# ANIMAL ASSOCIATIONS

**SYMBIOSIS:**

- De Bary coined the term symbiosis.
- The main reason for biological relationships is metabolism, food and shelter
- Mutualism, commensalism and parasitism together called symbiosis
- Symbiosis means living together in close and prolonged association of two or more organisms of different species with or without mutual benefit or harm.

Animal associations are of 4 types **Phoresis, mutualism, commensalism**, and **parasitism**

**Phoresis:**

- Phoresis means to carry. In this type of relationship the smaller one is called phorantn which is mechanically carried on the phorant and the other larger one is called host
- In phoresis metabolic interaction or dependency is absent

**Mutualism:**

- A close association between two different organisms, in which each one derives benefit from the other is known as **mutualism.**
- In mutualism the relationship between the two partners is more intimate.
- The mutualistic symbionts are incapable of living independently.
- **Zootermopsis** (a genus of termites or white ants) and **Trichomonas termopsidis** (a
- flagellate protist) is an example for mutualism).
- Termite feeds on cellulose containing materials but it is unable to digest cellulose. Trichonympha lives in the intestine of termites secrete cellulase enzyme that converts cellulose into glucose.
- A green alga called Zoochlorella leads mutualistic life in the musculo-nutritive cells of chlorohydra. (Chlorohydro viridissima)
- Chlorohydra provides the algae with shelter protection, $C0_2$ and nutrients. Algae provide the products of photosynthesis i.e. $0_2$ and starch. They can live cheamotropically during nights.

**Commensalism:**

- The association between two different species of organisms where one is benefited and another one neither benefited nor harmed is **commensalism.**
- The organism which give shelter in commensalism is known as the host and that receive shelter is known as 'commensal'.
- Commensalism is not a very intimate association. In this the organisms come together whenever necessary.
- Hydractinia echinata (a colonial coelenaterate) and pagurus bernhardus chermit crab) association is an example for ecto commensalism.
- 'Escherichia coli' (bacteria) lives as endocommensal in the intestine of Man. It receives nourishment and completes its life cycle with out doing harm to man.

**Parasitism:**

- An organism which depends on other organism for its food, shelter and protection is called a **parasite.**

- The organism on which a parasite lives is known as the host. The association between a host and parasite is called parasitism.
- Organisms in which the parasite reproduce sexually is known as 'Primary host' and in which asexually reproduce is known as 'Secondary' or 'Intermediate' host.
- Parasites which live outside the body of host are called 'Ectoparasites'. 'Head louse' lives as an ectoparasite in the hair of man.
- Parasites which live inside the body of the host are called 'endoparasites'.
- Parasites that live in the cavities of host body are known as 'Coelozoic parasites' or luminar parasites.Eg: **Thichomonas vaginalis** a flagellate parasite which lives in the vagina of wowen.
- Coelozoic parasites such as the round worms and tapeworms which lives in the cavity of the intestine of their hosts are distinguished as enterozoic parasites.
- Parasites that live in the body cells of host are known as 'Intracellular parasites' or **cytozoic parasites.** Eg: 1) **Plasmodium lives** in the RBC and liver cells of man 2) **Leishmania donovani** which lives in the reticuloendothelial cells of man.
- Parasites that live in the spaces found in between the cells of tissues are known as 'Inter-cellular parasites' or **histozoic parasites.** Ex: **1) Entamoeba histolytica** lives in the wall (tissues) of the colon 2) caecum of man and **Wuchereria bancrofti** which lives in the lymphvessels and lymphglands of man. The parasite which can live in its hosts if it is available, but capable of living independantly if its host is not available is known as **facultative parasite.** Eg: **'Mycobacterium tuberculosis'** which cause tuberculosis in man is a facultative parasite.
- Parasites which depend on specific host throughout life are called **'obligate parasites'.** Eg: 'Taenia solium'.
- The organisms which live as parasites on other parasites are called 'Hyper parasites'. Here one parasite acts as host to another parasite. Eg: **'Nosema notabilis'** leads a hyper parasitic life on 'Spherospora polymorpha' which in turn leads a parasitic life on the urinary bladder of toad fish
- **Monogenetic parasites** - These require hosts of only one species to complete their life history. Eg: Diplozoon paradoxum.
- **Digenetic parasites** - These require hosts of two different species to complete their life history. One of the host is called primary host or main host, the second host is called the secondary host or intermediate host. Eg: **Fasciola hepatica.**
- **Pathogeneic parasites** - Cause disease in main host. Eg: Taenia cause taeniasis in man.
- **Non pathogenic parasites** - Do not cause any disease in the host. Eg: **Taenia hominis** in habiting the intestine in man.
- **Intermittent parasites** - They are not constantly associated with the host. They obtain nourishment from the host from time to time. Eg: Bed bugs and leeches.
- Some parasites induce cell division. Ex: Fasciola hepatica causes the thickcning of bile ducts in the sheep by stimulating cell division. This condition characterised by an increase in the number of cells is known as **'hyperplasia'**
- Some parasites cause an increase in the size of cells. The R B C affected by Plasmodium are enlarged. This condition is called **'hypertrophy'.**
- Abnormal increase in the size of the host caused by parasite is called as **gigantism.** Eg: Larvae of Fasciola cause abnormal increase of the size of snails. Snail is the secondary host of Fasciola hepatica.
- Parasites induce the production of antibodies by the host then the parasites themselves develop immunity from the host's defensive responses.
- Some parasites destroy the gonads of some hosts. Eg: **Sacculina** can bring about female characters in male crab. The crab gradually become a hermaphrodite. This is known as **'parasitic castration'.**

**PARASITIC ADAPTATIONS**

- Endoparasites contain a thick cuticle. It protects the parasite against enzymatic action of the host. Eg: **Ascaris, Enterobius.**
- Tapeworms do not have cuticle. They possess a living tegument with numerous microvilli on its surface. Microvilli aid in the absorption of nutrients from the host's intestine.
- Tape worms secrete antienzymes against the digestive enzymes of the host to protected from being digested by the host digestive enzymes.
- Some parasites posses suckers, hooks and teeth for the attachment of host body.
- Many intestinal parasites carry anaerobic respiration. Some are **facultative anaerobes.** They can carry on aerobic respiration if $0_2$ is available and anaerobic respiration in the absence of $0_2$.
- Entamoeba histolytica enter into a cystic stage that can survive in the moist faeces of the host. Cysts enter a fresh host along with contaminated food and water.
- Some parasites like Plasmodium and Leishmania are adapted to live in their respective blood sucking intermediate hosts and vectors. These vcctors inoculate the infective stages of the parasite into a fresh human host.
- In parasites the reproductive system is well developed. They also release large number of eggs to protcct their species against risks.
- Greatest adaptation for survial is shown by the tapewroms in their reproductive system. Each proglottid is bisexual, hundreds of such proglottids produce throusands of eggs. This ensures infection of a fresh host and the perpetuation of the spacics.

**Types of hosts:**

- **Definitive host:** The host in which a paraiste attains the sexual maturity and reproduce sexually.
- Eg: a) For **Plasmodium vivax** definite host is female Anopheles mosquito.
- For Taenia solium definite host is man.
- For Wuchereria bancrofli definite host is man.
- **Intermediate host:** The host in which the larva stages of a parasite lives or the asexual multiplications take place for the completion of parasite's life cycle. In some cases two or more intermediate hosts may be involved. In that case they are termed the first and the second intermediate hosts.
- Eg: a) For Plasmodium vivax intermediate host is mar..
- For Taenia solium intermediate host is P'g-
- For Wuchercria bancrofti intermediate host is female culex mosquito.
- **Paratenic host:** It isa carrier or transport host. In this host a parasite is viable without any development.
- Eg: Housefly acts as paratenic host (an agent of contamination) of disease causing pathogens.
- **Vector host:** It is the host in which a part of the life cycle of a parasite takes palcc and is also instrumental in the transmission of the parasite from one main host to the other.
- Ex: Anopheles, Culex mosquito
- **Resorvoir host**: In the absence of regular hosts, some parasites survive in the reservoir hosts. These reservoir host become the source of infection to the regular hosts. They are not essential for the parasite to complete its life history.
- Ex: Monkey is reservoir host for Plasmodium.
- Some parasites show 'Polyembryony' and 'Parthenogenesis' in order to ensure perpetuation of species. Eg: Fasciola hepatica.

- **Predation:** It is a type of feeding strategy. In this one animal seizes, kills and eats another living animal.
- Predators are Cat and Tiger
- Rat and Bison are the preys.