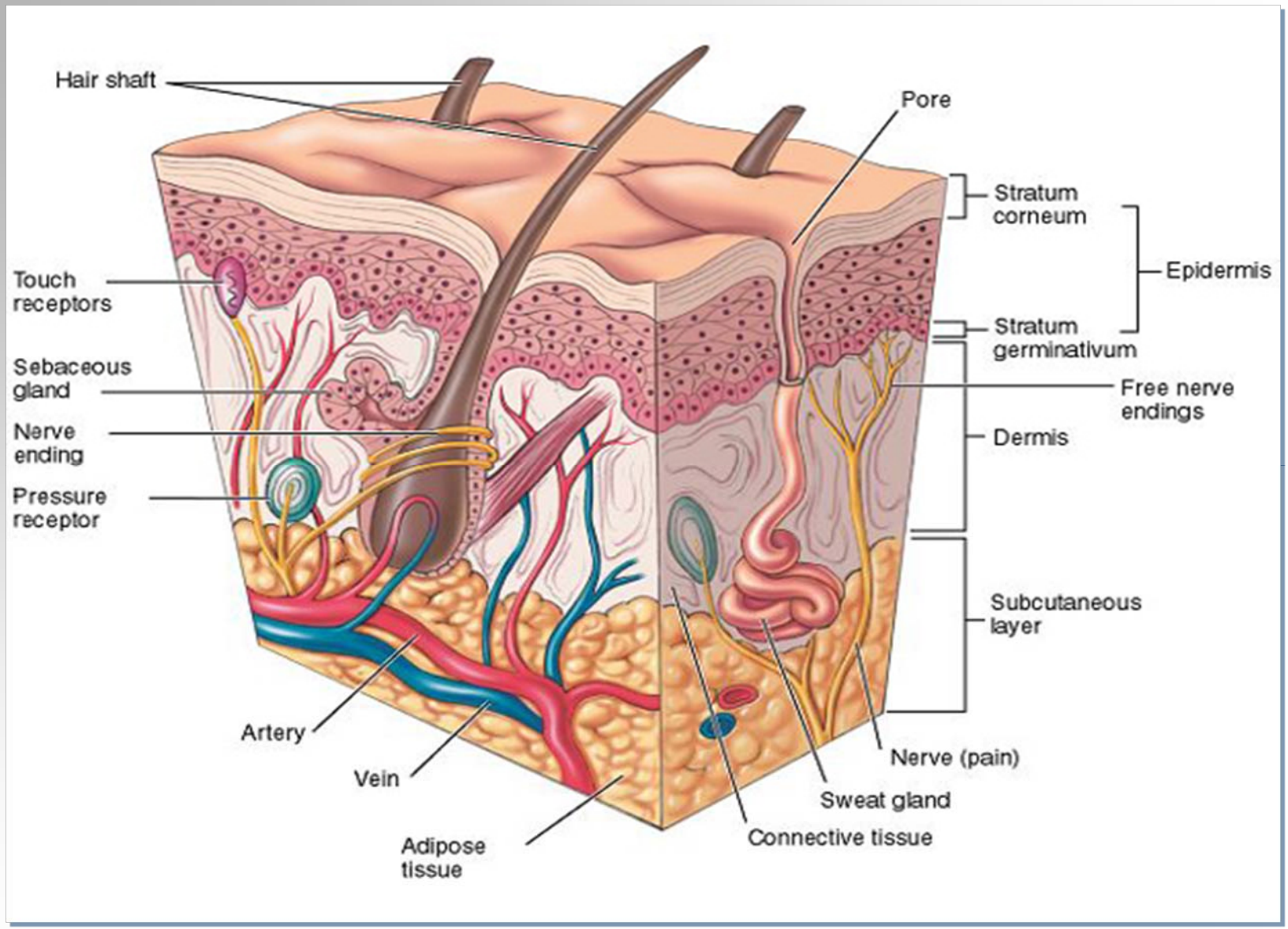
Integumentary System

Rita Carey-Nita

Integumentary System

- Integumentary System includes:
  - Skin
  - Sweat glands
  - Sebaceous glands
  - Hair
  - Nails


Hair shaft
Pore
Stratum corneum
Epidermis
Touch receptors
Stratum germinativum
Sebaceous gland
Free nerve endings
Nerve ending
Dermis
Pressure receptor
Subcutaneous layer
Artery
Nerve (pain)
Vein
Sweat gland
Connective tissue
Adipose tissue

Integumentary System

- Skin: AKA Cutaneous Layer
- 2 layers:
  - Epidermis & Dermis
- Epidermis:
  - Outer layer
  - Avascular
  - No nerves
  - Thin stratified squamous epithelium

Integumentary System

- 2 layers:
  - stratum corneum & stratum germinativum
- Stratum Germinativum:
  - Lies close to dermis / Deepest layer
  - Access to rich blood supply
  - Cells constantly divide—Mitosis
  - Cells replaced every 2-4 weeks
  - Keratinzation occurs producing keratin

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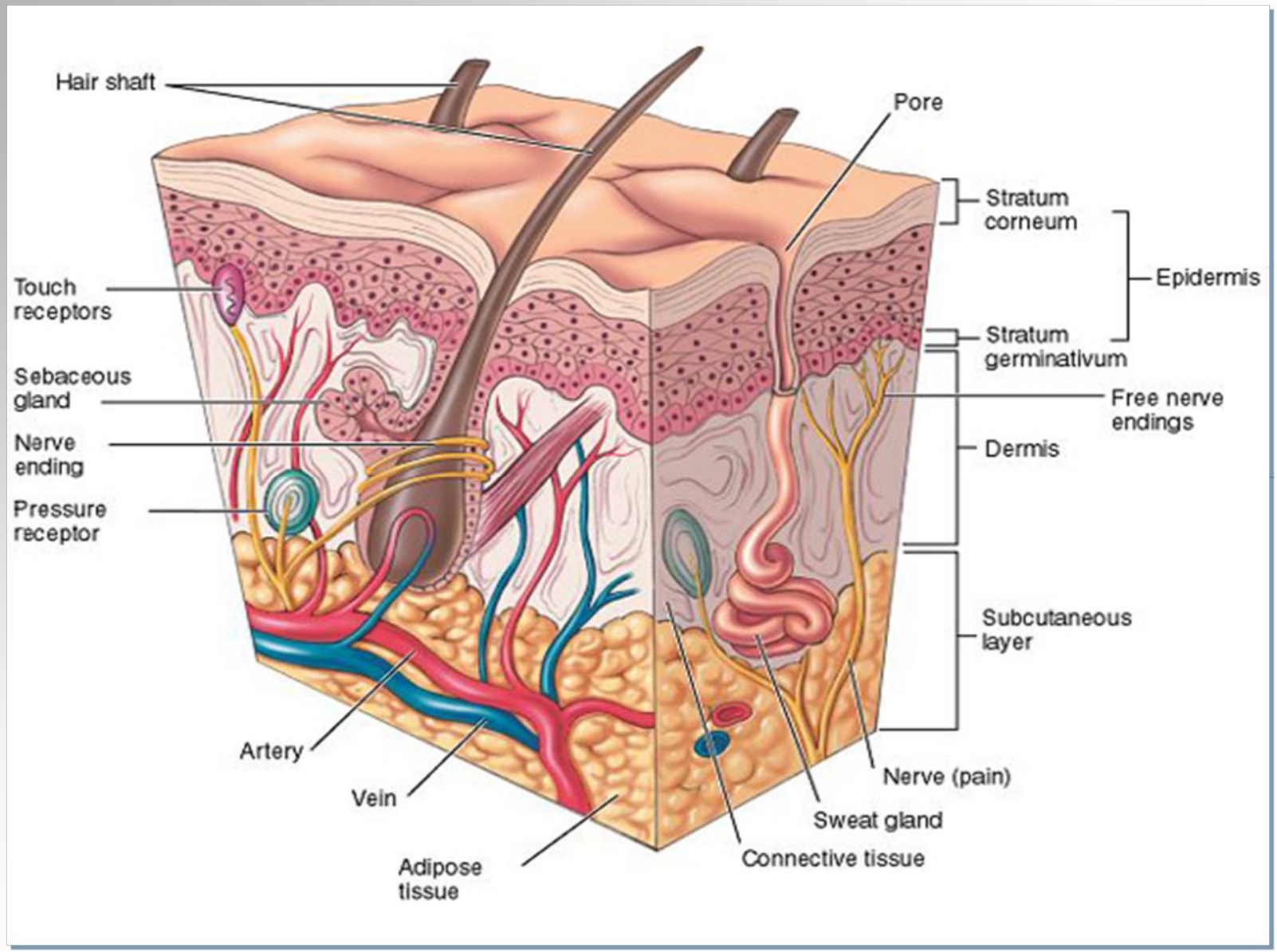
- Stratum corneum:
  - Surface layer of epidermis
  - Composed of dead, keratinized cells
  - Cells constantly replaced by other cells that are moving up from deeper layers
  - The dead cells are continuously sloughed off through wear & tear

Integumentary System

- Dermis:
  - AKA: Corium or True Skin
  - Located under epidermis
  - Thickness depends on site
  - Composed of dense fibrous connective tissue
  - Contains collagen to maintain shape & strength; elastin fibers for stretch
  - Nourishes & supports the epidermis
  - Accessory structures are embedded in dermis

Integumentary System

- Subcutaneous Layer:
  - Layer beneath dermis & on top of muscle
  - Not considered part of skin
  - Attaches epidermal/dermal layer to underlying structure
  - Composed of adipose & loose connective tissue
  - Cushions, protects, insulates & anchors skin to underlying structures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Integumentary System

- Skin Color:
  - Determined by genetics, physiological, UV rays & sometimes disease
  - Melanocytes secrete a skin-darkening pigment: **melanin**
  - The more melanin secreted the darker the skin
  - Skin also contains yellow pigment called carotene

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- Conditions related to malfunction of melanocytes:
  - Albinism: failure of melanocytes to secrete melanin.
  - Vitiligo: loss of pigment in certain area of the skin creating patches of white skin.
  - Freckles & Moles: concentration of melanin in an area

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- Diseases or conditions affect skin color:
  - Poorly oxygenated blood causes skin to turn blue
  - Increased blood flow to skin causes flushing or reddened skin
  - Increase in bilirubin causes yellow coloration of skin & is reflective of liver disease.
  - Adrenal disease deposits melanin in skin creating a bronze color
  - Bruising indicates that blood has escaped from the blood vessels & clotted under the skin

Integumentary System

- Accessory Structures:
  - Hair:
    - Composed of keratinized cells
    - Growth affected by sex hormones; testosterone & estrogen
    - Grows 1mm every 3 days
    - Lose 25-100 hairs/day
    - Color is determined by genetics & melanin

Integumentary System

- Shape of hair shaft determines hair type
- Hair has three parts:
  - Shaft: visible keratinized cells
  - Root: below skin where mitosis takes place
  - Hair follicle: epidermal bulb in dermal layer form which root grows
- Hair follicles are surrounded by arrector pili muscles. Contraction of arrector pili is stimulated with cold or fright muscles contract & hair stands erect causes an increase in temperature—shivering is response

Integumentary System

- Primary function of Hair:
  - Protection & Insulation
    - Scalp: from sunlight & cold
    - Eyelashes/eyebrows: protects eyes
    - Nostrils & ear: deters foreign objects & insects
  - Disease process causing hair loss is alopecia
  - Nutritional status determines hair texture

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- Nails:
  - Thin plates of stratified squamous epithelial cell
  - Very hard form of keratin
  - Function as protection from injury
  - Contains: free edge—nail body—nail root
  - Pink is normal color
- Unhealthy nails may represent disease process

Integumentary System

- Glands:
  - Sebaceous glands:
    - AKA oil glands
    - Associated with hair follicles & travels to surface
    - Secrete sebum which lubricates & waterproofs skin & inhibits bacteria growth on skin
    - Increase activity of sebaceous glands during puberty—increased acne
    - Decrease secretion with aging—dry brittle hair & skin
    - Fetus covered with vernix caseosa

Integumentary System

- Sudoriferous gland:
  - AKA sweat gland
  - Located in the dermis & subcutaneous layer
  - All regions of skin but more in palms & soles of feet
  - Each person has approx. 3 million
  - Secretes sweat
  - Two types: apocrine & eccrine

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- Apocrine:
  - Most abundant in axilla & genitals
  - Respond to emotional stress
  - Activated during puberty
  - Sweat does not produce strong odor; when mixed with bacteria can be odoriferous
  - Associated with hair follicles

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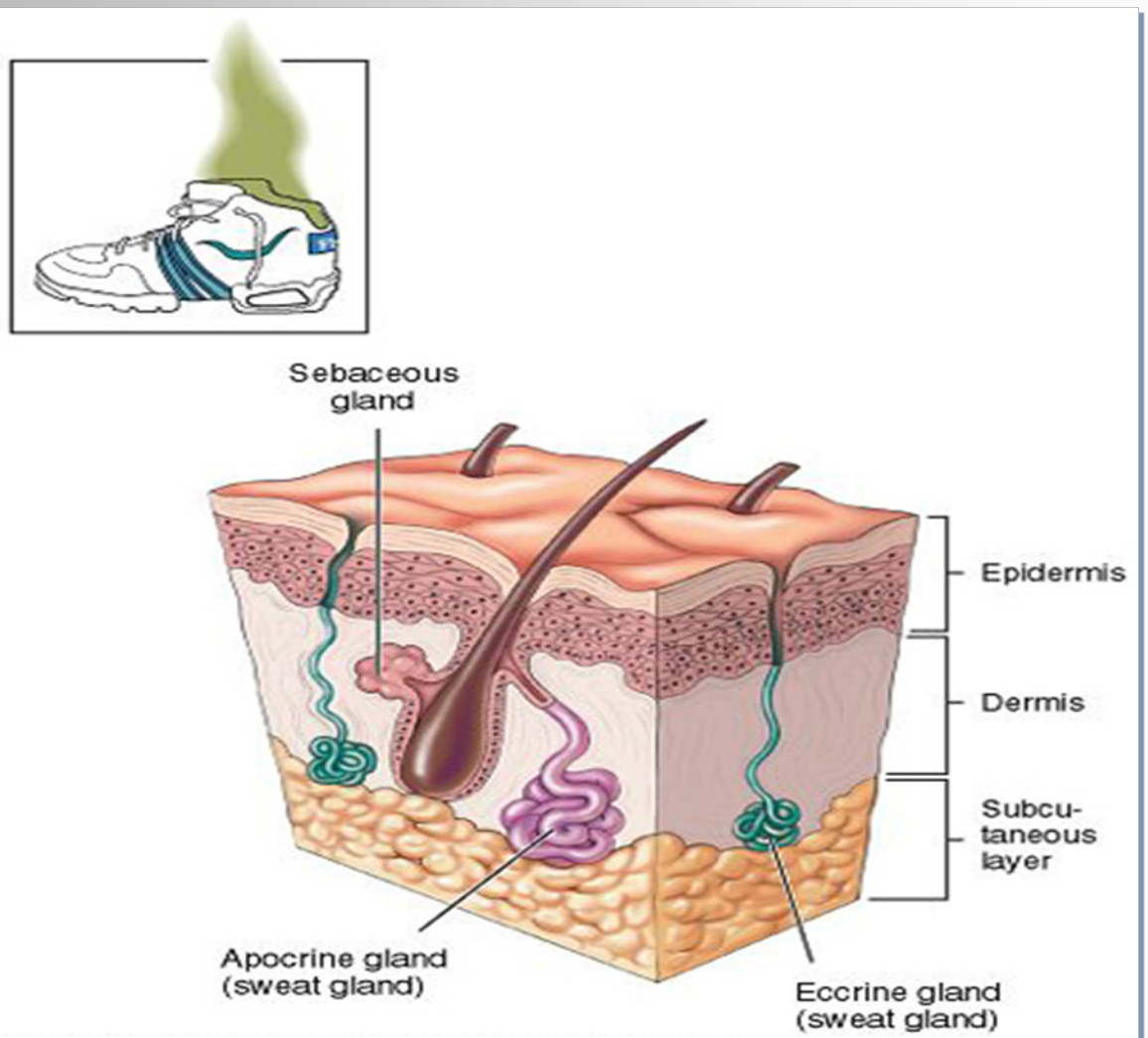
- Eccrine:
  - More numerous & wide spread throughout body; forehead, upper lip, palms, soles of feet
  - Not assoc with hair follicles
  - Key role in temperature regulation
  - Active during entire lifetime
- Other glands include:
  - Mammary gland secretes breast milk
  - Ceruminous glands secrete cerumen


Sebaceous gland
Epidermis
Dermis
Subcu-taneous layer
Apocrine gland (sweat gland)
Eccrine gland (sweat gland)

Integumentary System

Function of the Integumentary System

- Acts as physical barrier to microorganisms, foreign material & harmful substances
- Protects internal organs & structures from injuries due to chemical & physical trauma
- Helps body retain water & electrolytes
- Excretes waste
- Synthesizes & secretes Vitamin D
- Regulates body temperature
- Houses sensory receptors

Integumentary System

Temperature Regulation

- Metabolism in cells produces heat
- Body constantly produces & loses heat
- 80% of heat is lost through skin
- 4 ways heat is lost:
  - Radiation
  - Conduction
  - Convection
  - Evaporation

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- Radiation: heat is lost form warm object to the cooler air surrounding the warm object
- Conduction: loss of heat from a warm body to a cooler object in contact with the warm body
- Convection: loss of heat by air currents moving across the surface of the skin
- Evaporation: when a liquid becomes a gas

Integumentary System

Body Temperature Regulation

- Normal body temp. 98.6°F
- Thermostat of body is located in the hypothalamus
- Three structures assist in regulation:
  - Blood vessels
  - sweat glands
  - arrector pili muscles

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Temperature Regulation

- Body temperature increases
- Blood vessels dilate allowing blood to flow toward surface of skin
- Sweat glands are then activated & release sweat
- As sweat evaporates, heat is lost
- Decreases temperature

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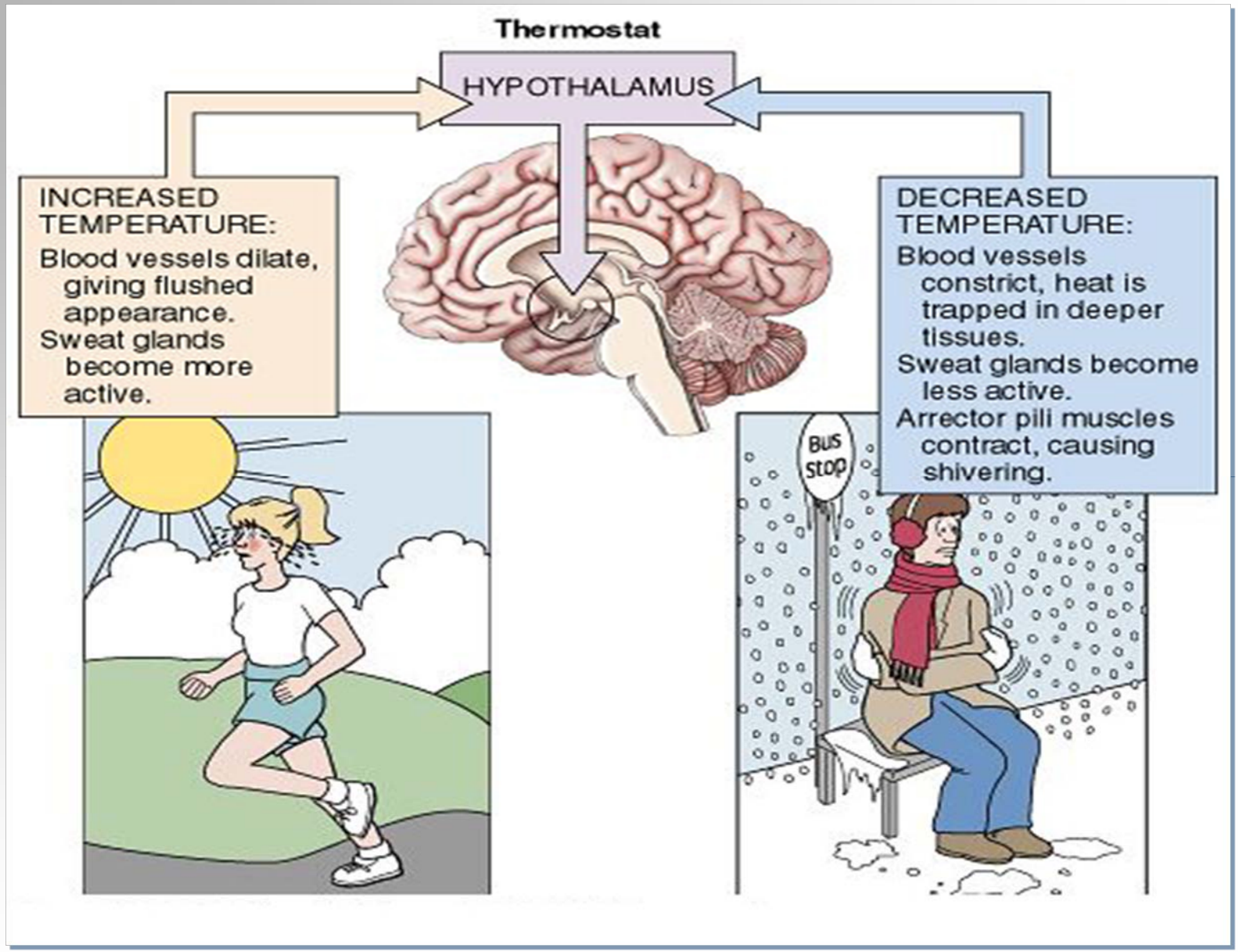
Temperature Regulation

- Body temperature decreases
- Blood vessels constrict reducing blood flow to surface of skin
- Sweat glands less active
- Arrector pili muscles contract, causing shivering
- Increase production of heat


Thermostat
HYPOTHALAMUS
INCREASED TEMPERATURE:
Blood vessels dilate, giving flushed appearance.
Sweat glands become more active.
DECREASED TEMPERATURE:
Blood vessels constrict, heat is trapped in deeper tissues.
Sweat glands become less active.
Arrector pili muscles contract, causing shivering.
BUS STOP

Integumentary System

Burns

- Cause major destruction to integ. system
- Classified by depth & extent
- Depth:
  - Partial thickness
    - First degree or Second degree
  - Full thickness
    - Third degree
- Extent
  - Rule of Nines