

In this lesson, you will study about the phenomenon called “**homeostasis**” which means ‘keeping steady state

LESSON -18 HOMEOSTASIS: THE STEADY STATE

- Homeostasis operates for a variety of needs inside our body and one such need is the regulation of body temperature called thermoregulation
- Homeostasis (homeo : same/steady, stasis : state) is a phenomenon in which the body regulates its functions to keep the internal conditions as stable as possible.
- Homeostasis occurs for several conditions in the body such as water content, sugar level, body temperature, etc.
- Most homeostatic regulations work through negative feed back which means reversing the change to the norm. Very seldom there is positive feedback which produces changes in the same direction as the first one.
- Enzymes are highly sensitive to temperature changes. They work best at about 37°C called optimum temperature.

CLASSIFICATION OF ANIMALS BASED ON THEIR TEMPERATURE TOLERANCE

- The **endotherms** have a variety of heat regulating systems such as sweating and vasodilation to lose heat during hot weather, increasing body metabolism or shivering to generate heat and presence of heat insulating structures like feathers, hairs and subcutaneous fat when it is cold. Examples: All birds and mammals
- **Homoiotherms** (homoio: same; therm: heat) refers to keeping the same or constant (warm) body temperature.
- Those animal whose body temperature rises and falls with the rise and fall of surrounding temperature are termed **Ectotherms**. All animals other than birds and mammals are ectotherms. Examples: Fish, frogs, lizards, insects, earthworms, etc.
- **Poikilotherms** (poikilo : changing/varying, therm: heat) referring to acquiring the body temperature from that of the surroundings.

How some endotherms cope with unfavourable temperatures?

- Polar bears, penguins and several other animals live in the ice-covered Polar Regions. They maintain their body temperature by generating heat and preventing heat loss through thick fur and a thick layer of under-skin fat.
- Camels, desert rats and several other tolerate the intense heat of the tropical deserts mainly by promoting heat loss.

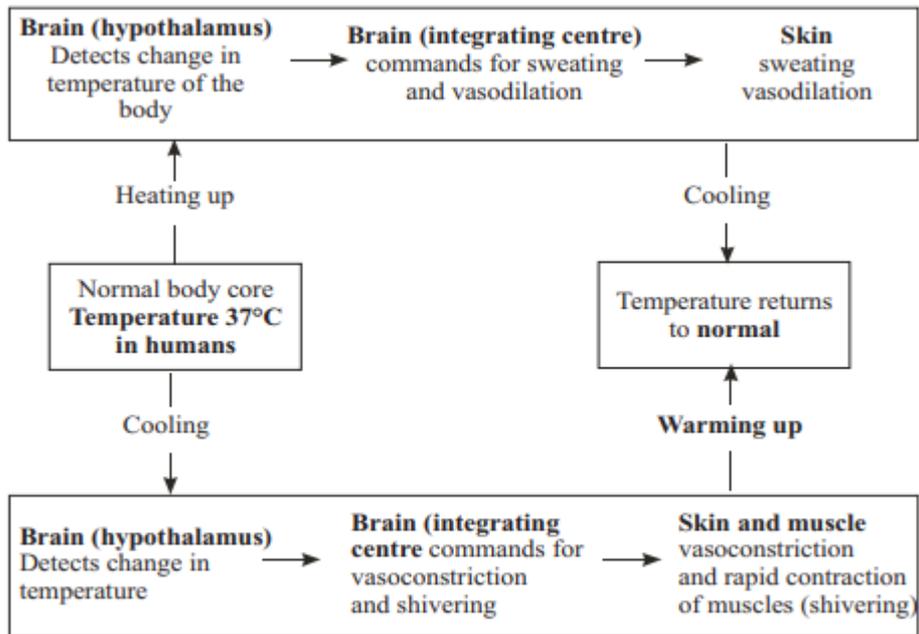
How ectotherms cope unfavourable temperature conditions?

Frogs hibernate under the ground in cold winters and aestivate during hot summers to avoid heat and escape from cold.

COMPONENTS OF HOMEOSTASIS

Homeostasis of any kind involves four components:

1. **Set point or the norm** - This is the normal level of any factor in the body.
2. **Sensor** - This consists of the sensory part that perceives the change in the set point. The sensor in thermoregulation comprises the heat receptors in (i) the skin and (ii) hypothalamus
3. **Integrating centre** - The integrating centre is the part, which receives the information about the change in the set point of the particular state, interprets it and then sends the command for correction.
4. **Effectors** - The effectors are the agencies, which act to restore the set point. For example, (i) Sweat glands, which pour out the sweat to produce cold by evaporation, (ii) Skin blood vessels, which widen (vasodilate) to bring more blood to the body surface for radiating out heat and (iii) Skeletal muscles, which vigorously contract (shivering) to produce heat



Different steps in thermoregulation in humans

TEST YOURSELF

1. In which temperature range do the enzymes in our body act best?
2. Classify the animals based on their temperature tolerance?
3. Mention different steps involved in thermoregulation in Humans?