520 حين □ (□□□)

Parasitic Zoonosis

الطفيليات المشتركة بين الإنسان والحيوان

المحتوى العلاقات الأحيائية بين الإنسان والبيئة خاصة الحيوانات

المنزلية والمستأنسة والطفيليات التي تصيب كل منهما والآثار المترتبة

على تلك الإصابة بالإضافة إلى كيفية انتقال تلك الطفيليات بين

العوائل المختلفة ومن ثم إلى الإنسان حتى يمكن الحفاظ على الصحة

العامة

ZOO 520 Parasitic Zoonosis (1+0+1)

Objective :

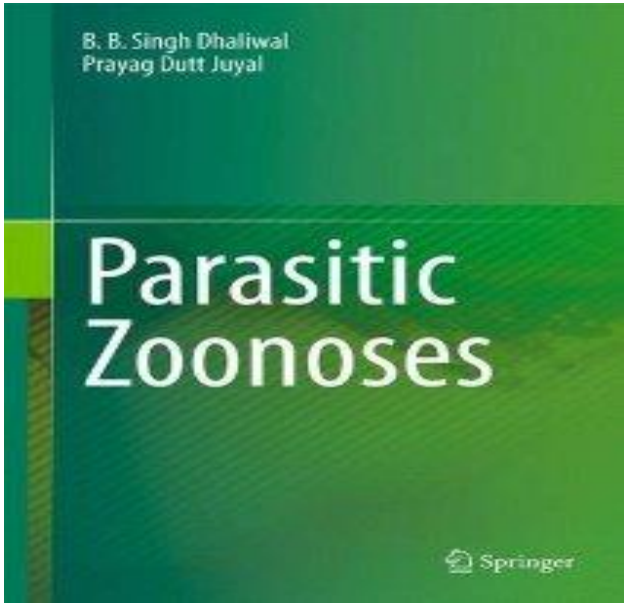
To allow Zoology graduate students a developed scope in the field of Parasitology and zoonotic diseases.

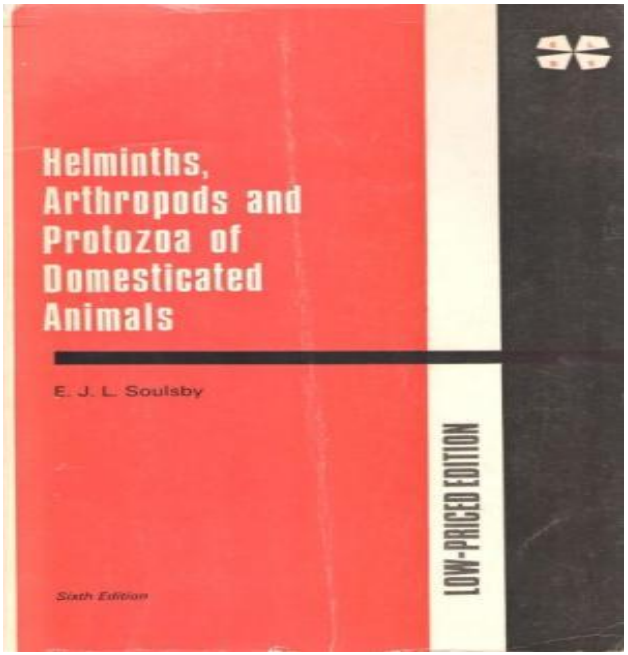
Contents:

Introduction of Parasitology
Zoonotic disease examples
Leishmania spp
Typanosoma spp
Toxoplasmosis
Plasmodium malaria
Fasciola spp.
Paragonimus westermani
Taenia spp.
Clonorchis sinensis

Some book suggestions

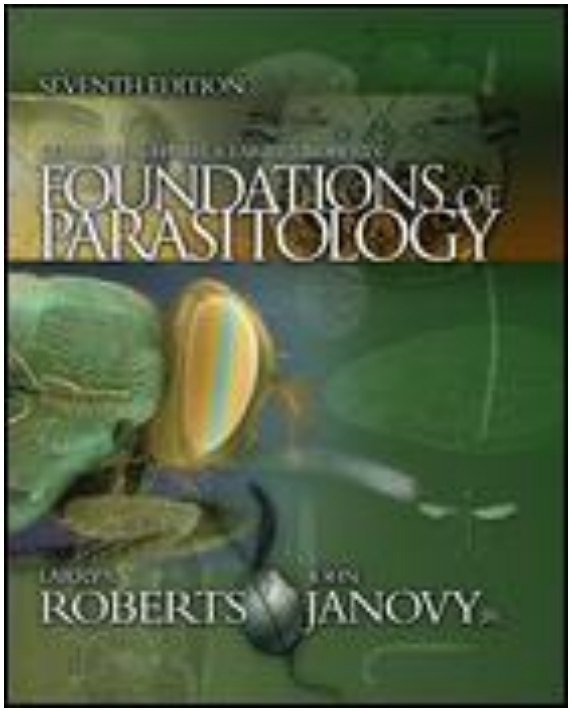
- Soulsby, E.J.L. Helminths, Arthropods and Protozoa of Domestic Animals. Bailiére Tindall. 1982
- Dhaliwal, B.S. and Juyal, P.D., 2013. Parasitic zoonoses. New Delhi: Springer.

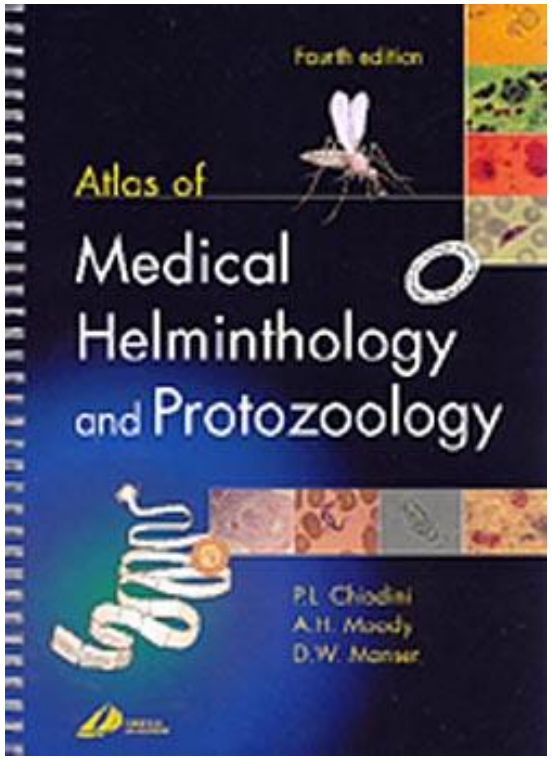




Some book suggestions

(for some of these titles newer editions might be available)





Zoonoses

From the Greek:

Zoon: Animal

Noson: Disease

Diseases and infections which are naturally transmitted between vertebrate animals and humans

- WHO 1959

Parasitism - a way of life

- **Parasite and Parasitism** are ecological terms that define a way of life rather than a coherent and evolutionary related group of organisms
- **Symbiosis, Commensalism, Mutualism, Parasitism**

- **PARASITE: The man who eat from others table!!!**

  From Greek:

  Para: beside or around

  Sitos: Wheat

Parasitism - a way of life

- **Parasite and Parasitism** are terms that define a way of life rather than a coherent and evolutionary related group of organisms
- **Symbiosis**: "Any two organisms living in close association, commonly one living in or on the body of the other, are symbiotic, as contrasted with free living." De Bary 1879
- **Commensalism**: Sharing the table. One partner benefits but the other is not hurt.
- **Mutualism**: Both partners benefit.
- **Parasitism**: One partner (the parasite) harms or lives on the expense of the other (host).

Host – Parasite Relationships:

Symbiosis : close association between 2 organisms (host and parasite) where either can not exist independently = parasite gets something from host & vice – versa

Mutualism: association between 2 organisms where both are benefited to the situation & can exist independently if separated.

Commensalism : an association of 2 organisms where one is benefited, the other is unaffected. = parasites derives benefit from the host.

Parasitism = an association between 2 organisms where one is dependent upon another for existence and one harms the other.

Key definitions: What is ….?

- **Medical Parasitology:** "the study and medical implications of parasites that infect humans"
- **A parasite:** "a living organism that acquires some of its basic nutritional requirements through its intimate contact with another living organism". Parasites may be simple unicellular **Protozoa** or complex multicellular **Metazoa**
- **Eukaryote:** a cell with a well-defined chromosome in a membrane-bound nucleus. All parasitic organisms are eukaryotes
- **Protozoa:** unicellular organisms, e.g. *Plasmodium* (malaria)
- **Metazoa:** multicellular organisms, e.g. helminths (worms) and arthropods (ticks, lice)
- **An endoparasite:** "a parasite that lives within another living organism" – e.g. malaria, Giardia
- **An ectoparasite:** "a parasite that lives on the external surface of another living organism" – e.g. lice, ticks

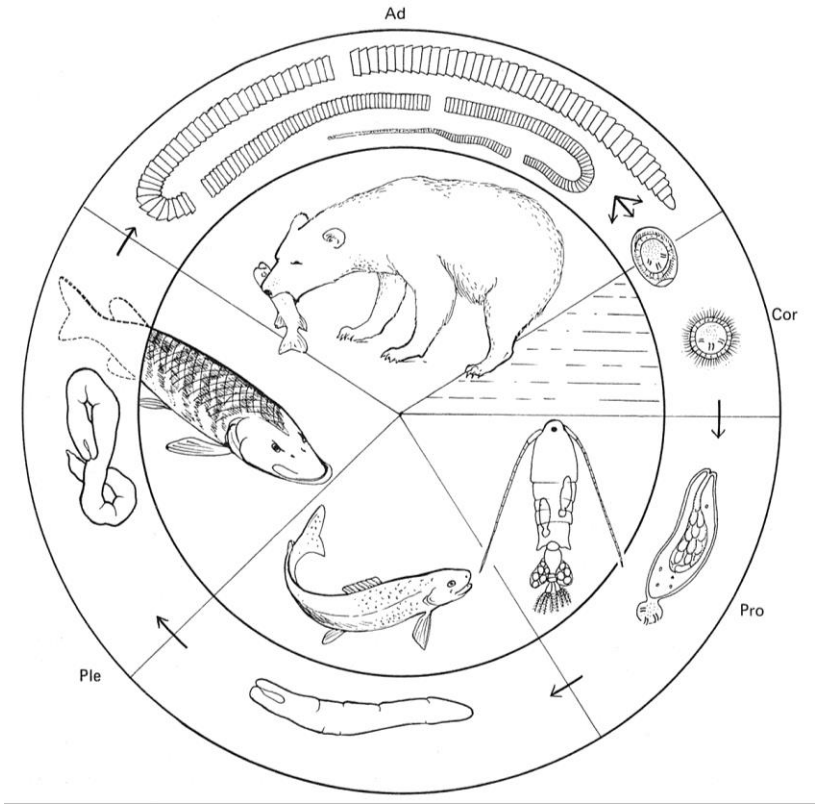
- **Host:** “the organism in, or on, which the parasite lives and causes harm”
- **Definitive host:** where the parasite lives & complete their life cycle (final host-human-trypanosome) = also harbors the mature /adult/ sexual /stage of the parasite
- **Intermediate host:** “the organism in which the parasite lives during a period of its development only”
- **Parasitic Zoonosis:** “a parasitic disease in which an vertebrate is normally the host - but which also infects man”
- **Vector:** “a living carrier (e.g. an arthropod) that transports a pathogenic organism from an infected to a non-infected host”. A typical example is the female *Anopheles* mosquito that transmits malaria.
- **Reservoir host:** Other animal that harbors the same parasite. = ensures continuity of the parasites life cycle. = act as additional source of human infection.

Endoparasites can exist in one of two forms: **intercellular parasites** (inhabiting spaces in the host's body) or **intracellular parasites** (inhabiting cells in the host's body). Intracellular parasites, such as protozoa. An example of this interaction is the transmission of malaria, caused by a protozoan of the genus *Plasmodium*, to humans by the bite of an anopheline mosquito. An **epiparasite** is one that feeds on another parasite. This relationship is also sometimes referred to as *hyperparasitism*, exemplified by a protozoan (the hyperparasite) living in the digestive tract of a flea living on a dog. is a parasite whose host is a parasite

Accidental host

A host in which the parasite is not commonly found, nevertheless it is one suitable for the parasite's development. In some instances (e.g. cysticercosis) the accidental host becomes a "dead end" because even though the parasite develops through its appropriate stages, it fails to find a portal of exit and is thus blocked from continuing its life cycle.

Hosts and life cycles



- The **definitive host** is by definition the one in which the parasite reproduces sexually
- Additional hosts are then designated **intermediate hosts**
- Host which actively transmit parasites to humans are often called **vectors**
- In **paratenic** or transport hosts no parasite development occurs
- **Reservoir host** are alternate animal host from which the parasite can be transmitted to humans (zoonosis) or domestic animals
- **Accidental host**, not suitable for parasite development, but severe disease might ensue nonetheless

Protozoology - study of single-celled **animal (Protozoa)**

Helminthology- study of worms and worm like organism
(roundworms, flukes, tapeworm)
Acanthocephalans

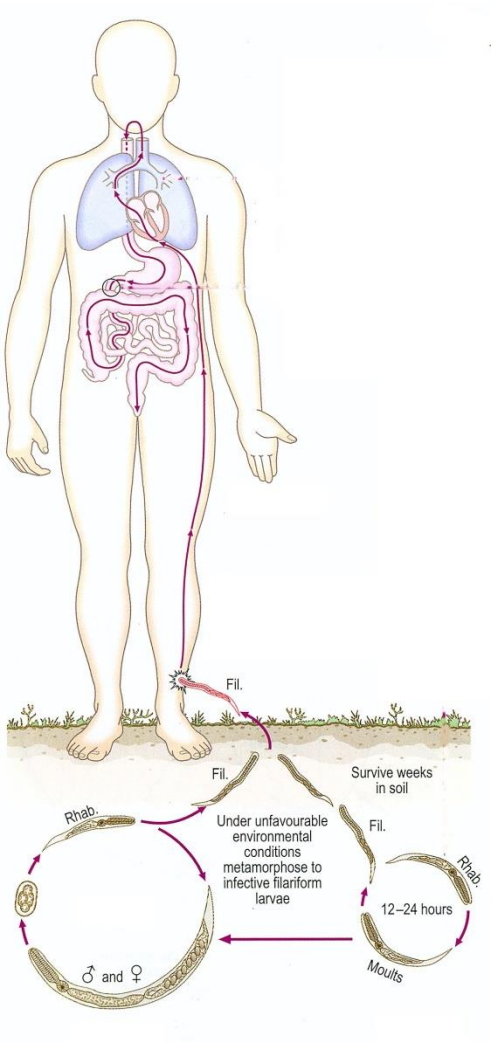
Arthropodology - study of jointed -**legged organism like the arthropods (flea, mite, mosquito, ticks ..etc.)**

Types of parasitism:

Obligate: Organism which are completely dependent on the host for existence. = cannot exist without a host (nematodes)

Facultative / Opportunistic: When a parasite is capable of living even without a host . Can exist as free – living or as parasite

Obligate/facultative, and permanent/intermittent parasites



Indirect **Direct**

- Most parasites are obligate parasites
- In some species only some life cycle stages, e.g. the larvae are parasitic, in others parasitic and free living generations can alternate depending on environmental conditions (*Strongiloides stercoralis*) .

Incidental - **parasite** the establishes itself in a host in which it does not ordinarily live.

Permanent - parasite that remains on or in the body of the host from early life until maturity or for its entire life.(*Ascaris*)

Pathogenic - **parasite** that causes injury to the host by its mechanical

Vectors:

are biological system that transmit parasite

Mechanical vector: Transmit a parasite without being a host = transmit Parasite to host, parasite stay in the host but does not undergo development . Not essential to the life cycle of the parasite. Example mosquito, flies

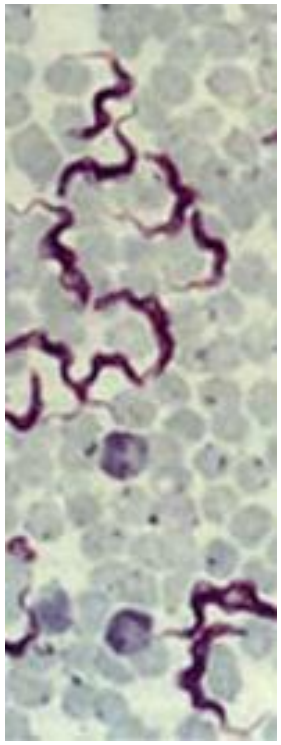
Biological vector: serves both as a vector and a host for the development stage of the parasite Ex. Anopheles mosquito. (malaria)

Source of exposure to parasitic infection(transmission)

Contaminated water and soil= most common=
utilized by most parasite Ex:
Contaminated H_2O
Protozoa = *Giardia* . *Cryptosporidium*
Nematodes = *Ascaris* = *Trichiuris* = *Enterobius*

Contaminated Soil
(Ex: Hookworm,) larva of parasite penetrate skin goes to venous circulation heart lungs alveoli (air sac) rupture bronchioles bronchi trachea esophagus swallowed into the stomach

Infection & infestation



- Infectious diseases are caused by transmittable parasitic agents including bacteria, viruses, fungi, protozoa and a variety of metazoans commonly referred to as helminths or worms
- Infection usually implies replication of the agent resulting in a growing number of pathogens
- Infestation are characterized by a constant number of pathogens. Severity of disease often depends on infection dose.

Skin = penetration of infective stage larva to skin

Directly

Ex: Cercaria of *Schistosoma*

Filariform larva of hookworm

Filariform larva of *S. stercoralis*

Indirectly

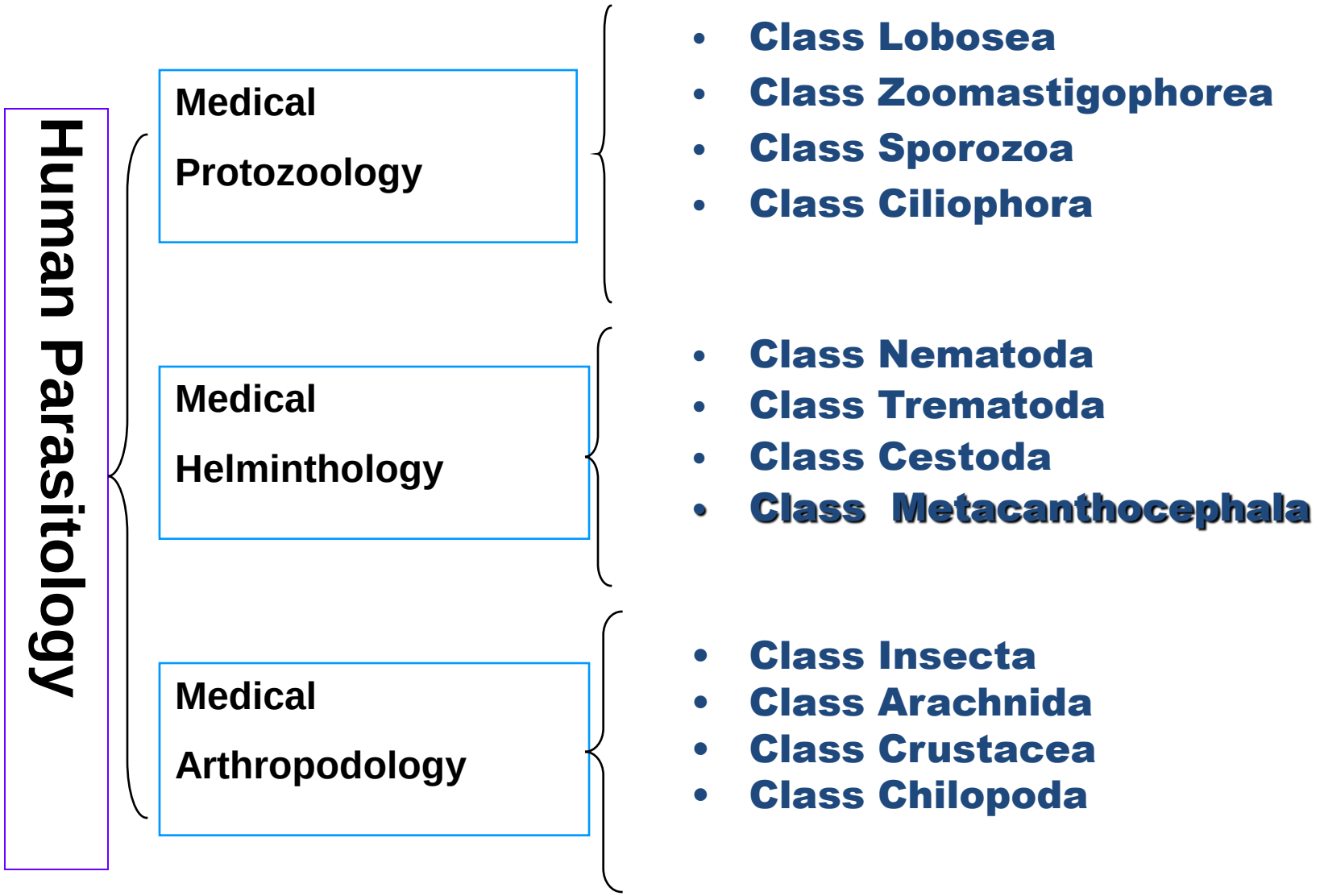
Through insect vectors Ex: Infective stage larva of *Trypanosoma* and *Leishmania*

Infective stages of *Plasmodium*

Incubation Period: The time between the entrance of the organism and the appearance of the first signs and symptoms of the disease.

Disease terminology

- Prepatency: infected but parasite presence can not be detected yet
- Patency: established infection, parasite stages can be detected (malaria parasites in blood smears, worm eggs in feces etc.)
- Incubation period: time between infection and the development of symptoms
- Acute disease can lead to crisis which can resolve in spontaneous healing, chronic infection or death
- Convalescence: Period after healing, absence of infectious agents, no symptoms, in certain case immunity to reinfection


Human Parasitology
Medical
Protozoology
Medical
Helminthology
Medical
Arthropodology
Class Lobosea
Class Zoomastigophorea
Class Sporozoa
Class Ciliophora
Class Nematoda
Class Trematoda
Class Cestoda
Class Metacanthocephala
Class Insecta
Class Arachnida
Class Crustacea
Class Chilopoda