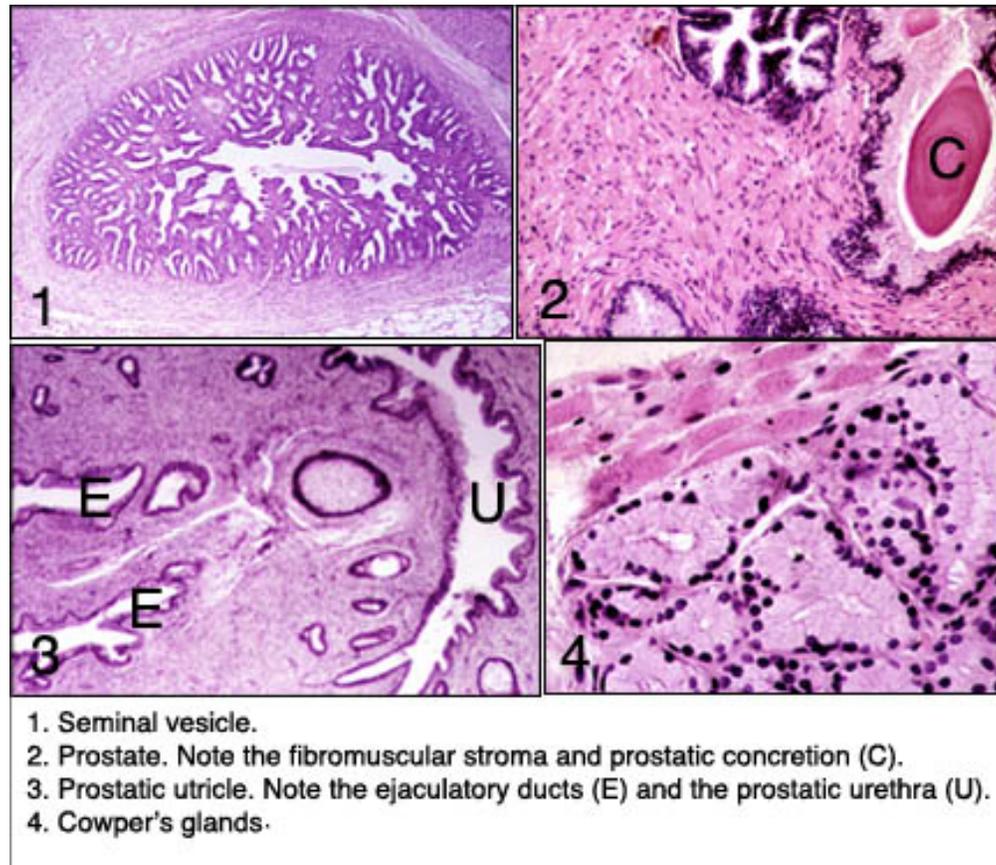


## Male Accessory Sex Glands



Male accessory sex glands include the seminal vesicles, prostate, and bulbourethral glands. The secretion from each of these glands is added to the testicular fluid and forms a substantial part of the semen.

### Seminal Vesicles

The seminal vesicles are elongated, saclike structures that lie posterior to the prostate gland. The duct of each joins with the distal end of the ductus deferens to form an ejaculatory duct. The mucosa of the seminal vesicles is thrown into numerous complex primary folds that give rise to secondary and tertiary folds. These project into the lumen and subdivide the seminal vesicle into many small, irregular compartments that give the lumen a honeycombed appearance. All the compartments communicate with a central lumen, although in histologic sections the impression is one of individual chambers. The mucosal folds are lined mainly by pseudostratified columnar epithelium consisting of rounded basal cells interposed between cuboidal or columnar cells. Regions of simple columnar epithelium may be present also. The mucosal cells contain numerous granules, some lipid droplets, and lipochrome pigment, which first appear at sexual maturity and increases with age. The ultrastructural features indicate a cell that is active in protein synthesis. The cytoplasm contains abundant granular endoplasmic reticulum, a prominent supranuclear Golgi complex, and conspicuous, dense secretory granules in the apical cytoplasm. The epithelium rests on a thin lamina propria of loose connective tissue with many elastic fibers. A muscular coat is present and consists of an inner layer of circularly arranged smooth muscle cells and an outer layer in which the smooth

muscle cells have a longitudinal orientation. Both layers of muscle are thinner than those in the ductus deferens. External to the muscle coat is a layer of loose connective tissue (adventitia) rich in elastic fibers. Secretions from the seminal vesicles form a substantial part (65-70%) of the total ejaculate. It is a yellowish, viscid secretion that contains fructose, prostaglandins, factors that increase sperm motility, factors that suppress the immune response in the female reproductive tract against semen, and factors that clot and then liquify semen in the vagina. Fructose is a source of energy for sperm whereas prostaglandins are thought to stimulate smooth muscle contractions within the walls of the tubular structures of the female reproductive tract to aid in moving sperm to the site of fertilization. In sections, the secretions appear as deeply stained, coagulated masses, often with a netlike structure. The seminal vesicles depend on testosterone, and removal of the hormone, as by castration, results in their involution and loss of secretory function.

## **Prostate**

The prostate is the largest of the accessory sex glands in men and surrounds the urethra at its origin from the bladder. It is a composite gland, made up of 35 to 60 small, compound tubuloalveolar glands from which 20 or more ducts drain independently into the prostatic urethra. These small glands appear to form strata around the urethra and consist of the periurethral mucosal glands, submucosal glands, and the main or principal prostatic glands, which lie peripherally and make up the bulk of the prostate. The prostate is contained within a vascular, fibroelastic capsule that contains many smooth muscle cells in its inner layers. Broad septa extend into the prostate from the capsule and become continuous with the dense fibroelastic tissue that separates the individual glandular elements. The secretory units of the glands are irregular and vary greatly in size and shape. The glandular epithelium differs from gland to gland and even within a single alveolus. It usually is simple or pseudostratified columnar but may be low cuboidal or squamous in some of the larger saccular cavities. The epithelium is limited by an indistinct basal lamina and rests on a layer of connective tissue that contains dense networks of elastic fibers and numerous capillaries. The cells contain abundant granular endoplasmic reticulum and many apical secretory granules. The lumina of secretory units may contain spherical bodies, the prostatic concretions, that are thought to result from condensation of secretory material. The concretions appear to increase with age and may become calcified. The connective tissue surrounding the individual glandular units contains numerous smooth muscle cells (a fibromuscular stroma), which aids in the rapid discharge of prostatic fluid at ejaculation. The prostatic secretion is a thin, milky fluid of pH 6.5 that is rich in zinc, citric acid, phosphatase, factors that enhance sperm motility, and proteolytic enzymes, one of which, fibrinolysin, is important in the liquefaction of semen. Prostatic secretion accounts for about one-third of the semen volume. Like the seminal vesicles, the development and functional maintenance of the prostate is dependent on testosterone and its metabolites. Blood levels of prostate-specific antigen (PSA) produced by the prostate is an important factor in screening for prostatic cancer.

## **Bulbourethral Glands**

The bulbourethral glands (of Cowper) are a pair of pea-sized structures located in the urogenital diaphragm, close to the bulb of the penis. They are compound tubuloalveolar glands whose long ducts drain into the proximal part of the penile urethra. Each gland is limited by a connective tissue capsule from which septa, containing elastic fibers and smooth and skeletal

muscle cells, extend into the glands, dividing them into lobules. The ducts and secretory portions are irregular in shape and size, and at their terminations, the secretory parts may form cystlike enlargements. The glandular epithelium varies from simple cuboidal to simple columnar depending on the functional state, but in distended alveoli the epithelium may be flattened. Active cells show a lightly stained cytoplasm filled with mucin granules that confine the nucleus to the base of the cell. Excretory ducts are lined by simple columnar epithelium that becomes pseudostratified near the urethra. In smaller ducts, the epithelium appears to be secretory. The surrounding connective tissue contains an incomplete layer of circularly arranged smooth muscle. Bulbourethral glands produce a clear, viscid fluid that is rich in amino sugars and contains sialoprotein. The glands secrete in response to erotic stimulation and the secretion serves as a lubricant for the penile urethra.

©William J. Krause