



# TEACHER'S NOTES

SICKLE CELL  
ACROSS THE WORLD

## OVERVIEW

Aimed at **key stage 3** pupils.

In this activity the pupils will learn about the relationship between Sickle Cell Anaemia and malaria.

## LEARNING OBJECTIVES

- Understand the relationship between malaria and Sickle Cell Anaemia
- Understand what malaria is and how the parasite that causes malaria infects our body
- Appreciate that having the sickle cell trait gives a person some protection against malaria

## CURRICULUM LINKS

- KS3: Conception, growth, development, behaviour and health can be affected by diet, drugs and disease.
- KS3: All living things show variation, can be classified and are interdependent, interacting with each other and their environment.

## you will NEED

- Student worksheets

## Activity

- This activity can be completed individually or in pairs after watching **Pamela's Story** film on the Genes Are Us website.

## ANSWERS

### 1. In which area is malaria most common?

Malaria is most common in Africa

### 2. In which area is Sickle Cell Anaemia most common?

Sickle Cell Anaemia is most common in Africa

### 3. Fit the following words into the gaps:

Malaria is more **common** in some parts of the world than others. In the countries where malaria is common, you will generally also find that Sickle Cell Anaemia is more common.

In the UK, both malaria and Sickle Cell Anaemia are relatively **rare**.

Malaria is an **infectious** condition, whereas Sickle Cell Anaemia is a **genetic** condition. People are born with Sickle Cell Anaemia but people catch malaria after being bitten by a **mosquito**.

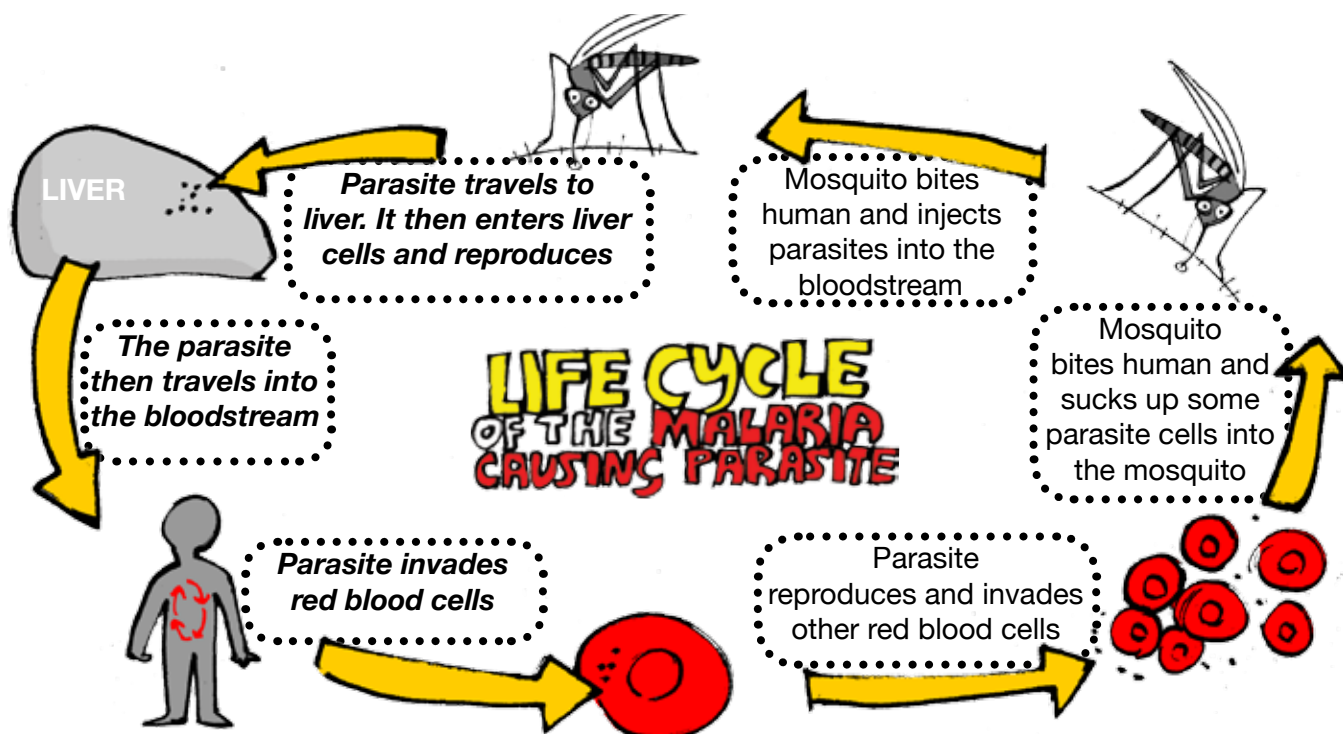
# TEACHER'S NOTES

## SICKLE CELL ACROSS THE WORLD

### ANSWERS

continued

**Life cycle of the malaria causing parasite. This diagram shows how the parasite that causes malaria infects the body. Fill in the empty boxes with the sentences below, some have already been done for you.**



4. If a person was living in Africa, where there is a high level of malaria, would it be an advantage to:  
Have Sickle Cell Anaemia Have sickle cell trait Have no sickle cell genes?

**Explain your answer:** If a person was living in Africa it would be an advantage to have sickle cell trait. In this area malaria is common but the sickle cell trait gives you some protection against malaria. This means you are more likely to survive a malaria infection than people without the sickle cell trait.

5. Imagine someone living in a country where there is no malaria, would it be an advantage for them to have the sickle cell trait?

If you live in a country where there is no malaria then it is not an advantage to have the sickle cell trait. This trait is only an advantage in countries where there is malaria because here it gives you some protection from the disease.

Students may also mention that in this situation it would be a disadvantage to have the sickle cell trait as you may pass the gene involved in causing Sickle Cell Anaemia on to your children.

### FURTHER information

See Pamela's Story Teacher Factsheet on Sickle Cell Anaemia for basic information.  
For more detailed information, link to the patient support group: [www.sicklecellsociety.org](http://www.sicklecellsociety.org)

For further information about malaria and Sickle Cell Anaemia and research being carried out in this area visit the Wellcome Trust website: <http://malaria.wellcome.ac.uk/>

The World Health Organisation website can also provide further information about malaria and work taking place globally to tackle this disease: <http://www.who.int/topics/malaria/en>

FOR MORE RESOURCES LIKE THESE AND TO SIGN UP FOR JEANS FOR GENES DAY, VISIT US AT [WWW.JEANSFORGENES.ORG](http://WWW.JEANSFORGENES.ORG)

CREATED IN COLLABORATION WITH **nowgen**

A Centre for Genetics in Healthcare

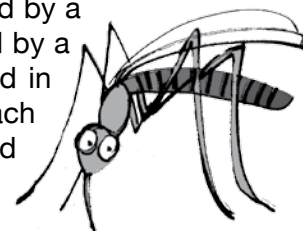


# SICKLE CELL ACROSS THE WORLD

You have heard from Pamela about life with Sickle Cell Anaemia. Pamela and her family are planning a holiday to Nigeria in Africa. Pamela went online to learn more about Nigeria. She found out that Sickle Cell Anaemia is much more common there than in England. She also found some interesting facts about Sickle Cell Anaemia and malaria.

## MALARIA

Malaria is an infectious disease that is caused by a single-celled parasite. This parasite is spread by a blood-sucking mosquito and malaria is found in more than 100 countries around the world. Each year over 300 million people are infected and malaria kills more than 2 million people a year. Some of the symptoms of malaria are fever, shivering, sweating and exhaustion.



The table below shows the number of people who catch malaria each year in different areas of the world and the number of babies born with Sickle Cell Anaemia in each area.

Area	Population size (to the nearest million)	Number of people who are infected with malaria in that area (each year)	Number of babies born every year with Sickle Cell Anaemia (approximately)
Africa	1,014	212 million	200,000
United States of America	310	1,200	1,000
England	62	1,300	350

NB. These statistics are from 2010.

Answer the questions below:

- 1 In which area is malaria most common?
- 2 In which area is Sickle Cell Anaemia most common?
- 3 Fit the following words into the gaps

mosquito

genetic

common

infectious

rare

Malaria is more common in some parts of the world than others. In the countries where malaria is \_\_\_\_\_, you will generally also find that Sickle Cell Anaemia is more common.

In the UK, both malaria and Sickle Cell Anaemia are relatively \_\_\_\_\_.

Malaria is an \_\_\_\_\_ condition, whereas Sickle Cell Anaemia is a \_\_\_\_\_ condition. People are born with Sickle Cell Anaemia but people catch malaria after being bitten by a \_\_\_\_\_.

# SICKLE CELL ACROSS THE WORLD

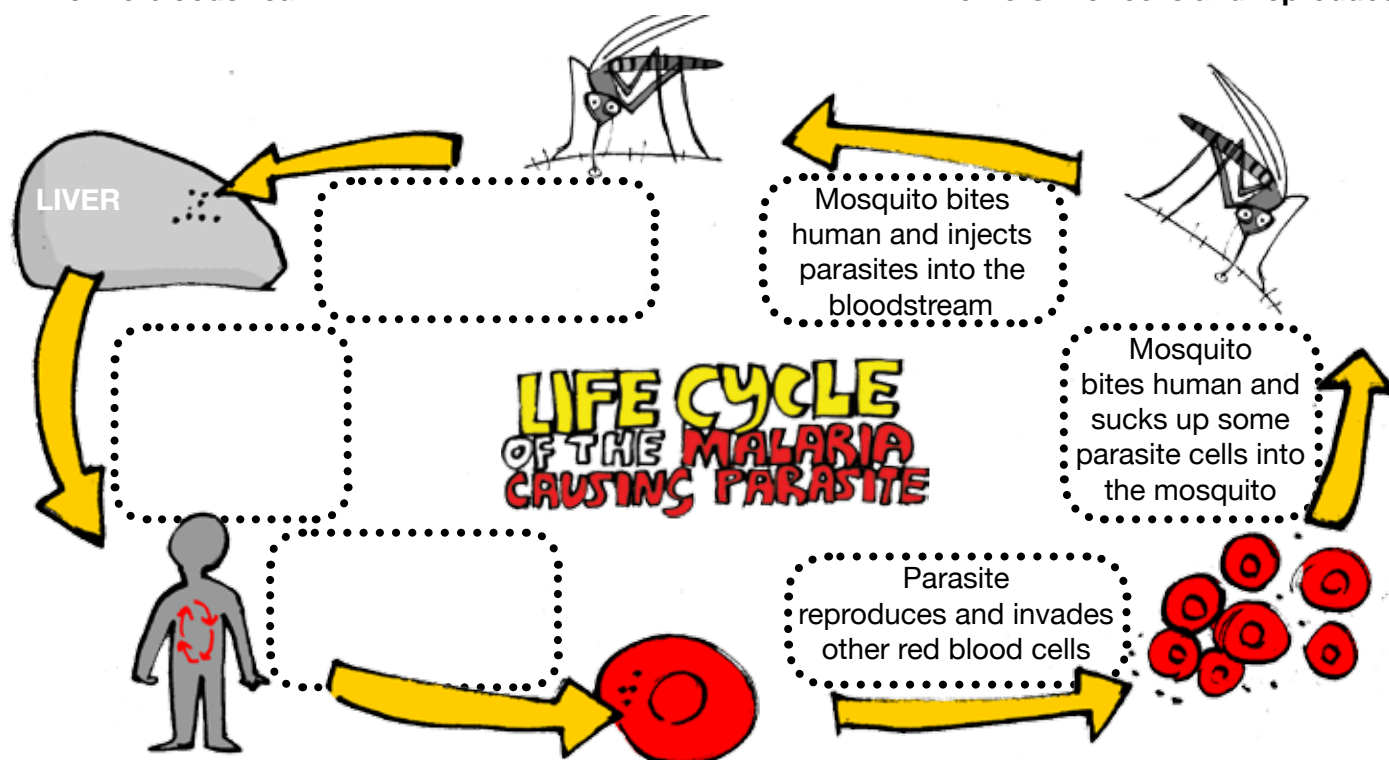
The pattern between Sickle Cell Anaemia and malaria was first noticed hundreds of years ago. Scientists are working hard to find out why this pattern exists. In order to do this they need to understand how the parasite that causes malaria infects our body.

This diagram shows how the parasite that causes malaria infects the body. Fill in the empty boxes with the sentences below, some have already been done for you.

The parasite then travels into the bloodstream

Parasite invades red blood cells

Parasite travels to liver. It then enters liver cells and reproduces



## MALARIA & SICKLE CELL ANAEMIA

Scientists are investigating why Sickle Cell Anaemia is more common in areas where malaria is more common. They have found that people who have the sickle cell trait (one copy of the gene that causes Sickle Cell Anaemia) have some protection against malaria. They are significantly more likely to

survive a malaria infection than others. This means that people who have sickle cell trait are more likely to go on and have children, passing on their genes, including the gene involved in causing Sickle Cell Anaemia. This explains why there are high levels of Sickle Cell Anaemia in areas where malaria is common.

**4** If a person was living in Africa, where there is a high level of malaria, would it be an advantage to:

Have Sickle Cell Anaemia

Have sickle cell trait

Have no sickle cell genes?

Explain your answer:

**5** Imagine someone living in a country where there is no malaria, would it be an advantage for them to have the sickle cell trait?

FOR MORE RESOURCES, GO TO [WWW.JEANSFORGENES.ORG](http://WWW.JEANSFORGENES.ORG)

CREATED IN COLLABORATION WITH

nowgen

A Centre for Genetics in Healthcare

