Parasitic Helminths and Arthropod Agents and Vectors of Diseases

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Parasitic Helminths
and
Arthropod Agents and Vectors of Diseases

Objectives:

By the end of this lecture the student should be able to :

- **Name the three main groups of parasitic helminths and their characteristic morphological features .**
- **Describe the life cycle of Ascaris lumbricoides as an example of parasitic helminths .**
- **Discuss the role of arthropods as agents and as vectors of diseases in humans.**
- **Give examples of the main arthropod vectors of diseases.**

Classification of Parasites

Protozoa	Helminthes
Unicellular Single cell for all function	Mulicellular Specialized cells
Amoebae: move by pseudopodia. **Flagellates:** move by flagella. **Ciliates :** move by cilia **Apicomplexia** (sporozoa) Tissue parasites	A- ***Round worms =*** **Nematodes** cylindrical, un-segmented(Ascaris) B- ***Flat worms*** **1-Trematodes:** leaf-like, un-segmented. **2-Cestodes:** tape-like, segmented

Location of helminthes in the body:

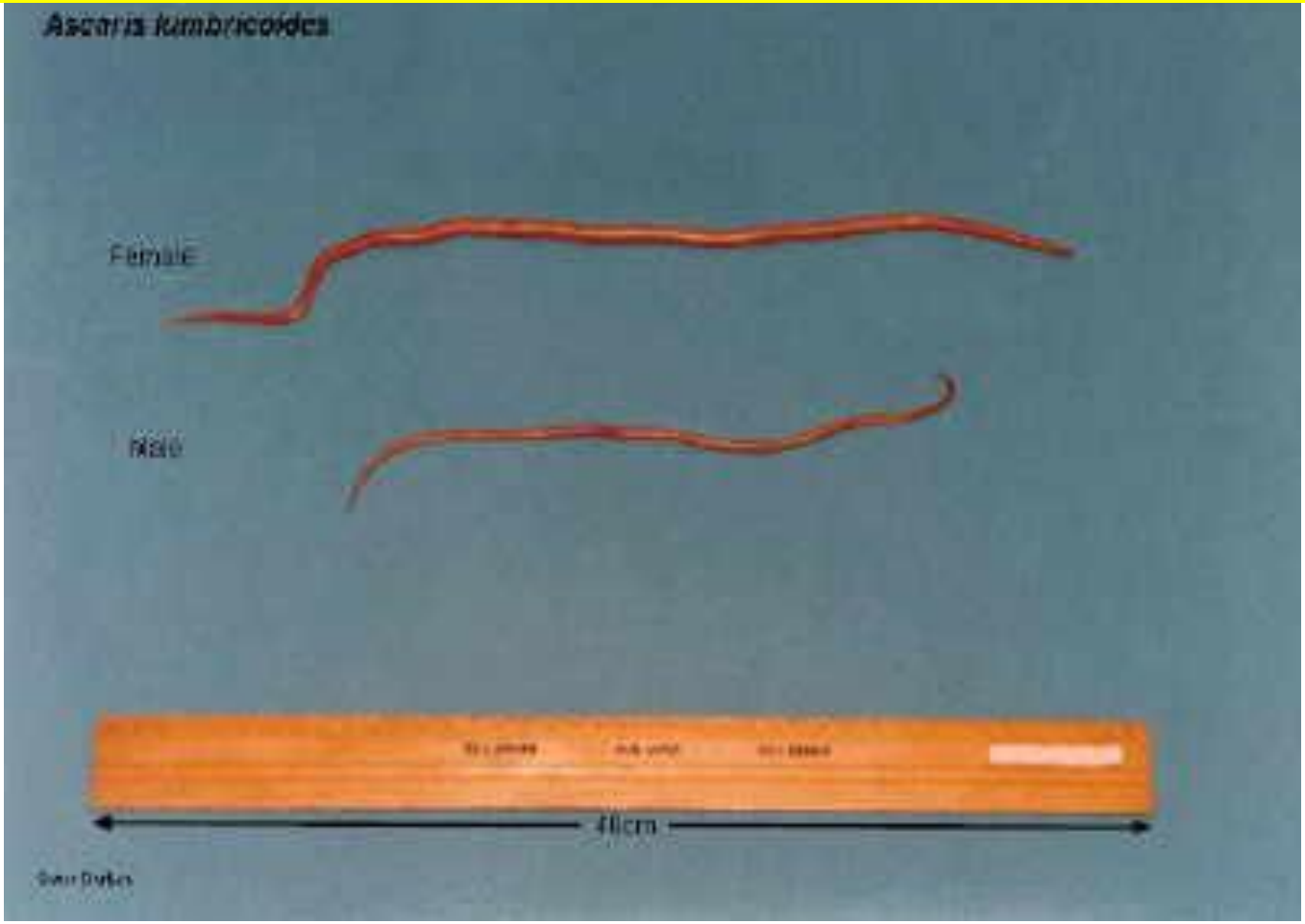
- **Intestinal helminthes:**
- **Tissue helminthes:**

Nematodes (round worm) intestinal Nematode

General features

1. **Elongated worm, cylindrical, unsegmented and tapering at both ends.**
2. **Variable in size, measure <1 cm to about 100cm.**
3. **Sex separate and male is smaller than female**

Ascaris lumbricoides (roundworm)

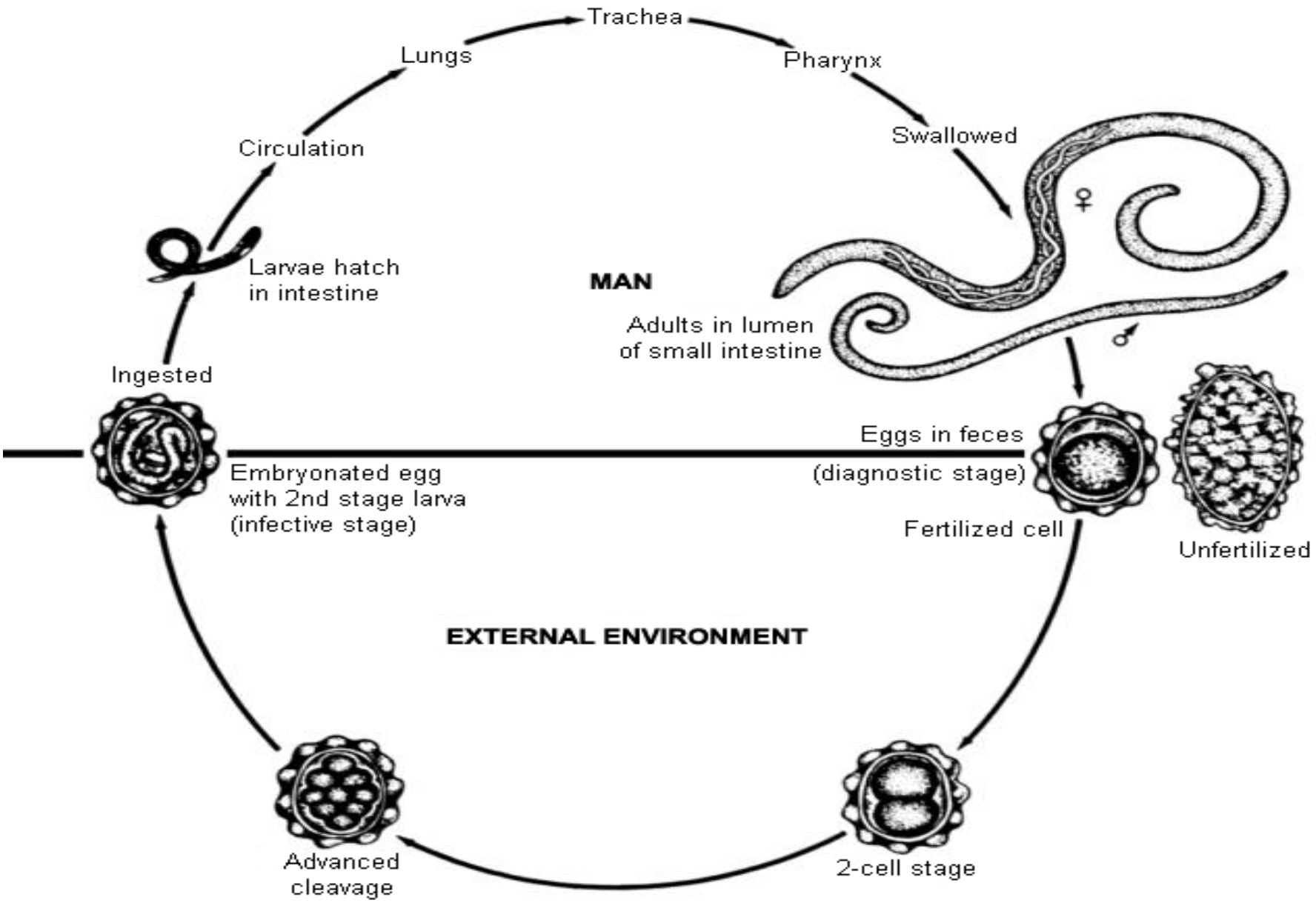


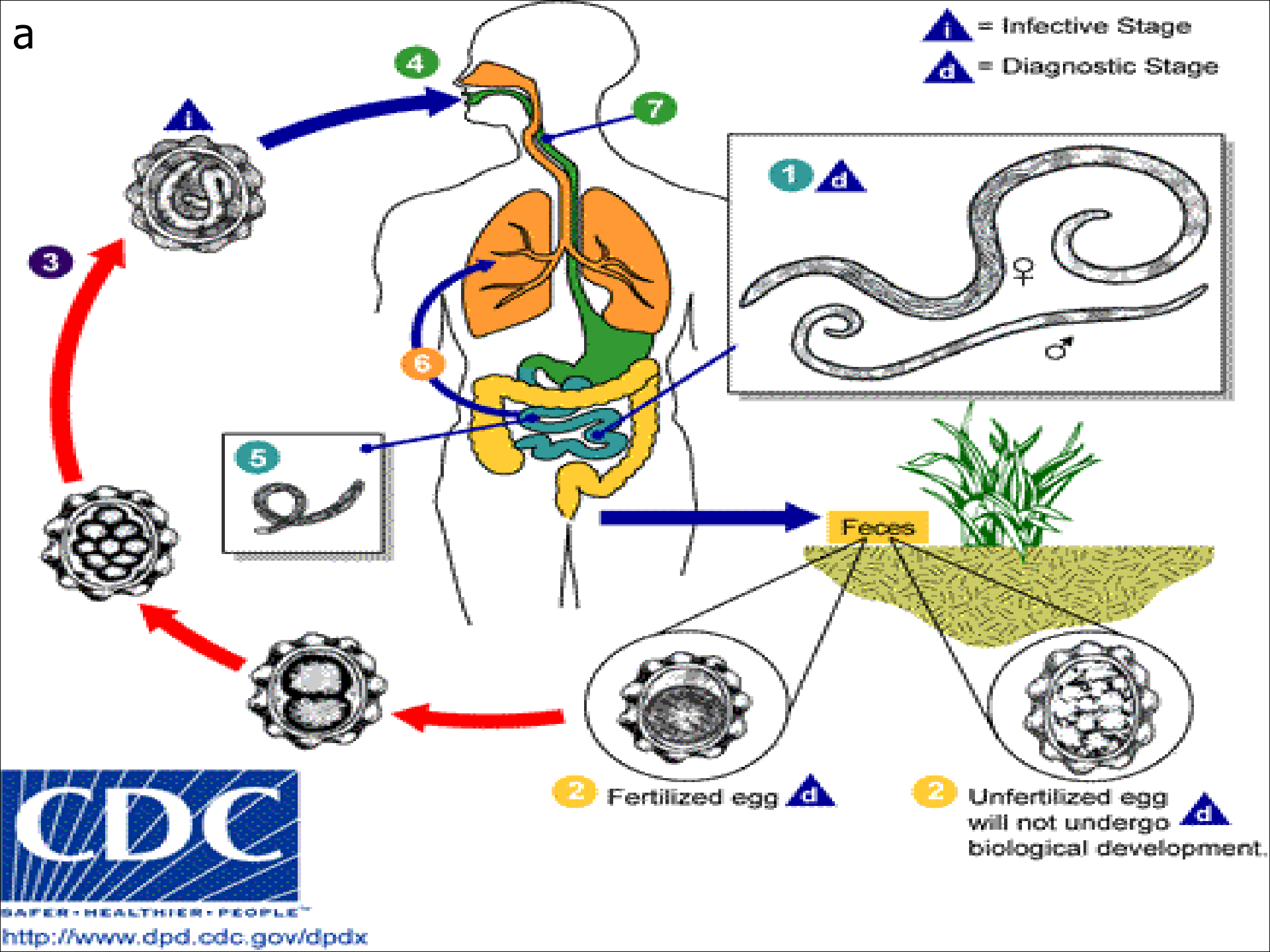
Ascaris lumbricoides (roundworm)

The commonest intestinal helminthes can cause infection to human.

- Found in **jejunum** and upper part of **ileum.**
- Female (**20-40 cm**) which is longer than male (**10-15 cm) .**
- Feed on semi digested food.

Ascaris lumbricoides life cycle




a
= Infective Stage
= Diagnostic Stage
1 d
♀
♂
2 Fertilized egg d
2 Unfertilized egg will not undergo biological development. d
Feces
CDC
SAFER·HEALTHIER·PEOPLE™
http://www.dpd.cdc.gov/dpdx

Life cycle of Ascais Lumbricoides

Infection starts when man ingest an **Embryonated egg** contaminated with food or water, then this **embryonated egg** become a **Larva** in the duodenum, and penetrate the wall of the **duodenum** , enter the blood stream to the heart , liver and enter the ***pulmonary circulation*** and stay in the **alveoli** ,where it grow for three weeks then **Larva** passes from respiratory system to be **coughed up** ,swallowed ,returned back to the small intestine where it mature to adults male &female ,fertilization take place producing eggs which pass in stool as **Fertilized eggs** or **unfertilized eggs** ,only **fertilized eggs** can be survive in the soil for 2 weeks to become an **Embryonated egg** ready to infect human with contaminated food.

Pathogenicity

- ***1-Migrating LARVA :***
- ***Ascaris pneumonia , some times LARVA reach aberrant sites like brain ,heart or spinal cord can cause unusual disturbance.***
- ***2-Adult WORM:***
- ***The worm consumes proteins and vitamins from host's diet and leads to malnutrition.***
- ***Can cause intussusception, intestinal ulcers and in massive infection can cause intestinal obstruction.***

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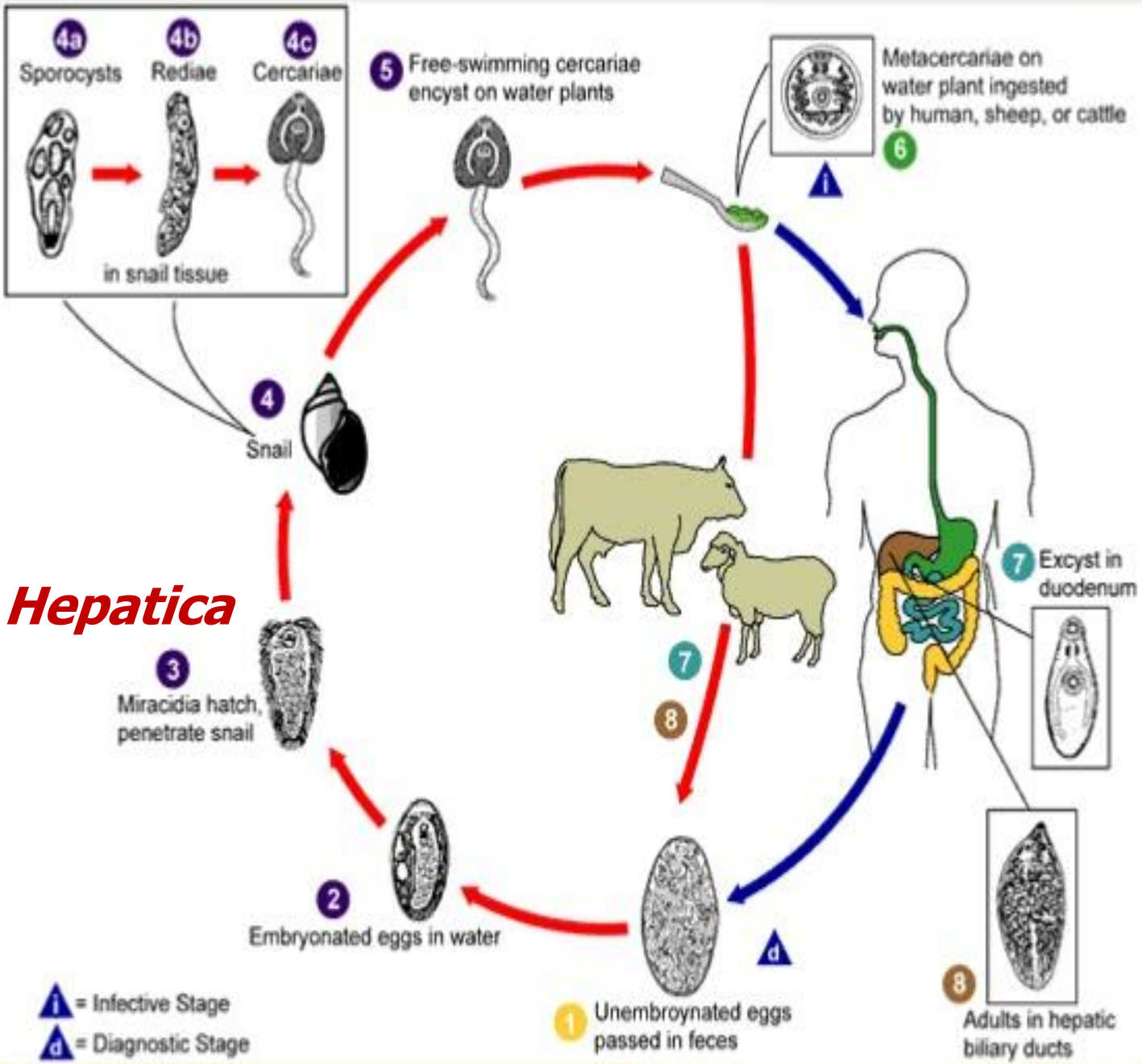
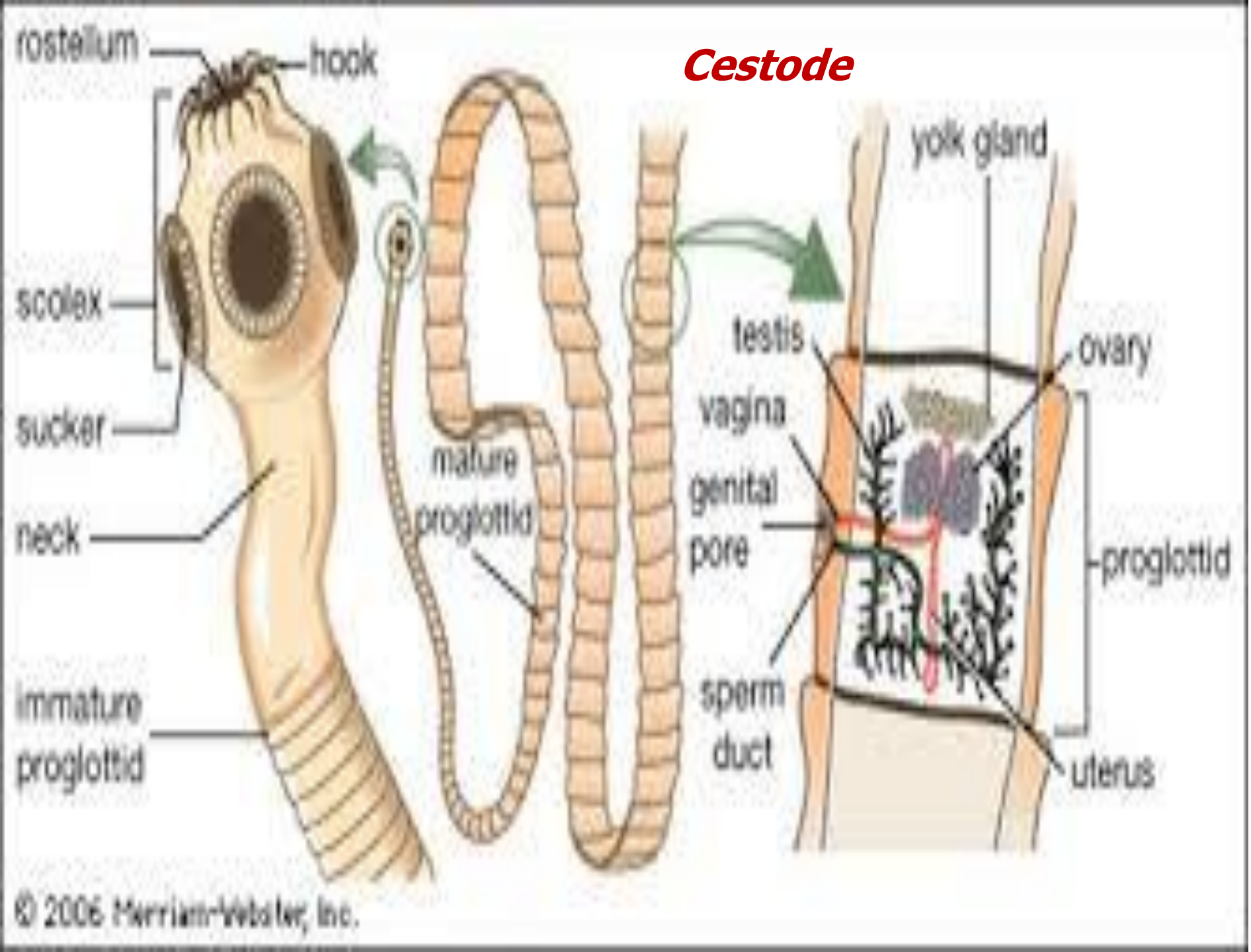
The Trematodes flat worm , un-segmented ,leaf like fasciola hepatica, causing Biliary Obstruction and Jaundice .

Ciclo de Vida

Faciola Hepatica



Cestode


rostellum
hook
scolex
sucker
neck
immature proglottid
mature proglottid
yolk gland
testis
ovary
vagina
genital pore
sperm duct
uterus
proglottid
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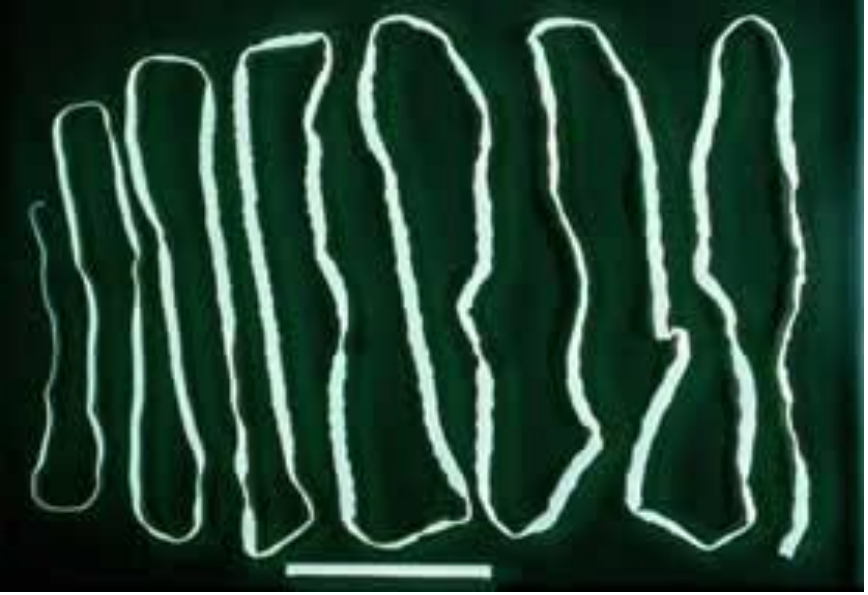
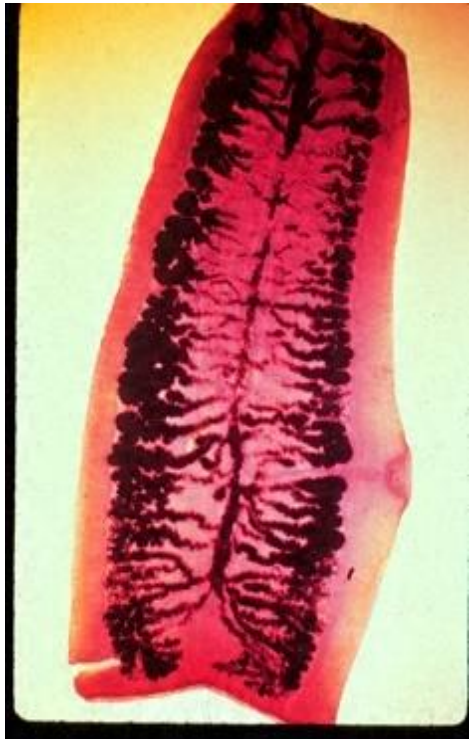


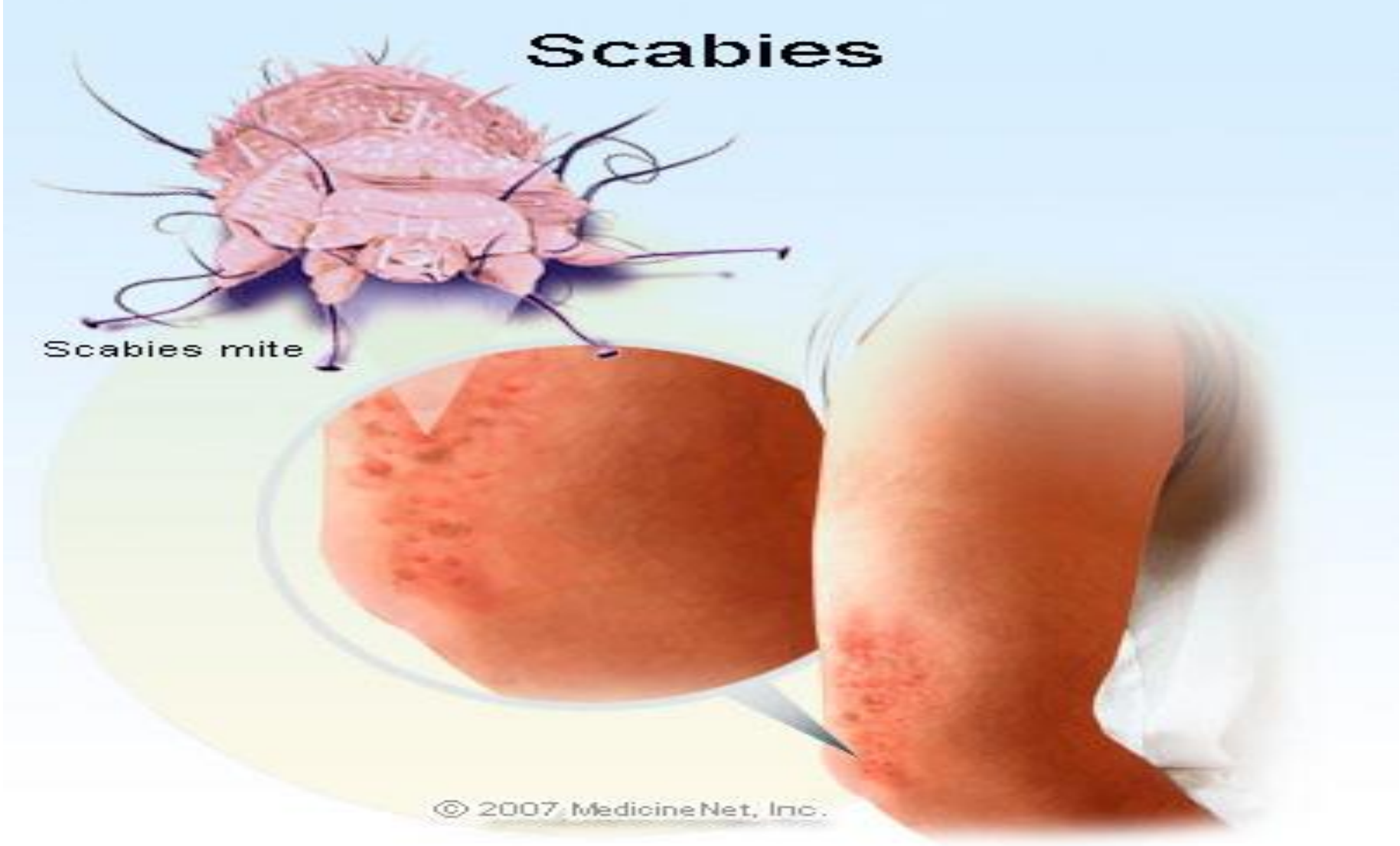


Taenia saginata Ex f a Cestode ,Tapelike worm segmented.GIT discomfort , diarrhea and vomiting.

MEDICAL IMPORTANCE OF ARTHROPODS

- **1)As aetiologic agents (causes) of diseases.**
  - **Tissue damage Scabies**
  - **Induction of hypersensitivity reactions.**
  - **Injection of poisons Scorpions العقرب.**
  - **Entomophobia (acarophobia)**
- **2) As vectors of diseases:**
- **I: Mechanical transmission - simple carriage of pathogens. flies**
- **II: Biological transmission:**
  - **cyclical filarial parasite**
  - **propagative e,g;plaque bacillie in rat fleas**
  - **cyclopropagative e,g;Malaria in mosquito**
- **III: Transovarian transmission as ricketsis carried within ticks.**

Scabies as tissue damage example of Arthropod As aetiologic agents (causes) of diseases.


Scabies
Scabies mite
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Scabies

الجرب

ARTHROPODS OF MEDICAL IMPORTANCE

Class *Insecta* الحشرات	Class *Arachnida* العناكب	Class القشريات *Crustacea*
• Muscid flies:housefly,Tsetse fly • Myiasis-producing flies . • Mosquitoes البعوض: *Anopheles, Aedes Culex* • Sandfly ذباب الرمل (*Phlebotomus)* • Black fly*(Simulium)* • Fleas البراغيث • Lice(*Pediculus,Phthirus)* القمل • Bugs:*Cimex,Triatoma* البق • Bees النحل	• Scorpions العقارب • Spiders العناكب • Ticks: القراد hard, soft • Mites السوس -*Sarcoptes scabiei*, -dust mites	• Water flea *(Cyclops)*

Important arthropod vectors for human diseases

House fly *(Musca domestica)*	Mechanical transmission of many viruses, bacteria and parasites.
Mosquitoes البعوض	Anopheles **:malaria** filariasis Culex: filariasis, viruses Aedes: yellow fever, dengue fever, Rift Valley Fever
Lice القمل	Body louse: vector for: Relapsing fever, typhus and trench fever.
Fleas البراغيث	Rat flea is vector for plague due to Yersinia pestis.
Ticks القراد	Soft ticks , some are vestors for : Borrela duttoni Hard ticks Include vectors for Babesiosis (protozoa), Q fever, and Rocky mountain spotted fever :
Tse tse fly *(Glossina)* ذبابة التسي	**Vector for African Trynanosomiasis** (African sleeping sickness)
Black fly *(Simulium)* الذبابة السوداء/	Vector for Onchocerca (river blindness)
Sand fly *(Phlebotomus)* ذبابة الرمل	Vectors for l**eishmania** .
Cyclops	Vector for Dracunculus medinensis

LICE القمل

Louse(singular) , Lice (pleural)

Pediculus humanus

sand flay transmit *Leishmania*