

Passage I

Finch beak depth (see Figure 1) is an *inheritable* trait (it can be passed from parents to offspring).

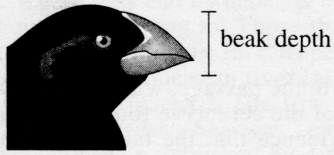


Figure 1

Researchers studied the beak depth of 2 species of finches, *Geospiza fortis* and *Geospiza fuliginosa*. Both species live on Island A. *G. fortis* alone lives on Island B, and *G. fuliginosa* alone lives on Island C. For both species, the primary food is seeds. Birds with shallower beaks can efficiently crush and eat only small seeds. Birds with deeper beaks can crush and eat both large and small seeds, but they prefer small seeds.

Study 1

Researchers captured 100 *G. fortis* finches and 100 *G. fuliginosa* finches on Island A. They tagged each bird, measured its beak depth, and released it. Then they calculated the percent of birds having each of the beak depths that had been measured. The researchers followed the same procedures with 100 *G. fortis* finches from Island B and 100 *G. fuliginosa* finches from Island C. The results of this study are shown in Figure 2.

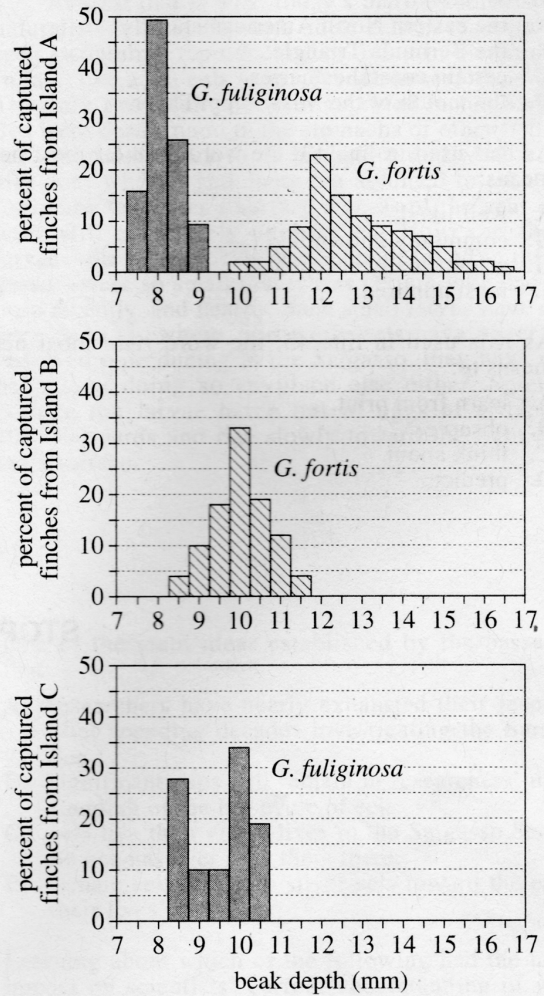


Figure 2

Study 2

After completing Study 1, the researchers returned to Island B each of the next 10 years, from 1976 to 1985. During each visit, the researchers captured at least 50 *G. fortis* finches and measured their beak depths. Then

they calculated the average *G. fortis* beak depth for each of the 10 years. The researchers noted that, during the 10-year period, 3 years were exceptionally dry, and 1 year was very wet (see Figure 3). Small seeds are abundant during wet years. During dry years, all seeds are less abundant, and the average size of the available seeds is larger.

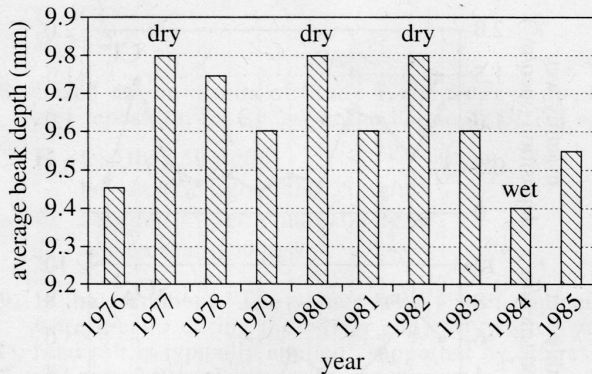


Figure 3

Figures adapted from Neil A. Campbell, Jane B. Reece, and Lawrence G. Mitchell, *Biology*, 5th ed. ©1999 by Benjamin/Cummings.

1. Based on the results of Study 1, the highest percent of finches on Island B and Island C had a beak depth of:

	Island B	Island C
A.	8 mm	8 mm
B.	9 mm	12 mm
C.	10 mm	8 mm
D.	10 mm	10 mm

2. During which of the following years were small seeds likely most abundant on Island B ?

- F. 1977
- G. 1980
- H. 1982
- J. 1984

3. Study 1 differed from Study 2 in which of the following ways?

- A. *G. fortis* finches were captured during Study 1 but not during Study 2.
- B. *G. fuliginosa* finches were captured during Study 1 but not during Study 2.
- C. The beak depth of captured birds was measured during Study 1 but not during Study 2.
- D. The beak depth of captured birds was measured during Study 2 but not during Study 1.

4. It is most likely that the researchers tagged the birds that they captured during Study 1 to:

- F. determine how beak depth was affected by rainfall on Island A.
- G. determine the average age of each finch population.
- H. ensure that the beak depth of each finch was measured multiple times during Study 1.
- J. ensure that the beak depth of each finch was measured only once during Study 1.

5. Based on the results of Study 2, would a finch with a beak depth of 9.4 mm or a finch with a beak depth of 9.9 mm more likely have had a greater chance of survival during 1977 ?

- A. A finch with a beak depth of 9.4 mm, because, on average, the size of available seeds is larger during dry years.
- B. A finch with a beak depth of 9.4 mm, because, on average, the size of available seeds is smaller during dry years.
- C. A finch with a beak depth of 9.9 mm, because, on average, the size of available seeds is larger during dry years.
- D. A finch with a beak depth of 9.9 mm, because, on average, the size of available seeds is smaller during dry years.

6. A researcher hypothesized that there would be more variation in the beak depths measured for the *G. fortis* finches when they were forced to compete with another finch species for seeds. Do the results of Study 1 support this hypothesis?

- F. Yes; the range of beak depths measured for *G. fortis* finches was greater on Island A than on Island B.
- G. Yes; the range of beak depths measured for *G. fortis* finches was greater on Island B than on Island A.
- H. No; the range of beak depths measured for *G. fortis* finches was greater on Island A than on Island B.
- J. No; the range of beak depths measured for *G. fortis* finches was greater on Island B than on Island A.