

Long Term Target # 8	I can explain how biological evolution is the consequence of the interactions of genetic variation, reproduction and inheritance, natural selection, and time.
-----------------------------	---

Content Targets: These are knowledge targets that you will demonstrate proficiency in by the end of this unit.

ST 8.4	I can explain how natural selection works as the primary mechanism for evolution of a population.
---------------	--

Key Terms to help you get there:

niche	gene pool
population	variation
allele frequency	fitness
mutation	natural selection
directional selection	stabilizing selection
disruptive selection	genetic equilibrium
founder effect	population bottleneck
genetic drift	sexual selection

1. What role does mutation have in evolution? What does it have to do with the variation in a gene pool?

A mutation is a change in DNA. It is random & most of the time it is harmful to the organism. Every once in a while, a mutation happens that is either neutral or helpful. These mutations build up and become variation.

2. What are the reasons that the gene frequency of a population might change? (remember, an unchanging population is said to be at equilibrium).

the factors that contribute to changes in a gene pool are:

- small population size
- non-random (choosy) mating
- natural selection
- genetic drift
- new mutations

3. What are the steps of natural selection? How does it happen? What must come first?

1. mutations lead to variation within a gene pool

2. variation is the percentages of different alleles.

3. Selection is when the genes that are more fit in an environment reproduce at a higher rate.

4. What are the three types of natural selection and what are their effects?

directional - one extreme of a trait does better.

stabilizing - the average of a trait is selected for (avg. stays the same).

Disruptive - 2 extremes of a trait are selected for.

5. What is 'evolutionary fitness'? What makes an individual 'fit'?

Fitness is an individual's ability to add to the future of their gene pool... ie. do they have kids & are those kids successful?

6. What is the smallest unit that natural selection can act upon?

a population! Natural selection changes the frequency of genes in a gene pool of a population.

7. Why can't natural selection create perfect organisms?

• the ~~env~~ environment is constantly changing.

• selection can only choose from existing genes/traits.

Mutation is random & can't create a best solution when needed.

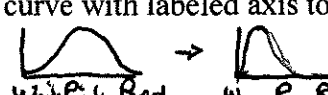
8. How are the founder effect and population bottlenecks different? How are they similar?

Founder effect: a small gene pool that starts a new, larger population. But the variation is still the same as what was in the small group.

Population bottleneck: a large population becomes small. A random event kills off much of the population, the gene frequency of survivors is also random.

9. If a cow develops a preference for eating white flowers and ignoring pink and red flowers, what type of selection is being demonstrated? Sketch a graph of the curve with labeled axis to demonstrate how the population would change in response to the selection.

the population would change in response to the selection.



Directional selection.

ST 8.6 I can explain how new species arise.

biological species concept

speciation

temporal isolation

geographical isolation

behavioral isolation

sympatric speciation

ecological isolation

allopatric speciation

10. What are the ways that two populations can become isolated from each other?

- Temporal isolation (breeding times)
- Behavioral isolation
- Ecological isolation (changing niches)
- geographical isolation (location)
- hybrid inviability/infertility (hybrids die/can't have kids)

11. At what point would they be considered two separate species? What is necessary for speciation to occur?

when there is no significant gene flow between two species. Hybrids might occur, but there is a very small chance for the two gene pools to ever share gene flow again. They are reproductively isolated.

12. How are allopatric and sympatric speciation different?

Allopatric speciation: populations are in separated locations.

Sympatric speciation: speciation happens even when two populations are in the same place.

13. Fireflies are able to distinguish between their own species and other species by the rate and brightness of their flashing patterns. This is an example of:

Behavioral Isolation. (like bird mating dances, as another example).

14. You notice several duck species in the same lake habitat. The females of different species look very similar to one another, but the males of each particular species have feathers with distinctive patterns and colors. Speculate on which forms of reproductive isolation may be keeping each species distinct.

How does the appearance of the male ducks provide a clue to the answer?

Behavioral Isolation! Choosy females are noticing particular traits, thus keeping species separate. (Notice the connection to the idea of sexual selection in LT 8.4?)

15. One family of mammals includes true horses, zebras, and donkeys and asses. Zebroids are hybrid offspring of wild zebras and domesticated horses that were confined to the same pasture. The unnatural confinement breached the reproductive barriers between the two lineages. Those barriers have been in place since a divergence more than 3 million years ago. What barriers might have been keeping those populations separate? What does the breach say about the number of genetic changes required to attain reproductive isolation in nature?

Geographic Isolation (different continents) likely happened first. Then as the processes of Mutation, Variation & Selection continued to change their gene pools separately, eventually they were genetically different enough that altho these species can hybridize, hybrids are not

16. The Kaibab squirrel lives on the north side of the Grand Canyon and the Albert squirrel lives on the south side. Even though these two species are only miles apart, their gene pools are kept isolated by their inability to cross the Grand Canyon. If the two species are derived from the same ancestral species, what mechanism probably accounts for their development into two separate species?

Geographic Isolation!