

# **Parasitic Helminths and Arthropod**

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

# Location of helminthes in the body:

- Intestinal helminthes:
- Tissue helminthes:

# Nematodes (round worm) intestinal Nematode

## General features

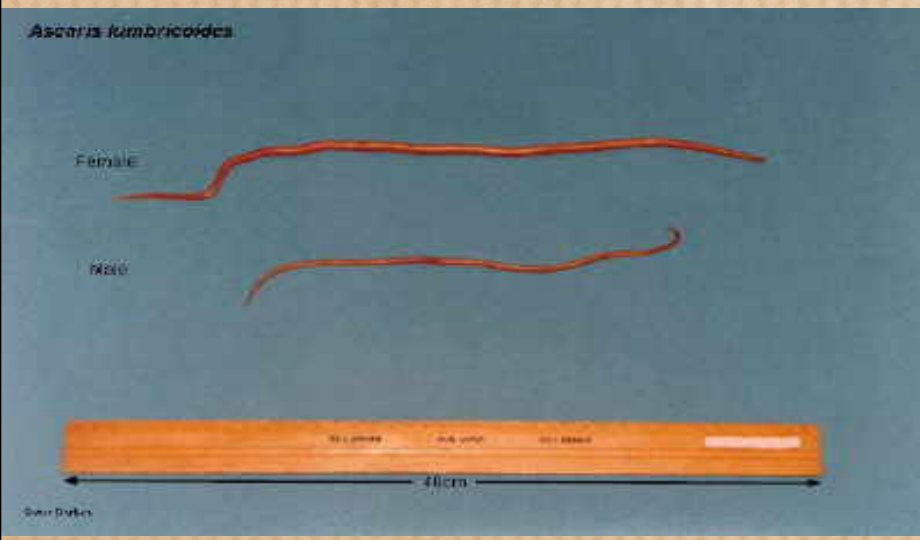
1. Elongated worm, cylindrical, unsegmented and tapering at both ends.
2. Variable in size, measure <1 cm to about 100cm.
3. Sex separate and male is smaller than female



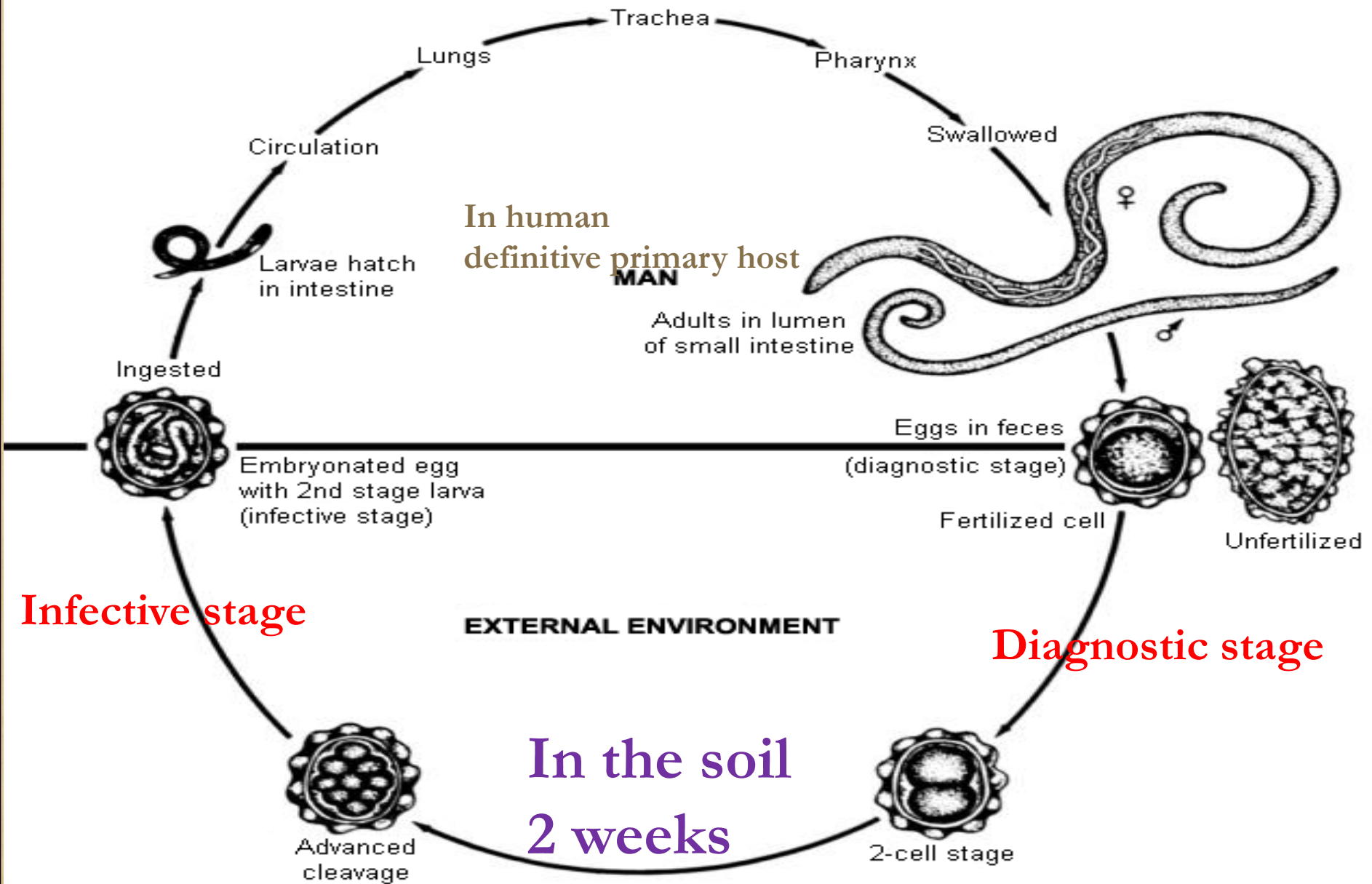
# *Ascaris lumbricoides* (roundworm)

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.

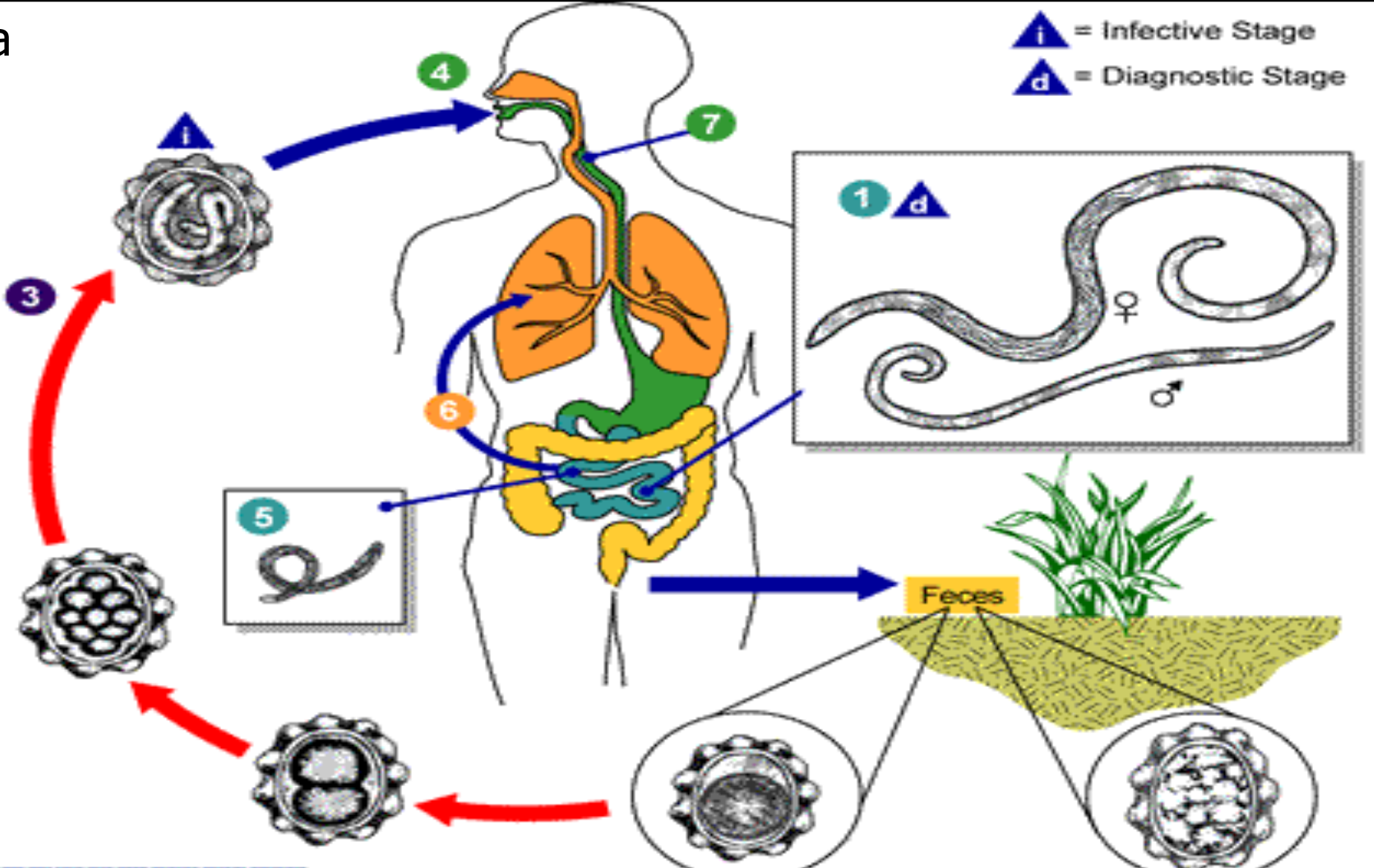


# Ascaris lumbricoides life cycle



a

**i** = Infective Stage  
**d** = Diagnostic Stage



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***Ascaris lumbricoides* life cycle**

2 Fertilized egg **d**  
2 Unfertilized egg will not undergo biological development. **d**



# Life cycle of Ascais Lumbricoides

Infection starts when man ingest an **Embryonated egg (infective stage)** contaminated with food or water, then this embryonated egg become a **Larva** in the duodenum, and penetrate it`s wall, then **larva** enter the blood stream to the heart , liver and pass to the pulmonary circulation to 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 (**definitive ,primary host**) which pass in stool as Fertilized or unfertilized eggs(**diagnostic stage**) ,only fertilized egg can be survive in the soil and after 2 weeks become an **Embryonated egg** ready to infect human.

# Pathogenicity

- **1-Migrating LARVA :**

- ***Ascaris pneumonia* mainly but some times LARVA reach the 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.***

# Classification of Parasites

## Protozoa

**Unicellular**

**Single cell for all function**

**Amoebae:**  
move by pseudopodia.

**Flagellates:**  
move by flagella.

**Ciliates :**  
move by cilia

**Apicomplexa**  
(sporozoa) **Tissue**  
**parasites**

## Helminthes

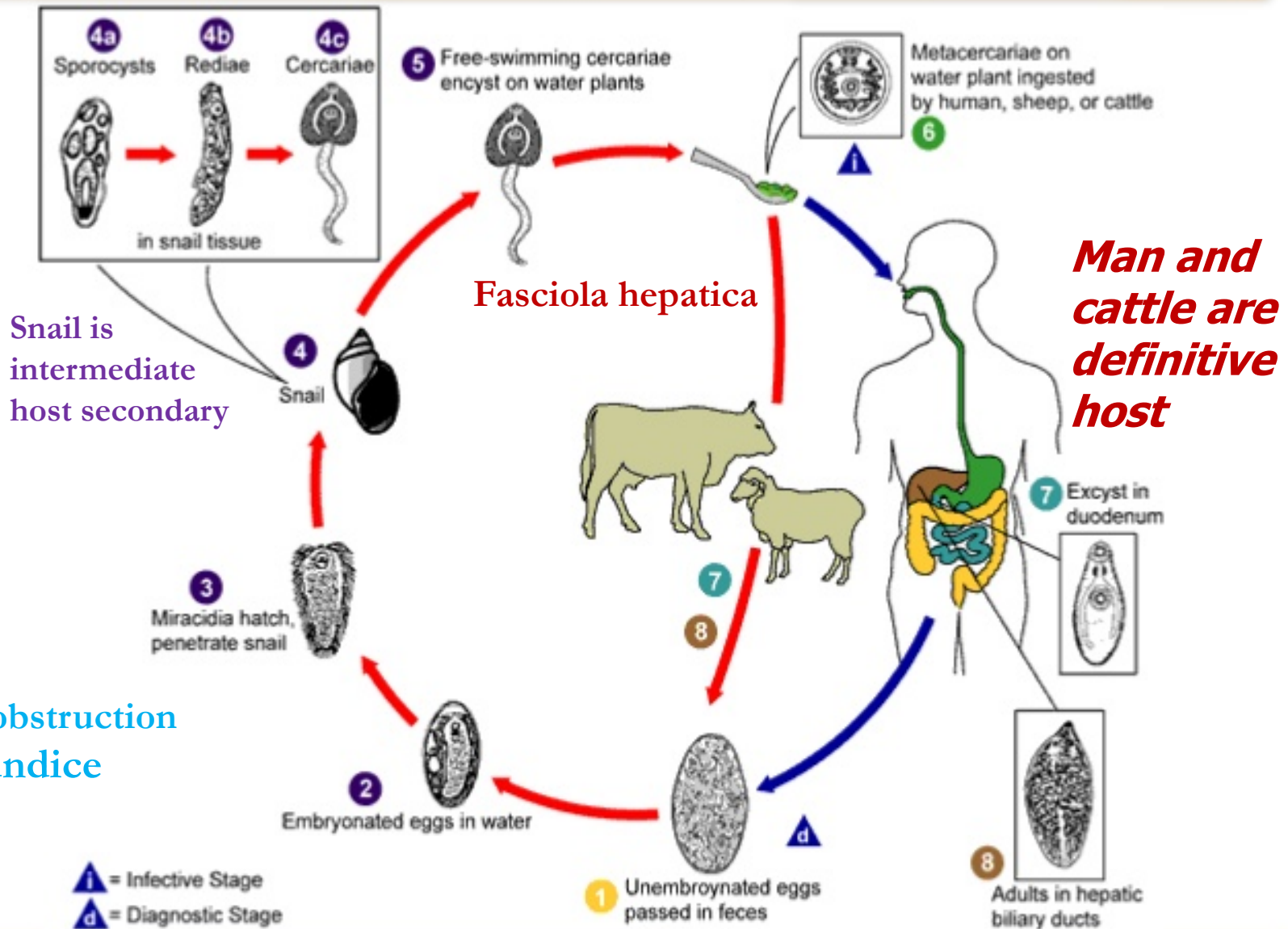
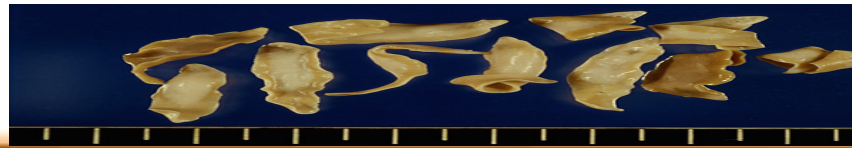
**Mulicellular**

**Specialized cells**

**A- Round worms =**  
**Nematodes**  
cylindrical,  
un-segmented(Ascaris)

**B- Flat worms**  
**1-Trematodes:**  
leaf-like, un-segmented.  
**2-Cestodes:**  
tape-like, segmented

Trematodes  
Leaf-like,  
unsegmented



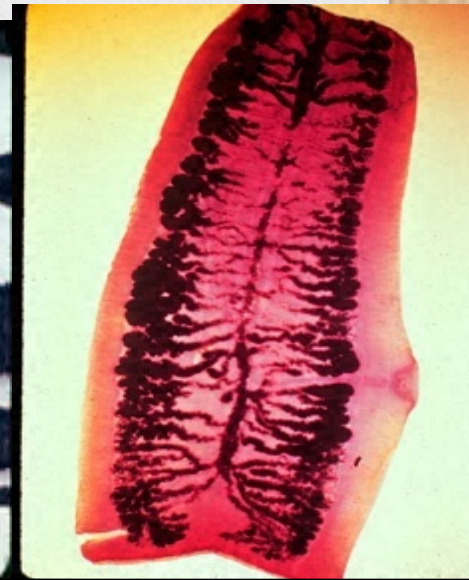
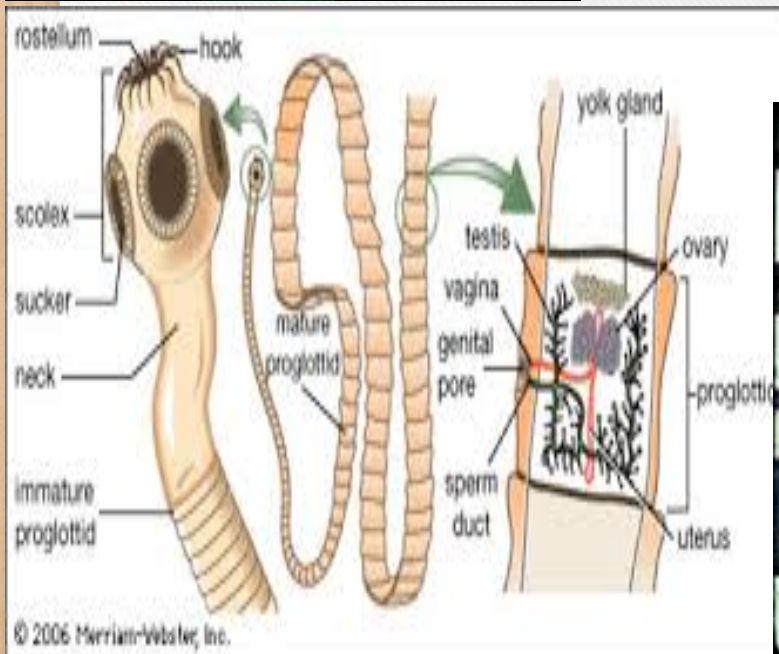
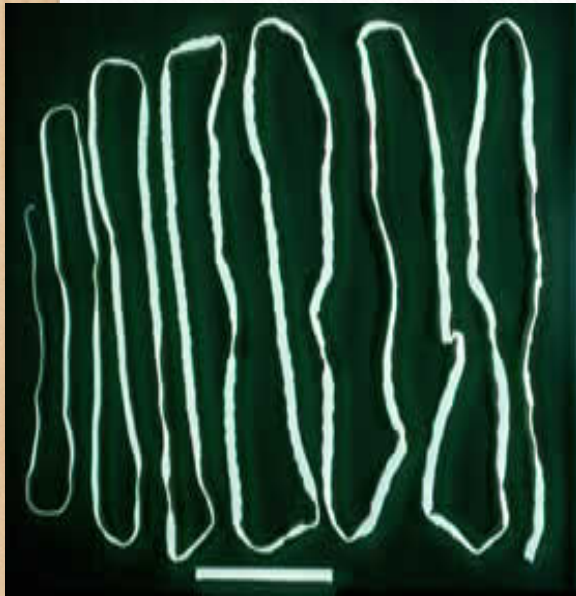
# ***Cestode*, Tape-like worm *segmented.***

## ***Taenia saginata***

Man is the primary definitive host, adult live and fertilized in small intestine of man.

Cattle is the secondary intermediate host.

Can cause abdominal discomfort, vomiting and diarrhea in human.





# Arthropods

## الحشرات

# MEDICAL IMPORTANCE OF ARTHROPODS

## 1) As aetiologic agents (causes) of diseases.

- Tissue damage **Scabies** الجرب
- Induction of hypersensitivity reactions.
- Injection of poisons **Scorpions** العقرب .
- **Entomophobia** رهاب الحشرات

## 2) As vectors of diseases:

I: Mechanical transmission - simple carriage of pathogens. **Flies** الذباب

II: Biological transmission:

- cyclical (دوري) **filarial parasite**
- **propagative** (تكاثر) ) e,g; plaque bacillie in rat fleas
- cyclo-propagative تنمو وتتكاثر e,g; Malaria in mosquito
- III: Transovarian transmission تتوارث **as rickets is carried within ticks.**

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

II:

**Biological transmission:**

1- **cyclical** (تنمو):cyclical change only but does not multiply in the body of the vector e,g :filarial parasite.

2-**propagative**(تكاثر) :when the disease agent undergo no cyclical change but multiplies in the vector e,g;plague bacillie in rat fleas.

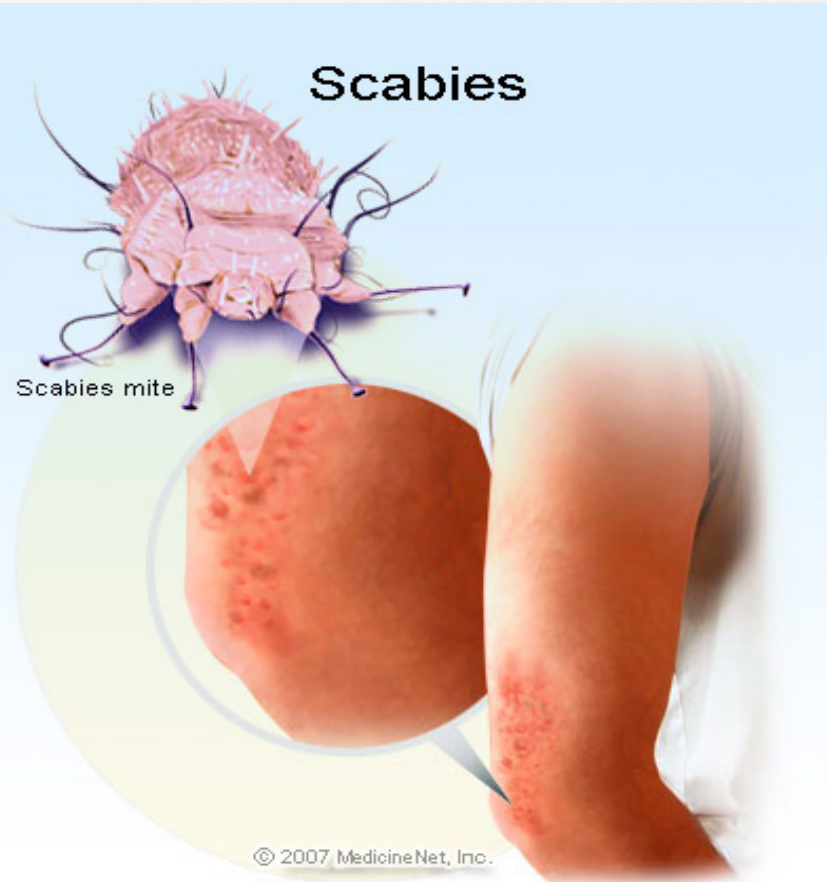
3- **Cyclo-propagative** (تنمو و تکاثر):the disease agent undergoes cyclical change and multiply in the body of arthropods e,g;Malaria in mosquito.

III: **Transovarian transmission:** تتوارث

transmitted as vector from arthropods parents to offspring as ricketsis carried within ticks.



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





**Scabies**

**الجرب**



# ARTHROPODS OF MEDICAL IMPORTANCE

<p>Class <i>Insecta</i> ت حشرات</p>	<p>Class <i>Arachnida</i> عناب ذك</p>	<p>Class <i>Crustacea</i> ت</p>
<p>Muscid flies: housefly, <b>Tsetse fly</b>                      Myiasis-producing flies .                      Mosquitoes <b>بعوض</b> : <i>Anopheles, Aedes Culex</i>                      Sandfly <b>ذره ليم</b>                      (<i>Phlebotomus</i>)                      Black fly (<i>Simulium</i>)                      Fleas <b>برا يلك</b>                      Lice (<i>Pediculus, Phthirus</i>)  <b>قمل</b>                      Bugs: <i>Cimex, Triatoma</i> <b>بق</b>                      Bees <b>نحل</b></p>	<p><b>Scorpions</b> ب                      Spiders <b>عناب ذك</b>                      Ticks: <b>قرا الذ</b>                      hard, soft                      Mites <b>سول</b>                      -<i>Sarcoptes scabiei</i>,                      -dust mites</p>	<p>Water flea                      (<i>Cyclops</i>)</p>

# Important arthropod vectors for human diseases

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

# LICE

Louse(singular) , Lice (plural)

*Pediculus humanus*



Head louse

Louse eggs (nits)

ADAM



# Mosquitoes :



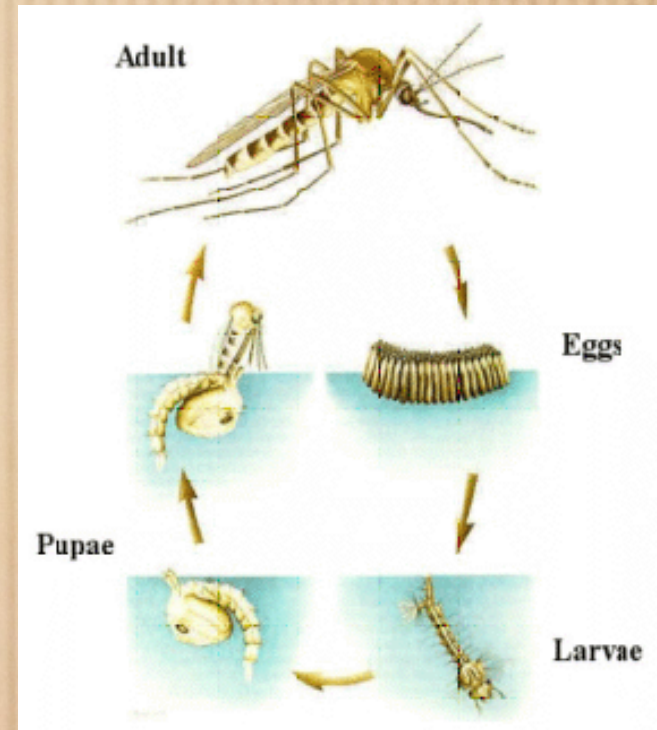
Cosmopolitan , more than 3000 species.

Larval and pupal stages always aquatic (تعيش في الماء)

Mouth parts in female adapted to piercing and sucking blood.

**cyclo-propagative**

تنمو وتتكاثر



**Malaria**

# sand fly transmit *Leishmania*

