

# Human Parasitology

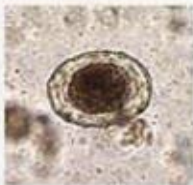
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## -Lecture-5



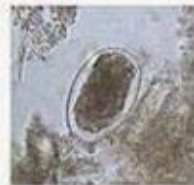
*Ascaris lumbricoides*



*Ascaris lumbricoides*



*Ascaris lumbricoides*  
infértil



*Ancilostomídeo*



*Enterobius vermicularis*



*Trichuris trichiura*



*Taenia sp.*



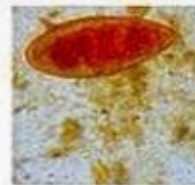
*Hymenolepis sp.*



*Diphylobotrium sp.*



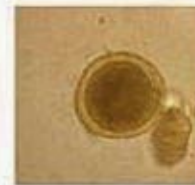
*Dipylidium sp.*  
(aglomerado de ovos)



*Schistosoma mansoni*



*Fasciola hepatica*



*Toxocara canis*



*Taenia saginata*  
proglóte



*Taenia solium*  
proglóte



*Dipylidium sp.*  
proglótes



*Strongyloides stercoralis*  
Larva



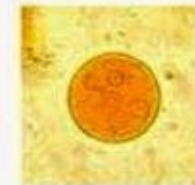
*Ancilostomídeo sp.*  
(larva filarióide)



*Enterobius vermicularis*  
(larva femea)



*Enterobius vermicularis*  
(larva macho)



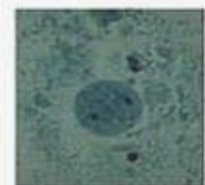
*Entamoeba coli*



*Entamoeba histolytica*



*Giardia lamblia*



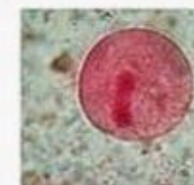
*Endolimax nana*



*Iodamoeba butschlii*



*Chilomastix mesneli*



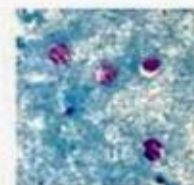
*Balantidium coli*



*Blastocystis sp.*



*Isospora sp.*



*Cryptosporidium sp.*



# Medical Parasitology

## Definitions

is the branch of medical sciences dealing with organisms (parasites) which live temporarily or permanently, on or within the human body (host)

A parasite: “a living organism that acquires some of its basic nutritional requirements through its intimate contact with another living organism”

According to the host-parasite relationship (competition), the host may overcome and remains healthy or loses the competition, and a disease develops

Human parasites are either simple unicellular (protozoa) or multicellular, complex multicellular metazoa (helminthes and arthropods)

The parasites may live inside the host (endoparasites), like *E.histilytica* or on the host surface (ectoparasites), like ticks, lice & others

Eukaryote: a cell with a well-defined chromosome in a membrane-bound nucleus. All parasitic organisms are eukaryotes

# Definitions

**.Host: “the organism which the parasite lives in, or on, and causes disease**

**Definitive host: “the organism in which the adult or sexually mature stage lives”, e.g. humans are the definitive host for most of nematodes like *Trichuris* (whipworm), *Strongyloides*, *Enterobius* (pinworm or threadworm) & some of cestodes like *Taenia saginata***

**Intermediate host: “the organism in which the parasite lives during a period of its development only**

**e.g. *Echinococcus granulosus*, also called the hydatid worm, that the adult worm dwells in the small intestine of canids mostly dogs (definitive host), while the intermediate hosts are most commonly sheep, however, cattle, horses, pigs, goats & humans, where it causes cystic echinococcosis, also known as hydatid disease**

**Zoonosis: “a parasitic disease in which an animal is normally the host – but can accidentally transmitted to human e.g. *Toxoplasma gondii*, *Hymenolepis nana*, *Leishmania major* & *donovani*, and *Sarcoptes scabiei* (from domestic animals)**

**Vector: “a living carrier (e.g. an arthropod) that transports a pathogenic organism from an infected to a non-infected host  
typical example is the female *Anopheles* mosquito that transmits malaria**

# Ectoparasite

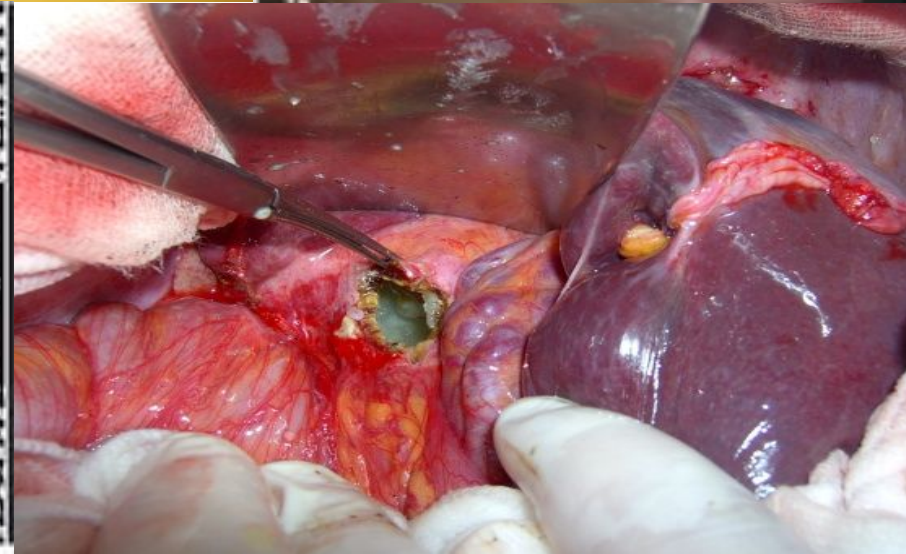
## Sarcoptes scabiei

**Scabies is caused by infestation with the female mite which burrow into the skin to live and deposit eggs called *Sarcoptes scabiei*. It is a contagious disease (transmitted by direct contact). The most common symptoms are severe itching and a pimple-like rash. Occasionally, tiny burrows may be seen in the skin. The symptoms of scabies are due to an allergic reaction to the mites**

**Spread of infection may occur during brief contact (10-15 .minutes) with infected human, animals or contaminated objects**



**Humans, sheep & cattle are intermediate hosts for the cestode called *Echinococcus granulosus*, also called the hydatid worm, where the larval stage (hydatid cyst) lives. The adult worm dwells in the small intestine of canids mostly dogs (definitive host). Hydatid disease can affect any viable tissue in the body most common the liver**



# Examples for parasitic diseases transmitted by insect vector



Lesion on the left cheek

**Cutaneous leishmaniasis (Baghdad boil) is the most common form of leishmaniasis affecting humans. It is a skin infection caused by a single-celled parasite that is *Leishmania tropica* transmitted by the bite of a *phlebotomine sandfly***

Visceral leishmaniasis (VL), also known as kala-azar, is the most severe form of leishmaniasis caused by *Leishmania donovani*. The parasite migrates to the internal organs such as the liver, spleen (hence "visceral"), and bone marrow.



# important intestinal protozoa

The more prevalent 2 intestinal parasites in Iraq, was *Entamoeba histolytica* and the second *Giardia lamblia*

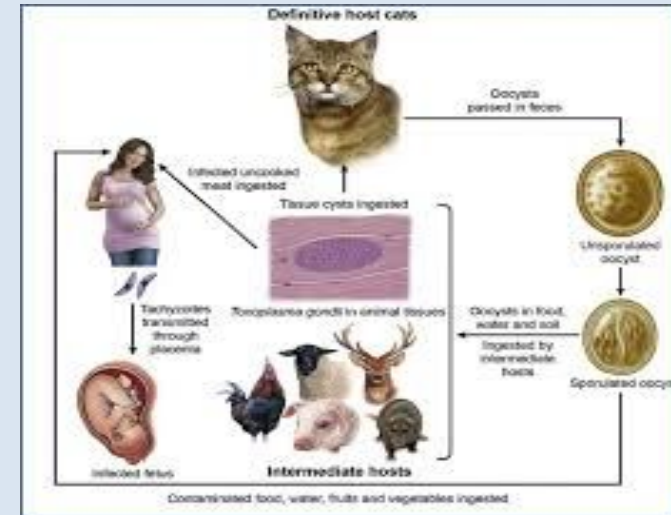
***Entamoeba histolytica***: may invade the colon and cause bloody diarrhoea – amoebic dysentery. Also causes amoebic liver abscess

***Giardia lamblia***: world-wide distribution, lives in the small intestine and results in malabsorption. It is considered the commonest enteric parasite worldwide

**Plasmodium:** the cause of malaria. There are 4 species that infect man: *P. falciparum*, *P. vivax*, *P. ovale* and *P. malariae*

**Toxoplasma gondii:** transmitted by the ingestion of oocysts from cat faeces. Infection can lead to ocular problems and is also a cause of neonatal toxoplasmosis

**Leishmania:** transmitted by sand flies can lead to visceral, cutaneous and mucocutaneous leishmaniasis



**Trypanosoma:** haemoflagellates which cause  
In Africa - sleeping sickness (transmitted by –  
(the Tsetse fly –  
In South America - Chagas disease  
(transmitted by the Reduviid bug) .  
.not reported in Iraq, –

## African Sleeping Sickness (Trypanosomiasis)





# **Leishmaniasis strain in Iraq outbreak identified**

**In the hot, dry border region between northern and central Iraq, Leishmania parasite infections are so common that's why it called "Baghdad sores"**

**Cutaneous leishmaniasis (CL), which is spread to humans by sand fly bites, can cause skin ulcers and eventually remain as disfiguring scars**

**The researchers were able to confirm a recent new outbreak of CL in Iraq**

**Visceral leishmaniasis caused by *L.donovani* can be severe, and even fatal if not recognized and treated. New outbreak reported since 2015 with new cases peaking of visceral Leishmaniasis**

**This disease is zoonotic transmitted by sand flies and is common in the Middle East. The disease can cause chronic fever, weight loss, splenomegaly and pancytopenia.**

**Complications may occur as secondary bacterial infections, severe malnutrition, and severe bleeding can also occur**

# Iraq is Malaria free since 2009 Iraq free of malaria... a new success and upcoming challenge

Malaria control campaign started in Iraq in 1957. This made the country largely free of the disease








Since 1991, following the recent war, Iraq has been affected by serious epidemic of *P. vivax* malaria that started in 3 autonomous governorates (north of Iraq) and soon involved other parts of the country

Iraq is Malaria free since 2009

Malaria causes the most morbidity & mortality worldwide



# Taxonomic classification of helminths

<b>Sub kingdom</b>	<b>Phylum</b>	<b>Class</b>	<b>Genus – examples</b>
<b>Metazoa</b>	<b>Nematodes</b> Round worms; appear round in cross section, they have body cavities, a straight alimentary canal and an anus 		<b>Ascaris (roundworm)</b> <b>Trichuris (whipworm)</b> <b>Ancylostoma (hookworm)</b> <b>Necator (hookworm)</b> <b>Enterobius (pinworm or threadworm)</b> <b>Strongyloides</b>
	<b>Platyhelminthes</b> Flat worms, dorsoventrally flattened, no body cavity and, if present, the alimentary canal is blind ending 	<b>Cestodes</b> Adult tapeworms are found in the intestine of their host They have a head (scolex) with sucking organs, a segmented body but no alimentary canal Each body segment is hermaphrodite 	<b>Taenia (tapeworm)</b> 
		<b>Trematodes</b> Non-segmented, usually leaf-shaped, with two suckers but no distinct head They have an alimentary canal and are usually hermaphrodite and leaf shaped Schistosomes are the exception. They are thread-like, and have separate sexes 	<b>Fasciolopsis (liver fluke)</b> <b>Schistosoma (not leaf shaped!)</b> 

# Epidemiology of Some Parasitic Helminthes in Iraq



**This study was carried out in all Iraqi governorates from 2011 until June, 2015**

**The results showed that**

**patients were infected with Enterobiasis 56206**

**patients with Echinococcosis (Hydatid cyst disease) 4769**

**patients were infected with Ascariasis 89**

**173 patients were infected with Hymenolepiasis**

**25 patients were infected with Taeniasis**

**cases were infected with Trichuriasis 9**

**patients were infected with Ancylostomiasis 6**

**non-patient infected with Strongyloidiasis**

**During the last five years, Iraq was absent of schistosomiasis**

# In Iraq Taeniasis caused by *Taenia saginata* rather than *Taenia solium*

Although in several arabic countries in the middle east • species responsible was not specified. Religious prohibitions on the consumption of pork and the limited extent of pig farming across much of this region, however, suggest that many reported taeniasis cases are likely to be attributable to *T. saginata* rather than *Taenia solium*

Data do not indicate the presence of cysticercosis •



# Filariasis not reported in Iraq

**Lymphatic filariasis, commonly known as elephantiasis, is a neglected tropical disease. Infection occurs when filarial parasites (*Wuchereria bancrofti*, which is responsible for 90% of the cases) are transmitted to humans through mosquitoes. Infection is usually acquired in childhood causing hidden damage to the lymphatic system. The lymphoedema, elephantiasis and scrotal swelling occur later in life. In 2018, .893 million people in 49 countries, mostly in Africa & Asia Iraq is free of the disease but may be seen in immigrants .workers or national travellers from endemic countries**



**Schistosomiasis (Bilharziasis) is a chronic, parasitic disease caused by blood flukes (trematode worms) of the genus *Schistosoma*.**

- **Schistosomiasis is prevalent in tropical and sub-tropical areas.**
- ***S. haematobium* was endemic in Iraq, especially in poor, agricultural areas. The incidence of schistosomiasis is decreasing due to the national control programme, with no cases reported since 2011. Only 5 cases were reported during 2010, which indicates that the country is moving toward the disease elimination phase. In 2015, the situation was evaluated by experts and at present, the country is in the elimination phase, with the aim of WHO certification.**

# Examples of important metazoa – intestinal nematodes

***Trichuris* (whipworm)** •  
A soil transmitted helminth –  
prevalent in warm, humid conditions –  
Can cause diarrhoea, rectal prolapse –  
and anaemia in heavily-infected people

***Ancylostoma* and *Necator* (hookworms)** •  
A major cause of anaemia in the tropics –

***Strongyloides*** •  
inhabits the small bowel –  
infection more severe in –  
immunosuppressed people (e.g. HIV/AIDS,  
malnutrition, intercurrent disease)

***Enterobius* (pinworm or threadworm)** •  
prevalent in cold and temperate –  
climates but rare in the tropics  
.found mainly in children –  
Cause intense perianal itching –  
.especially at night

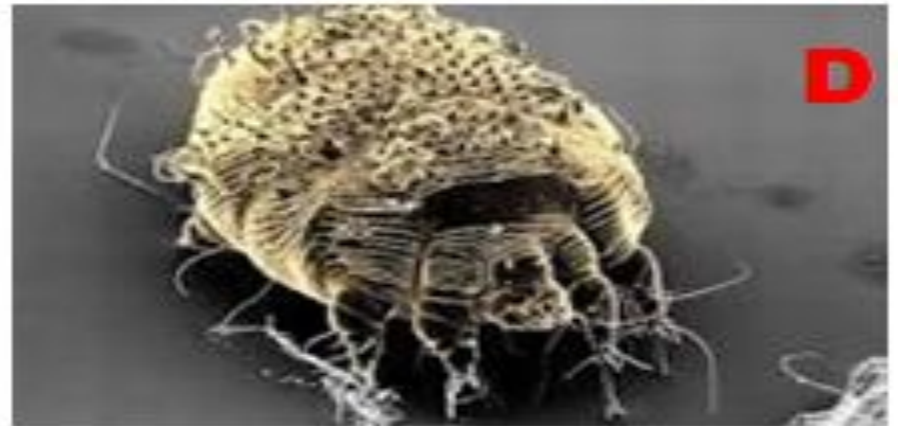
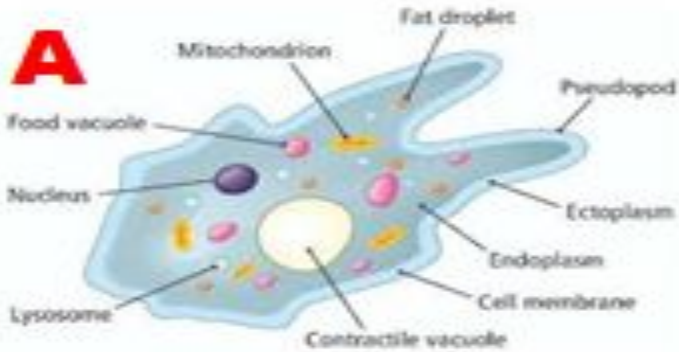
***Ascaris* (roundworm)** •  
Found world-wide in –  
conditions of poor hygiene,  
transmitted by the faecal-  
oral route  
Adult worms lives in the –  
small intestine  
Causes eosinophilia –



**Heavy intestinal infections  
may occur with *Ascaris*.  
Adult worms can reach up  
to 35 cm long**



# Q1: which of the following parasite ?is contagious



**Q2: The parasitic disease which causes the highest morbidity & mortality worldwide is**

- .A- Visceral leishmaniasis(Kala azar) •**
- .B- Schistosomiasis mansoni •**
- C- Malaria •**
- D- Filariasis •**

**Q3: The most common helminthic disease in Iraq is**

**A- Ascariasis •**

**B- Hymenolepiasis •**

**C- Schistosimiasis haematobium •**

**D- Enterobiasis •**

*Next lecture*  
*Amoebiasis & Giardiasis*

**Thank  
you!**