STEM Project

Chapter 2 – Evolution

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Wallabat evolution

There is significant evidence to suggest that global warming is occurring on Earth, which will result in changes to environments around the globe. Climate scientists are predicting changes in temperatures, sea levels and the frequency of extreme weather events.

If these changes occur rapidly, it could result in some plant and animal species becoming extinct, unless they are able to evolve and adapt to the new environments.

In this activity, you will explore the ways in which an animal species could potentially evolve if its environmental conditions were to change.

The following information is about a mythical Australian marsupial called a 'wallabat'.

What is a wallabat?

Wallabats are small and furry and live in temperate forest regions of Australia, along the eastern and southern coasts.

Wallabats are vegetarians and mainly eat moss and lichen, and are preyed upon by feral cats. If they hear a possible predator they will run away or stand still to camouflage themselves. This makes them difficult to find in thick forest vegetation.

Wallabats breed very quickly and produce lots of offspring, so they have a chance of evolving in response to changes in their environment. Their offspring have several natural variations as shown in this table.

Trait	Fur colour	Heat tolerance	Birth coat	Running speed	Ear size	Food tolerance
Variations	grey/brown	high/low	naked/furry	slow/fast	small/large	Moss, lichen only / tolerant to other foods

Discuss with a partner and note down some ways that each variation of the traits in the table could affect the survival of a wallabat. For example, does a wallabat with large ears have an evolutionary advantage over one with small ears? Why / why not?

fur colour: _____

_____

_____

heat tolerance: _____

_____

_____

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birth coat:

running speed

ear size:

food tolerance:

Climate change

The wallabat usually lives in the temperate forests of South-Eastern Australia. The temperatures are mild and the rainfall is moderate. There are some feral cat predators, but not so many that the wallabats are in danger of extinction.

What would happen if the climate changes?

Climate change 1: From temperate forest to tropical rainforest

Imagine there is a dramatic change in the habitats in which wallabats live. The temperatures and rainfall both increase, and the temperate forests become much more tropical. Humidity-loving plants such as lichen, moss and ferns thrive and species that prefer a drier environment die out. Feral cat numbers reduce dramatically when infected by the 'feral cat tick' that only lives in tropical climates. If the wallabat population is to survive this climate change, they may have to evolve.

In a hot and humid tropical rainforest, predict which traits:

- will thrive
- will not thrive

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- will not be affected

Climate change 2: From temperate forest to desert

Now imagine that the temperatures increase but rainfall and humidity reduce significantly. The wallabat's habitats change to desert conditions. Many green and lush plant species, such as mosses and lichens, die off leaving the bush less dense. Feral cat numbers increase due to their increased hunting effectiveness in the sparser vegetation. If the wallabat population is to survive this climate change, they may have to evolve.

In a hot and dry desert, predict which traits:

- will thrive
- will not thrive
- will not be affected

Mutations

Mutations are changes in an organism's DNA that can be passed down to offspring. They can be caused by mutagens (such as radiation, chemicals or UV light) or through spontaneous 'mistakes' in the DNA replication process.

Some mutations can be beneficial, resulting in a variation in a species that can help them to survive. The ability of humans to see in colour is believed to be the result of a genetic mutation in our DNA several million years ago.

For the climate change scenarios you have considered, discuss with your partner what genetic mutations could be beneficial for wallabats in their new environment. Describe three possible beneficial mutations and how they would help a population of wallabats evolve to survive.

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Name: Class:

Climate change 1: From temperate forest to tropical rainforest

Beneficial mutations:

1

2

3

Climate change 2: From temperate forest to desert

Beneficial mutations:

1

2

3

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Discussion and reflection

What effects do you think climate change could have on the real wildlife in Australia? Do you think they will need to (and be able to) evolve to survive?

What effects do you think climate change will have on wildlife in other parts of the world? Do you think they will need to (and be able to) evolve to survive?

What effects do you think climate change will have on the human population? Do you think we will need to (and be able to) evolve to survive?

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