

Topic	Evolution by natural selection	Level	GCSE (or any course for students aged 11-16)
Outcomes	<ul style="list-style-type: none"> • 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	<p>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.</p> <p>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.</p>		
Pedagogy focus	There is a great article here from the BBC that provides background information on giraffe evolution.		
Other resources	<p>Other resources on evolution are here: https://thescienceteacher.co.uk/evolution/ </p>		

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

What is the possible advantage of a long neck?

1. Giraffes use their long necks to eat leaves from the top of the trees

2. Male giraffes use their long necks to fight other male giraffes for access to females

3. Giraffes are able to see predators from a greater distance away

- 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

<i>Draw a labelled diagram in each box that represents the process that is described.</i>		
Step 1: Some giraffes had longer necks than other giraffes. There was variation in neck length.	Step 2: After a dry summer, only tall trees had leaves so there was competition for food.	Step 3: The giraffes with long necks could reach the tall trees whereas the giraffes with shorter necks could not.
Step 4: Because the shorter neck giraffes could not reach the leaves, they starved and died.	Step 5: Giraffes with long necks lived longer and had more offspring.	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 .



[Video link to
giraffes
'necking'](#)

Source: <https://www.newscientist.com/article/dn19135-zoologger-how-did-the-giraffe-get-its-long-neck/>

Hypothesis 2: long necks allow males to fight for females

<i>Draw a labelled diagram and complete the description for each step.</i>		
Step 1: Some giraffes had longer necks than other giraffes. There was variation in neck length.	Step 2:	Step 3:
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 life-time 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.