

Exercise walk-through

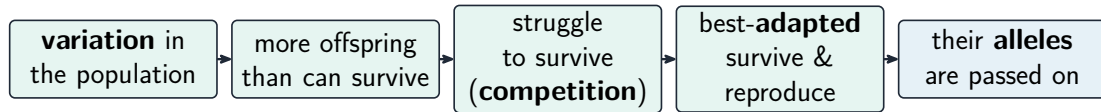
# 18.3

## Selection

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IGCSE Biology

# Natural selection



over many generations the population becomes better adapted

## Natural selection :

- 1 variation in the population
- 2 more offspring than can survive
- 3 **competition** for **resources** – food, water, space
- 4 **best-adapted** survive & breed
- 5 helpful alleles spread

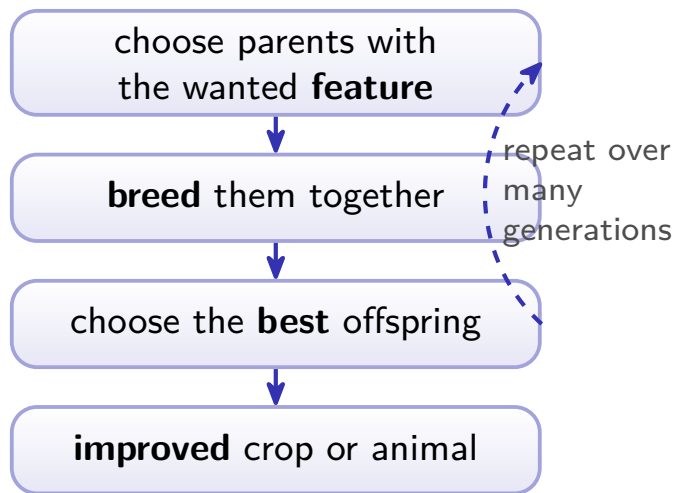
# Examples



The dark **peppered moth** was favoured on soot-darkened bark.

**Antibiotic** -resistant bacteria are natural selection happening fast.

# Selective breeding



humans choose which breed (not the environment)

In **selective breeding**, humans choose which organisms breed, over many generations (better crops & animals).

Natural selection: the **environment** decides. Selective breeding: **humans** decide.

# Adaptive features



A camel is adapted to desert life: it stores fat in its humps and can survive a long time without water

# Plants adapted to too much water, and to too little

## hydrophytes

water plants – **air spaces** to help them float, and stomata on the **upper** leaf surface, where the air is

## xerophytes

desert plants – a **thick waxy cuticle**, few small stomata, and the ability to **store water**

## the xerophyte logic

every feature reduces **transpiration**, because water is the scarce **resource**

## the hydrophyte logic

water is abundant, so the problems are **floating and gas exchange** instead

## further xerophyte features

sunken stomata, rolled leaves, hairs – all trapping humid air next to the stomata

State the feature, then **what it does about water**. “Thick waxy cuticle” alone is a description; “so less water evaporates from the leaf” is the mark.

## Exercises 2.1·2.2

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**2.1** State what is meant by natural selection. [1]

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**2.2** State who or what “selects” in selective breeding. [1]

## Exercises 2.1·2.2

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2.1 State what is meant by natural selection. [1]

2.1

- natural selection: the **best-adapted** organisms survive, reproduce and **pass on their alleles**
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2.2 State who or what “selects” in selective breeding. [1]

2.2

- in selective breeding, **humans** select

## Exercise 3.1

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**3.1** In natural selection, the individuals most likely to survive and reproduce are those that are: [1]

☐

**A** the largest

**B** best adapted to the environment

**C** chosen by humans

**D** identical to each other

## Exercise 3.1

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**A** the largest

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**C** chosen by humans

**D** identical to each other

**3.1 B**

- those **best adapted to the environment** are most likely to survive and reproduce
- A is not always true; C is selective breeding; D is asexual

## Exercise 3.2 (a)

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**3.2** Some bacteria become resistant to an antibiotic.

(a) Explain how antibiotic resistance spreads, using natural selection.

[3]

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**3.2** Some bacteria become resistant to an antibiotic.

(a) Explain how antibiotic resistance spreads, using natural selection.

[3]

(a)

- a few bacteria carry a **resistant allele** (by mutation)
- the antibiotic kills the non-resistant ones, so the resistant **survive**
- they reproduce and pass on the allele, so the **population becomes resistant**

## Exercise 3.2 (b)

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**3.2** Some bacteria become resistant to an antibiotic.

(b) State the main difference between natural selection and selective breeding. [1]

## Exercise 3.2 (b)

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**3.2** Some bacteria become resistant to an antibiotic.

(b) State the main difference between natural selection and selective breeding. [1]

(b)

- natural selection: the **environment** selects; selective breeding: **humans** select