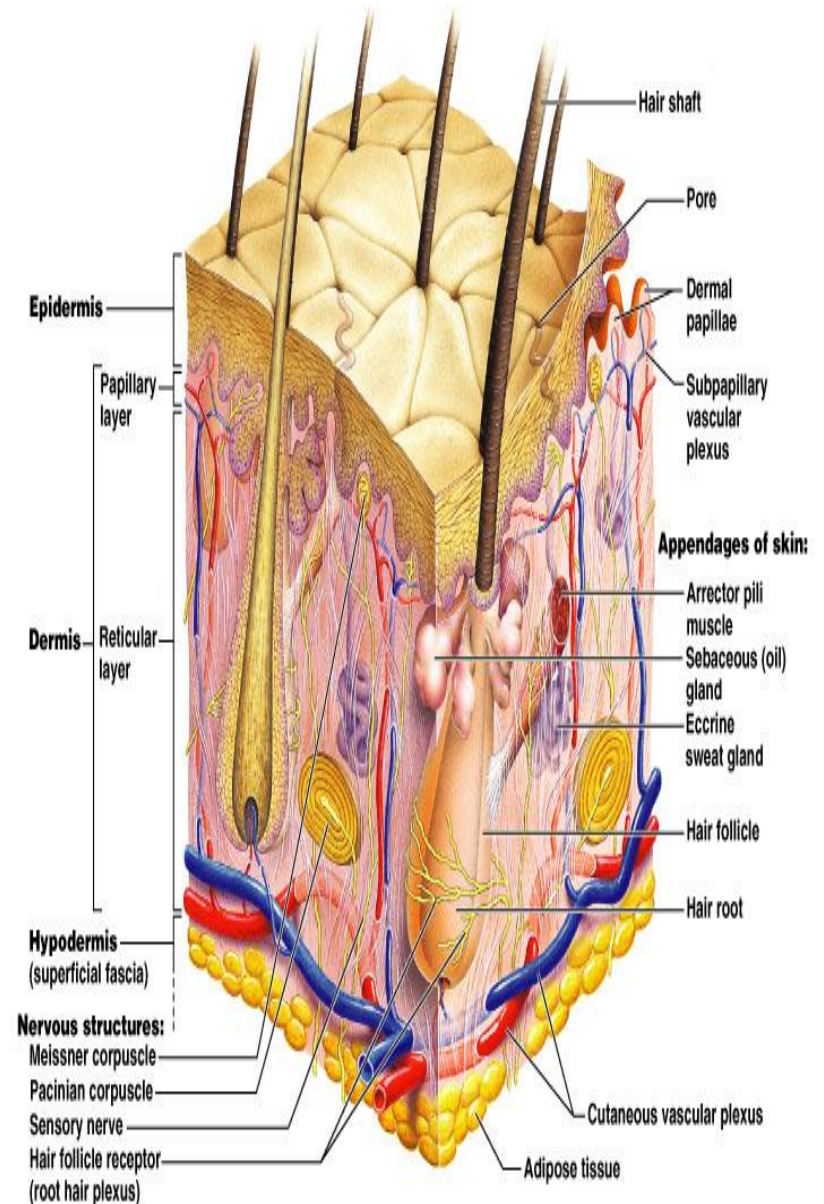


Skin (Integumentary System)



Goals

To Describe:

the basic functions and types of skin

**the layers of the epidermis and how
their characteristics contribute to skin function**

**the cell types of the epidermis and their role
in skin function**

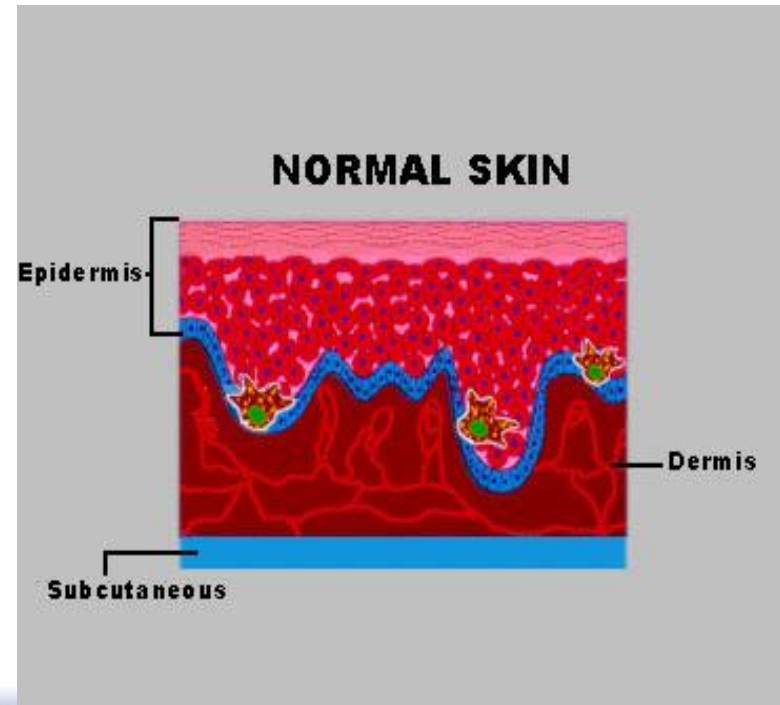
**the tissues of the dermis and hypodermis and how
they contribute to skin function**

**the morphology and function of nerve endings
of the skin**

the morphology and function of epidermal appendages

Skin

- Covers entire surface of body
- Consists of three layers
 - Epidermis: thin outer layer
 - Dermis: thick underlying layer
 - Hypodermis: fatty layer



Epidermis

- Consists of five sub-layers
- Basal cell layer
 - Innermost layer of epidermis
 - Contains basal cells
 - Contains melanocytes that produce melanin
 - Melanoma develops when melanocytes undergo malignant transformation
 - Contains Merkel cells

Epidermis

- Squamous cell layer
 - Resides above basal layer
 - Called stratum spinosum
 - Contains keratinocytes
 - Contains Langerhans cells
 - Is the thickest part of epidermis

Dermis

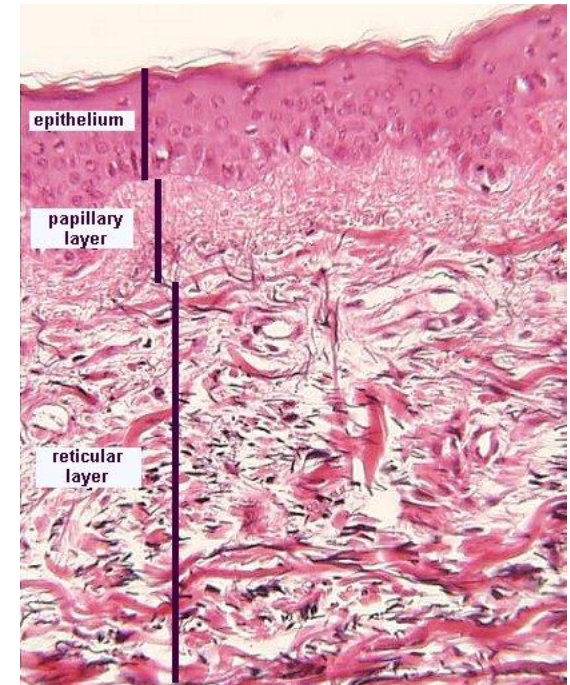
- Thickest of the three layers
- Main functions are:
 - Stores much of the body's supply of water
 - Supplies nutrients to the epidermis
 - Regulates body temperature

Dermis

- Contains specialized cells and structures
 - Blood vessels
 - Lymph vessels
 - Hair follicles
 - Sweat glands
 - Sebaceous glands
 - Nerve endings
 - Collagen

Dermis

- Papillary layer
 - Regulates body temperature
 - Supplies epidermis with nutrient-filled blood
- Reticular layer
 - Provides structure and elasticity
 - Supports components of skin



Hypodermis

- Network of fat and collagen
- Functions as:
 - Shock-absorber for body
 - Insulator
 - Stores fat as energy reserve

Functions of Skin – largest organ

Protection – barrier against UV light, mechanical force, dehydration, microbes

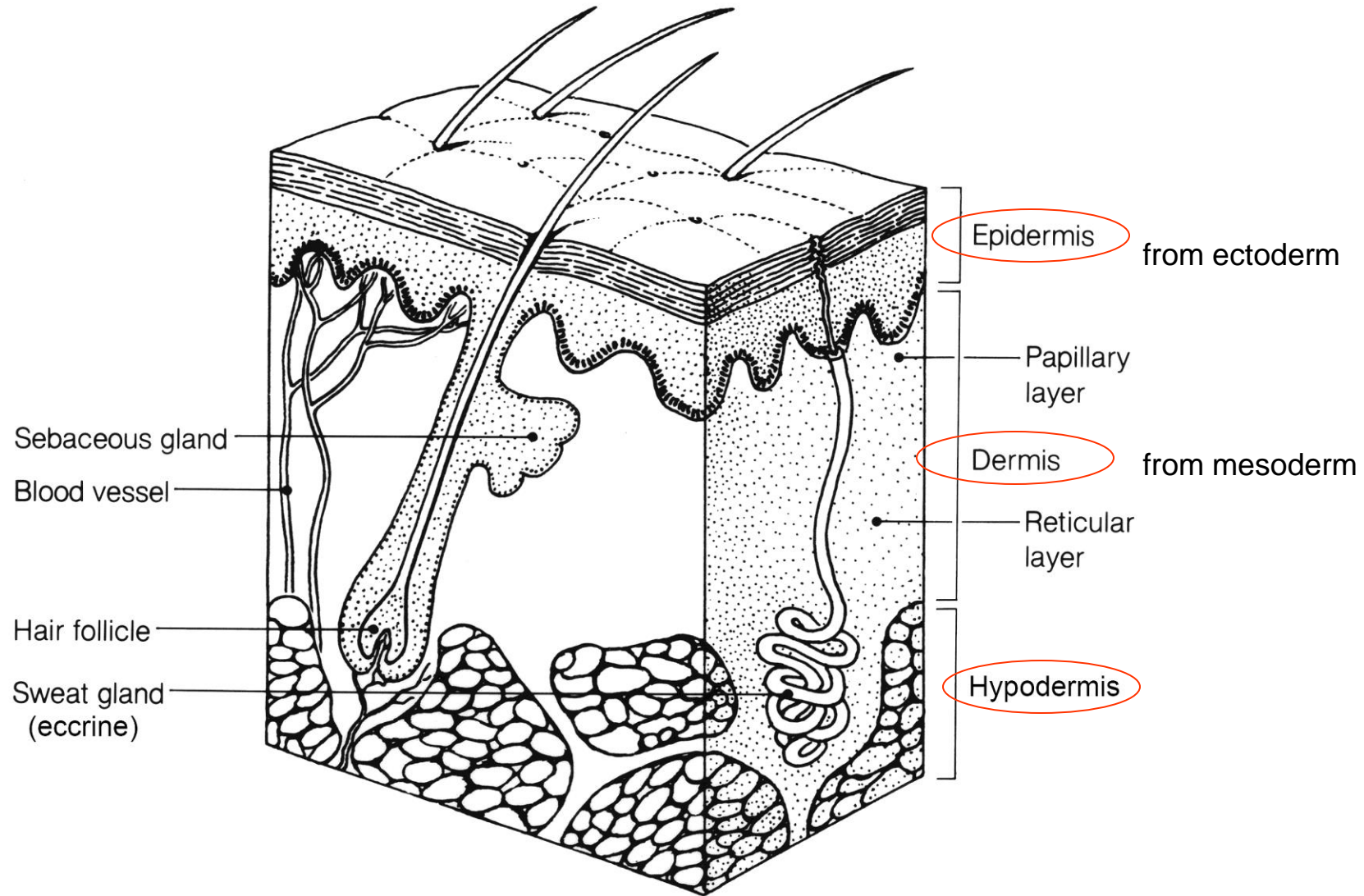
Sensation – temperature, pressure, pain, touch

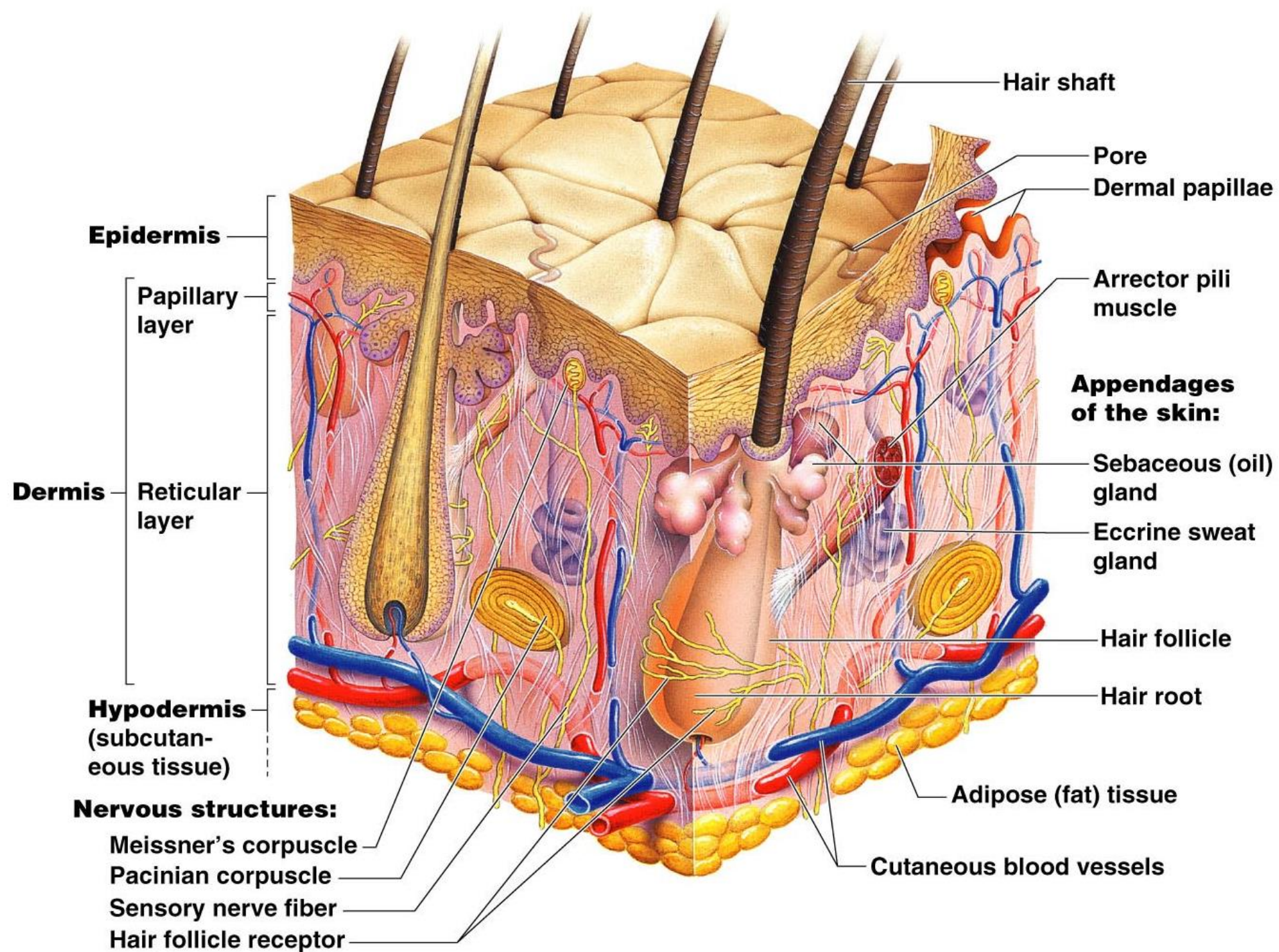
Thermoregulation – insulated by hair and adipose tissue, sweat, changes in blood flow

Metabolism – storage of fat in adipose tissue, vitamin D production, milk production

Communication – blushing, apocrine sweat glands, raising of hairs (animals)

Layers of Skin



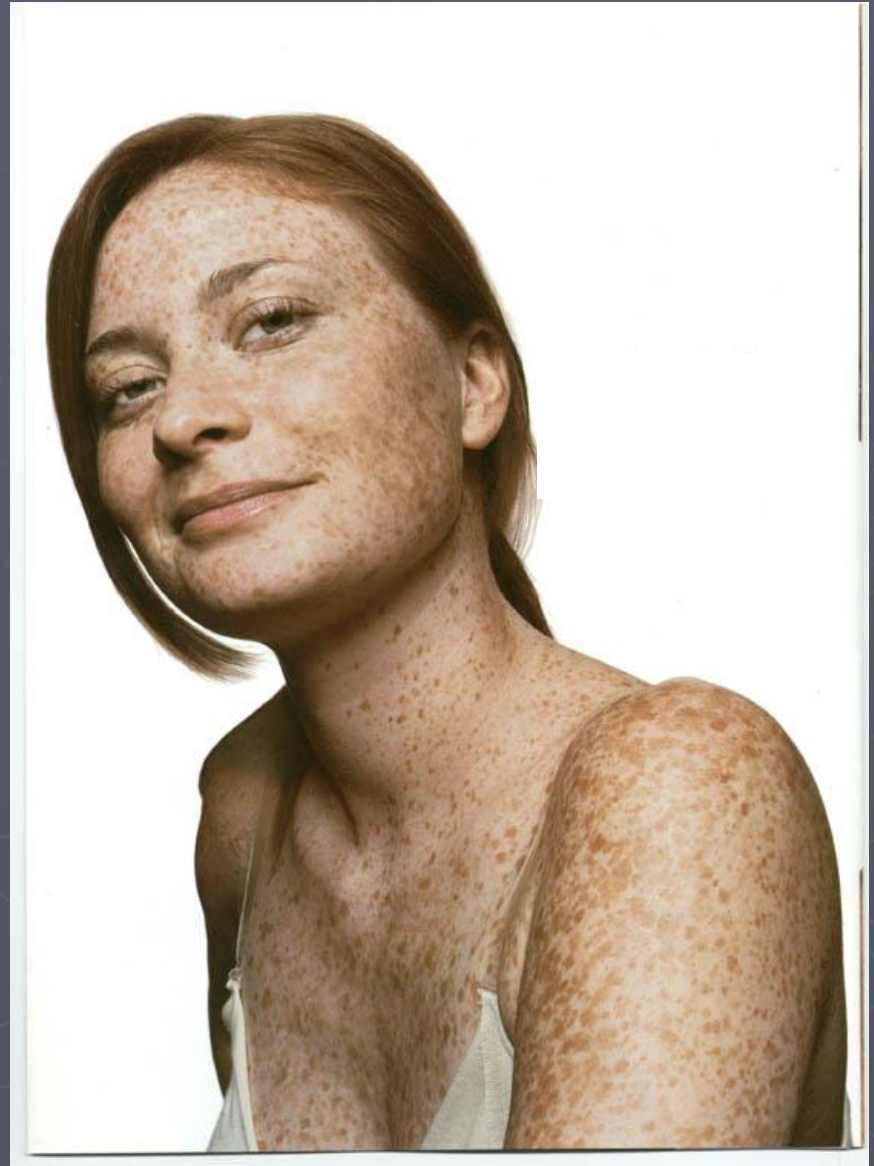


Melanin

- ▶ Pigment (melanin) produced by melanocytes
- ▶ Melanocytes are mostly in the stratum basale
- ▶ Color is yellow to red to brown to black
- ▶ Amount of melanin produced depends upon genetics and exposure to sunlight

Melanin continued....

- ▶ Large amounts of melanin occur in some regions like freckles, moles, and nipples.
- ▶ Less melanin occurs in the lips, hands, and soles of the feet.
- ▶ All races have the same number of melanocytes! The amount of melanin produced is determined by genetics.



Albinism

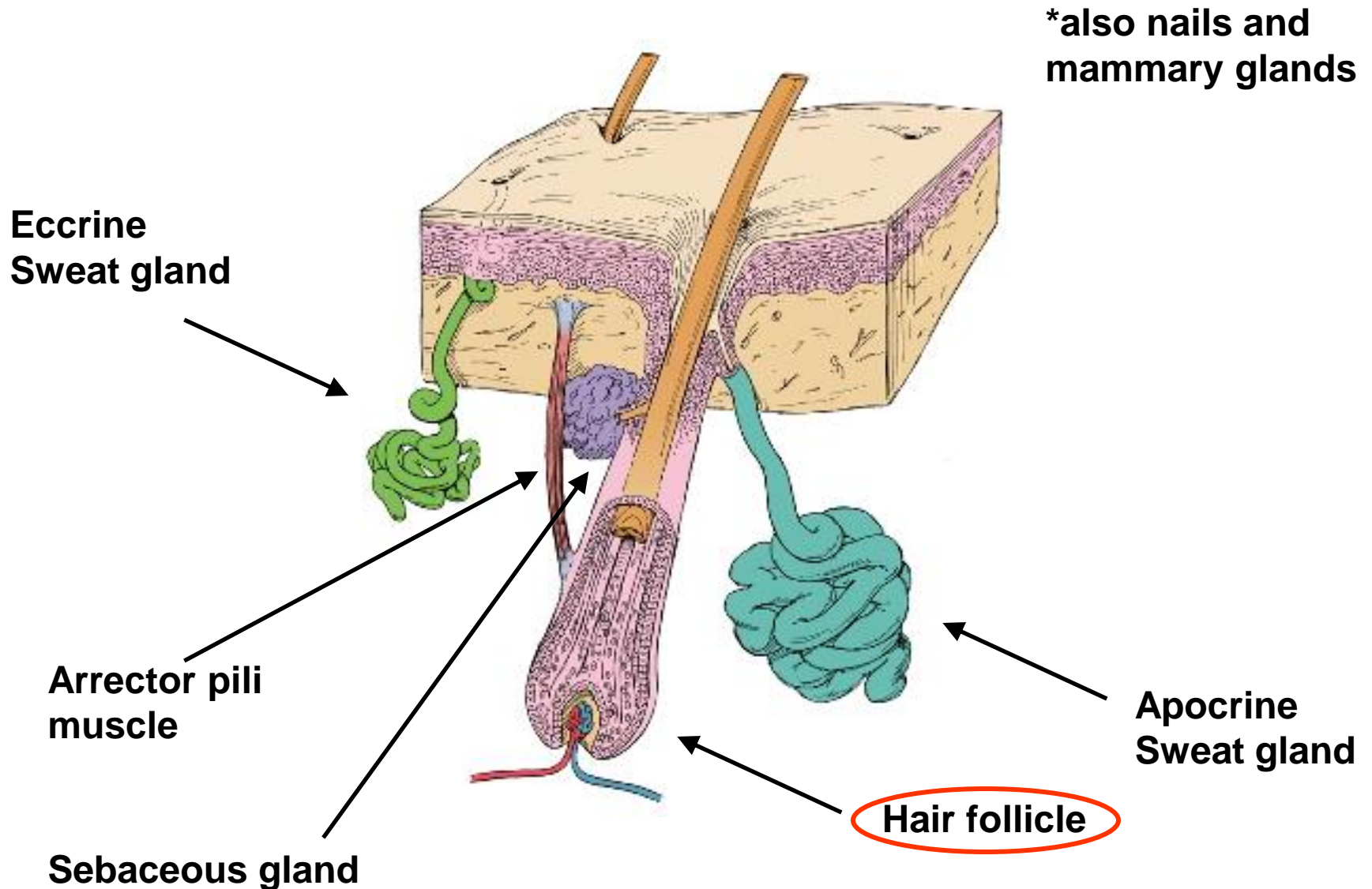
- ▶ A single mutation can cause a deficiency or complete absence of melanin.
- ▶ Albinos have fair skin, white hairs, and unpigmented eyes



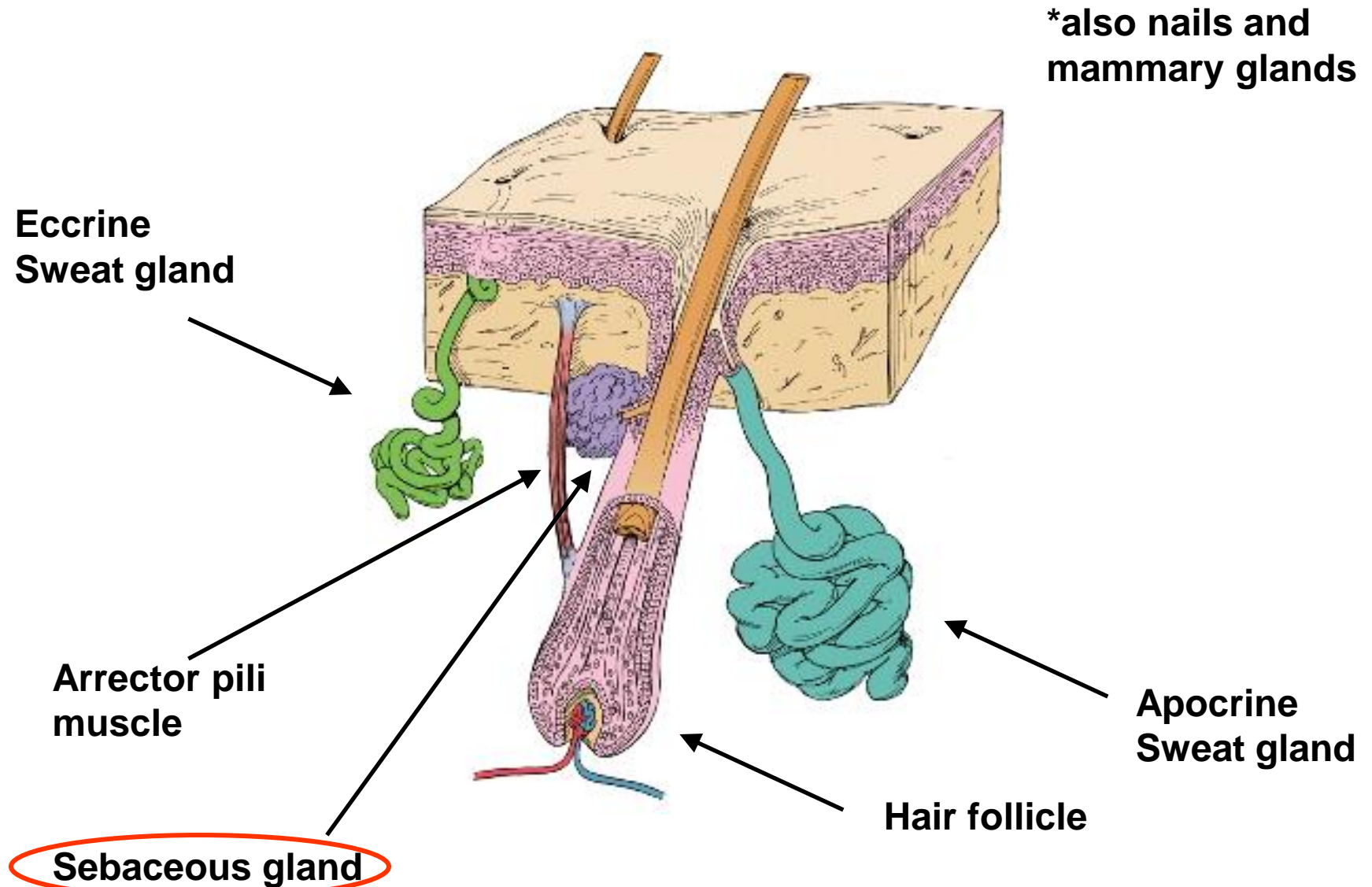
Skin appendages

- Derived from epidermis but extend into dermis
- Include
 - ☐ Hair and hair follicles
 - ☐ Sebaceous (oil) glands
 - ☐ Sweat (sudoriferous) glands
 - ☐ Nails

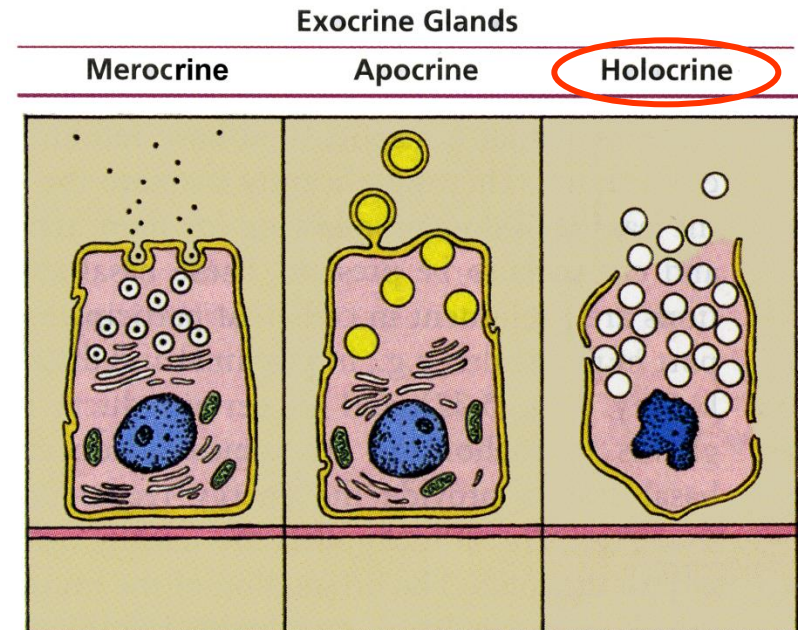
Epidermal Appendages



Epidermal Appendages

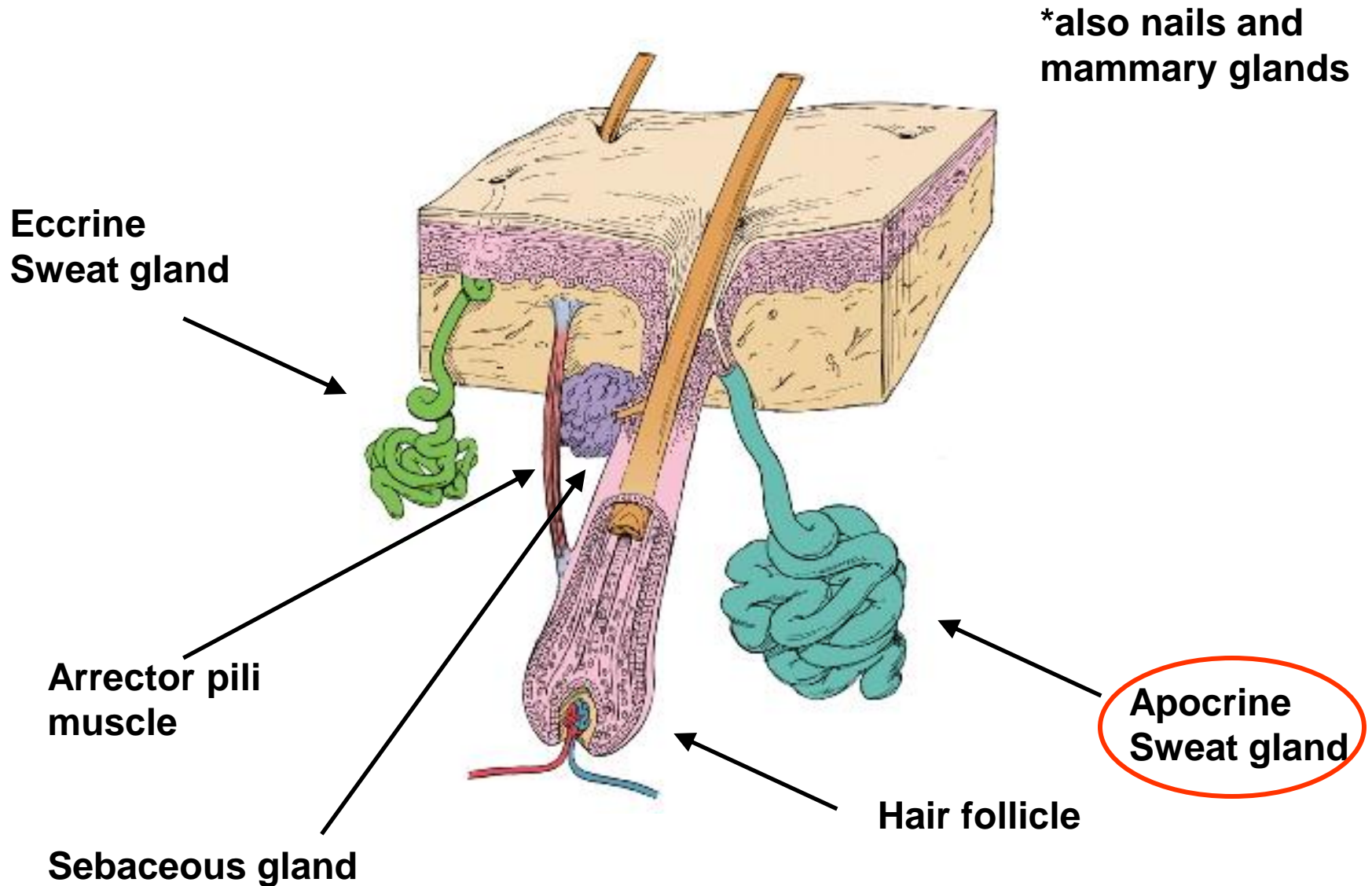


Sebaceous glands

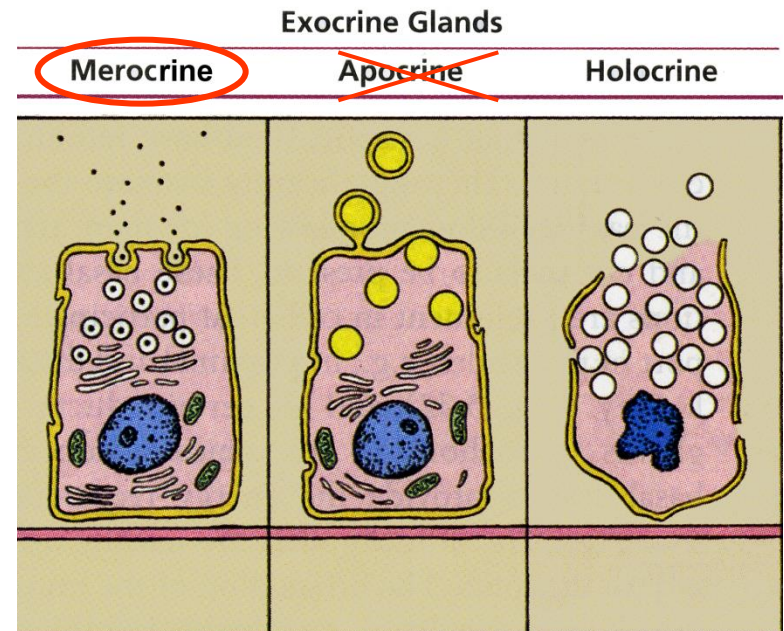
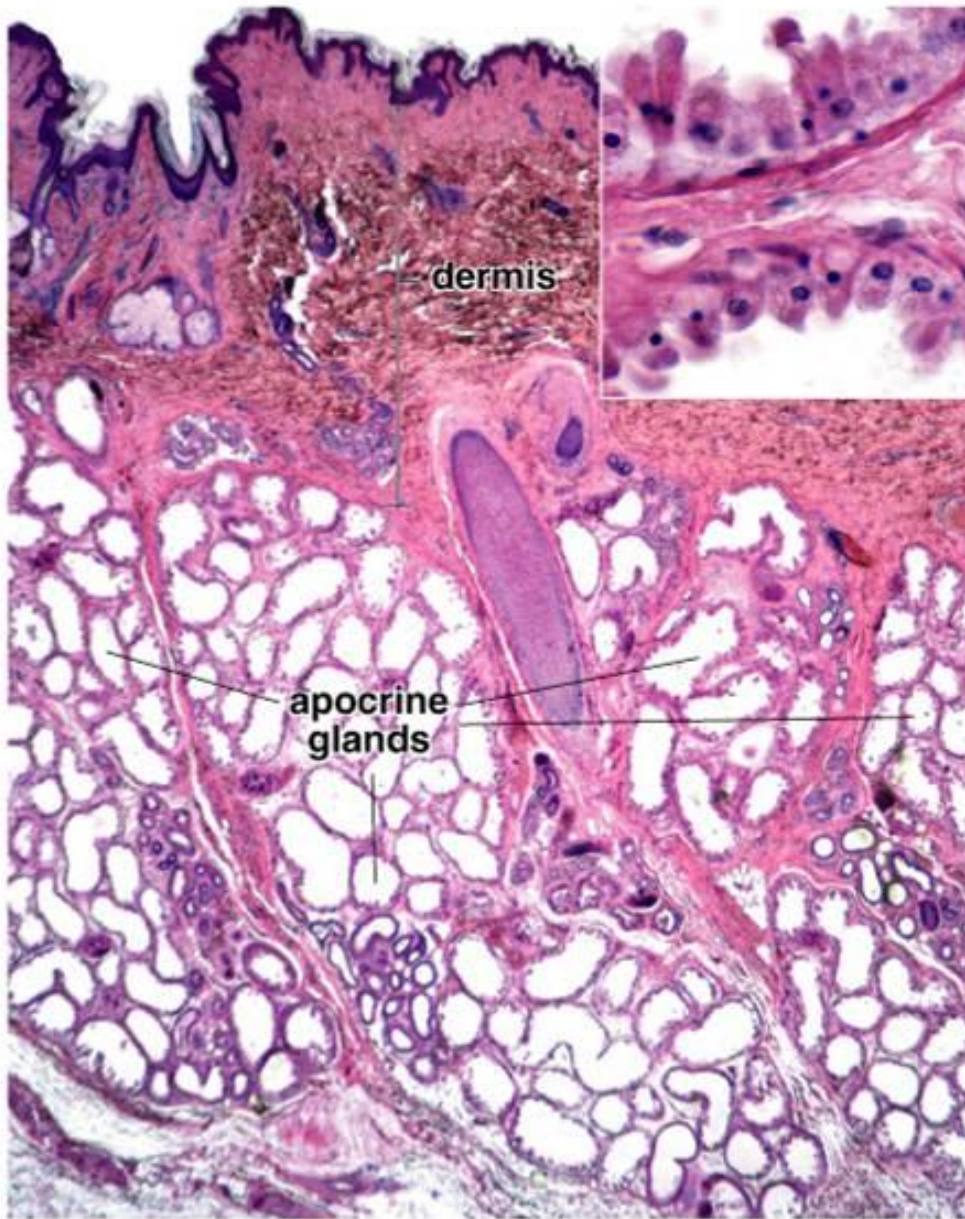


sebocytes secrete sebum: triglycerides,
fatty acids, waxes

Epidermal Appendages

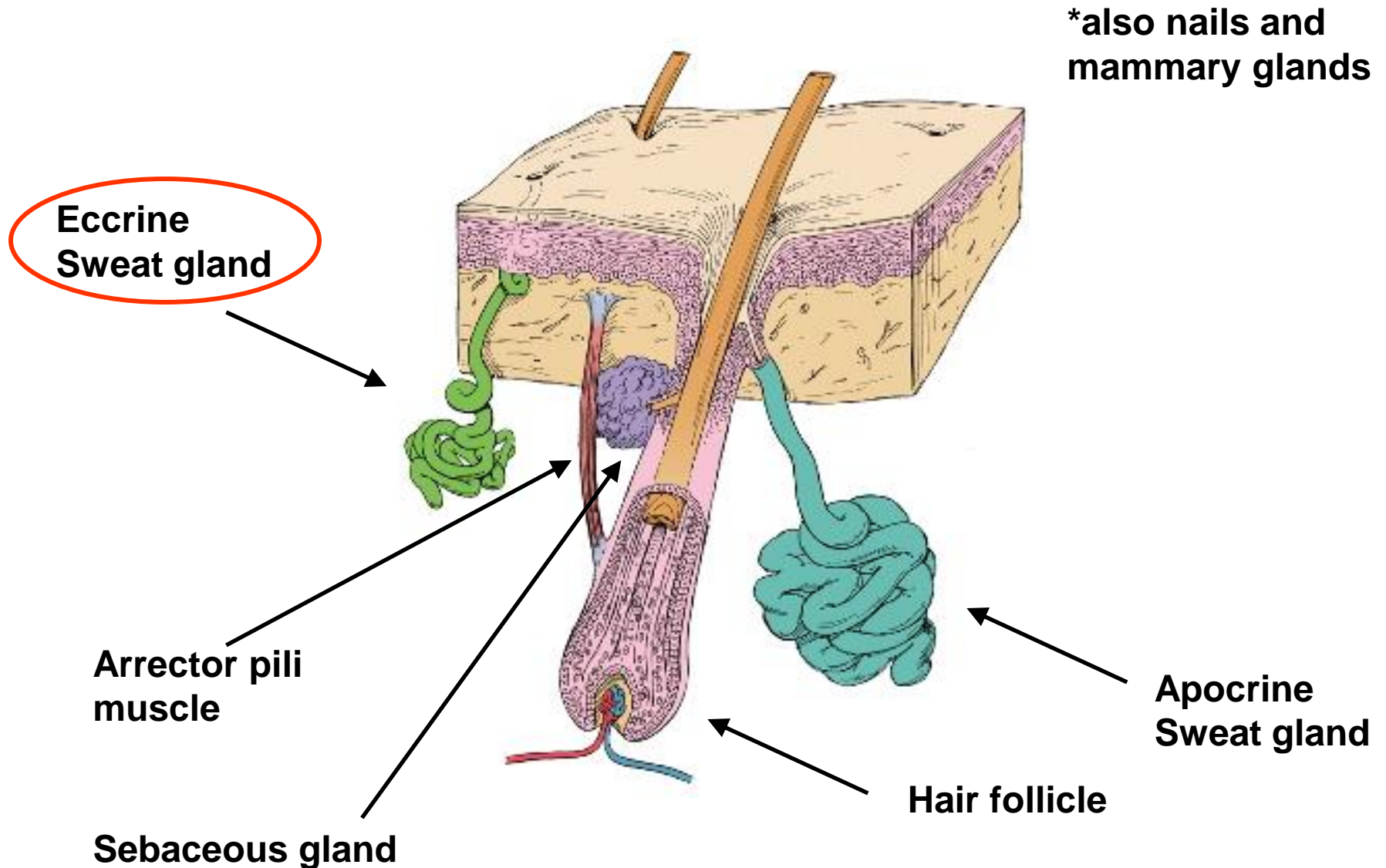


Apocrine Sweat Glands

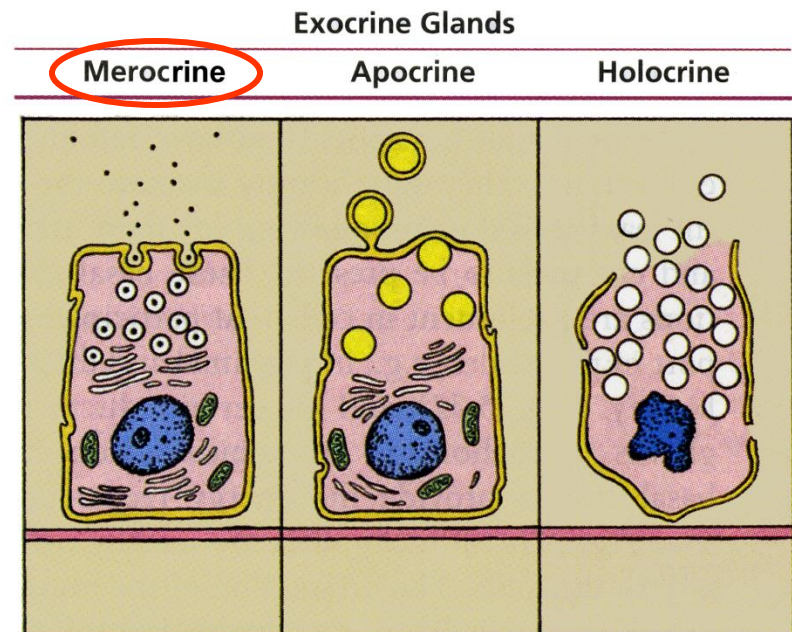
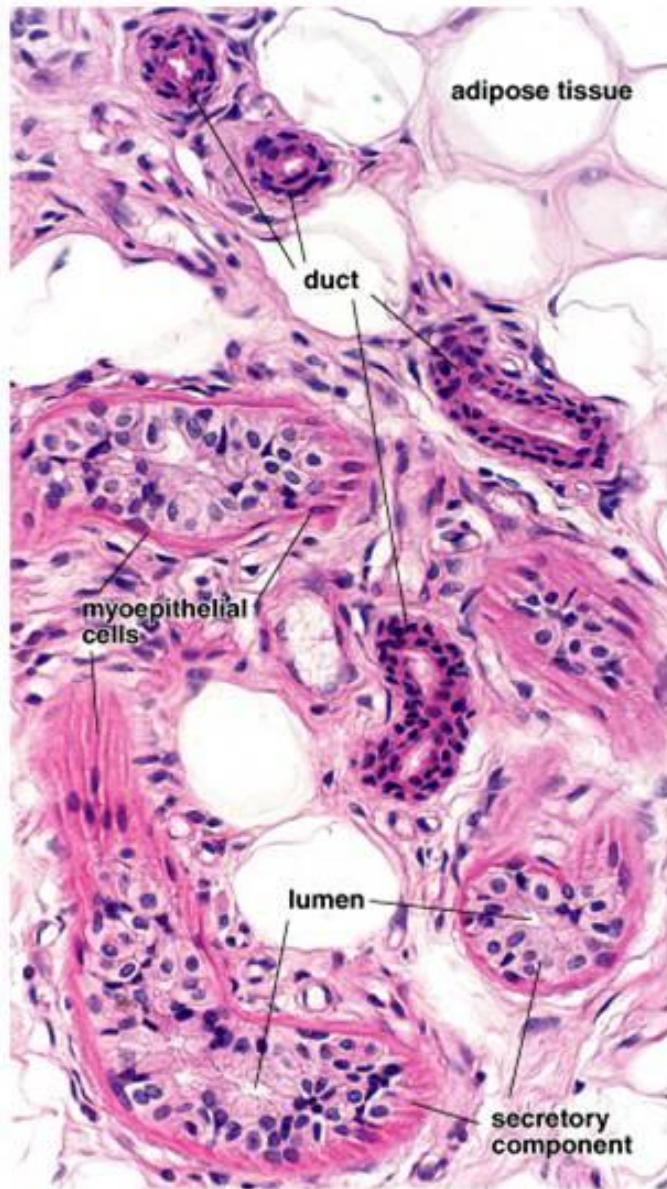


secrete a mixture of carbs, lipids, protein and ammonia

Epidermal Appendages



Ecocrine Sweat Glands



Major Points

The dermis is a dense irregular connective tissue with dermal papillae that contain capillaries

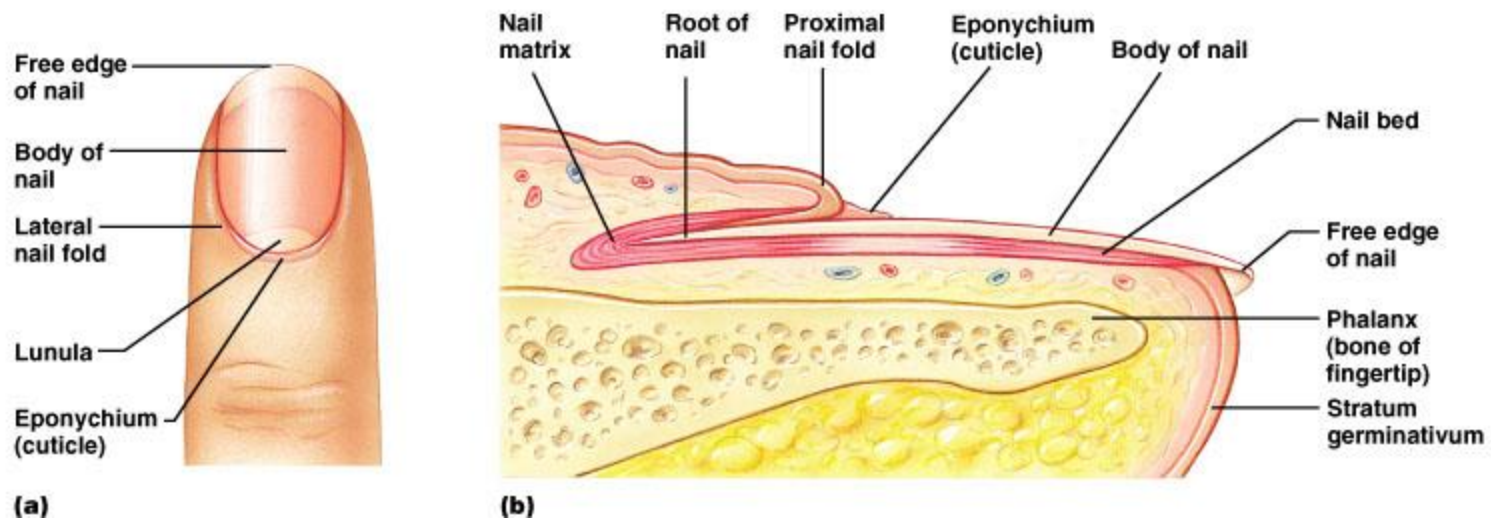
Many types of nerve endings are found in different parts of the skin

Epidermal appendages are derived from the epidermis and include hair follicles, apocrine sweat glands, eccrine sweat glands, and sebaceous glands

The hypodermis is a fatty connective tissue layer that surrounds some epidermal appendages

Nails

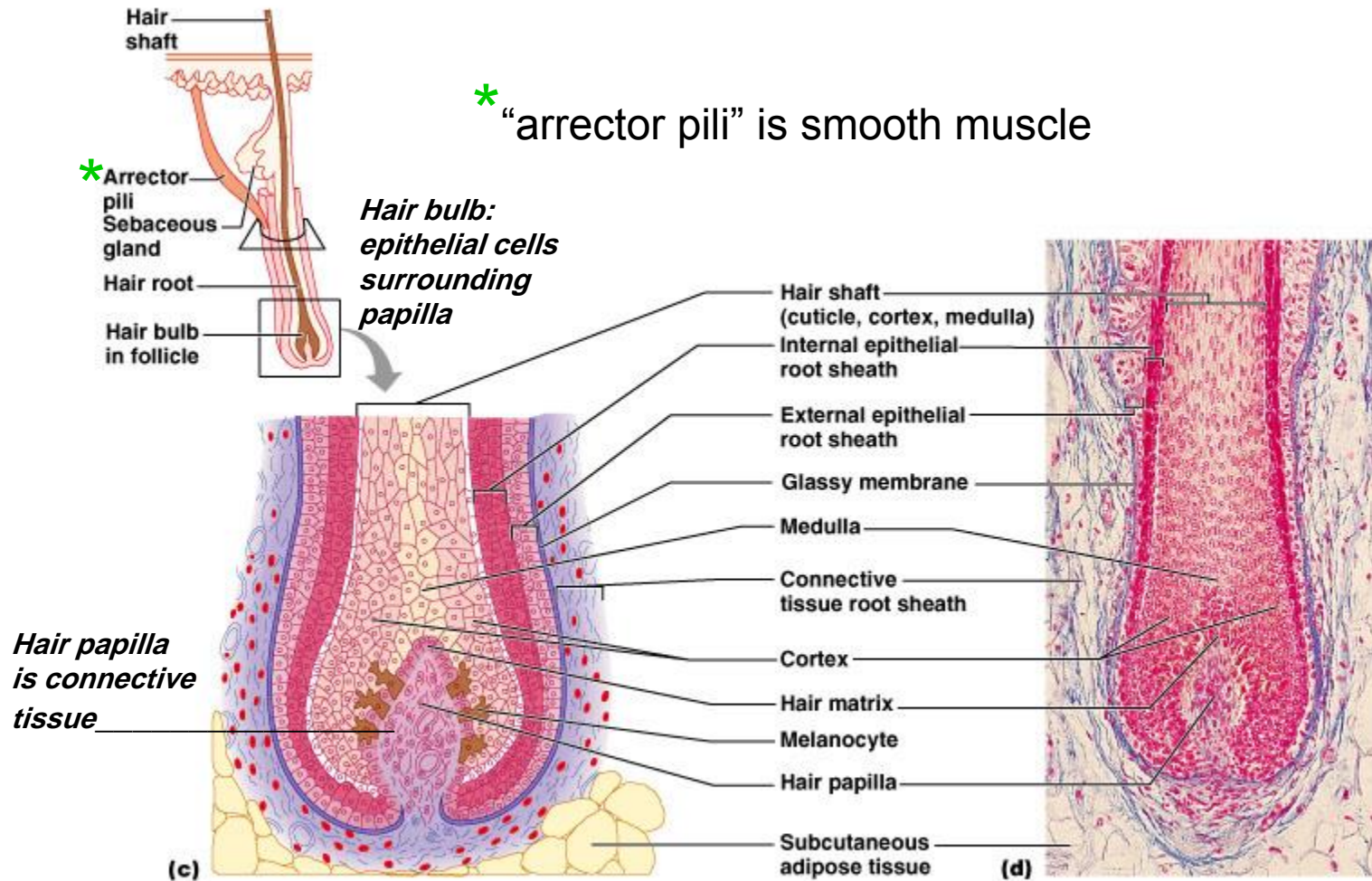
- Of hard keratin
- Corresponds to hooves and claws
- Grows from nail matrix



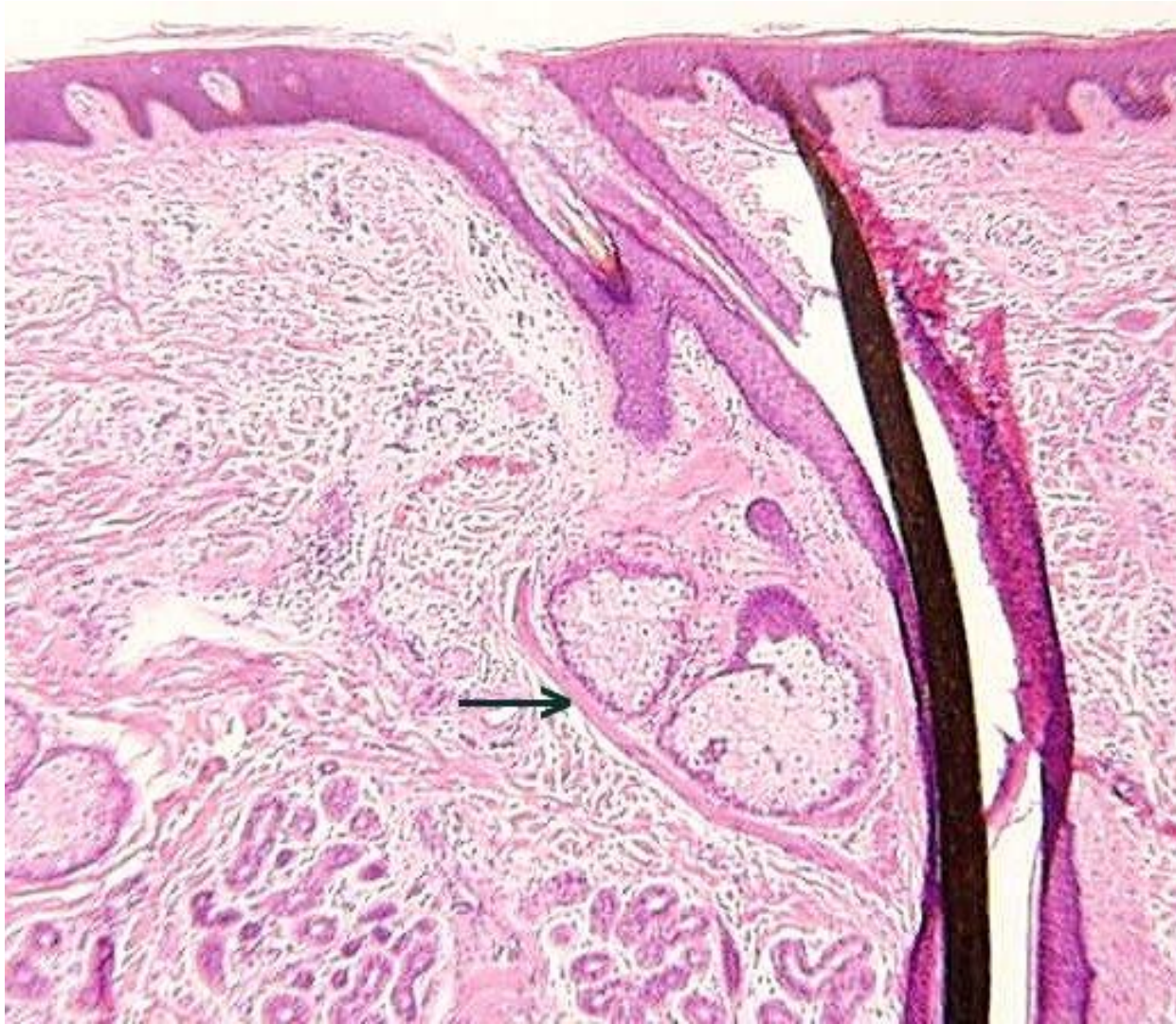
Hair and hair follicles: complex

Derived from epidermis and dermis

Everywhere but palms, soles, nipples, parts of genitalia



Arrector Pili Muscle



Disorders of the integumentary system

■ Burns

□ Threat to life

- Catastrophic loss of body fluids
- Dehydration and fatal circulatory shock
- Infection

□ Types

- First degree – epidermis: redness (e.g. sunburn)
- Second degree – epidermis and upper dermis: blister
- Third degree - full thickness

■ Infections

■ Skin cancer

Burns

First-degree

(epidermis only; redness)



(b)

Second-degree

(epidermis and dermis, with blistering)



(c)

Third-degree

(full thickness, destroying epidermis, dermis, often part of hypodermis)



(d)

Tumors of the skin

- Benign, e.g. warts
- Cancer – associated with UV exposure (also skin aging)
 - Aktinic keratosis - premalignant
 - Basal cell - cells of stratum basale
 - Squamous cell - keratinocytes
 - Melanoma – melanocytes: most dangerous; recognition:
 - A - **A**symmetry
 - B - **B**order irregularity
 - C - **C**olors
 - D - **D**iameter larger than 6 mm

Skin Cancer



(a) Basal cell carcinoma



(b) Squamous cell carcinoma



(c) Melanoma