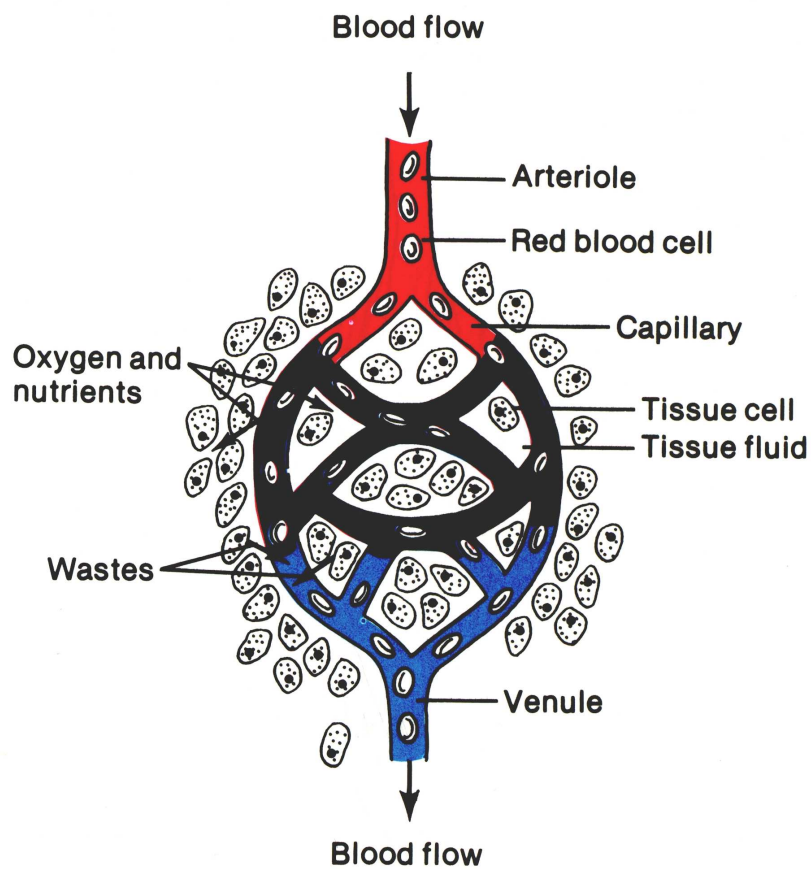
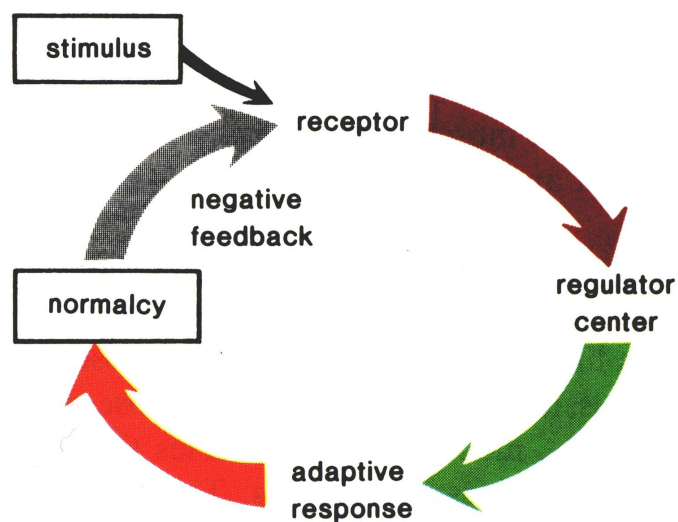


FIGURE 3.19 Diagram illustrating the principle of feedback control. A receptor (sense organ) responds to a stimulus, such as high or low temperature, and notifies a regulator center that directs an adaptive response, such as sweating. Once normalcy, such as a normal temperature, is achieved, the receptor is no longer stimulated.



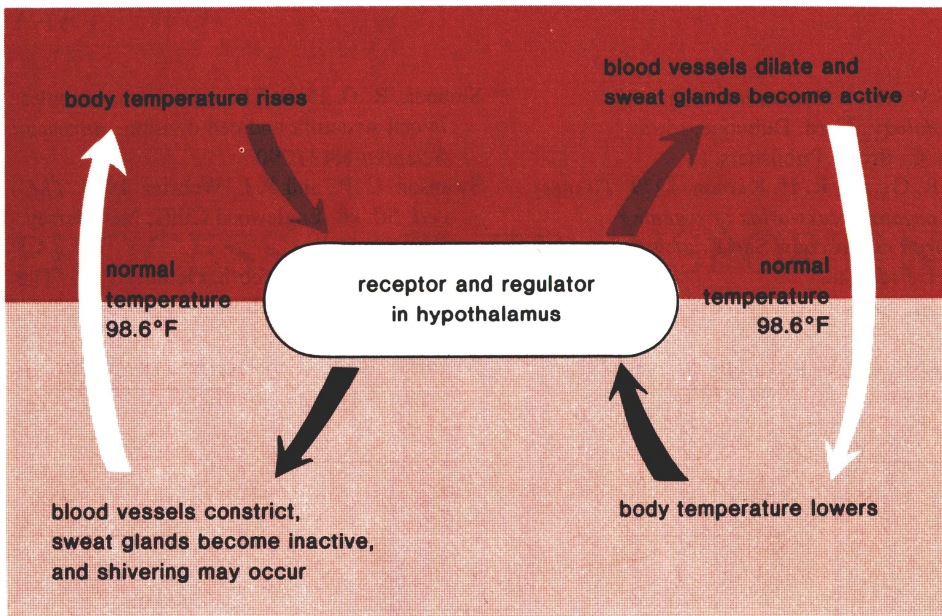


FIGURE 3.20 Temperature control. When the body temperature rises, the blood vessels dilate and the sweat glands become active. When the body temperature lowers, the blood vessels constrict and shivering may occur. In between these extremes the receptor is not stimulated and thus body temperature fluctuates above and below normal.