

بسم الله الرحمن الرحيم

GENERAL PARASITOLOGY

The word parasite comes from the •
Greek word “*parasitos*” that
means a [plant or animal that lives
upon or within another living
organism at whose expense it
obtains some advantage].

The science that deals with this •
type of relationship is termed
Parasitology.

Parasite and Parasitism

There are different types of inter-relationship between living organisms: •

Symbiosis, this is an intimate and obligatory relation that exists between two heterospecific organisms. •

1-Mutualism, it is the state when both organisms are benefited from symbiosis. •

2-Commensalism, this is the state when one of the organisms is benefited while the other is not affected. •

3-Parasitism is the state when one organism gets benefit on the expense of the other. The one which gets the benefit is called *parasite*, while the other which loses is called the *host* which harbours the parasite. •

Types of parasites

According to the relation with the host's body :

Ectoparasite, living on or outside • the body (infestation).

Endoparasite, living within the • body (infection).

According to the life history

a-Facultative parasite, when it is capable of living outside the host and can also be parasitic.

b-Obligate parasite, when it is completely dependent on the host and cannot live outside its body. •

C-Incidental parasite, is the parasite which establishes itself in a host which is not its ordinary one. •

d-Pseudoparasite, it is an artifact which could be mistaken as parasite during examination, like some pollen grains or yeasts. •

e-Coprozoic or spurious parasite, is a foreign species that has passed through the alimentary tract without infecting the host, as some eggs of animal parasites or free living amoebae for example. •

f-Erratic or ectopic parasite, which lives in the body of its host in another place than its normal one. •

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According to the time of parasitism

- **Temporary parasite**, living part of its life freely in the environment and seeks the host only to obtain nourishment.

Permanent parasite, remaining • on or in the host from early life until maturity or its whole life.

According to the number of the hosts

- **Monoxenous**, having only one host for its whole life cycle.

Heteroxenous, having several • hosts, one for each stage during the life cycle of the parasite.

Types of hosts:

- 1-**Definitive** or final host, this is the host that harbours the adult or sexual stage of the parasite. •
- 2-**Intermediate** host, in which part or all the larval stage or the asexual cycle takes place. Some parasites may need more than one intermediate host. •
- 3-**Reservoir** host, it is another animal than man which harbours the same parasite. It ensures the continuation of its life cycle and can act as a source of infection to man. •
- 4-**Paratenic** host, it is a host that harbours the organism in an arrested state of development that can be continued in a subsequent suitable host. •

5-Transfer host, it is an animal host that • propagates the parasite carrying it from one place to another in or on its body.

6-Incidental host, this is not the proper • host for the parasite's survival or development.

7-Vector, this is special name given to • arthropods that share actively in the life cycle of parasites as intermediate or definitive or transfer hosts and help in infecting man and animals by them.

Scientific nomenclature (taxonomy):

Animal parasites are classified according to the • International Code of Zoological Nomenclature. Each parasite belongs to a Phylum – Class – Order – Family – Genus – Species. Sometimes there is a further division to suborder, superfamily, subfamily and subspecies are employed. The family name ends by –idea, the superfamily by –oidea and the subfamily ends by –inae. The names are latinized, and the scientific designation is binomial for species and trinomial for subspecies e.g. *Ascaris lumbricoides*. The law of priority obtains as to the oldest available specific name, even if only a portion of the parasite or its larva have been described.



Geographic distribution

The parasite is either **endemic** i.e. present in the same locality for a long period, or **epizootic** attacking many susceptible individuals in a new area in a short time. The latter condition was considered rare beforehand but can occur now due to progress in traveling and communications.

Endemicity of parasites depends on the presence of:

- 1-**Suitable or susceptible host**, and easy escape from this host to the environment.
- 2-**Suitable environment** including all environmental conditions e.g. temperature, *humidity* and transferring medium as water, wind or soil and insects.
- 3-**Sanitary conditions** of the community and its socioeconomic status. Inadequate individual and community sanitation, low socioeconomic status favors the spread of parasitic diseases.
- 4-**The mode of the life cycle of the parasite**, the simpler the life cycle, the more likely for the parasite to be cosmopolitan.
- 5-**Migration of populations** has spread parasitic diseases all over the world, e.g. importation of slaves from Africa was accompanied by hookworm disease and Schistosomiasis

Parasitic infection and disease

Since parasitic infection often tends to run a chronic course with few symptoms, an infected individual may become carrier, so serving as a potential source of infection to the others. **A carrier state** represents the normal state of infection where there is an equilibrium between the host and the parasite. •

The mode of transmission of infection varies from direct contact to a more complicated way through other vehicles e.g. •

1-**Water** which if polluted with human excreta can transmit protozoan cysts, helminth eggs and some larval stages as cercariae. •

2-**Soil** when polluted with human and animal excreta is infective with the previously mentioned stages as well as hook worm larvae. •

3-**Air** can also carry protozoan cysts and helminth eggs to susceptible hosts by inhalation or through uncovered food in slum areas with bad sanitation. •

4-**Arthropods** can also mechanically transmit the parasites mentioned before on their body or through their gut and excreta from one place to another e.g. flies and roaches. Also they can take part in the life cycle and become thus a source of infection. •

5-**Congenital or connate** transmission of the parasites from mother to foetus via placenta during pregnancy or during labour respectively. •

6-**Blood transfusion** can be a method of transmission of blood parasites •

e.g. malarial parasites. •

7-**Direct contact** and sexual intercourse can also transmit some parasites •

Effects of parasite on the host:

Parasites have many harmful effects on their hosts, which vary according to their pathogenesis, but generally they can be summarized as follows. •

1-Mechanical effects, as pressure from an enlarging cyst, obstruction of a vessel or a hollow viscous. •

2-Invasion and destruction of the host cells by the parasite itself as in cases of malaria infecting R.B.Cs. •

3-Inflammatory reaction to the parasite or parasitic products. •

4-Facilitation of secondary infection by bacteria during entry of parasite through skin or bites of insects or even skin ulceration due to parasitic infection. •

5-Drain of host's nourishment causing several deficiency manifestations, growth retardation and anemia. •

6-Toxic effect of some parasitic products may affect the host e.g. bone marrow depression or some nervous manifestations •

Resistance and immunity

The term parasite immunology applies to the effect of the parasite on the body immune system. The body has also its own physicochemical barriers to invasion by parasites like intact skin which is impenetrable for some parasites. There is either (1) **natural** or innate immunity due to physico-chemical barriers of the body or (2) **acquired** immunity due to previous exposure to the same parasite. •

Prevention of parasitic infection:

A-**Proper knowledge** about the life cycle and mode of infection and transmission of parasites during their existence outside the body helps in the control and prevention of disease. •

B-The **measures** taken for prevention of parasitic infection are:

1-**Treatment** of infected individuals to reduce human sources of infection. •

2-**Education** in personal prophylaxis to prevent spread of infection and to reduce the chance of exposure. •

3-**Sanitary control** for food, water, living and working conditions and for waste disposal. •

4-**Destruction** or control of reservoir hosts and vectors to limit transmission of diseases. •

5-**Application of biologic barriers** to the transmission of parasites, this is an environment-friendly way to get rid of parasites without harmful effect on the environment by insecticides or such chemicals, e.g. by use of some types of fish that feed on mosquito larvae. •



Thank you●