

Name _____ Period _____

Chapter 14: The Origin of Species

Guided Reading Activities

Big idea: Defining species

Answer the following questions as you read modules 14.1–14.3:

1. Microevolution is the gradual adaptation of a population to its environment.
2. The process by which one species eventually evolves into two different species is known as speciation.
3. Briefly explain why microevolution must not be all that occurs with respect to how life changes over time.
If that were true, then there would be only highly specialized versions of the first form of life on the planet.
4. Complete the following table, which compares the different methods for defining a species.

	Biological species concept	Morphological species concept	Ecological species concept	Phylogenetic species concept
Description	Based on the ability of the organisms to produce fertile offspring	A system based on similar sizes, shapes, and other physical traits, in other words, morphology (form)	Identifies species based on their specialized role(s) in their respective environments	A small group of organisms that share a common ancestor; in other words, they share a single branch on the evolutionary tree.

5. True or false: Offspring produced through two members of the same species are referred to as hybrids. If false, make it a correct statement.
False, hybrids are produced as a result of interbreeding between members of different species.
6. The types of reproductive barriers are prezygotic and postzygotic.

7. Which of the following represents a post-zygotic barrier?
 - a. Temporal
 - b. Habitat
 - c. Reduced hybrid viability
 - d. Gametic
8. Two different species of fruit flies mate at different times of the day. One breeds in the morning and one breeds in the afternoon. What type of reproductive barrier is this?

This is an example of a temporal prezygotic barrier.

Big idea: Mechanisms of speciation

Answer the following questions as you read modules 14.4–14.11:

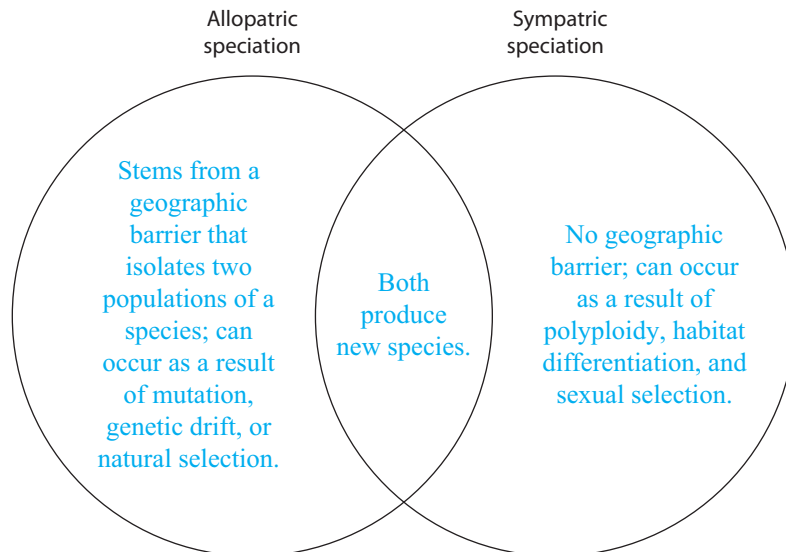
1. A geographic barrier to reproduction can give rise to allopatric speciation.
2. Isle Royale National Park consists of a series of islands located in Lake Superior. Initially, there were no wolves on any of the islands since they were in the middle of Lake Superior. However, in 1949, an unusually long and cold winter produced an ice bridge between Canada and the islands of the National Park. During this winter, a pair of wolves used the ice bridge to travel inadvertently to Isle Royale. Today there continues to be a wolf population on the main island descended from that original pair. Has allopatric speciation occurred yet? If not, could it?

Probably not because not enough time has passed. In theory, it could as long as enough time passes to allow the wolves on Isle Royale to be subjected to the selective pressures specific to Isle Royale.
3. True or false: Geographic isolation always leads to speciation. If false, make it a correct statement.

False, because some organisms have the ability to spread their seed or move across geographic barriers, which renders the barriers ineffective.
4. Refer to Figure 14.5 on page 283 of your textbook. Assume that the initial growth medium was different from both the starch and the maltose. Would the flies in either group, after the 40th generation, be able to reproduce with the flies from the original medium?

It is expected that the starch flies and the maltose flies would have the same difficulty mating with the flies from some other hypothetical medium.

5. Which of the following refers to having more than two complete sets of chromosomes?
 - a. Speciation
 - b. Polyploid
 - c. Sympatric
 - d. Allopatric
6. True or false: A new plant species can occur in one generation resulting from the creation of a tetraploid plant. If false, make it a correct statement.
True
7. Complete the Venn diagram that compares sympatric speciation with allopatric speciation.



8. True or false: In order to have polyploid speciation occur, you must have errors occur in either mitosis or meiosis. If false, make it a correct statement.
True
9. Briefly explain why a plant that arises from hybridization of two haploid gametes would be sterile.
Because the single chromosomes cannot line up during meiosis as homologous pairs
10. The evolution of numerous species from a common species is referred to as adaptive radiation.

11. Isolated island chains are often capable of great speciation through adaptive radiation. Assume that, in the future, Lake Superior shrinks to a series of smaller, disconnected lakes. Would this provide a similar opportunity for fish species now residing in these smaller lakes? Briefly explain your answer.

The fish in each lake would undergo evolution by natural selection given the distinct conditions in each lake.

12. Refer to Figure 14.9B on page 287 of your textbook. If color sensitivity in cichlids was not heritable, how would that have affected the study?

The females would not have necessarily chosen male cichlids with the red coloring.

13. Which of the following is the type of reproductive barrier exhibited in *Pundamilia nyererei* and *Pundamilia pundamilia*?

- a. Temporal
- b. Behavioral
- c. Habitat
- d. Mechanical

14. An area in which members of different but closely related species can mate and produce hybrid offspring is known as a(n) hybrid zone.

15. Complete the following table, which compares the different outcomes for hybrid zones.

	Reinforcement	Fusion	Stability
Description	Results in a strengthening of reproductive barriers due to weakness in the hybrid offspring	Occurs when the reproductive barriers are weak and hybrid organisms can actually become a single species	A situation where occasional gene flow between populations occurs, but each species is maintained
Example	Collared flycatchers and pied flycatchers	Cichlid species in Lake Victoria	Finches in the Galapagos islands

16. Sudden changes in speciation can be referred to as punctuated equilibria.

17. Almost everyone has seen that famous illustration of human evolution that shows us evolving to become more upright over time until we get to modern humans. What kind of evolution does that illustration show?

It illustrates a graduated pattern of speciation.

CONNECTING THE BIG IDEAS

Use your knowledge of the information contained within this chapter's "Big Ideas" to answer this question.

Do you think it is likely that modern humans will undergo speciation? Briefly explain your answer.