

Exercise walk-through

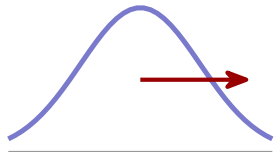
7.11

Variations in Populations

AP Biology

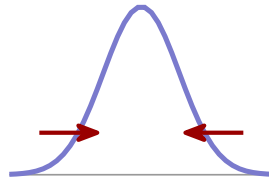
Types of selection

Selection can push a trait three ways:



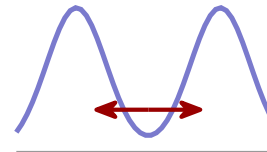
Directional

one extreme wins



Stabilizing

middle wins



Disruptive

both extremes win



*Antibiotics select for
resistant bacteria*

Artificial selection (breeding) does the same,
faster – proof that populations **change**.

What all life shares

the claim

all life descends from a **common ancestor**

the same machinery

DNA and RNA, transcribed and translated the same way in every domain

the same genetic code

the same codons specify the same amino acids, nearly universally

ribosomes

present in every cell, and structurally conserved

shared metabolism

core pathways such as glycolysis appear everywhere

the inference

features this arbitrary and this universal are far better explained by **inheritance** than by repeated invention

The argument is not that the features are useful – it is that the **particular arbitrary choices** are shared. A different code would work just as well.

Speciation, and reading a phylogenetic tree

speciation

the origin of new species, when populations become **reproductively isolated** and diverge

allopatric

a **geographic** barrier separates the populations

sympatric

divergence **without** physical separation – polyploidy, or a shift in habitat or mating time

a phylogenetic tree

a cladogram diagramming evolutionary relationships

branch points

mark **common ancestors**; the shared derived characters define each clade

reading it

relatedness is read from **how recently two lines share a node**, never from proximity across the page

Two tips drawn next to each other can be distantly related. Trace back to the shared node – that is the only thing a tree asserts.

Exercises 2.1-2.3

2.1 Why is genetic diversity useful when the environment changes? [1]

2.2 State one source of genetic variation. [1]

2.3 What is the risk of low genetic diversity? [1]

Exercises 2.1-2.3

2.1 Why is genetic diversity useful when the environment changes? [1]

2.1

- It makes it more likely some individuals have traits that let them survive the change
-

2.2 State one source of genetic variation. [1]

2.2

- Mutation (or sexual reproduction)
-

2.3 What is the risk of low genetic diversity? [1]

2.3

- A higher risk of extinction if no individuals can survive a new threat

Exercise 3.1

3.1 A population with high genetic diversity is more likely to

[1]

☐

A go extinct

B survive an environmental change

C stop reproducing

D have identical individuals

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3.1 B

- survive an environmental change

Exercise 3.2 (a)

3.2 A new disease spreads through two populations of the same species.

(a) Explain why the more genetically diverse population is more likely to survive. [2]

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(a)

- A diverse population is more likely to include individuals with resistance to the disease, so some survive and reproduce

Exercise 3.2 (b)

3.2 A new disease spreads through two populations of the same species.

(b) State one source of the genetic variation.

[1]

Exercise 3.2 (b)

3.2 A new disease spreads through two populations of the same species.

(b) State one source of the genetic variation.

[1]

(b)

- Mutation (or sexual reproduction)

Exercise 3.3

3.3 Explain why a monoculture crop is vulnerable to being destroyed by a single disease.[2]

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3.3

- A monoculture has almost identical genes, so if the disease can kill one plant it can kill them all – there are no resistant variants to survive