

- List four areas in which the biological species concept is difficult to apply.
- Identify the type of reproductive barrier illustrated by the following examples and indicate whether they are pre-or postzygotic barriers.

Type of Barrier	Pre- or Postzygotic	Example
a.	b.	Two species of frogs are mated in the lab and produce viable, but sterile, offspring.
c.	d.	Two species of sea urchin release their gametes at the same time, but cross-specific fertilization does not occur.
e.	f.	Two species of orchid have different length nectar tubes and are pollinated by different species of moths.
g.	h.	Two species of mayflies emerge during different weeks in springtime.
i.	j.	Two species of salamanders will mate in the lab and produce viable, fertile offspring, but offspring of these hybrids are sterile.
k.	l.	Two similar species of birds have different mating rituals.
m.	n.	When two species of mice are bred in the lab, embryos usually abort.
o.	p.	Peepers breed in woodland ponds, whereas leopard frogs breed in swamps.

- What factors have contributed to the adaptive radiation of the thousands of endemic species of the Hawaiian Archipelago?
- A new plant species B forms by autopolyploidy from species A, which had a chromosome number of $2n = 10$. How many chromosomes would species B have?
- If species A were to hybridize by allopolyploidy with species C ($2n = 14$) and produce a new, fertile species, D, how many chromosomes would species D have?
- Fill in the following table to review the four ways in which a species can be conceptualized.

Concept	Explanation
	Emphasizes anatomical differences used by taxonomists to identify species.
	Population(s) with potential to interbreed reproductively isolated from other species.
	Mating adaptations that result in recognition and successful mating of conspecifics.
	Cohesion of phenotype, species integrity maintained by integrated complex of genes and adaptations.

- Compare the gradual and punctuated equilibrium theories of evolution
- What evidence is used to support each theory?

SYK

- How are speciation and microevolution different?
- When the environment changes, a population may move to a new adaptive peak. How is this different from a peak shift?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 11) A rapid method of speciation that has been important in the history of flowering plants is 11) _____
A) parapatric speciation.
B) behavioral isolation.
C) genetic drift.
D) polyploidy.
E) a mutation in the gene controlling the timing of flowering.
- 12) A new plant species formed from hybridization of a plant with a diploid number of 16 with a plant with a diploid number of 12 would probably have a gamete chromosome number of 12) _____
A) 16 B) 28 C) 14 D) 12 E) 22
- 13) The biologists who proposed the theory of punctuated equilibrium are 13) _____
A) Darwin and Wallace.
B) Eldridge and Gould.
C) Sheldon and Templeton.
D) Watson and Crick.
E) Mayr and Wright.
- 14) All of the following have contributed to the diversity of organisms on the Hawaiian archipelago EXCEPT that 14) _____
A) the islands are distant from the mainland.
B) the islands are very young.
C) adaptive radiation has occurred.
D) multiple invasions have occurred.
E) the islands have a volcanic origin.
- 15) Races of humans are unlikely to evolve extensive differences in the future for which of the following reasons? 15) _____
I. The environment is unlikely to change.
II. Humans are essentially perfect.
III. The human races are incompletely isolated.

A) I only
B) I, II, and III
C) II and III only
D) III only
E) I and II only
- 16) Which of the following is a postzygotic barrier to hybridization? 16) _____
A) behavioral isolation
B) mechanical isolation
C) habitat isolation
D) genetic isolation
E) hybrid sterility

- 17) *The only way that two populations can assure their integrity as distinct biological species is by* 17) _____
A) *allopatry.*
B) *sympatry.*
C) *introgression.*
D) *reproductive isolation from one another.*
E) *geographic isolation from one another.*
- 18) *Two species of frogs belonging to the same genus occasionally mate, but the offspring do not complete development. This is an example of* 18) _____
A) *gametic isolation.*
B) *adaptation.*
C) *the postzygotic barrier called hybrid breakdown.*
D) *the postzygotic barrier called hybrid inviability.*
E) *the prezygotic barrier called hybrid sterility.*
- 19) *Plant species A has a diploid number of 8. A new species, B, arises as an autopolyploid from A. The diploid number of B would probably be* 19) _____
A) 32 B) 4 C) 64 D) 8 E) 16
- 20) *Which of the following statements is consistent with the punctuated equilibrium interpretation of speciation?* 20) _____
A) *There is an equilibrium between living and extinct species.*
B) *Large populations evolve more quickly than small ones.*
C) *Evolution proceeds at a slow, steady pace.*
D) *Rapid speciation is caused by population explosions.*
E) *Long periods of minor change are interrupted by short bursts of significant change.*
- 21) *Some species of Anopheles mosquito live in brackish water, some in running fresh water, and others in stagnant water. What type of reproductive barrier is most obviously separating these different species?* 21) _____
A) *ecological isolation*
B) *postzygotic isolation*
C) *gametic isolation*
D) *temporal isolation*
E) *behavioral isolation*
- 22) *The biological species concept is inadequate for grouping* 22) _____
A) *plants.*
B) *sympatric populations.*
C) *asexual organisms.*
D) *endemic populations.*
E) *parasites.*

- 23) Which of the following is a way that polyploidy can most directly influence speciation? 23) _____
- A) It can improve success in island habitats.
 - B) It can change the mating behavior of animals.
 - C) It can enhance the rate of stabilizing selection.
 - D) It can overcome hybrid sterility.
 - E) It can generate new adaptive peaks.
- 24) The reproductive barrier that maintains the species boundary between horses and donkeys is 24) _____
- A) gametic isolation.
 - B) hybrid inviability.
 - C) hybrid sterility.
 - D) mechanical isolation.
 - E) hybrid breakdown.
- 25) An adaptive peak represents 25) _____
- A) a place where microevolution can cause a founder effect.
 - B) a symbolic landscape with valleys and rivers.
 - C) a successful combination of allele frequencies.
 - D) a place where alpine organisms can flourish.
 - E) a stable environment for a given population.