

Exercise walk-through

7.4

Population Genetics

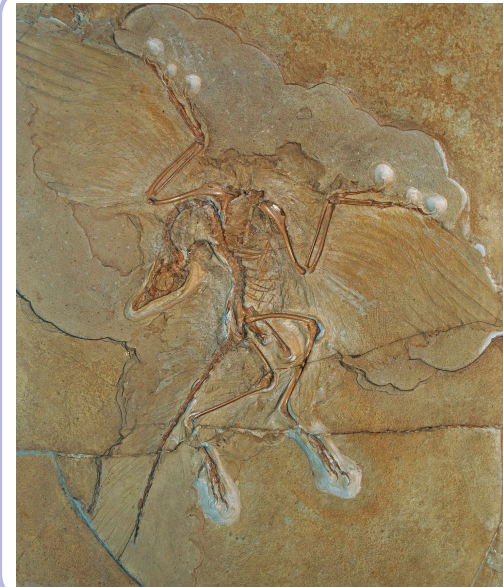
AP Biology

Population genetics

The **gene pool** is all the alleles in a population. Frequencies shift by more than selection:

- **genetic drift** – random, strong when small
- **gene flow** – **migration** in/out

Bottleneck and **founder effect** : a few survivors carry only some alleles.



Allele frequencies change across populations and deep time

Exercises 2.1-2.3

2.1 How many alleles for a gene does each individual carry? [1]

2.2 In a population, allele A has frequency 0.7. What is the frequency of a ? [1]

2.3 Name two causes of allele-frequency change. [2]

Exercises 2.1-2.3

2.1 How many alleles for a gene does each individual carry? [1]

2.1

- Two
-

2.2 In a population, allele A has frequency 0.7. What is the frequency of a ? [1]

2.2

- $1 - 0.7 = 0.3$
-

2.3 Name two causes of allele-frequency change. [2]

2.3

- Any two: natural selection, mutation, gene flow, genetic drift, non-random mating

Exercise 3.1

3.1 Evolution at the population level is defined as a change in

[1]

☐

A an individual's genes

B allele frequencies over generations

C the environment

D the number of species

Exercise 3.1

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A an individual's genes

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3.1 B

- allele frequencies over generations

Exercise 3.2 (a)

3.2 A population of 50 has 18 BB , 24 Bb , and 8 bb .

(a) Find the total number of alleles.

[1]

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(a) Find the total number of alleles.

[1]

(a)

- $50 \times 2 = 100$ alleles

Exercise 3.2 (b)

3.2 A population of 50 has 18 BB , 24 Bb , and 8 bb .

(b) Calculate the frequency of the B allele.

[3]

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(b) Calculate the frequency of the B allele.

[3]

(b)

- B count = $2(18) + 24 = 60$; frequency = $60/100 = 0.6$

Exercise 3.3

3.3 Explain why genetic drift changes allele frequencies more in a small population than a large one. [2]

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3.3

- In a small population, chance events (which few individuals happen to reproduce) have a large effect on frequencies; in a large population these random effects average out