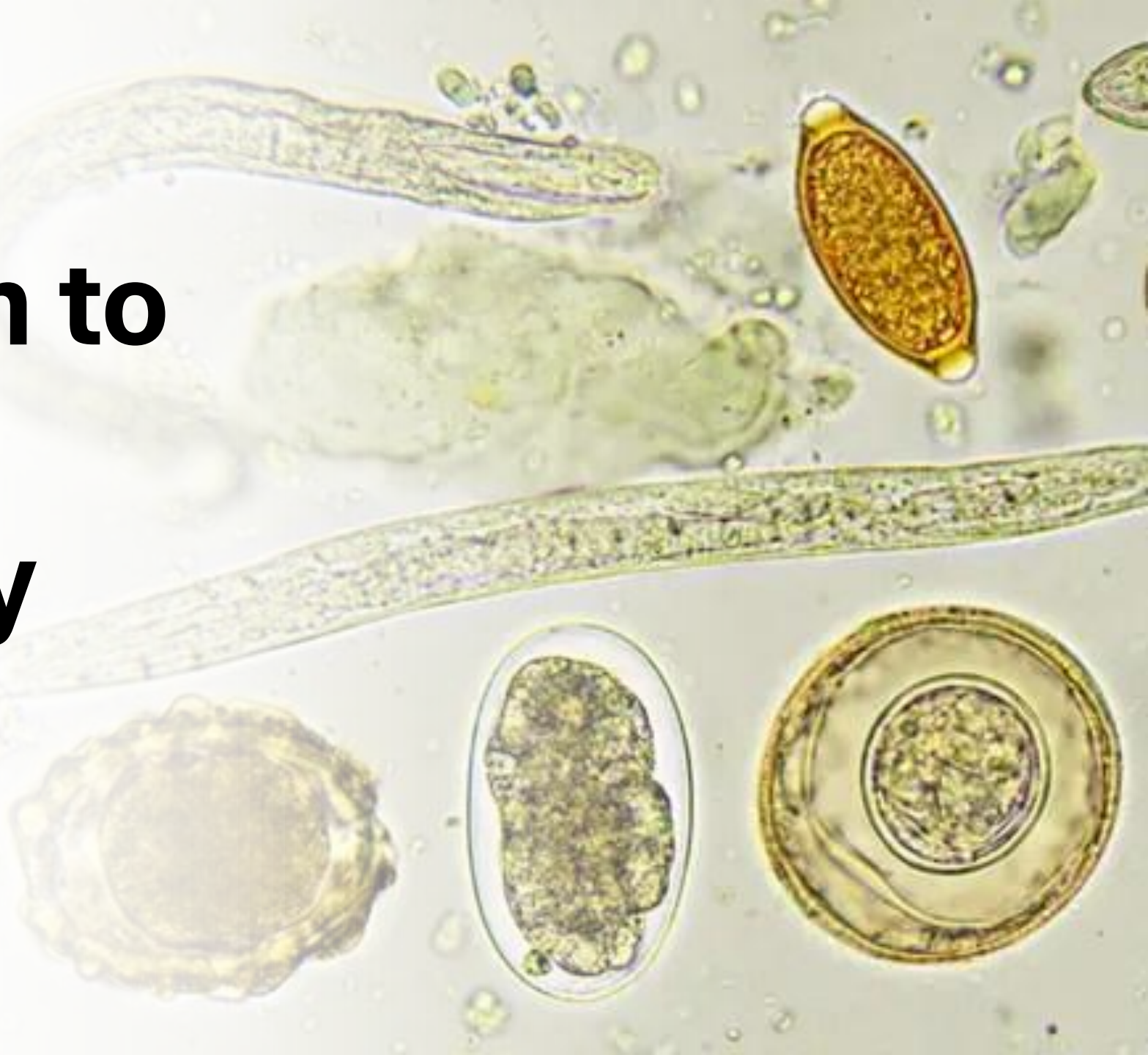
Introduction to Clinical Parasitology



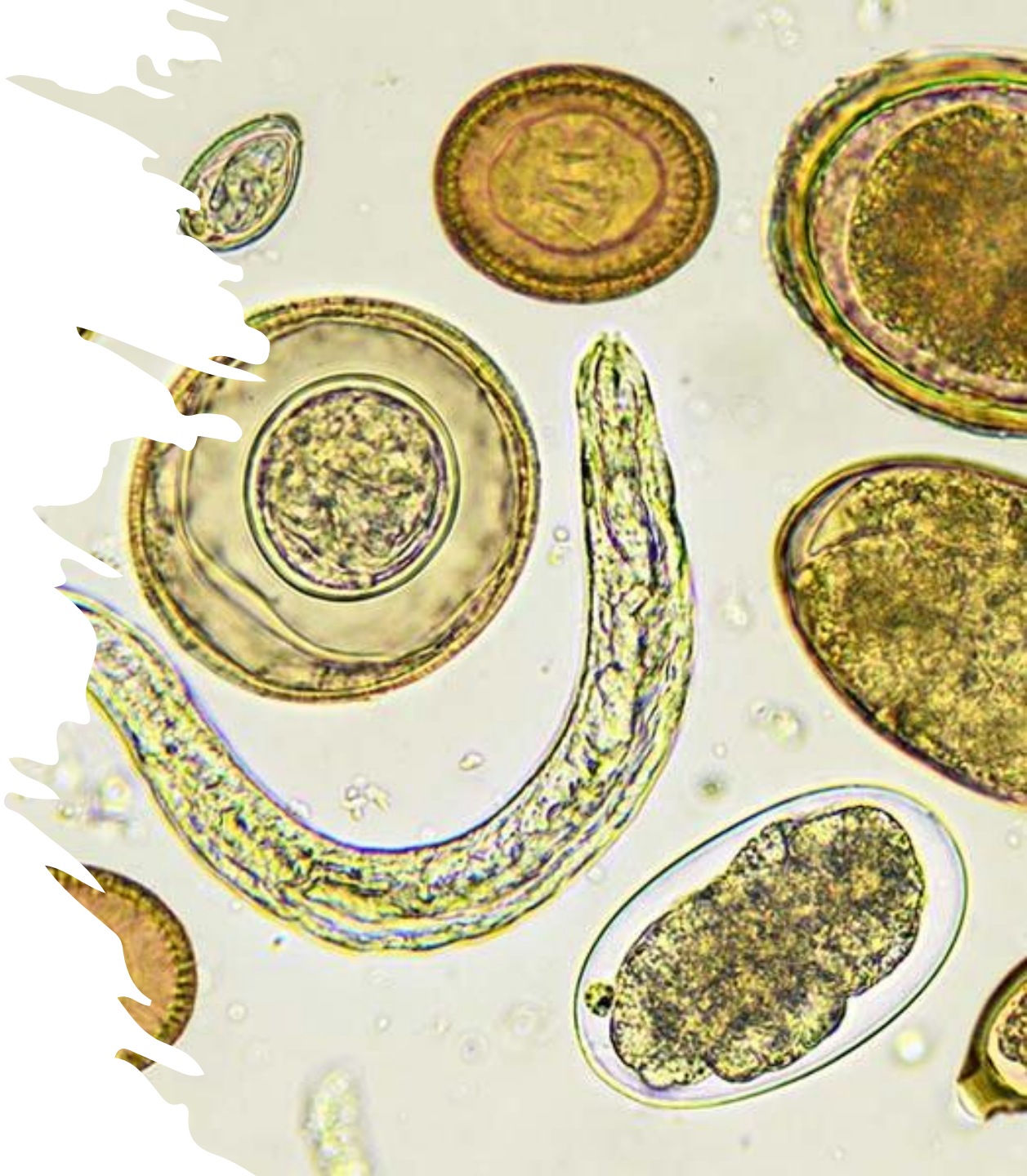
Leslee Anne Cortez, RMT, LPT, MPH
Faculty, School of Medical Technology
Emilio Aguinaldo College Cavite

Learning Objectives

At the end of this session, students should be able to:

a. define the basic terms in parasitology; and

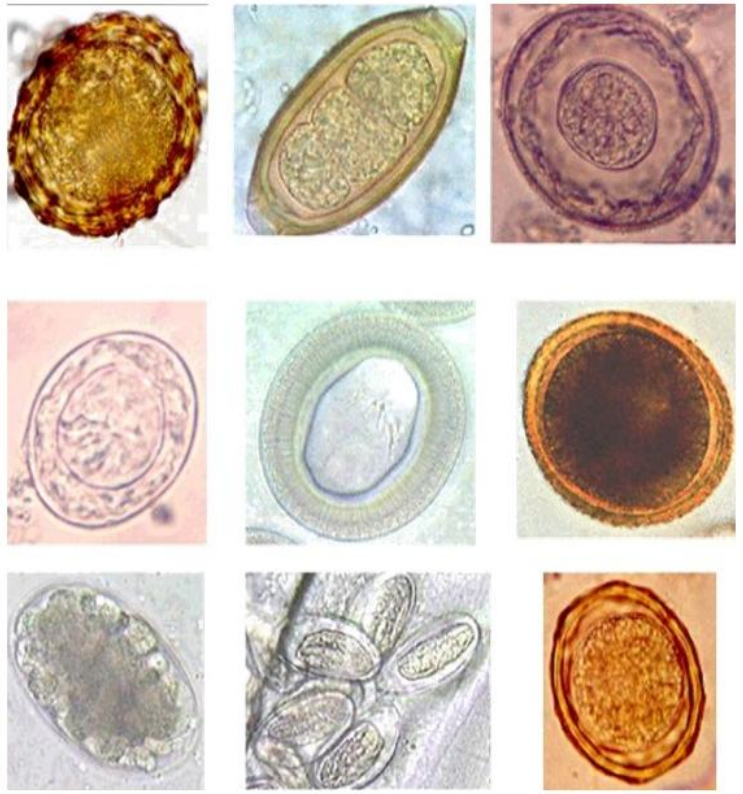
b. explain the factors affecting parasitic transmissions and infections.



What is PARASITOLOGY?

- "…the discipline concerned with the **detection, identification, and interpretation of parasites** of medical importance in human specimens, providing the basis for **diagnosis and treatment** of parasitic infections." (Elsevier, 2017)

- "…provides a systematic comprehension of the various medically important human parasites; their **distribution, habitat, morphology and life cycle, pathogenesis and clinical features, laboratory diagnosis, treatment, prevention and control**." (Springer, 2017)



- "The main task of studying parasites is **to control and hence prevent parasites from causing diseases**. For this purpose, we have to know what a parasite is and **how it can survive, evolve, and cause disease**." (Springer, 2024)

Biological Relationships

- Symbiosis is the living together of unlike organisms that includes both **positive and negative interactions.**
    a. **Commensalism** (i.e. *E. coli* in intestinal lumen, skin microbiota)
    b. **Mutualism** (i.e. flagellates in the digestive system of termites, *B. thetaiotetraiotamicron*)
    c. **Parasitism** (*E. histolytica* in human host, helminthiasis)

Strategic Public Health Framework for Soil-Transmitted Helminth Control in the Philippines (2025–2030)

Home › Acta Parasitologica › Article

Prevalence and Risk Assessment of Soil-Transmitted Helminths Among the Rice and Vegetable Farmers of Panay, Capiz, Philippines: A Cross-Sectional Study

Research | Published: 14 November 2025

Volume 70, article number 219, (2025) Cite this article

REVIEW article

Front. Public Health, 09 April 2025

Sec. Public Health Education and Promotion

Volume 13 - 2025 | https://doi.org/10.3389/fpubh.2025.1558564

Prevention and control of schistosomiasis in the Philippines from a health education perspective

What is a parasite?

- "…an organism that lives on or inside another organism called its host and derives its nourishment from the host, without giving any benefit to the host."
- A parasite is **an organism that lives on or in a host and gets its food from or at the expense of its** host.

Malaria

Tapeworms

Ticks

Lice

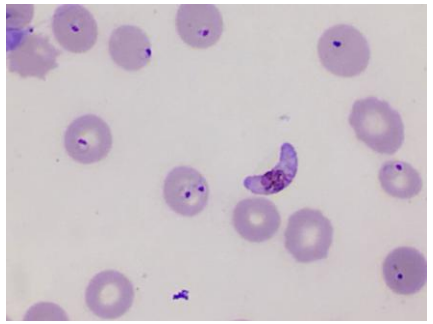
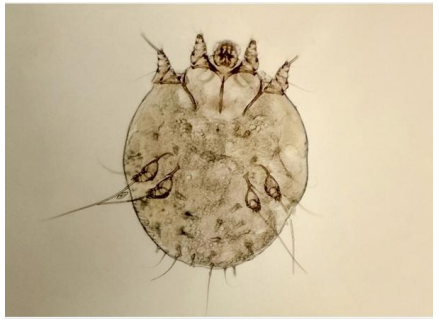
Aphids and Ants

Dodder

Leeches

Fleas

Parasites



- described according to their habitat or mode of development:

a. **endoparasite** – parasite living inside the body of a host → infection
b. **ectoparasite** – parasite living outside the body of a host → infestation
c. **erratic** – found in an organ which is not its usual habitat
d. **incidental** – found in a host where it does not normally live
e. **permanent** – remains on/in the body of the host in its entire life
f. **temporary** – lives on/in a host for a short period of time
g. **spurious** – free-living organism which passes the GIT of host without infecting it

Parasites

- described according to their habitat or mode of development:

a. obligate parasite – needs a host to complete their development

b. facultative parasite – may exist in a free-living state or become parasitic

Parasites

- described according to their mode of transmission

SOIL TRANSMITTED - *Ascaris lumbricoides*, *Strongyloides stercoralis*,, *Trichuris trichiura*, Hookwoems	FOOD BORNE (MOT: INGESTION) - *Taenia* spp., *Trichinella spiralis*, *Toxoplasma gondii*, Heterophyds, *Paragonimus westermani*, *Capillaria philippinensis*, Fascioloid
WATER BORNE (MOT: INGESTION) - *Amoeba, Giardia lamblia, Blastocystis hominis, Cryptosporidium* spp., *Cyclospora cayetanensis*	DIRECT CONTACT (MOT: SKIN PENETRATION) - *Trichomonas vaginalis*, *Enterbius vermicularis*
ARTHROPOD/VECTOR-TRANSMITTED - 2 Types of Vectors: a. Biological – Parasite continues its life cycle inside the vector (*Anopheles* mosquito) b. Mechanical – Parasite does not continue its life cycle inside the vector (*Aedes aegypti*)	

Hosts

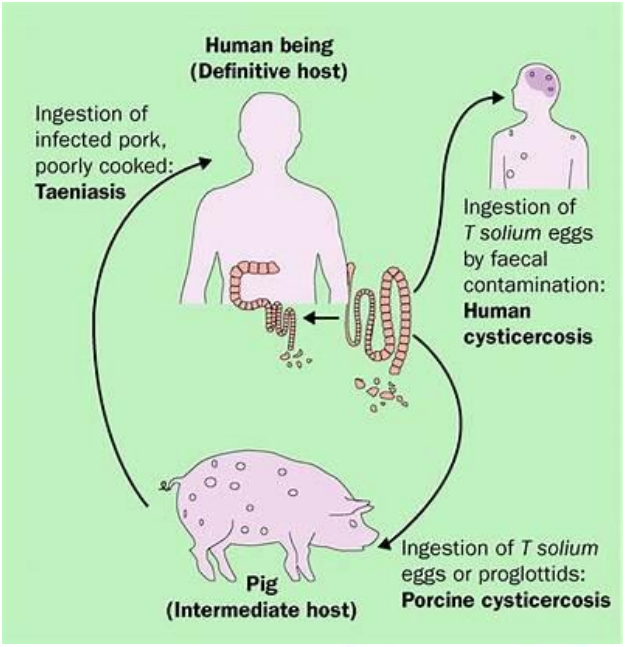
- classified into various types based on their role in the life cycle of the parasite:

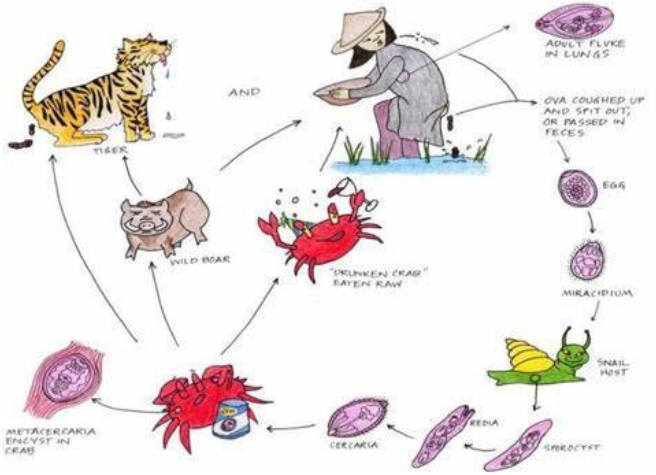
a. **definitive** – one in which the parasite attains sexual maturity (humans → *T. solium*, mosquitos → *Plasmodium spp.*)

b. **intermediate** – harbors the asexual stage of the parasite (cows → *T. saginata*, snails → Schistosoma spp., humans →

c. **paratenic** – one in which the parasite does not develop further to later stages (wild boar → Paragonimus

d. **reservoir** – allow the parasite's life cycle to continue and become additional sources of infection (pigs → *B. coli*, cats → *B. malayi*, soil → *A. lumbricoides*)



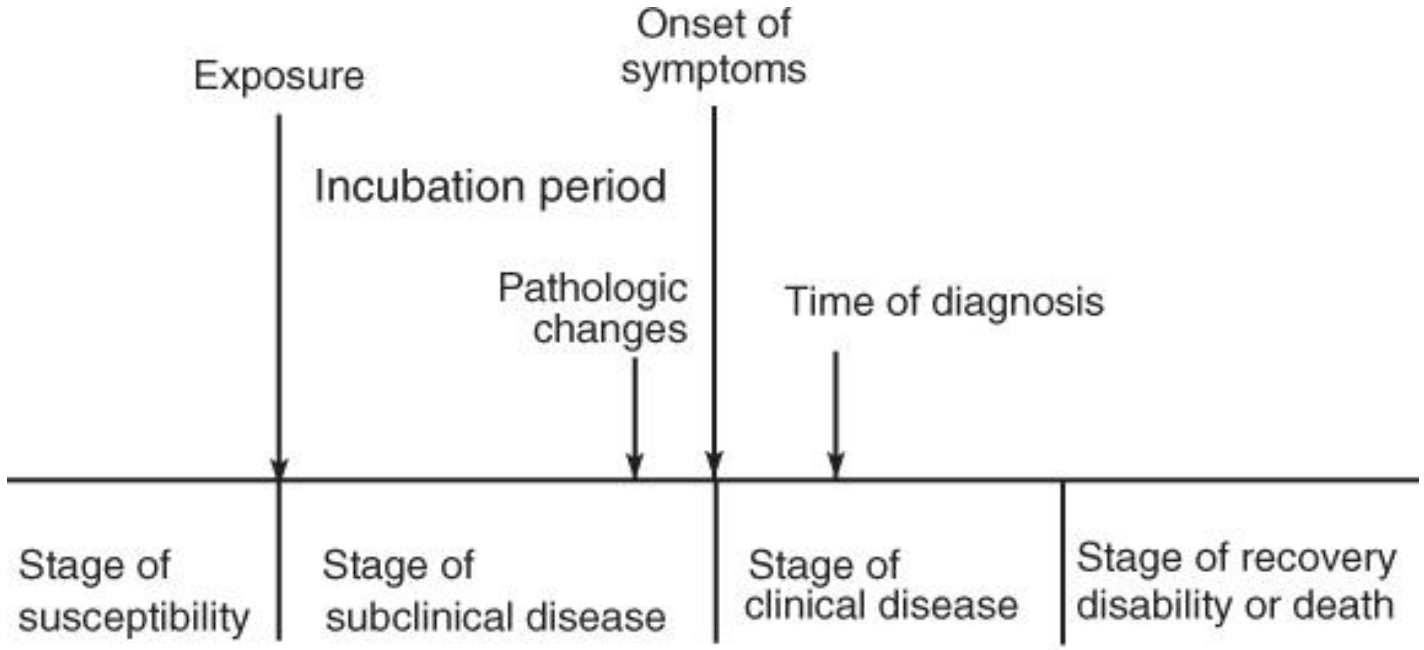


Exposure and Infection

a. **Carrier** – harbors a particular pathogen without manifesting any signs and symptoms (i.e. Typhoid Mary)
b. **Exposure** – contact with a pathogen or its transmission source (i.e. drinking contaminated water, walking barefoot on soil, being bitten by a mosquito)
c. **Infection** – successful entry, establishment, and multiplication of the pathogen inside the host's body (i.e. amoebic trophozoites, ring form in RBCs)

Exposure and Infection

NATURAL HISTORY OF DISEASES



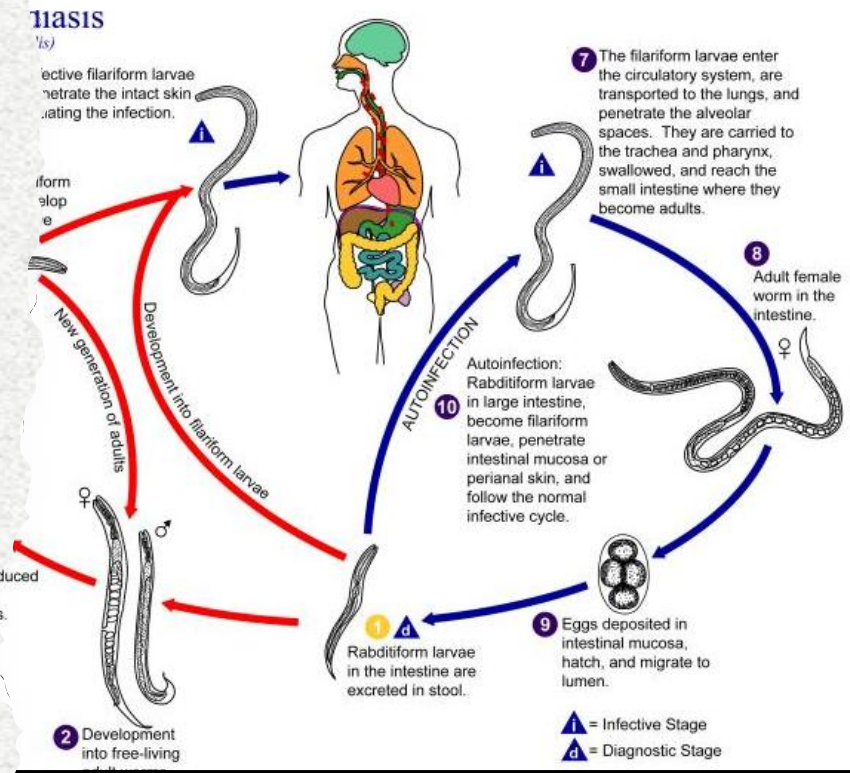
a. **incubation period** – period between infection and evidence of symptoms (i.e. *A. lumbricoides* – 4-8 weeks, *T. trichiura* - 2-3 weeks)

b. pre-patent period – period between acquisition of parasite and evidence of infection (i.e. *A. lumbricoides* - 8 weeks, *T. trichiura* – 10-15 weeks)

Exposure and Infection

a. <u>autoinfection</u> – happens when an infected individual becomes his own direct source of infection (i.e. *S. stercoralis, E. vermicularis*)

b. <u>superinfection</u> – happens when the already infected individual is further infected with the same and/or other species (i.e. STH triad, *C. philippinensis*)

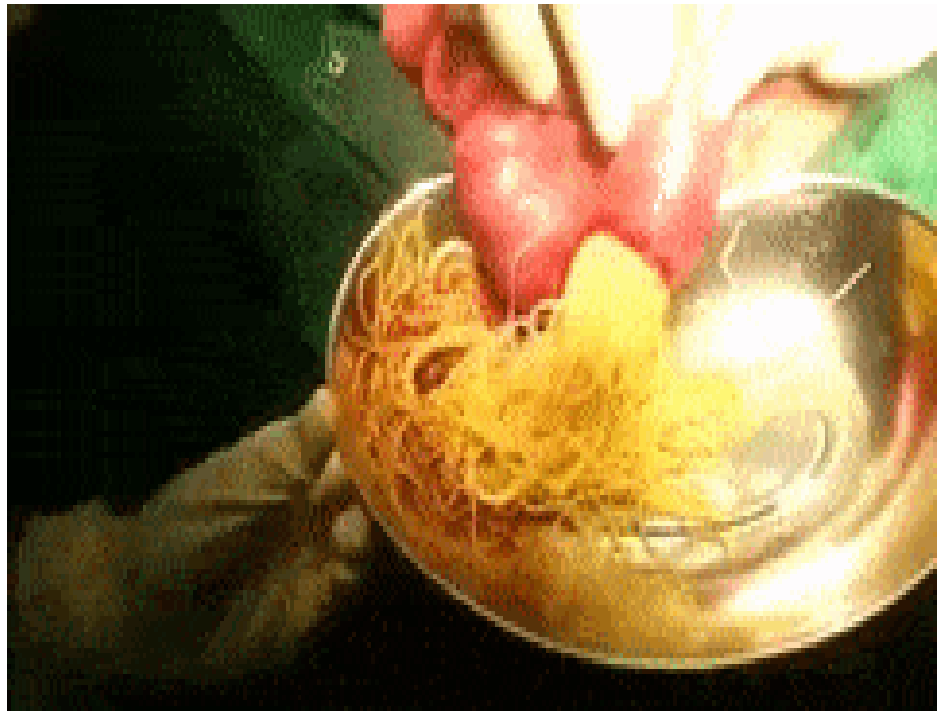


Life Cycle

- May be simple or complicated (i.e. *A. lumbricoides* vs. *Schistosoma spp.*)
- Life stages present differ from one parasite to another
- Most parasitic organisms attain sexual maturity in their definitive hosts
- Life cycle demonstrates both diagnostic and infective stages
- Perpetuation of a species depends upon its ability to ensure transmission from one host to another

Epidemiologic Measures

- **Epidemiology**: Study of patterns, distribution, and occurrence of disease
- **Incidence**: Number of new cases of infection appearing in a population in a given period of time
- **Prevalence**: Number of individuals in a population estimated to be infected with a particular parasite species at a given time
- **Intensity of infection**: Burden of infection which is related to the number of worms per infected person
- **Morbidity**: Clinical consequences of infections or diseases that affect an individual's well-being



Treatment of Parasitic Infections

- **Deworming**: Use of anthelminthic drugs in an individual or a public health program
  - **Cure Rate**: Number (usually expressed as a percentage) of previously positive subjects found to be egg negative on examination of a stool or urine sample using a standard procedure at a set time after deworming; best for measuring clinical success of a deworming drug

    $$\text{Cure Rate} = \frac{\text{No. of subjects who became negative}}{\text{Total no. of subjects treated}} \times 100$$

  - **Egg Reduction Rate (ERR):** Percentage fall in egg counts after deworming based on examination of a stool or urine sample using a standard procedure at a set time after the treatment; best for evaluating drug efficacy

    $$\text{Egg Reduction Rate} = [1 - (\text{mean EPG after tx} / \text{mean EPG before tx}) \times 100]$$

Treatment of Parasitic Infections

- **Selective Treatment**: Individual-level deworming with selection for treatment based on a diagnosis of infection or an assessment of the intensity of infection
- **Targeted Treatment**: Group-level deworming where the (risk) group to be treated (without prior diagnosis) may be defined by age, sex, or other social characteristics irrespective of infection status.
- **Universal Treatment**: Population-level deworming in which the community is treated irrespective of age, sex, infection status, or other social characteristics.

Eradication versus Elimination

- **Disease Eradication**: Permanent reduction to zero of the worldwide incidence of infection caused by a specific agent, as a result of deliberate efforts.
- **Disease Elimination**: Reduction to zero of the incidence of a specified disease in a defined geographic area as a result of deliberate efforts.