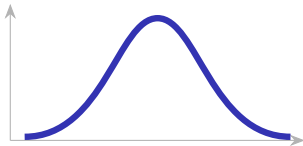


Variation & Selection

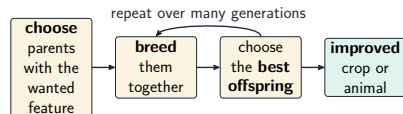
IGCSE Biology ■ Topic 18

IGCSE Biology



What we will cover

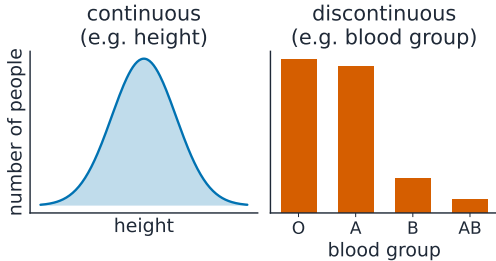
- 1 Variation
- 2 Mutation & adaptation
- 3 Natural selection
- 4 Examples
- 5 Selective breeding



humans choose which breed (not the environment)

selective breeding

Variation



Adaptations help survival in the habitat

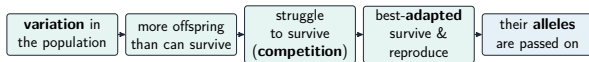
Mutation and adaptation

original: A T G C A
mutated: A T T C A → a change in the
bases = a new allele



Variation is the raw material of selection

Natural selection



over many generations the population becomes better adapted

Natural selection 自然选择:

- 1 variation in the population
- 2 more offspring than can survive
- 3 **competition** 竞争 to survive
- 4 **best-adapted** 适应 survive & breed
- 5 helpful alleles spread

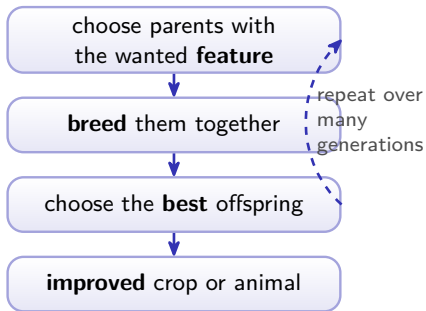
Examples



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

Antibiotic 抗生素-resistant bacteria are natural selection happening fast.

Selective breeding



humans choose which breed (not the environment)

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

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

Worked example – explaining natural selection

Dark moths became common in a sooty industrial area. Explain using natural selection.

- **Variation:** the population already had pale and dark moths (from mutation).
- Soot darkens the bark, so **dark moths are better camouflaged**.
- Birds eat more pale moths $\Rightarrow$ dark moths **survive and reproduce**, passing on the allele.
- Over many generations, **the dark allele becomes more common**.

Four steps, always: **variation** $\rightarrow$ **selection pressure** $\rightarrow$ **the better-adapted survive and breed** $\rightarrow$ **the allele's frequency rises**.
Name the pressure.

Topic 18 – key takeaways

1

Variation

continuous (range) vs
discontinuous (groups)

2

Mutation

makes new alleles – the source of
variation

3

Natural selection

best-adapted survive & pass on
alleles

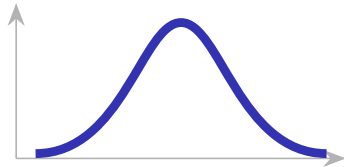
4

Breeding

humans choose the parents

Check yourself

- 1 Which variation gives a smooth range?
- 2 What is the original source of all variation?
- 3 Who survives in natural selection?
- 4 Who chooses the parents in selective breeding?



Answers 1. continuous variation 2. mutation 3. the best-adapted 4. humans