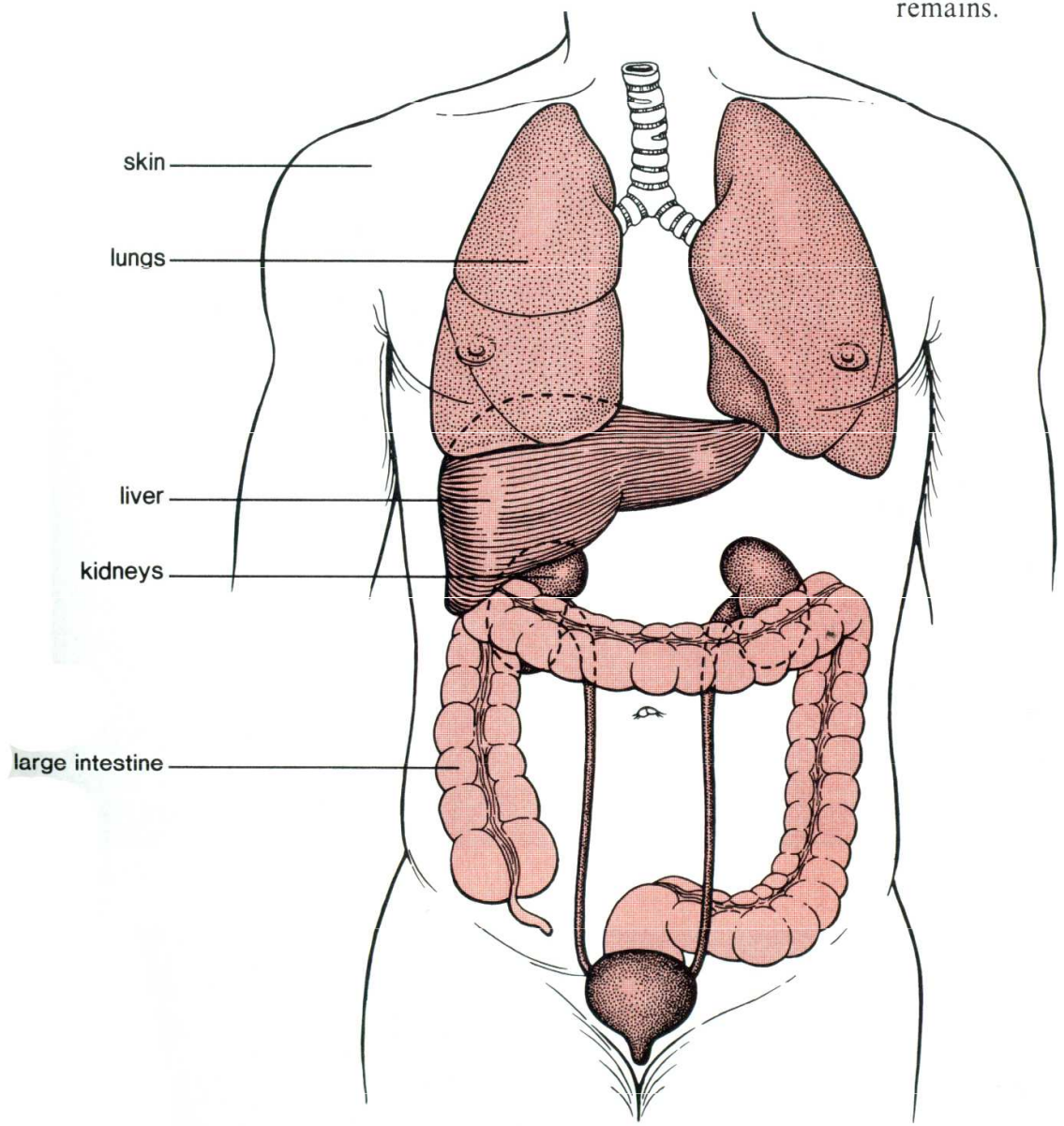
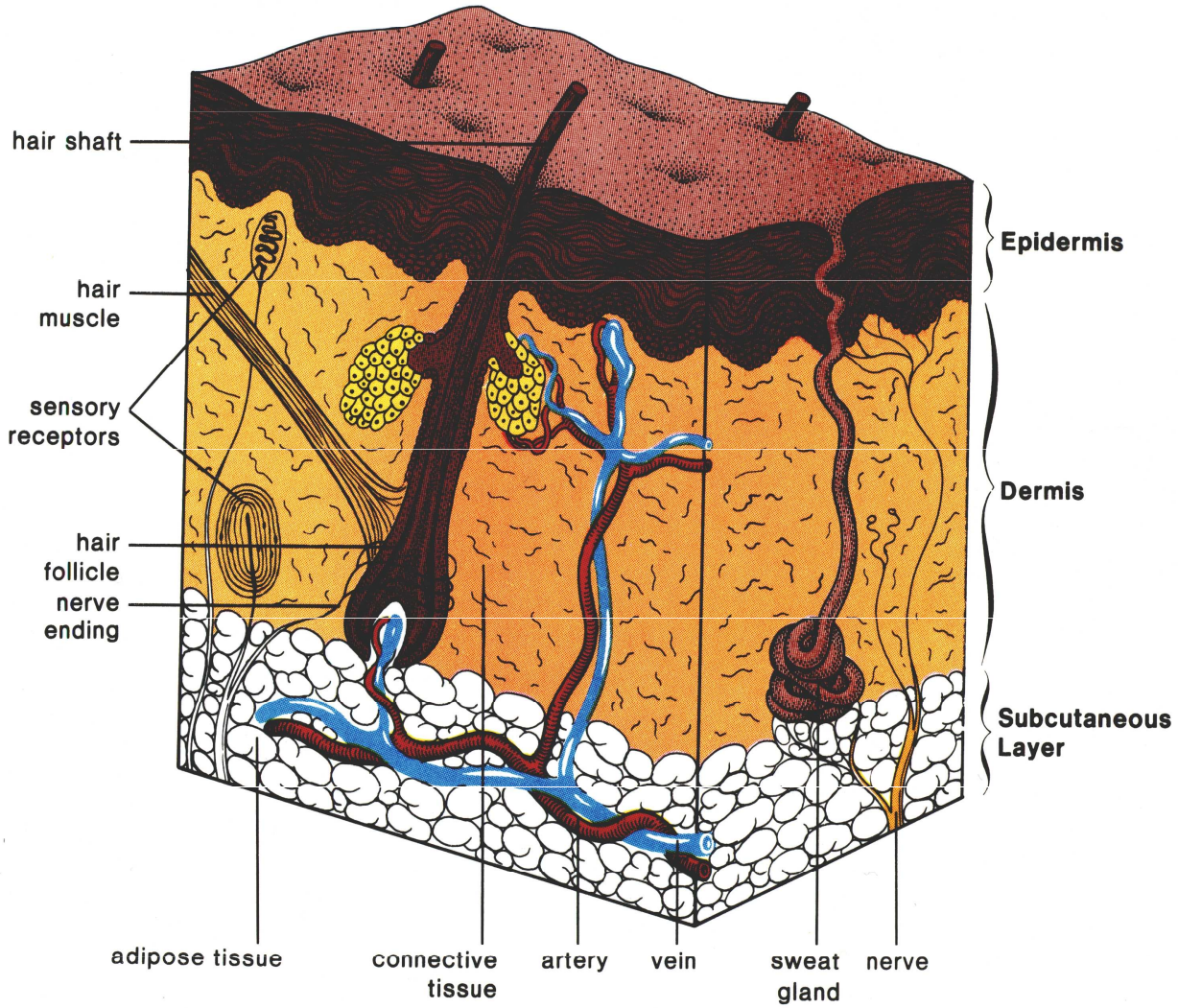


FIGURE 9.2 The organs of excretion include not only the kidneys but also the skin, lungs, liver, and large intestine. The lungs excrete carbon dioxide; the liver excretes hemoglobin breakdown products, and the intestine excretes certain heavy metals. Excretion, ridding the body of metabolic wastes, should not be confused with defecation, ridding the body of nondigestible remains.

FIGURE 3.15 Skin anatomy. Skin is composed of two layers: the epidermis and the dermis. The subcutaneous layer is not strictly a part of skin. Most cells in the epidermal layer are no longer living. Skin cancer brought on by UV radiation from the sun starts in the lower epidermal cells because they are mitotically active. The dermis contains the various structures depicted.



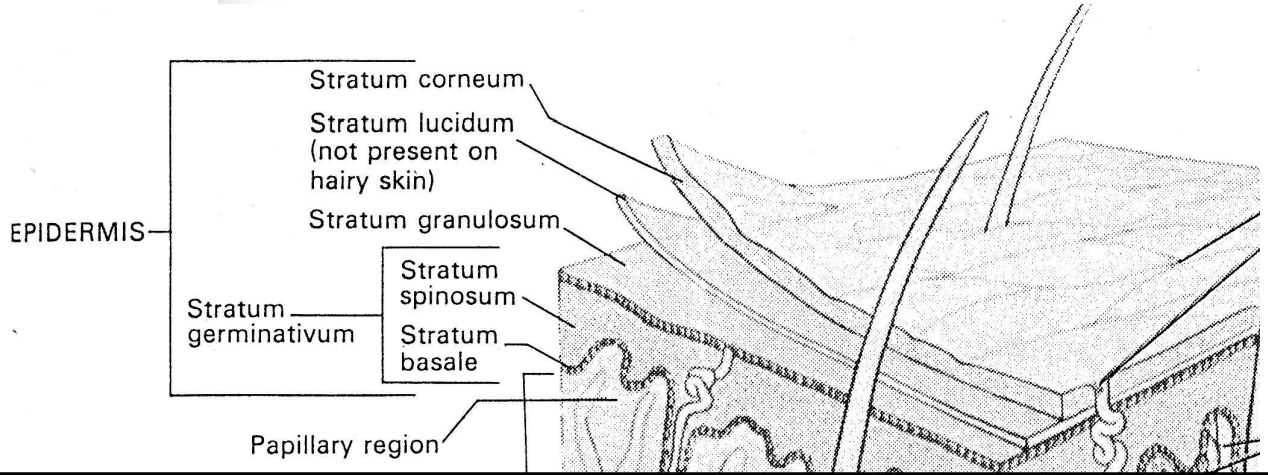


FIGURE 9.6 The urinary system. Urine is only found within the kidneys, ureters, bladder, and urethra.

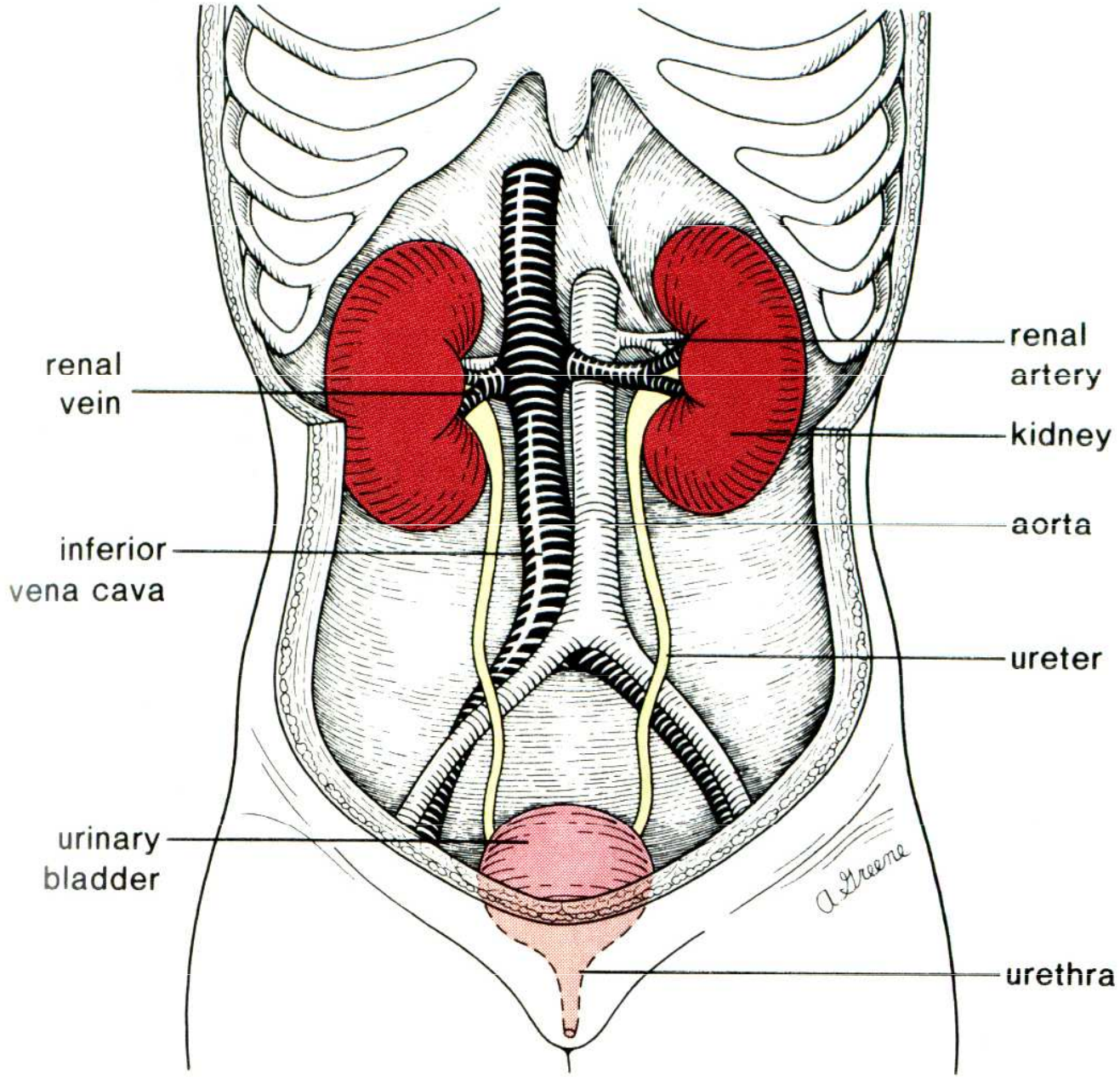


FIGURE 9.7 Longitudinal section of a male urethra leaving the bladder. Note the position of the prostate gland, which can enlarge to obstruct the flow of urine.

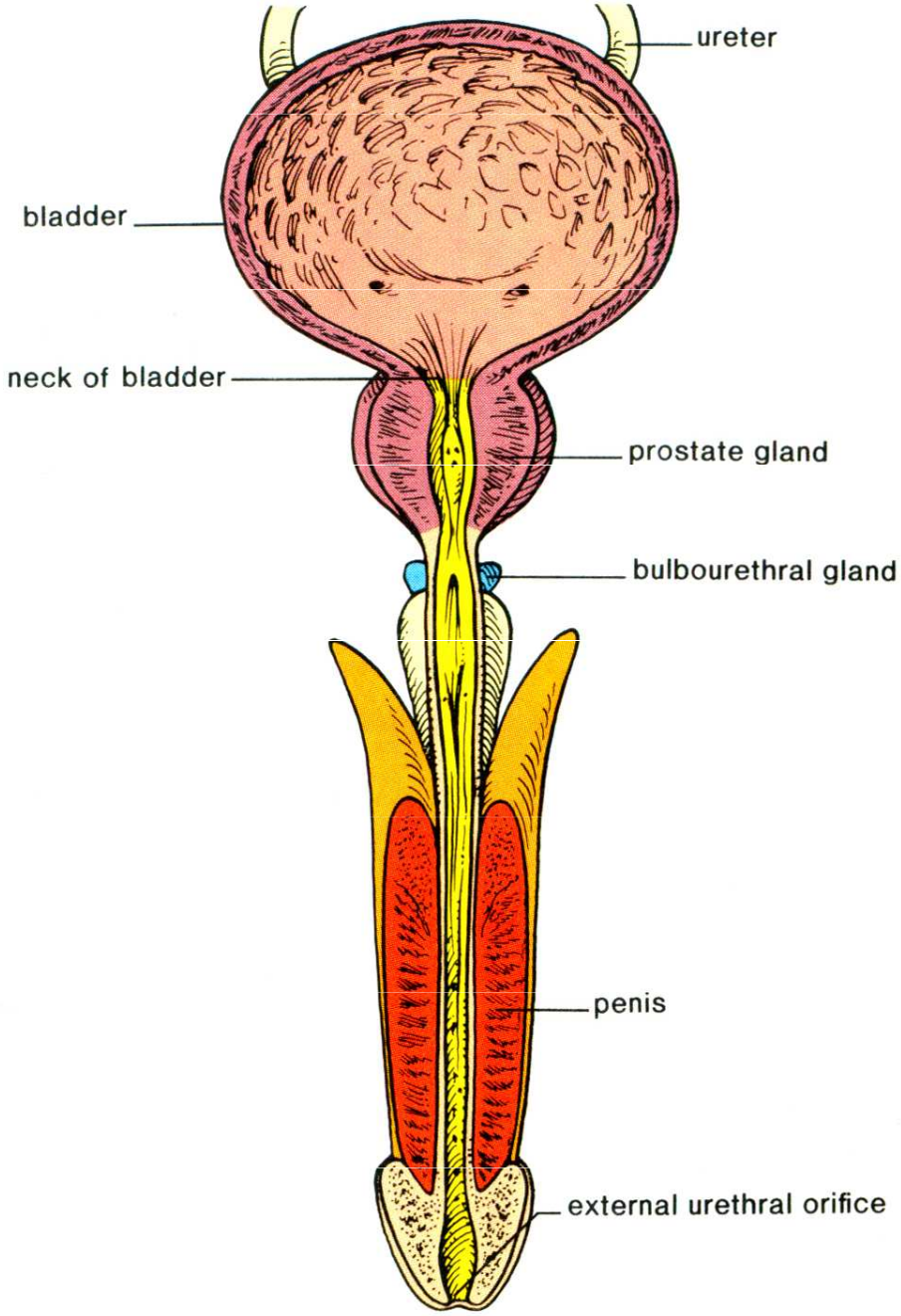


FIGURE 9.8 Macroscopic anatomy of the kidney with an enlargement of a pyramid. The structure of a pyramid is dependent on the structure of kidney tubules, called nephrons.

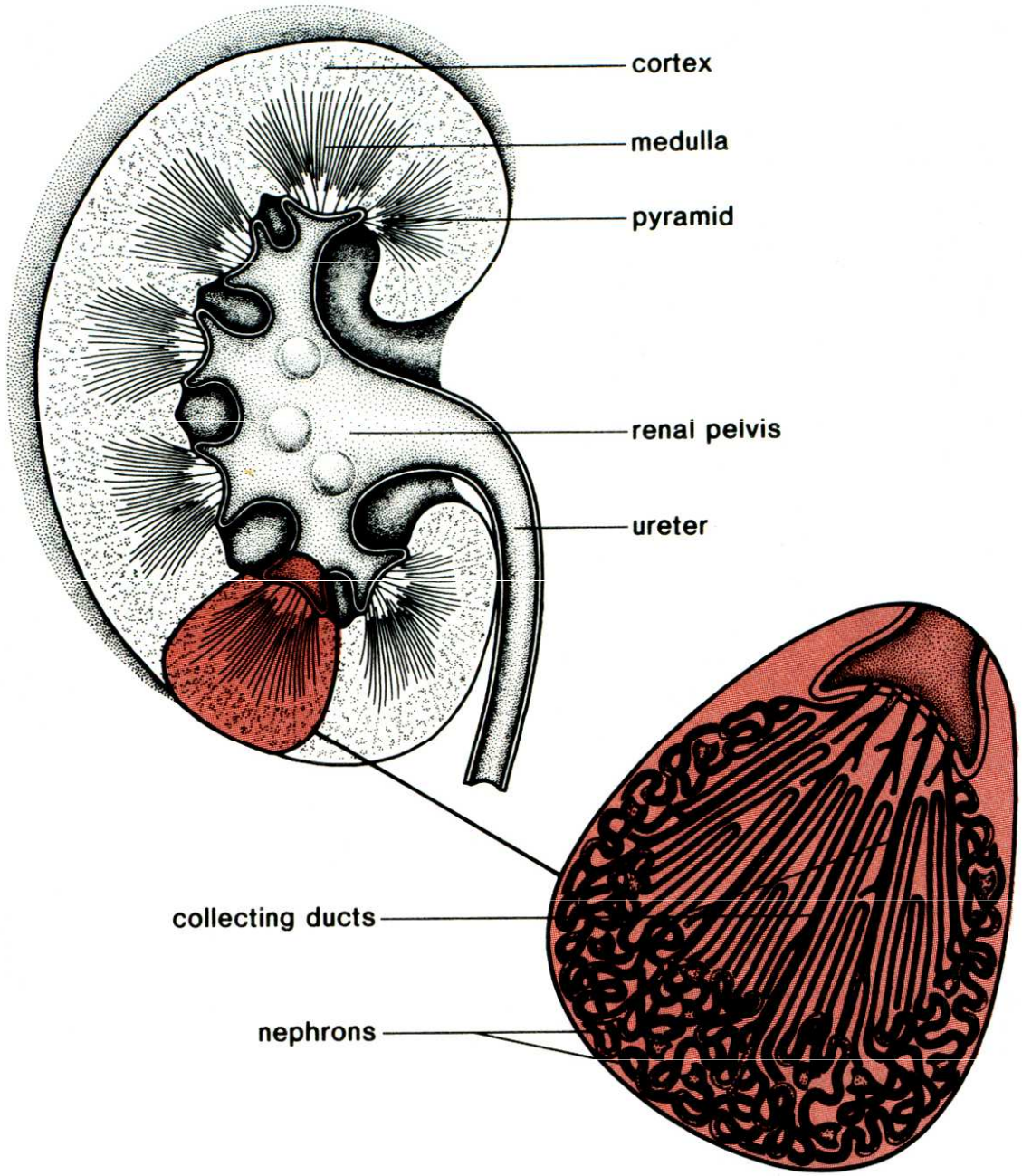


FIGURE 9.9 *a.* Diagram of nephron (kidney tubule) gross anatomy. You may trace the path of blood about the nephron by following the arrows. Note that the dotted line indicates which portions of the nephron are in the cortex and which portions are in the medulla of the kidney. *b.* Each kidney receives a renal artery that divides into arterioles within the kidney. Venules leaving the kidney join to form the renal vein. This drawing shows how one nephron is placed in the kidney so that some parts are in the cortex and other parts are in the medulla.

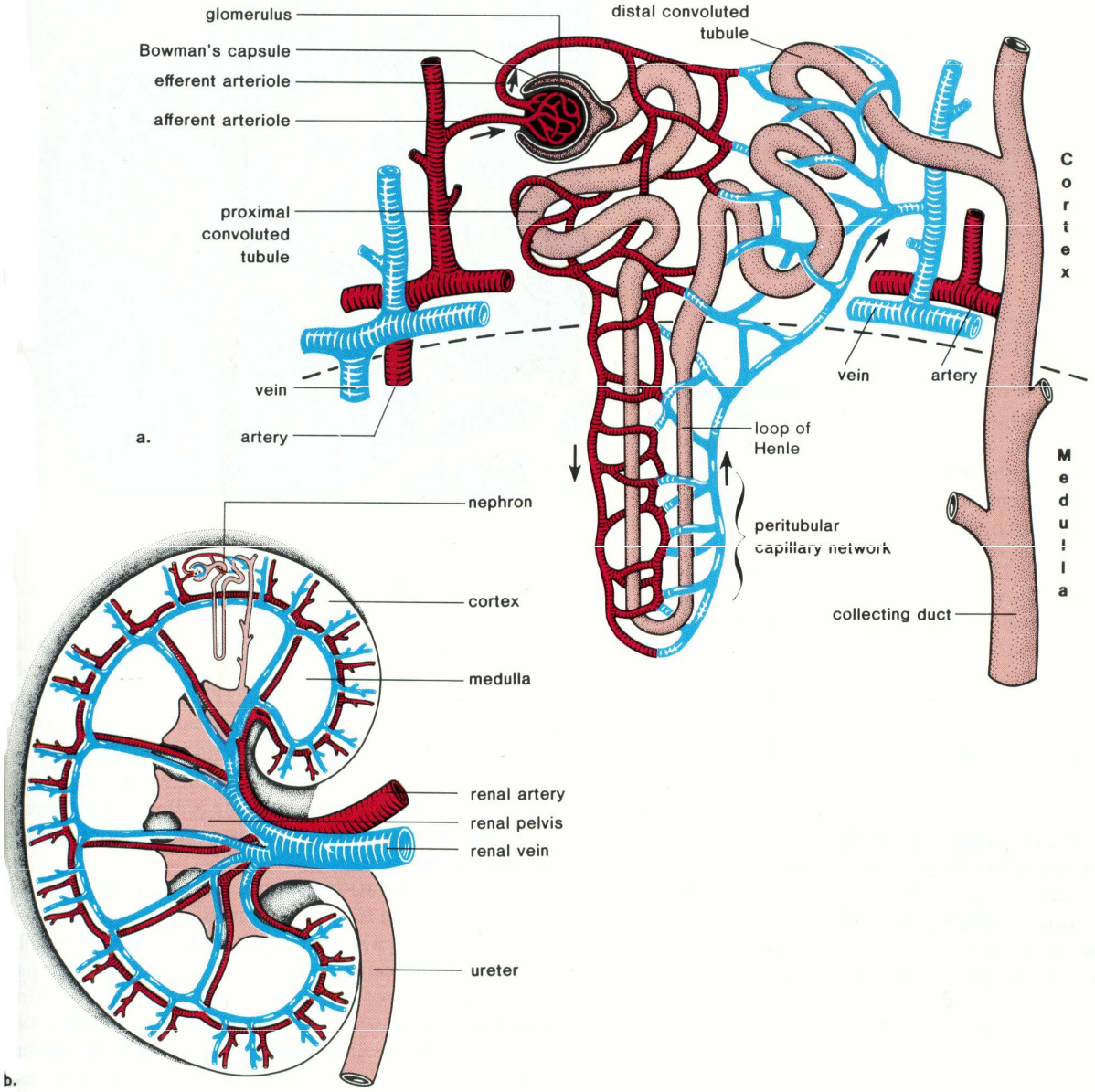
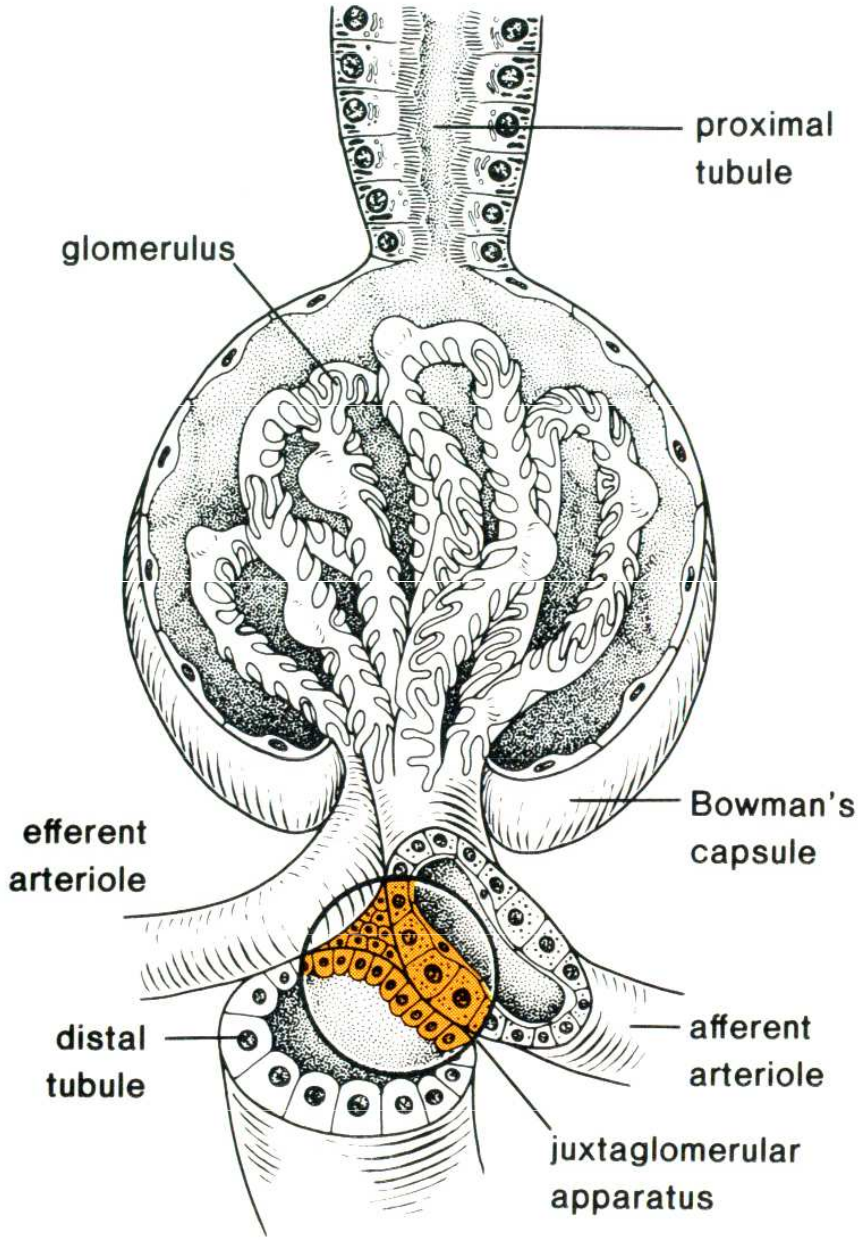


FIGURE 9.11 Drawing of glomerulus and adjacent distal convoluted tubule. The juxtaglomerular apparatus (*circled*) is sensitive to the fluid pressure within the distal convoluted tubule and releases renin if this pressure falls below normal.



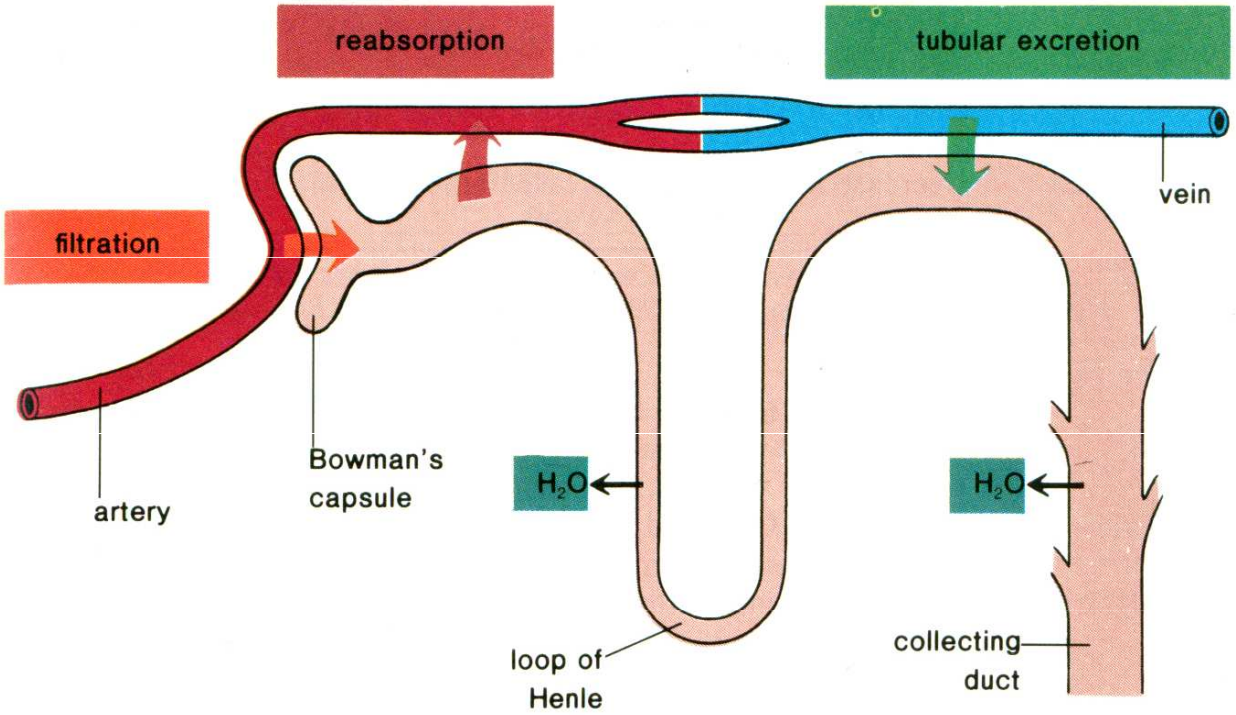


FIGURE 9.15 Diagram of nephron showing steps in urine formation: filtration, reabsorption, and tubular excretion. Note also that water enters the tissues at the loop of Henle and collecting duct.

FIGURE 9.14 The presence of a loop of Henle allows the nephron to concentrate the urine. Salt (Na^+Cl^-) diffuses and is extruded by the ascending limb into the medulla; also, the collecting duct is believed to extrude urea into the tissues of the medulla. This produces a hypertonic environment that draws water out of the descending limb and the collecting duct. This water is returned to the circulatory system.

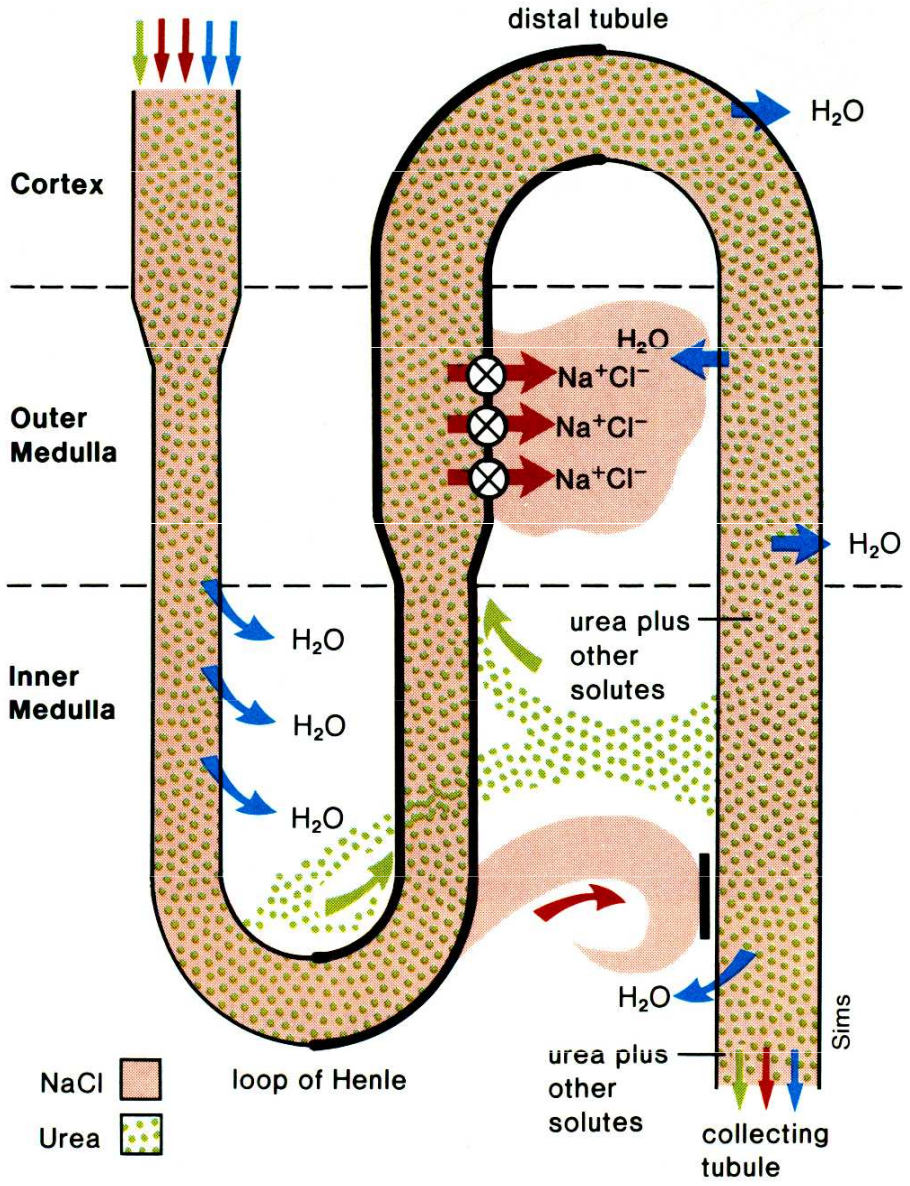


FIGURE 9.12 Nutrient molecules and sodium are actively reabsorbed from a kidney tubule in the manner illustrated. These molecules move passively into the tubule cell but then are actively transported out of the tubule cell into the blood. Active transport requires the participation of carrier molecules.

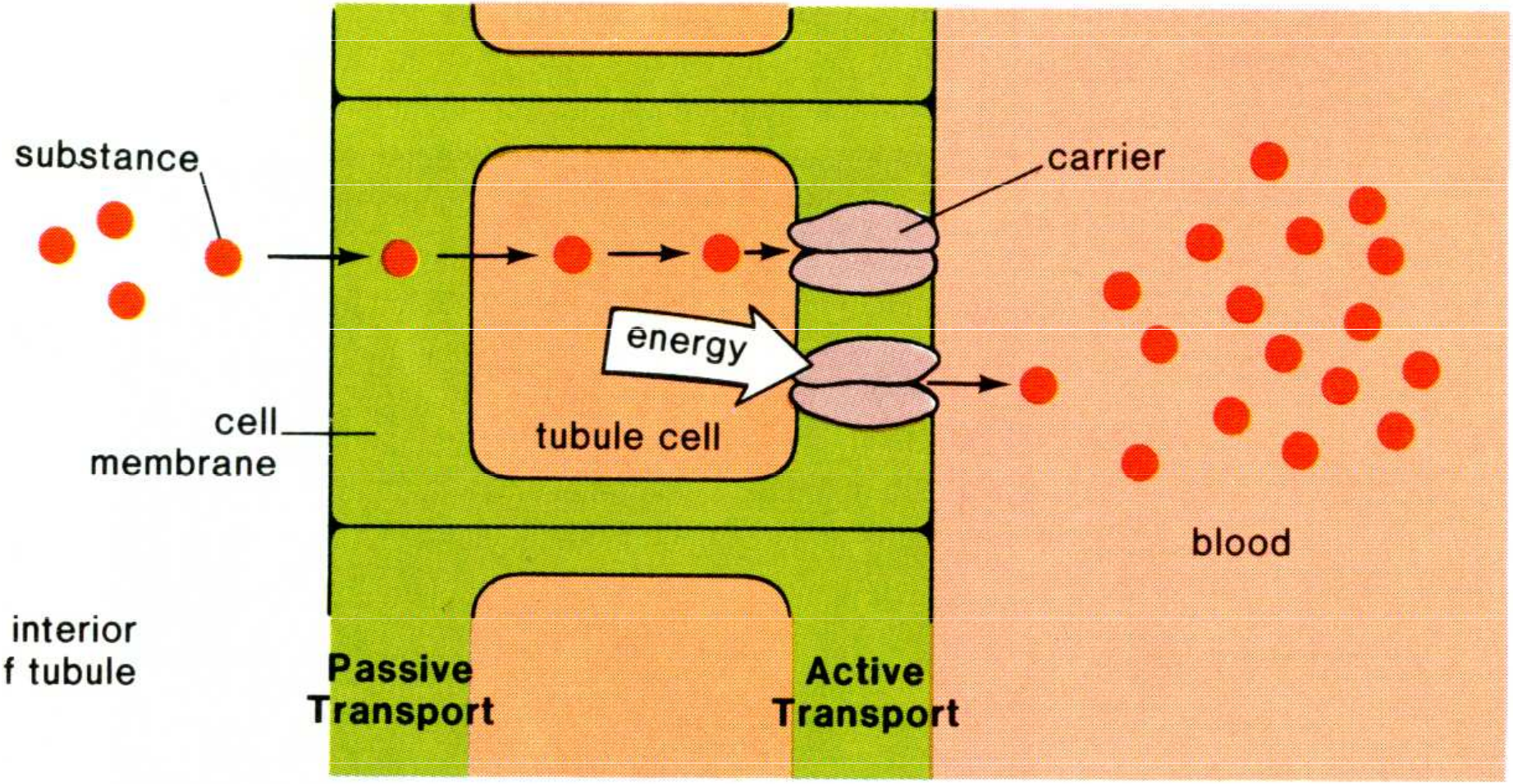


FIGURE 17.2 Side view of male reproductive system. Trace the path of the genital tract from a testis to the exterior. The seminal vesicles, Cowper's gland, and prostate gland produce seminal fluid and do not contain sperm. Notice that the penis in this drawing is not circumcised since the foreskin is present.

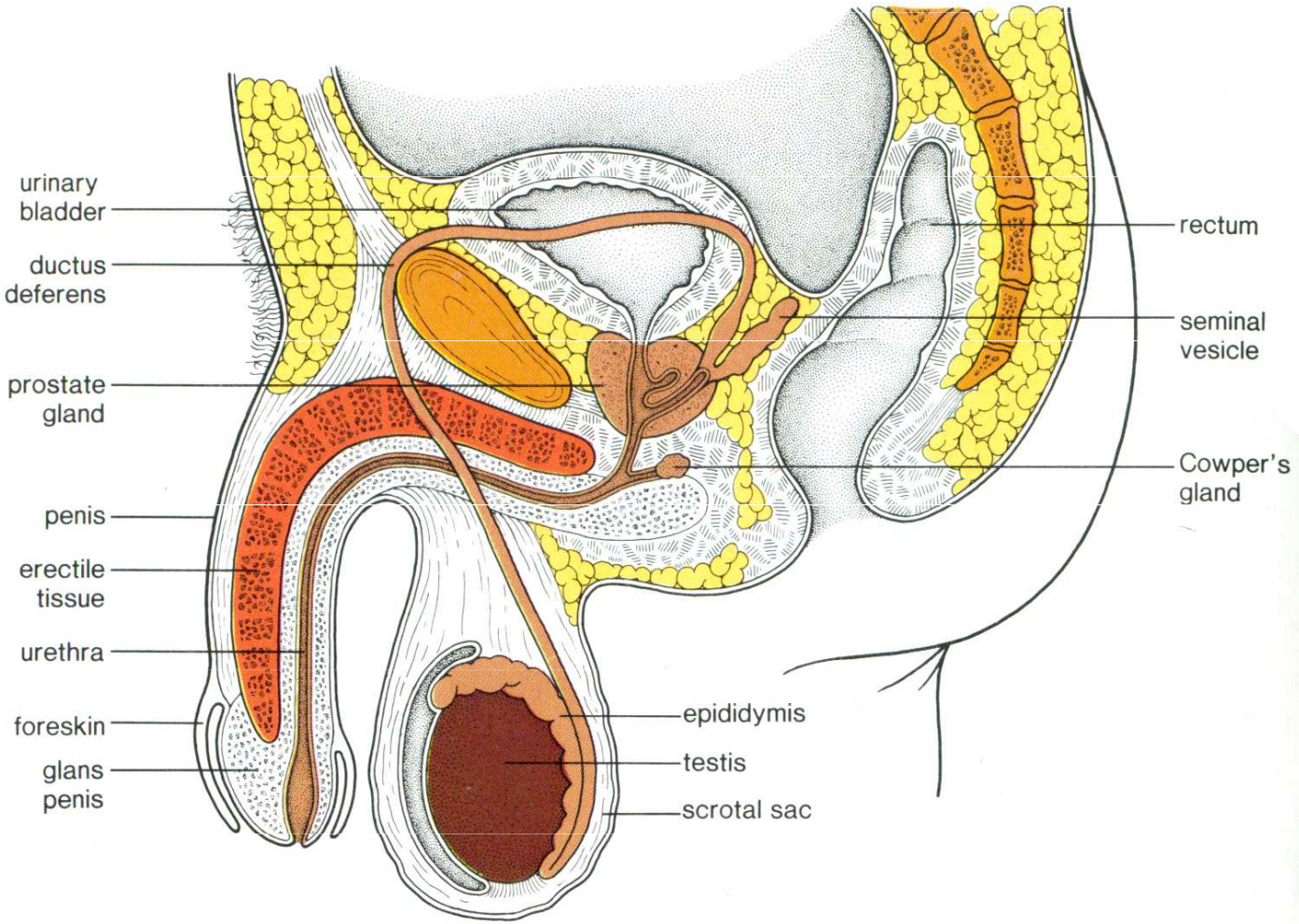
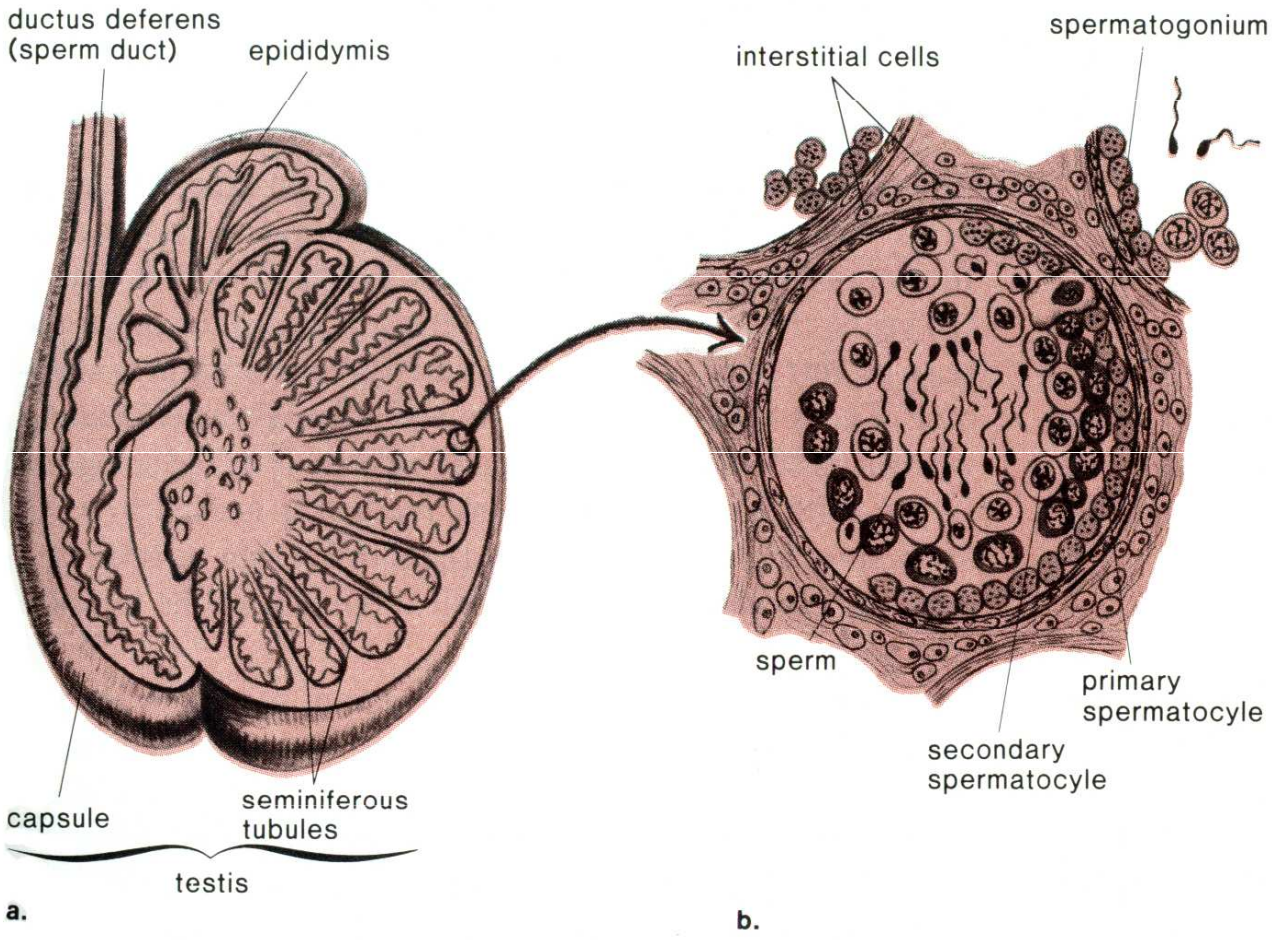


FIGURE 17.3 Sections through a testis. *a*. Longitudinal section showing lobules containing seminiferous tubules. *b*. Cross section of a tubule showing germ cells in various stages of spermatogenesis. *c*. Micrograph of b.



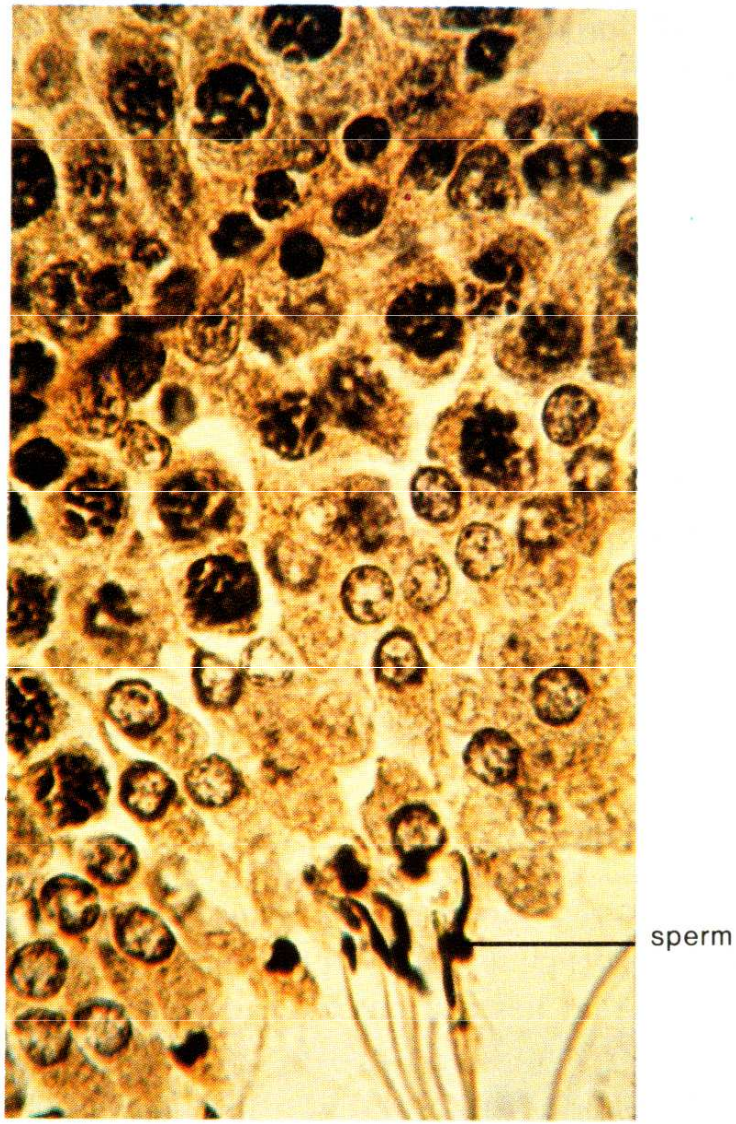
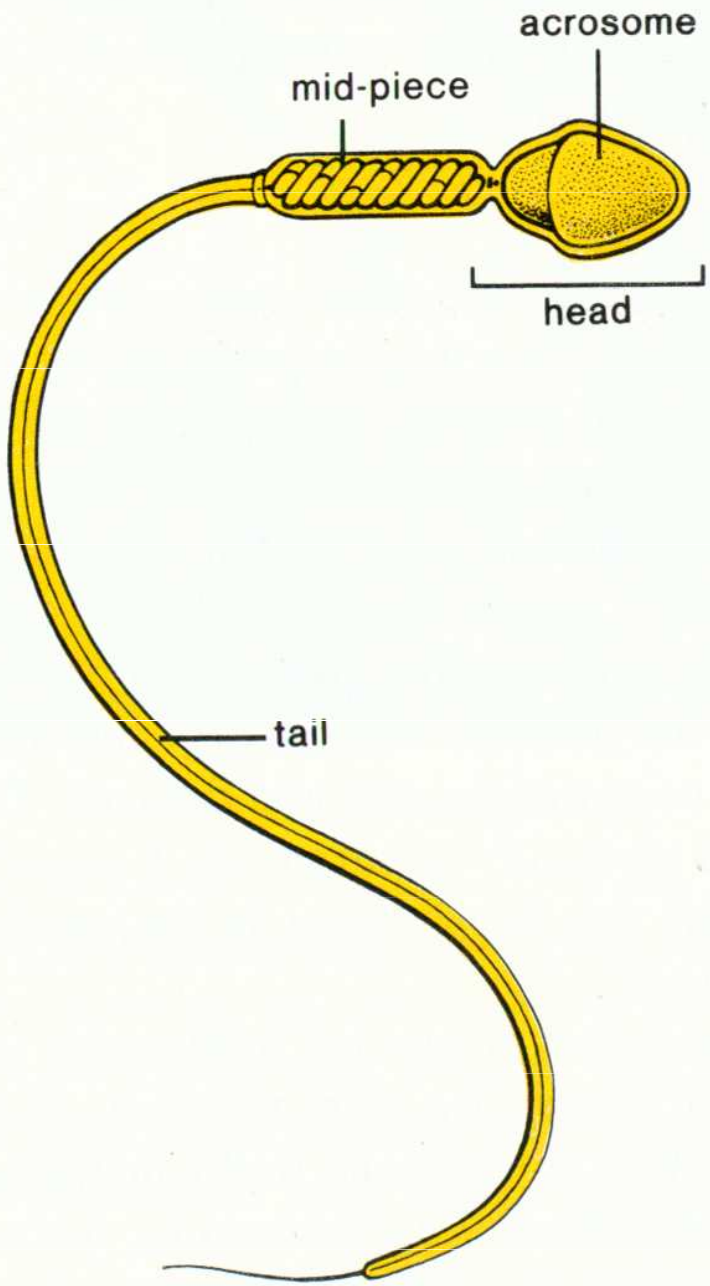


FIGURE 17.4 Microscopic anatomy of sperm.



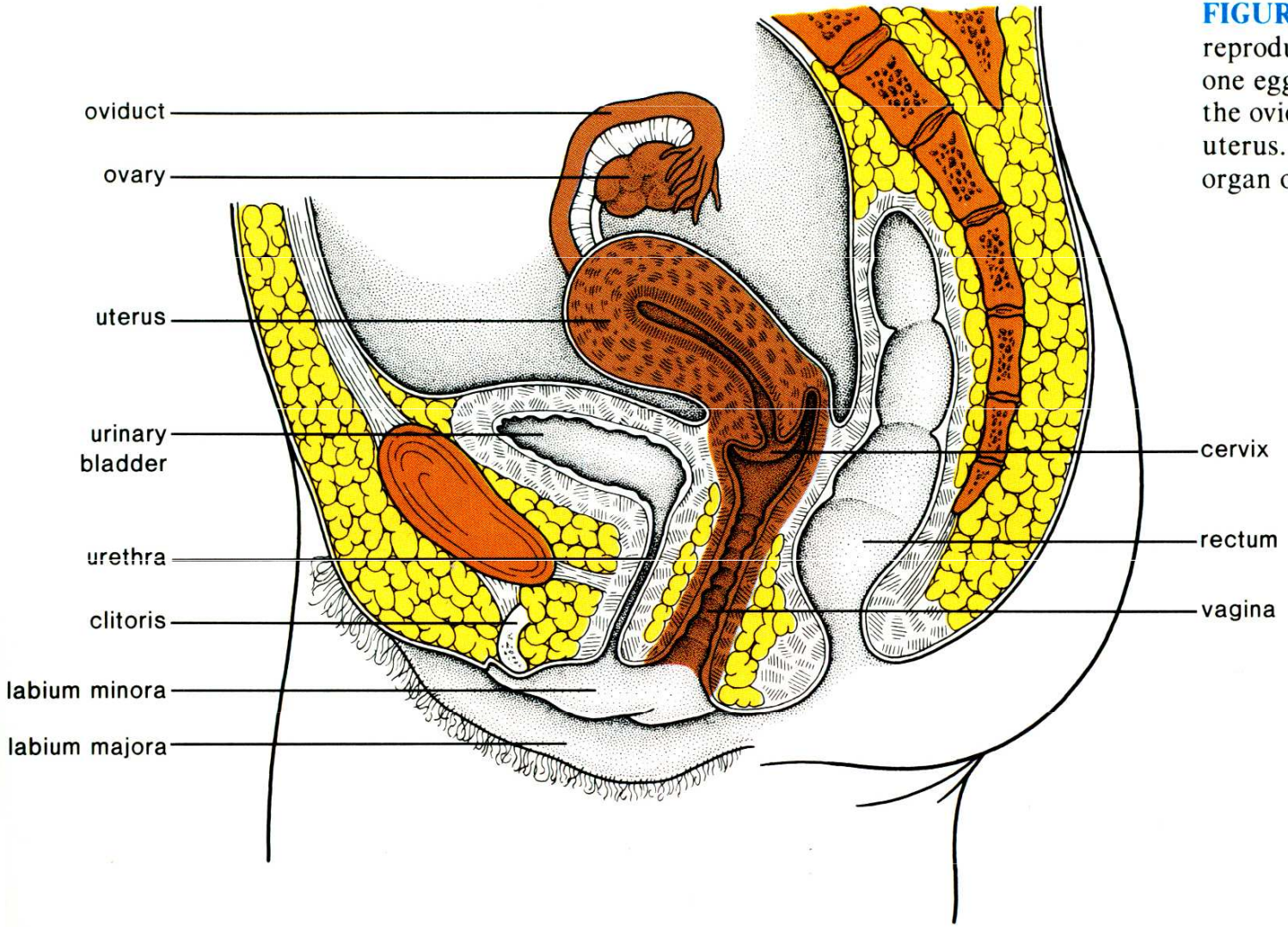


FIGURE 17.8 Side view of female reproductive system. The ovaries produce one egg a month; fertilization occurs in the oviduct and development occurs in the uterus. The vagina is the birth canal and organ of copulation.

FIGURE 17.9 *a*. Reproductive organs of female, front view. Left side is surface view and right side is longitudinal view. *b*. The enlargement shows maturation of the follicle, release of egg, and resulting corpus luteum.