Past-paper walk-through

Biodiversity ▪ 18.2

eXercise

Questions in this set

- 9700/42 N25 Q8 ▪ 12 marks
- 9700/41 J25 Q5 ▪ 16 marks

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- // separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = "or words to that effect" – the wording need not match.

Question 8

9700/42 N25 ▪ Q8 ▪ 12 marks

Palm oil is the most widely used vegetable oil. It is obtained from the African oil palm, *Elaeis guineensis*. Oil palms are the highest yielding vegetable oil crop, needing only 10% of the land area required by other crops to produce the same quantity of oil.

On the island of Borneo, tropical rainforests are cut down and cleared to create oil palm plantations. This has a large effect on biodiversity.

The Bornean orangutan, *Pongo pygmaeus*, is only found on the island of Borneo and is classified as critically endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species™.

Fig. 8.1 shows Bornean orangutans.

(a) Suggest ways in which the Bornean orangutan may be conserved. **[4]**

(b) Biodiversity can be assessed at different levels.

Outline the main levels at which biodiversity can be assessed. **[3]**

Question 8

(c)(i) Complete Table 8.1. **[2]**

(c)(ii) Calculate the value for Simpson's index of diversity (D). **[1]**

(c)(iii) Using your value for D, comment on the biodiversity of this temperate woodland. **[2]**

Question 8

common name	n	$\frac{n}{N}$	$\left(\frac{n}{N}\right)^2$
maple	807	0.196	0.0384
alder	6	0.001	0.0000
hazel	1856	0.451	.....
hawthorn	82	0.020	0.0004
blackthorn	40	0.010	0.0001
willow	101	0.025	0.0006
birch	78	0.019	0.0004
wild rose	84	0.020	0.0004
oak	1036	0.252	0.0635
dogwood	29	0.007	0.0000
N =	4119	Total =	.....

Question 8

Solution 8

(a) Mark scheme

any four from :

1. (named) protected reserves ;
2. **limit** palm oil plantations / ref. to sustainable palm oil production ;
3. restoring lost habitat / reforestation / reduce deforestation ;
4. captive breeding programs ;
5. release into wild ;
6. ban, hunting / trade;
7. raise awareness / education ;
8. ref. to research ;

Solution 8

(b)

Mark scheme

1. ecosystem / habitat (diversity) ;
2. species (diversity / richness) ;
3. genetic (diversity) ;

Solution 8

(c)(i)

Mark scheme

- 0.2034 ;
- 0.3072 ;
- allow **ecf** for mp2 if both incorrect
- allow **ecf** for mp2 if figure correct in both but not to 4dp

Solution 8

(c)(ii)

Mark scheme

- 0.6928 / 0.693 ;
- allow **ecf** for 1 minus their answer to **8ci**

(c)(iii)

Mark scheme

- (D) close(r) to 1 / higher than 0.5 ;
- (so) high(er) (bio)diversity ;

Question 5

9700/41 J25 ▪ Q5 ▪ 16 marks

5 The Galápagos is a group of islands with a high biodiversity.

(a) *Geospiza fortis* is one of the many species of finch that live on the Galápagos islands. On one of the Galápagos islands, Daphne Major, scientists measured the bill size (length, width and depth) of individuals in a population of *G. fortis* over several years.

Fig. 5.1 shows a *G. fortis* female.

Question 5

Fig. 5.1

G. fortis feed on seeds. Seed size and bill size vary. It is easier for *G. fortis* with smaller bills to eat small seeds and for *G. fortis* with larger bills to eat large seeds.

In 1977, a drought occurred on Daphne Major, which resulted in a large decrease in the availability of seeds, particularly small seeds.

Scientists observed an increase in the mean bill size in the *G. fortis* population on Daphne Major after the drought.

(i) State the type of natural selection that occurred in the *G. fortis* population on Daphne Major as a result of the drought.

Question 5

(ii) Fig. 5.2 shows the distribution of bill size in the *G. fortis* population before the drought in 1977.

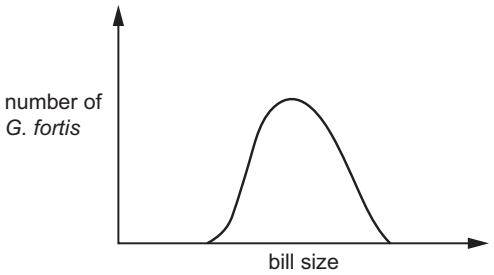


Fig. 5.2

Sketch a new curve on Fig. 5.2 to show the distribution of bill size in the *G. fortis*

Question 5

population after the drought

Question 5

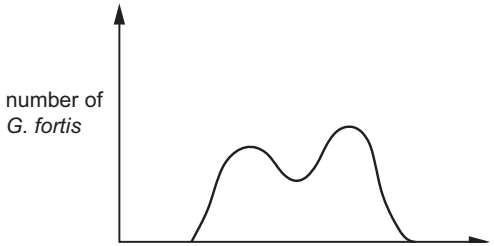
population after the drought.

[1]

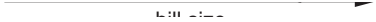
(b) *G. fortis* also lives on Santa Cruz, another island in the Galápagos.

Most of the seeds available for *G. fortis* to eat on Santa Cruz are either small or large. There are few intermediate sizes of seed.

Fig. 5.3 shows the distribution of bill size in the *G. fortis* population on Santa Cruz.



Question 5



Question 5

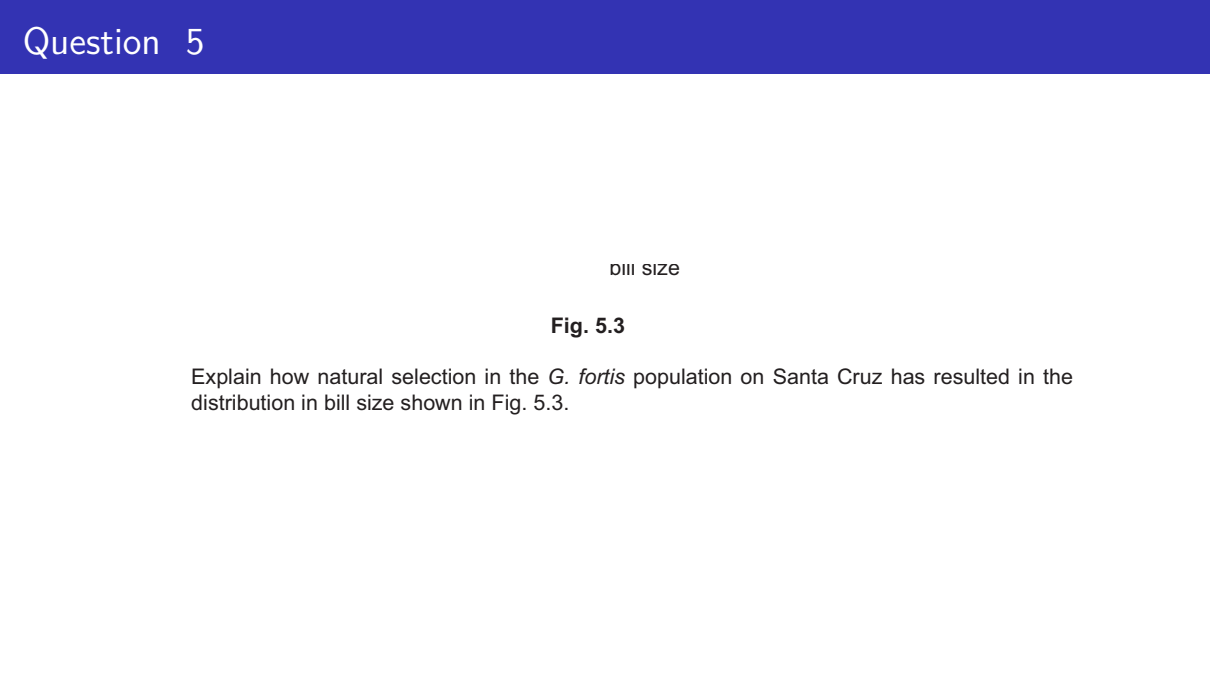


Fig. 5.3

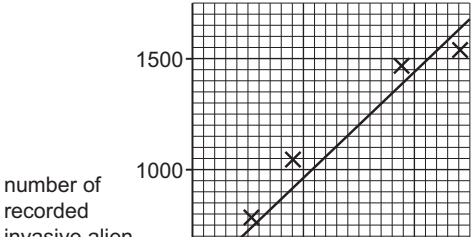
Explain how natural selection in the *G. fortis* population on Santa Cruz has resulted in the distribution in bill size shown in Fig. 5.3.

Question 5

(c) Scientists studied the effect of an increase in the number of tourists each year on the number of invasive alien species present in the Galápagos islands.

The scientists recorded the number of invasive alien species present each year in the Galápagos islands over many years. The scientists also recorded the number of tourists visiting the islands each year.

Fig. 5.4 shows a graph of the data for five different years during the study.



Question 5

invasive alien

Question 5

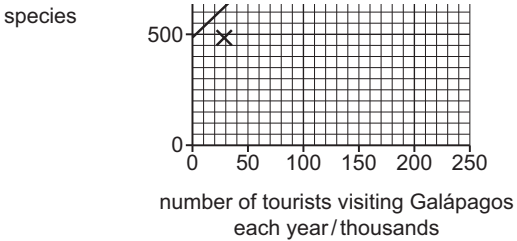


Fig. 5.4

(i) The scientists carried out a Pearson's linear correlation calculation for the data in Fig. 5.4.

The scientists calculated an ***r*** value of 0.930.

The scientists concluded that there is a significant correlation between the number of tourists visiting the Galápagos islands each year and the number of invasive alien species present.

Question 5

species present.

Question 5

Table 5.1 shows a probability table of critical values for Pearson's linear correlation.

Table 5.1

number of observations	probability level (p)	
	0.05	**0.01**
3	0.997	1.000
4	0.950	0.990
5	0.878	0.959
6	0.811	0.917
7	0.754	0.875

With reference to Table 5.1, explain why the ***r*** value of 0.930 indicates that there is a significant correlation between the number of tourists and the number of invasive alien species.

Question 5

(ii) Invasive alien species are thought to have contributed to extinctions recorded in the Galápagos islands.

Discuss the negative effects of introducing invasive alien species to an ecosystem.

Question 5

(iii) State **two** factors, other than competition and the introduction of invasive alien species, that can cause extinction.

Question 5

[2]

[Total: 14]

Solution 5

(a)(i)

Mark scheme

- directional (selection) ;
- 1

(a)(ii)

Mark scheme

- curve with starting point (on x-axis), peak and end point (on x-axis) all to the right of the original positions ;
- 1

Solution 5

(b) Mark scheme

- any four from:
- 1
- disruptive / diversifying (selection) ;
- 2
- selection pressure is, seed / food (availability / size) ;
- 3
- competition for, food / seeds ;
- 4

Solution 5

- (birds with) intermediate bills cannot eat small and large seeds ;
- 5
- extreme / small and large, phenotypes / bills, more likely to survive / have selective advantage / selected for ;
- 6
- correct description of change in allele frequency ;
- 4

Solution 5

(c)(i)

Mark scheme

- r / 0.930 / calculated value, is greater than critical value for n = 5 ;
- at (probability level) 0.05 ;
- 2

Solution 5

(c)(ii) Mark scheme

- any four from:
- invasive alien species / they, may:
- 1
- change / disrupt, food, chains / webs ;
- 2
- compete for food with / feed on same food as / occupy same niche as, native, species / organisms ;
- 3

Solution 5

- prey on / graze / eat, native, species / organisms ;
- 4
- introduce (new), disease / parasites ;
- 5
- change / damage, the habitat ;
- 6
- be toxic / threaten human health ;
- 7
- damage, tourism / agriculture ;
- 4

Solution 5

(c)(iii) Mark scheme

- any two from:
- 1
- climate change ;
- 2
- hunting by humans ;
- 3
- degradation / loss, of habitat ;
- 4

Solution 5

- (named) pollution ;
- 5
- disease ;
- 6
- (named) natural disasters ;
- 2
- 9700/41
- May/June 2025