**TD2 CHAPTER 2**

**ABIOTIC FACTORS**

**A.Climatic Factors**

**1. Concept of Climate Scale**

Climate can be considered at different scales:

• **Macroclimate (regional climate):** Relates to a vast geographical area, influenced by altitude (elevation above sea level), latitude (north and south), and proximity to seas (ocean currents). Example: Continent, Nation.

• **Mesoclimate:** Relates to a limited natural region, subject to topographical variations. Example: Climate of a forest, climate of a valley.

• **Microclimate:** Extends over areas ranging from hundreds of square meters to tens of square centimeters, at the scale of each organism's environmental conditions. Example: The underside of a stone.

**2. Temperature**

Temperature is a physical quantity measured with a thermometer, which indicates the thermal energy of a body. It is also the degree of agitation of the particles that compose a system, resulting from the kinetic energy of the system.

The most common temperature scale is Celsius, where water freezes at 0°C and boils at approximately 100°C under standard pressure conditions. In countries using the imperial (Anglo-Saxon) system of units, the Fahrenheit scale is used (freezing at 32°F and boiling at 212°F). The unit of the International System of Units, used in scientific contexts and defined from absolute zero, is the kelvin (a common name derived from William Thomson, Lord Kelvin).

**Concept of Critical Temperature**

This is the temperature at which a given medium changes from one physical state to another. For living beings, it is the minimum or maximum temperature below and above which biological activity can no longer occur. It varies greatly from one species to another and depending on its developmental stage.

**Concept of Stenothermy, Eurythermy, and Optimal Temperature**

**A \*\*stenotherm**\*\* is an organism that can tolerate, at least during active life, only a limited range of ambient temperatures. Conversely, **a \*\*eurytherm\*\*** is an organism with a high ecological tolerance to temperature. Sometimes, **a \*\*microtherm\*\* or \*\*oligotherm\*\*** refers to an organism or group of organisms adapted to low temperatures, and a **\*\*megatherm\*\* or \*\*polytherm**\*\* refers to an organism or group adapted to high temperatures.

The **\*\*optimal temperature\*\*** is the temperature at which development and metabolic reactions occur in the best possible manner, with minimal energy expenditure.

**a) In Plants:** Example of the **\*\*dormancy\*\*** phenomenon:

**Dormancy**: A period of rest in plants triggered by a drop in temperature. It is characterized by a near halt or slowdown of vital processes and increased resistance to ambient conditions. The interruption or "breaking" of dormancy occurs under the influence of temperature: Example: Seed dormancy and bud dormancy.

**b) In Animals:**

**Hibernation:** A state of regulated hypothermia, a general slowdown that allows certain mammal species to conserve energy during a more or less long winter period. It is characterized by controlled hypothermia and relative immobility of animals in their burrows. Hibernators use the large fat reserves they have stored before winter. Example: Polar bear, hamster, etc.

**Estivation:** A kind of torpor or "sleep" that overcomes certain animals, such as turtles, snakes, and crocodiles, during the hottest days of the season.

**Migration**: In animals, it generally occurs during periods of climatic changes such as temperature. Migration is a phenomenon present in many species (e.g., birds) that involves a displacement, often over long distances, with a periodic character that implies a regular return to the starting region.