D4.1 Natural selection (HL)

What the Cell · DP Biology · worksheet · HL statements D4.1.9–15

Name _____ **Date** _____ **Total** _____ / 40

About 40 minutes, or one section at a time. The number of marks shows how many separate points to make.

Section A: Recall

8 marks

1 **Define** gene pool. D4.1.9 **[1]**

2 **Define** allele frequency. D4.1.9 **[1]**

3 **State** the two Hardy-Weinberg equations. D4.1.13 **[2]**

4 **Name** the type of selection that favours both extremes of a trait. D4.1.12 **[1]**

5 **State** two conditions needed for Hardy-Weinberg equilibrium. D4.1.14 **[2]**

6 **State** one example of artificial selection. D4.1.15 **[1]**

Section B: Understanding

14 marks

7 **Explain** how natural selection changes allele frequencies in a gene pool. D4.1.11 **[3]**

8 **Distinguish** between stabilizing and directional selection. D4.1.12 **[3]**

9 **Explain** why populations that are separated geographically can have different allele frequencies. D4.1.10 **[3]**

10 **Explain** why the evolution of antibiotic resistance is natural, not artificial, selection. D4.1.15 **[2]**

11 **Explain** what it shows if the genotype frequencies of a population do not fit the Hardy-Weinberg equation. D4.1.14 **[3]**

Section C: Working with evidence

12 marks

All data in this section are invented for practice. The patterns are realistic.

12 D4.1.13, D4.1.14

In a species of snail, the allele for an unbanded shell (B) is dominant to the allele for a banded shell (b). In a woodland, 1000 snails were sampled: 160 were banded. Ten years later, after thrushes began feeding there, 1000 snails were sampled again: 90 were banded.

a **Calculate** the frequency of allele b in the first sample. **[2]**

b **Calculate** the frequency of allele B in the first sample. **[1]**

c **Calculate** the number of heterozygous snails expected in the first sample. **[2]**

d **Calculate** the frequency of allele b in the second sample. **[2]**

e **Suggest** an explanation for the change in allele frequency. **[2]**

f **Identify** the type of selection shown. **[1]**

g **Identify** which Hardy-Weinberg condition was not met, and give a reason. **[2]**

Section D: Longer answer

6 marks

13 **Compare** natural selection and artificial selection. D4.1.15 **[6]**