

# 3.6 Natural selection

**Biology NC link:**

- how organisms affect, and are affected by, the environment
- the variation between species and between individuals of the same species, natural selection.

**Working Scientifically NC link:**

- present reasoned explanations, including explaining data in relation to predictions and hypotheses.



Band	Outcome	Checkpoint	
		Question	Activity
Developing	State how survival rates differ for successful adaptation (Level 3).	C, 2	Lit, Main, Plenary 2
	State organisms have changed over time, giving examples (Level 4).	A, 1	Lit, Main
	Create a simple evolutionary sequence (Level 3).		Lit, Main
Secure	Describe the process of natural selection (Level 6).	C, 2, 3	Lit, Starter 2, Main, Plenary 2
	Describe how organisms evolve over time (Level 6).	1, 3	Lit, Starter 2, Main
	Create an evolutionary family tree, giving justification for the route chosen in the tree (Level 6).		Main
Extending	Explain how natural selection leads to evolution (Level 7).	C, 2, 3	Lit, Main, Plenary 2
	Explain how scientists know that organisms have changed over time (Level 7).	B, 1	Main, Plenary 1
	Create an evolutionary family tree, and present reasoned arguments to justify the structure of the tree (Level 8).		Main

**Literacy**

Students explain the evolution of a species using scientific terminology and apply these throughout the lesson. Students also prepare a short presentation to justify the path they have chosen for their evolutionary family trees, listening to each other and contributing to discussions throughout the activity.

**APP**

Students make an evolutionary family tree display from images provided (AF3), using this as a model to explain evolution and to demonstrate how scientific knowledge has progressed using evidence from fossils (AF1).

**Key Words**

evolution, fossil, natural selection

**Answers from the student book**

In-text questions	<p><b>A</b> The process of species gradually developing/changing over time.</p> <p><b>B</b> The remains of plants or animals that lived a long time ago, which have changed to stone.</p> <p><b>C</b> Organisms with the characteristics that are most suited to the environment survive and reproduce. Less well adapted organisms die.</p>
Activity	<p><b>Evolution cartoon</b></p> <p>Credit sensible cartoon strip demonstrating variations in a species, 'survival of the fittest', and evolution of the species. Species concerned can be real or imaginary as long as the scientific concepts shown are sound. For example, peppered moths are pale coloured at first because tree bark was pale. Dark coloured ones were readily predated on as they were less camouflaged. The Industrial Revolution turned tree barks dark so the trend reversed. Pale coloured moths now less well camouflaged and dark coloured moths better camouflaged. The population of dark coloured moths now outweighs that of the pale coloured moths.</p>

Summary Questions	Answers
1	evolved, millions, fossils, remains, stone (5 marks)
2	Organisms which have adaptations suited to their habitat survive for longer. This means they produce more offspring. Offspring are likely to inherit their parents' advantageous characteristics. Therefore more offspring with the advantageous characteristics survive, continuing the process. (3 marks)
3	6 mark question. Example answers: Prior to the Industrial Revolution, pale moths were more successful because the pale moths were camouflaged from predators on pale tree bark. Therefore most of the peppered moth population was pale. The Industrial Revolution caused trees to become blackened. Pale moths became less camouflaged/successful. Dark moths became more camouflaged/successful. Therefore dark moths reproduced more than pale moths. The population of dark moths increased rapidly. The population of pale moths decreased rapidly. Therefore a greater proportion of peppered moths were dark in colour.



Starter	Support/Extension	Resources
<p><b>Evolutionary terms</b> (5 min) Interactive resource where students complete a crossword based on the key words of this topic.</p> <p><b>Change over time</b> (5 min) Select an everyday object such as a piece of technology (e.g., the mobile phone). Display images from the Internet to show how the device has changed over time. Discuss as a class, leading on to the fact that modern phones are more suited to our lifestyle. This analogy can then be used when talking about the gradual change in a named plant or animal.</p>		<p><b>Interactive:</b> Evolutionary terms</p>
Main	Support/Extension	Resources
<p><b>Evolutionary family tree</b> (40 min) Introduce the idea of evolution, including the key concepts of adaptations and natural selection. Discuss the idea of an evolutionary family tree. Introduce an example as an image from the Internet, and discuss what the branches show. Students then work in small groups to construct their own family tree using the images provided on their activity sheet, and discuss with you how they have arranged their tree. Students prepare a short presentation of their family tree to the rest of class, where a justification for their design is required. Students should be prepared to answer questions on this topic from other students and from you. This activity does not necessarily require students to reach the 'correct' sequence in the family tree. The skill of applying their understanding of adaptation and evolution is more important here.</p>	<p><b>Support:</b> Students should be given a starting organism to work from on their family tree. If necessary, provide prompts for students to group organisms into similar groups first, before forming an evolutionary chain.</p>	<p><b>Activity:</b> Evolutionary family tree</p>
Plenary	Support/Extension	Resources
<p><b>Fossils</b> (10 min) Show the class fossils or images of fossils from the Internet. Ask students to state what is being shown to them, explain what fossils are made from, and what scientists can deduce from fossils.</p> <p><b>Survival of the fittest</b> (10 min) Show an image of an insect-eating bird. Students should describe the diet (insects) of this bird, based on its adaptations. Use coloured counters/dots on the board to denote populations of different coloured insects, and ask students to predict the effects on future generations of these insects if the bird prefers one type of insect over another, or if one insect is better adapted for survival than the others.</p>	<p><b>Support:</b> Show students images of gradual changes in fossil records.</p> <p><b>Extension:</b> Students suggest how scientists may be able to date fossils, or place fossils in chronological order.</p>	
Homework		
<p>Students choose an animal of their choice. They carry out research to write an explanation of how this animal has evolved over time.</p>		