## Classification and evolution – 2021/20 GCE Biology A Component 02

**1.** Nov/2021/Paper_H420/02/No.20

Charles Darwin visited the Galapagos Islands in the 1820s. The organisms living on the Galapagos Islands provided Darwin with evidence that helped him to develop his theory of evolution by natural selection.

**(a)** Finches are small birds that are common on the Galapagos Islands.

The variation in the sizes of beak of the various Galapagos finch species provided evidence for evolution by natural selection.

Scientists recently studied the beak sizes of two species of Galapagos finch living on the same island, *Geospiza fuliginosa* and *Geospiza fortis*.

Beak size is an overall measurement that includes length, depth and width. The arbitrary units are relative to the average of all of the individual birds measured.

Some of the scientists' results are shown in **Fig. 20.1**.

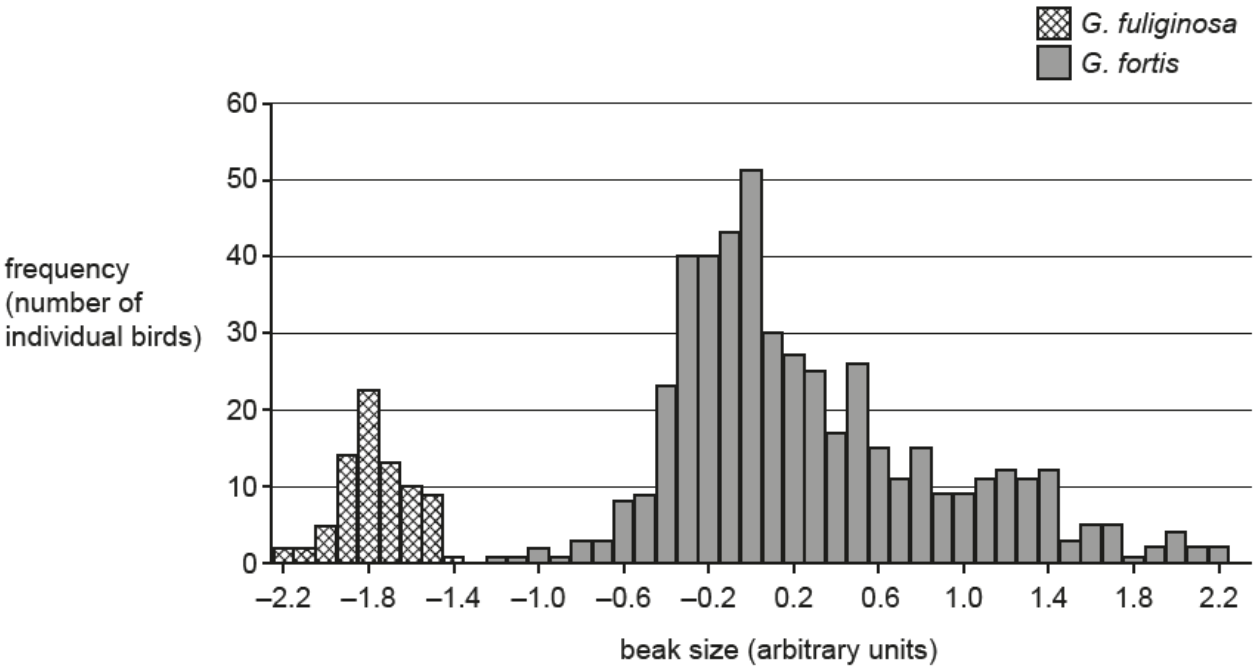


**Fig. 20.1**

**(i)** Identify the modal beak size of *G. fuliginosa*.

Size = ..... arbitrary units **[1]**

**(ii)** Calculate the range of *G. fuliginosa* beak size as a proportion of the range of *G. fortis* beak size.

Give your answer to **2** significant figures.

Proportion = ..... **[2]**

**(iii)** The scientists concluded that the data showed evidence of disruptive selection in the population of *G. fortis*. In disruptive selection, extreme phenotypes are selected for and average phenotypes selected against.

Evaluate the conclusion that disruptive selection is occurring in *G. fortis*.

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..... **[3]**

**(b)** The *G. fortis* all live in the same location. If disruptive selection is occurring in the *G. fortis* population, it is possible that speciation might occur.

**(i)** Name the type of speciation that occurs when two populations live in the same location.

..... **[1]**

**(ii)** Suggest how *G. fortis* with large beaks could become reproductively isolated from *G. fortis* with small beaks despite living in the same location.

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..... **[1]**

**(iii)** Comparing anatomy between species such as beak size in finches can be used to provide evidence to support the theory of evolution by natural selection.

Describe how DNA can be used to provide evidence to support the theory of evolution by natural selection.

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..... **[2]**

**(c)*** In the 1970s, another group of scientists studied beak sizes in one species of finch on Daphne Island, one of the Galapagos Islands. The study lasted three years. The results are shown in **Fig. 20.2**.

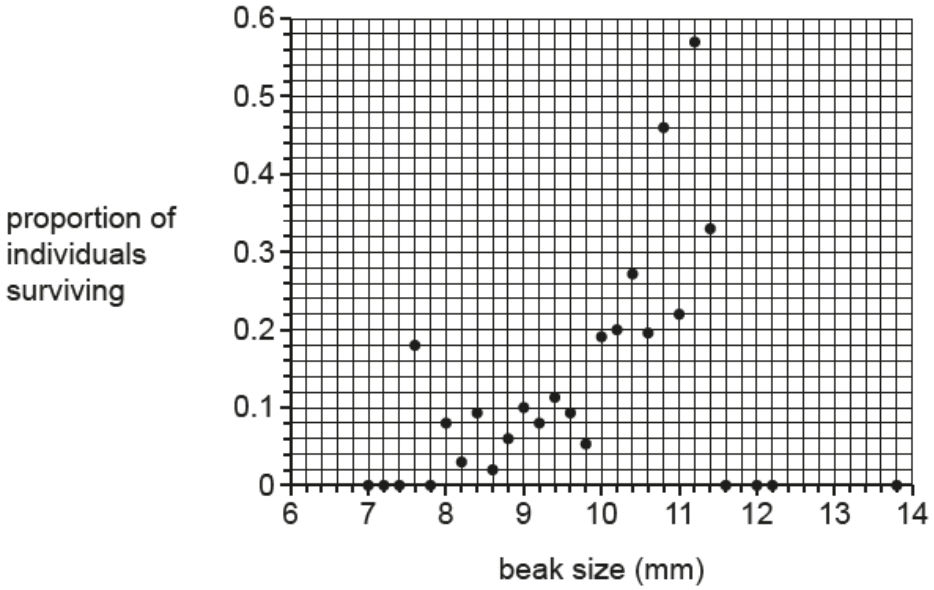


**Fig. 20.2**

The results suggested that stabilising selection was occurring within this population of finches.

With reference to **Fig. 20.2**, explain the effect of stabilising selection on beak size on Daphne Island. **[6]**

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**(d)** Alfred Russel Wallace is another important figure in the understanding of evolution.

Outline the way in which Wallace contributed to the acceptance of Darwin's theory of natural selection by the wider scientific community.

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..... **[2]**

**2.** Nov/2020/Paper_H420/02/No.5

The cell labelled **E** shows a parasite called *Trypanosoma*.

Which of the following statements is/are evidence that *Trypanosoma* is a eukaryote?

1 a nucleus is present
2 it is a similar size to blood cells
3 the presence of flagella

**A** 1, 2 and 3

**B** only 1 and 2

**C** only 2 and 3

**D** only 1

Your answer ☐ **[1]**

**3.** Nov/2020/Paper_H420/02/No.8

Polar bears, *Ursus maritimus*, and giant pandas, *Ailuropoda melanoleuca*, both belong to the family Ursidae.

Which of the following, **A** to **D**, is **not** true about the classification of polar bears and giant pandas?

**A** They each belong to a different class.

**B** They each belong to a different species.

**C** They each belong to the same order, carnivora.

**D** They each belong to the same phylum, chordata.

Your answer ☐ **[1]**