Ashur university collage

Dept. of Biology

First-year

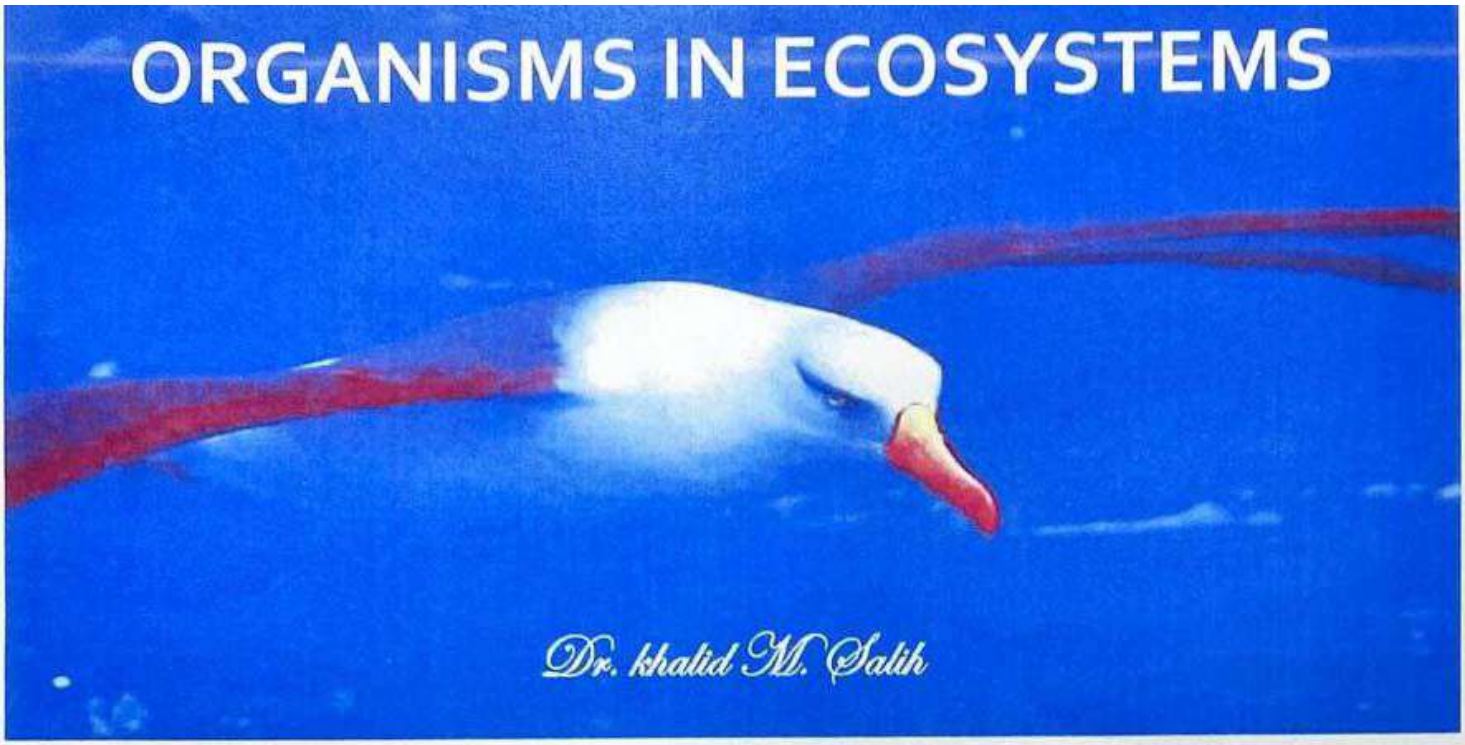
Lecture 2

Zoology

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2022-2023

ORGANISMS IN ECOSYSTEMS



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Definition

The study of cooperation and competition for biotic and abiotic parts of the environment needs to know three important things:

- **Habitat** which is the place where an organism lives.
- **Niche** which is the role of each species in its environment.
- **Interaction** which is the relationships between species. Organisms never live alone, but they are always interacting in some form or another with other living things.

Types of Interaction

There are many different types of interactions:

1. Predation
2. Competition
3. Symbiosis (living together)

1. Predation

It is the interaction between two different species:

- ***Predator*** is benefit and trying to eat the prey species
- ***Prey*** is killed and trying to run away.

- Examples: lion & zebra, bear & fish, and grasshopper & leaf.



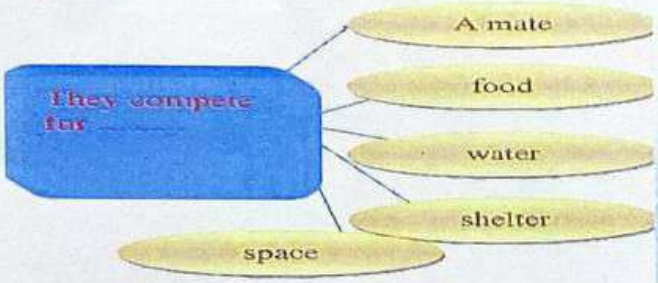


2. Competition

- Competition is an interaction between organisms, in which the fitness of one is lowered by the presence of another *(competitor)*.
- It is done either among members of same species *(intraspecific competition)*, or between individuals of different species *(interspecific competition)*.



WHY ANIMALS COMPETE ???







2. Competition

- For example, competition occurs between sparrows and white lizards:
  - Sparrow fight for a shelter
  - White lizard fight to catch insects.
- When the food is less, species less suited to compete for resources should either adapt or die out.



3. Symbiosis (living together)

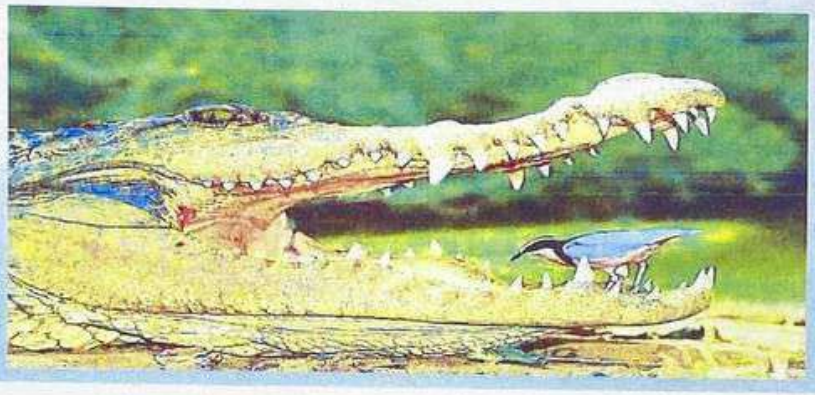
- Symbiosis is a relationship where two or more organisms depend on each other for resources, so each of them known as *(symbiont)*.
- In symbiotic relationships, the two organisms aren't trying to kill each other and they aren't trying to fight over food.
- There are three types of symbiosis:
  - a) Parasitism
  - b) Mutualism
  - c) Commensalism

a) Parasitism

- A relationship between two organisms where one organism benefits known as **(parasite)** while the other is harmed known as **(host)**.
- Parasites do not kill their host, much smaller than their host, and can be classified into two types:
  - 1) *Ectoparasites*
  - 2) *Endoparasites*

b) Mutualism

- A relationship between two or more organisms in which both organisms benefit, so they are called *(mutualists)*.
- An example: **Egyptian plover** and the **crocodile**, the crocodile lies with its mouth open and the plover flies into its mouth and feeds on bits of decaying meat stuck in the crocodile's teeth. The plover eats a meal and the crocodile gets his teeth cleaned.



c) Commensalism

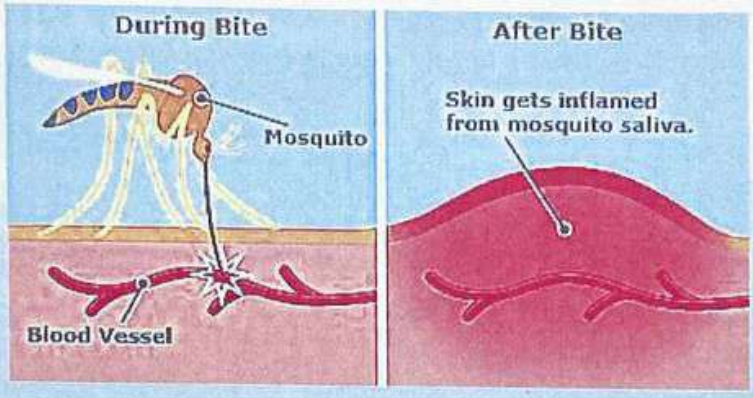
- One organism benefits but the other is neither harmed nor benefit.
- **Remora** (sucker-fish) lives in close association with or other larger fish. The sucker-fish is small and does not injure (or benefit the shark, but envoys the shark's protection and lives on the scraps formed as the shark devours its prey.
- **Cattle egrets** (birds) live near **cattle** because when the cattle graze, their movements stir up insects, so birds have their insects and cattle are unaffected.





1) *Ectoparasites*

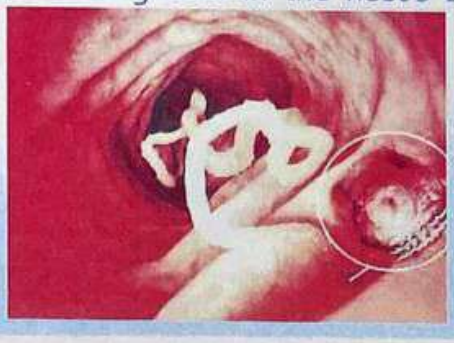
- Ectoparasites live on the surface of the host such as (mites, ticks, lice, mosquitoes).
- The mosquito needs to suck the blood from animals for feeding, while the animal that is bitten is harmed because it loses some blood and skin gets inflamed.



2) *Endoparasites*

Endoparasites live inside the host and can exist in one of two forms:

- *Intercellular parasites* inhabiting spaces in the host's body such as **tapeworms** that lives in the gut of their hosts and steals nutrients from the food in its host's intestine; without a host, the tapeworm is unable to live, but the host suffers from weight loss and decreased energy, as well as many other health problems.
- *Intracellular parasites* inhabiting cells in the host's body, such as protozoa, bacteria or viruses.



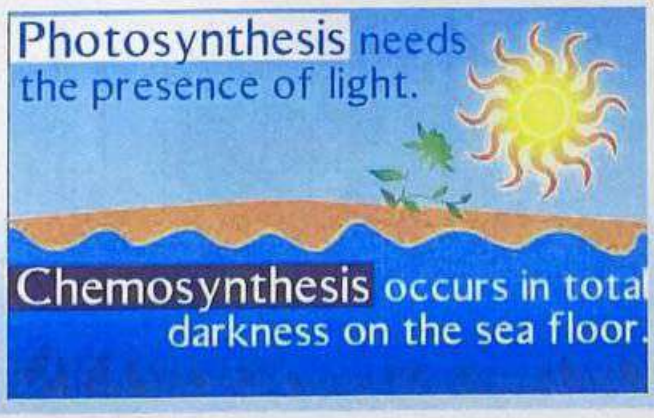
The Trophic Levels

- The word trophic derives from the Greek ***τροφή (trophē)*** = food or feeding.
- The trophic level of an organism is the position it occupies in a food chain.
- The three basic ways in which organisms get food are:

1. Producers (autotrophs)
2. Consumers (heterotrophs)
3. Decomposers (detritivores)

1. Producers (autotrophs)

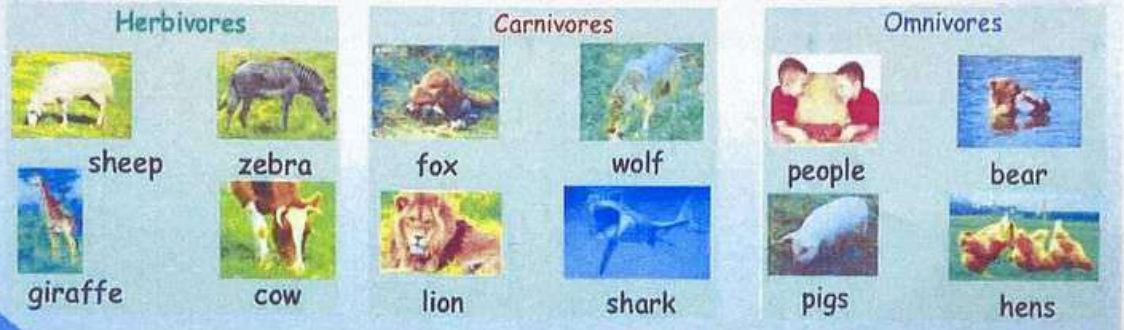
- They are typically plants or algae that do not eat other organisms, but pull nutrients from the soil or the ocean and manufacture their own food using energy either from:
- sun light by a process known as photosynthesis (so they are called ***Photoautotrophs***)
- chemical compounds by a process known as chemosynthesis (so they are called ***Chemoautotrophs***).



2. Consumers (heterotrophs)

They are species that cannot manufacture their own food and need to consume other organisms.

- *Herbivores:* animals that eat primary producers (like plants).
- *Carnivores:* animals that eat other animals.
- *Omnivores:* animals that eat both plant and other animals.



3. Decomposers (detritivores)

- They break down dead plant and animal material and wastes and release it again as energy & nutrients into the ecosystem for recycling.
- Such as bacteria, worms, fungi (mushrooms), and others which are feed on waste and dead matter, converting it into inorganic chemicals that can be recycled as mineral nutrients for autotrophs to use again.



The Trophic Levels

Trophic levels can be represented by numbers according to how far the organism is along the food chain.

Level 1: Plants and algae make their own food and are called ***primary producers***.

Level 2: Herbivores eat plants and are called ***primary consumers***.

Level 3: Carnivores that eat herbivores are called ***secondary consumers***.

Level 4: Carnivores that eat other carnivores are called ***tertiary consumers***.

Level 5: ***Apex predators*** are at the top of the food chain that have no predators.

