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:

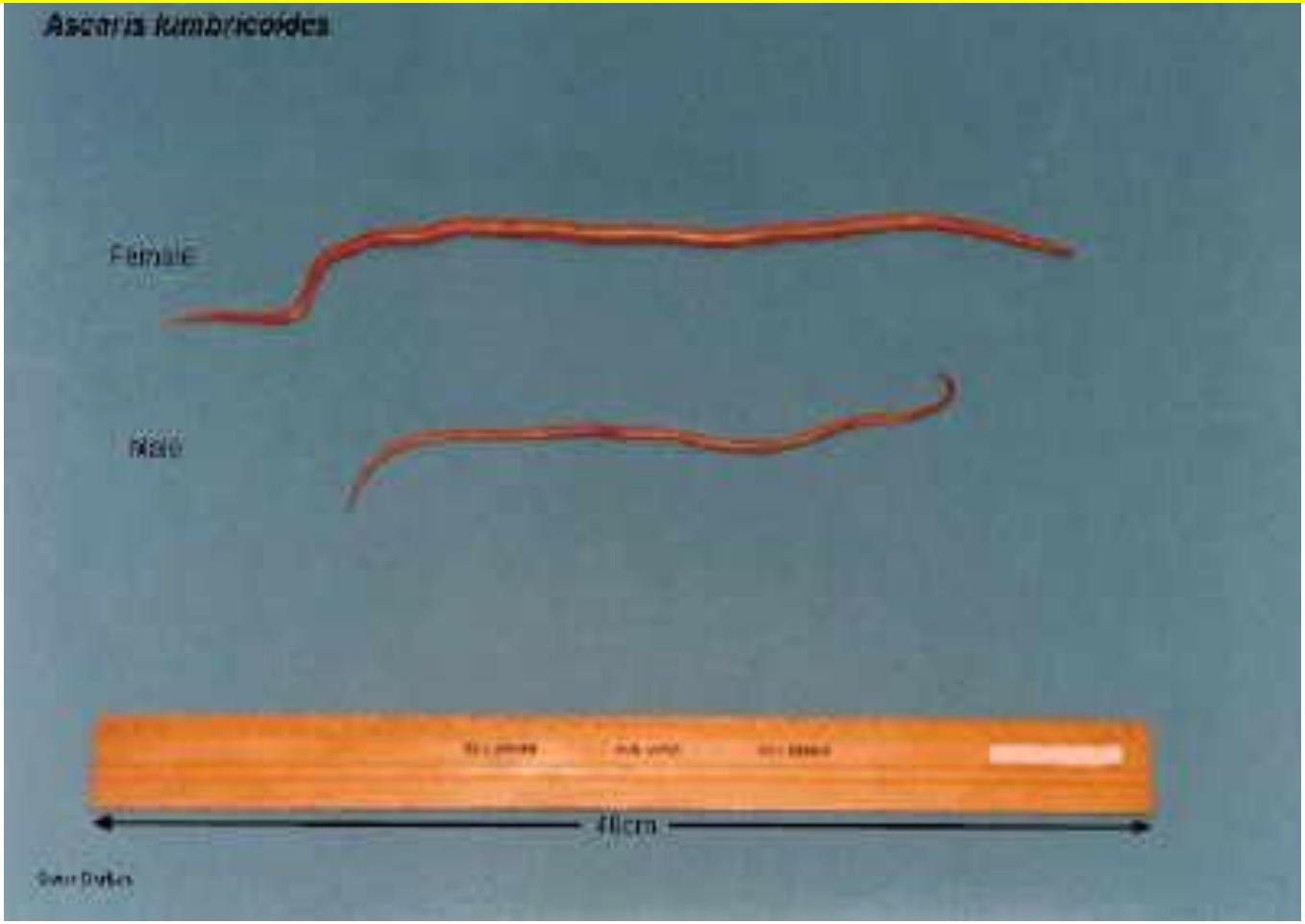
- **Intestinal helminthes:**
- **Tissue helminthes:**

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)

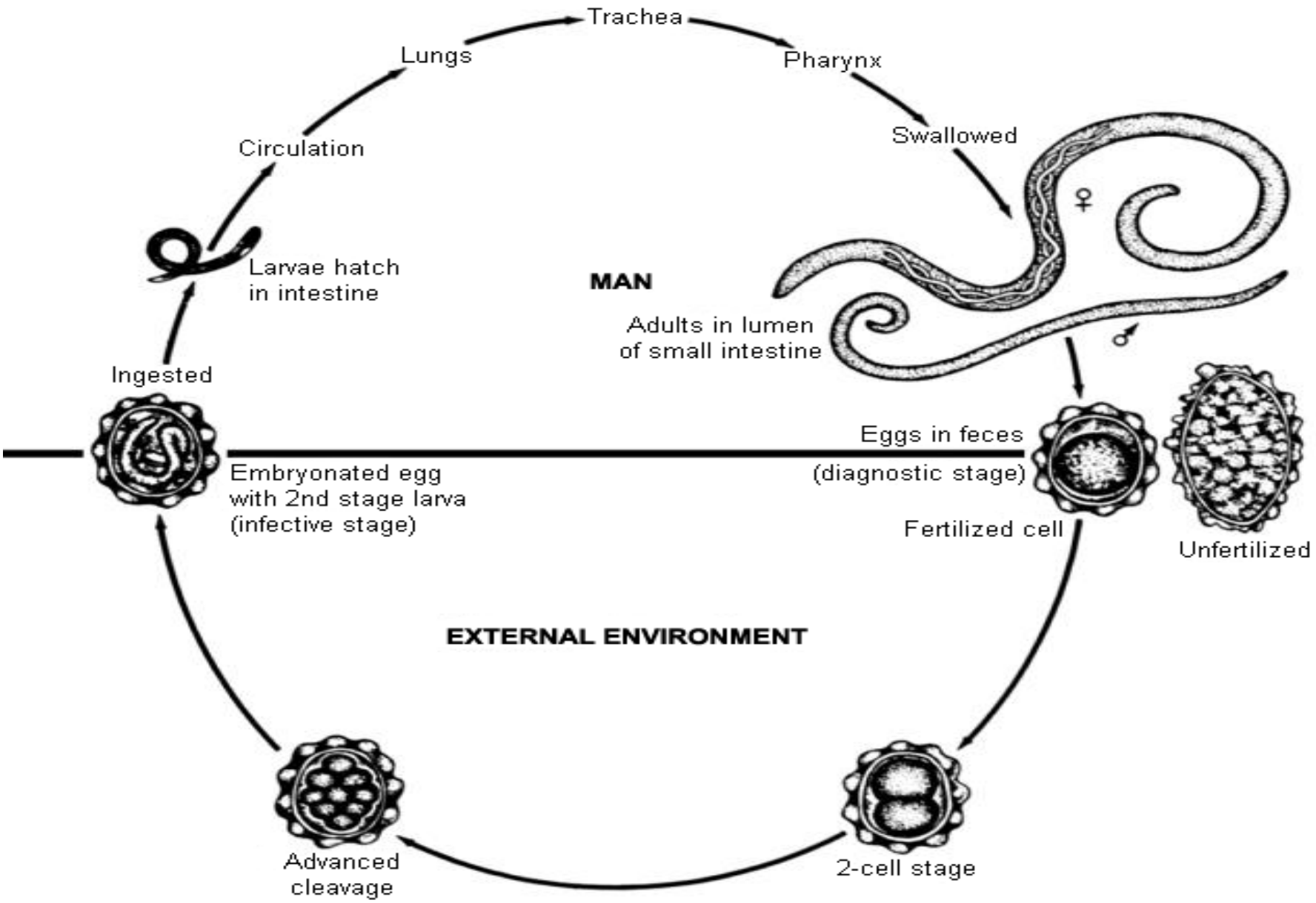


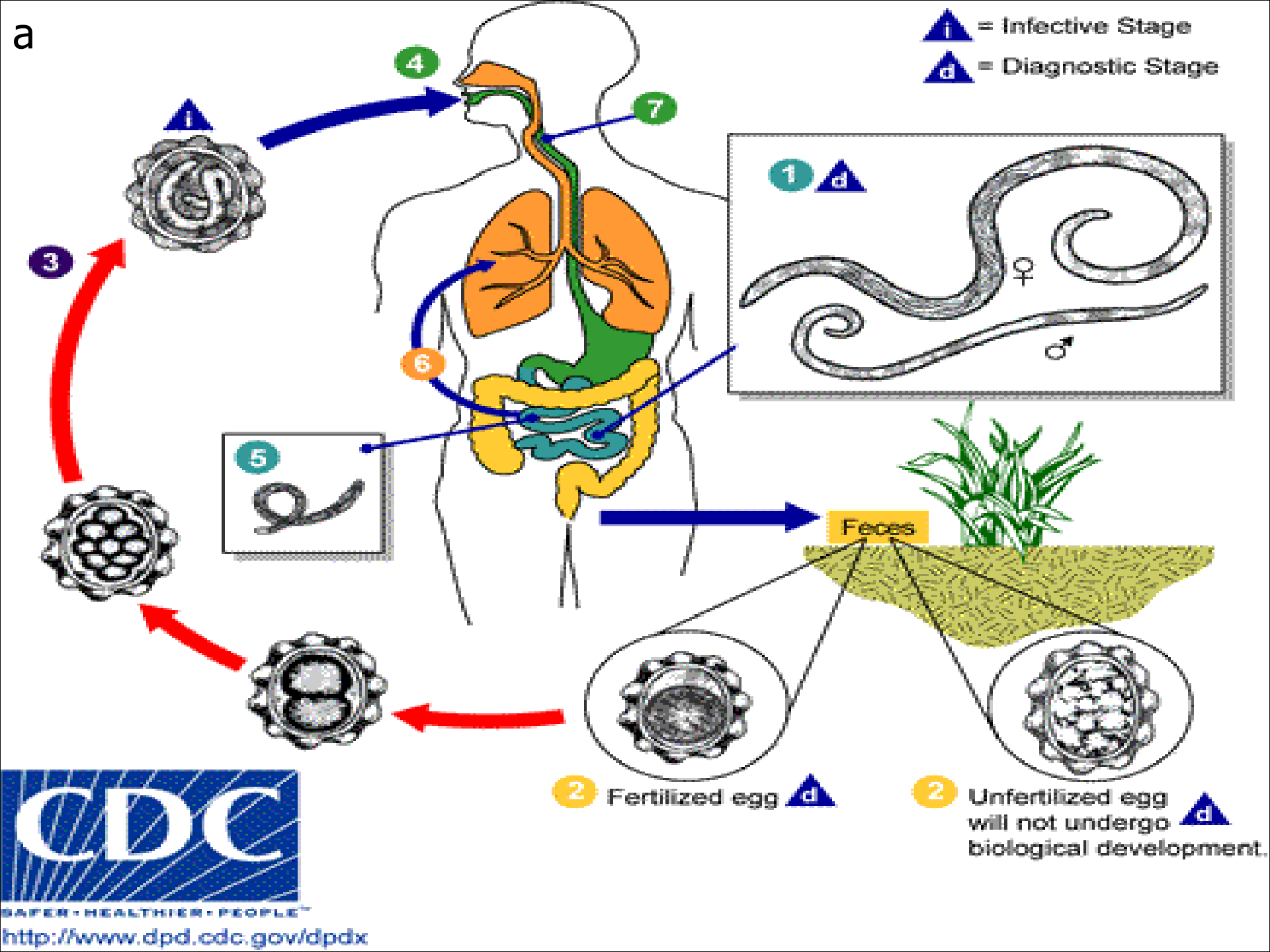
Ascaris lumbricoides (roundworm)

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

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

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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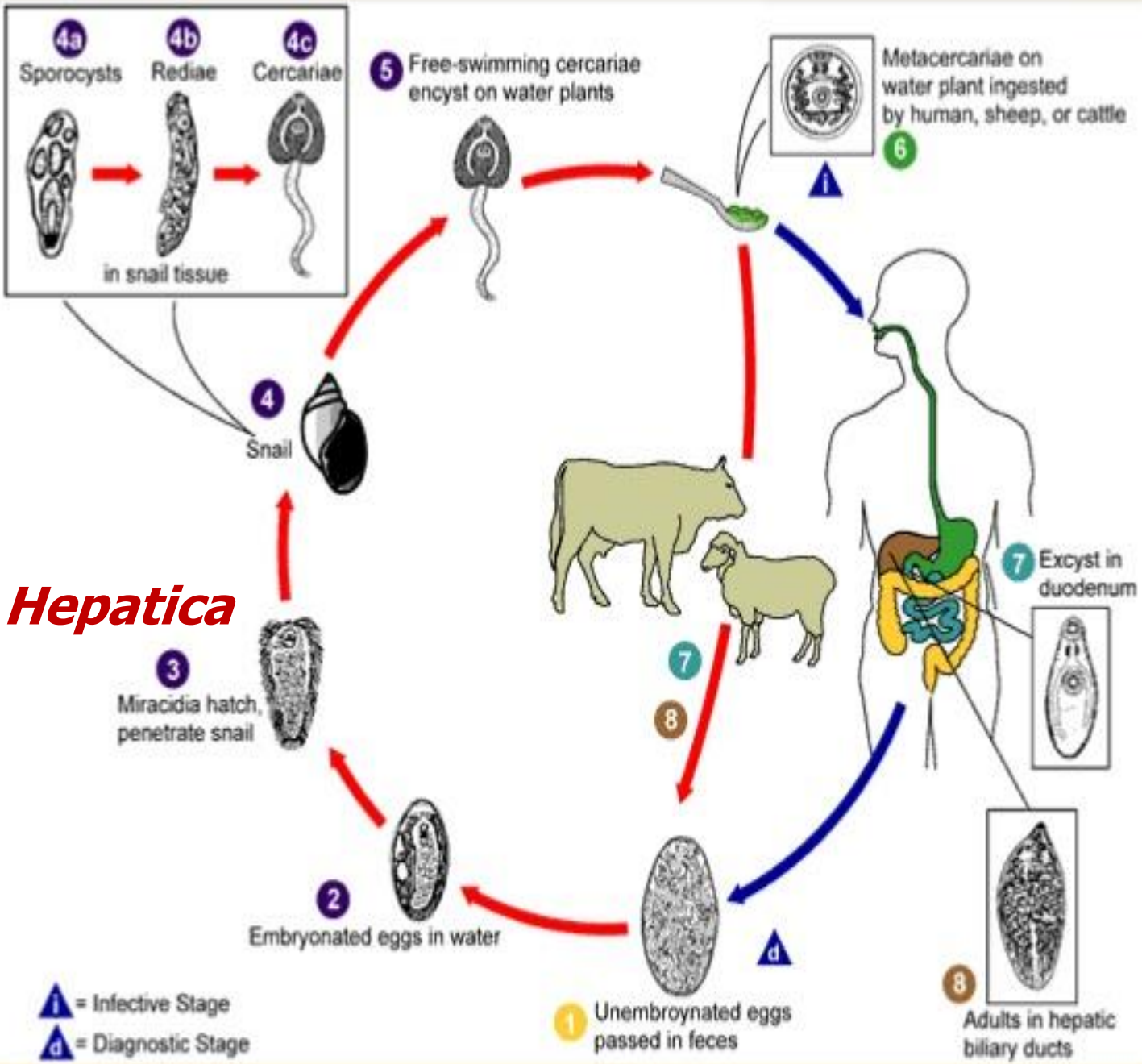
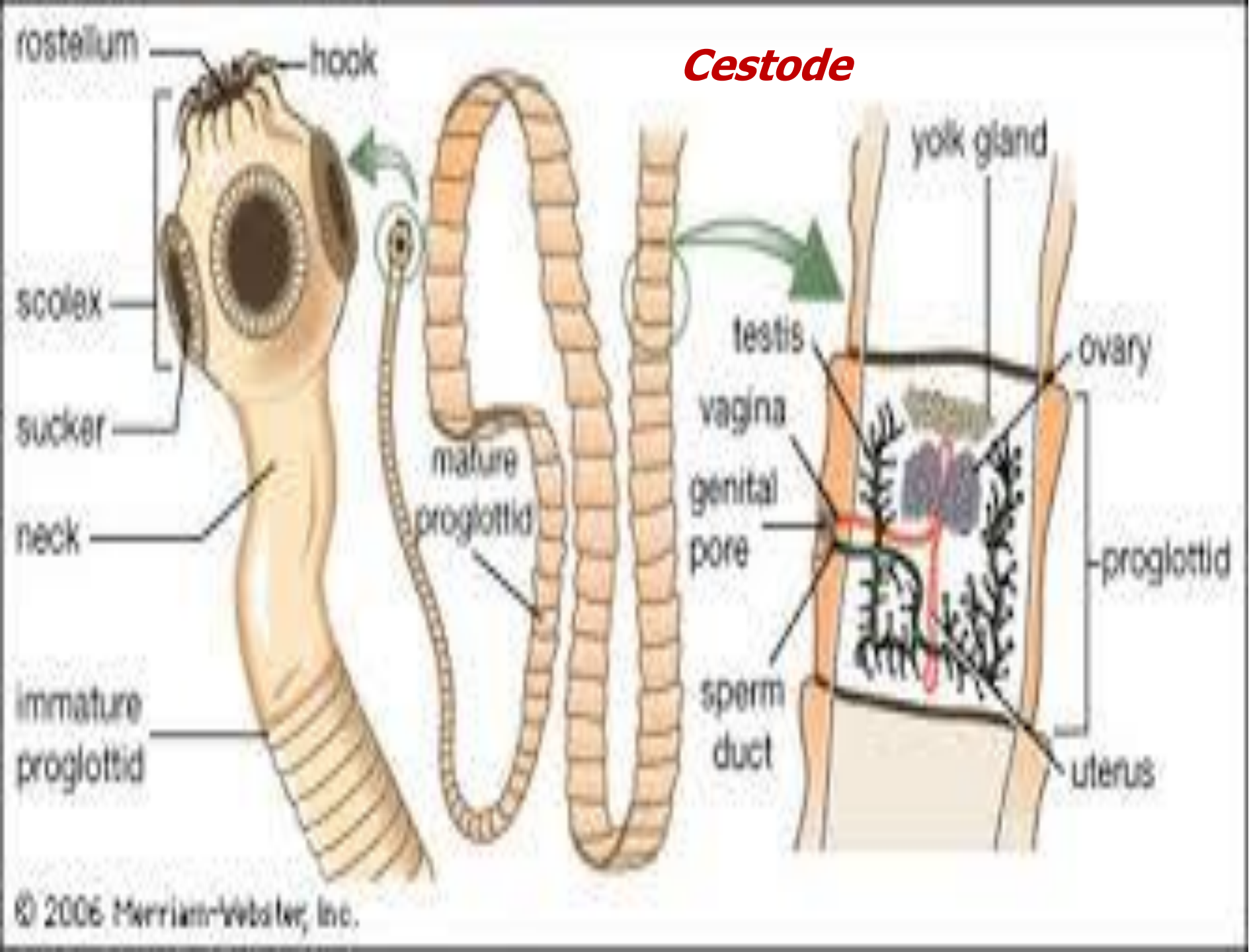
The Trematodes flat worm , un-segmented
,leaf like fasciola hepatica

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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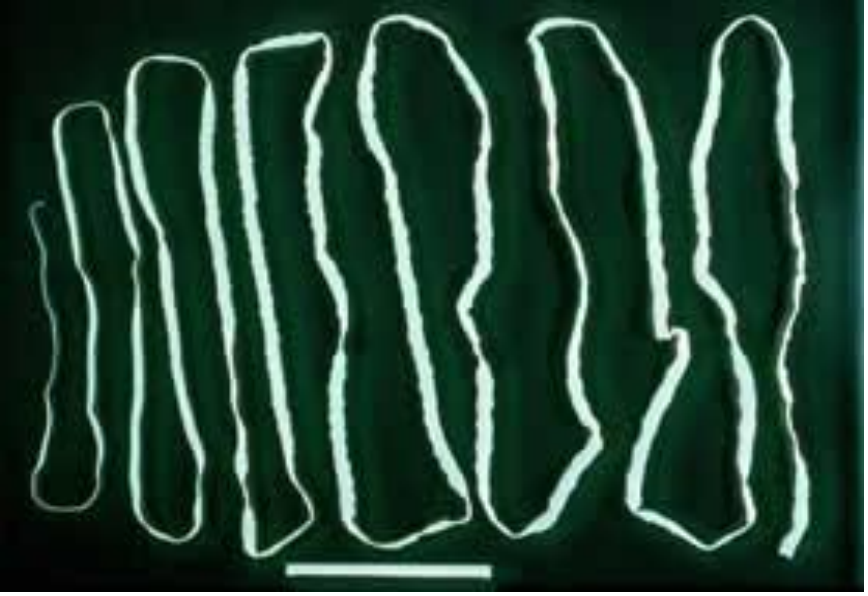
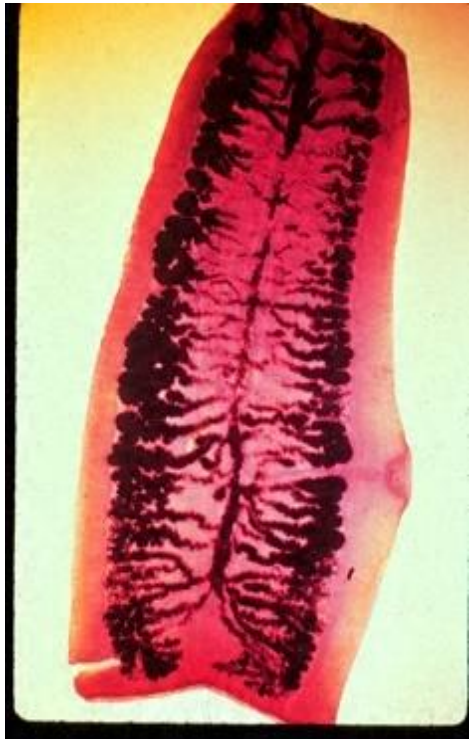




Taenia saginata Example of a Cestode ,Tapelike worm segmented.

MEDICAL IMPORTANCE OF ARTHROPODS

- **1)As aetiologic agents (causes) of diseases.**
  - **Tissue damage Scabies**
  - **Induction of hypersensitivity reactions.**
  - **Injection of poisons Scorpions.**
  - **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.**

Medical importance of Arthropods as vector of diseases

- **I: *Mechanical transmission* - simple carriage of pathogens e,g flies.**

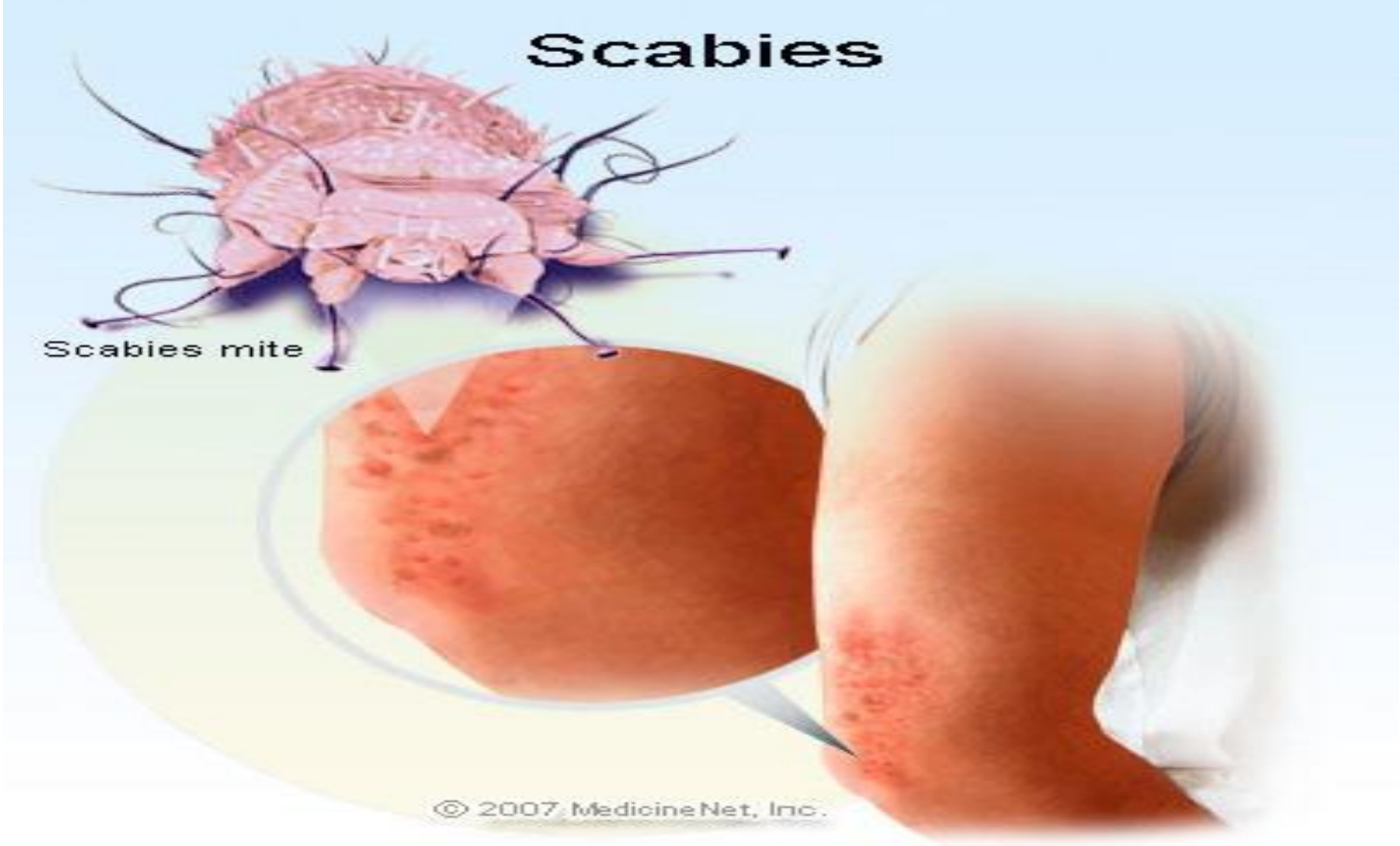
  II: *Biological transmission:*

- **1- cyclical :cyclical change only but does not multiply in the body of the vector e,g :filarial parasite.**
- **2-propagative:when the disease agent undergo no cyclical change but multiplies in the vector e,g;plaque bacillie in rat fleas.**
- **3- Cyclo-propagative :the disease agent undergoes cyclical change and multiply in the body of arthropods e,g;Malaria in mosquito.**

  III: *Transovarian transmission:*

- **transmitted as vector from arthropodes parents to offspring 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

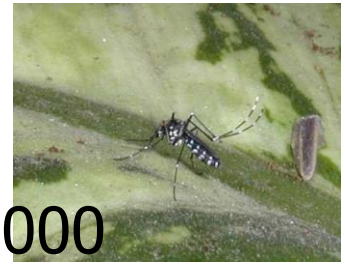
House fly *(Musca domestica)*	Mechanical transmission of many viruses, bacteria and parasites.
Mosquitoes البعوض	Anopheles :malaria filariasis Culex: filariasis, viruses Aedes: yellow fever, dengue fever, Rift Valley Fever
Lice القمل	Body louse: vector for: Relapsing fever, typhus and trench fever.
Fleas 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)* /لذبابة السوداء	Vector for Onchocerca (river blindness)
Sand fly *(Phlebotomus)* ذبابة الرمل	Vectors for l**eishmania** and sandfly fever virus.
Cyclops	Vector for Dracunculus medinensis

LICE

Louse(singular) , Lice (pleural)

Pediculus humanus

Mosquitoes :

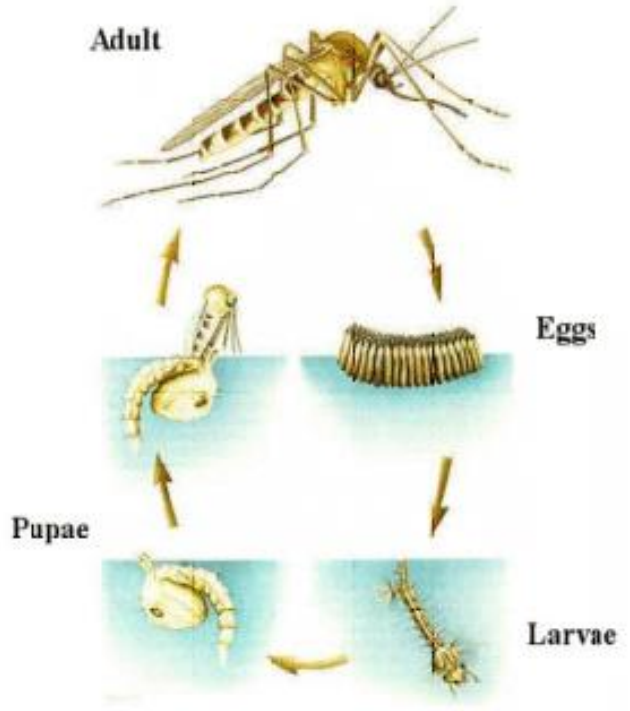


Cosmopolitan , more than 3000 species.

Larval and pupal stages always aquatic

Mouth parts in female adapted to piercing and sucking blood.

Genus and species distinguished by morphology of adult and deveopmetal stages.



cyclo-propagative

Malaria

sand flay transmit *Leishmania*