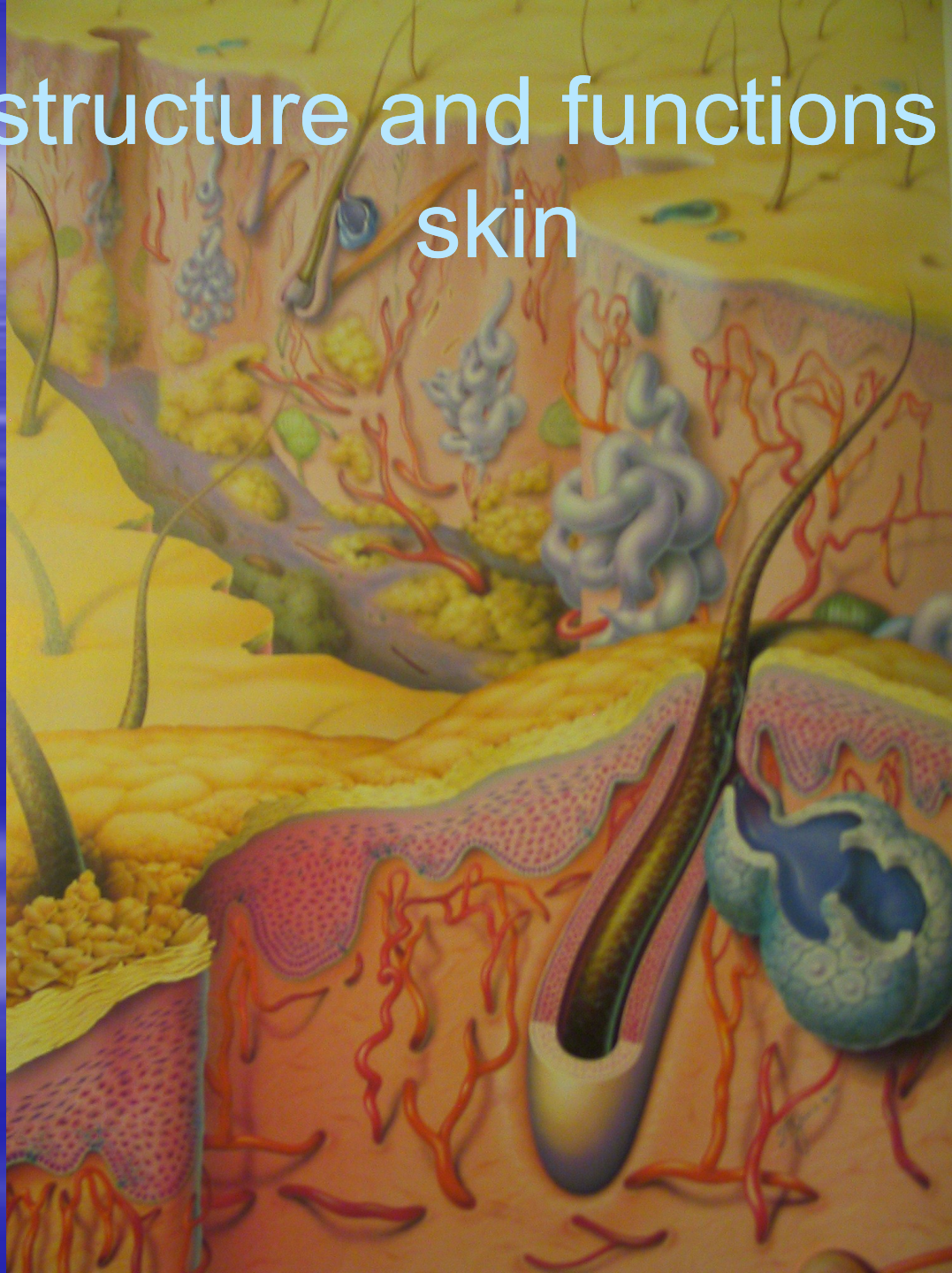


The structure and functions of the skin



Skin of an adult

- Surface 1,5 – 2m²
- Weight 18 – 20 kg
15-19% of total weight

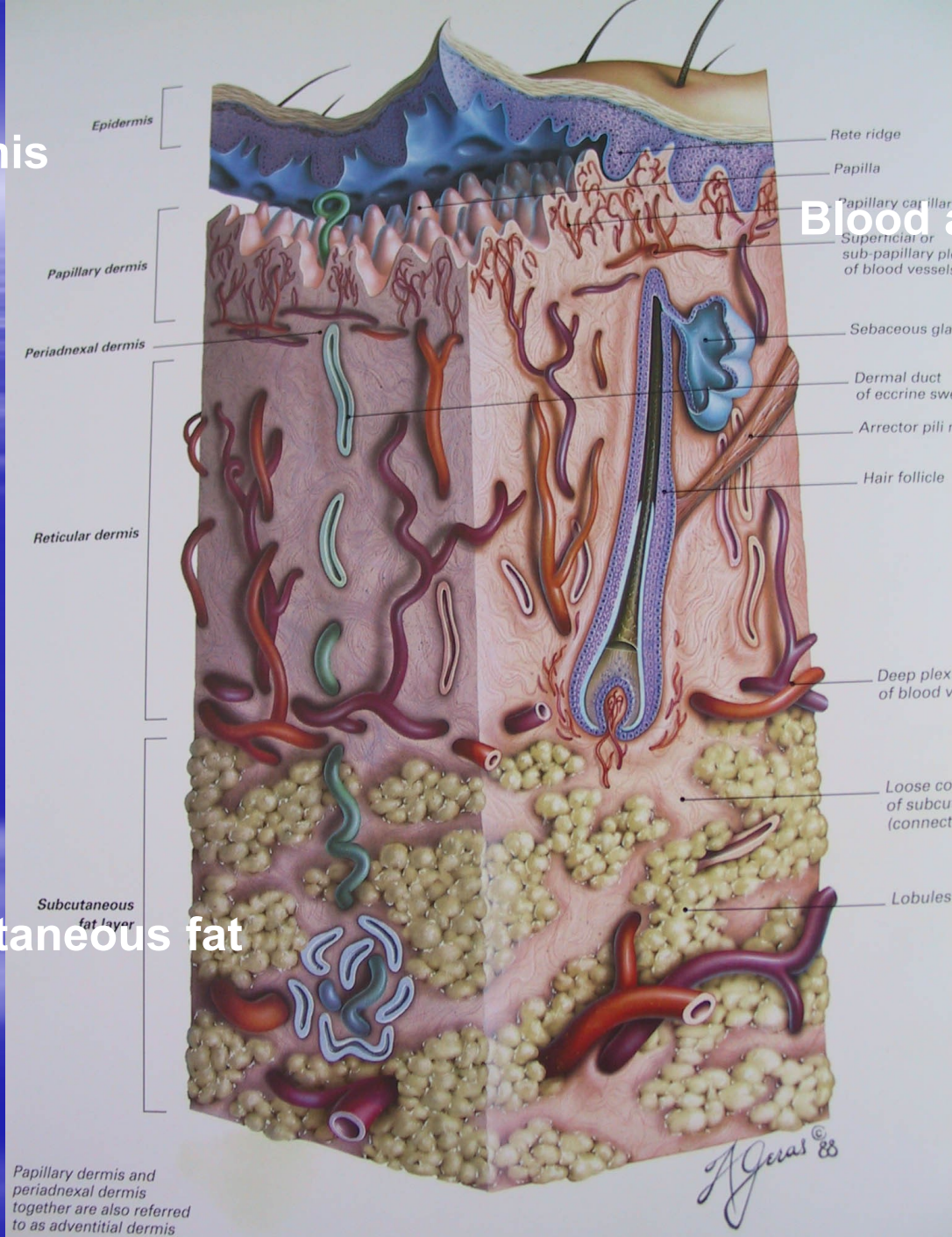
Epidermis and dermis mean thickness 2mm
(0,5 kg and 3,5 kg)

Subcutaneous tissue 8-25mm

Epidermis

Dermis

Subcutaneous fat



Blood and lymphatic vessels

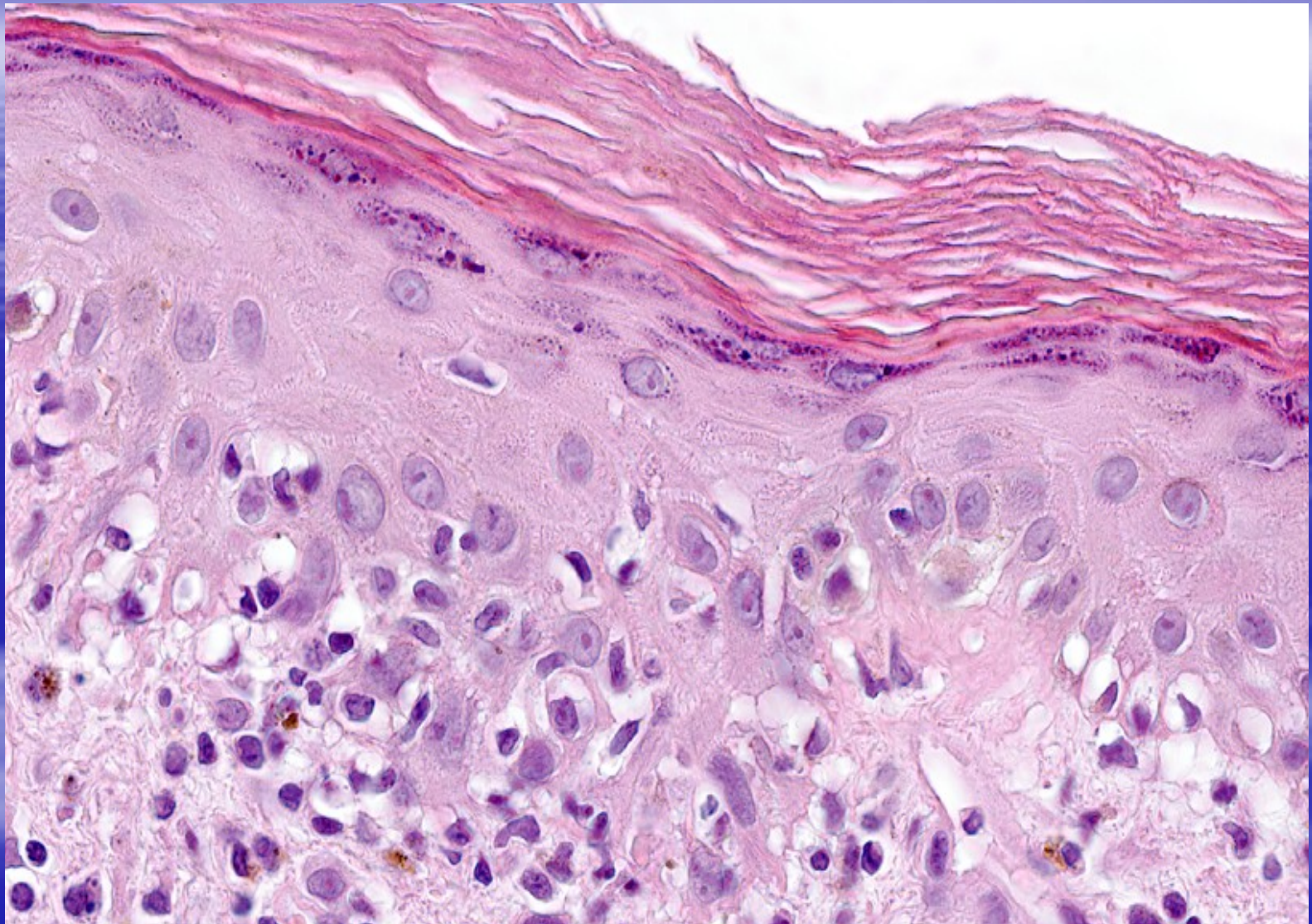
Hair follicle unit

Sweat glands

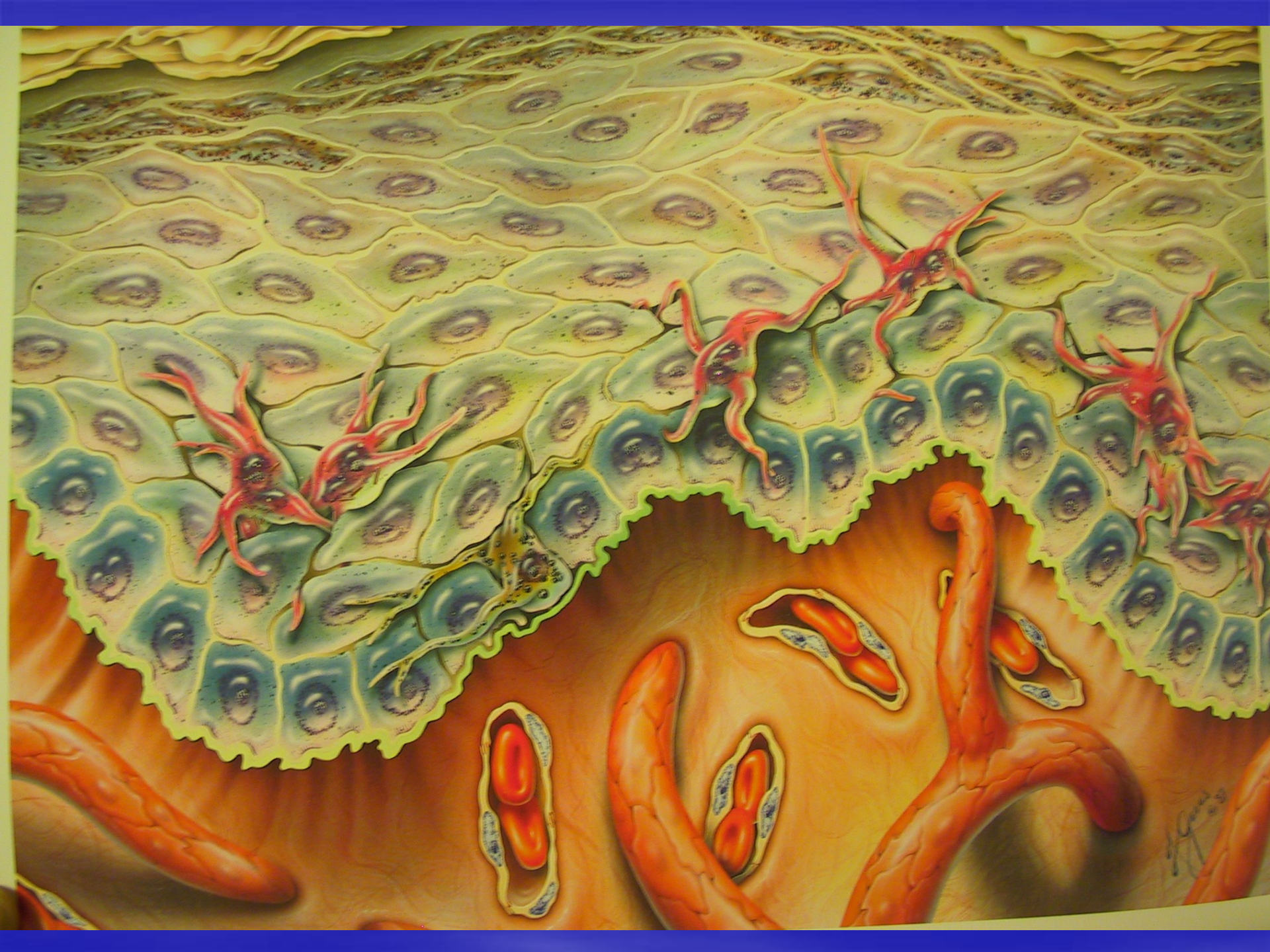
Nerves

Connective tissue

Papillary dermis and periadnexal dermis together are also referred to as adventitial dermis



www.muni.cz/atlas



Keratinocyte and keratinization

Horny layer 12 days

Granular layer- keratohyaline granules
2 days

Stratum spinosum
- 6 days

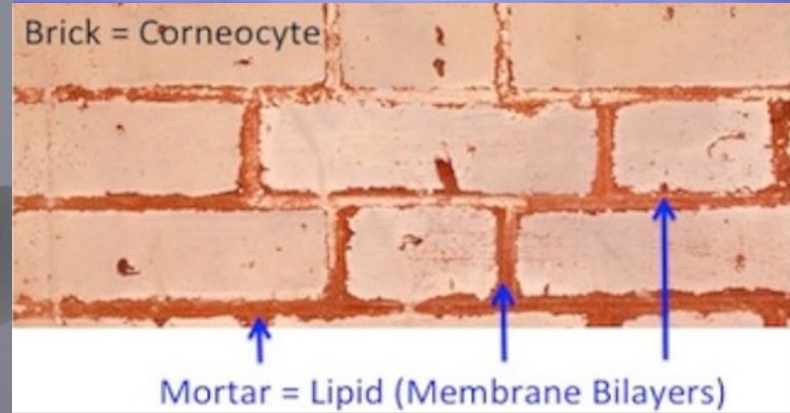
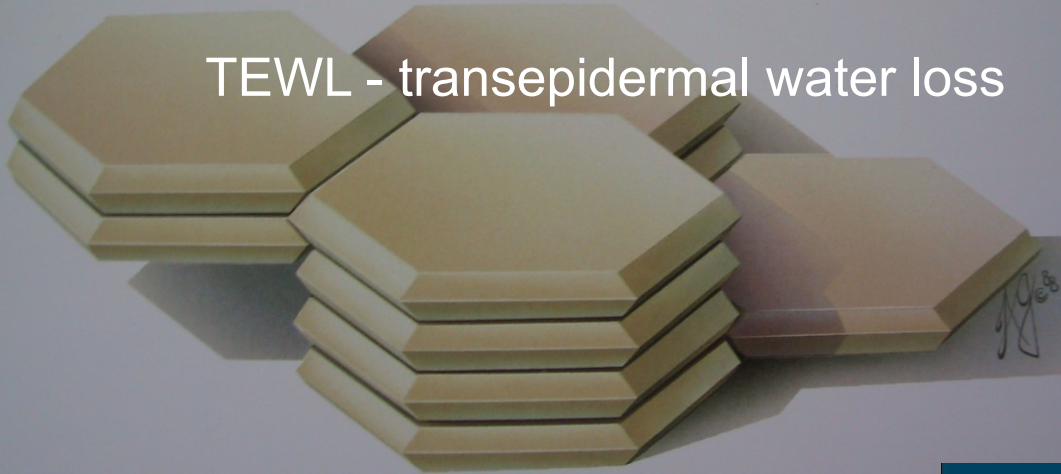
Basal cell layer
- 8-10 days

Total 28-30 days



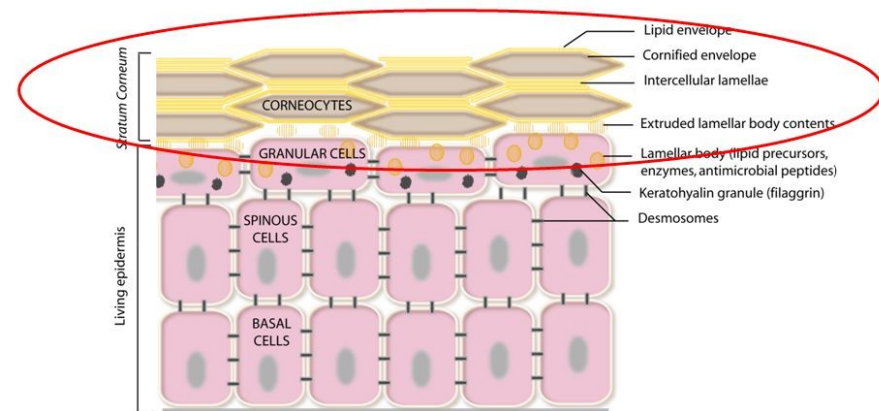
Horny layer - epidermal barrier

TEWL - transepidermal water loss



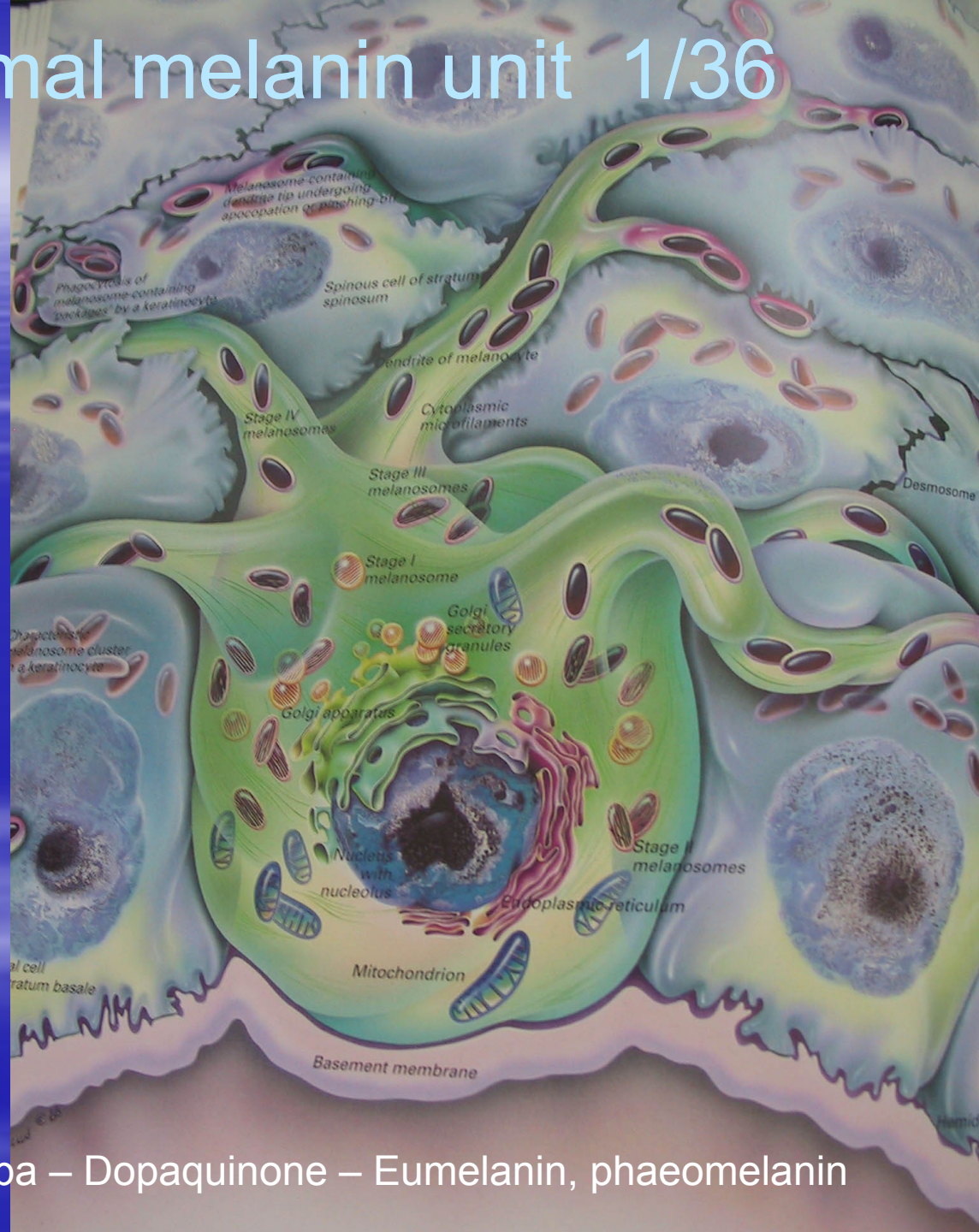
The Epidermal Barrier

Disorders - hyperkeratosis proliferation x retention
- parakeratosis
- dyskeratosis



Transepidermal water loss

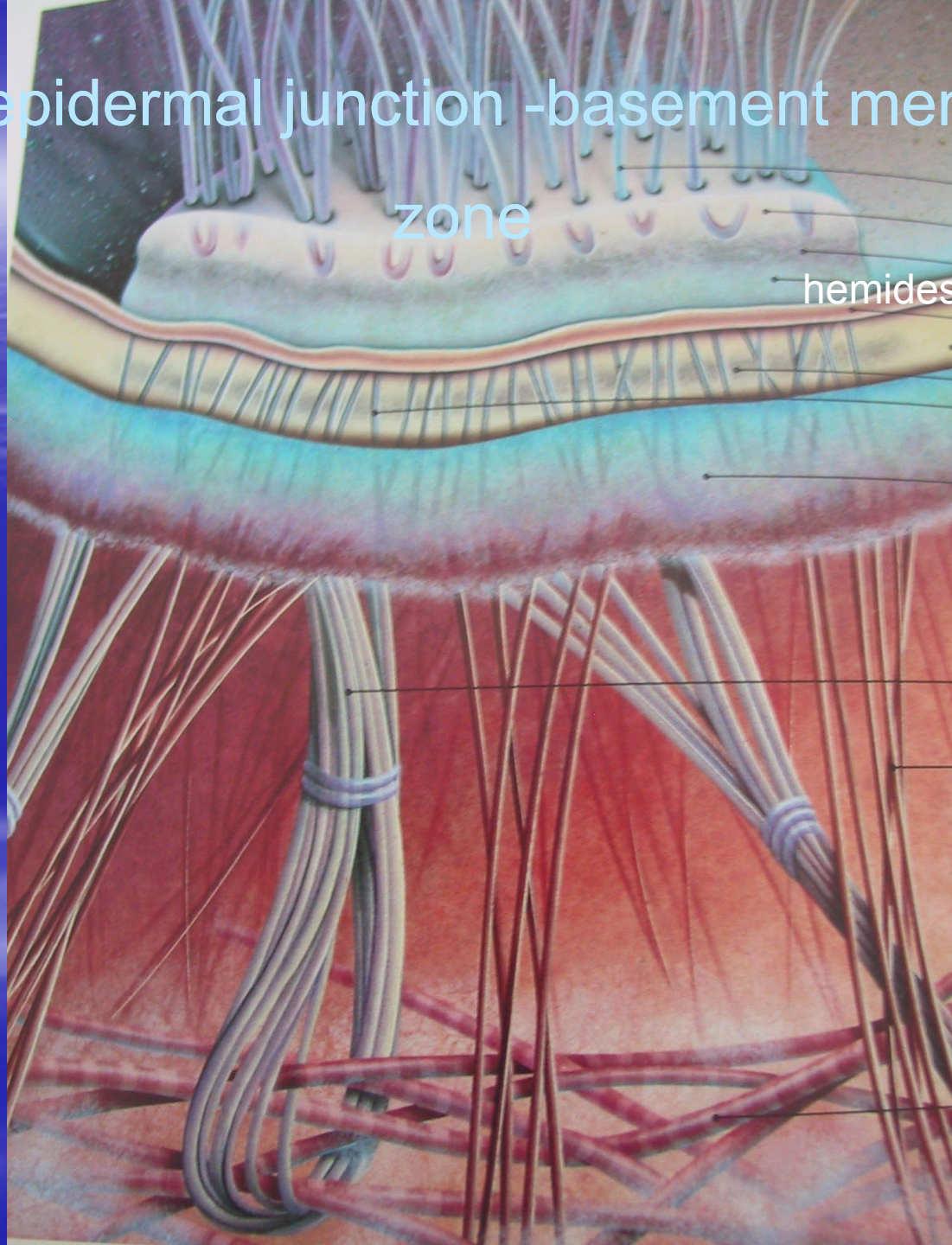
Epidermal melanin unit 1/36



Tyrosinase

Tyrosine – Dopa – Dopaquinone – Eumelanin, pheomelanin

Dermo epidermal junction -basement membrane



zone

hemidesmosome

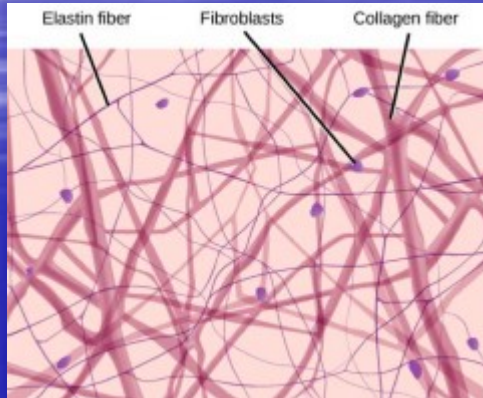
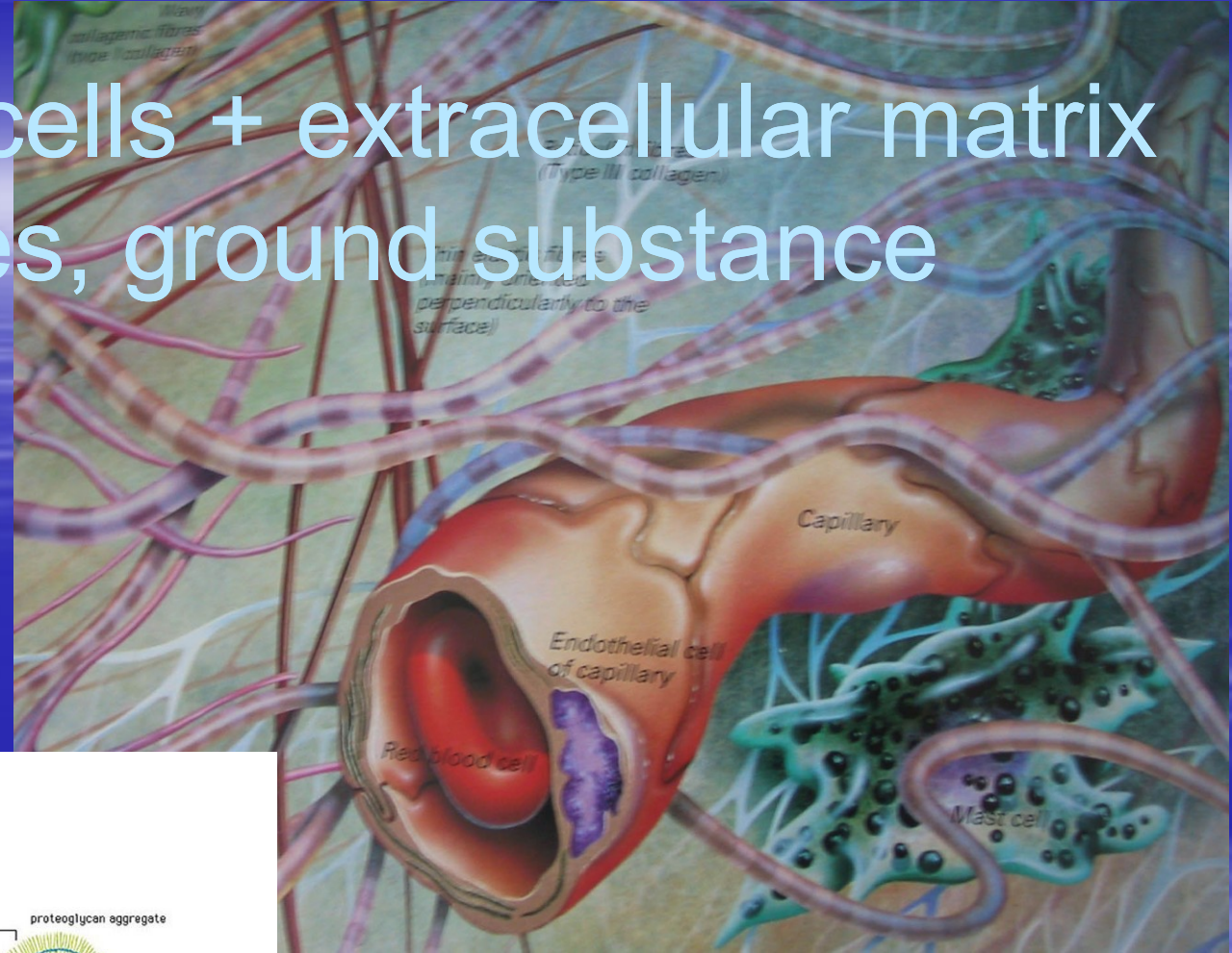
lamina lucida

lamina densa
collagen IV

collagen VII

Dermis – cells + extracellular matrix

- fibres, ground substance



Ground substance

is found in all cavities and clefts between the fibres and cells of connective tissues

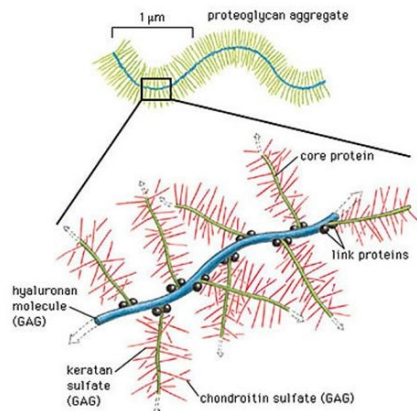
glycosaminoglycans /GAGs/

- hyaluronic acid
- chondroitin 4-sulfate / chondroitin 6-sulfate/
- dermatan sulfate
- heparan sulfate

proteoglycans /protein core to which GAGs are covalently bound/ - aggrecan, syndecan, fibroglycan

glycoproteins

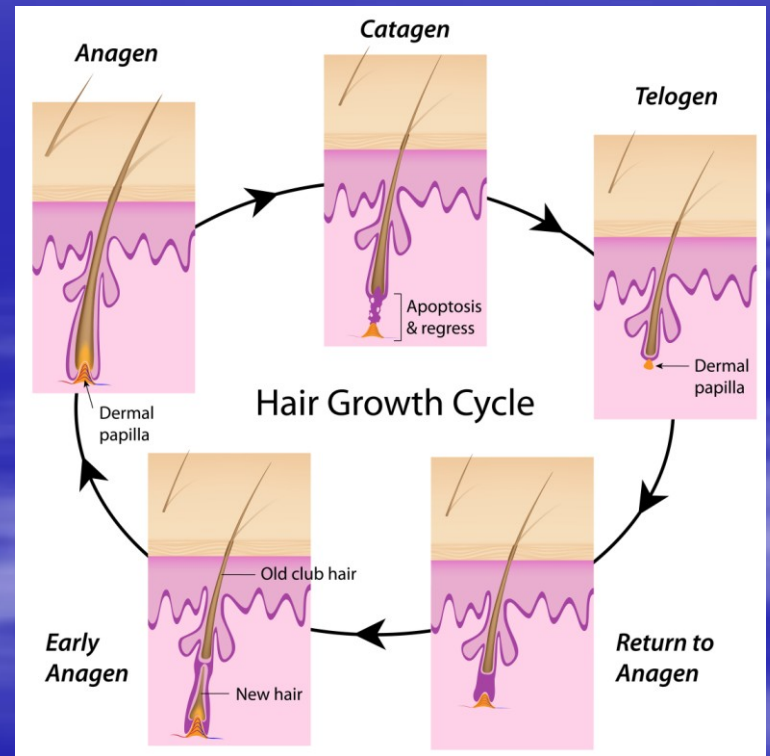
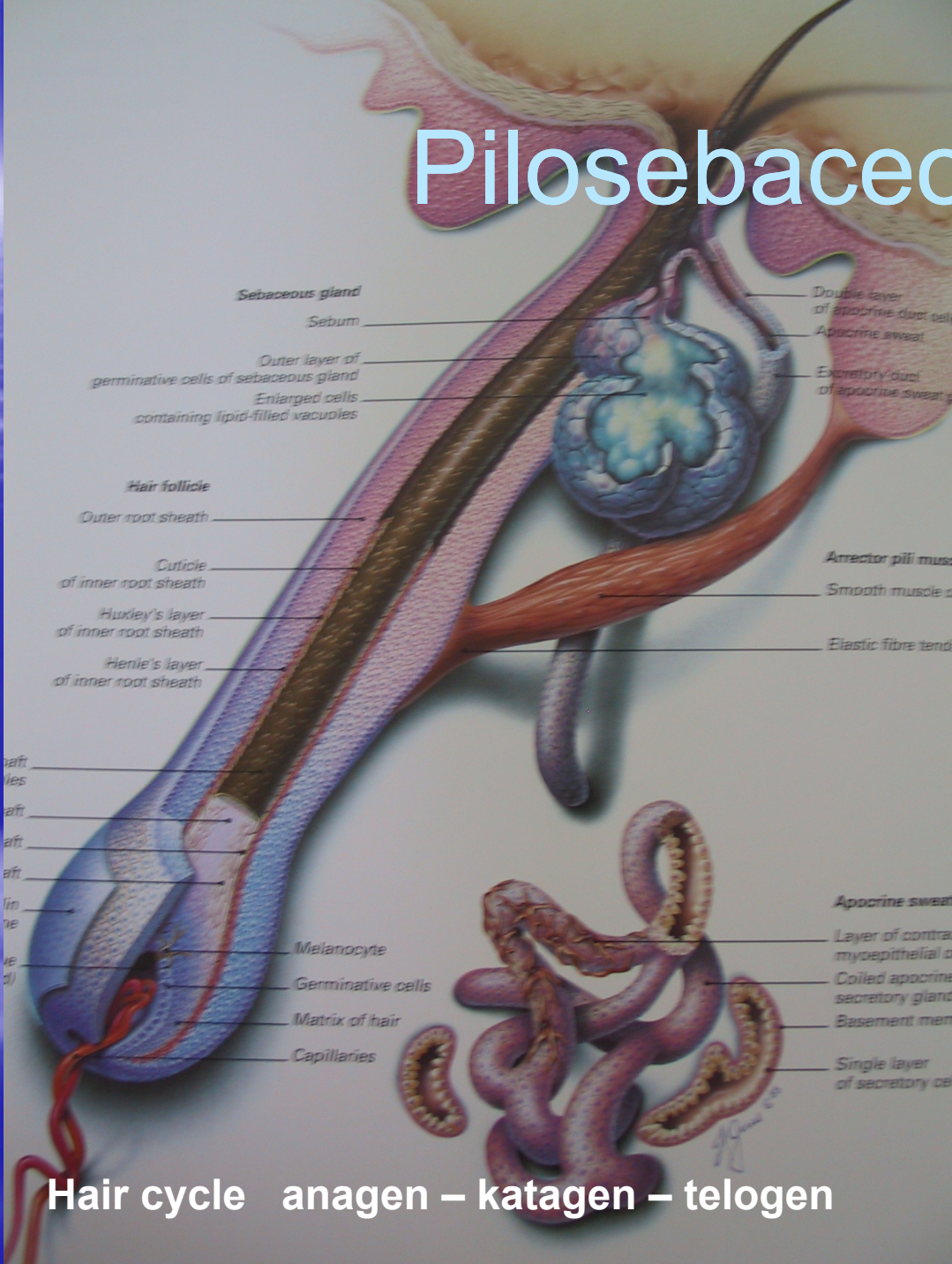
- fibronectin, laminin, osteonectin, osteopontin, chondronectin..



Some functions of dermal resident cells

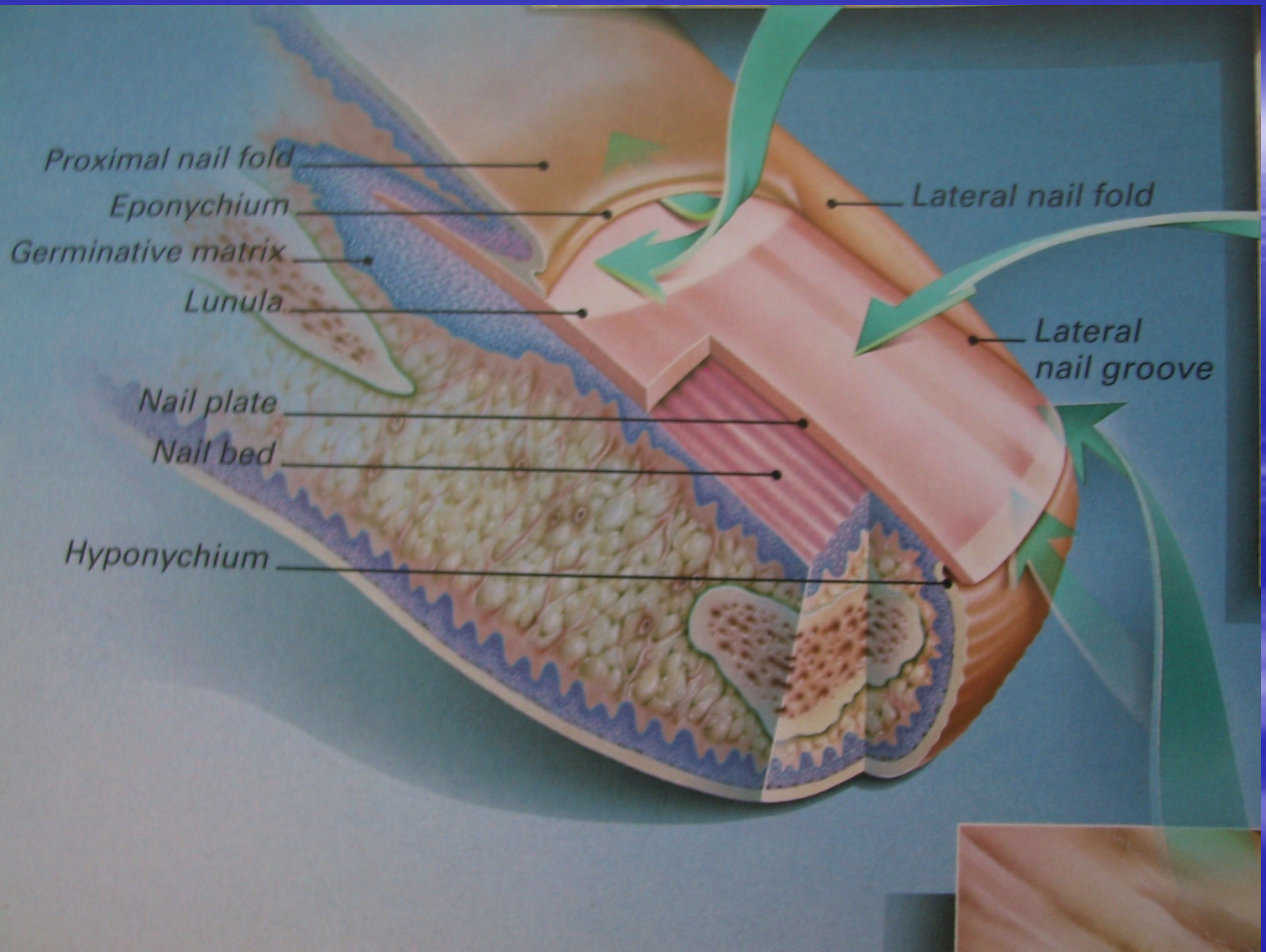
- **Fibroblast** synthesis of collagen, reticulin, elastin, fibronectin, glycosaminoglycans
- **Mononuclear phagocyte** phagocytose (bacteria), cytokine secretion
- **Lymphocyte** – immunosurveillance
- **Mast cell** – release of mediators (histamine, heparin, prostaglandins, leukotriens, tryptase etc)

Pilosebaceous unit



Hair cycle anagen – katagen – telogen

1000 – 10 – 100 days



Nerves

Nerve endings

Merkel cells

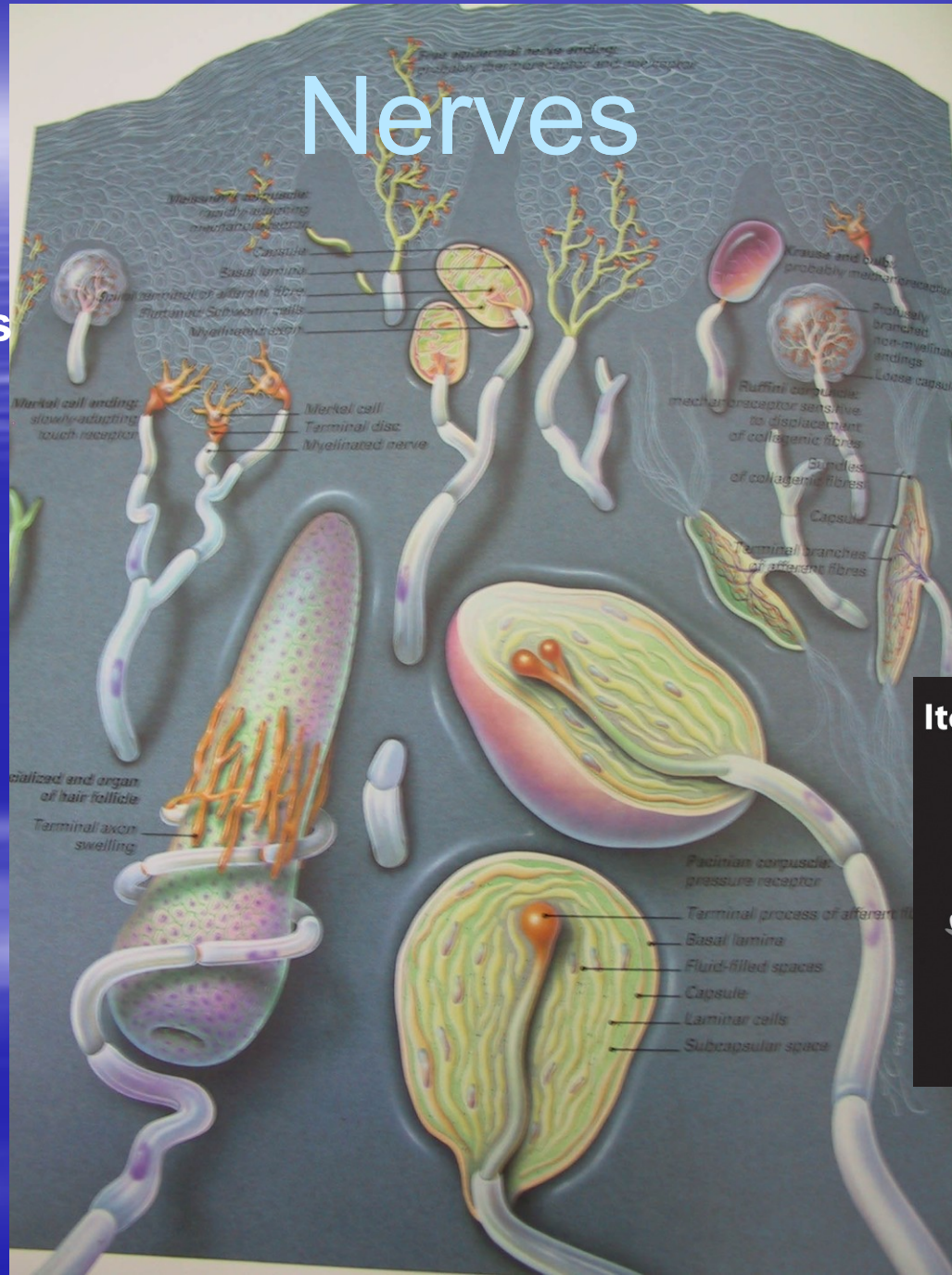
Corpuscles

Temperature

Pressure

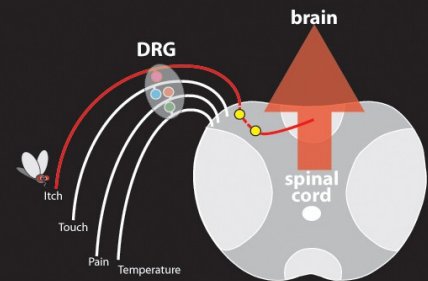
Vibration

Touch



Itch
Pain

Itch: detection and circuit

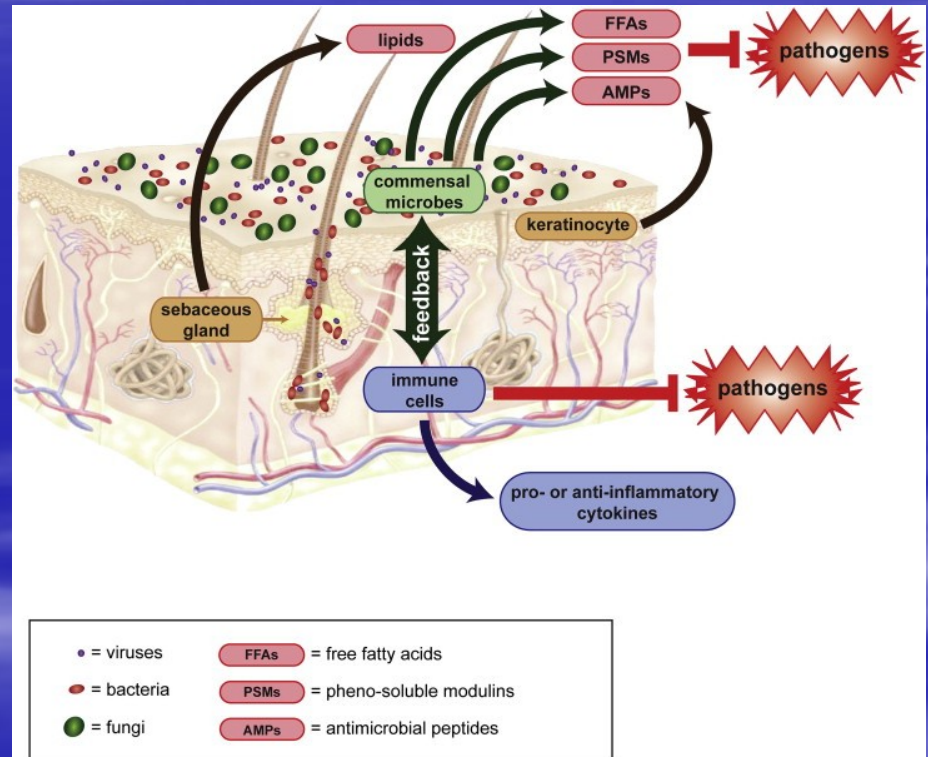
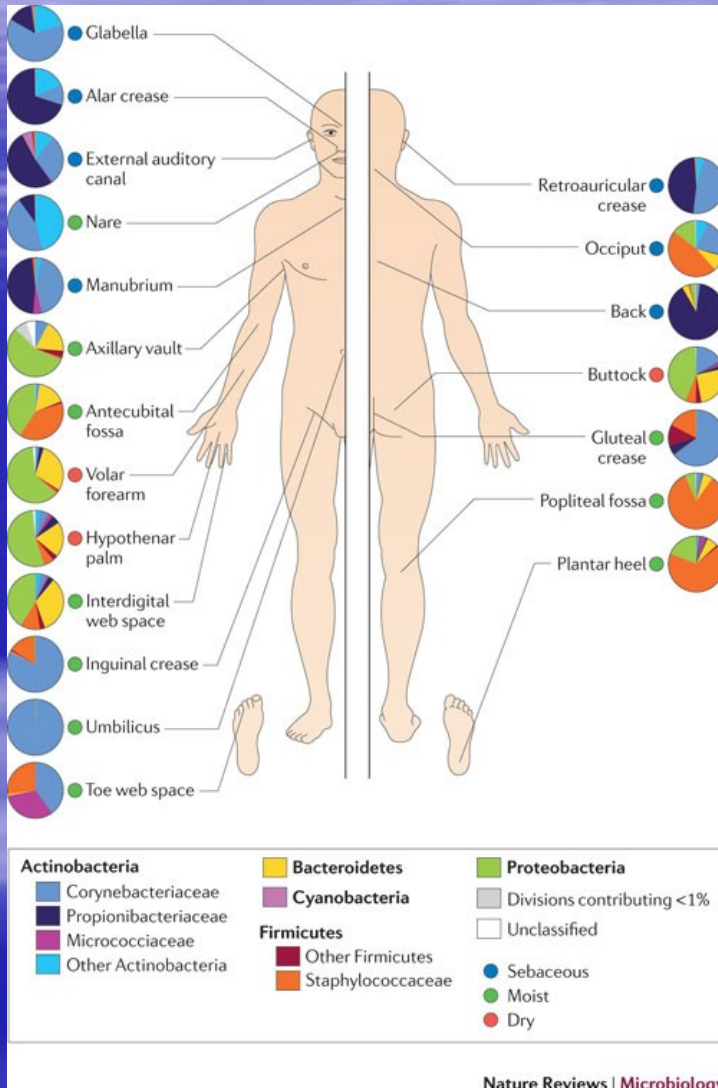


The function of the skin

1. Protection against

- Chemicals
- physical factors – UV, cold, heat, mechanical injury
- infections
- antigens
- Horny layer, (pH 5,5)
- Melanocytes, urocanic acid
- Antimicrobial peptides
- Langerhans cells

Skin microbioma



The function of the skin

2. Preservation of balanced internal environment

- Loss of water, electrolytes, macromolecules

3. Temperature regulation

4. Shock absorber

5. Sensation

6. Energy and water reserve

- Horny layer

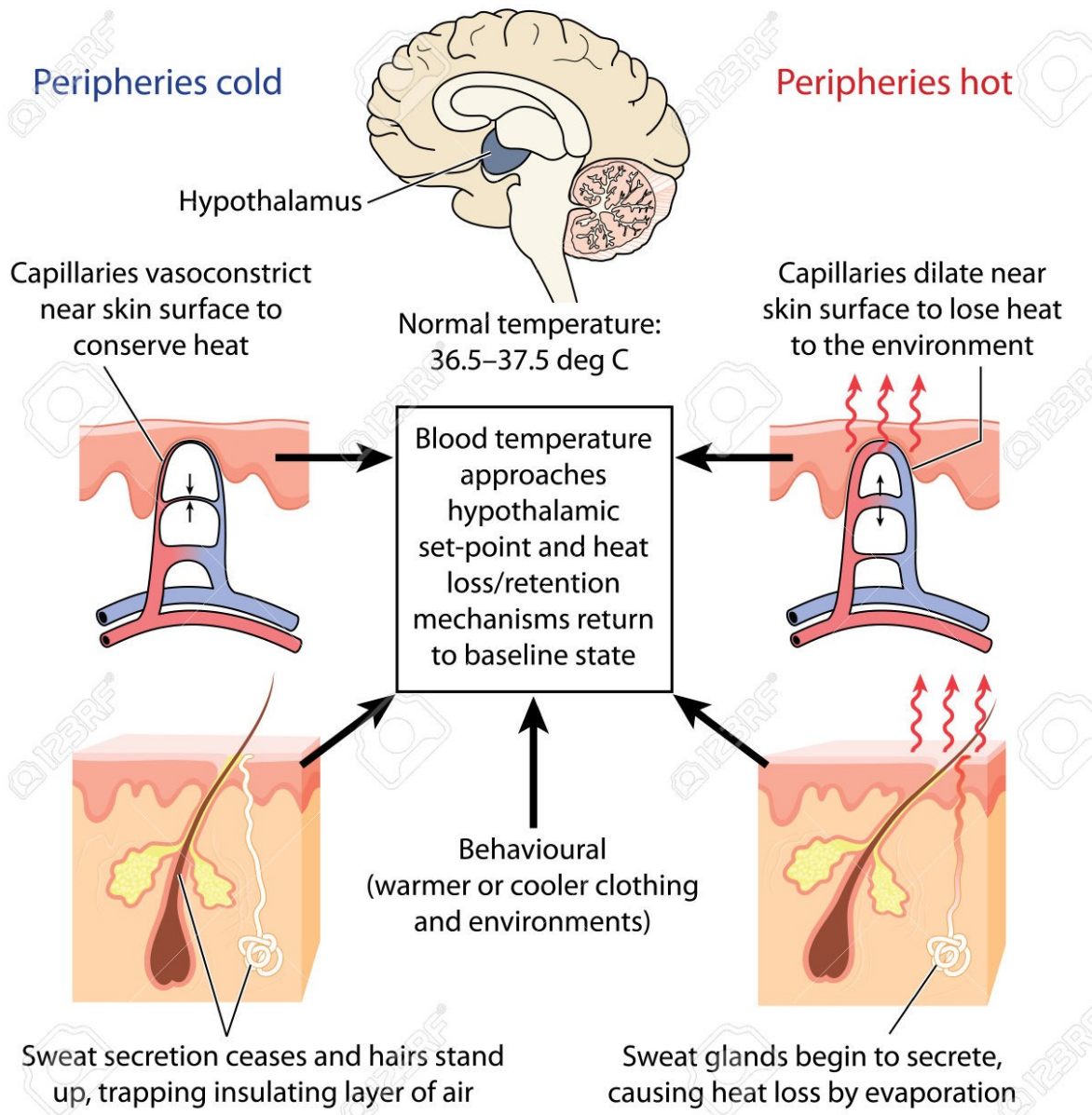
- Blood vessels, eccrine sweat glands

- Dermis, subcutaneous fat

- Nerves

- Subcutaneous fat, dermis

Thermoregulation



The function of the skin

7. Vitamin D synthesis

- Keratinocytes

8. Own metabolic function

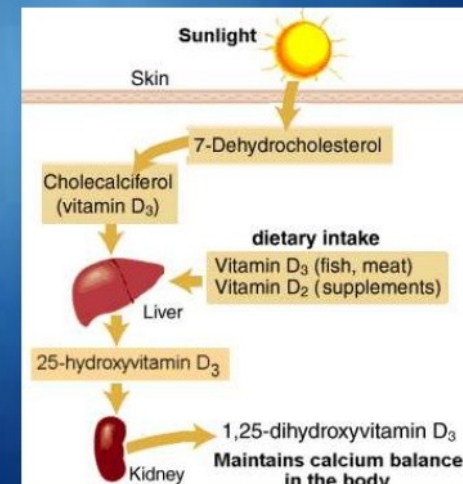
- Keratinocytes
- Fibroblasts

9. Immunological

10. Detoxicant

Vitamin D synthesis

- Synthesized in skin.
- Essential for bone metabolism.



The function of the skin

8. Protection and fight

- Nails, hair

9. Psychosocial function

- Cosmetic quality, lips, hair

10. Body odour

- Apocrine sweat glands



