

Exercise walk-through

7.2

Natural Selection

AP Biology

Natural selection

Natural selection (Darwin):
helpful traits spread because their carriers
reproduce more. It needs three things:

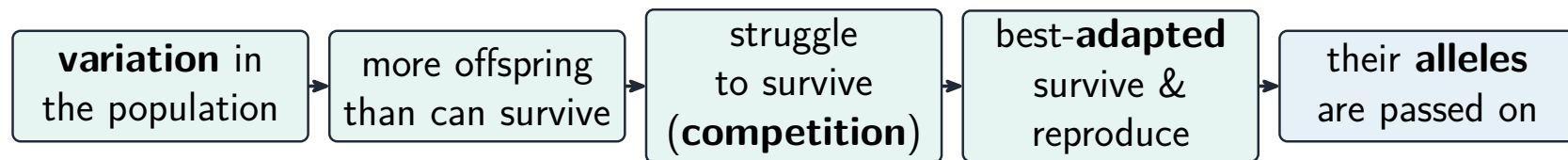
- **variation** among individuals
- the trait is **heritable**
- **differential reproductive success**

An individual does not evolve – the
population does, as **allele fre-**
quencies shift.



*Helpful alleles spread; fitness is surviving
offspring*

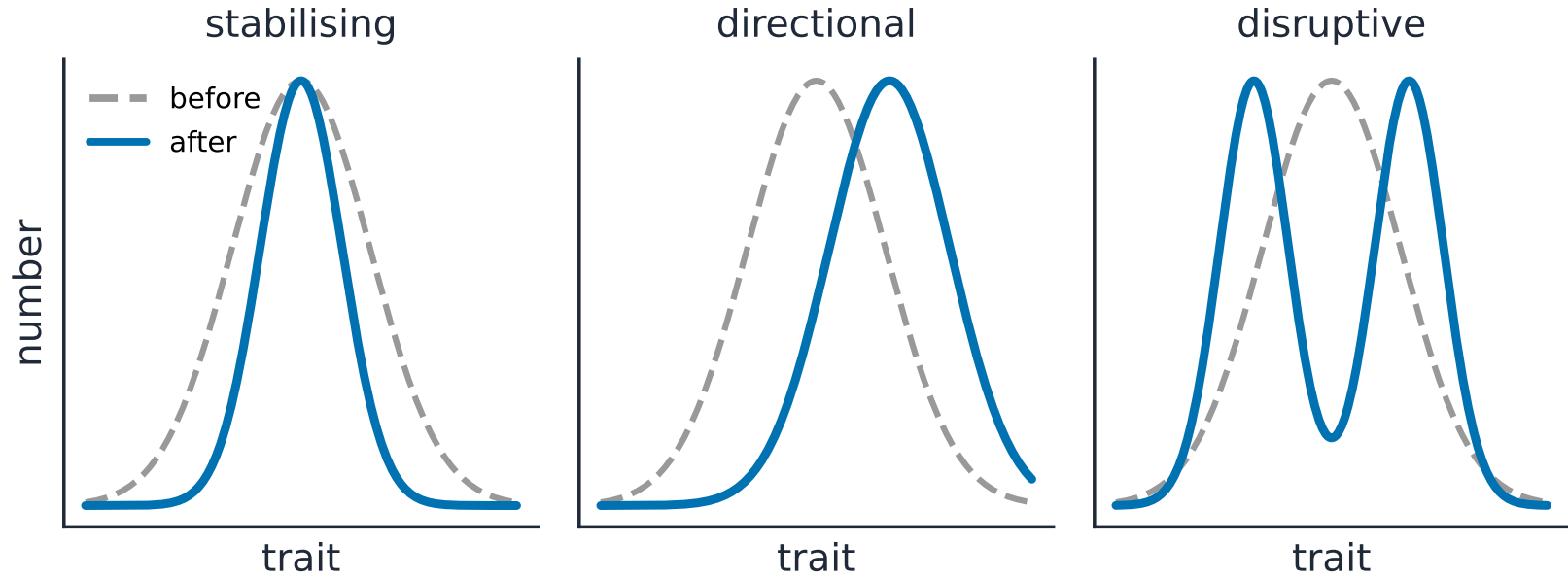
Natural selection: the best-adapted survive



over many generations the population becomes better adapted

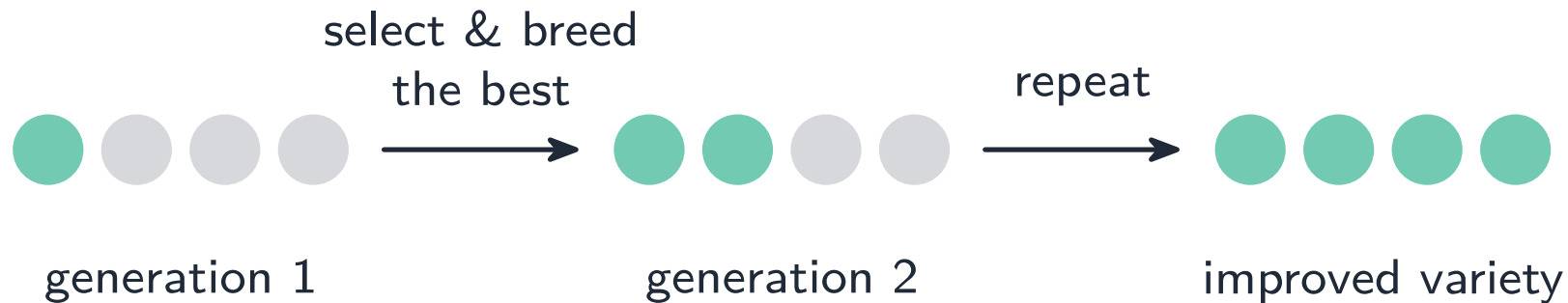
Natural selection: the best-adapted survive, reproduce, and pass on their alleles

Stabilising



Stabilising, directional, and disruptive selection

Artificial Selection



Selective breeding makes a wanted feature more common over generations

Artificial selection, and the evolution we can watch

artificial selection

humans, not nature, choose which individuals breed – crops, livestock, dogs

the mechanism

identical to natural selection; only the *selecting agent* differs

the evidence it gives

large phenotypic change in a few hundred generations, from existing variation

evolution is ongoing

antibiotic-resistant bacteria, pesticide-resistant insects, and rapid change in fast-breeding species

why those examples

a short generation time makes the change **observable within a human lifetime**

Artificial selection was Darwin's own opening argument, because it shows selection producing change in a timescale anyone can check.

Exercises 2.1-2.3

2.1 Which type of selection favors the average trait?

[1]

2.2 Which type shifts the average toward one extreme?

[1]

2.3 What happens to a distribution under disruptive selection?

[1]

Exercises 2.1-2.3

2.1 Which type of selection favors the average trait? [1]

2.1

- Stabilizing selection
-

2.2 Which type shifts the average toward one extreme? [1]

2.2

- Directional selection
-

2.3 What happens to a distribution under disruptive selection? [1]

2.3

- It splits toward both extremes (two peaks)

Exercise 3.1

3.1 Selection that favors both extremes over the middle is

[1]

☐

A directional

B stabilizing

C disruptive

D artificial

Exercise 3.1

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[1]

☐

A directional

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C disruptive

D artificial

3.1 C

- disruptive

Exercise 3.2 (a)

3.2 In a drought, only birds with large beaks can crack the remaining hard seeds.

(a) Name the type of selection.

[1]

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(a) Name the type of selection.

[1]

(a)

- Directional

Exercise 3.2 (b)

3.2 In a drought, only birds with large beaks can crack the remaining hard seeds.

(b) Describe how the beak-size distribution changes over generations.

[2]

Exercise 3.2 (b)

3.2 In a drought, only birds with large beaks can crack the remaining hard seeds.

(b) Describe how the beak-size distribution changes over generations. [2]

(b)

- Large-beaked birds survive and reproduce more, so average beak size increases over generations (the distribution shifts toward large)

Exercise 3.3

3.3 Human birth weight clusters near an average, with very small and very large babies less likely to survive. Name and explain the type of selection. [2]

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3.3

- Stabilizing selection – the average birth weight is favored while both extremes are selected against, narrowing the distribution around the mean