Skin – human skin

- **epidermis is** multiple layers of **ectodermal tissue**
- **dermis** is fibrous inner layer derived from **the mesoderm**

Hairy and glabrous skin, glabrous skin is **hairless**.

It is found on fingers, palmar surfaces of hands, soles of feet, lips, labia minora and penis

Functions:

Protection: an anatomical barrier for pathogens and damage

Sensation: contains a variety of nerve endings that react to heat and cold, touch, pressure, vibration, and tissue injury

Heat regulation: dilated blood vessels reduce perfusion and increase heatloss, while constricted vessels greatly increase cutaneous blood flow and conserve heat.

Control of evaporation: the skin provides a relatively dry and semi-impermeable barrier to fluid loss.

Storage and synthesis: acts as a storage center for lipids and water, as well as a means of synthesis of vitamin D_3 by action of UV on certain parts of the skin.

Absorption: In addition, the medicine can be administered through the skin.

SWEAT

Sweat contains mainly **water**.

It also contains **minerals, lactate, and urea**.

sodium (0.9 gram/liter), potassium (0.2 g/l), calcium (0.015 g/l), magnesium (0.0013 g/l).

zinc (0.4 milligrams/liter), copper (0.3–0.8 mg/l), iron (1 mg/l), chromium (0.1 mg/l), nickel (0.05 mg/l), lead (0.05 mg/l).

In humans, sweat is hypoosmotic, relative to plasma.

Bacteria

- number roughly 1000 species from 19 phyla
- Microorganisms like ***Staphylococcus epidermidis*** colonize the skin surface.

The disinfected skin surface gets recolonized from bacteria residing in the deeper areas of the hair follicle, gut and urogenital openings

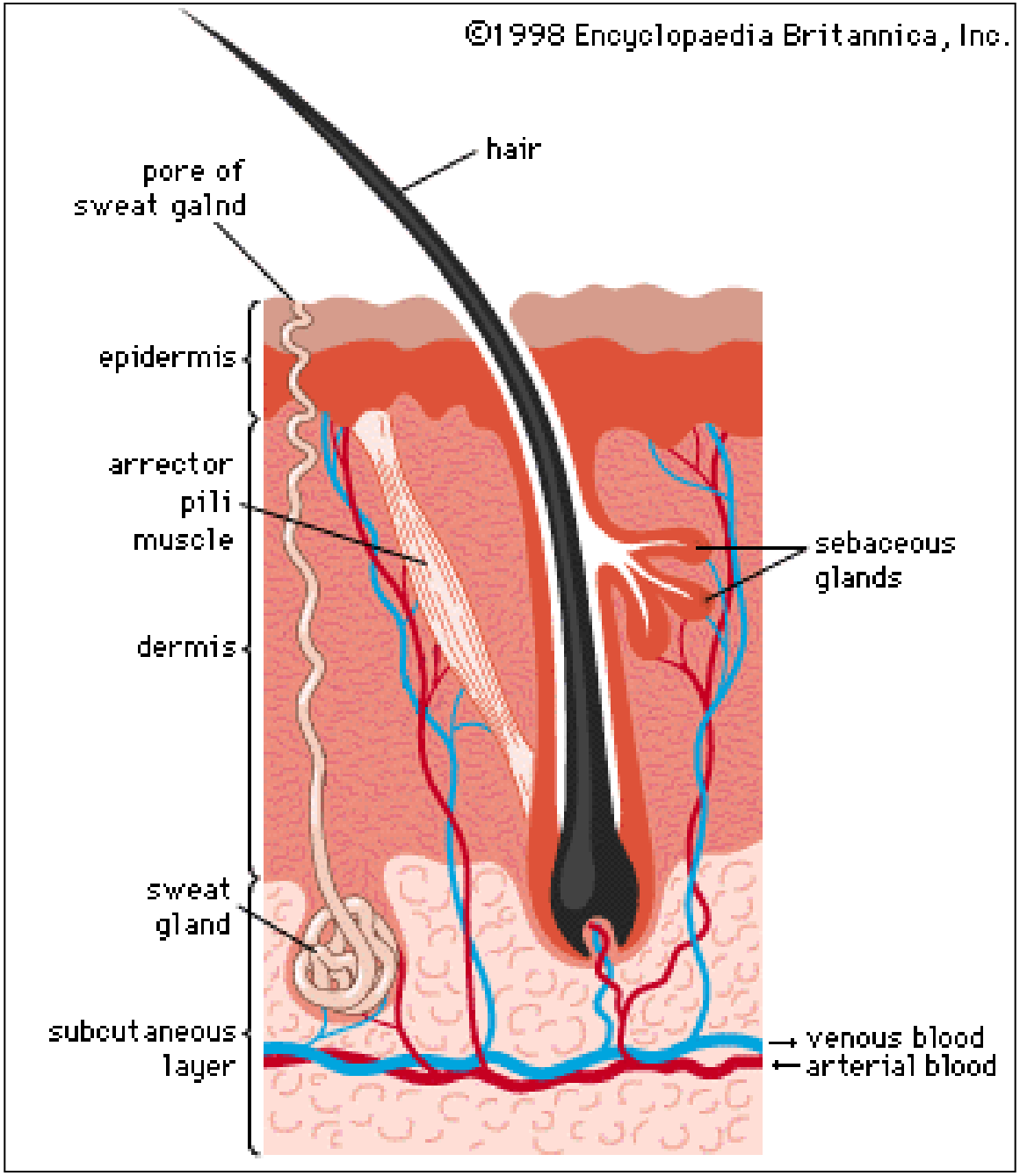
Actinobacteria (51.8%), *Firmicutes* (24.4%), *Proteobacteria* (16.5%), and *Bacteroidetes* (6.3%)

Skin layers

- **Epidermis,** which provides waterproofing and serves as a barrier to infection.

- **Dermis**, which serves as a location for the appendages of skin**.**

Hypodermis *(subcutaneous adipose layer)*.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hair
pore of sweat galnd
epidermis
arrector pili muscle
dermis
sebaceous glands
sweat gland
subcutaneous layer
venous blood
arterial blood

Epidermis

❑ **stratified squamous epithelium with keratin**

❑ Cells in the deepest layers are nourished by diffusion from blood capillaries extending to the upper layers of the dermis.

The main type of cells which make up the epidermis are **keratinocytes** (90-95%)**, melanocytes, Merkel cells and Langerhans** cells also present.

The process is called **keratinization** and takes place within about 27 days.

Dermis

consists of **connective tissue.**

- It contains the **hair follicles, sweat glands, sebaceous glands, lymphatic vessels and blood vessels**.

The blood vessels in the dermis provide nourishment and waste removal.

It also harbors many **mechanoreceptor/nerve** endings.

Merkel cells or **Merkel-Ranvier cells** are oval receptor cells found in the skin of vertebrates that have **synaptic contacts with somatosensory afferent neuron**.

In combination with sensory neuron ending forms a mechanoreceptor called **Merkel's corpuscle**

Melanocytes - skin cells derived from the neural crest that produce the protein pigment melanin.

Langerhans cells - an antigen-presenting dendritic cell of the epidermis, containing characteristic rod-shaped granules

Mechanoreceptor/nerve endings

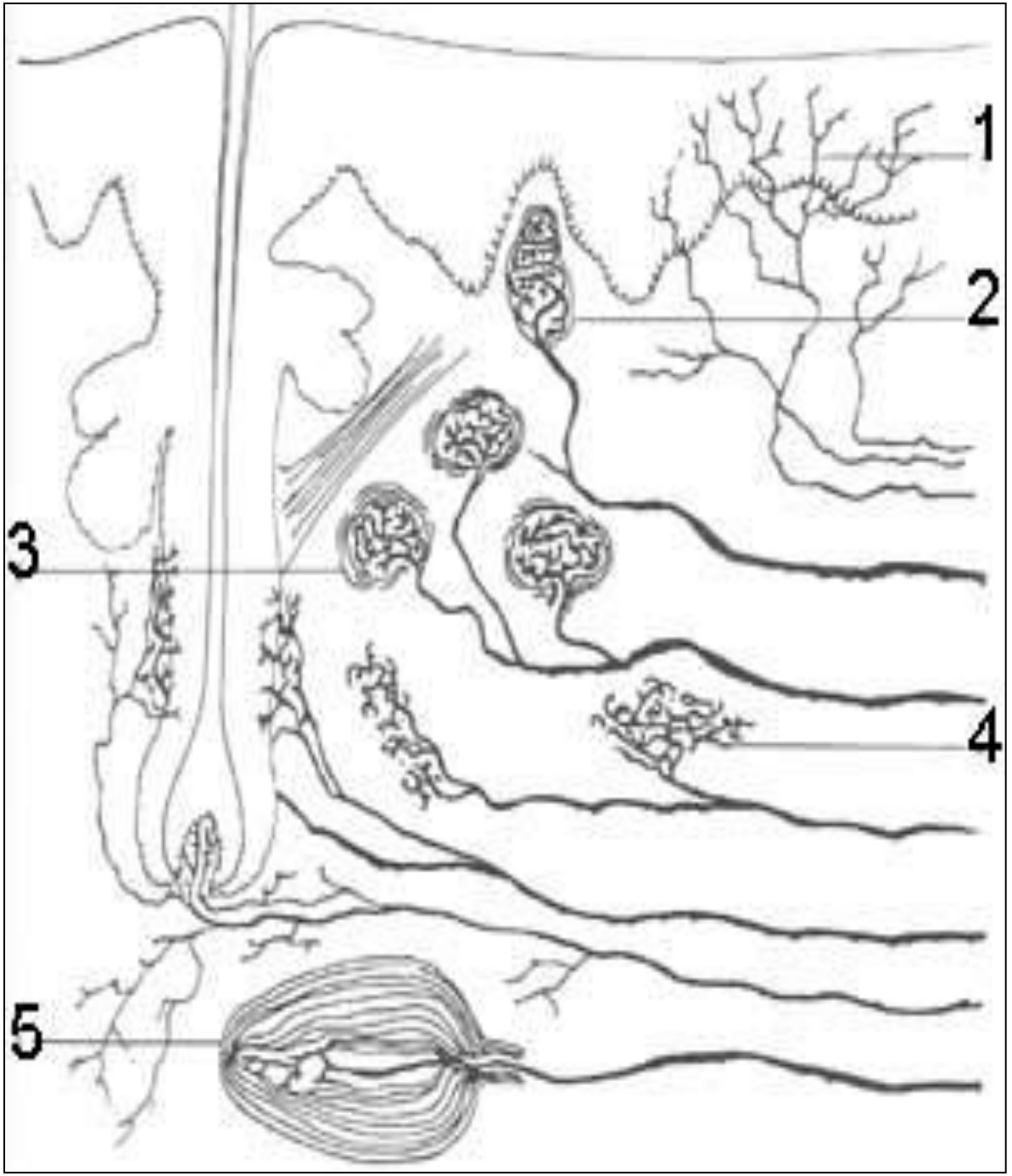
1. **free nerve ending -** nerve terminal looses myelin sheath, at the epidermal/dermal junction

2. **Meissner‘s corpuscle -** oval body found in the fingers and toes; they consist of a connective tissue capsule in which the axon fibrils terminate; believed to be mechanoreceptors for tactile sensation - touch receptors

3. **Krause‘s end bulb** – has a more delicated capsule; located in the mucosa of the tongue, and the external genitalia; they are believed to be cold receptors. Also known as Krause‘s corpuscle

4. Ruffini endings = found in the deep dermis and in the hypodermis ; ovoid mechanoreceptor sensitive to sustain or continuous stress ; Ruffini corpuscle

5. Pacini‘s corpuscle - found deep in the dermis and in the hypodermis; sense vibration and pressure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Hypodermis

The hypodermis is not part of the skin.

It attaches the skin **supplying it with blood vessels and nerves**.

It consists of **loose connective tissue and elastin**.

The main cell types are **fibroblasts, macrophages and adipocytes** (50% of body fat).

Fat serves as padding and insulation for the body.

Skin tone

provided by melanin from melanocytes, ectodermal cells.

Pigment absorb ultraviolet radiation (UV).

Type	Definition	Description
I	Always burns, never tans	Pale, Fair, Freckles
II	Usually burns, sometimes tans	Fair
III	May burn, usually tans	Light Brown
IV	Rarely burns, always tans	Olive brown
V	Moderate constitutional pigmentation	Brown
VI	Marked constitutional pigmentation	Black

African skin tone

Europian Skin tone

Albinism

- lack of product, pigment of skin and hair,
- achromatosis
- lack or non-functional tyrosinase

Albinism is associated with a number of vision defects, such as **photophobia, nystagmus and astigmatism**. Lack of skin pigmentation makes for more susceptibility to sunburn and skin cancers

Thank you form your attention