Temperature as an ecological factor

- The Measure of the intensity of heat is called ***Temperature***
- The units of temperature commonly expressed in Degrees **of Fahrenheit scale or on *Celsius* scale**
- The Main source of heat energy is the Sun
- Extreme variations in temperature from day to nigh: and from season to season are found in **Inland area***;*
- Organisms which can tolerate wide fluctuations in temperature are termed - **Eurythermal.**

  Eg: Lizards, Birds and Mammal

- Organisms which can tolerate only small variation in temperature are termed**-Stenothermal organisms Eg: Coral animals, Fishes**
- *The temperature at which the organism's life activities are at the maximum level is called* **Optimum temperature**
- The lowest temperature at which organisms can live indefinitely is called - **Minimum effective temperature.**
- The highest temperature at which an organism can live indefinitely is called **Maximum effective temperature.**
- An organisms enters into chill coma if the temperature is - **Below minimum effective temperature**
- The lowest temperature at which survival is possible **- Minimum survival temperature**
- An organism goes into heat coma if the temperature is above maximum effective level
- Thermal stratification in lakes in the temperate regions with marked variations of temperature occurs with the change of Seasons
- Thermal stratification occurs only in - **Temperate lakes**
- Formation of different layers of water in freshwater lakes due to temperature variations is called **Thermal stratification**

SUMMER STRATIFICATION

- The upper layer of water that having a temperature range of 21 to 25 C during summer in temperate lakes is called - **Epilimnion**
- The zone of water where there is rapid decrease in temperature at rate of 1^0C/meter is called -**Thermocline /Metalimnion**
- The cold and oxygen defecient zone of water below the thermocline is called- **Hypolimnion**
- Oxygen levels decrease in hypolimnion if the thermocline is formed - **Below the compensation level**
- Over turn of water occurring in the lake after summer stratification is - **Fall overturn**
- Oxygen rich water from surface reaches deeper area **d**uring fall over turn

WINTER STRATIFICATION

- During winter, surface water freezes to jce where as water below the surface remains at 4^0C and is called **Winter stratification**
- The organisms are not subjected to hypoxia during winter stagnation as there is - decrease in bacterial decomposition and respiratory activity of aquatic organisms.
- Spring overturn occurs in a stratified lake after **Winter**
- Periodic replenishment of nutrients and oxygen in stratified lakes takes place by the **Overturn in lakes.**
- The phenomenon that upwells the nutrients & increases the productivity is due to - **overturns**

Biological effects of temperature:

- Animals which can maintain constant body temperature within narrow limits are **Homeotherms Eg: Birds and Mammals.**
- Animals which are not capable of maintaining constant body temperature are – **poikilotherms Eg: Fishes, Amphibians, reptiles etc.**
- Internal mechanisms to regulate body temperature are absent in - **Poikilotherms**
- **Thermal migrations:**
- Migration of animals to the places of optimum temperature range to escape extremes of temperature is - **Thermal migration**
- Desert animals move to shaded places to avoid scorching heat of the sun during – **Noon**
- The Organisms which can move between land and water in an attempt to - **Minimise the effect of change in temperature on their bodies**
- Thermal migration in desert animals takes place during – **Noon**

- The organisms move between land & water to minimise the effect of temperature are - Amphibians,Crocodiles Hippopotamus

Metabolism

- Effect of temperature on metabolic activities of animals is more significant in Poikilothermic than ir Homeothermic animals because **Homeotherms maintain constant body temperature.**
- Temperature regulates metabolism because temperature influences the - **Activity of enzymes**
- Effect of temperature is not significant in **Homeotherms**
- Doubling of rate of biochemical reactions with ever) 10 C rise in temperature is called - **Van't Hoff; rule.**
- The effect of temperature on the rate of reaction i: expressed as - **temperature coeffecient or Q**
- Value of Q for an enzyme controlled reaction is approximately -2

Effect of temperature on sex ratio

- Increase in the number of male individuals **-In Ratflea *xenopsylla cheopis* population thar the female individuals is due to increase ir temperature.**
- Recent invitro and invivo experiments on turtle embryo have shown bipotential gonads are masculanized in the absence of - **Temperature trigger.**
- Female producing temperatures cause the enzyme aromatase to act locally on gonads to produce estrogen and activate the development of **Ovaries**

Cyclomorphosis

- Modifications in the body form in relation to seasonal changes in temperature are cyclomorphosis
- Cyclomorphosis was observed in ***Daphnia*** **(by Coker)**
- In winter head of ***Daphnia*** **is Round**
- The helmet like projection starts on head of ***Daphnia*** **during Spring season**
- The helmet like projection completely found during **Summer**
- The helmet like projection begins to decrease during **Autumn**
- The helmet like projection completely disappear & the head becomes round during- **winter**
- During winter ***Daphnia*** can float on water due to more density of water**.**
- The hood like structure in ***Daphnia*** helps to **increasing buoyancy**
- Other effects of temperature
- Effect of temperature on the body size of animals is explained by **- Bergmann's rule**
- Ratio of body surface to the body size **of** warn blooded animals living in colder regions is **- less than that of their counter parts living in warmer climates**
- Effect of temperature on the size of extremities of the body in homeotherms is explained by **Allen's rule**
- Examples of Allen's rule - Ear lobes of Fox.
- According to Allen's rule - large extremites increase the surface area without increasing the volume.
- Effect of temperature on the early segmentation in the development of some fish is explained by **Jordan's rule**
- Eg: Number of vertebrae is 56 in - Cod fish hatchesin new found land 4° C — 8°C
- Number of vertebrae is 54 in - Cod fish hatches in new found land 10°C — 11°C
- Effect of temperature on pigmentation of animals is given by **Gloger's rule**
- Eg: Pigmentation of skin is more in - Tropical region animals
- Pigmentation of skin is less in - Temperate region animals