

a WOW Lab

**BLUEPRINT**

**Selection in Action**

## Inquiry Approaches

### Initial Inquiry

Name some examples of species. What makes them all different?

Students will come up with many examples when asked to name species. In answering what makes them different, possible responses could be different body types, diet and adaptations to their environments. Students should understand that, generally, different species cannot interbreed, although there are exceptions.

What does the term “genetic diversity” mean? What are some examples of genetic diversity within our species, *Homo sapiens*?

Genetic diversity refers to the differences between individuals in a population. Genetic diversity among humans includes, but is not limited to, differences in height, hair type and colour, skin colour, and eye colour.

### Experimental Procedure Inquiry

Whose car survived Round One? Can you think of any reasons why these cars survived?

Answers will vary but all answers should mention that surviving cars had traits that made them able to pass the obstacles more easily.

How many “parent” cars had offspring that survived the second round? Are there any characteristics that may have increased the chances of cars surviving?

Once more, answers will vary. Various inherited traits (for example, the size of the wheels) may be suggested.

Are the cars a genetically diverse population? Why might it be important that each individual is slightly different? What would happen if all the cars were the exact same size and had to pass through the arch obstacle, but they all happened to be too large?

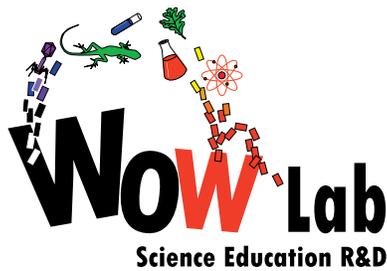
Yes, the cars are a genetically diverse population. Students will provide examples of how all the cars are different. Genetic diversity is very important because if there is environmental change, at least some of the individuals are likely to possess traits that enable them to survive in the new environment. For example, if the arch was a “must pass” obstacle and all the cars were the same size and were too large, the population might face extinction.

What role did the environment (the obstacles) play in the survival of the cars?

Each individual lives in an environment and is subject to its pressures. If a car possesses traits that are beneficial in the particular environment, it will have a greater chance of surviving. Therefore, the environment is key for the survival of the cars.

Would more cars have survived had the environment stayed the same for Round two?

It is likely that more cars would have survived if the environment had remained the same. The cars from the previous generation possessed characteristics that were helpful for surviving in the environment and it was those traits that were passed on.



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## Selection in Action - Inquiry Approaches

### In-Depth Inquiry

In the real world and in real environments, what obstacles might plants or animals face?

Some obstacles include predators, finding food and water, access to mates, climate change and other environmental pressures.

Are offspring a “blend” of both parents? Give an example from the car reproduction stage to support your answer.

In sexually reproducing species, each offspring inherits a unique combination of genes from both parents. This results in variation among the population (see Genetic Recombination in *Glossary*). Students may give the example of a second generation car inheriting wheels from the mother and another piece from the father. The important point is that the Lego pieces were not blended together to create a new piece.

Can cars change their characteristics in response to the environment? Can animals do this in real life?

No, they cannot. For example, if a car is too large to fit through the arch, it cannot change its dimensions by removing certain pieces. The same holds true in real life; animals cannot change their morphology to suit the environment. Darwin would explain that within the population of cars, some, by chance, will possess characteristics that are favourable to survival. For instance, some cars will already be small enough to fit through the arch. This trait will be selected for and these cars will be more likely to survive and pass on this trait to their offspring.

There are many different species on planet Earth today. Have they always been here? Are there any species that you know of that lived on earth a long time ago and are no longer alive today?

No, the species on Earth have not always been here, but are the result of many speciation events over very long periods of time. Students might give examples of extinct animals such as dinosaurs or saber-toothed tigers.

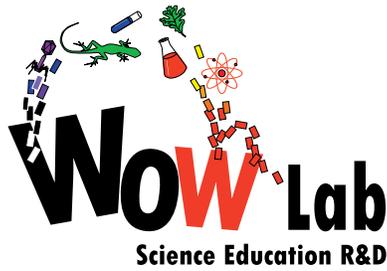
### Inquiry Questions on Peppered Moths

Before the Industrial Revolution, peppered moths were two colours: light grey and dark grey. If tree trunks were light in colour and moths often rested on them, which group was more likely to be eaten by predators?

The dark grey moths were more likely to be spotted and eaten, since they stood out more than the light grey moths.

During the Industrial Revolution, factories produced a great amount of pollution. The air pollution was so great that it caused the tree trunks to darken in colour. What do you think happened to the light grey moths that used to blend in with the tree trunks? What do you think happened to the dark grey moths that used to stand out?

The students will probably say that the light grey moths now stood out on the dark grey tree trunks, while the dark grey moths blended in. The dark grey moths were now more likely to survive than the light grey moths. If dark grey moths have a greater chance of escaping predators and mating, they will produce more dark grey moths. If light grey moths have a greater chance of being spotted by predators, they may not have the chance to reproduce and fewer light grey moths will be born.



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What would have happened if there was no genetic diversity within the moth population and all the moths had been light grey?

It is possible that the population might have died out (gone extinct) during the Industrial Revolution. This is why genetic diversity is important. Natural selection works on what already exists in the population. In the moth example, it is important to understand that the moths did not darken in colour as their environment became increasingly polluted. Instead, the dark grey moths already existed, but their numbers increased because they had a greater rate of survival thanks to being camouflaged by their environment.

How can the case study of the peppered moths be compared to the cars and obstacle course? How is this an example of natural selection?

Genetic diversity is key for both examples. Using the arch as an example, if all the cars were the exact same, size and the arch was too small for them to pass through, all the cars would die. However, this probably would not happen because the cars are a genetically diverse population and some of them will be small enough to fit through the arch. Therefore, natural selection works by favouring the survival of cars that are adapted to the environment.