

SECTION 16-1 REVIEW

GENETIC EQUILIBRIUM

VOCABULARY REVIEW Define the following terms.

1. population genetics _____

2. gene pool _____

3. allele frequency _____

4. phenotype frequency _____

5. Hardy-Weinberg genetic equilibrium _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. The smallest unit in which evolution occurs is

| | |
|----------------------------|---------------|
| a. an individual organism. | c. a species. |
| b. a population. | d. a kingdom. |

- _____ 2. Length, weight, and many other quantitative traits in a population tend to show variation that, when plotted on a graph, looks like

| | |
|-----------------------|-------------------------|
| a. a population wave. | c. a bell curve. |
| b. a gene pool. | d. an equilibrium plot. |

- _____ 3. If a population of four o'clock flowers consists of five *RR* plants (red flowers), two *Rr* plants (pink flowers), and one *rr* plant (white flowers), the phenotype frequency of plants with pink flowers is

| | | | |
|-----------|----------|---------|----------|
| a. 0.125. | b. 0.25. | c. 0.5. | d. 0.75. |
|-----------|----------|---------|----------|

- _____ 4. In the population described in question 3, the frequency of the *R* allele is

| | | | |
|-----------|----------|---------|----------|
| a. 0.125. | b. 0.25. | c. 0.5. | d. 0.75. |
|-----------|----------|---------|----------|

- _____ 5. For a population to be in genetic equilibrium,

| | |
|--|----------------------------------|
| a. individuals must not enter or leave the population. | c. the population must be small. |
| b. the population must be evolving. | d. selection must occur. |

SHORT ANSWER Answer the questions in the space provided.

1. What types of individuals in a population are represented by the two ends of a bell curve?

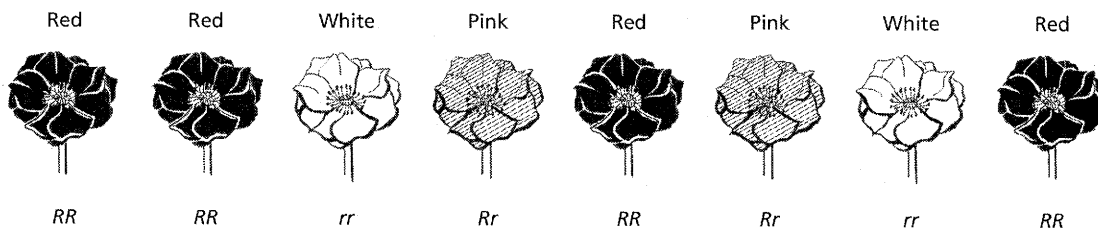
2. What are the three main ways that variations in genotype arise in a population? _____

3. What five assumptions must be made for the Hardy-Weinberg genetic equilibrium to apply to a population? _____

4. **Critical Thinking** Does a gene pool include the genes of individuals that cannot reproduce?

Explain your answer. _____

STRUCTURES AND FUNCTIONS The drawing below shows a population of four o'clock flowers. Using the information given in the table below the drawing, predict the phenotype frequencies and allele frequencies in the offspring of this population. Write your answers in the table below. Show your calculations.



| PARENTS | | OFFSPRING | |
|---------------------|------------------|---------------------|-------------------------------|
| Phenotype frequency | Allele frequency | Phenotype frequency | Allele frequency |
| Red: 0.5 | $R: 0.625$ | Red: _____ | $R: \underline{\hspace{1cm}}$ |
| White: 0.25 | $r: 0.375$ | White: _____ | $r: \underline{\hspace{1cm}}$ |
| Pink: 0.25 | | Pink: _____ | |

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SECTION 16-2 REVIEW

DISRUPTION OF GENETIC EQUILIBRIUM

VOCABULARY REVIEW Distinguish between the terms in each of the following pairs of terms.

1. immigration, emigration _____

2. gene flow, genetic drift _____

3. random mating, assortative mating _____

4. stabilizing selection, directional selection _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. Any violation of the conditions necessary for Hardy-Weinberg equilibrium can result in

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|-----------------------------|-------------------------|
| a. independent assortment. | c. evolution. |
| b. disorganizing selection. | d. eventual extinction. |
- _____ 2. The movement of reproductive individuals from one population to another results in

| | |
|--------------------------|-------------------|
| a. infertile offspring. | c. genetic drift. |
| b. spontaneous mutation. | d. gene flow. |
- _____ 3. Genetic drift is most likely to occur in

| | |
|-----------------------|---|
| a. small populations. | c. populations that migrate. |
| b. large populations. | d. populations that have a low frequency of mutation. |
- _____ 4. Assortative mating occurs when

| | |
|--|---|
| a. one animal mates with a variety of other individuals during its lifetime. | b. males choose to mate with females that are the most fertile. |
| c. an individual chooses mates that are similar to itself. | d. females choose to mate with males that are from other populations. |
- _____ 5. Starlings produce an average of five eggs in each clutch. If there are more than five, the parents cannot adequately feed the young. If there are fewer than five, predators may destroy the entire clutch. This is an example of

| | |
|---------------------------|---------------------------|
| a. disruptive selection. | c. directional selection. |
| b. stabilizing selection. | d. sexual selection. |

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SHORT ANSWER Answer the questions in the space provided.

1. List five conditions that can cause evolution to take place. _____

2. Explain how a Hardy-Weinberg genetic equilibrium is affected by mutations. _____

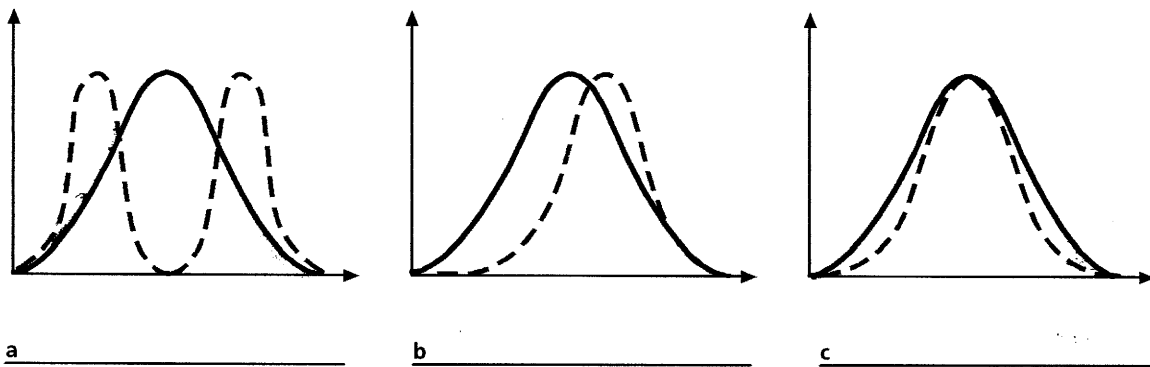
3. What is one potential negative consequence of nonrandom mating based on geographic proximity? _____

4. How might being brightly colored increase the fitness of the males of some bird species? _____

5. Why is genetic homozygosity dangerous to a nearly extinct species? _____

6. **Critical Thinking** If a cow develops a preference for eating white four o'clock flowers and ignoring pink and red four o'clock flowers, what type of selection is being demonstrated? Would the cow eventually eliminate all white four o'clock flowers from the population on which it feeds?

STRUCTURES AND FUNCTIONS Label the three types of selection illustrated by the graphs below.



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SECTION 16-3 REVIEW

FORMATION OF SPECIES

VOCABULARY REVIEW Define the following terms.

1. morphology _____

2. geographic isolation _____

3. punctuated equilibrium _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. One limitation of the morphological species concept is that
 - a. morphological characteristics are not easy to observe.
 - b. it cannot be applied to extinct organisms.
 - c. members of different species often appear quite different.
 - d. there can be morphological differences among individuals in a single population.
- _____ 2. According to the biological species concept, a species is a population of organisms that
 - a. can successfully interbreed but cannot breed with other groups.
 - b. have a similar structure and appearance.
 - c. are physically separated from other organisms with a similar appearance.
 - d. can hybridize with each other to produce infertile offspring.
- _____ 3. Fish populations that do not interbreed because they live in different ponds may evolve into separate species due to
 - a. ecological isolation.
 - b. geographic isolation.
 - c. prezygotic isolation.
 - d. postzygotic isolation.
- _____ 4. Bird populations that do not interbreed because they cannot recognize each other's mating calls may evolve into separate species due to
 - a. ecological isolation.
 - b. geographic isolation.
 - c. prezygotic isolation.
 - d. postzygotic isolation.
- _____ 5. A pattern of rapid evolutionary changes followed by long periods of no change is described as
 - a. gradual evolution.
 - b. punctuated equilibrium.
 - c. reproductive isolation.
 - d. continuous speciation.

SHORT ANSWER Answer the questions in the space provided.

1. What are two limitations of the biological species concept? _____

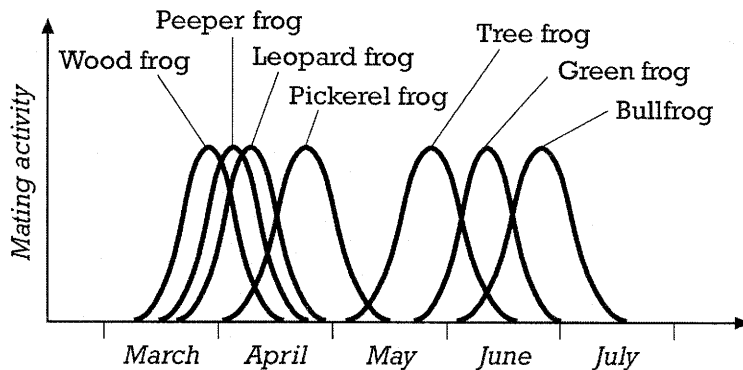
2. What is one advantage of prezygotic isolation over postzygotic isolation? _____

3. Describe two pieces of evidence indicating that speciation does not always occur at the same rate.

4. **Critical Thinking** Some scientists predict that if global warming continues over the next few centuries, melting of the polar ice caps will raise the level of the oceans, causing some peninsulas to become islands. How might this change eventually affect the species that live on these peninsulas?

STRUCTURES AND FUNCTIONS

1. The graph below shows the mating seasons of several species of frogs. On the basis of the information shown in the graph, do the peeper frog and the leopard frog likely have barriers to reproduction in addition to slightly different mating seasons? What other barriers might be in operation? Explain your answers.



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