



## **Sporozoa: Malarial Parasites of Humans**

### **Introduction**

Sporozoa, also known as Apicomplexa, is a large subphylum or class of unicellular, intracellular parasites. This diverse group comprises over 65,000 species with varying morphological characteristics. As strict parasites, they are responsible for causing various diseases in human beings, such as Malaria, Babesiosis, and Cyclosporiasis, among others.

### **Characteristics of Sporozoa**

Sporozoa are single-celled and non-motile, meaning they do not have the ability to move independently<sup>1</sup>. Instead, they rely on their hosts for transportation and dissemination. Moreover, these organisms are spore-forming, allowing them to develop specialized structures that help them survive in adverse conditions and facilitate transmission to new hosts.

### **Malaria and Sporozoa**

One of the most well-known examples of organisms in the Sporozoa group is the Malaria parasite, Plasmodium. Plasmodium, which infects red blood cells in mammals (including humans), birds, and reptiles, occurs worldwide, especially in tropical and temperate zones.

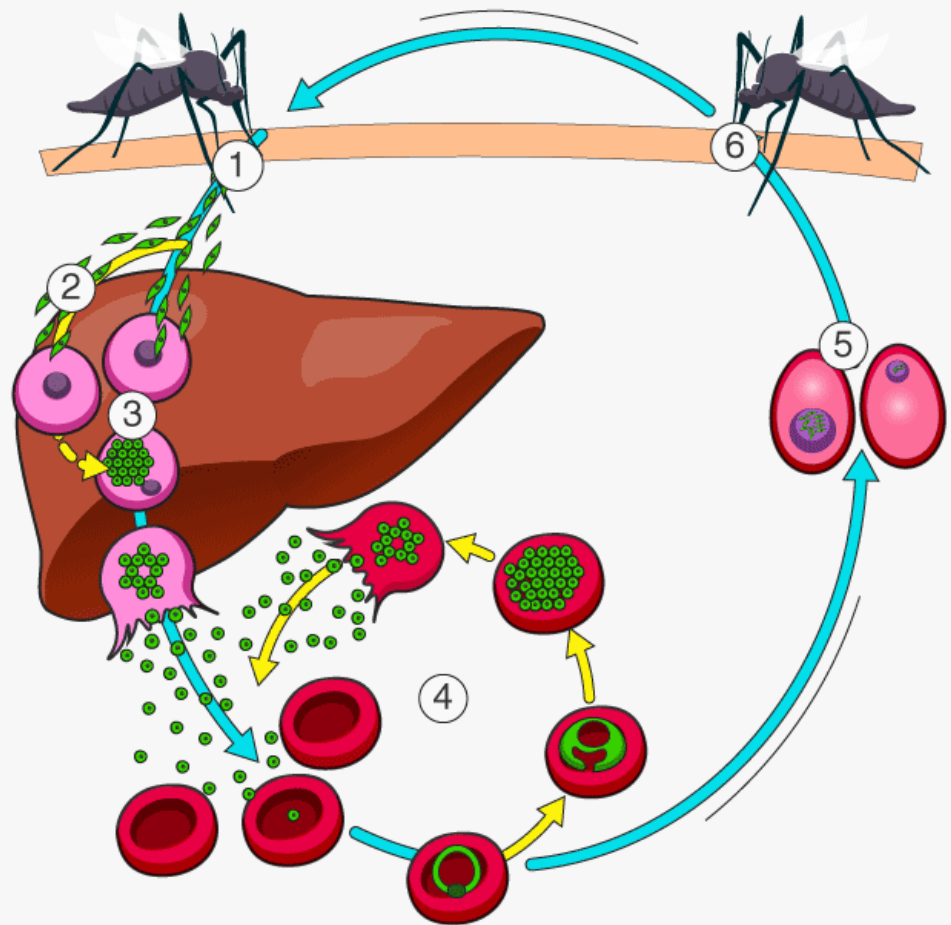
## Life Cycle of Malarial Parasites

The life cycle of the Malaria parasite involves two hosts. During a blood meal, a malaria-infected female *Anopheles* mosquito inoculates sporozoites into the human host. Sporozoites infect liver cells and mature into schizonts, which rupture and release merozoites.

Merozoites infect red blood cells. Some parasites

## LIFE CYCLE OF MALARIA

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- |                                               |                                                  |                                               |
|-----------------------------------------------|--------------------------------------------------|-----------------------------------------------|
| 1 Transmission to human (injects sporozoites) | 2 Sporozoites enter liver and infect hepatocytes | 3 Liver cells rupture and merozoites released |
| 4 Intraerythrocytic cycle                     | 5 Sexual cycle                                   | 6 Transmission to mosquito                    |

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differentiate into sexual erythrocytic stages (gametocytes). When these gametocytes are ingested during blood feeding by a female *Anopheles* mosquito, they mate in the gut of the mosquito and begin a cycle of growth and multiplication in the mosquito.



## Diagnosis of Malaria

### 1. Clinical Evaluation:

- The first step in diagnosing malaria involves a thorough clinical evaluation of the patient. Symptoms such as fever, chills, headache, fatigue, and body aches are common indicators of malaria. However, these symptoms are not specific to malaria and can resemble other infectious diseases as well.

### 2. Microscopic Examination:

- Microscopic examination of blood smears is the gold standard for malaria diagnosis. This method allows the detection and identification of malaria parasites in the patient's blood.
- Thick Blood Smear: A drop of blood is spread in a thick film on a glass slide, stained with a suitable stain (e.g., Giemsa), and examined under a microscope. This method is useful for detecting the presence of parasites in the blood.
- Thin Blood Smear: A thin film of blood is prepared on another glass slide, stained, and examined under a microscope. This method helps in identifying the species of Plasmodium parasite and determining the stage of infection.

### 3. Rapid Diagnostic Tests (RDTs):

- RDTs are simple, point-of-care tests that provide rapid results within 15-20 minutes. They are based on the detection of specific malaria antigens in the patient's blood.

#### 4. Molecular Diagnosis:

- Polymerase Chain Reaction (PCR) is a highly sensitive and specific method for diagnosing malaria. It can detect and differentiate between different species of Plasmodium parasites, including drug-resistant strains.
- PCR-based methods amplify the DNA of the parasite present in the patient's blood, allowing for accurate species identification and detection of low parasite levels.

#### Treatment

Chloroquine phosphate is the preferred treatment for any parasite that is sensitive to the drug.

#### Conclusion

In summary, Sporozoa (Apicomplexa) is a group of unicellular, intracellular parasites responsible for causing various diseases in humans and other animals. They are characterized by their complex life cycles, which involve **two hosts** and *alternating sexual* and **asexual stages**.

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## Toxoplasma

#### Introduction

Toxoplasma is a genus of parasites that includes the species Toxoplasma gondii, the causative agent of toxoplasmosis<sup>1</sup>. Toxoplasmosis is a common infection that occurs worldwide and can cause serious illness in certain groups of people.

#### Characteristics of Toxoplasma

Toxoplasma gondii is a single-celled parasite that belongs to the phylum Apicomplexa. humans. The parasite reproduces sexually only in the cat family, making cats the definitive host<sup>1</sup>.

## Toxoplasmosis

Toxoplasmosis is an infection caused by *Toxoplasma gondii*<sup>2</sup>. Most people infected with toxoplasmosis do not have any symptoms<sup>2</sup>. However, some people may experience flu-like symptoms, including fever, swollen lymph nodes, headache, muscle aches, and skin rash<sup>2</sup>. In severe cases, toxoplasmosis can cause lung or brain disease, particularly in people with weakened immune systems.

## Life Cycle of Toxoplasma

The life cycle of *Toxoplasma gondii* involves two hosts: cats (the definitive host) and a secondary host, which can be any warm-blooded animal, including humans<sup>1</sup>. The parasite reproduces sexually in the gut of the cat, producing oocysts that are shed in the cat's feces<sup>1</sup>. These oocysts can then be ingested by the secondary host, where they transform into tachyzoites and bradyzoites, the forms of the parasite that can cause disease.

|                       |                                                                              |
|-----------------------|------------------------------------------------------------------------------|
| <b>Hosts</b>          | Cats (definitive host), most warm-blooded animals (secondary host)           |
| <b>Disease Caused</b> | Toxoplasmosis                                                                |
| <b>Symptoms</b>       | Often none, but can include flu-like symptoms, eye disease, lung disease     |
| <b>Transmission</b>   | Ingestion of oocysts from contaminated food or water, contact with cat feces |

## Diagnosis of Toxoplasmosis:

Toxoplasmosis is diagnosed based on blood tests. Laboratory tests can detect two types of antibodies. **One antibody is present during a new and active infection with the parasite, and the other antibody is present if you had an infection at any time in the past.**

## Treatment of Toxoplasmosis:

- **Sulfadiazine/pyrimethamine:** Sulfadiazine is given along with pyrimethamine (an antiparasitic) to treat the infection.
- **Spiramycin:** This is given to pregnant women to prevent infection of their children.