

# *How foxes became suited to cold climates*

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## 2 How foxes became suited to cold climates

In this activity, students read a description of what happens in a population that is under pressure from an environmental factor, and how the population gradually adapts to the new environment. Before reading, students are prompted to form and justify an opinion concerning some of the key conditions necessary for natural selection. After reading, students evaluate their prior knowledge and are allowed to make adjustments.

### 2.1 Aims

- To promote reading with understanding.
- To make the often abstract and difficult-to-grasp concept of biological evolution by natural selection easier to understand through a story.

### 2.2 Structure

- Students work individually or in pairs (15–20 min).
- Discussion with the whole classroom (15–20 min).

### 2.3 Materials

- Student sheet

### 2.4 Procedure

1. Students work individually on the reading activity.
2. After completing all three parts of the reading activity, students may discuss the “After reading” section of the exercise in pairs.
3. Finally, the teacher discusses the whole story with the class, emphasizing the key concepts of evolution through natural selection. The teacher reviews all the statements with the class, pointing out the corresponding evidence in the text.

## How foxes became suited to cold climates

### Part 1. Before reading

For each of the following statements, decide whether you agree or disagree with it. If you agree with a statement, provide an example from nature that you have observed or read about to support your opinion. If you disagree with a statement, provide contradicting evidence that you have observed or read about.

- 1 *In nature, all individuals making up a population are identical.*

agree / disagree

Example or contradicting evidence:

- 2 *Many characteristics of living organisms are heritable.*

agree / disagree

Example or contradicting evidence

- 3 *In nature, the individuals that survive to adulthood and then reproduce are a completely random sample of the population.*

agree / disagree

Example or contradicting evidence

- 4 *All individuals in the population receive an equal amount of resources from their environment.*

agree / disagree

Example or contradicting evidence

**Part 2. During reading**

- A. Read the text below to get a general idea of what it is about.  
B. Read the text again and highlight the descriptions of individuals in the population.

**How foxes became suited to cold climate**

Let's consider a population of foxes living in an inland area. All foxes are carnivores, active hunters able to run long distances in search of food. Members of the population are not all precisely of the same size: some of them have longer legs and tails, while others have more compact bodies. Their faces vary as well, individual foxes having ears of slightly different sizes and varying snout length and width.

A mated fox pair usually remains together for life and produces a litter once a year. There are usually four to six young in each litter—all of them blind, deaf and toothless. Mothers remain in the den with the small foxes for two to three weeks, to feed and protect them, and keep them warm. During this time, the male brings food for the mother and protects the den from predators. When the young are about a month old, they come out of the den. The mortality of young foxes is quite high and less than half of them survive to adulthood.

As foxes range around, they encounter different kinds of environments, where they may try to settle down. Some foxes move to higher elevations, where conditions for survival are harsh. The environment is colder with not much food available. Foxes with more compact bodies, shorter legs and snouts, and smaller ears are favored in this environment. When it is cold, these individuals are better able to conserve their body heat and therefore their energy. Animals with relatively longer legs, snouts, and big ears dissipate body heat through these extremities. They lose more energy which needs to be supplied by hunting, which in turn requires more physical activity and therefore further energy expenditure.

Foxes with more compact bodies, shorter legs and snouts, and smaller ears are not only able to survive better in cold environments, they also produce larger litters and feed them better, due to the energy stored thanks to their physical characteristics. The better fed young have a higher chance of survival.

Young foxes inherit their physical characteristics from their parents. Young foxes born to stout parents with rather compact bodies tend to have stout and compact bodies as well. When young foxes leave the den, they come under the selection pressure of the environment. Those individuals whose bodies are better able to conserve heat are more likely to survive. Of the young born, less than half reach adulthood. These surviving individuals are mostly those whose physical characteristics enable them to conserve energy. Most of them will have relatively compact bodies with relatively short snouts and small ears.

Gradually, over the course of several generations, more and more foxes living in this environment will have compact bodies with relatively short legs and snouts and small ears. Over generations, short legs and snouts and small ears become a distinctive feature of the fox population living in cold, mountainous areas.

**Part 3. After reading**

**A.** Think once more about the statements from the part “Before reading” and indicate your agreement or disagreement with the given statements again.

1 *In nature, all individuals making up a population are identical.*

agree / disagree

2 *Many characteristics of living organisms are heritable.*

agree / disagree

3 *In nature, the individuals that survive to adulthood and then reproduce are a completely random sample of the population.*

agree / disagree

4 *All individuals in the population receive an equal amount of resources from their environment.*

agree / disagree

**B.** Have any of your initial opinions changed after reading the article? Explain.