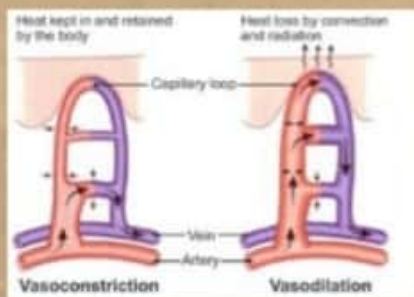
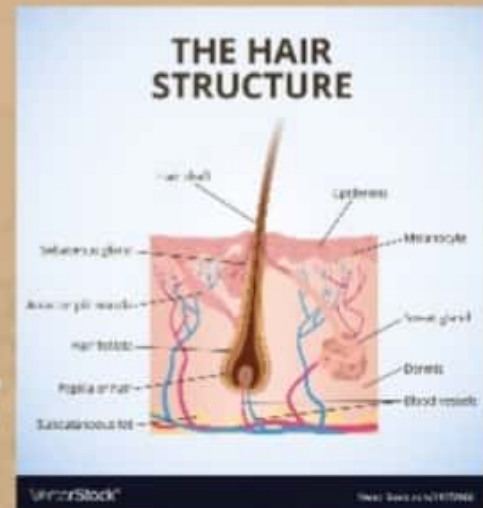


Krishnagar Academy

Biology

SKIN - the jack
of all
trades

Class - 9



Chapter Outline

- Structure of the Human Skin
- Functions of the Skin
- Skin Derivatives and their Functions
- Modification of Skin Glands
- Role of Skin in Heat Regulation of the Body
- Role of Hypothalamus in Heat Regulation of the Body

All organisms being in continuous contact with the external environment have to maintain a stable internal environment for the survival and normal functioning of the body cells. *The maintenance of internal environment, i.e., composition, temperature, etc., is called homeostasis (homeo = same; stasis = to stand).*

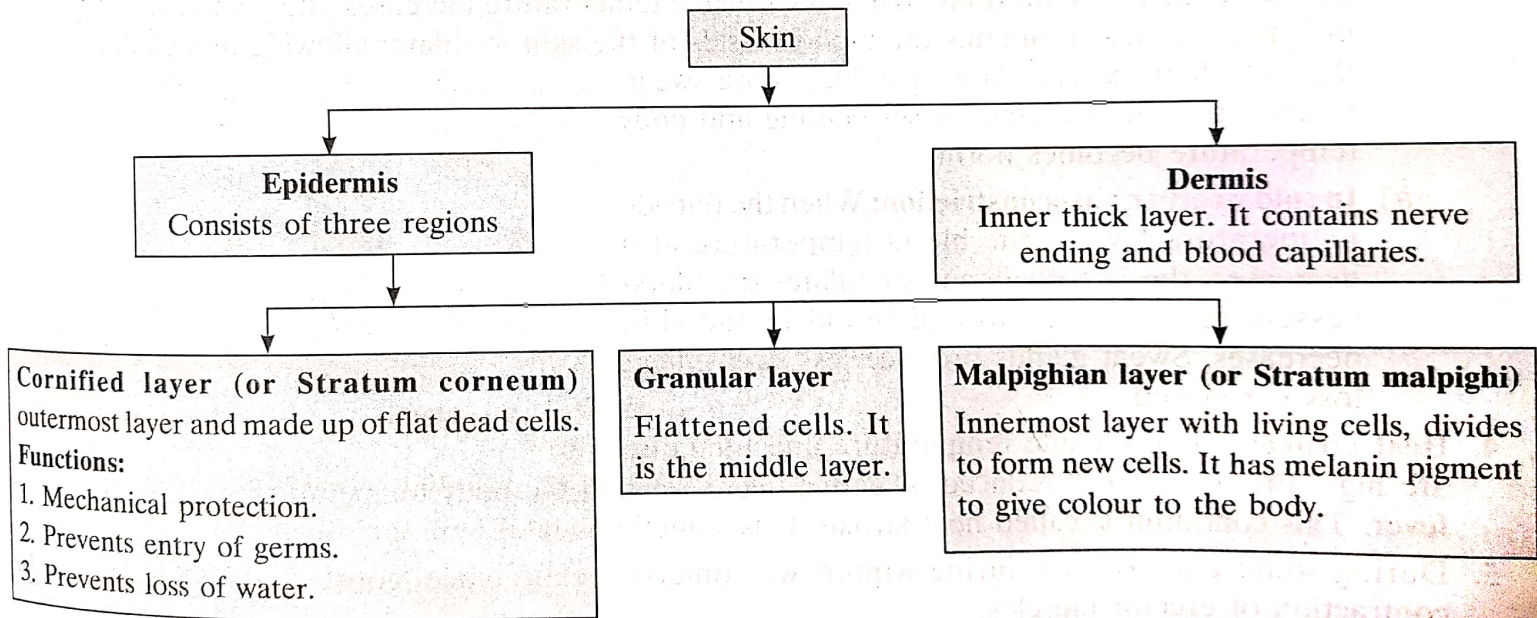
One of the most important parts of the body that helps in homeostasis is the skin or integument.

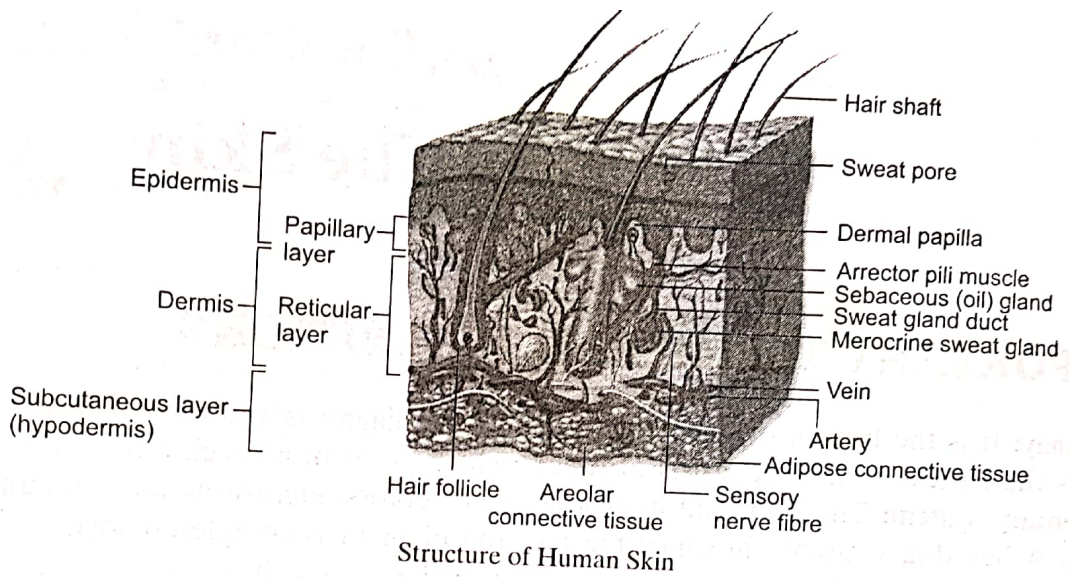
Human skin is the **largest organ** of the body and constitutes about 15% of the body weight. It covers the whole body and serves as an outer protective barrier. It prevents not only the internal fluids from escaping the human body but also the harmful micro-organisms from entering the body.

The skin also plays an important role in the **regulation of body temperature**. The amount of heat lost from the body surface to the external environment can be adjusted by controlling sweat production and regulating the flow of blood through the skin.

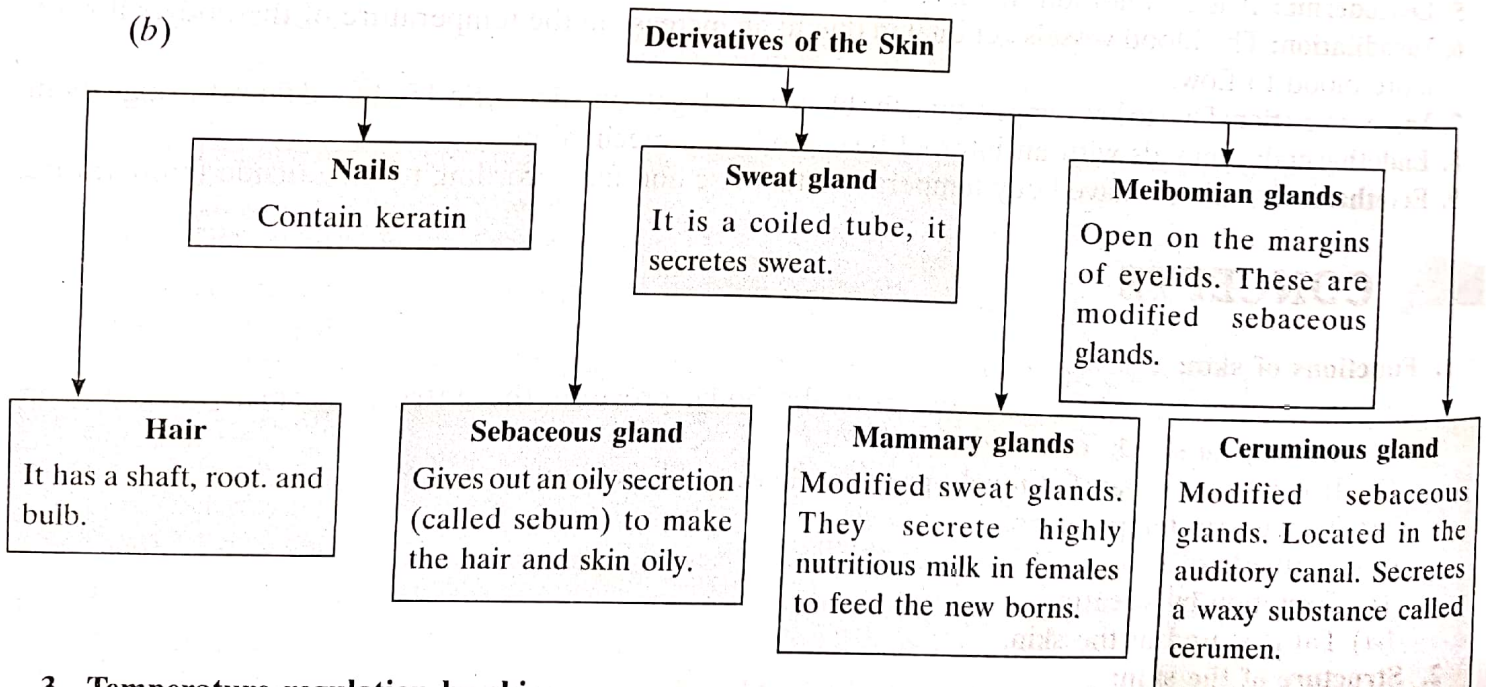
2. Structure of the skin:

(a) The skin is made up of an outer epidermis and inner dermis.





(b)



3 Temperature regulation in skin

Functions of skin:

- (i) Protection from loss of water from the body, prevents the entry of germs, protects from mechanical shock, etc.
- (ii) It is a sense organ for touch, pressure, heat, cold, pain, etc.
- (iii) To regulate temperature.
- (iv) Synthesis of vitamin D.
- (v) Excretion by sweating.
- (vi) Fat is stored in the skin.

Hair

A hair is a specialised, elongated, thread-like, cylindrical outgrowth of the skin epidermis. It lies within a pit in the skin called **hair follicle**, formed by the tubular invagination of the epidermis deep into the dermis.

The base of the hair follicle has a small aggregation of dermal tissues. It gives rise to the hair and is known as **dermal** or **hair papilla**. It is richly supplied with fine blood vessels and provides nourishment to the hair.

A hair consists of three parts:

- ❑ **Hair shaft** is the upper part of the hair. It projects out of the epidermis at an acute angle.
- ❑ **Hair root** is the basal part of the hair situated deeply in the dermis.
- ❑ **Hair bulb** is the lower part of the hair root which is expanded in the form of a bulb.

The hair bulb and the hair follicle are collectively responsible for the growth of hair. The varying quantity of **melanin pigment** in the hair provides it different colour in different individuals. The grayish colour of the hair is often due to the **small air spaces** formed in the hair after loss of pigment.

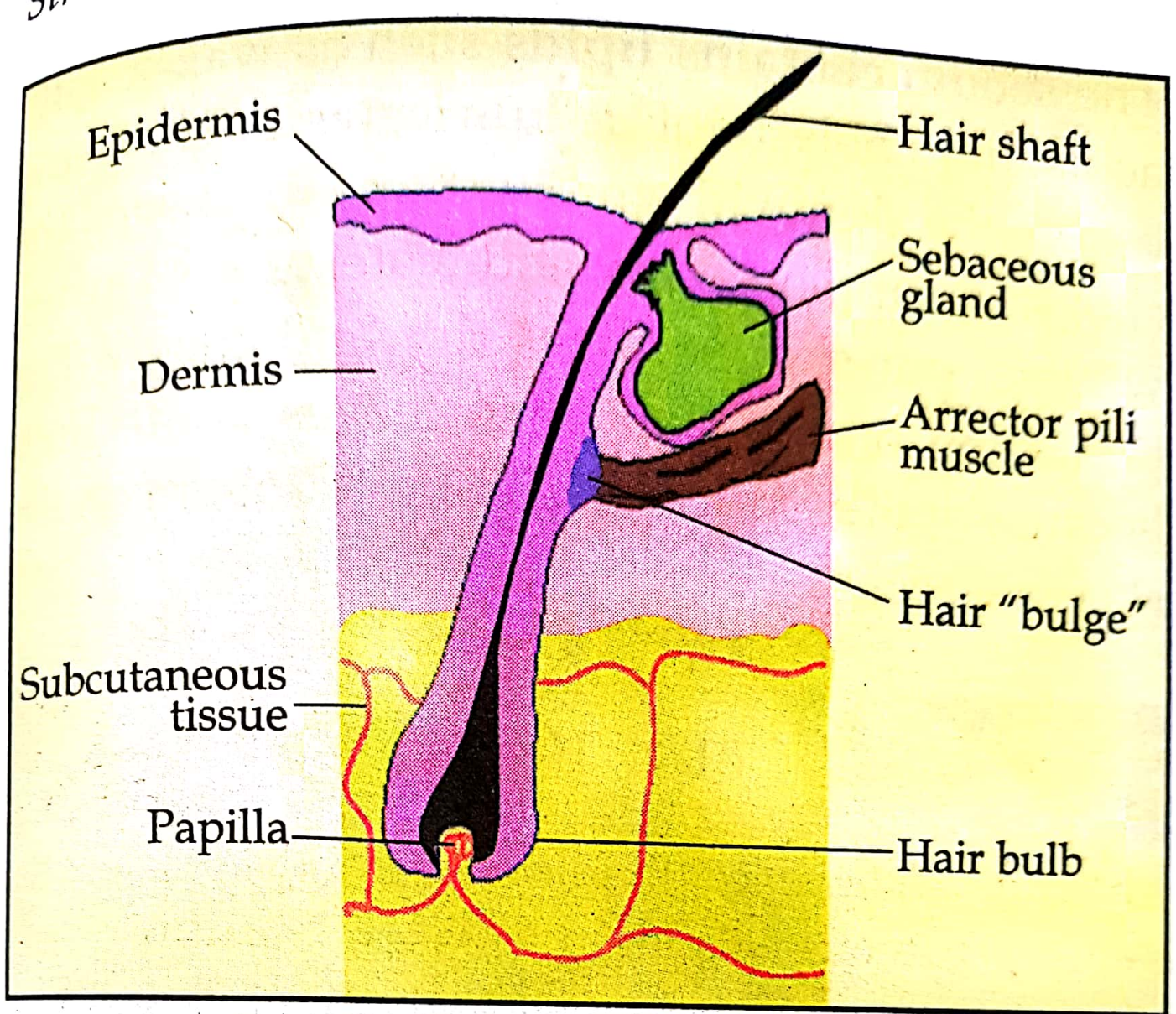


Fig. 13.5: A typical hair follicle

A **sebaceous gland** opens into each hair follicle. It provides oily secretion to the hair preventing it from being brittle. A small smooth muscle called **erector (arrector) pili** extends between each follicle and the outer part of the dermis. During fear, anger, excitement or winters, it pulls the hair base and the slant hair becomes straight. It gives the skin a pimply appearance and this state is called **goosepimples** or **goosebumps** or **gooseflesh**.

Nails

Nails are hard, thin and plate-like structures which protect the highly sensitive and vascular tips of the digits. These are dead structures made up of **keratin**. This is the reason we do not feel any pain while cutting the nails.

The nail consists of three parts:

- ❑ **Plate (body):** It is the dead, keratinised, hard, outer **visible part** of the nail.
- ❑ **Root (bed):** It is the lower part of the nail **embedded into the skin**. It is richly supplied with nerves and blood vessels. If we pull the nail, it would hurt and pain badly.
- ❑ **Matrix:** It is the basal part of the nail which produces new cells and pushes the older ones towards the tip of the nail resulting in its growth. The matrix is visible as the whitish semilunar structure at the base of the nail, called **lunula**.

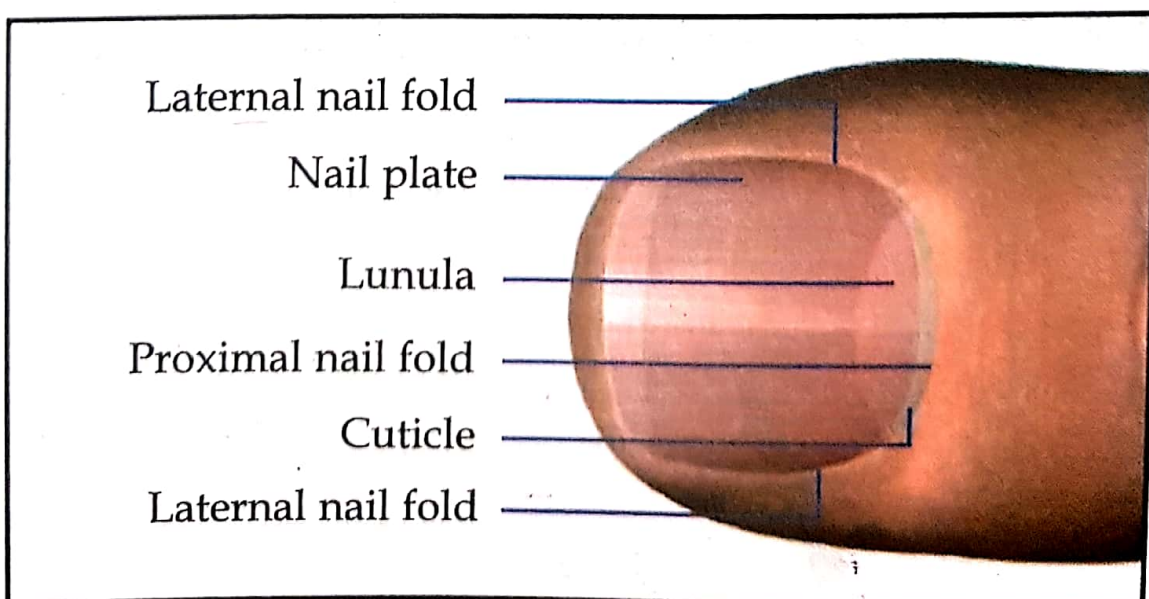


Fig. 13.6: Top view of a typical nail

Sweat glands, also known as **sudoriferous** or **sudoriparous glands**, from **Latin** *sudor*, meaning 'sweat',^{[6][7]} are small tubular structures of the **skin** that produce **sweat**. Sweat glands are a type of **exocrine gland**, which are glands that produce and secrete substances onto an **epithelial** surface by way of a **duct**. There are two main types of sweat glands that differ in their structure, function, secretory product, mechanism of excretion, anatomic distribution, and distribution across species:

- **Eccrine sweat glands** are distributed almost all over the human body, in varying densities, with the highest density in palms and soles, then on the head, but much less on the trunk and the extremities. Its water-based secretion represents a primary form of **cooling** in humans.^[8]
- **Apocrine sweat glands** are mostly limited to the **axillae** (armpits) and **perianal area** in humans.^[8] They are not significant for cooling in humans, but are the sole effective sweat glands in hoofed animals, such as the **camels**, **donkeys**, **horses**, and **cattle**.^{[9][10][11]}

Ceruminous glands (which produce ear wax), mammary glands (which produce milk), and ciliary glands in the eyelids are modified apocrine sweat glands.^{[2][12]}

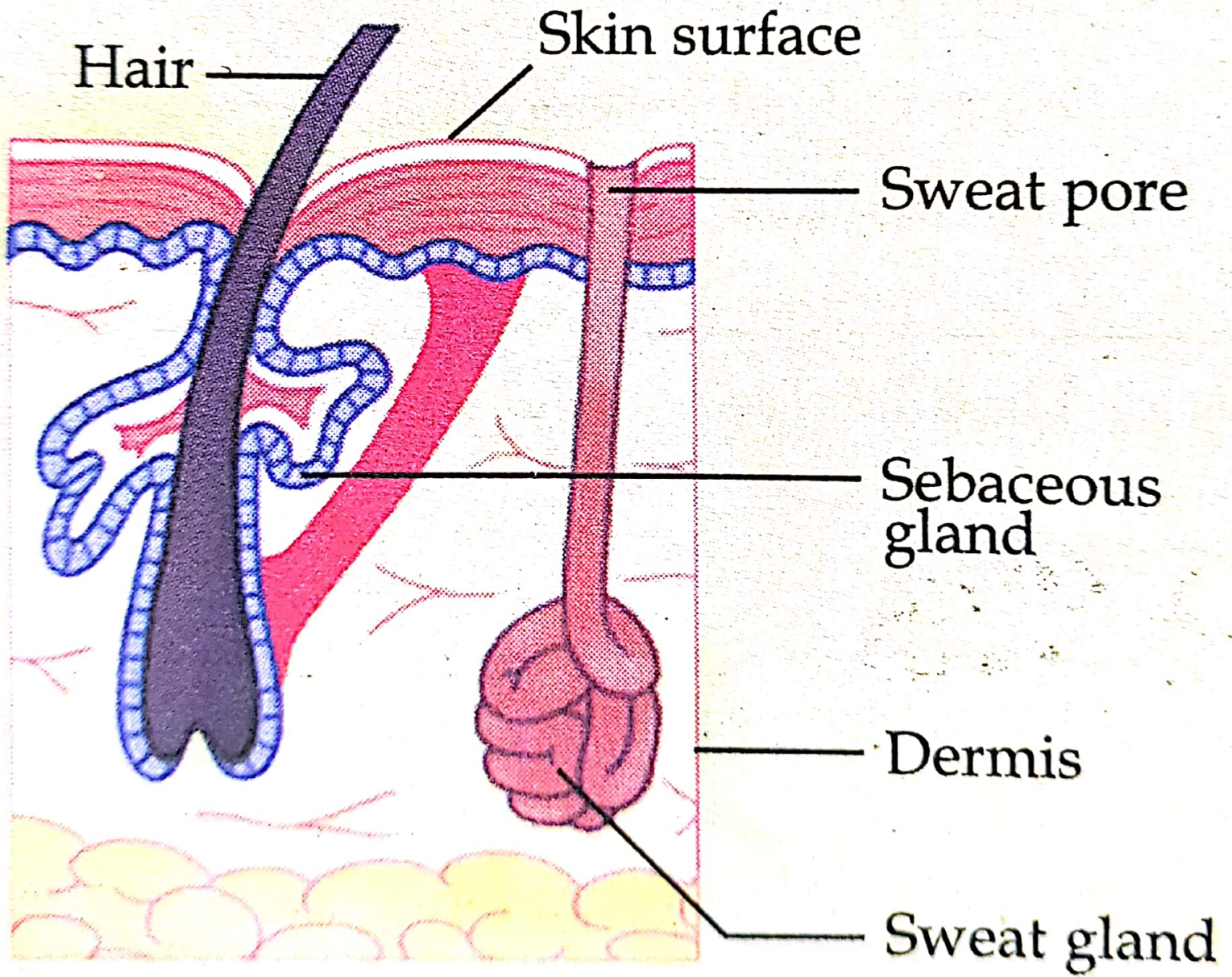


Fig. 13.7: Glands in the human skin

D. LONG ANSWER QUESTIONS

1. What are the various functions of the skin?
2. Describe the structure of epidermis with the help of a diagram.
3. What are the different constituents of dermis? Write the importance of each constituent.
4. Draw a well-labelled diagram of hair and explain its different parts.
5. How are hair important for human beings?
6. What are the various ways by which our body produces and loses heat? Explain.
7. How does skin play an important role in temperature regulation?
8. What is hypothalamus? Give its significance in terms of thermoregulation.
9. Give reasons for the following:
 - (a) During winters, our skin sometimes gives a pimply appearance.
 - (b) A superficial cut in the skin does not let the blood flow.
 - (c) The skin of palms and soles is very thick.
 - (d) It does not hurt when we cut hair or nails but it hurts if we pull them.
 - (e) We should take extra salt and water during excessive sweating or heavy exercise.
 - (f) Our skin often becomes dry and rough in winters.
 - (g) We need to maintain a constant body temperature irrespective of the environmental temperature.
 - (h) We clasp our hands and shiver during winters.

E. QUESTIONS