the skin has **five types of glands**
- merocrine sweat glands
- apocrine sweat glands
- sebaceous glands
- ceruminous glands
- mammary glands
Sweat Glands (Sudoriferous)

- two kinds of sweat (sudoriferous) glands
  - merocrine (eccrine) sweat glands
    - most numerous skin glands - 3 to 4 million in adult skin
    - are simple tubular glands
    - watery perspiration that helps cool the body
    - myoepithelial cells – contract in response to stimulation by sympathetic nervous system and squeeze perspiration up the duct
  - apocrine sweat glands
    - occur in groin, anal region, axilla, areola, bearded area in mature males
    - ducts lead to nearby hair follicles
    - produce sweat that is thicker, milky, and contains fatty acids
    - scent glands that respond to stress and sexual stimulation
    - develop at puberty
    - pheromones – chemicals that influence the physiology of behavior of other members of the species
    - bromhidrosis - disagreeable body odor produced by bacterial action on fatty acids
Sweat

• begins as a protein-free filtrate of blood plasma produced by deep secretory portion of gland
  
  – potassium ions, urea, lactic acid, ammonia, and some sodium chloride remain in the sweat, most sodium chloride reabsorbed by duct
  
  – some drugs are also excreted in sweat
  
  – on average, 99% water, with pH range of 4 to 6
    • acid mantle – inhibits bacterial growth
  
  – insensible perspiration – 500 ml per day
    • does not produce visible wetness of skin
  
  – diaphoresis – sweating with wetness of the skin
    • exercise – may lose one liter of sweat per hour
Sebaceous Glands

- **sebum** – oily secretion produced by sebaceous glands
- flask-shaped glands with short ducts opening into hair follicle
- **holocrine gland** – secretion consists of broken-down cells
  - replaced by mitosis at base of gland
- keeps skin and hair from becoming dry, brittle, and cracked
- **lanolin** – sheep sebum
  - *We wash off our sebum so we can rub into our skin the sebum of sheep!"*
Ceruminous Glands

• found only in external ear canal

• ceruminous gland secretion combines with sebum and dead epithelial cells to form earwax (cerumen)
  – keep eardrum pliable
  – waterproofs the canal
  – kills bacteria
  – makes guard hairs of ear sticky to help block foreign particles from entering auditory canal

• simple, coiled tubular glands with ducts that lead to skin surface
Mammary Glands

- **breasts** *(mammae)* of both sexes contain very little glandular material

- **mammary glands** – milk-producing glands of **females** that develop only during pregnancy and lactation
  - modified apocrine sweat gland
  - richer secretion released by ducts opening into the nipple

- **mammary ridges or milk lines**
  - two rows of mammary glands in most mammals
  - primates kept only anterior most glands

- **additional nipples** *(polythelia)*
  - may develop along milk line