

BASIC ECOLOGY

Lect. #2

3rd

Chemistry-Zoology

Group

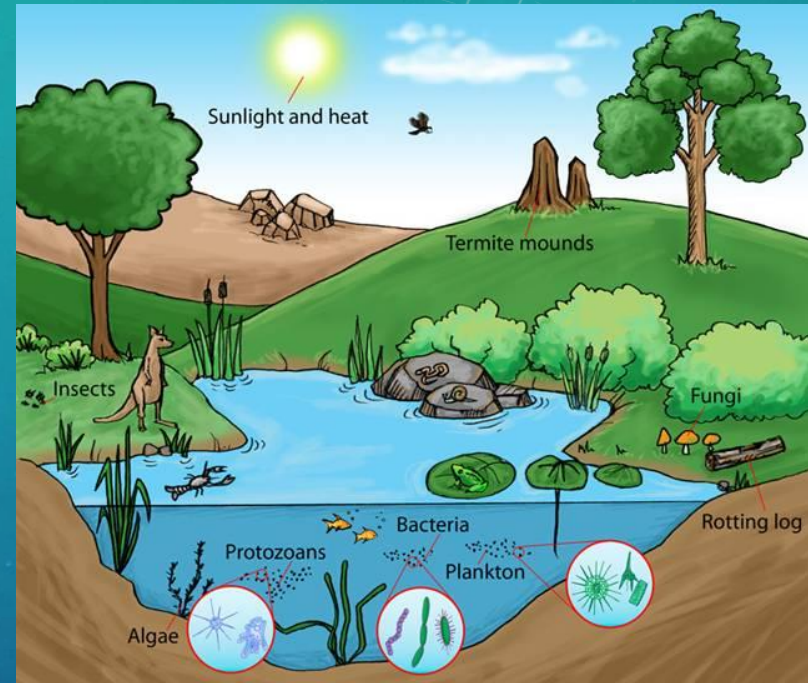


FACTORS LIMITING DISTRIBUTION

Physical Factors

1- Light

- One of the important physical factors without which life can't exist.
- There are different sources for light as sun, moon & stars, but sun light ‘Solar Radiation’ is the most important.
- Light is a form of radiant energy/wavelength covering what is called the electromagnetic spectrum.
- Note: energy is **inversely** proportional to wavelength. So, The energy from the sun comprises of short, high-energy radiations to long, low energy radiations.



FACTORS LIMITING DISTRIBUTION

Physical Factors

1- Light

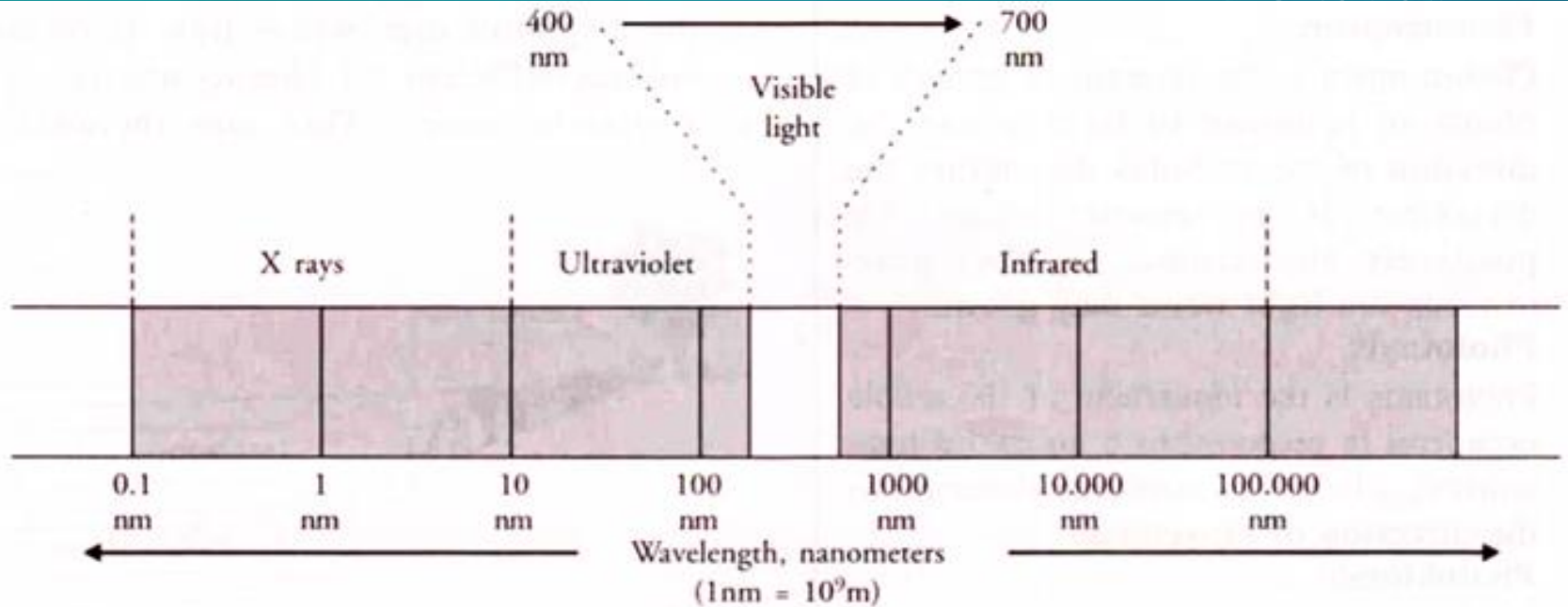


Fig. 3 The electromagnetic spectrum of solar radiation.

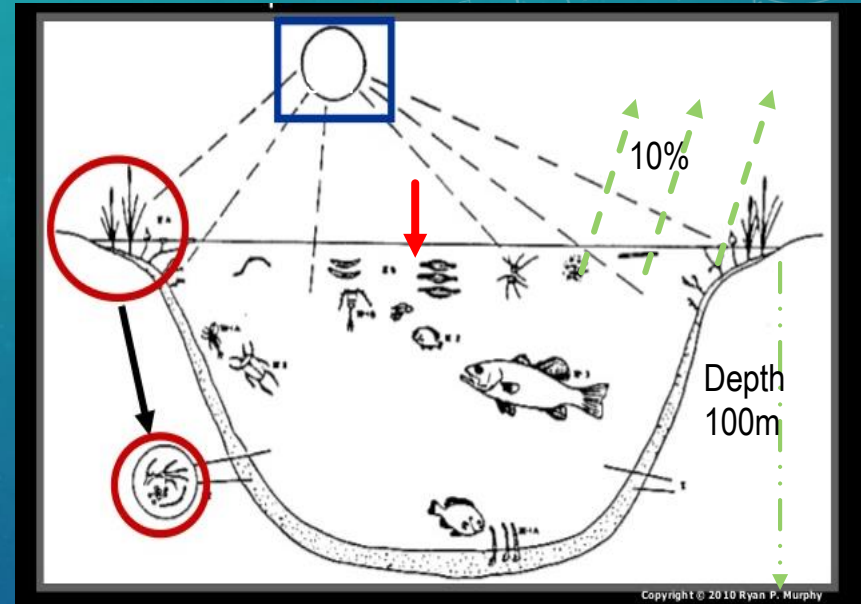
Animals detect light by sensory organelles as photoreceptors, sense organs or eyes

FACTORS LIMITING DISTRIBUTION

Physical Factors

- **1- Light**

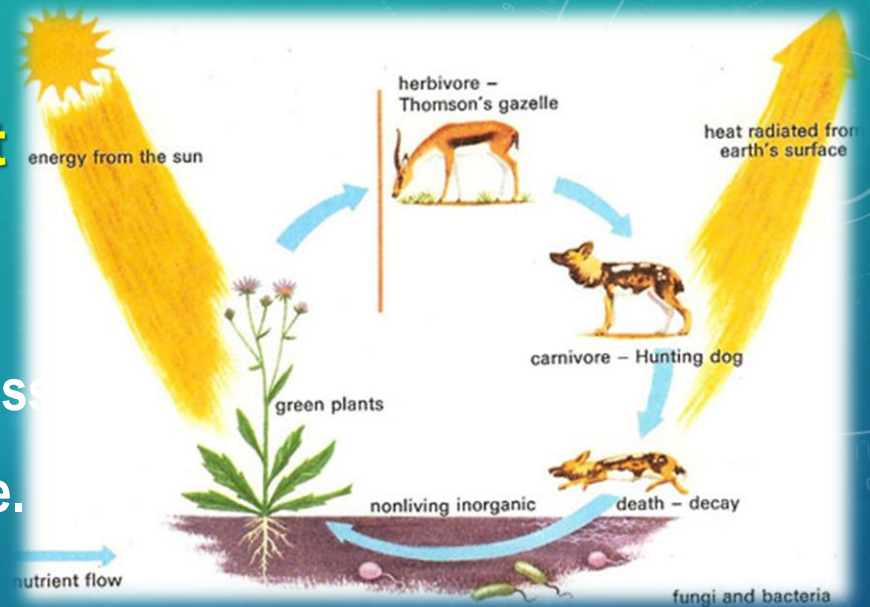
- Light, as energy, is important for primary producers (plants), upon which consumers depend (animals).
- When the sunlight arrives to the Earth, 10% is reflected and 90% absorbed by water surfaces as Oceans.
- In Oceans, Primary producers are found in the upper 100m.
- This distance are varied in other water surfaces according to their depths



FACTORS LIMITING DISTRIBUTION

Physical Factors 1- Light

- Importance of light
 1. Needed in photosynthesis process
 2. Main source of global temperature.
 3. Affects physiology (Metabolism, increases metabolic activity in animals by increasing enzyme activity) of organisms.
 4. Affects morphological (as changing color according to background) characteristics of organisms.



FACTORS LIMITING DISTRIBUTION

Physical Factors 1- Light

5. Affects behavioral activities as:

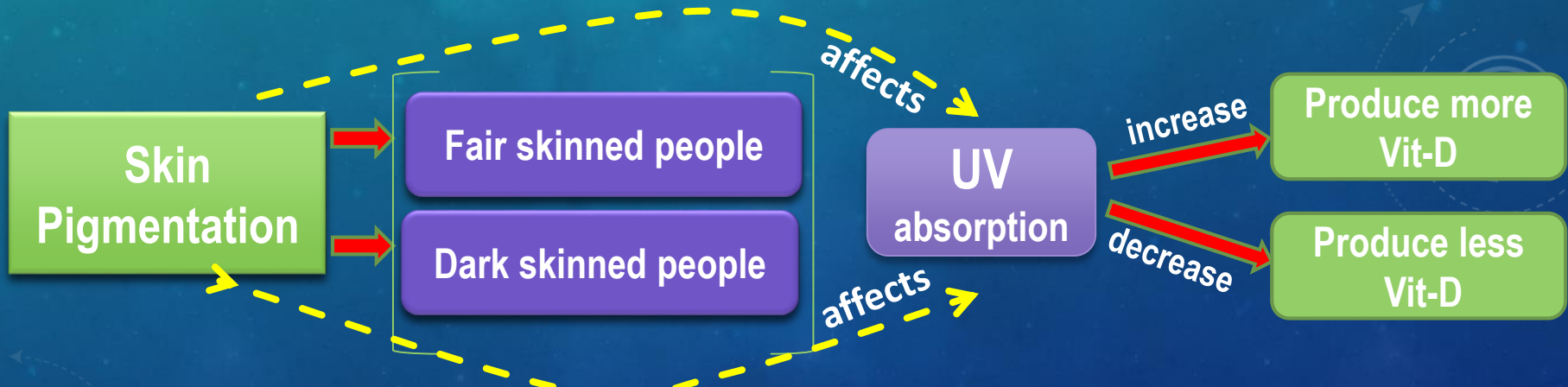
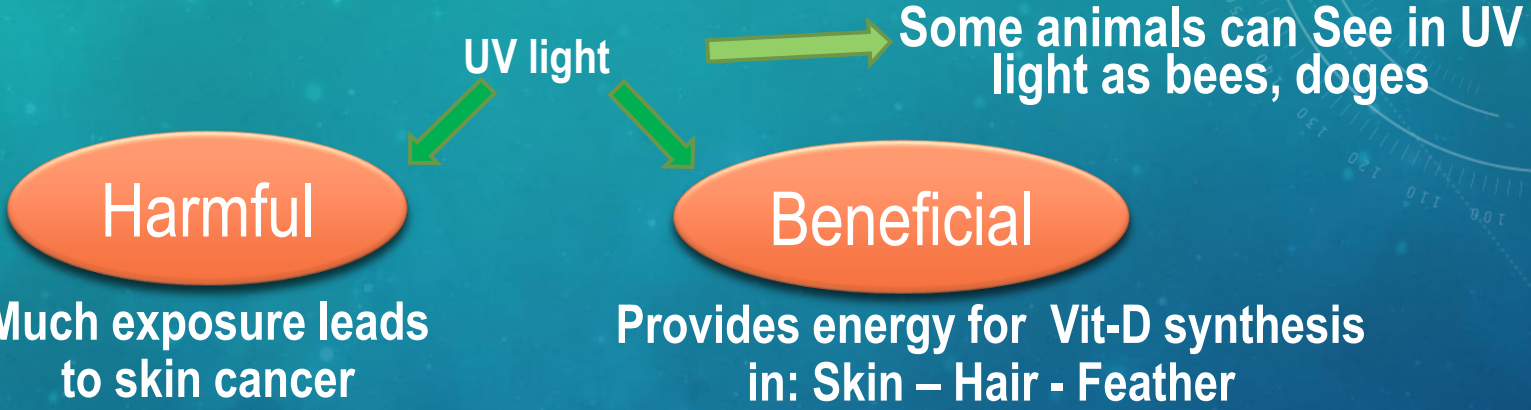
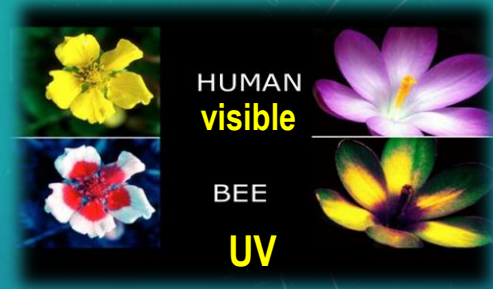
- Migration === time of migration depend on daylength (summer or winter)
- Movement and feeding during daylight (diurnal), others move and feed during night (nocturnal).
- Adaptation of nocturnal animals to see in dark include large eyes and pupils & reflecting layer behind retina called "Tapetum lucidum".
- Movement of animals towards a specific direction is called navigation, while others use sun as a compass to orient themselves toward a specific area.
- Some animals are self-light emitting by chemical reaction within Bioluminescent organs. These light are used for species recognition & food capture (fireflies).



FACTORS LIMITING DISTRIBUTION

Physical Factors

1- Light



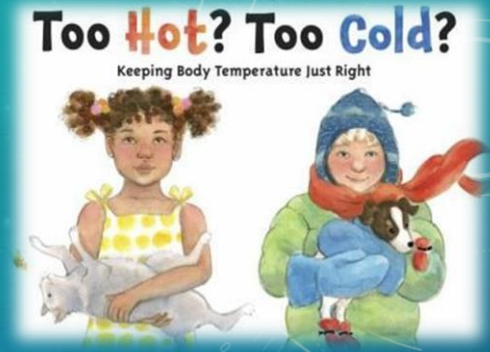
Tanned (=darkened skin color) is adaptation regulates exposure to UV by increasing pigmentation

FACTORS LIMITING DISTRIBUTION

Physical Factors

2- Temperature

- Temperature is the degree or intensity of heat or coldness.
- Temperature is the 2nd most limiting physical factor after light.
- Temperature shows variations which are:
 - Daily (day / night)
 - Seasonally (summer, winter, autumn, spring)
 - Locally (from area to area variations).



Physical Factors

2- Temperature

- Every animal reacts with surrounding Temp. and results “Effects of temperature on animals” shown as:
 1. Effect on Metabolism (high temp. increases metabolism)
 2. Effect on Reproduction (reproduce in favorable temp)
 3. Effect on Fecundity.
 4. Effect on Growth and Development .
 5. Effect on Colouration.
 6. Effect on Morphology.
 7. Effect on Behaviour.

Factors limiting Distribution

Physical Factors

2- Temperature

- Every animal has a temp. range in which physiological functions are Optimal.



Optimal Temp.
Paramecium

24-28 °C

Temp. increases

Speed up
Metabolism

Temp. decreases

Decrease
Metabolism

House Fly

Inactive



Optimal



dead



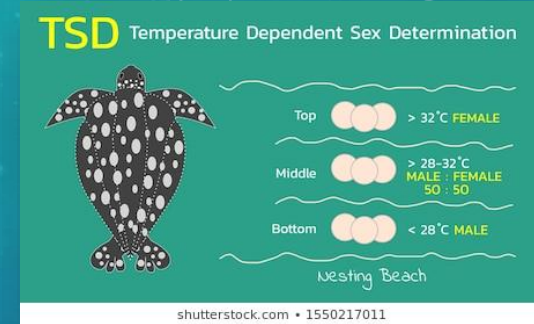
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 40 42 44 46

Factors limiting Distribution

Physical Factors

2- Temperature

- Eggs of some insects fail to develop in Too low or Too low Temp & slowly develop in low temp.
- In some animals, Temperature determine the gender of developing embryo as in turtle.
- Some adult insects die in winter (**LOW Temp.**), but their eggs stand the cold weather.
- Others migrate or hibernate to avoid unfavorable Temp.
- Some protozoans live in **Hot spring at 50°C** which kill others.



Factors limiting Distribution

Physical Factors

2- Temperature

- Most animals Live at temperature ranged 10 – 45°C, this known as **Biokinetic** zone.

- **Homeothermic** animals (**warm blooded**) = have constant body temp. by producing heat through metabolic oxidation & loss of excess heat by evaporation (sweat).



- **Poikilothermic** animals (**cold blooded**) = Their inner temperature varies as the environment temperature does (i.e., obtain heat directly from environment).



Physical Factors

2- Temperature

- **Heterothermic** animals are those that can switch between **poikilothermic** and **homeothermic** strategies as in small birds and mammals. These animals are **homeothermic** during active periods **and** decrease their body temperature during inactivity periods . To become **poikilothermic**.
- Inactive periods usually are yearly or daily.
- Yearly inactivity periods are usually known as **hibernation** (or **estivation** if it happens in summer).



Black bear hibernate



Lemur estivate