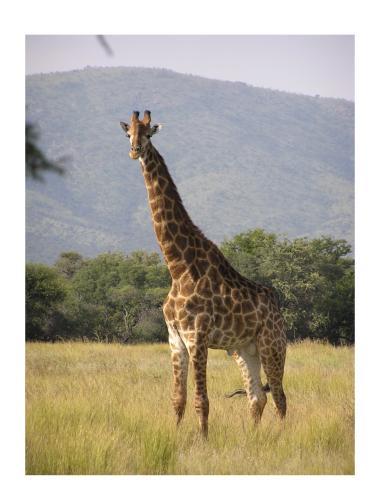
Topic	Evolution by natural selection	Level	GCSE (or any course for students aged 11-16)	
Outcomes	 Understand how giraffe length evolved by natural selection (including variation, competition and reproduction) Suggest an adaptive hypothesis for the evolution of neck length in giraffes Understand that variation is the starting point for natural selection 			
Information for teachers	This activity asks students to think more deeply about evolution by natural selection. We use the evolution of giraffe length as the example, but start off by considering what the possible advantages of long necks <i>could</i> be. Students first learn how neck length evolved according to the 'competing browsers' hypothesis and then apply these ideas to 'necks for sex' hypothesis. A story board is used so that students gain an appreciation of the distinct stages involved as often natural selection is incorrectly considered to involve just one stage. Whilst I have used the term giraffes in the story board for the beginning stages, it is important to point out that these work giraffe-like ancestors.			
Pedagogy focus	There is a great article here from the BBC that provides background information on giraffe evolution.			
Other resources	Other resources on evolution are here: https://thescienceteacher.co.uk/evolution/			

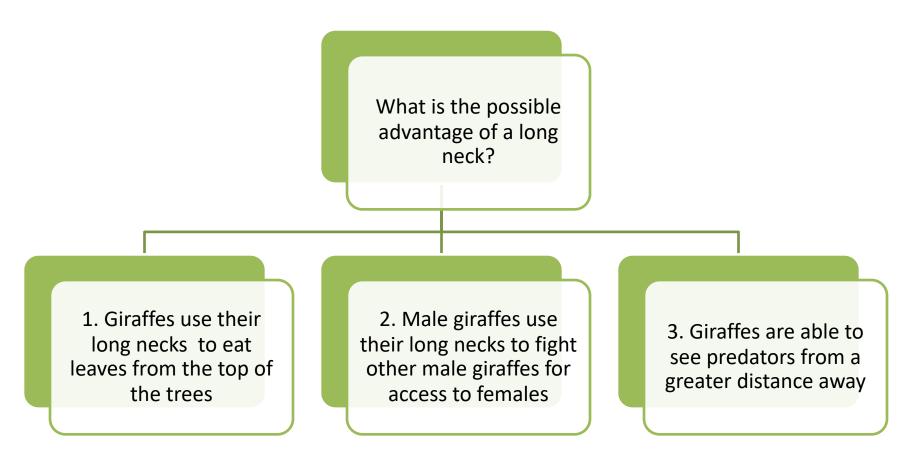
www.thescienceteacher.co.uk | resources for science teachers who like to think

A hypothesis is a statement that tries to explain certain factors or observations.

Come up with as many hypotheses as you can that explain why long necks are advantageous to giraffes.



Possible adaptive hypotheses



- Discuss each of the hypotheses in your group.
- Decide which one you think is the most likely and why
- Complete the story board on the next slide for hypothesis 1

Hypothesis 1: long necks help giraffes to reach food in the tops of trees

Draw a labelled diagram in each box that		
represents the process that is described.		
Step 1: Some giraffes had longer necks than	Step 2: After a dry summer, only tall trees	Step 3: The giraffes with long necks could
other giraffes. There was variation in neck	had leaves so there was competition for	reach the tall trees whereas the giraffes
length.	food.	with shorter necks could not.
Step 4: Because the shorter neck giraffes	Step 5: Giraffes with long necks lived	Step 6: The offspring inherited long neck
could not reach the leaves, they starved	longer and had more offspring.	genes from their parents and so had long
and died.		necks. Overtime there were more long neck
		giraffes in the population. This change in
		the inherited characterises of a population
		overtime is called evolution .



Video link to giraffes 'necking'

Hypothesis 2: long necks allow males to fight for females

Draw a labelled diagram and complete the		
description for each step.		
C. 4.C. :	C. 2	C. 2
Step 1: Some giraffes had longer necks than	Step 2:	Step 3:
other giraffes. There was variation in neck length.		
lengui.		
Step 4:	Step 5:	Step 6: The offspring inherited long neck
		genes from their parents and so had long
		necks. Overtime there were more long neck
		giraffes in the population. This change in
		the inherited characterises of a population
		overtime is called evolution .

Thinking deeply

- 1. What causes variation in populations?
- 2. If all giraffes had plenty of food would hypothesis 1 be possible? Explain your answer.
- 3. Some people believe that giraffes evolved their long necks by constantly stretching to reach the tops of trees. Explain how this idea is different to hypothesis 1.
- 4. What follow up measurements would you take to provide evidence for hypothesis 2?

Thinking deeply

1. What causes variation in populations?

Meiosis and mutation cause genetic variation

2. If all giraffes had plenty of food would hypothesis 1 be possible? Explain your answer.

No, natural selection can only happen when there is competition for a limited resource. If there was plenty of food then long-necked giraffes would not have any more offspring than shorter-necked giraffes

3. Some people believe that giraffes evolved their long necks by constantly stretching =to reach the tops trees. Explain how this idea is different to hypothesis 1.

In hypothesis 1, giraffes do not develop longer necks over the course of their lifetime and neck length is an inheritable characteristic.

4. What follow up measurements would you take to provide evidence for hypothesis 2?

Measure the neck length of males and females and see whether there is any difference. Because neck length is advantageous only for males in hypothesis 2, you would expect males to have longer necks than females.