UNIT 4

BIOTIC INTERACTION

BIOTIC INTERACTION :

There are many complex relationship in ecosystem Biotic relationships are between living organisms (bio = ling). All the organisms including plants, animals and microorganisms are influenced by environmental factors like light, temperature, rainfall etc. The organisms under normal conditions influence each other directly or indirectly. All grade of interrelationships exist among organisms. The relationship between organisms of same species is called intraspecific relationship while relationship between different species is known as inter-specific relationship. The relationships may be beneficial or harmful to both partners or helpful to one and harmful to other, or it may be neutral in respect to other partner.

Ecological relationships describe the interactions between and among organisms within their environment. These interactions may have positive, negative or neutral effects on either species' ability to survive and reproduce, or "fitness." By classifying these effects, ecologists have derived five major types of species interactions: predation, competition, mutualism, commensalism and amensalism.

Interacting species have a tremendous influence on the size of each other's populations. The various mechanisms for these biotic influences are quite different from the way in which abiotic factors effects the size of populations. Biotic factors also regulate the size of populations more intensely. Finally, the influence of biotic interactions can occur at two different levels. Interspecific effects are direct interactions between species, and the intraspecific effects represent interactions of individuals within a single species.

4.1 POSITIVE INTERACTION :

This term is used for the types of interspecific relationships which are mutually beneficial and where one or both partners are benefited and no one is harmed. This benefit may be in terms of food, shelter, substratum or transport. The association may be continuous or transitory, obligate or facultative.

Positive interaction exists between two plants or two animals or between plant and animal both. It is mainly divided into three categories. [A] Mutualism, [B] Commensalism, [C] Proto-cooperation.

[A] Mutualism :

It is mutually beneficial relationship between two organisms. Here both the species derive benefit. The relationship may be compulsory (obligatory) or facultative (optional).

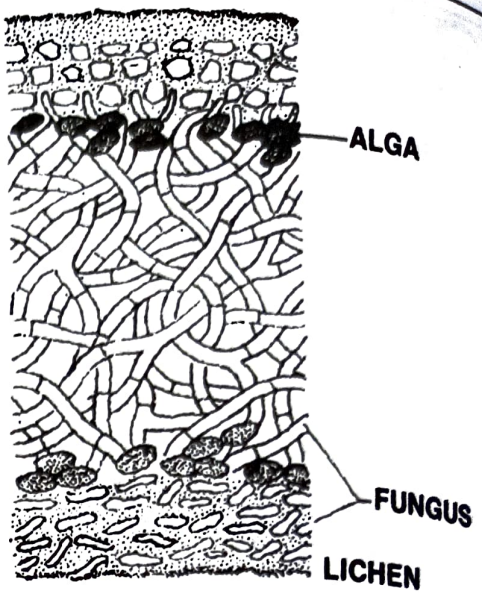
(1) Compulsory Mutualism :

The relationship is compulsory and members are invariably in continuous contact with each other. For example :

4.1.1 Lichens :

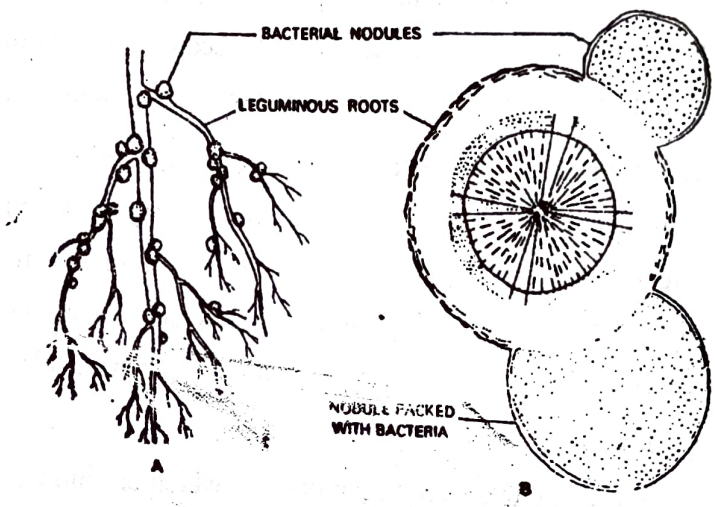
The term symbiosis literally means "living together" in broad sense. It was coined by De Bary (1879).

Lichen is the example of mutualism where contact is close and permanent as well as obligatory. Their body is made up of matrix formed by fungus, within it, the algal cells are embeded. The fungus provides moisture as well as minerals and protection to algae whereas alga manufactures food material. Neither of the two can grow alone independently in nature.



[FIG. 4.1.1 LICHEN (ALGAE AND FUNGI]

4.1.2 Symbiotic nitrogen fixers :

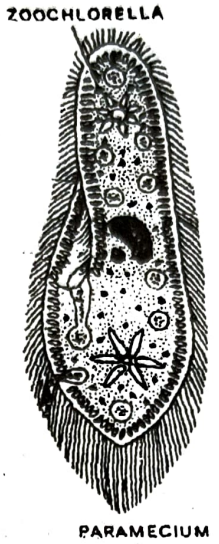


[FIG. 4.1.2 LEGUMINOUS ROOTS WITH RHIZOBIUM]

This is a well-known example of mutualism where the bacterium Rhizobium form nodules in the roots of leguminous plants and lives symbiotically with the host. Bacteria obtain food from the higher plant and in turn fix gaseous nitrogen, making it available to plants.

4.1.3 Association between Zoochlorellae and Paramoecium (association between plant and animal) :

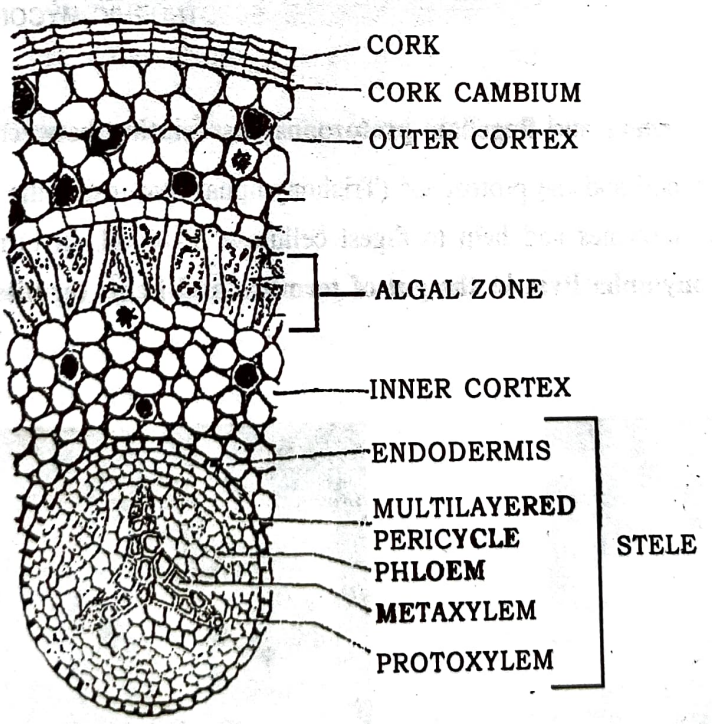
Some unicellular algae like Zoochlorellae live symbiotically in Paramoecium. In this relationship alga synthesizes food to be used by both and Paramoecium gives protection to algae. Zoochlorellae also are found in the outer tissues of certain sponges, nodules, coelenterates, molluscs and worms. The unicellular green alga **Chlorella vulgaris** lives within the gastro dermal cells of Hydra.



[FIG. 4.1.3 PARAMOECIUM AND ZOOCHLORELLAE]

4.1.4 Association between coralloid root of Cycas and Blue green algae :

The coralloid root of Cycas are inhabited by nitrogen fixing blue green algae like Nostoc and Anabaena, which fix atmospheric nitrogen for Cycas. In turn, they get protection and nutrients.

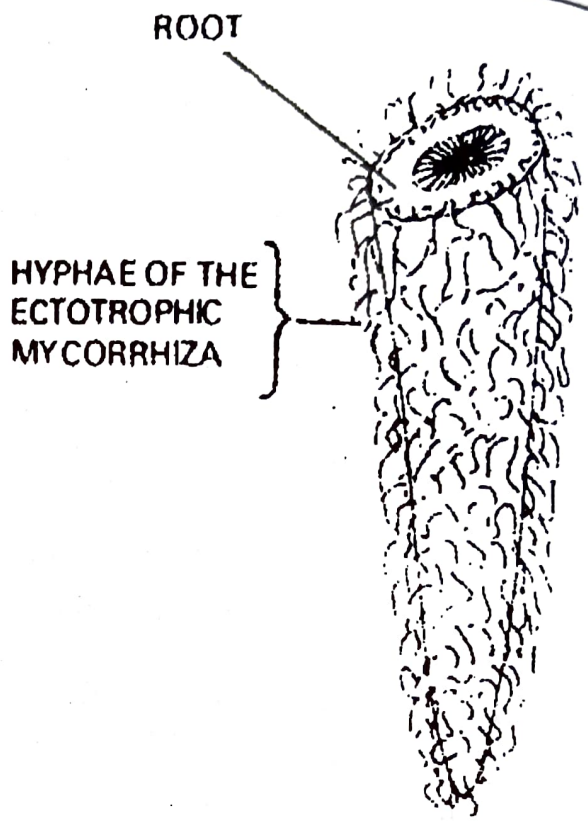


[FIG. 4.1.4 CORALLOID ROOT OF CYCAS AND BLUE GREEN ALGAE]

4.1.5 Association between roots of Pinus and ectotrophic mycorrhiza :

The mycelium of mycorrhiza is found attached to roots of Pinus helping the plant in absorption of water. The mycorrhiza in turn gets food. In ectotrophic mycorrhiza, the fungal hyphae are the natural substitutes of root hairs.

Ectotrophic mycorrhizae are also very common in nature on Oaks, Hickories and Beech. While endotrophic mycorrhizae occur in roots of Red Maple and tissues of many Orchids.



(FIG. 4.1.5 PINUS ROOT COVERED WITH ECTOTROPHIC MYCORRHIZAE)

4.1.6 Association between termite and flagellate protozoans (Association between animals) :

The termites feed on wood and the protozoans (Trichonympha) live inside the guts of termites; the protozoans secrete digestive enzymes and help to digest cellulose of wood. In turn they get food and shelter from termite. **Trichonympha lives in the gut of termites and helps termite digest cellulose in wood.**

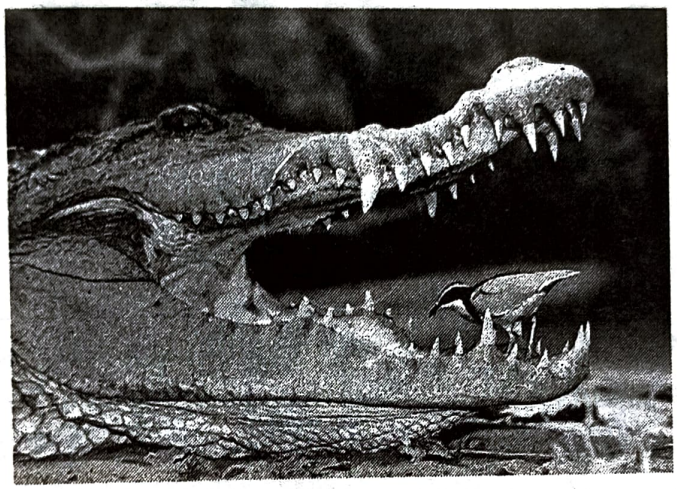
[FIG. 4.1.6 ASSOCIATION BETWEEN TERMITE AND FLAGELLATE PROTOZOANS]

(2) Facultative mutualism :

Here the relationship is optional and both partners are not in continuous contact with each other always. Some of the examples are described below :

4.1.7 Association between crocodile bird and crocodile :

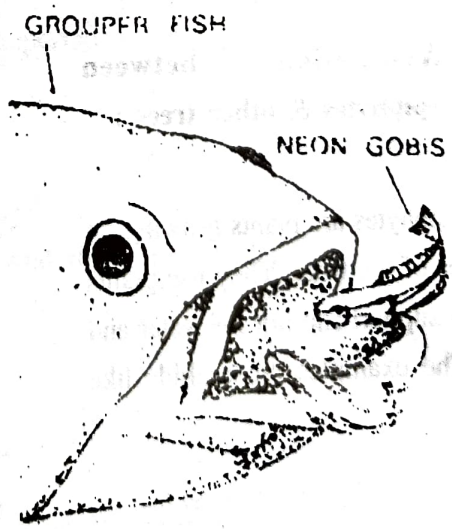
Here, the crocodile bird enters the mouth of crocodile and picks up leaches found between the teeth and feed on them. Thus, birds clean the teeth and crocodile is benefited the bird gets its nutritional requirement. This is also called cleaning symbiosis.



[FIG. 4.1.7 ASSOCIATION BETWEEN CROCODILE AND BIRD]

4.1.8 Relationship between neon gobis and the larger grouper fish :

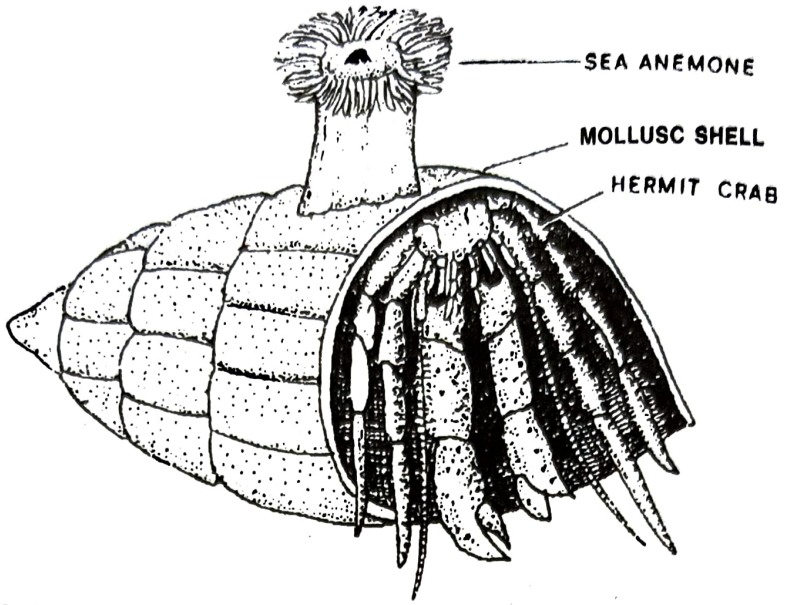
Here, the neon gobis, which is a small fish, cleans the mouth of larger grouper fish. In this process the neon gobis gets food particles. It is called cleaning symbiosis.



[FIG. 4.1.8 ASSOCIATION BETWEEN NEON GOBIS AND THE GROUPER FISH]

4.1.9 Association between sea anemone and hermit crab :

The sea anemone attaches to the empty gastropod shell in which lives hermit crab. In these relations, the sea anemone gets free transportation from one place to another. The crab in turn gets protection from its enemies which afraid to come near to crab due to powerful stinging cells (nematocysts) of sea anemone.



[FIG. 4.1.9 ASSOCIATION BETWEEN HERMIT CRAB AND SEA ANEMONE]

[B] Commensalism :

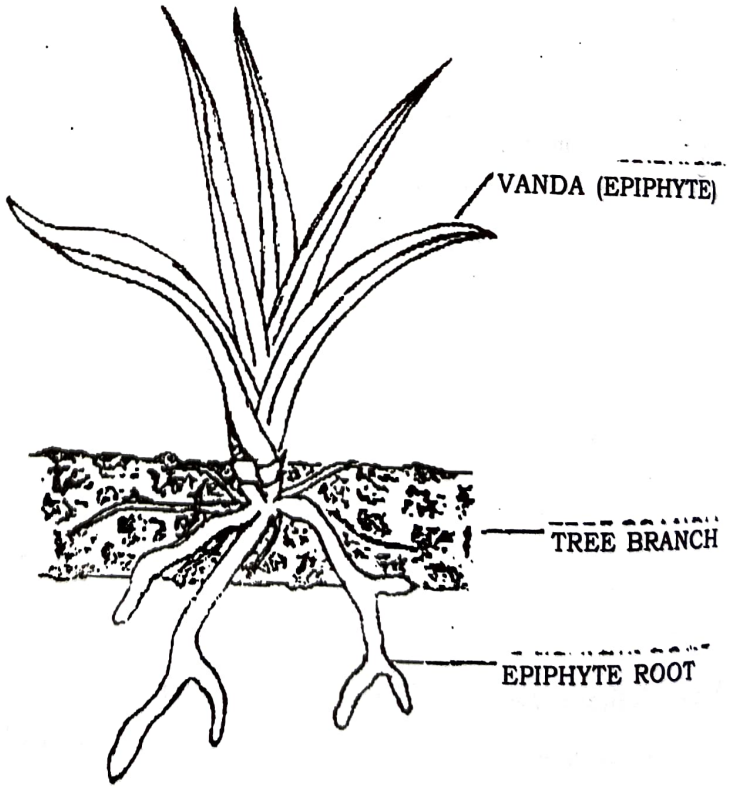
In this inter-specific relationship one of the partner is benefited and other partner is neither benefited nor harmed. Here, the partner getting the benefit is called commensal. There are two types of commensalisms.

1. Ectocommensalism :

Here, the commensal lives on the body of the other partner, which may be called host. Some of the examples are described below :

4.1.10 Association between epiphytes & other trees :

Epiphytes are plants growing on branches of the trees. They use plants only for support and not for water and food. The examples are orchids like Vanda.



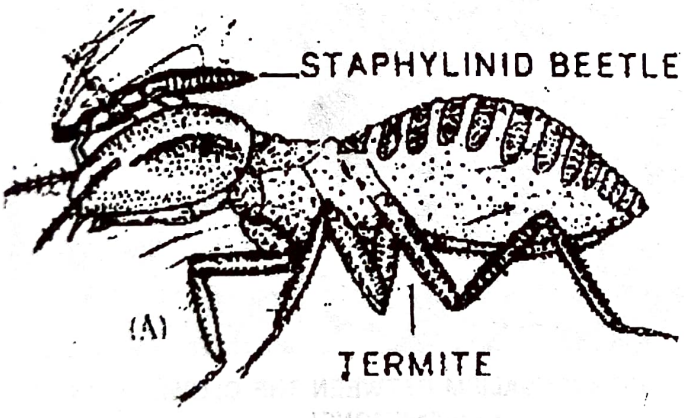
[FIG. 4.1.10 EPIPHYTE VANDA ON A TREEN BRANCH]

1 Epiphytes on animals :

Some green algae grow on the large ved hairs of sloth. This alga becomes e abundant to give green colour to nal.

[FIG. 4.1.11 AN ANIMAL BODY GREEN ALGAE GROWING]

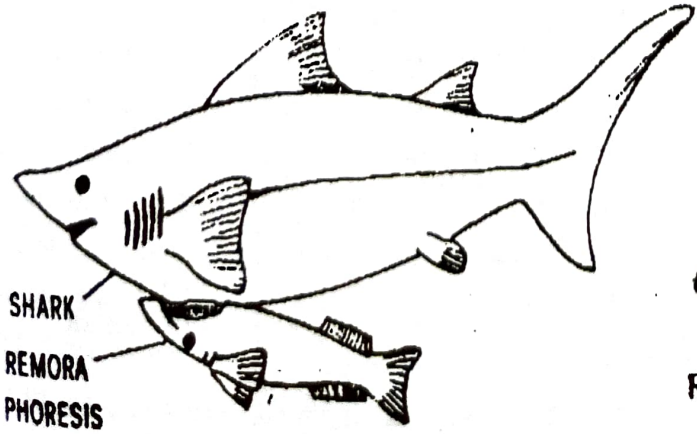
12 Association between staphylinid beetle and termites :



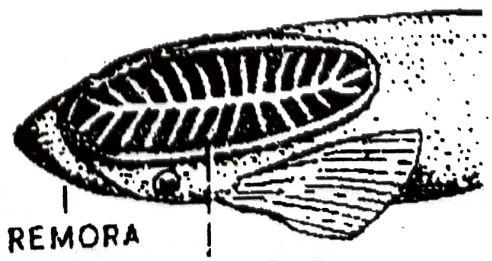
The staphylinid beetle lives in the termite colony as scavenger. The beetle is seen even riding on the head of termite. The beetle gets living space, food & transportation.

[FIG. 4.1.12 COMMENSALISM FOR FOOD-TEMITE AND STAPHYLINID BEETLE

1.13 Association between suckerfish (or Remora or Echeneis) and shark :



COMMENSALISM



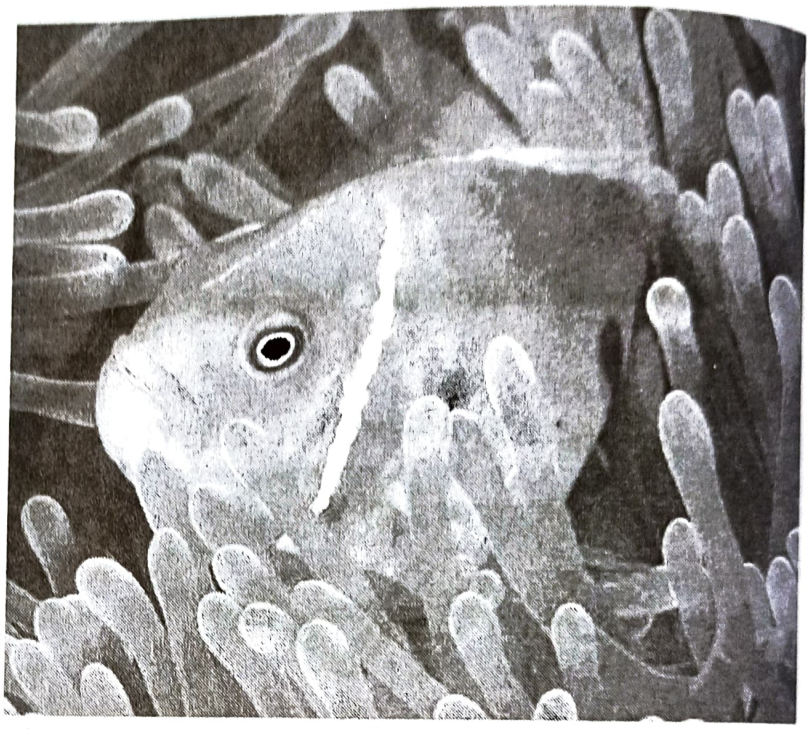
ADHESIVE DISC (SUCKER)

[FIG. 4.1.13 (a) COMMENSALISM FOR TRANSPORT] [FIG. 4.1.13 (b) ADHESIVE DISC (OR SUCKER MAGNIFIED]

The sucker fish (or Remora) has the dorsal fin modified as a sucker (or adhesive) disc with the he of which it is attached to the body of shark so that suckerfish gets free transportation. The attachment not permanent. The sucker fish releases the attachment after some time and swims in search of food. T situation in which a small organism gets free transport is called **phoresis.**

4.1.14 Association between clown fish and sea anemone :

The clownfish lives among the tentacles of sea anemone and protected from enemies by powerful stinging cells present on tentacles.



[FIG. 4.1.14 COMMENSALISM BETWEEN THE CLOWN FISH AND SEA-ANEMONE]

2. Endo Commensalism :

4.1.15 Association between Tropical fish and sea cucumber :

[FIG. 4.1.15 ASSOCIATION BETWEEN SEA CUCUMBER AND TROPION FISH]

Here the commensal lives within the body of host. E.g. the tropical marine fish Fierasfer lives inside the cloacal chamber of holothurians (or sea cucumbers) where the fish gets protection from enemies. The fish comes out of the cloacal chamber occasionally for feeding. After feeding, when fish wants to reenter cloacal chamber, it touches the opening of the cloaca with its snout. Immediately afterwards, the fish changes its position and brings the tail to cloacal chamber where it will be drawn inside with tail region being taken in first.

4.1.16 Association between saprophytic bacteria and fungi :

A variety of microorganisms, saprophytic bacteria and fungi and protozoans live within the tissues or cavities of higher plants and animals. Many microorganisms like bacteria live as commensals in the digestive system of various animals. The microorganisms use undigested food for their nutritional requirements. E. coli lives in the intestine of humans.

[FIG. 4.1.16 ASSOCIATION BETWEEN BACTERIA AND FUNGI]

[C] Protocooperation :

Protocooperation is a form of mutualism, but the cooperating species do not depend on each other for survival. An example of protocooperation happens between soil bacteria or fungi and the plants that occur growing in the soil. None of the species rely on the relationship for survival, but all of the fungi, bacteria and higher plants take part in shaping soil composition and fertility. Soil bacteria and fungi interrelate with each other, forming nutrients essential to the plants survival. The plants obtain nutrients from root nodules and decomposing organic substance. Plants benefit by getting essential mineral nutrients and carbon dioxide. The plants do not need these mineral nutrients but do help the plant grow even further.

4.1.17 Ants and aphids :

An example of protocooperation is the connection between ants and aphids. The ant searches for food on trees and shrubs that are hosts to honeydew-secreting species such as aphids, mealybugs and

some scales. The ant gathers the sugary substance and takes it to its nest as food for its offspring. It h been known for the ant to stimulate the aphid to secrete honeydew straight into its mouth. Some a species even look after the honey dew producers from natural predators. In areas where the ant inhab the same ecosystem as the aphid, the plants they inhabit normally suffer from a higher presence of aphi which is detrimental to the plant but not to the two species protocooperating.

4.1.18 Flowers and insects :

The flowers of plants that are pollinated by insects and birds benefit from protocooperation. Th plants, particularly those with large bright colourful flowers bearing nectar glands, experience cro pollination because of the insects activities. This is beneficial to the insect that has got the food supply pollen and nectar required for its survival.

4.1.19 Birds :

Protocooperation can occur in birds. The Egyptian plover removes insect pests from the backs buffalo, antelope, giraffes and rhinos. The cattle egret in America as well does the same task of removin the unwanted insects and parasites.

4.1.20 Fish :

Certain fish perform the task of cleaning other fish, by removing ectoparasites, cleaning wounde flesh and getting rid of dead flesh. Even predatory fish rely on cleansing symbionts and adopt a placi state while they are cleansed. The fish that do the cleansing are often concentrated around specific site where the other fish come to be cleansed. These are known as cleansing stations.

4.2 NEGATIVE INTERACTION :

These interactions include association where one or both individuals are harmed. The harm may be caused by eating other organism, competition for food, excretion of harmful wastes, etc., Where members of one population may eat members of the other population, compete for food, excrete harmful wastes, or otherwise interfere with the other population. These have been sub-divided into (1) Exploitation, (2) Competition and (3) Antibiosis . The various relationship in respect of food may belong to;

[A] Exploitation :

In exploitative interactions, one species is benefited at the expense of another. Predation is an interaction between organisms in which one organism captures biomass from another. It is often used as a synonym for carnivory but in its widest definition includes all forms of one organism eating another, regardless of trophic level (e.g., herbivory), closeness of association (e.g., parasitism and parasitoidism) and harm done to prey (e.g., grazing). Intraguild predation occurs when an organism preys upon another of different species but at the same trophic level (e.g., coyotes kill and ingest gray foxes in southern California). Batesian mimicry is also an exploitative interaction, where one species has evolved to mimic another, to the advantage of the copying species but to the detriment of the species being mimicked.

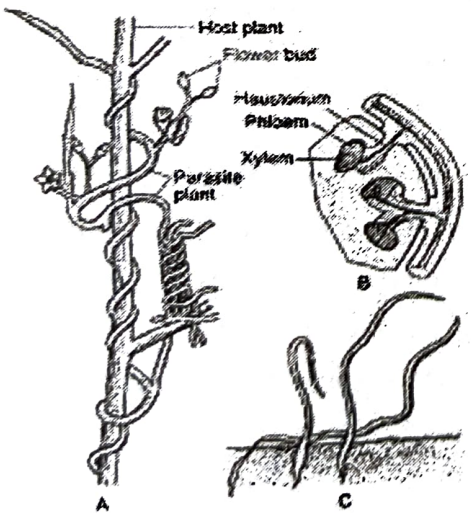
1. Parasitism :

This is an interaction between two organisms in which one (called parasite) derives synthesized food from another living organism (called host). A true parasite though obtains its food from the host, seldom kills it.

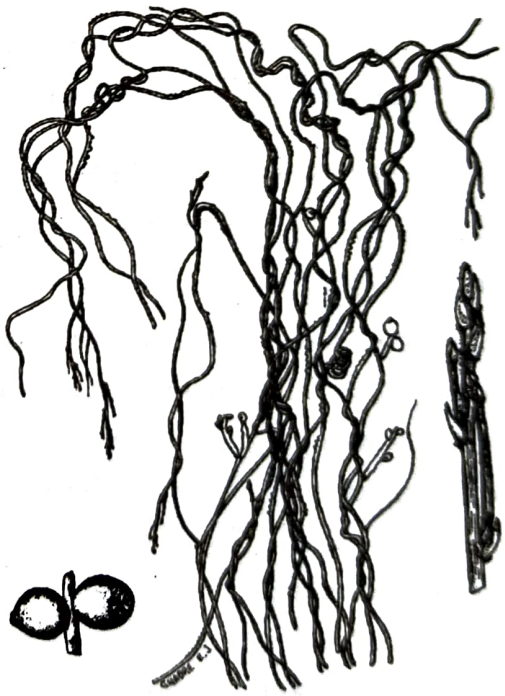
Large number of organisms-both plants and animals exist as parasites. Besides vascular plants, lower organisms- protozoans, invertibrates and micro organisms like mycoplasmas, viruses, bacteria, rickettsiaes, fungi, etc., are common as parasites.

Some of the parasites could be called total parasites if they obtain all requirements such as water, minerals, food, etc., from the host. These do not possess chlorophyll and therefore, are not green in colour. These are parasites called partial parasites which synthesize their own food but obtain water and minerals from the host plant. A few examples are given below.

- Total stem parasite-**Cuscuta** (dodder) (Fig. 4.2.1)
- Partial stem parasite-**Viscum (mistletoe)**, Loranthus, Cassytha, etc. Fig. 4.2.2.

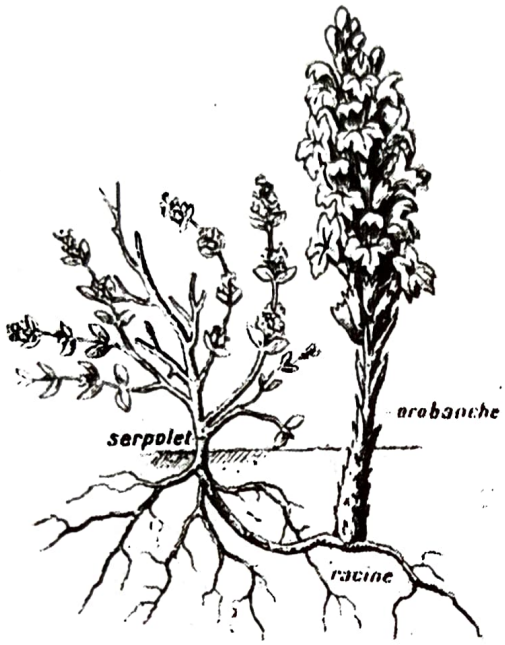


[FIG. 4.2.1 CUSCUTA, TOTAL STEM PARASITE]



[FIG. 4.2.2 LORANTHUS, PARTIAL STEM PARASITE]

- Total root parasite-Rafflesia (stinking corpse lily), **Orobanche**, Balanophora, etc. Fig. 4.2.3
- Partial root parastie - Santalum album (sandalwood), **Striga**, etc. Fig. 4.2.4



[FIG. 4.2.3 TOTAL ROOT PARASTIE]

[FIG. 4.2.4 PARTIAL ROOT PARASTIE]

Among the animals, ticks, mites and lice are external parasites or ectoparasites. The malarial parasite, microfilaria, tapeworm, guineaworm, roundworm etc., are internal parasites or endoparasites.

Bacteria such as Corynebacterium diphthariae (diphtheria), Mycobacterium leprae (leprosy), Vibric comma (cholera), etc., are mostly parasites and cause serious diseases.

The fungal parasites include Erysiphe (powdery mildew), Ustilago (smut), Puccinia (rust), etc. These cause diseases which result in serious losses of economically important crops.

2. Predation :

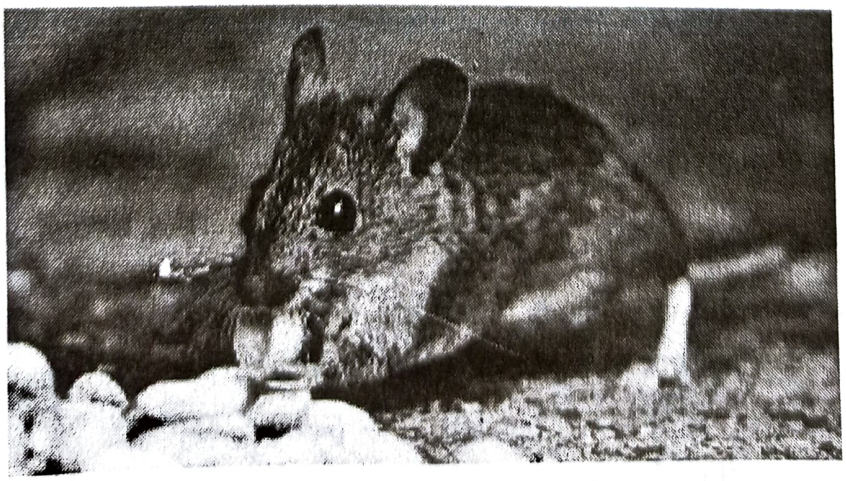
In contrast with a parasite which derives nourishment from its host without killing, a predator is free living which catches and kills another species for food or predator is a direct food relationship between two individuals in which an animal that remains free living (called predator) catches and kills another animal (called prey) for food. Most of the predatory organisms are animals, but there are some plants (Carnivores) also, especially fungi which feed upon other animals. Tiger (predator) eating deer (prey), frog eating insects, owl eating rates, etc., are examples of predation. Insectivorous plants also show direct food relation. Drosera, Nepenthes, Utricularia, etc., are insectivorous plants which eat insects to overcome nitrogen deficiency in the soil. The following are some of the common examples of predation.

(i) **Browsing and grazing :** Herbivores kill the plants and use unharvested herbs, shrubs or even trees as their food and sometimes pose much problems of management of natural and artificial vegetations. Different plants receive varying degrees of harmness as a result of browsing and grazing. Many insects and ruminants browse lightly over the vegetation. Cattle, camels, goats etc. frequently browse the tender shoots of shrubs and trees and sheep graze the grasses.

Generally annuals suffer more due to grazing than the perennials, shrubs are damaged less than herbs. Grazing and browsing may bring about marked changes in vegetation. Grazing in shrubby vegetation generally increases the number and sizes of the shrubs by removing the competitive grasses. Fig. 4.2.5

[FIG. 4.2.5 BROWSING AND GRAZING]

(ii) **Seeds and seedling destruction :** Animal such as insects, squirrels, mice, rodents etc. consume much quantities of seeds as food. Moreover, they browse seedlings of shrubs and trees and damage most of them by trampling. Fig. 4.2.6



[FIG. 4.2.6 SEEDS AND SEEDLING DESTRUCTION]

(iii) **Plants as food :** Aquatic plants are frequently eaten by animals like ducks, fish, muskats etc. and they really create problems of management of these water bodies. Aquatic filter feeders destroy the diatoms, flagellates and other algae. Fig. 4.2.7

[FIG. 4.2.7 PLANTS AS FOOD]

(iv) **Carnivorous plants :** A number of plants as **Nepenthes** Darlingtonia, Sarracenia, Drosera, Utricularia, Dionaea consume insects and other small animals for their food. They are also known as insectivorous plants. They are adapted in remarkable ways to attract, catch and digest their victims. Their leaves or foliar appendages produce proteolytic enzymes for digestion of the insects. The carnivorous habit in plants is said to be an incidental feature of their nutrition, since none of them is dependent upon its animal prey for nitrogenous compounds. Fig. 4.2.8

[FIG. 4.2.8 DROSERA CARNIVOROUS PLANTS]

[B] Competition :

Competition is an interaction between organisms or species in which both the organisms or species are harmed. Limited supply of at least one resource (such as food. water and territory) used by both can be a factor. Competition both within and between species is an important topic in ecology, especially

community ecology. Competition is one of many interacting biotic and abiotic factors that affect community structure. Competition among members of the same species is known as intraspecific competition, while competition between individuals of different species is known as interspecific competition. Competition is not always straightforward and can occur in both a direct and indirect fashion.

According to the competitive exclusion principle, species less suited to compete for resources should either adapt or die out, although competitive exclusion is rarely found in natural ecosystems. According to evolutionary theory, this competition within and between species for resources is important in natural selection. However, competition may play less of a role than expansion among larger clades, this is termed the 'Room to Roam' hypothesis.

1. By mechanism :

Competition occurs by various mechanisms, which can generally be divided into direct and indirect. These apply equally to intraspecific and interspecific competition. Biologists typically recognize two types of competition : interference and exploitative competition. During interference competition, organisms interact directly by fighting for scarce resources. For example, large aphids defend feeding sites on cottonwood leaves by ejecting smaller aphids from better sites. In contrast, during exploitative competition, organisms interact indirectly by consuming scarce resources. For example, plants consume nitrogen by absorbing it into their roots, making nitrogen unavailable to nearby plants. Plants that produce many roots typically reduce soil nitrogen to very low levels eventually killing neighboring plants.

Male-male competition in red deer during rut is an example of interference competition within a species.

[FIG. 4.2.9 INTERFERENCE COMPETITION WITHIN SPECIES]

(i) Interference :

Interference competition occurs directly between individuals via agression etc. when the individuals interfere with foraging, survival, reproduction of others, or by directly preventing their physical establishment in a portion of the habitat. An example of this can be seen between the ant Novomessor cockerelli and red barvester ants, where the former interferes with the ability of the latter to forage by plugging the entrances to their colonies with small rocks. (Fig. 4.2.9)

(ii) Exploitative :

Exploitation competition occurs indirectly through a common limiting resource which acts as an intermediate. For example, use of resources depletes the amount available to others, or they compete for space.

(iii) Apparent :

Apparent competition occurs indirectly between two species which are both preyed upon by the same predator. For example, species A and species B are both prey of predator C. The increase of species A may cause the decrease of species B, because the increase of A may aid in the survival of predator C, which will increase the number of predator C, which in turn will hunt more of species B.

2. By size asymmetry :

Competition varies from complete symmetric (all individuals receive the same amount of resources, irrespective of their size) to perfectly size symmetric (all individuals exploit the same amount of resource per unit biomass) to absolutely size-asymmetric (the largest individuals exploit all the available resource). The degree of size asymmetry has major effects on the structure and diversity of ecological communities, e.g. in plant communities size-asymmetric competition for light has stronger effects on diversity compared with competition for soil resources.

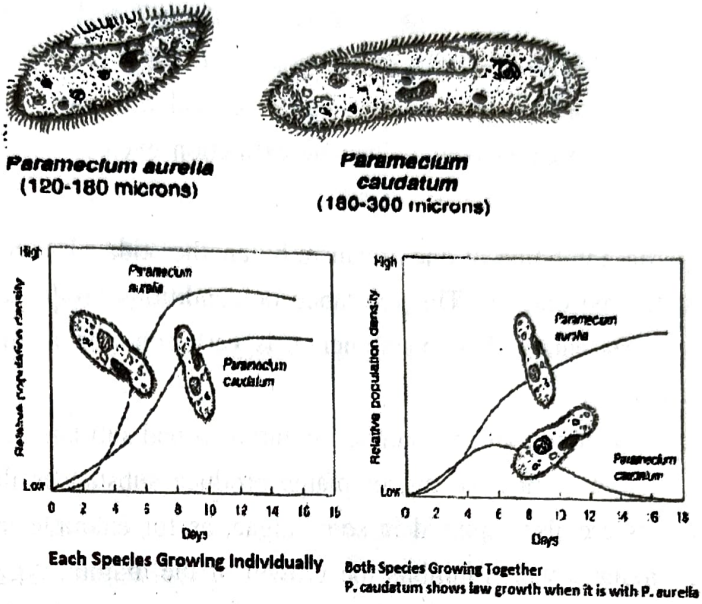
3. By taxonomic relationship :

Competition can occur between individuals of the same species, called intraspecific competition, or between different species, called interspecific competition. Studies show that intraspecific competition can regulate population dynamics (changes in population size over time). This occurs because individuals become crowded as population grows. Since individuals within a population require the same resources, crowding causes resources to become more limited. Some individuals (typically small juveniles) eventually do not acquire enough resources and die or do not reproduce. This reduces population size and slows population growth.

Species also interact with other species that require the same resources. Consequently, interspecific competition can alter the sizes of many species' populations at the same time. Experiments demonstrate that when species compete for a limited resource, one species eventually drives the populations of other species extinct. These experiments suggest that competing species cannot coexist (they cannot live together in the same area) because the best competitor will exclude all other competing species.

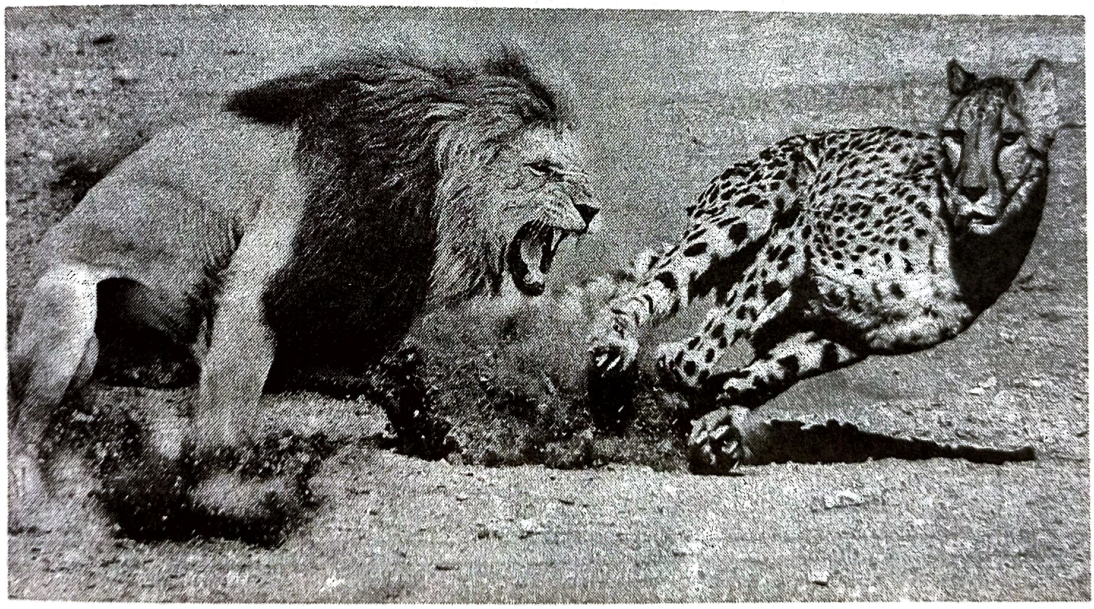
(i) Intraspecific :

Intraspecific competition occurs when members of the same species compete for the same resources in an ecosystem. An example among protozoa involves paramecium aurelia and Paramecium caudatum. **(Fig. 4.2.10)** Russian ecologist, Georgy Gause, studied the competition between the two species of Paramecium that occurred as a result of their coexistence. Through his studies, Gause proposed the Competitive exclusion principle, observing the competition that occurred when their different ecological niches overlapped.



[FIG. 4.2.10 INTERSPECIFIC COMPETITION]

(ii) Interspecific :



[FIG. 4.2.11 INTERSPECIFIC COMPETITION]

Interspecific competition may occur when individuals of two separate species share a limiting resource in the same area. If the resource cannot support both populations, then lowered fecundity, growth, or survival may result in at least one species. Interspecific competition has the potential to alter populations, communities and the evolution of interacting species. An example among animals could be the case of cheetahs and lions; **(Fig. 4.2.11)** since both species feed on similar prey, they are negatively impacted by the presence of the other because they will have less food, however they still persist together, despite the prediction that under competition one will displace the other. In fact, lions sometimes steal prey items killed by cheetahs. Potential competitors can also kill each other, in so-called 'intraguild predation'. For example, in southern California coyotes often kill and eat gray foxes and bobcats, all three carnivores sharing the same stable prey (small mammals).

Competition has been observed between individuals, populations and species, but there is little evidence that competition has been the driving force in the evolution of large groups. For example, mammals lived beside reptiles for many millions of years of time but were unable to gain a competitive edge until dinosaurs were the devastated by the Cretaceous-Paleogene extinction event.

[C] Antibiosis :

This is a complete or partial inhibition of one organism by another either by secreting some substance or by modifying its immediate environment. The substance or conditions produced by an organism are generally harmful for the other organism. This phenomenon is very common in micro-organisms which secrete a substance called antibiotic.

Bacteria, actinomycetes and fungi produce a number of antimicrobial substances which are widespread in nature. Lichens as well as large number of higher plants produce substances that inhibit molds and bacteria. Antagonistic substances are also reported in some algae, as for example in culture of Chlorella vulgaris, some substance accumulates which inhibits the growth of the diatom, Nitzschia frustulum. The term antibiosis would also include such phenomena as hypersensitive reactions that involve the interaction between microorganisms, particularly pathogenic ones and are harmful to one or both.

	POSITIVE INTERACTION
Mutualism	• Both the species derive benefit. Association more or less obligatory, essential for survival of both. • e.g. pollination, Fruit and seed dissemination, Lichens, Symbiotic nirogenfixers, Mycorrnizae Zoochlorellae etc.
Commensalisms	• Only one species benefited, neither is harmed. • e.g. Lianas, Epiphytes and epizoans, Bamacles attached to wiales, Hydroids on fish, Crab in the mantle cavity of oyster, Rhizosphere and Phyllosphere micro-organisms.
Proto co-operation	• Both are benefited but is is not obligatory.

	NEGATIVE INTERACTION
Parasitism	• Food derived from the host with or without causing its death.
Predation	• Food-derived by killing the host. • e.g. Browsing, Grazing, Seedling destruction, Plants as food, Carnivorous plants.
Competition	• Competition occurs when many organisms struggles for same limited resources.
Antibiosis	• One species produces a poisonous substance or a change in environmental conditions immical to another species, none derives benefit.

: MULTIPLE CHOICE QUESTIONS :

Q. 1 MCQs :

. Relation between sea anemone & crab is known as .....

(a) commen salism (b) competition (c) predation (d) Antibiosis

. ..... is a ppositive interaction.

(a) predation (b) parasitism (c) mutualism (d) all of the above

. Which one of the following is an insectivorous plant ?

(a) monotropa (b) droseru (c) viscum (d) santalum

. Tapeworm is an example of .....

(a) predator (b) parasite (c) phytoplankton (d) all of the above

. Lichen is a ..... biotic interaction

(a) positive (b) negative (c) neutral (d) non of these

. The term referring to the complete or partial inhibition or death of organism by another & through the production of some harmful substance as aresult of metabdic pathway is known as .....

(a) antibiosis (b) predation (c) mutalism (d) commensalism

. In which type of interspecific interactions both species are benefited?

(a) commensalism (b) competition (c) mutualism (d) predation

. Interspecific relation between Rhizobium and leguminous plant is the example of

(a) mutualim (b) commensalism (c) competition (d) parasitism

. Lichen is a combination of

(a) algae and fungi (b) Algae and protozoa

(c) Fungi and chlorella (d) None

0. Mycorrhiza is à ..... interaction

(a) negative (b) Positive (c) competitive (d) None

: SHORT QUESTIONS :

Q. 2 Short question :

1. What is symbiosis ?
2. Write about parasitism ?
3. Explain antibiosis.
4. Differentiate between total & partial parasites.
5. Define symbiosis, give example
6. What is negative interaction ?
7. Give an example of antibiosis

8. What are lianas ?
9. What is mutualism?
10. What is commensalism?
11. What is predation?
12. Define antibiosis.
13. Define mutualism.
14. Define commensalism.
15. Define exploitation.
16. Define competition.
17. Define Predation.
18. Give examples of ectparasites and endo parasites.
19. State the kinds of symbiotic relationships.

: LONG QUESTIONS :

Q. 3. Long questions :

1. What is parasitism ? explain with a suitable example.
2. Write a note on coomensalism
3. Discuss predation as a negative interaction ?
4. Write a note on mutualism.
5. Write a note on mycorrhizae
6. What is positive interaction ? write about mutualism with suitable example in detail.
7. Write a note on lianas.
8. Differentiate between commensalism and mutualism
9. Write a note on endocommensalism.
10. What is parasitism?Explain different types of parasitism.
11. Write short note on ectoparasite.
12. Write short note on endoparasite.
13. Describe environmental interrelationships of organisms.
14. Write short notes on parasitic plants.

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