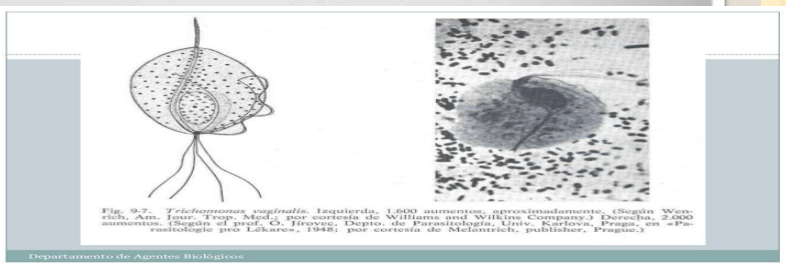
TISSUE PARASITES

Trichomonas vaginalis

- ***Trichomonas vaginalis*** :is an anaerobic flagellated protozoan a form of microorganism.
- The parasitic microorganism is the causative agent of trichomoniasis and is the most common pathogenic protozoan infection of humans in industrialized countries.



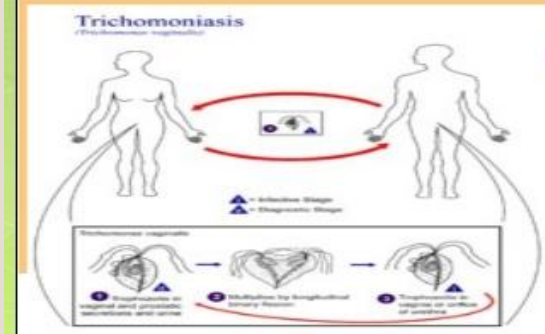
- The human genital tract is the only reservoir for this species. Trichomonas is transmitted through sexual or genital contact.
- Cause by the single-celled protozoan parasite, Trichomonas vaginalis

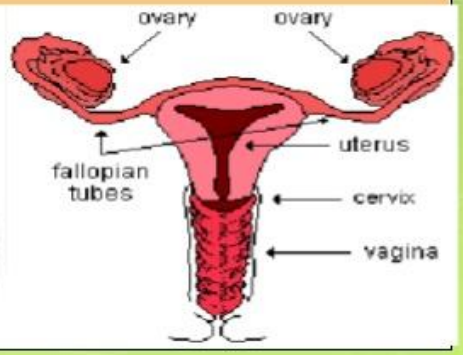
LABORATORY DIAGNOSIS

- Direct Detection, vaginal discharge
- Culture
- Antigen detection (Serology)
- Nucleic acid detection Techniques (PCR etc.)

Mechanism of infection ;

- *Produces mechanical stress on host cells and then ingesting cell fragments after cell death.*



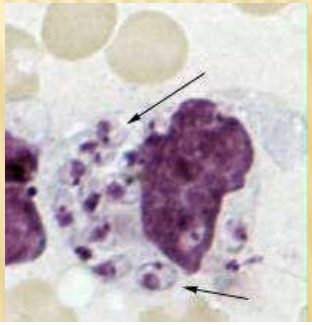


LEISHMANIA

INTRODUCTION

- ***Leishmania***:
  - Is a genus of trypanosomatid protozoa, which causes a fatal vector-borne parasitic disease called Leishmaniasis.
  - It is spread by the bite of sandflies of the genus *Phlebotomus* in the Old World, and of the genus *Lutzomyia* in the New World.

- **Leishmaniasis**:
- is the second-largest parasitic killer in the world (after malaria) and is endemic in many parts of Africa, Asia and South America.

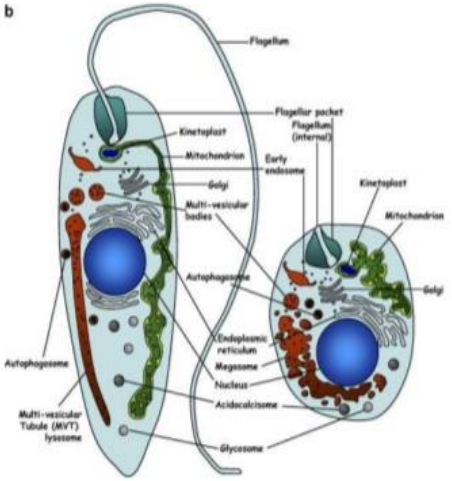


MORPHOLOGY

(same in all species)

- The parasite exists in 2 forms;-

1. Amastigotes – aflagellar stage
2. Promastigotes- flagellar stage

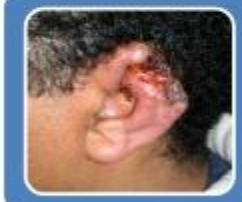


IMPORTANT SPECIES

- *L. donovani*
- *L. tropica*
- *L. mexicana*
- *L. braziliensis*
- *L.major*
- *L.guyanensis*
- *L.lainsoni, etc*

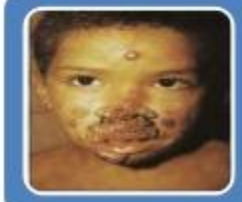
In *L.tropica*

- amastigotes reside in the large mononuclear cells of the skin



In *L.mexicana*

- Amastigotes found in reticuloendothelial cells and lymphatic tissues of skin



In *L.braziliensis*

- amastigotes are found in reticuloendothelial cells and lymphatic tissues of skin and mucus membrane

MODE OF TRAMSMISSION

(*L.donovani*)

1. Mainly by the bite of sand fly (vector) Phlebotomus argentipus
2. **Less frequently by:**

- blood transfusion,
- congenital infection,
- accidental inoculation of cultured promastigotes in the lab. Workers.
- sexual intercourse.

- Males are affected more (due to increased exposure to sand flies through the occupation and leisure activities).

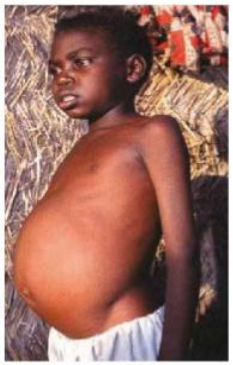
TYPES OF LEISHMANIASIS

Leishmaniasis is divided into clinical syndromes according to what part of the body is affected

- Visceral Leishmaniasis(VL)
- Cutaneous Leishmaniasis(CL)
- Mucocutaneous leishmaniasis(MCL)

1. Visceral Leishmaniasis (VL) or Kala-azar

- caused by *L.donovani*
- part of the body affected most is internal organs

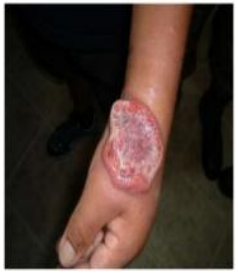


Spleenomegaly

2. Cutaneous Leishmaniasis(CL)

(most common type)

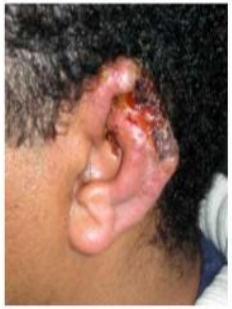
a) **Old world CL:-** caused by ***L.tropica, L. aethiopica***



b) **New world CL:-** caused by *L.mexicana, L.braziliensis, L.g uyanensis*

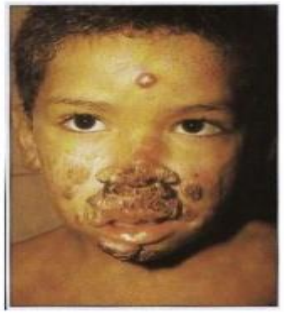
c) **Dermal leishmanoid** or **Post kala-azar dermal leishmaniasis(PKDL):-** caused by *L.donovani*

- Part of the body most affected is **skin**



3. Mucocutaneous leishmaniasis(MCL)

- Caused by *L. braziliensis* and occasionally by *L.panamensis*
- Part of the body affected most is skin and mucous membrane of nose and pharynx



دورة

VECTOR
(Sand fly)

- *Phlebotomas*
- *Lutzomyia*

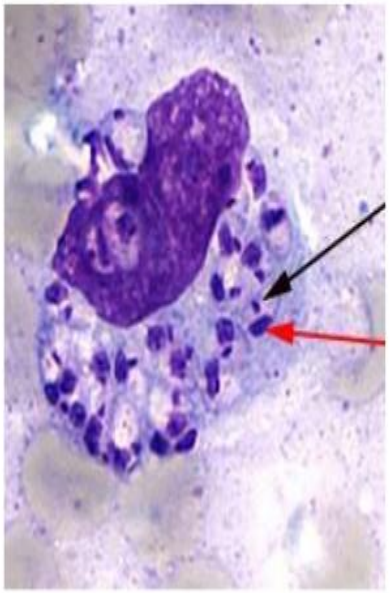
SYNONYMS OF LEISHMANIASIS

Visceral leishmaniasis	Cutaneous leishmaniasis	Mucocutaneous Leishmaniasis
Kala-azar,	Aleppo boil,	*Breda's disease*
Black fever	Baghdad boil,	bosch yaws,
Dum-Dum fever,	Delhi boil,	bush yaws
Sahib's disease	Kandahar sore,	forest yaws
Kala Dukh	Lahore sore,	
White leprosy	Oriental sore,	

- **Clinical Features:**
  Human leishmanial infections can result in 2 main forms of disease, cutaneous leishmaniasis and viscer leishmaniasis (kala-azar). The factors determining the form of disease include leishmanial species, geographic location, and immune response of the hos Cutaneous leishmaniasis is characterized by one or more cutaneous lesions on areas where sandflies hav fed. Persons who have cutaneous leishmaniasis have one or more sores on their skin. The sores can change in size and appearance over time. They often end up looking somewhat like a volcano, with a raised edge and central crater. A scab covers some sores. The sores can be painless or painful. Some people have swollen glands near the sores (for example, in the armpit if the sores are on the arm or hand).
- **Laboratory Diagnosis:**
  Examination of Giemsa stained slides of the relevant tissue is still the technique most commonly used to detect the parasite.
- **Diagnostic findings**
- Microscopy
- Isolation of the organism in culture (using for example the diphasic NNN medium) or in experimental animals (hamsters) constitutes another method of parasitilogic confirmation of the diagnosis, and in addition can provide material for further investigations (e.g., isoenzyme analysis).
- Antibody detection can prove useful in visceral leishmaniasis but is of limited value in cutaneous disease, where most patients do not develop a significant antibody response
- molecular (PCR) approaches. Such techniques, however, are not readily available in general diagnostic laboratories.

Direct Evidences (contd.....)

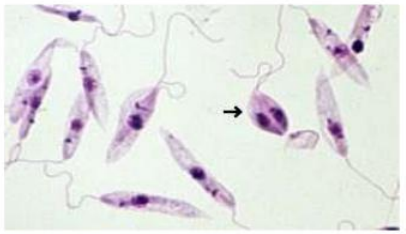
1. Peripheral blood by thick film method.(Amastigote form)



Amastigotes in a macrophage

Direct Evidences (contd.....)

2. **Blood culture** in N.N.N. Medium. (Promastigote form)



Promastigote from culture in NNN medium

TOXOPLASMA GONDII

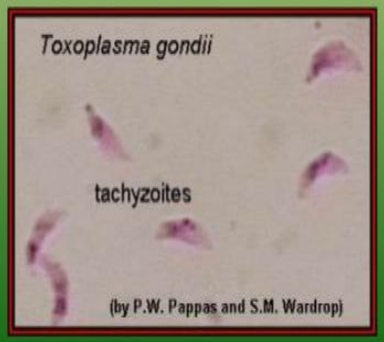
- **Causal Agent:**
  Toxoplasma gondii that infects most species of warm blooded animals, including humans, . A single-celled parasite (a protozoan parasite) causes a disease known as toxoplasmosis. While the parasite is found throughout the world, more than 60 million people in the United States may be infected with the *Toxoplasma* parasite. Of those who are infected, very few have symptoms because a healthy person's immune system usually keeps the parasite from causing illness. However, pregnant women and individuals who have compromised immune systems should be cautious; for them, a*Toxoplasma* infection could cause serious health problems.
- **Geographic Distribution:**
  Serologic prevalence data indicate that toxoplasmosis is one of the most common of humans infections throughout the world. A high prevalence of infection in France has been related to a preference for eating raw or undercooked meat, while a high prevalence in Central America has been related to the frequency of stray cats in a climate favoring survival of oocysts and soil exposure. The overall seroprevalence in the United States among adolescents and adults, as determined with specimens collected by the third National Health and Nutrition Examination Survey (NHANES III) between 1988 and 1994, was found to be 22.5%, with a seroprevalence among women of childbearing age (15 to 44 years) of 15%.

TOXOPLASMOSIS

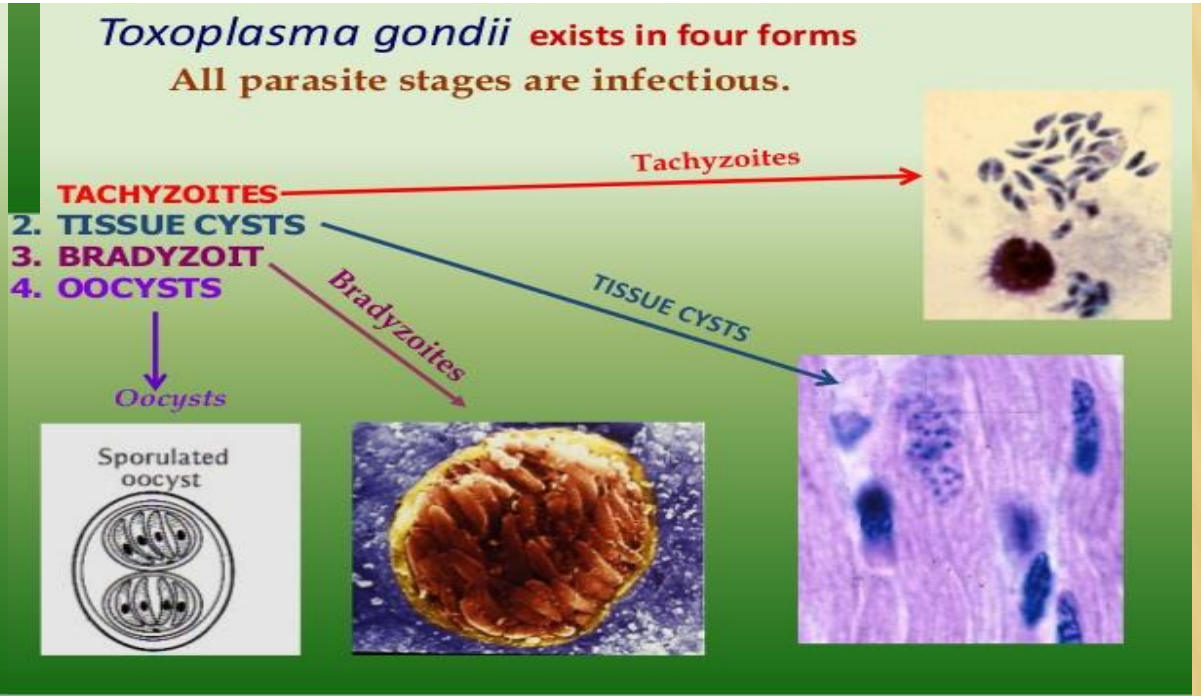
- Widely-distributed zoonosis caused by *T. gondii* protozoa.
- The definitive host is the domestic cat and other felines.
- Humans and other mammals are intermediate hosts.

MORPHOLOGY

- The intracellular parasites (tachyzoite) are 3x6µ and crescent shaped organisms that are enclosed in a parasite membrane to form a cyst measuring 10-100 µ in size.
- Cysts in cat feces (oocysts) are 10-13 µ in diameter



- Definitive hosts for *Toxoplasma gondii* are members of family Felidae (domestic cats and their relatives).
- Unsporulated oocysts are shed in the cat's feces . Although oocysts are usually only shed for 1-2 weeks, large numbers may be shed. Oocysts take 1-5 days to sporulate in the environment and become infective. Intermediate hosts in nature (including birds and rodents) become infected after ingesting soil, water or plant material contaminated with oocysts .
- Oocysts transform into tachyzoites shortly after ingestion. These tachyzoites localize in neural and muscle tissue and develop into tissue cyst bradyzoites . Cats become infected after consuming intermediate hosts harboring tissue cysts . Cats may also become infected directly by ingestion of sporulated oocysts.
- Animals bred for human consumption and wild game may also become infected with tissue cysts after ingestion of sporulated oocysts in the environment . Humans can become infected by any of several routes:



How is Toxoplasmosis Transmitted?

A. Oocysts:

- Contact with cats
- Dirty hands
- Contaminated food
- Water

B. Tachyzoites (Tg):

- Meat
- Blood and its products
- Tissue transplants

C. Bradyzoite:

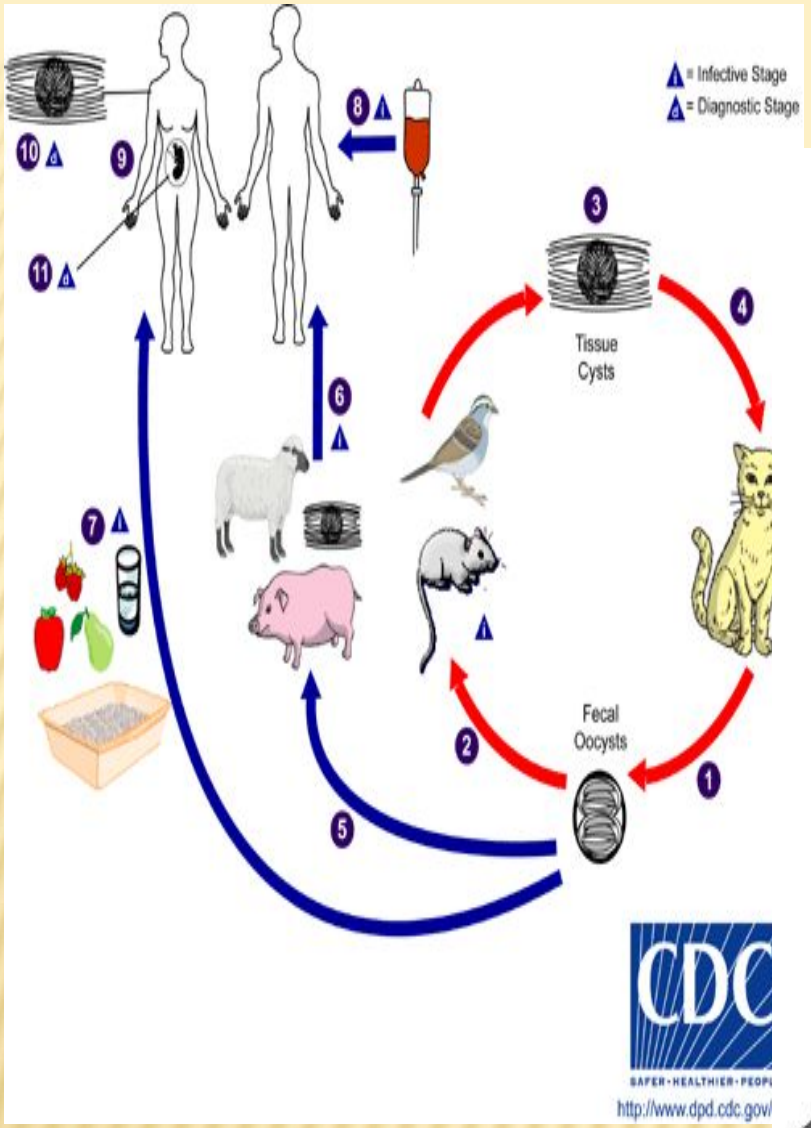
- Meat

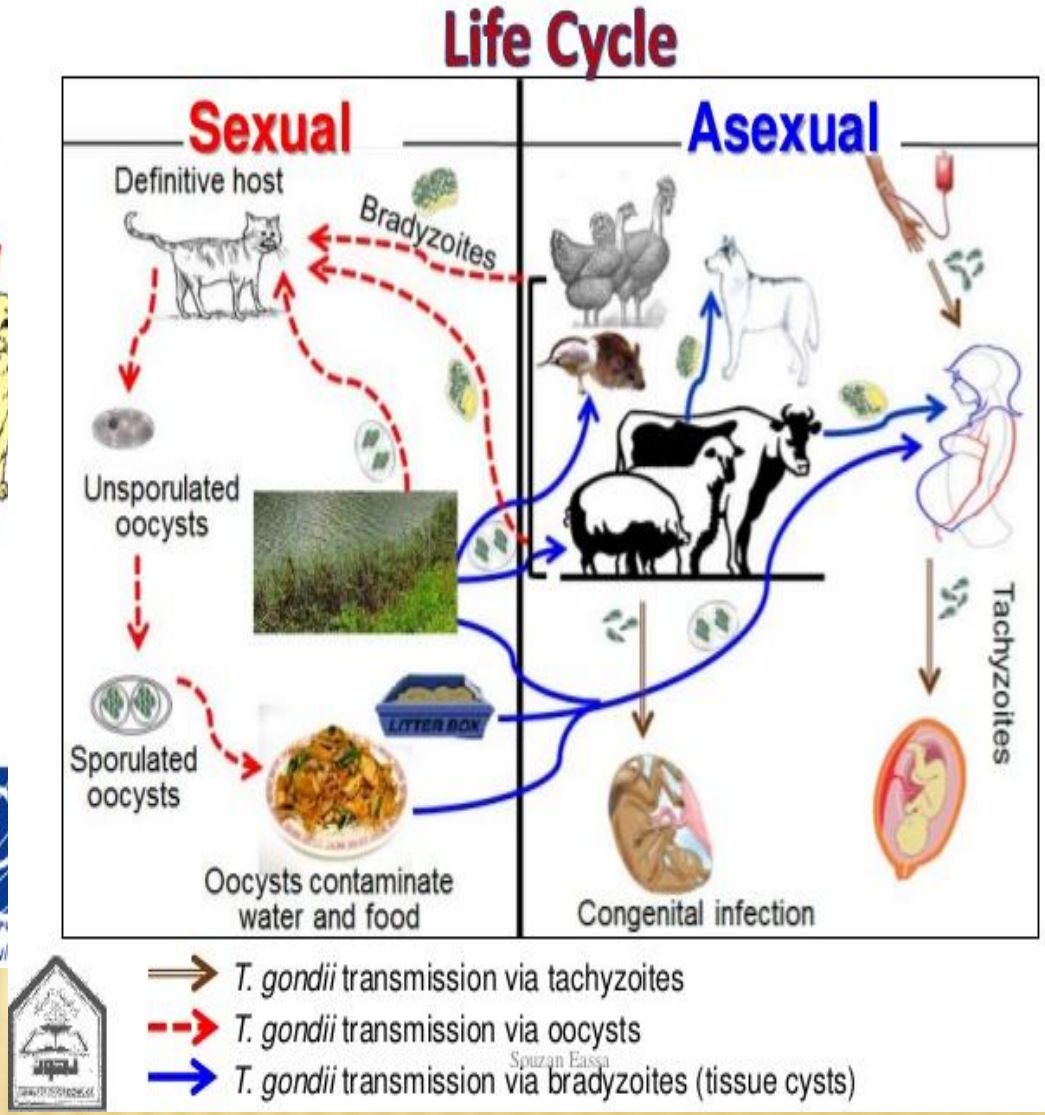
Cats are infected by hunting and eating their prey (Bradyzoites), or by coming into contact with oocysts in feces from infected cats

Transmission to man:

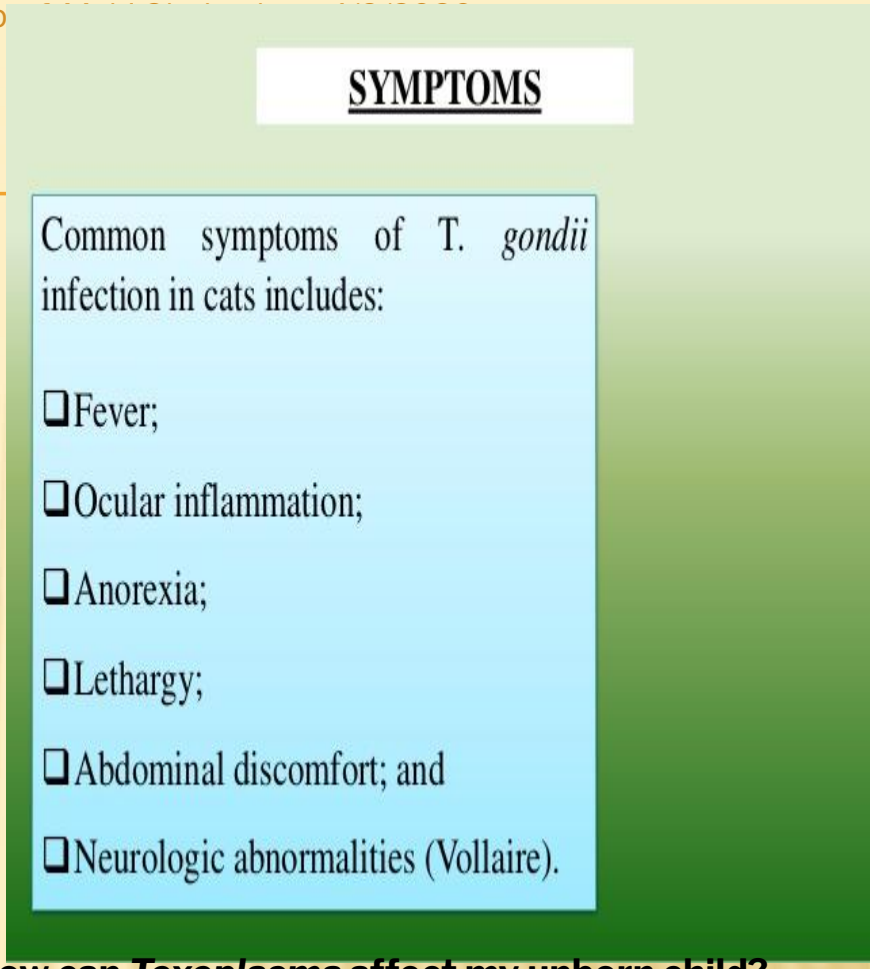
1. Ingestion of sporulated oocysts from contaminated soil, food or water
2. Ingestion of tissue cyst containing bradyzoites from undercooked meat
3. By blood transfusion, needle stick injuries, organ transplantation
4. Transplacentral transmission
5. Laboratory accidents

(Tachyzoites are the infective form in blood)


= Infective Stage
= Diagnostic Stage
Tissue Cysts
Fecal Oocysts
CDC
http://www.dpd.cdc.gov/


Life Cycle
Sexual
Asexual
Definitive host
Bradyzoites
Unsporulated oocysts
Sporulated oocysts
LITTER BOX
Oocysts contaminate water and food
Congenital infection
Tachyzoites
T. gondii transmission via tachyzoites
T. gondii transmission via oocysts
T. gondii transmission via bradyzoites (tissue cysts)
Spuzan Eassa

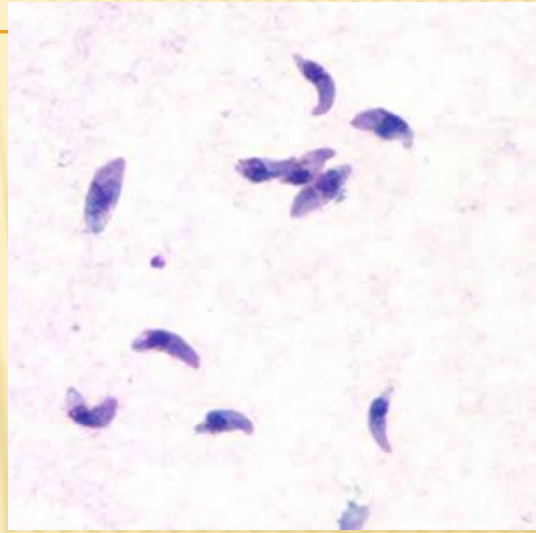
- In the human host, the parasites form tissue cysts, most commonly in skeletal muscle, myocardium, brain, and eyes; these cysts may remain throughout the life of the host
- **Healthy people (nonpregnant)**
- Healthy people who become infected with *Toxoplasma gondii* often do not have symptoms because their immune system usually keeps the parasite from causing illness. When illness occurs, it is usually mild with "flu-like" symptoms (e.g., tender lymph nodes, muscle aches, etc.) that last for weeks to months and then go away. However, the parasite remains in their body in an inactive state. It can become reactivated if the person becomes immunosuppressed.
- **Mother-to-child (congenital)**
- Generally if a woman has been infected before becoming pregnant, the unborn child will be protected because the mother has developed immunity. If a woman is pregnant and becomes newly infected with *Toxoplasma* during or just before pregnancy, she can pass the infection to her unborn baby (congenital transmission). The damage to the unborn child is often more severe the earlier in pregnancy the transmission occurs. Potential results can be
- a miscarriage
- a stillborn child
- a child born with signs of toxoplasmosis (e.g., abnormal enlargement or smallness of the head)
- Infants infected before birth often show no symptoms at birth but may develop them later in life with potential vision loss, mental disability, and seizures.



How can *Toxoplasma* affect my unborn child?

If you are newly infected with *Toxoplasma* while you are pregnant, or just before pregnancy, then you can pass the infection on to your baby. You may not have any symptoms from the infection. Most infected infants do not have symptoms at birth but can develop serious symptoms later in life, such as blindness or mental disability. Occasionally infected newborns have serious eye or brain damage at birth

- **Laboratory Diagnosis:**
  The diagnosis of toxoplasmosis may be documented by:
- Observation of parasites in patient specimens, such as bronchoalveolar lavage material from immunocompromised patients, or lymph node biopsy.
- Diagnosis
- A *Toxoplasma*-positive reaction, stained by immunofluroescence (IFA). (CDC Photo)
- The diagnosis of toxoplasmosis is typically made by **serologic**testing. A test that measures immunoglobulin G (IgG) is used to determine if a person has been infected. If it is necessary to try to estimate the time of infection, which is of particular importance for pregnant women, a test which measures immunoglobulin M (IgM) is also used along with other tests such as an avidity test.
- Diagnosis can be made by direct observation of the parasite in stained tissue sections, cerebrospinal fluid (CSF), or other biopsy material. These techniques are used less frequently because of the difficulty of obtaining these specimens.
- Parasites can also be isolated from blood or other body fluids (for example, CSF) but this process can be difficult and requires considerable time.
- Molecular techniques that can detect the parasite's DNA in the amniotic fluid can be useful in cases of possible mother-to-child (congenital) transmission.



- Isolation of parasites from blood or other body fluids, by intraperitoneal inoculation into mice or tissue culture. The mice should be tested for the presence of *Toxoplasma* organisms in the peritoneal fluid 6 to 10 days post inoculation; if no organisms are found, serology can be performed on the animals 4 to 6 weeks post inoculation.
- Detection of parasite genetic material by PCR, especially in detecting congenital infections in utero

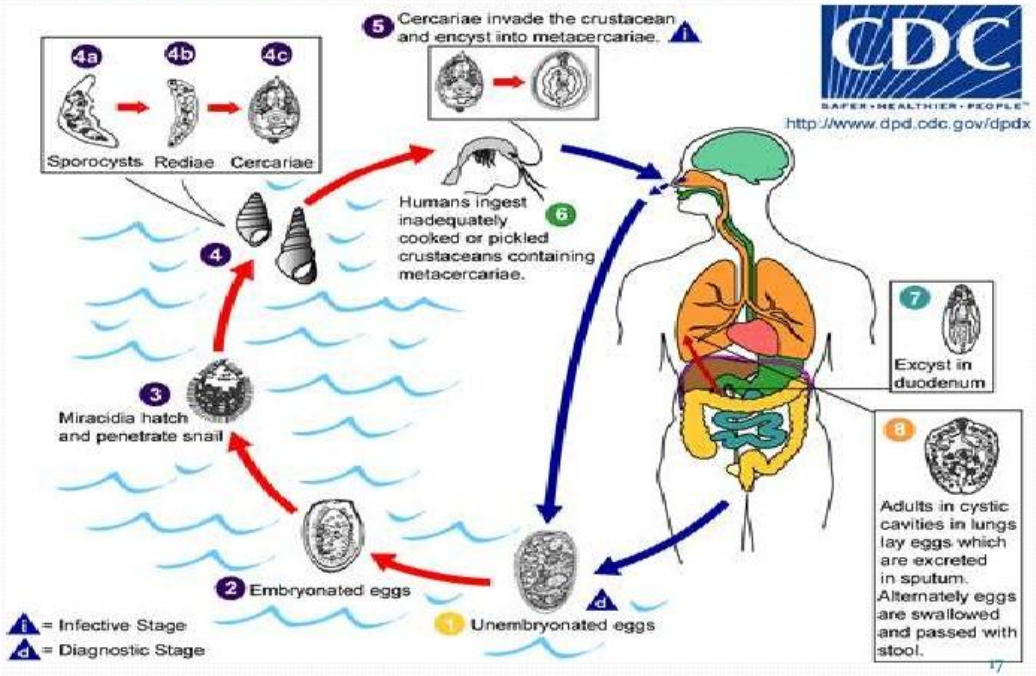
Paragonimus westermani

Paragonimus westermani is the major species of lung fluke that infects humans, causing **paragonimiasis**. The species sometimes is called the Japanese lung fluke or oriental lung fluke. Human infections are most common

Adult worm

18

Life cycle



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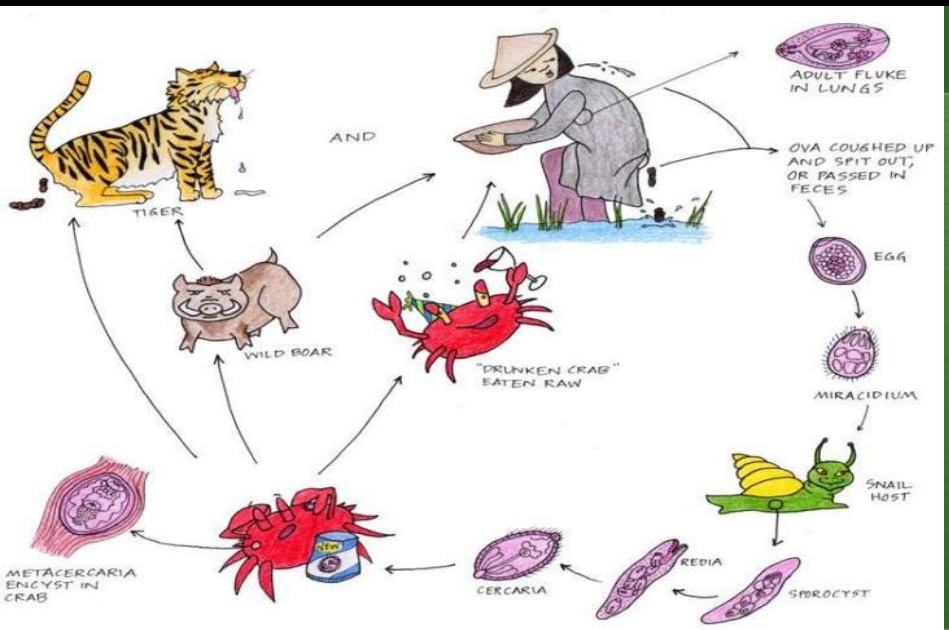
Lung Flukes: *Paragonimus westermani*

- *Paragonimus westermani* ova
  - Yellowish brown
  - Thick-shelled
  - Operculated with a thickened abopercular egg
  - May be seen in the sputum or in feces if the sputum is swallowed

Prepared by FZHapan

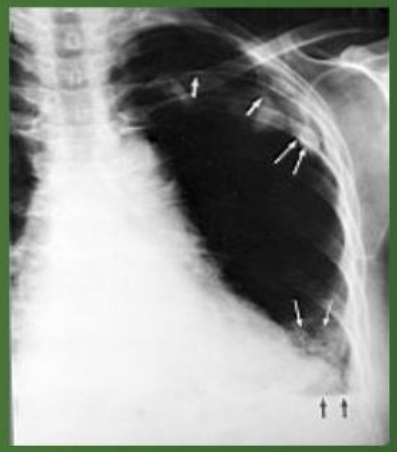
LIFE CYCLE

1. Infective stage: Metacercariae
2. Infective mode: eating raw fresh water crabs and crayfish with metacercariae
3. Infective route: by mouth
4. Site of inhabitation: lungs
5. Intermediate hosts: 1st int. host is melania snail. 2nd int. hosts are crab and crayfish.
6. Reservoir hosts: carnivores such as tiger, lion, wolf, fox, dog, leopard, cat and etc
7. Life span: 5-6 years



Lung Flukes:
Pathogenesis and Clinical Manifestations

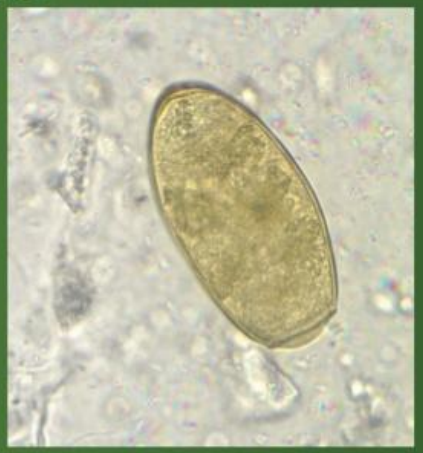
- Paragonimiasis
  - Cough
  - Hemoptysis
  - Symptoms consistent with pulmonary tuberculosis
  - Misdiagnosed as PTB



Prepared by FZHapan

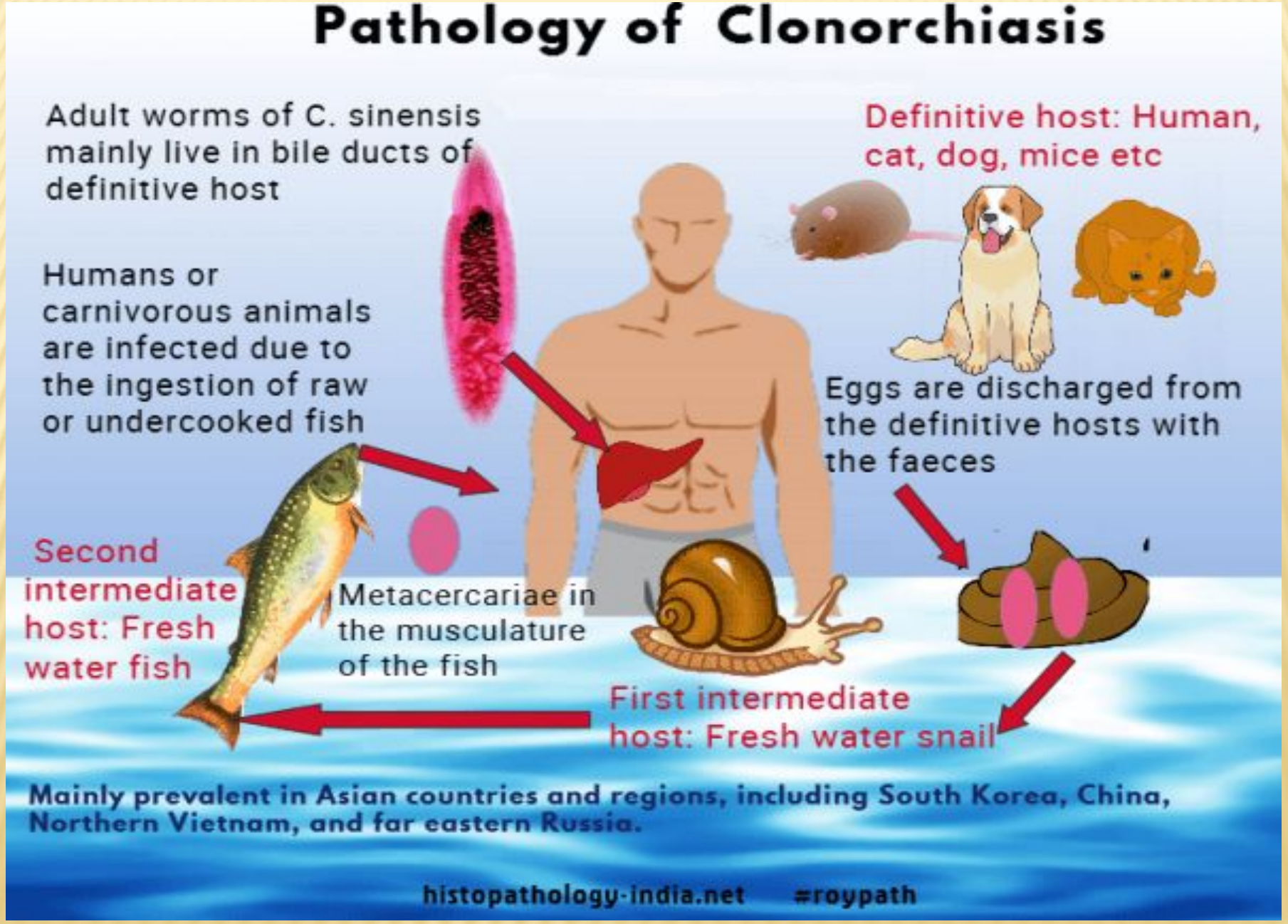
Lung Flukes: Diagnosis of Paragonimiasis

- Radiographs aid in diagnosis
- Definitive diagnosis is based on the finding of ova in the sputum, stool or less frequently in aspirated material from abscesses or pleural effusions
- Multi-dot ELISA

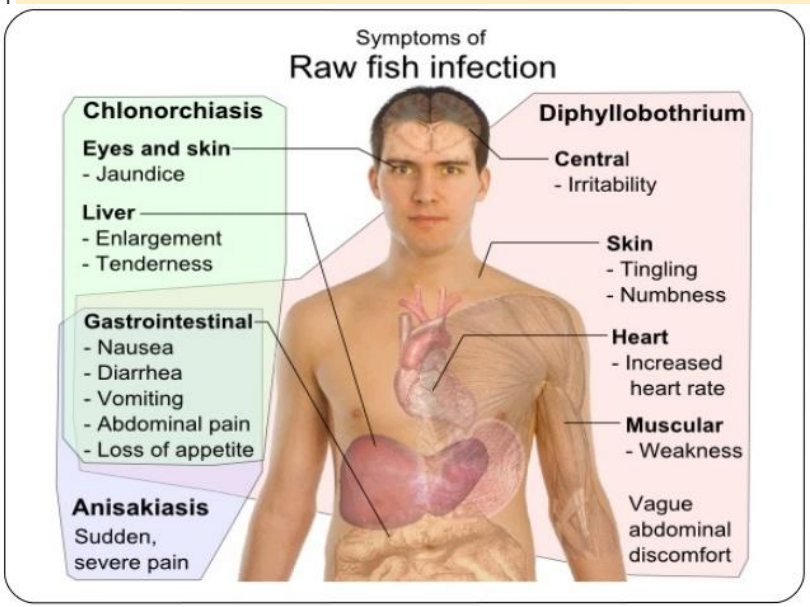


Prepared by FZHapan

clonorchis sinensis



- Source of infection: patients, infected reservior hosts:cats, dogs, mice, pigs
- Route of transmission: the infection is acquired by eating raw or inadequately cooked freshwater fish or shrimp, which are previously infected
- Susceptibility: human is generally susceptive, related with the dietary habits



Laboratory Findings

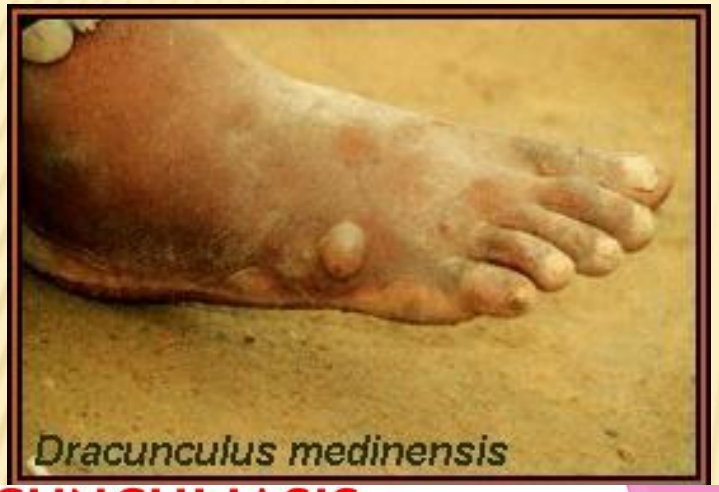
- Blood routine test: eosinophilia, anemia in severe infection
- Eggs examination:

simple smear feces to find eggs

Stool concentration technique may increase the positive rate

Duodenal aspiration: raise the chance of finding eggs

DRACUNCULUS MEDINENSIS


Dracunculus medinensis

- Transmitted exclusively when people drink stagnant water contaminated with parasite infected water fleas.
- It affects people in rural, deprived and isolated communities who depend mainly on open surface water sources such as ponds and wells.

DRACUNCULIASIS :

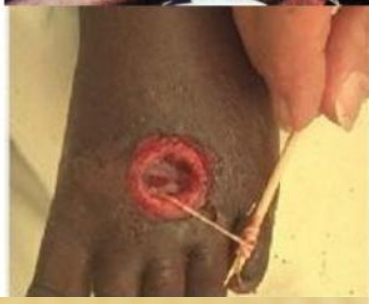
- Also known as guinea worm disease.
- Vector borne parasitic disease.
- Involves subcutaneous tissues(leg and foot).
- Caused by nematode parasite, Dracunculus medinensis.
- Its not lethal but disable its victim temporarily.

LIFE CYCLE:::

*The adult female emerges from the skin (90% legs and feet)

*Person with protruding worm enters water, and female releases larvae

*Copepods ingest larvae and within 10-14 days they reach the infective stage



LIFE CYCLE:::

(continued)

*Once ingested, larvae travel to the small intestine

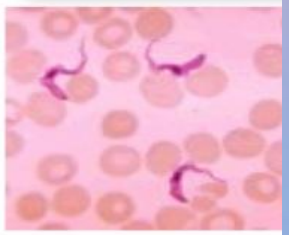
*Penetrate wall of small intestine and pass into the body cavity

*Over 10-14 months, the adult females grow to full size (2-3 feet)

*The mature female then migrates to site where she will emerge (usually lower limbs)

*A blister will develop at the emerging site, and within 1-3 days it will rupture

*Worm will emerge from ulcerated skin



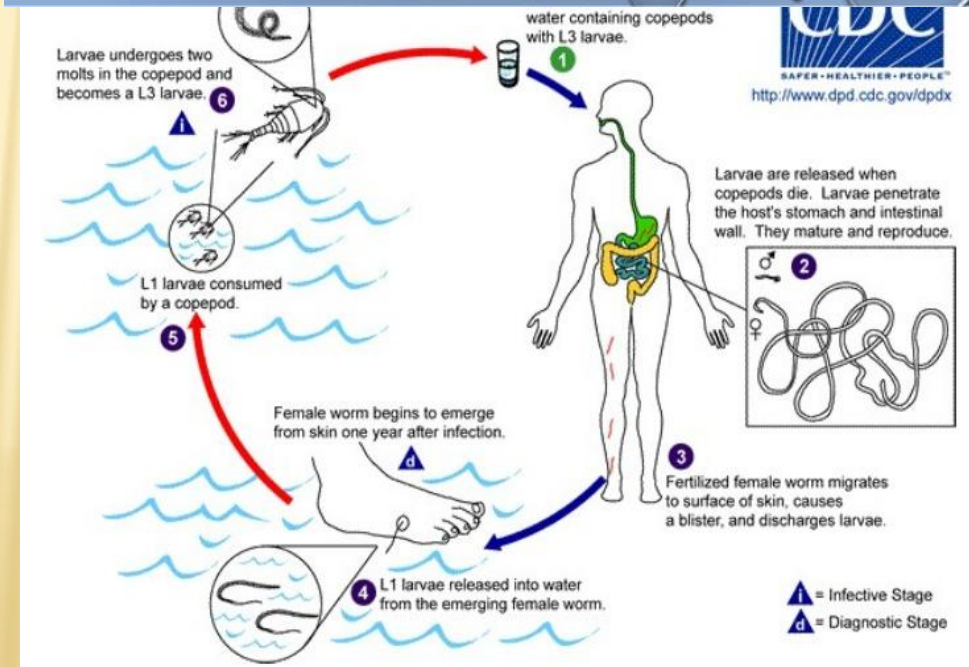
- DETECTION OF LARVA
- CONTACT WITH WATER – LARGE AMOUNT OF LARVA DISCHARGES
- MICROSCOPIC EXAMINATION

- SEROLOGY
- ANTIBODY SEEN IN SERUM BY ELISA & FLUORESCENTS ANTIBODY TEST

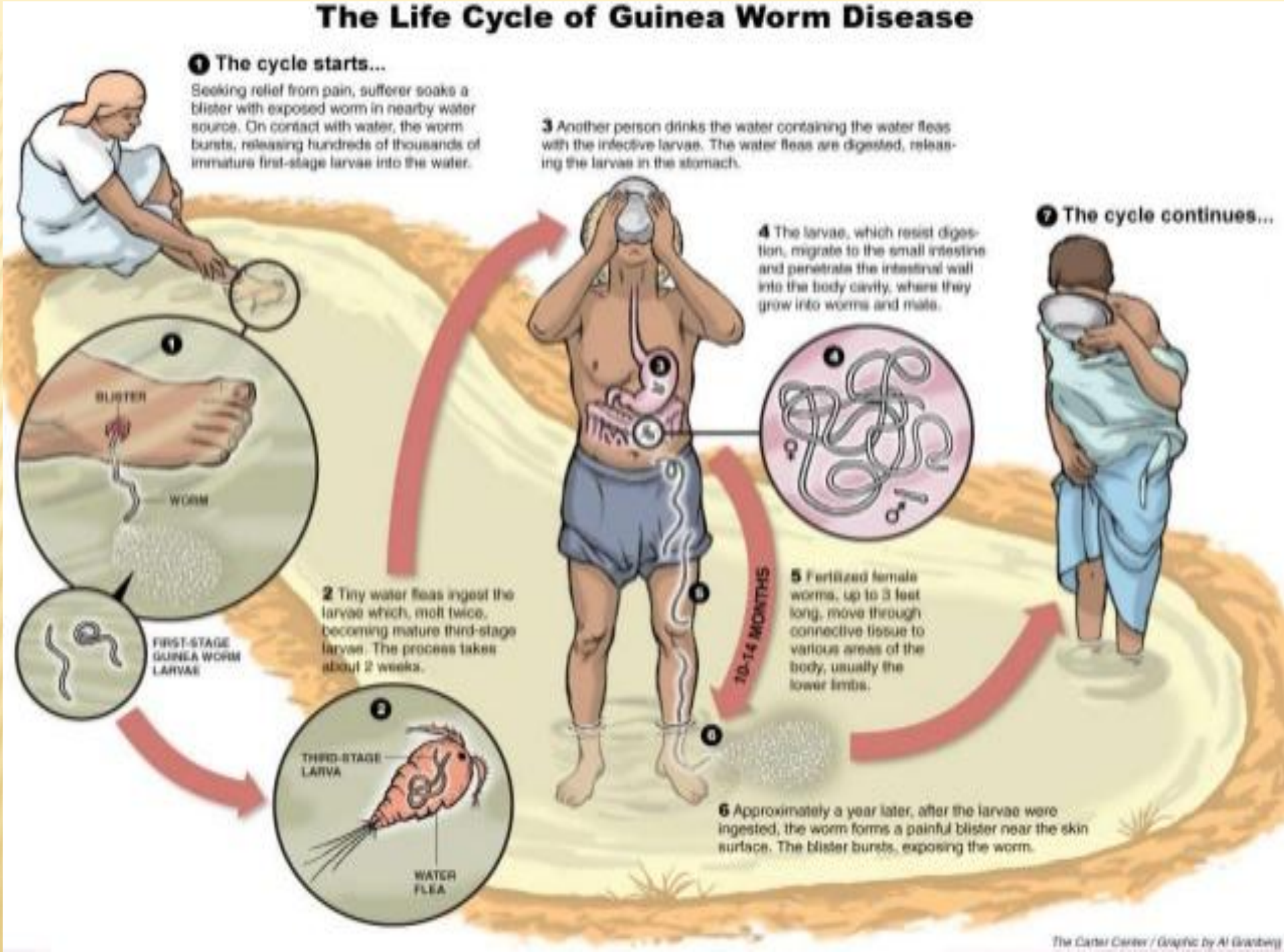
- SKIN TEST
- ANTIGEN IS INJECTED INTRADERMAL TO SEE WHEAL REACTION

SIGN/SYMPTOMS :

- Intense burning pain localized to path of travel of worm(the fiery serpent).
- Fever
- Nausea
- Vomiting
- Allergic reaction



The Life Cycle of Guinea Worm Disease



The Carter Center / Graphic by Al Granberg

Thanks
wish you all the best