British Society for immunology

MALARIA

What is malaria?

Malaria is a life-threatening disease caused by parasites that are transmitted to people by mosquitoes.

An estimated 700,000 people were kiled by malaria in 2010 globally and approximately half the world's population are at risk of the disease.

Malaria is **preventable** and **curable**.

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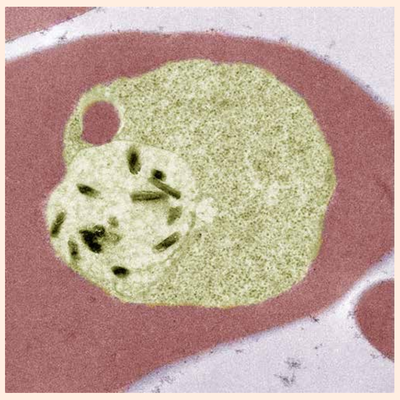
In the map on the left, the territory size is proportional to the number of malaria cases.

9 out of 10 malaria deaths occur in Africa and most of these are in children.

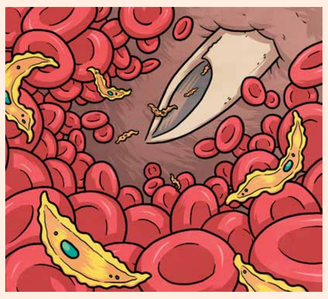
What causes malaria?



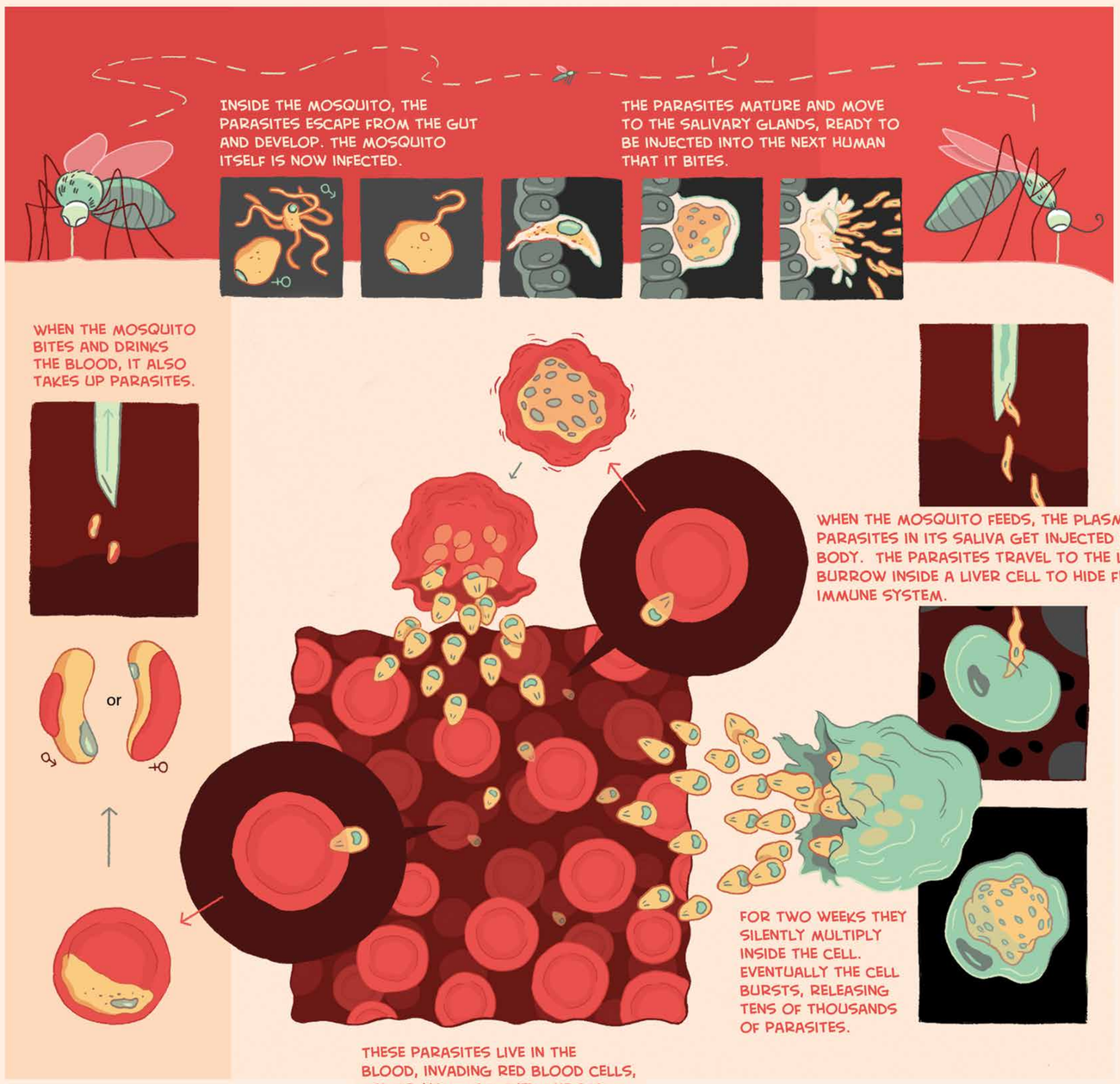
Plasmodium (yellow) inside a red blood cell (red). This image was taken with an electron microscope.

Malaria is caused by a microscopic parasite called ***Plasmodium***. Four species of this parasite infect humans to cause malaria but *Plasmodium falciparum* is the most deadly.

Plasmodium is transmitted between people by blood-eating mosquitoes. The mosquito is described as a malaria '**vector**' becasue it spreads but doesn't actually cause disease.



Plasmodium has a **complex life cycle** involving the infection and destruction of red blood cells (see left).



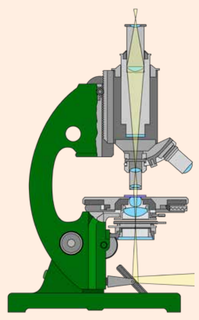
Symptoms of malaria

Initial symptoms are **similar to the flu**:

>> Fever, headache, shivering, vomiting

In severe cases of *Plasmodium falciparum* malaria, these symptoms can develop:

>> Severe anaemia (lack of oxygen in blood), breathing difficulties, organ failure, problems with the nervous system



Because the symptoms of malaria can be similar to those of other conditions, the best way of diagnosing it is to look at **samples of a patient's blood** down a microscope. If you can see malaria parasites then the patient has malaria.

Why doesn't the immune system stop us from getting malaria?

To beat malaria, the immune system needs to be able to find *Plasmodium*. But ***Plasmodium* hides**, first in liver cells and then in red blood cells.

This prevents the immune system's white blood cells from finding and destroying it.

How is malaria treated?

Quick diagnosis and treatment of malaria with anti-malarial drugs prevents deaths and reduces transmission. But the cost of such drugs and the development of resistance by *Plasmodium* poses challenges.

Ideally, we would prevent people from getting malaria in the first place.

How can malaria be prevented?

The main way of preventing malaria is to **target mosquitoes** by:

> Reducing areas of standing water where mosquitoes breed

> Using insecticide-treated bed nets that help prevent mosquitoe bites

> Spraying houses indoors with insecticides that kill mosquitoes when they land

Vaccines could help prevent malaria

A malaria vaccine would **train the immune system** to find and d