

ATOMIC ENERGY CENTRAL SCHOOL, INDORE



NEERAJ KUMAR BAMANIA

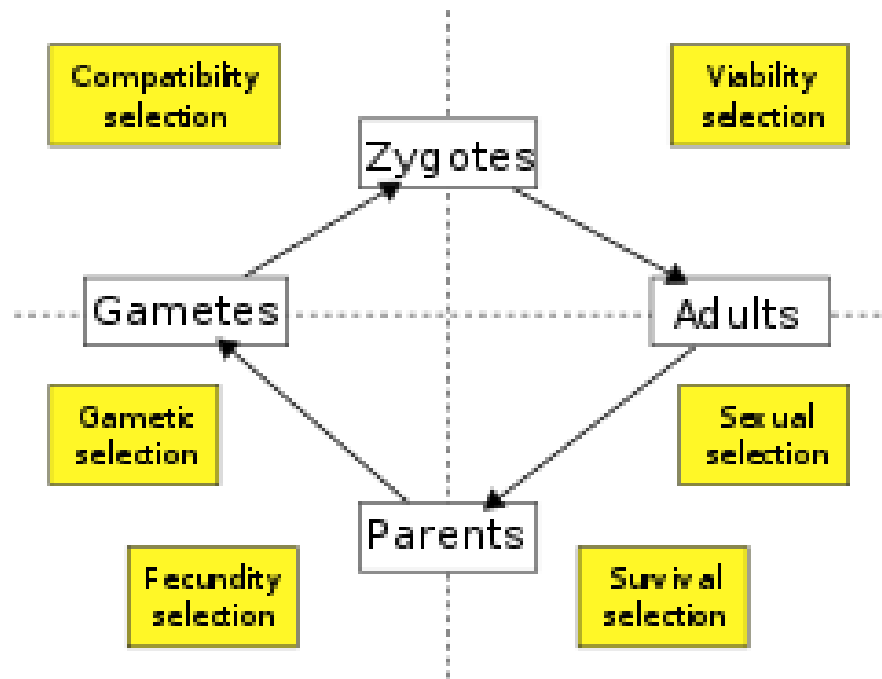
PGT(SS) - BIOLOGY
ATOMIC ENERGY
CENTRAL SCHOOL,
INDORE

MODULE 3/3

CLASS XII
BIOLOGY

Chapter 13
Organisms and
Populations

13.2.3. *Life History Variation*



- Populations evolve to maximize their reproductive fitness, also called Darwinian fitness (high r value), in the habitat in which they live. Under a particular set of selection pressures, organisms evolve towards the most efficient reproductive strategy.
- Some organisms breed only once in their lifetime (Pacific salmon fish, bamboo) while others breed many times during their lifetime (most birds and mammals). Some produce a large number of small-sized offspring (Oysters, pelagic fishes) while others produce a small number of large-sized offspring (birds, mammals).
-

13.2.4. Population Interactions

Members of biotic community depends upon one another for food, reproduction, dispersal & production, the phenomenon is called **species interdependence interaction**.

Types of interactions that occur amongst different members of biotic community are—positive and negative.

Two-species Population Interactions (E.P. Odum, 1983)

	Type of Interaction	Species		General nature of interaction
		1	2	
	1. Neutralism	0	0	Neither population affects the other
"Negative interactions", types 2 through 4	2. Competition: direct interference type	-	-	Direct inhibition when common resources are in short supply
	3. Competition: resource use type	-	-	Indirect inhibition when common resource is in short supply
	4. Amensalism	-	0	Population 1 inhibited, 2 not affected
Both "positive interactions" and "negative interactions", types 5 and 6	5. Parasitism	+	-	Population 1, the parasite generally smaller than 2, the host
	6. Predation (including herbivory)	+	-	Population 1, the predator, generally larger than 2, the prey
"Positive interactions", types 7 through 9	7. Commensalism	+	0	Population 1, the commensal, benefits, while 2, the host is not affected
	8. Protocooperation	+	+	Interaction favorable to both but not obligatory
	9. Mutualism	+	+	Interaction favorable to both and obligatory

Legend:

0 indicates no significant interaction;

+ indicates growth, survival or other population attribute benefited (positive term added to growth equation)

- indicates population growth or other attribute inhibited (negative term added to growth equation)

13.2.4. *Population Interactions*

POSITIVE OR BENEFICIAL INTERACTION

1. Mutualism (+/+) or Symbiosis : (coevolution) :

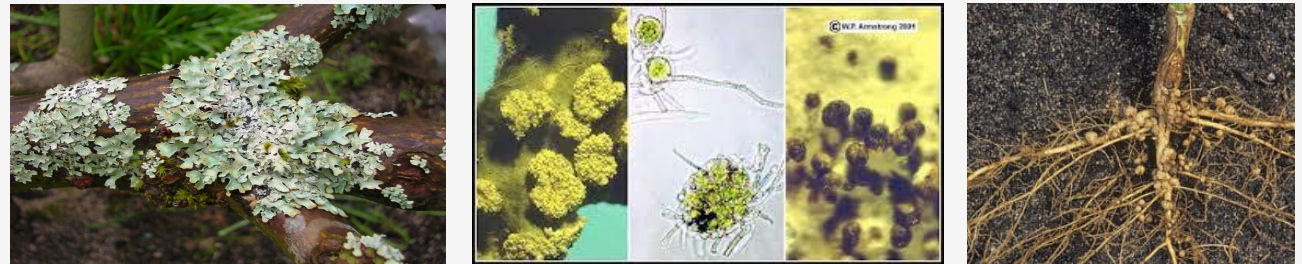


Neeraj Bamania

It is a positive interspecific interaction in which members of two different species completely depend on each other for growth and survival.

Physical contact is present in between both the interacting species.

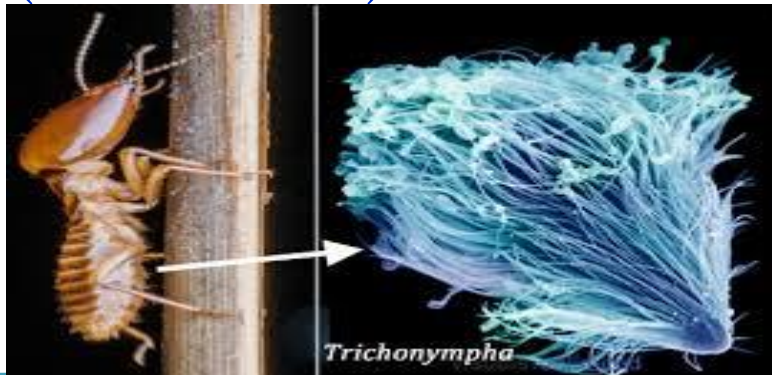
It is an obligatory relationship.



13.2.4. Population Interactions

POSITIVE OR BENEFICIAL INTERACTION

1. Mutualism (+/+) or Symbiosis : (coevolution) :



Neeraj Bamania

Examples –

Mutualism between animal and animal-

E.g., Termites and aflagellates (Trichonympha)

Mutualism between plant and animals

E.g., (a) Zoo chlorella and Hydra. (b) Yucca plant flowers and Pronuba insects -
Pollination of Yucca plant by pronuba (Female yucca moth)

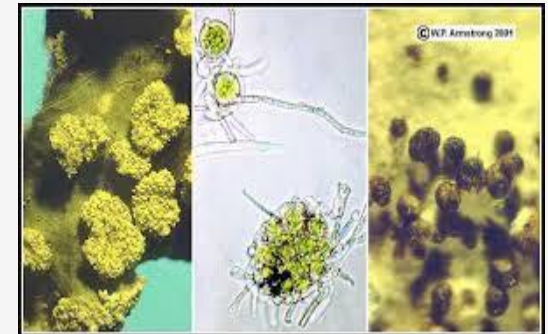


Mutualism between plant and bacteria

E.g., legume plant and Rhizobium.

Mutualism between algae and higher plant

E.g., Nostoc, Anabaena and Anthoceros plant.



Mutualism between algae and fungi

E.g., Lichens.

Mutualism between fungi and higher plants

E.g., Mycorrhizal association.



13.2.4. *Population Interactions*

POSITIVE OR BENEFICIAL INTERACTION

2. Commensalism (+ / 0)



Neeraj Bamania

It is an association between members of two species in which one is benefited while the other is almost unaffected.

Lianas : Lianas are woody plants. Their roots are present in soil but their stem uses other plants or objects for support to get better light. They are found in dense forest. No nutritional relationship is present. Lianas are the speciality of tropical rainforest.

E.g., Bauhinia, Tinospora

Epiphytes : Those small plants which grow on other plants in tropical rainforest. They utilize the only the space of host plant for light and humidity.

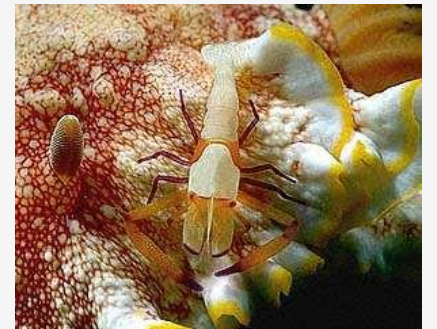
E.g., Orchids, hanging mosses.

Epizones : Those animals which depend on plants or other animals.

E.g. Sucker fish (Echeneis) – Shark

Pilot fish – Shark E. coli bacteria – Intestine of man

Clown fish – Sea anemone



13.2.4. *Population Interactions*

POSITIVE OR BENEFICIAL INTERACTION

3. Proto-cooperation (+/+)



It is an association in which both the organisms are benefited but can live separately.

It is a facultative or optional or occasional association. It is also called as non-obligatory relationship.

Examples –

Hermit crab – Sea anemone

Tick bird (Red-billed or yellow billed) – Rhinoceros

Crocodile – Bird

Plants with both self and cross fertilization.

13.2.4. *Population Interactions*

**NEGATIVE INTERACTION
(ANTAGONISM)/DETRIMENTAL**

1. Parasitism (+/-) :



Neeraj Bamania

This association involves individuals of two species of different sizes in which the smaller (parasite) is benefitted and the larger (host) is harmed. The parasite gets nourishment and shelter from host but does not kill the host.

Types of parasite :

Ectoparasite : Lives on the body of the host. E.g.,–

- **Ectozooparasite** : leech on cattle, ticks on dogs, sandfly on man.
- **Ectophytoparasite** : aphids, lac insects, red cotton bug

Endoparasites : Live in the body of the host. E.g., Tapeworm, Taenia, Ascaris, Entamoeba → Live in intestine of man.

Plasmodium → Lives in R.B.C. of human.

13.2.4. *Population Interactions*

**NEGATIVE INTERACTION
(ANTAGONISM)/DETRIMENTAL**

2. Predation (+/-) :



Neeraj Barmania

A free living organism which catches and kills another species for food.

E.g.,

Insectivores fungi : *Dactylella*, *Dactylaria*,
Arthrobotrys

Carnivores animals : Lion, snake

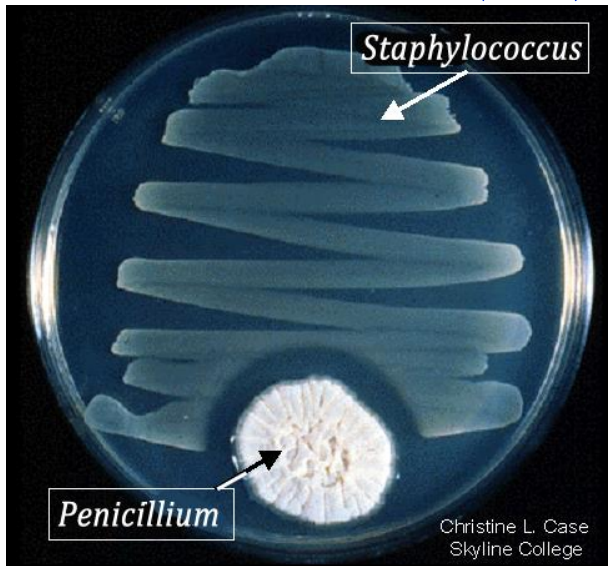
Insectivores plants : *Drosera*, *Utricularia*,
Nepenthes



13.2.4. *Population Interactions*

**NEGATIVE INTERACTION
(ANTAGONISM)/DETRIMENTAL**

3. Amensalism (-/0)



- **In this interaction, one species is inhibited by the toxic secretion of another species. Inhibitor species is neither benefited nor harmed.**

Type of amensalism are antibiosis and allelopathy.

Antibiosis – secretion of antibiotics.

E.g., Penicillium fungi secretes penicillin which inhibits the growth of Staphylococcus bacteria.

Chlorella algae secretes bacteriocytins which not only kill but also inhibit growth of the bacteria.

Allelopathy is the secretion of toxic chemicals and the plant is always harmed in this case.

E.g., Parthenium : Trans Cinnamic acid is secreted by Parthenium which inhibits the growth of some plants like Cassia tora and Vincetoxicum. This phenomenon is known as allelopathy.

13.2.4. *Population Interactions*

**NEGATIVE INTERACTION
(ANTAGONISM)/DETRIMENTAL**

4. Competition



Neeraj Bamania

- **Interaction between two species, where both suffer adverse effects is known as competition.**
- It is of 2 types – interspecific and intraspecific.
- **Interspecific competition : occurs between two individuals of two different species occurring in the same habitat.**
- **Intraspecific competition : occurs between individuals of the same species for mating, food etc.**



*THANK
YOU*

Neeraj Bamania

