Background information

Malaria is an infectious disease transmitted by the female Anopheles mosquito. It is caused by the parasitic protozoan, Plasmodium, which infects the human and insect host alternatively.

The life cycle of Plasmodium is depicted in Figure 2 below:

1. An infected female mosquito bites a human, injecting the Plasmodium into the bloodstream. These pass to the liver.

2. The parasites multiply in the liver cells over the next few days. There are no symptoms at this stage.

3. The Plasmodium burst from the liver cells, invade the red blood cells, and multiply again. The new parasites are released and invade more red blood cells. This cycle is repeated and each time the parasites break free and invade again, the victim suffers an acute attack of violent fever.

4. If an uninfected female mosquito then feeds on the victim, parasites will pass into her stomach wall, multiply, and then migrate to her salivary glands.

5. The mosquito inoculates another human by injecting the Plasmodium in her saliva when she next feeds.

Figure 2. The life cycle of Plasmodium.

Malaria is one of the world’s biggest health problems, killing about two million people each year, most of them children. The parasite is found in tropical and sub-tropical regions of the world. African countries south of the Sahara desert account for 80% of all clinical cases. In some rural, tropical African areas, one in 20 children die from malaria before they reach the age of 5 years. In West Cameroon, at least 75% of children have Plasmodia growing in their blood cells. Other countries affected by the disease include India, Brazil, Afghanistan, Sri Lanka, Thailand, Indonesia, Vietnam, Cambodia and China.

The severity and incidence of malaria are governed to a certain extent by the immunity levels of the host, man. Immunity depends on constant exposure to malaria-infected mosquitoes. Thus the disease can become prevalent under situations in which non-immune people enter infected areas, for example: (i) the mass migration of
refugees in response to war and civil disturbances; (ii) the influx of workers to areas undergoing rapid urbanization and development; (iii) the development of the tourist industry.

In this century, over half a million chemicals have been tested against malaria, but only 20 or so have proved useful. Although these drugs can help treat victims and prevent infection, unfortunately *Plasmodia* often develop resistance to them by changing their form.

In an attempt to eradicate malaria during the 1960s, vast areas were sprayed with insecticides, thereby destroying the mosquito habitats. Drugs were used carefully and effectively and people were encouraged to sleep under nets treated with insecticide. However, wars, inflation, political instability and famine prevented further progress, and the mosquitos became resistant to the insecticides. Attempts have also been made to control the disease by land drainage to destroy the larvae (mosquitos breed in wet, warm places). Biological control has been investigated with the introduction of predators such as guppies (fish) which breed rapidly and eat mosquito larvae.

Tourists travelling to malaria zones are advised to take anti-malarial drugs before, during and after their visit. Other means of protection against the disease are: (i) spraying the inside of rooms with insecticide; (ii) sleeping under mosquito nets; (iii) fixing insect screens to the windows; (iv) wearing long clothes to cover the skin; (v) applying insect repellent to exposed skin; (vi) burning mosquito coils. Today, scientists are under great pressure to develop a vaccine. However, with such a complicated life cycle, and so many different forms of the parasite, it is unlikely that one single injection will ever protect against malaria for life.

**Class discussion 1**

Introduce the class to the topic of malaria by asking whether anyone has suffered from or knows anyone suffering from malaria. Explain that the disease is caused by a complex parasite, *Plasmodium*, which has two hosts — the mosquito and the human.

*(5 – 10 minutes)*

**Group work**

Split the class into groups and instruct them to use pages 41–43 of the book to help them to complete questions 1–6 of the student worksheet on ‘Malaria’.

*(10 minutes)*

**Class discussion 2**

Using the worksheet as a basis, ask the class to describe how the disease is spread and why it is more prevalent in some areas than others. Discuss the known means of protecting yourself against the disease.

Consider the implications of malaria on tourism, and the economics and politics of large-scale insecticide spraying.

*(10 minutes)*

**Class discussion 3**

For more advanced classes, ask pupils to complete question 7 of the worksheet for discussion.

*(10 minutes)*