



OPT0425
MICROBIOLOGY I

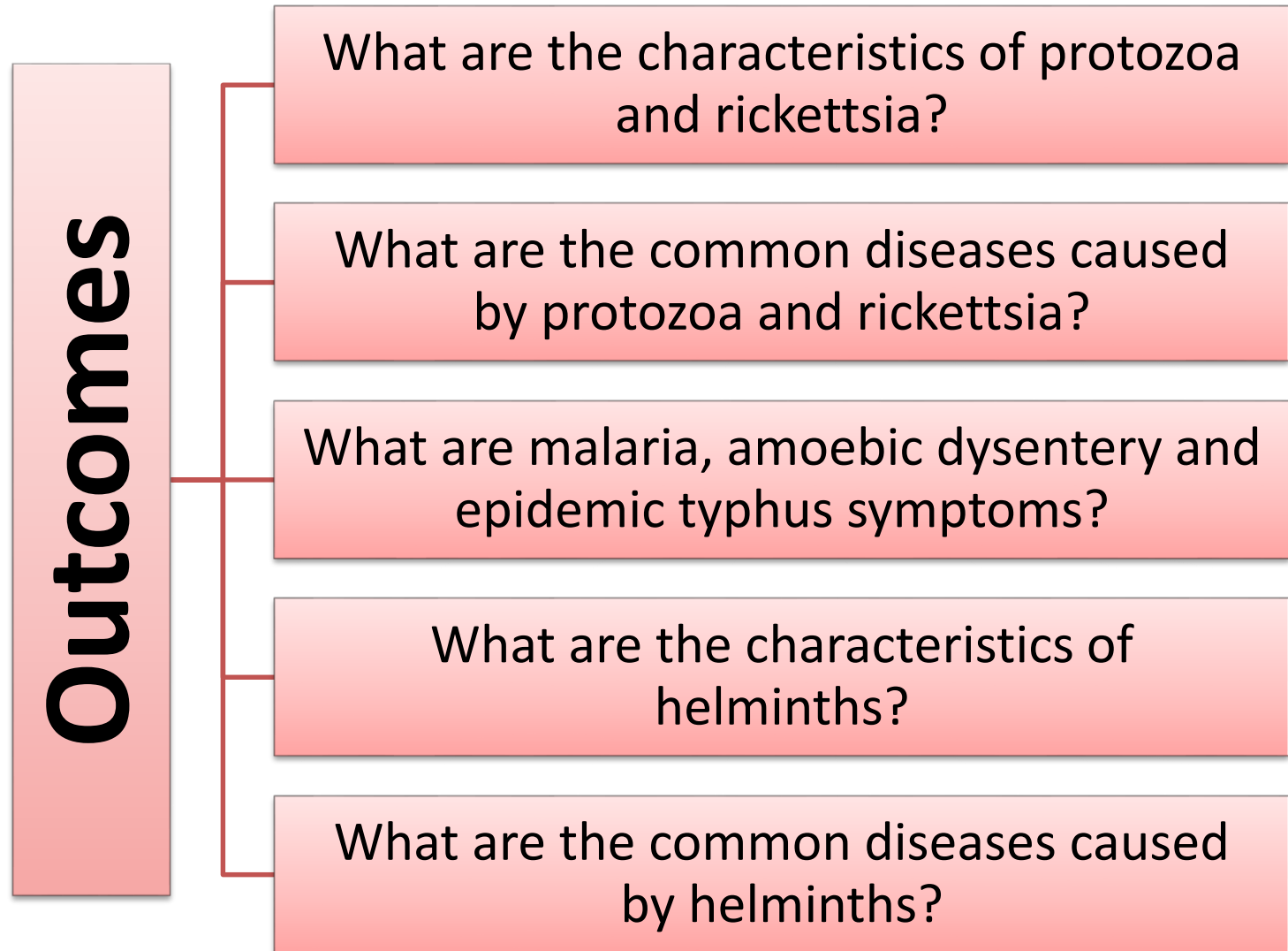
GAMAL EL-HITI

Types of Microorganisms



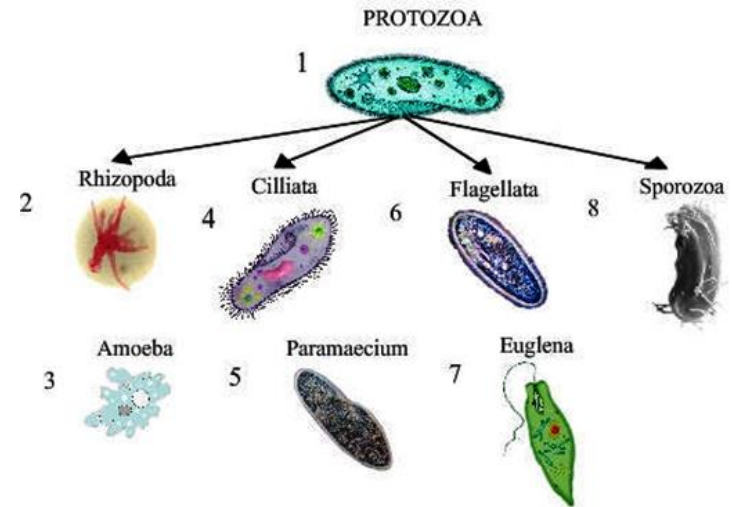
OPT0425
Lecture Six

Learning Outcomes



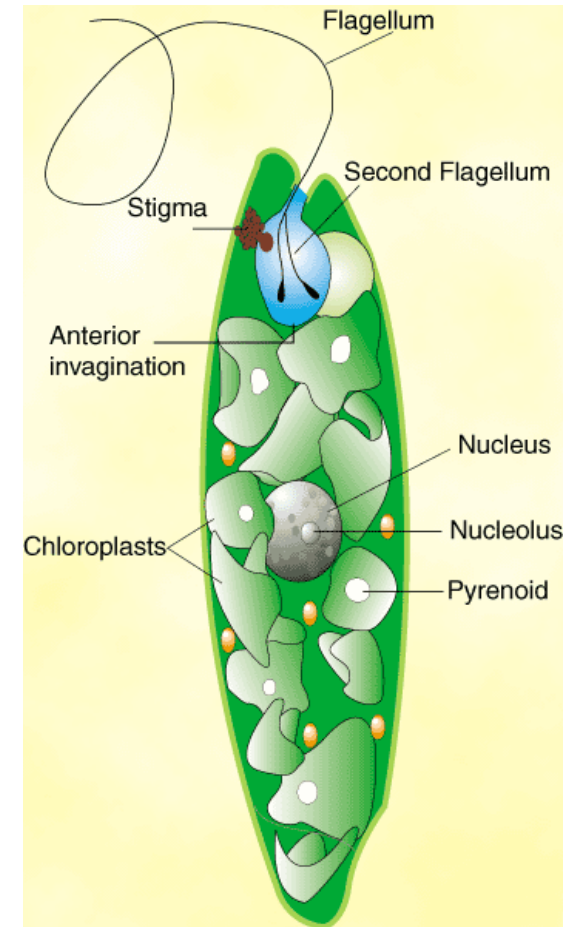
Protozoa

- Protozoa are one-celled tiny animals found in most habitats and contaminated water supplies.
- Like all cells, they are bounded by a thin cell membrane.
- Most protozoa have a tough outer membrane called a **pellicle**, which maintains their form.
- Despite their small size protozoans carry on all the metabolic functions of animals.



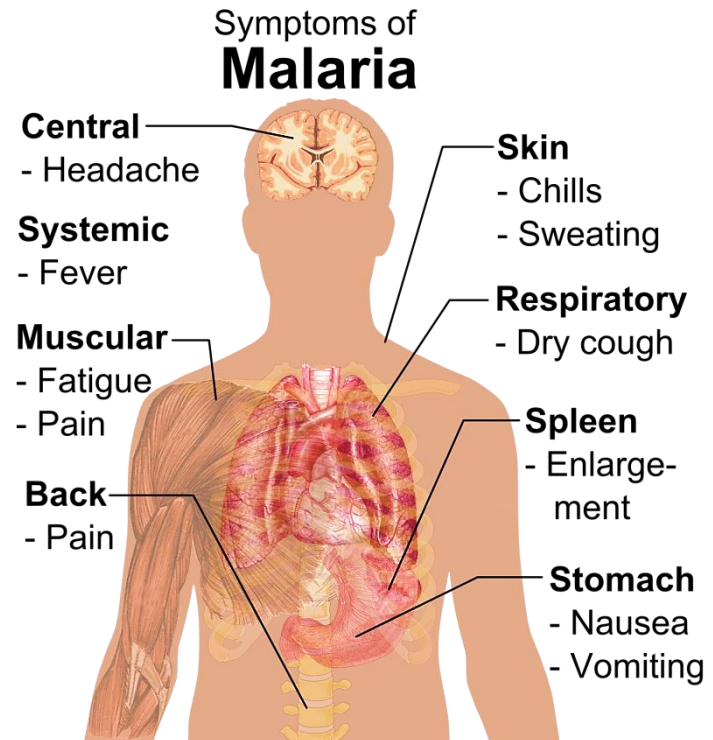
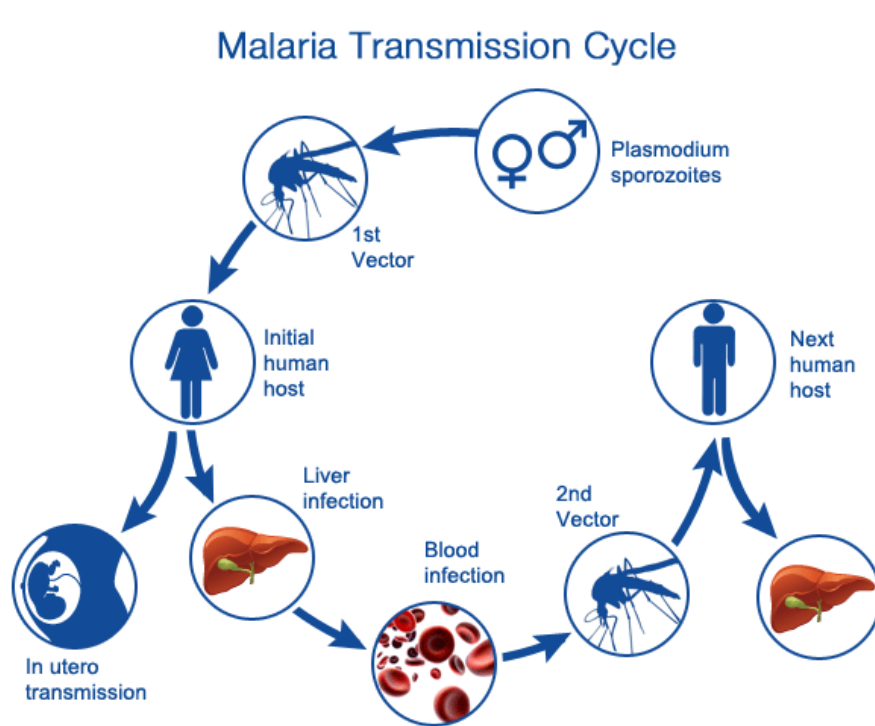
Protozoa

- Infections range from asymptomatic to life threatening.
- The infection range depend on several factors:
 - The species
 - The strain of the parasite
 - The resistance of the host
- Protozoa cause various diseases such as **malaria**, **trichomoniasis** and **amoebic dysentery**.



Protozoa

- Protozoa cause:
- **Malaria**, a mosquito-borne infectious disease caused by parasitic protozoans.

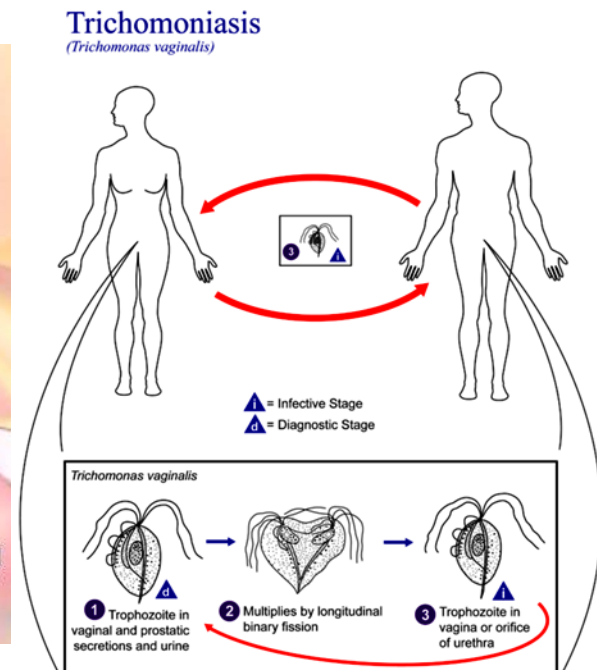


Protozoa

- **Trichomoniasis**, a sexually transmitted disease, caused by a single-celled *Trichomonas vaginalis*.
- It affects nearly 3.7 million in the US.

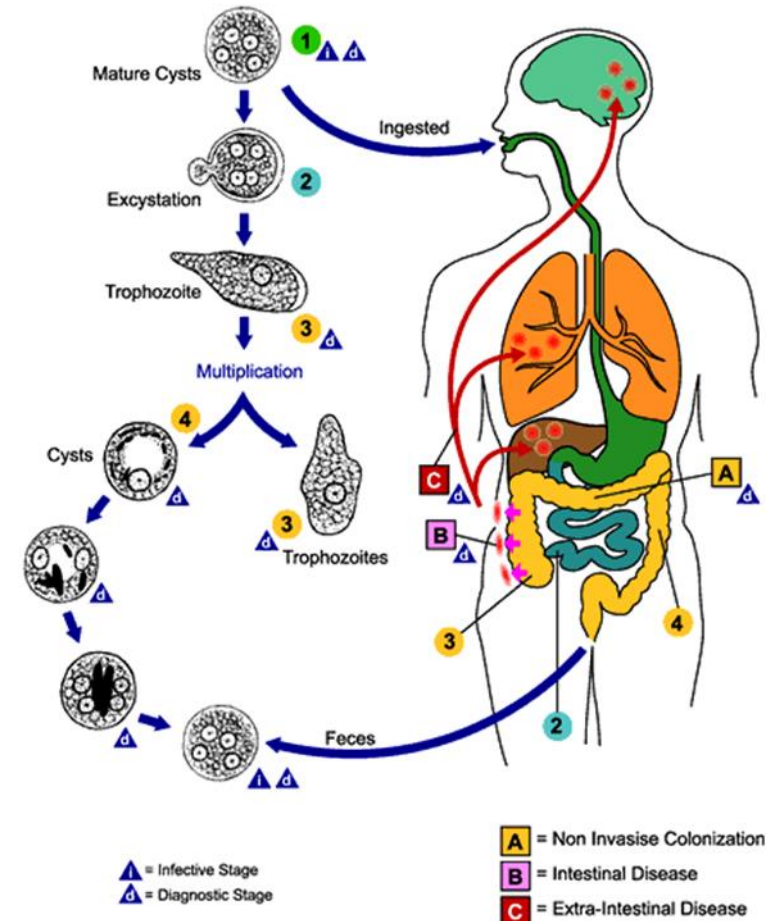
Signs and symptoms

- Women
 - Frothy, yellowish discharge that has a foul odor
 - Vaginal irritation and itching
 - Urinary frequency/burning: infection in urethra
 - Chronic infection: bladder and anal involvement
- Men
 - Usually no symptoms; a mild discharge or slight burning after urination or ejaculation



Protozoa

- **Amoebic dysentery**, a type of dysentery (bloody diarrhea) caused primarily by the amoeba *Entamoeba histolytica*.
- **Amoebic dysentery** is transmitted through contaminated food and water.
- It spread by forming infective cysts which can be found in stools.

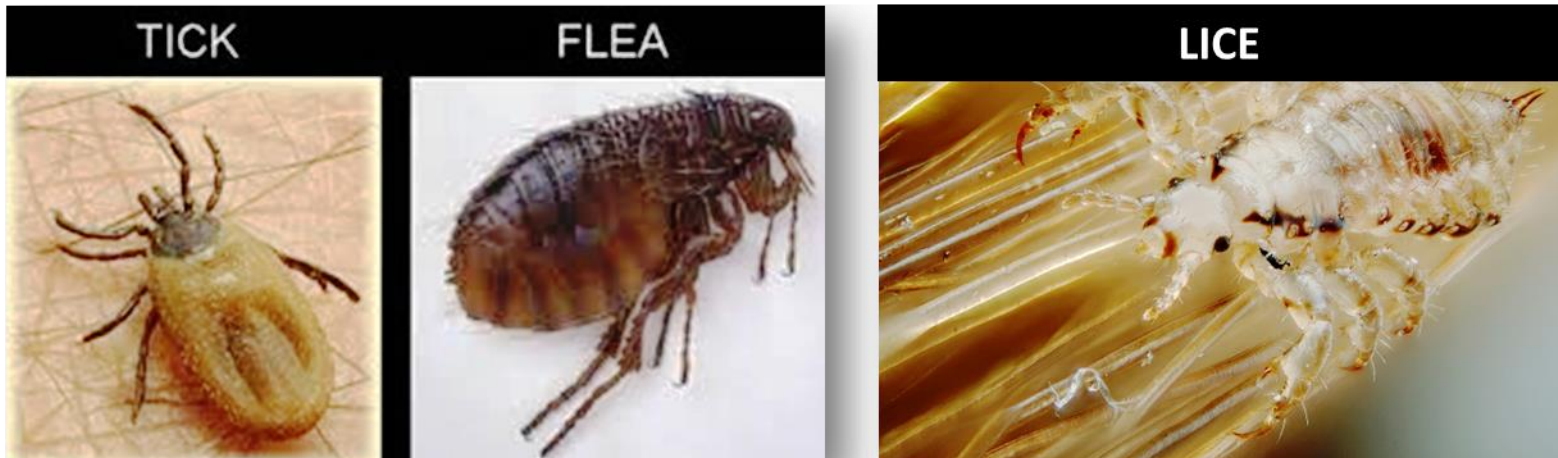


Protozoa

- The common symptoms of amoebic dysentery:
 - These symptoms can also be caused by or result in other diseases.
 - Violent diarrhea.
 - Blood in the foul-smelling stools.
 - Frequent flatulence (gas and abdominal bloating).
 - Dehydration and slight weight loss.
 - Moderate anemia, fever and fatigue.

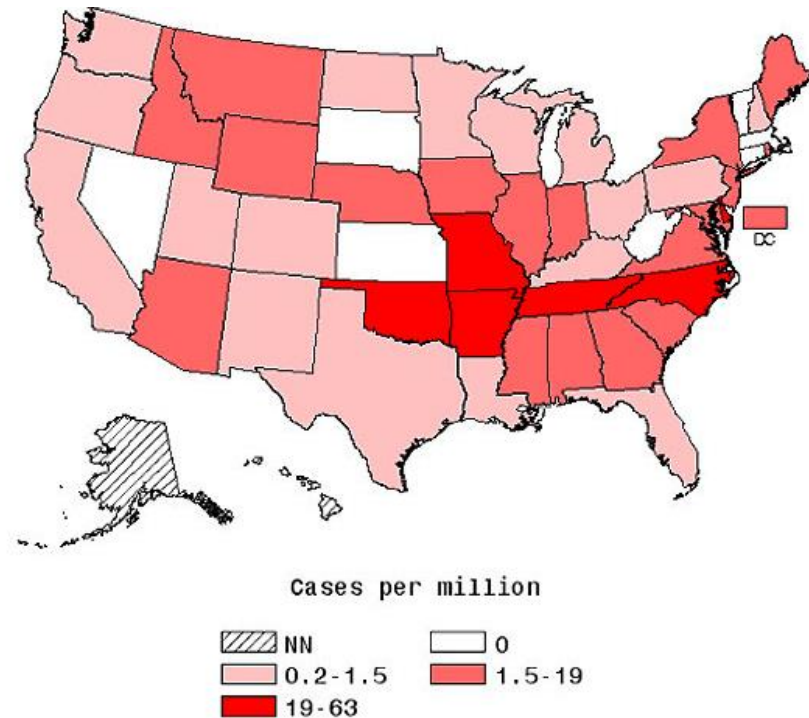
Rickettsiae

- **Parasites** must live inside cells of other living organisms.
- One type of bacteria.
- Diseases caused by these microbes are transmitted to humans by the animal parasite it inhabits (*e.g.* fleas, lice, and ticks).



Rickettsiae

- Humans bitten by infected insects may contract diseases such as **rocky mountain spotted fever**.
- It is the most lethal and most frequently reported rickettsial illness in USA.
- Spotted fever can be very difficult to diagnose in its early stages.
- The disease is caused by *Rickettsia rickettsii*.



Rickettsiae

- Initial signs and symptoms of the rocky mountain spotted fever disease include:
- Sudden onset of fever
- Headache
- Muscle pain, followed by development of rash.

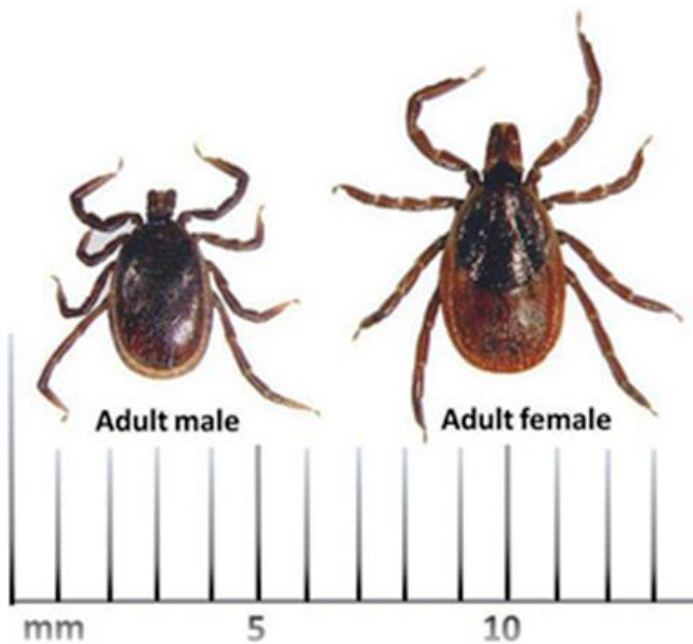


*Rocky Mountain
spotted fever*



Rickettsiae

- **Lyme disease**
- Nymphal and adult deer ticks can be carriers of Lyme disease.
- Nymphs are about the size of a poppy seed.

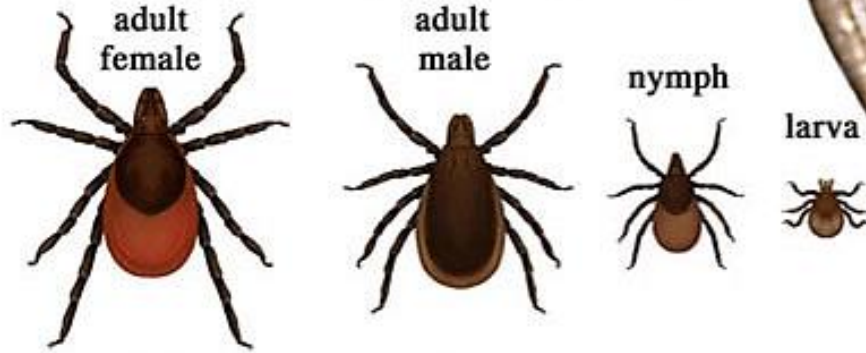


Lyme disease

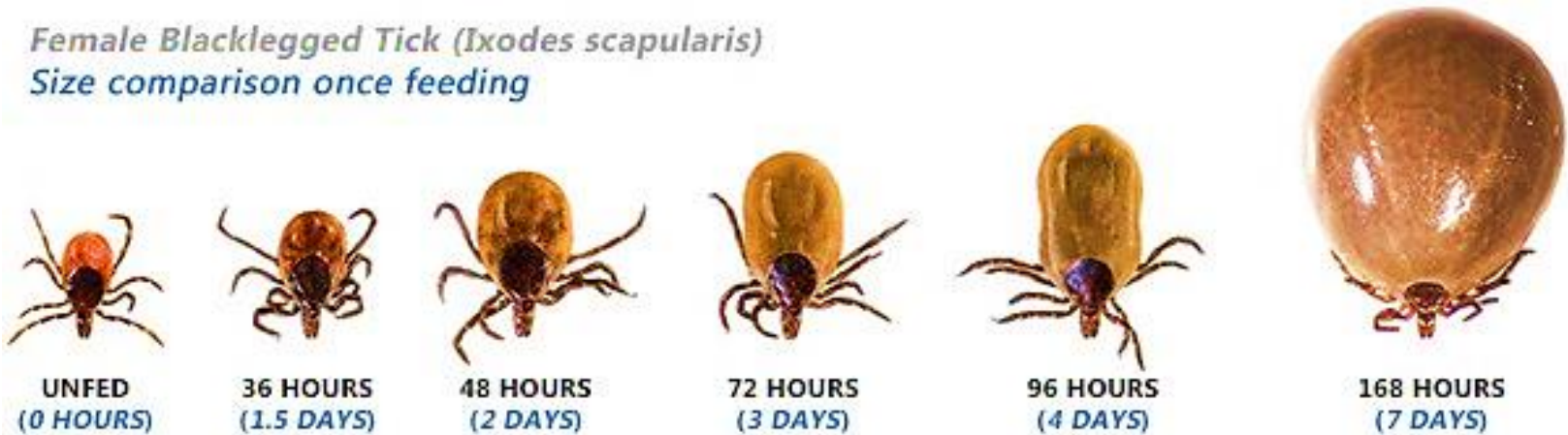


Rickettsiae

Blacklegged Tick (*Ixodes scapularis*)

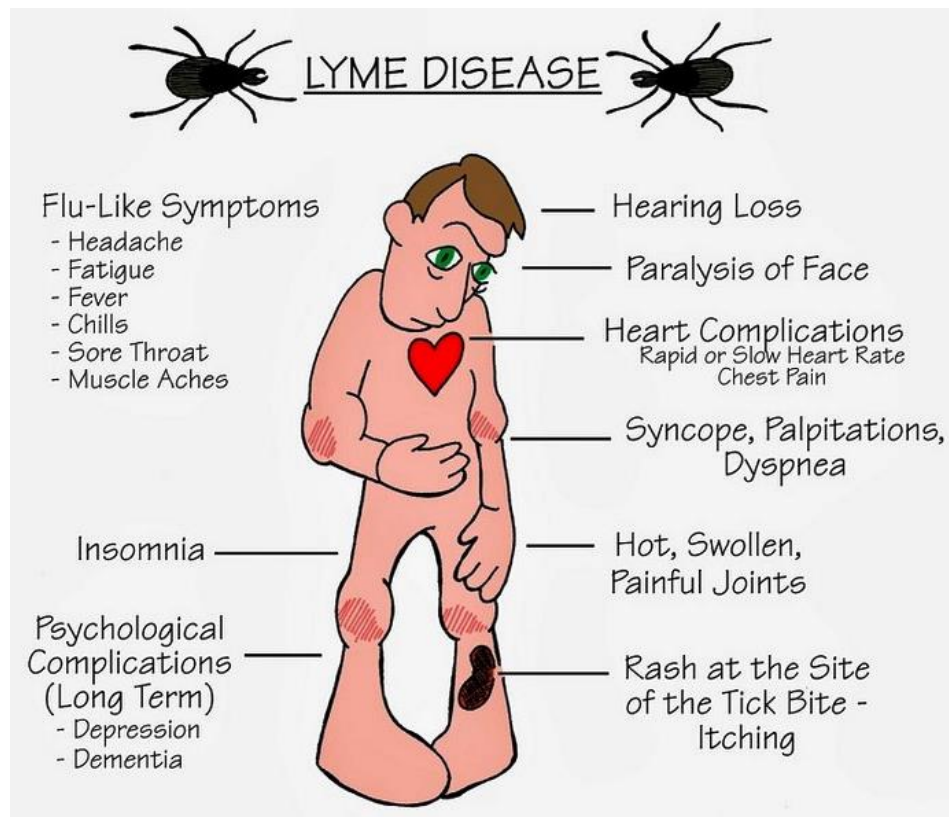


Female Blacklegged Tick (*Ixodes scapularis*)
Size comparison once feeding



Rickettsiae

- Some people may experience flu-like symptoms in the early stages, such as:
 - A large, red, expanding rash
 - Tiredness
 - Muscle pain
 - Joint pain
 - Headache
 - Fever or chills
 - Neck stiffness
 - Hearing loss



Rickettsiae

- **Typhus**
- Typhus is a diseases caused by an obligate parasitic bacterium called *Rickettsia*.
- Such bacteria cannot survive for long outside living cells.
- Typhus should not be confused with typhoid fever.
- Typhoid caused by different species of bacteria.



Rickettsiae

● Epidemic Typhus Symptoms

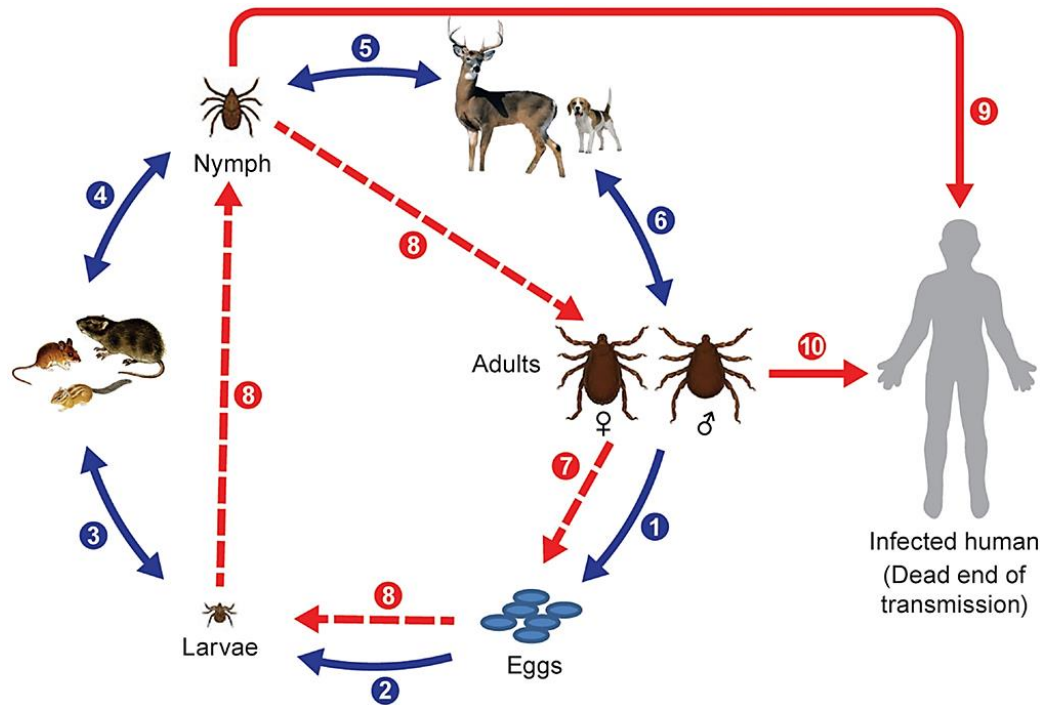
- Chills
- Rashes
- Joint pain
- High fever (40 °C)
- Low blood pressure
- Back pain and bad cough
- Photophobia (sensitivity to light)
- Severe headaches and muscle pain



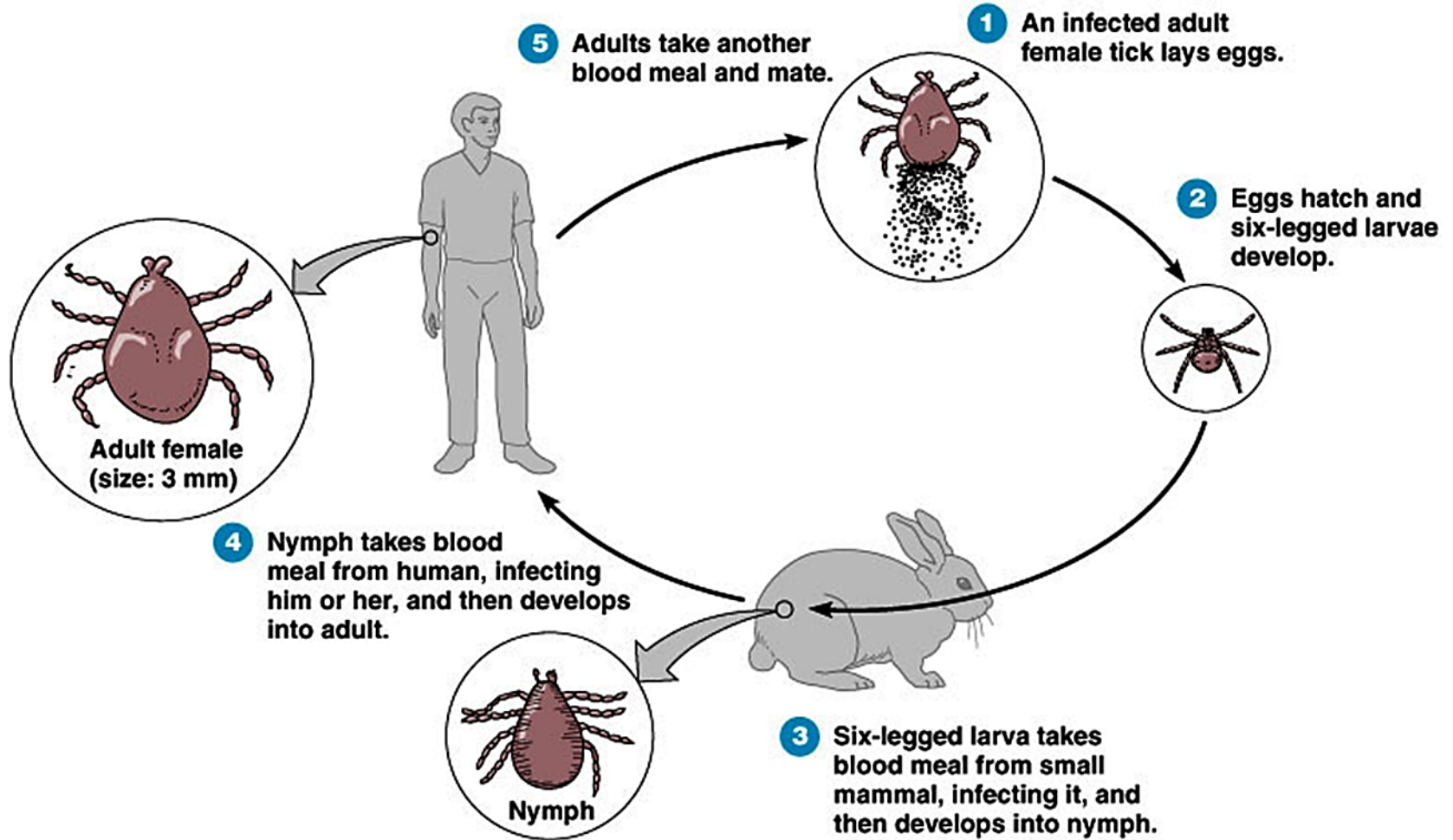
Rickettsiae

• Murine Typhus Symptoms

- Abdominal pain
- Backache
- Dull red rash
- Headaches
- Joint pain
- Nausea
- Vomiting
- High fever (41 °C)
- Hacking and dry cough



Rickettsiae





Helminths

- **Helminths are** commonly known as parasitic worms.
- They are large multicellular organisms.
- When mature can generally be seen with the naked eye.
- They are often referred to as intestinal worms even though not all helminths reside in the intestines.
- *e.g.* **Schistosomes** are not intestinal worms, but rather reside in blood vessels.

Helminths

- Helminths live inside the hosts and feed off on them.
- Disrupt nutrient absorption.
- Lead to weakness.
- Excrete toxins making the host susceptible to other diseases.
- Approximately, two billion people globally are infected by helminths.
- Helminths have different shapes and cause various infections

Helminths

- Three major assemblages of parasitic helminths are recognized.
- The **Nemathelminthes** (nematodes).
- The **Platyhelminthes** (flatworms) which subdivided into the **Cestoda** (tapeworms) and the **Trematoda** (flukes).

nematode



cestode



trematode



Helminths

whipworm



pinworm



hookworm



threadworm



roundworm



filarial worm



guinea worm



Helminths

nematode cycle
egg - larvae (L1-L4) - adult



cestode cycle
egg - metacestode - adult

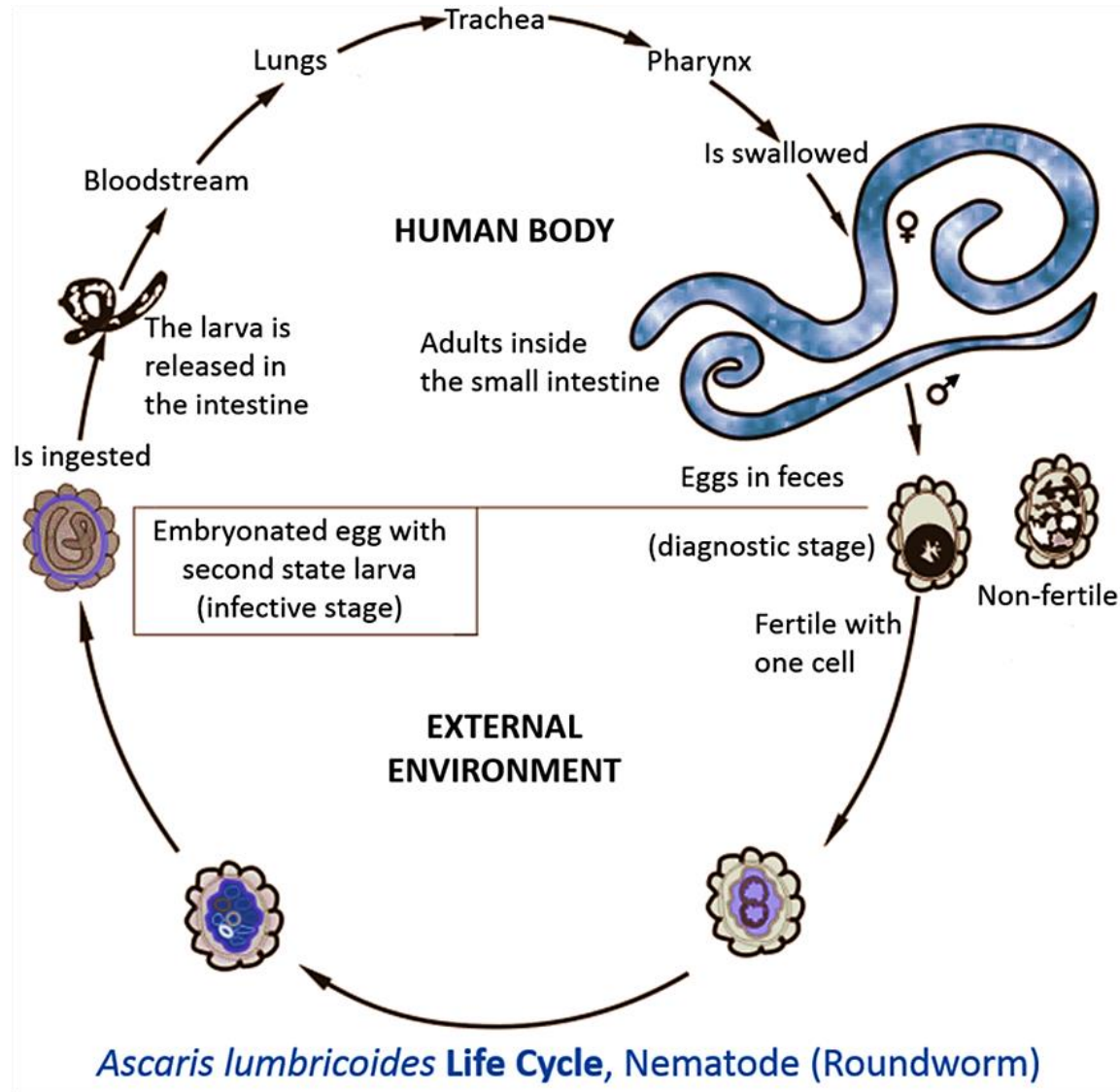


trematode cycle
egg – miracidium – sporocyst – redia –
cercaria - (metacercaria) - adult



Helminths form three main life-cycle stages as
eggs, larvae and adults

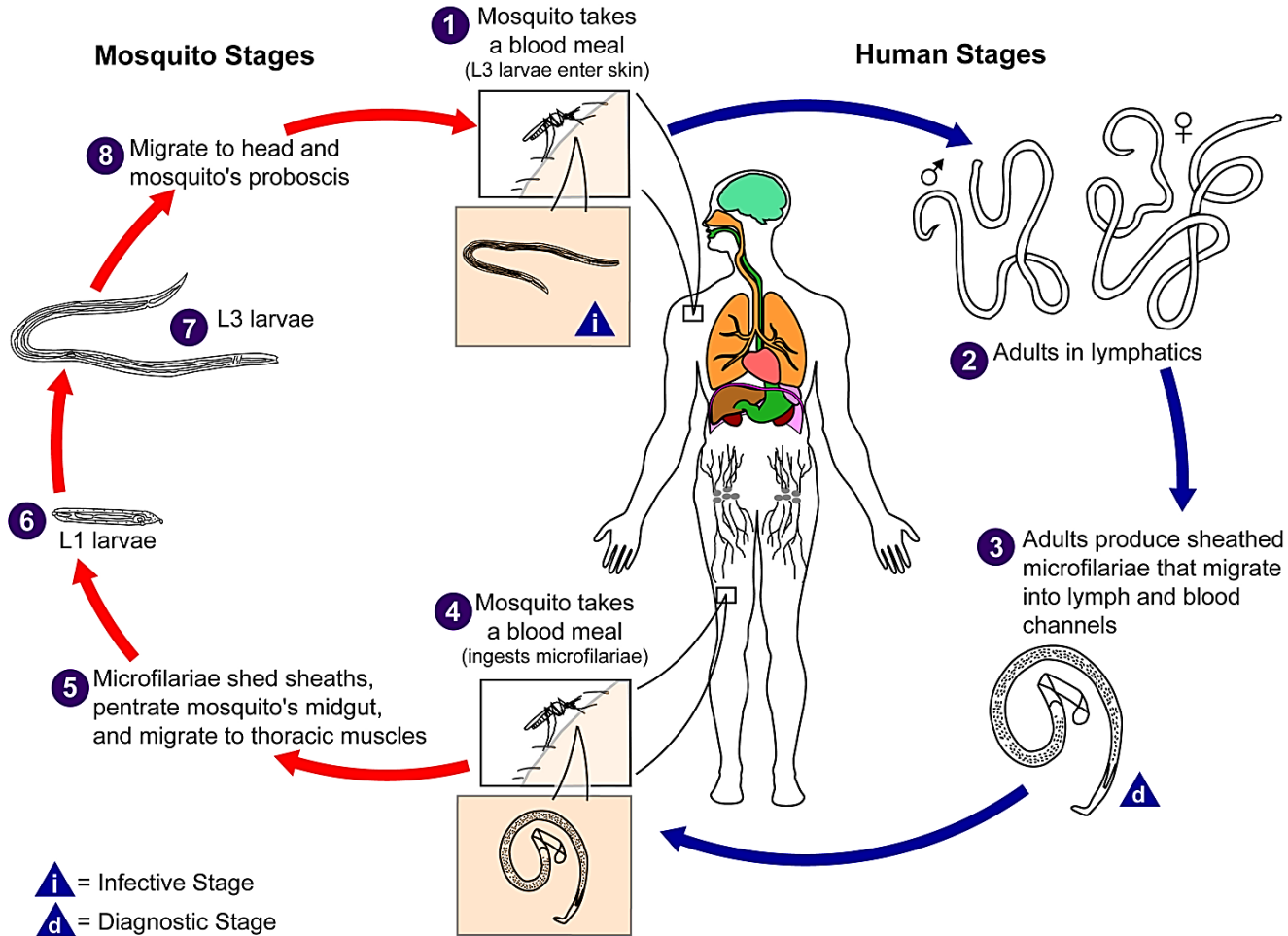
Helminths



Helminths

Filariasis

(*Wuchereria bancrofti*)



Helminths

Schistosomes

