

INTEGUMENTARY SYSTEM

THE INTEGUMENT: DERMIS

DERMIS +

PAPILLARY LAYER A
DERMAL PAPILLA A

RETICULAR LAYER B
HAIR SHAFT C / FOLLICLE C'
ARRECTOR PILI MUSCLE D
SEBACEOUS GLAND E

SECRETION F

SEBUM F+E

SWEAT GLAND G

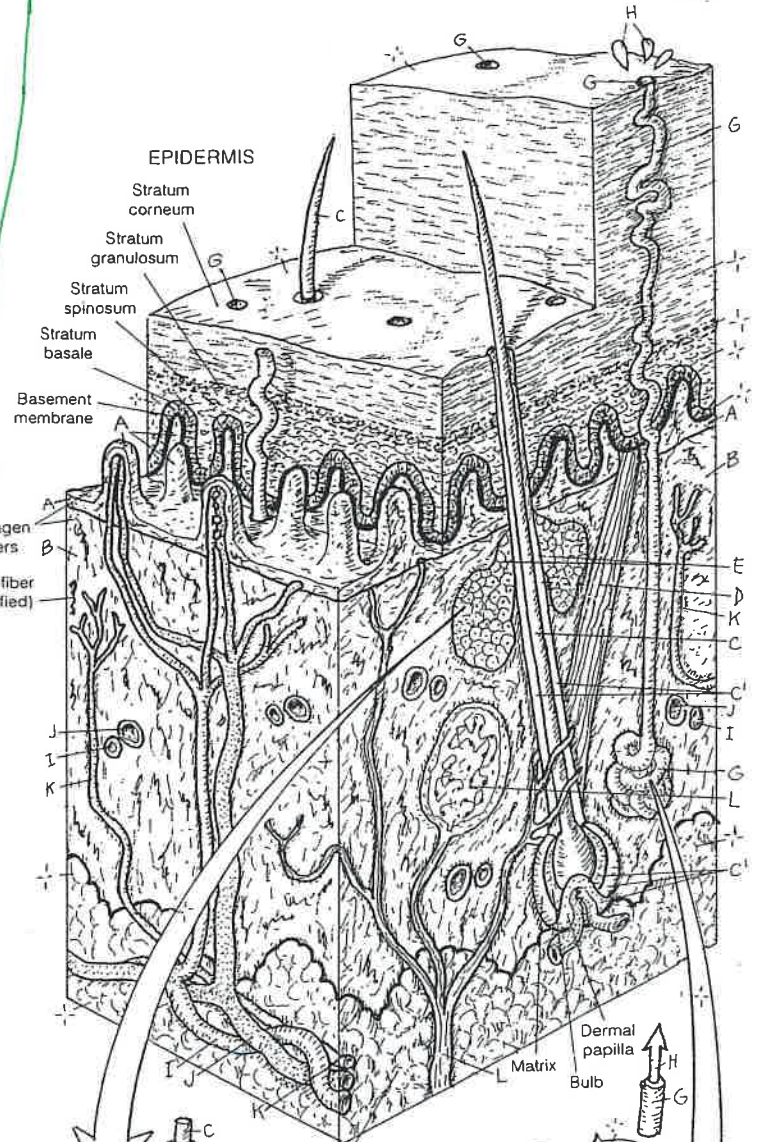
SWEAT H

ARTERY I VEIN,
LYMPHATIC VESSEL J
NERVE L Fat L

Note: These structures have assigned colors.

Do these structures 1st.
CN: Use red for I, blue for J, green for K, yellow for L.

-/- = do not color

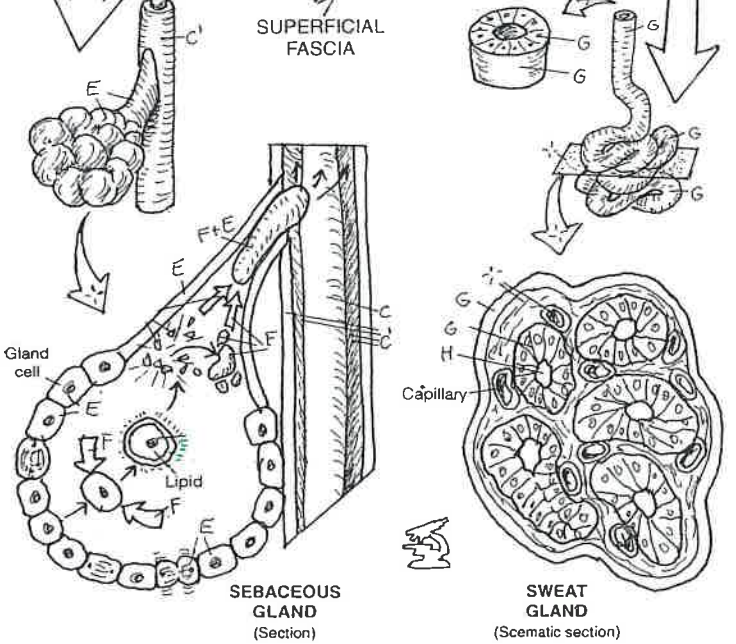


The dermis consists of a fibrous connective tissue supporting *arteries* and *veins*, *lymphatic capillaries*, *nerves* and sensory receptors (see Plates 18, 91), and a number of accessory structures. The dermis is separated from the epidermis by a basement membrane (epidermal-dermal junction). On the deep side, the dermis is bordered by superficial fascia (hypodermis, subcutaneous tissue), a loose connective tissue layer with variable amounts of adipose tissue. The upper or most superficial layer of dermis is the *papillary layer*, characterized by a vascular, loose connective tissue. Pegs of this layer (dermal papillae) poke up into the epidermis. These pegs have strong attachment to the basement membrane and contain vessels, nerve endings, and axons among the collagen and elastic fibers. The subjacent *reticular layer* has a more dense fibrous character.

Hair shafts rise from epidermal *follicles* pushed down into the dermis (and hypodermis in the scalp) during development. They are not found in thick skin. The follicle begins at the site where the hair leaves the epidermis; it terminates in the form of a bulb. Hair shafts are composed of layers of keratin surrounded by layers of follicular cells (root sheaths, glassy membranes). The base of the follicle (hair bulb) is turned inward (invaginated) to accommodate a vascular dermal papilla. An obliquely placed bundle of smooth muscle attaches the outer membrane of the follicle to a papillary peg under the epidermis. This is the *arrector pili muscle*. When it is contracted, the hair to which it is attached erects to become perpendicular with the skin surface. In many mammals, hair standing on end is a sign of increased vigilance.

Sebaceous glands are grape-shaped collections of cells with a common duct (acini; holocrine gland) that surround hair follicles. The base of each gland is mitotically active; the daughter cells move into the gland center and become filled with lipid. Continued lipid engorgement results in *burst cells*. The secretory product and the cell debris constitute *sebum*. The gland duct transports the sebum to the epidermal surface or into the upper hair follicle. Sebum coats the skin and hairs, providing a degree of waterproofing. Sebum may play a social role, in terms of olfactory identification.

Sweat glands are coiled tubular glands in the deep dermis. The *ducts* of these glands traverse the epidermis by spiraling around the keratinocytes and open onto the epidermal surface. The glandular cells at the base of the sweat gland are in intimate proximity to capillaries, just as the glomerulus is in relation to the visceral layer of the renal capsule in the kidney. The cells produce sweat, a filtrate of plasma, somewhat like the filtrate of the renal corpuscle (Plate 149). Sweat is largely salt water, with a dash of urea and other molecules. Sweating is a means by which the hypothalamus can induce a degree of cooling by evaporation.



SEBACEOUS GLAND (Section)

SWEAT GLAND (Schematic section)