Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Third Year)

Subject: Zoology

Paper Code: ZOC 110

Paper Title: Parasitology

Unit: Unit 1-Introduction to Parasitology

Module Name: Parasites and Parasitology

Name of the Presenter: Mrs. Preethi M. Pednekar

Notes-

Parasitism is a relationship between two living organisms in which one benefits at the cost of the other. The one that benefits is the parasite and the one that is harmed is the host.

The word Parasite –has its origins in the latin word 'parasitus', which itself came from a Greek word 'parasitos' that means someone eating at another's table (from para-'alongside' +sitos -'food'). Parasitism seems to be the most prevalent lifestyle on earth. Roughly half of the plants and animal species are parasitic at some stage of their life cycle. Few species if any, lack parasites. Even parasites themselves are parasitized by other parasites .It is in the interest of the parasite that the host does not die. That is in keeping with the adage 'Dead host - dead parasite'. Few fossil parasites are known these include Schistosome eggs from ancient Egyptian mummies (few thousands of years ago), galls on the arms of feather stars possibly due to parasitic annelids from Silurian and Devonian periods (350-430 million years ago). Conclusions on origin of parasitism is mostly based on study in extant species.

Types of Parasites are categorised based on various criteria such as size, location on a host, extent of dependency on the host , whether they spend their entire life inside or on a host etc.

Based on size, the parasites are classified into micro and macro parasites. Microparasites are microscopic –e.g. Unicellular protozoans like *Plasmodium*.

Macroparasites are those visible with a naked eye like multicellular Helminths, Arthropods, etc.

Based on location, they may be termed ecto, endo or mesoparasites. Ectoparasites -inhabit only the body surface without penetrating within. They anchor themselves temporarily or permanently using piercing mouthparts or adhesive suckers. The term infestation is used to describe parasitisation by ectoparasites e.g. bed bugs, fleas, lice etc.

Endoparasites -are parasites that live within the body of the hosts. They usually spend at least one stage of their lifecycle within the host e.g. tape worms, round worms, Plasmodium etc.

Mesoparasites live partly but not fully inside a host's body. It enters the body through an outer opening like the ear, cloaca etc and partially embed themselves- e.g. some copepods.

Based on how dependent parasite is on host the parasites can be classified as obligate and facultative.

Obligate Parasites-can only survive in a host. They compulsorily depend on one or more hosts during the whole of their life cycle e.g. Tapeworms, *Toxoplasma gondii .*

Facultative Parasites-are those that are capable of adapting to both parasitic and free living existence. e.g.-flies of Genera *Chrysoma* (blow flies) and *Calliphora* (blue bottle flies) lead a free living existence in decomposing organic matter and adopt an endoparasitic existence in earthworms and mammals e.g . *Naegleria fowleri*.

Based on mode of transmission the parasites are termed as either directly transmitted, trophically transmitted or vector transmitted.

Directly transmitted parasites like fleas and mites reach their host on their own. Trophically transmitted parasites are parasites transmitted when one host (definitive) eats another host (intermediate) carrying the parasite . Examples of trophically transmitted parasites include many trematodes , and most cestodes . Vector transmitted parasites depend on a vector to carry them to the next host- E.g .*Trypanosoma* transported by biting insects.

Based on presence or absence of alternation of generations there are monogenetic and heterogenetic parasites.

Monogenetic parasites -in these there is no alternation of generations. E.g. *Ascaris, Ancylostoma*

Heterogenetic parasites-here there is alternation of generations--E.g malarial parasites have alternation of sexual and asexual generations ,the Nematode *Strongyloides* has one generation which is parasitic and parthenogenic and another is free living and sexual.

Based on the number of hosts required the parasites are called monoxenous or heteroxenous. Monoxenous- development is restricted to one host species. E.g.hookworms, fish trematodes. Heteroxenous - the parasite requires at least two host species to complete it's life cycle E.g. malarial parasites , most Trypanosomes, tape worms etc.

Based on the host range,they are stenoxenous and euryxenous.

Stenoxenous (Narrow range)--infects/infests only one host species. E.g.American and European hookworms infect only humans.

Euryxenous (broad range)--Parasite infects/infests a broad range of hosts. E.g. *Toxoplasma gondi.*

There are other terms that describe Parasites, they are as follows:

Accidental Parasites--are parasites that establish themselves in hosts (unnatural host) in which they do not normally live. E.g . *Balantidium coli* is normally a commensal in pigs but can sometimes parasitize man.
Wandering/Erratic/Aberrant Parasites--are parasites that are characteristic of the host but are found in an unusual location within the host. E.g.*Entamoeba histolytica* is typically a parasite of the gastrointestinal tract. However this parasite sometimes wanders into the liver and lungs in humans where it is a dead end for the parasite.

Periodic Parasites--are parasites that make short visits to it's host to obtain nourishment or other benefits. E.g . *Anopheles*

Hyperparasites/Epiparasites/Secondary parasites--are those parasites that parasitise other parasites. E.g. a protozoan living in a flea that is living on a dog.

Brood parasites--these trick other species into raising their young. Brood parasitism can be seen in most species of cuckoos. They do not build nests of their own but deposit their eggs in the nests of other species like crows. The cuckoo may remove one host egg to reduce the suspicion surrounding the presence of it's egg.

Social Parasites--are social insects that parasitize colonies of other social insects. Social parasitism can be found among some bees, wasps and ants. E.g the ant species -*Polyergus breviceps* (slave-makers)—they cannot survive on their own even if plenty of food is available. These ants must have slaves to survive. They raid other ant colonies to steal the brood .These then eclose into worker slaves that are chemically imprinted, they do all the work like tending to the brood, gathering food, caring for the queen, defending the nest etc. These slaves comprise almost 90% of the work force. The slave makers have enlarged glands and sickle shaped mandibles. Secretions of the gland serve to pacify the workers of the target colony during a raid.

Sexual parasites---The deep sea anglerfish lure their prey in the darkness using a bioluminescent structure placed on top of the snout. The males of the species are a fraction of the size of the females (females are 60 times the length of the male) and do not have a luring apparatus, so with the help of their huge nostrils they detect the species specific chemical attractant emitted by the female and latch on to the females for the rest of their lives. Circulatory systems of the two fuse–male feeds on nutrients received through her blood. Male fertilizes the eggs produced by the females and the male thus becomes a sexual parasite completely dependent on the female.