

## Chapter 13. Skin- “The Jack of All Trades”

### Exercise 1

#### Solution A.

1. (d) the skin will turn dry and rough
2. (b) Albinism, Leucoderma
3. (c) Skin
4. (b) Dermis
5. (d) Palm

#### Solution B.1.

Hypothalamus, a portion of the forebrain is the principal body heat regulating centre in our brain.

#### Solution B.2.

Modified sweat gland: Mammary gland

Modified sebaceous gland: Ceruminous gland

#### Solution B.3.

Sebaceous glands

#### Solution C.1.

Functions of the mammalian skin other than those concerned with heat regulation:

1. **Storage of food:** Skin acts as a storehouse of energy by storing reserve food in the form of fat in the hypodermis.
2. **Synthesis of Vitamin D:** Skin has the ability to synthesize small quantity of Vitamin D in the presence of sunlight.

#### Solution C.2.

A peculiar roughness of the skin produced by cold or fear, in which the hair follicles become erect and form bumps on the skin is called goose flesh.

Goose flesh occurs when the muscles at the base of hair known as erectors or arrectors, contract. The erector muscles are obliquely placed between the hair follicle and the outer part of dermis. They are smooth muscles that are necessary to move the hair. The contraction of erector muscle pulls the hair vertical and depresses the epidermis, resulting in goose flesh.

#### Solution C.3.

Man is a warm-blooded mammal. Our body must maintain an average temperature of 98.6 degree Fahrenheit to function properly. When we feel too hot or too cold, our

nervous system sends certain automatic and autonomic reflexes that help to keep us warm. In cold weather, the blood vessels get narrowed (vasoconstricted). Shivering occurs when our muscles expand and contract rapidly to produce extra body heat. The amount of heat produced is increased by increased metabolic rate and muscular activity, which occurs in the form of shivering. That is why, our body shivers and teeth chatter to protect from cold by generating more heat.

#### Solution C.4.

| Leucoderma                                                                                | Albinism                                                    |
|-------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Loss of skin pigmentation from smaller or larger patches at different regions of the body | Complete loss of pigmentation of the skin all over the body |

#### Solution C.5.

Two glands found in the human skin are:

1. Ceruminous gland: It is a modified sebaceous gland found in the auditory canal. It secretes wax-like substance called ear wax.
2. Mammary gland: It is a modified sweat gland. It is related to reproductive hormones and pregnancy.

#### Solution C.6.

Fever and sickness or any kind of vigorous activity can lead to perspiration even in cold outside.

#### Solution D.1.

| Epidermis                                                                                                                           | Dermis                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <b>1. Stratum corneum:</b> It is the outermost layer having layers of flattened dead cells made up of horny protein called keratin. | It consists of elastic fibres, blood vessels, nerves, etc. |
| <b>2. Granular layer:</b> It is very thin middle layer having two or three sublayers of flattened cells.                            |                                                            |
| <b>3. Malpighian layer:</b> It is the innermost region of the epidermis. The cells can actively divide to produce new cells.        |                                                            |

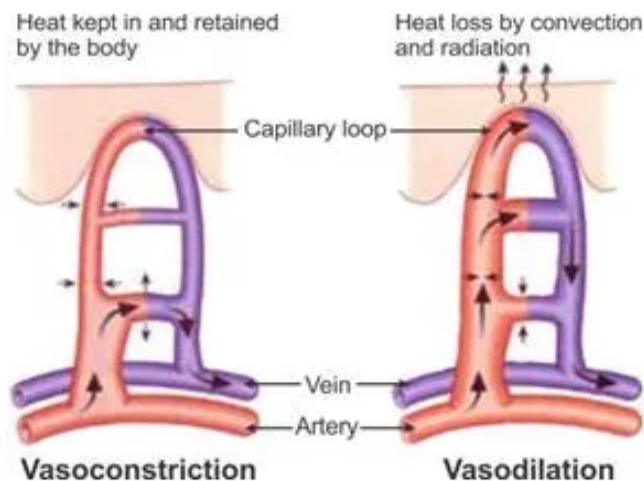
#### Solution D.2.

**Vasodilation:** Dilation of blood vessels in the skin leading to an increase in the blood supply.

**Vasoconstriction:** Narrowing of blood vessels leading to reduction in the blood supply to the skin.

**Temperature regulation in cold weather:**

1. At low temperature, the blood vessels get narrowed or vasoconstricted. This reduces the blood supply to the skin.
2. There is less loss of heat by convection, conduction and radiation. There is less loss of heat through vapourization as reduced blood supply lowers the secretion of sweat by sweat glands.



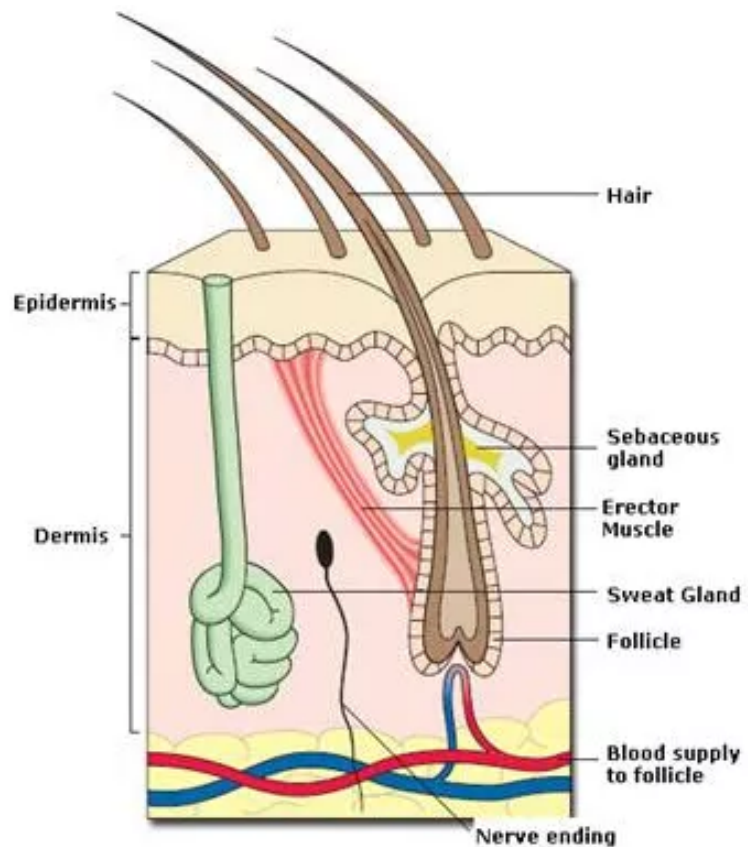
**Temperature regulation in hot weather:**

1. At high temperature, the blood supply to the skin is increased by vasodilation or dilation of blood vessels in the skin.
2. This results in greater loss of heat by convection, conduction and radiation. There is more loss of heat through vapourization as more sweat is secreted due to rich supply of blood to the skin.

**Solution D.3.**

- (a) Entry of germs: Skin prevents the entry of harmful substances or infectious agents inside the body.
- (b) Excessive loss of heat in severe cold: Skin prevents energy loss from the body. It conserves body heat in cold weather and facilitates loss of heat in hot weather.
- (c) Entry of harmful ultra-violet rays: Skin protects the body against harmful ultraviolet light.

**Solution E.1.**



Vertical section of the mammalian skin

### Solution E.2.

(a)

1. Sweat pore
2. Sebaceous gland
3. Sweat gland
4. Fat
5. Dermis
6. Stratum malpighian
7. Stratum corneum
8. Epidermis
9. Hair

(b)

- **Function of part 2 (Sebaceous gland):** It produces oil called sebum, which plays a role in keeping our skin moist.
- **Function of part 4 (Fat):** The skin reserves food in the form of a layer of fat.
- **Function of part 3 (Sweat gland):** It secretes a transparent liquid (sweat) containing water and salts from the body in order to regulate body temperature.
- **Function of part 9 (Hair):** Hair provide a sensation of touch and are also helpful in forensic investigations.

**Part which has at least three functions:**

Sebaceous gland:

1. Skin protection
2. Secretes an oily substance known as sebum that lubricates hair and skin of mammals
3. Presence of sebum enables to experience a wet skin even when we have not taken bath for days

(c) The one function which may be common to both men and women is that the fat serves as a food reserve and heat insulating layer as well as a shock absorber.